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Consumer Attitudes Toward Human-Like Avatars in Advertisements: The Effect of Category Knowledge and Imagery

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ABSTRACT: Despite the importance and the growing use of avatars in online and offline advertising, investigations on the effectiveness of avatar-based advertising remains scant. This article attempts to narrow this gap by examining several factors that influence consumers' evaluations of human-like avatar-based ads. Based on mental schema theory, the authors theorize that avatars elicit categorization tension, a feeling of incongruence between avatar and expected human features. This tension is reflected in negative attitudes toward the ad and low purchase intention. Two experiments supported these contentions and demonstrated how product category knowledge and imagery moderate these effects. This investigation contributes to theory by employing a mental schema framework to explain and predict how and when consumers form positive evaluations of human-like avatar-based ads. The research findings also offer several recommendations for advertising professionals. The findings suggest that human-like avatars are more likely to generate negative evaluations among novice or less knowledgeable consumers. To minimize this effect, advertisers can encourage consumers to imagine the consumption experience.

KEY WORDS AND PHRASES: Avatars, categorization tension, mental schema, online advertising, online imagery, product category knowledge.

With the proliferation of virtual worlds and the increasing importance of Internet-based commerce, avatars have seen increasing use within online environments over the past decade. Defined as "general graphic representations that are personified by means of computer technology" [26, p. 20], *avatars* vary in their form, detail, and use. Salem and Earle [56] noted that avatars can vary from realistic avatars (accurate representation of users), to abstract avatars (cartoon image or fictitious entity) and naturalistic avatars (human-like). Avatars are different from cartoons in that cartoons simplify or exaggerate human features while avatars attempt to create a virtual replica. The focus of this study is on the naturalistic human-like type of avatar. Avatars are used as virtual representations of self in virtual worlds and in online gaming communities [25, 52]. Within e-commerce websites, companies use avatars to represent their sales people and online customer service representatives [26, 31, 41, 65]. This extensive use of avatars is driven by their ability to enhance the social appeal of various online environments, their cost-effectiveness, and their flexibility to be customized to any desired appearance [17, 65, 66].

As such, it is not surprising that increased research interest has been devoted to the study of avatars within online environments. Overall, this research stream has empirically demonstrated some of the benefits and boundary conditions of avatars use within online environments [e.g., 26,

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31, 41, 66]. Research findings have shown that the use of an avatar (as an online sales agent, spokesperson, or customer representative) leads to positive evaluation of the product or brand [e.g., 26, 40], greater purchase intentions [e.g., 26, 41], and higher overall satisfaction with the website [e.g., 25, 66]. A key premise in these research efforts is that the use of avatars humanizes e-commerce, and increases the social presence and interactivity of the online environments (e.g., companies' websites). Hence, avatars enhance the overall online consumer experience [17, 24, 31, 65]. Furthermore, findings in this research stream have suggested that a number of variables play a key role in the effectiveness of avatar use within online environments. For example, avatar design (i.e., human, cartoon, animal) [44], avatar type (e.g., attractive vs. expert) [26, 35, 65], product type (i.e., search vs. credence) [31], communication style (task vs. social oriented) [31], and level of product involvement [26] are some of the variables that have been shown to influence consumers response to the use of avatars within online environments.

Another area of avatar use that has received less research attention is the use of avatar in advertising. The positive contribution of avatars to online marketing efforts has led communication managers to consider using these human-like characters in online and offline advertising. Indeed, overall online advertising has grown into the third most preferred advertising medium after newspapers and TV over the past decade [32]. On the one hand, the use of avatars in advertising promises significant benefits to practitioners. Within offline context, technological advances paired with lower production costs make avatars a viable and efficient option to use in traditional advertising. In addition, the use of avatars within this context is a way to break from the traditional advertising clutter and give more flexibility and control over the communication message. Within the online context, avatars are used in advertising efforts to increase the persuasiveness of communication messages [1, 66]. For online advertising that normally contains 2D advertising using text and images on a webpage, the use of avatars elevates communication efforts to the 3D advertising level using animation and computer technology to create graphical representations of companies' representatives. Such types of communication promise to offer different kinds of experiences with important social interaction enhancement effects [32]. On the other hand, advertising both online and offline is costly and companies using avatars in their persuasive communication efforts (i.e., characters within online and offline advertisements) are at the risk of losing money, as well as their brand equity, if consumers react negatively to the use of avatars.

Despite the importance and the growing use of avatars in online and offline advertising, work in this area has been limited. The overall effectiveness of avatar-based advertising is not clear. Furthermore, research from related fields have offered mixed theoretical predictions regarding how individuals evaluate avatars in advertising. On the one hand, research in robotics examining a phenomenon called "the uncanny valley" has suggested that, in some conditions, consumers might evaluate avatar-based ads negatively when robots are too realistic [19, 43]. This negative effect is

also present in animation [20]. On the other hand, based on the imagery-accessibility framework, research on animation in advertising has suggested that consumers might evaluate avatar-based ads favorably [47, 48]. These mixed theoretical predictions underscore the need for a deeper investigation on the psychological processes consumers undertake to evaluate avatar-based advertising.

To fill this gap in the literature and expand the investigation of avatar use as an online and offline communication and persuasive marketing tool, this research employs mental schema theory to examine the effectiveness of avatar-based advertising and the role of product category knowledge and imagery in effecting consumers' evaluation of avatar-based advertisements. More specifically, based on mental schema theory [9, 50], the present article offers a theoretical explanation of why in some instances individuals' evaluations of human-like avatar-based ads are positive, but in some instances are negative. In short, we propose that individuals possess cognitive structures representing one's expectations about objects such as product categories and human characteristics. When avatars depart from these expectations, individuals experience categorization tension. This negative feeling is reflected in negative ad evaluations such as low attitudes toward the ad and low purchase intention.

Additionally, we contend that, in the context of human-like avatar-based advertising, categorization tension is accentuated when individuals possess low, rather than high, product category knowledge. Less knowledgeable individuals tend to focus on ad appearance when assessing advertisements [12, 14, 49]. A higher attention to the human-like avatar character will lead to a higher feeling of tension. Individuals low in product category knowledge, however, can reduce categorization tension by engaging in imagery [48]. Results from two experiments provide empirical support for our contentions.

This investigation contributes to theory and practice in significant ways. For theory, this research employs existing theoretical backgrounds to enhance our understanding regarding how and why individuals evaluate human-like avatar-based advertising. For practice, we provide normative recommendations regarding how and when human-like avatar-based advertising can be used effectively.

The remainder of this article presents a literature review about the use of avatars in online marketing efforts. First, we discuss the theoretical framework and presents research hypotheses. Then, we describe two experiments and the results. A discussion of the findings follows, along with implications for theory and practice. To conclude, we describe the research limitations and offer different avenues for future research.

Avatars in Online Marketing

Avatars first appeared in collaborative virtual environments (CVEs)—three-dimensional chat rooms—as expressive representations of chat participants. Avatars were introduced to increase communication effectiveness among chat participants by adding nonverbal communication cues, such as body

postures, facial expressions, and hand gestures, to participants' interactions [56]. Since then, the application of avatars has rapidly expanded to other contexts such as virtual worlds (e.g., Second Life), video games, movies, and online training [25, 52]. More recently, avatars have also been used as salespeople in online retail outlets and virtual worlds [e.g., 8, 17, 31].

Two research streams dominate the literature investigating the role of avatars in online marketing efforts. The first stream examines whether avatar behavior in virtual worlds extends to offline consumer behavior. Besides the economic value of virtual transactions, virtual worlds provide companies an opportunity to better understand consumer behavior to increase offline financial performance [3]. Research on this topic has shown that avatars are a good proxy for their creator's personality and lifestyle [7, 45], that the personal selling process in virtual worlds is as personal as the face-to-face offline selling process [8, 30], and that consumers' market maven behaviors in virtual worlds are similar to consumers' market maven behaviors in real life [6].

A second research stream investigates the role of avatars in shaping the consumers' shopping experience in online retail stores. Drawing from social response theory, which posits that individuals tend to treat computers as social actors [30], researchers have found that avatars serving as sales assistants or company spokespeople or service representatives reduce the impersonal nature of online transactions and increase consumers' arousal and pleasure, leading to higher hedonic and utilitarian shopping value and improving the online shopping experience [64, 65]. Furthermore, findings in this research stream have suggested that a number of avatar-, product-, and consumer-related variables play a key role in the effectiveness of avatar use within online environments [26, 35, 31, 44, 65]. Holzwarth, Janiszewski, and Neumann [26] showed that, in an online retail context, avatar sales agents increase satisfaction with the retailer and spur higher attitudes toward the product as well as greater purchase intention. Furthermore, the authors found that an attractive avatar is a more effective sales agent at moderate levels of product involvement, but an expert avatar is a more effective sales agent at high levels of product involvement [26]. Another study by Jin and Bolebruch [29] showed that a human-like spokesperson avatar in a virtual store improves consumers' shopping enjoyment, product involvement, and brand attitudes. Similarly, results from a study by Moon, Kim, Choi, and Sung [41] indicated that an individual's social interaction with a salesperson and a peer shopper in the form of an avatar enhances their social presence, enjoyment, brand attitudes, and purchase intention. Other studies have shown that avatar design can also have an impact on user's perceptions. For example, Keeling, McGoldrick, and Beatty [31] found that the effect of communication style (task vs. social oriented) of online avatar sales assistants on building trust and patronage intentions is moderated by product type (search vs. credence products). More specifically, task-oriented communications contribute to trust and in turn to patronage intentions for search products whereas social-oriented communications contribute to trust and in turn to patronage intentions for credence products. Mull, Wyss, Moon, and Lee [44] focused on different types of avatars as

salespeople (human, fantasy, animal, and humanoid). Their research indicated that a human avatar was perceived as the most credible and attractive and was regarded as highest in relation to intention to interact with. Hanus and Fox [23] found that giving users the power to customize the appearance of a virtual salesperson enhances their brand liking and purchase intentions. Wang, Qiu, Kim, and Benbasat [65] found that the social appeal of avatars had a significant positive impact on affect based trust which mainly contributes to the hedonic value of using avatars as online product recommendation agents. Overall, Etemad-Sajadi and Ghachem's [18] findings showed that the utilitarian and hedonic values of avatars increased perceptions of a website's quality. In a more recent study, Etemad-Sajadi [17] showed that avatar's social presence enhanced trust in and emotional appeal of the website and subsequently increased user's desire for online real-time interaction and patronage intentions. Overall, these findings are consistent with Aljukhadar, Senecal, and Ouellette's [2] work showing that trust in the virtually represented agent delivering the persuasive communication message positively mediated the relation between increased social presence and trust in the e-retailer and subsequently influenced consumer judgments of the e-retailer trustworthiness and purchase intentions.

Overall, these investigations have suggested that avatars have a positive impact on consumers' experience in online retail settings. Although these research streams provide valuable insights regarding consumer behavior, to our knowledge there has been no research regarding how consumers evaluate avatars in advertising. As we pointed out above, this void is important because technological advances paired with lower production costs make avatars a viable option for advertising and promotion managers. Hence, in the following section, we elaborate a theoretical explanation for how consumers evaluate human-like avatar-based advertising and develop testable hypotheses. More specifically, we employ mental schema theory to examine the effectiveness of human-like avatar–based advertising and the role of product category knowledge and imagery in affecting consumers' evaluation of avatar-based advertisements.

Theoretical Background

Theories in different, but related, domains offer opposite directions to understand how consumers evaluate avatar-based advertising. Research in robotics examining the phenomenon called "the uncanny valley" suggested that consumers should evaluate avatar-based ads negatively [19, 43]. According to this approach, individuals react negatively to human-like characters when individuals struggle to categorize the realistic characters' traits as human or nonhuman [19]. This categorization problem causes perceptual tension and, in turn, leads to negative emotions and evaluations toward the object [42]. This effect has also been proposed to lead to negative evaluations of realistic computer-animated characters [20, 53, 62]. Hence, following this perspective, the realism of avatars enabled by new animation technologies could lead to negative consumer evaluations of avatar-based ads when the

difference between animation and reality is blurred. In contrast, following the imagery-accessibility framework, researchers in the field of animation proposed that the realism of animations is likely to increase product imagery and, consequently, increase positive consumers' evaluations toward advertising materials [48]. Product imagery is the process by which consumers form mental image representations of products or consumption experiences and store them in working memory [10, 36]. Imagery from advertising elicits affective reactions toward the product [21, 39, 57, 58], enhances information storage in memory [27], and facilitates the retrieval of product-related information [33]. Consequently, imagery positively affects consumption memories [11], product recall [47], attitudes toward the product and the brand [16], and purchase intentions [48]. Overall, under this perspective, the increased vividness of animated characters could facilitate the imagery of the consumption experience and, as a consequence, lead to positive consumers' evaluations.

We posit that mental schemata [9, 50] provide a conceptual framework that can potentially reconcile these opposing views. Schemata are mental structures of reality that represent one's expectations about an object [8]. Schemata are stored in memory and comprise a network of associations, including patterns of behavior, related to an object (i.e., product category, brand, context, or characters). These mental structures are unconsciously activated by cues in the environment and help individuals interpret their environment and guide behavior. According to this perspective, individuals navigate the environment with a tendency to seek cognitive equilibrium by matching new information to a predefined schema. When individuals encounter information that is incongruent with a predefined mental structure, schema disequilibrium occurs. Hence, individuals restore equilibrium by integrating incongruent information to the schema (assimilation) or by creating a new mental schema (accommodation) [9, 34, 50].

The schemata perspective explains negative evaluations to avatars as a result of schema disequilibrium. Individuals possess mental structures related to human characters that activate a series of expectations regarding appearance, behavior, and context. When the schema is activated and a piece of information in the network of associations (i.e., appearance) is incongruent with the schema, disequilibrium occurs. Consistent with previous studies [43], we refer to this disequilibrium as *categorization tension*.

The schemata perspective can also explain the positive evaluations toward human-like characters when imagery is evoked. Schemata related to human characters are formed in the early stages of human development and validated throughout the years. Assimilation of new features to a robust schema of stereotypical human traits may require a long time and a large number of validations [13]. Thus, individuals have to accommodate incongruent information creating a new schema. Under this perspective, imagery spurs the accommodation process by relaxing individuals' categorization effort, reducing categorization tension, and encouraging the creation of new schemata. Accordingly, in what follows, we explain and hypothesize how individual (i.e., product category knowledge) and contextual (e.g., imagery inducement) factors can enhance or mitigate individuals' evaluation of avatar-based ads.

Hypotheses

Product Category Knowledge

Product category knowledge "reflects individual differences among consumers" [38]. According to Selnes and Howell [59], information processing and decision making differ between individuals with high and low levels of product category knowledge. Individuals with high levels of knowledge about a product category possess a more comprehensive product category –specific knowledge structure, tend to put more effort in processing new product-related information compared to individuals that possess low levels of product category knowledge [33], and are more likely to base their evaluation on central product information cues presented rather than on peripheral information such as appearance [12, 28, 49, 63]. Individuals low in product category knowledge lack a strong preexisting schema around the product and tend to focus on peripheral and contextual information, such as appearance, to evaluate an ad [14, 28, 49]. Consistent with this theorization, Huang, Lin, and Yuan's [28] results indicated that individuals' level of product knowledge influences the effect of online persuasive strategies on their attitude change. Therefore, we expect individuals with low product category knowledge to pay more attention to the appearance of the avatars than individuals high in product category knowledge and, as a consequence, experience higher levels of categorization tension.

To test our theorizing, we compare consumers' evaluations of avatar- versus human-based ads. Specifically, we would expect less knowledgeable consumers to report lower ad evaluations for an avatar-based ad versus a human-based ad. No such differences are expected for individuals with high product category knowledge. Specifically, we posit:

> ***Hypothesis 1:*** *Product category knowledge will influence individual's evaluation of avatar-based ads versus human-based ads such that: (a) individuals with low product category knowledge will evaluate the avatar-based ad lower than the human-based ad; and (b) no differences in the evaluation of avatar-based ads versus human-based ads are expected for individuals with high product category knowledge.*

Product Category Knowledge and Imagery

Imagery refers to the process by which consumers form mental representations of consumption experiences and store them in memory [10, 36]. Ad imagery elicits affective reactions toward the product [4, 21, 39, 57], enhances the storage of information in memory [27], and facilitates the retrieval of product-related information [33]. Imagery is positively related to consumption memories [11], product recall [47], attitudes toward the product and the

brand [16], and purchase intentions [48]. Imagery can be triggered by viewing instructions during ad evaluation [4, 47].

In addition, recent research has shown that individuals lacking a strong mental schema for a consumption context find it easier to activate imagery than individuals that are more familiar with the consumption context because the retrieval of information from well-developed strong schemas in memory intrudes with the imagination of a new situation in that context [15]. Hence, it is proposed that individuals with low product category knowledge are less sensitive to incongruences to the schema when imagery is induced, leading to less negative evaluations from perceptual incongruences in the avatar ad. In contrast, we expect individuals with high product category knowledge will not be affected by imagery. The appearance of avatars is not likely to generate more tension. Retrieval of information from well-developed strong schemas in memory intrudes with the imagery [15]. As such, imagery inducement is not likely to influence evaluation of avatar-based ads for individuals with high product category knowledge; thus:

> ***Hypothesis 2:*** *Imagery inducement will enhance evaluations of avatar-based ads for individuals with low product category knowledge, but not for individuals with high product category knowledge.*

Study 1

Study 1 tested Hypothesis 1. Specifically, this study examines individuals' evaluation of avatar versus human ads and the effect of product category knowledge on their evaluation of the ads.

Method

Study 1 employed a 2 (Ad Type: avatar-based vs. human-based) × 2 (Product Category Knowledge: low vs. high) randomized block experimental design. The ad type manipulation consisted of two video ads portraying a sunscreen skin care/UV product. The research team selected this product category deliberately to create two groups that are different on product category knowledge, but not on product relevancy. The two ads were similar in content, context, duration, and narrative (see online Appendixes A and B for details). The ad describes product features and portrays the use of the sunscreen in an ordinary setting. However, one of the ads employs a human-like avatar whereas the other one employs human actors. The focal ads were embedded in a clutter reel along with two filler ads (i.e., newspaper, air freshener). Filler ads were pretested for neutrality. The position of the focal ad in the series was evenly presented. We selected the skin care product to ensure relatively high and low levels of product category knowledge based on gender. In a pretest, female participants reported being more knowledgeable than male participants regarding this product category.

Procedure and Measures

The 250 participants in this study were recruited from an online consumer panel provided by Qualtrics. The consumer panel included American full-time employees between 21 and 30 years old. Participants were sent a link to the online instrument. Upon consent, participants engaged in a practice task, answered screening questions (including gender), and were randomly assigned to video conditions. Finally, participants answered dependent variables, manipulation checks, and other demographic questions.

The dependent variables used to assess ad evaluation were attitude toward the ad and purchase intention. Attitudes toward the ad was measured using a three-item semantic differential scale adopted from [37] while purchase intention was assessed using a three-item semantic differential scale adopted from [67]. The manipulation checks for product category knowledge involved three items from [22] and familiarity with brand was measured using three items from [60]. Scale items appear in online Appendix C.

Results

Psychometric Analysis

Prior to testing the hypotheses, the measures were examined for construct validity via exploratory factor analysis and for internal consistency reliability as recommended by [46]. The results showed that all study measures were valid, reliable, and one-dimensional. See online Appendix C.

Manipulation Check

The results of an analysis of variance (ANOVA)—with gender as the independent factor and the manipulation check measure for product category knowledge as the dependent variable—showed a main effect of gender ($F(1, 248) = 14.53$, $p = .000$). Male participants reported lower levels of product category knowledge than female participants ($M_{\text{male}} = 4.01 < M_{\text{female}} = 4.89$). Further analysis indicated the relevancy of the product category (i.e., sunscreen) for both male and female groups. More specifically, a three-item measure of product involvement asked participants how relevant a product like this is for them on a 7-point scale ranging from 1 (*unimportant/important*) to 7 (*irrelevant to me/relevant to me*). As we expected, the data show a significant difference in product involvement between female and male participants (product involvement: $M_{\text{female}} = 5.91 > M_{\text{male}} = 5.07$, $F(1,248) = 17.832$; $p = .000$). However, males' level of product involvement is still high at 5.07 on a 7-point scale, which is significantly higher than the scale midpoint ($t_{df\ 124} = 9.73$, $p = .000$). This indicates that the chosen product category was relevant for both genders.

Hypothesis Testing

To test H1, a multivariate analysis of variance (MANCOVA) was conducted including ad type (avatar-based vs. human-based) and product category knowledge (low vs. high) as the independent variables while attitudes toward the ad and purchase intentions served as the dependent variables with brand familiarity as a covariate. The results indicated an overall significant interaction effect between ad type and product category knowledge (Wilks's lambda $F(2, 244) = 4.71$, $p = .01$). Next, two separate ANCOVAs showed that the interaction effect between ad type and product category knowledge was significant for both dependent variables: attitudes toward the ad ($F(1,245) = 6.62$, $p = .011$) and purchase intention ($F(1,245) = 9.44$, $p = .002$). Conducting the analyses without the covariate showed similar significant results with slight improvement from including the covariate. Table 1 shows the complete ANCOVA results for both dependent variables. Figure 1A shows a graphic representation of the interaction effect for each dependent variable, respectively.

Pairwise comparisons showed that for the low product category knowledge group, participants' evaluation of the avatar ad was significantly lower than their evaluation of the human ad for both dependent variables (Aad: $M_{avatar} = 4.10 < M_{human} = 5.40$, $p = .000$; PI: $M_{avatar} = 3.77 < M_{human} = 5.13$, $p = .000$). For the high product category knowledge group, there were no significant differences in participants' evaluation of the human versus the avatar ad for both dependent variables (Aad: $M_{human} = 4.85 > M_{avatar} = 4.50$, $p = .548$; PI: $M_{human} = 4.51 > M_{avatar} = 4.28$, $p = .992$). Hence, H1 was supported.

Discussion and Additional Empirical Evidence

In support of H1, and consistent with categorization tension and the schemata approach explanation, results of Study 1 indicate that while there were no significant differences between avatar versus human ad evaluations for the high product category knowledge group, participants with lower levels of product category knowledge evaluated the avatar-based ad significantly lower than the human-based ad. It is important to recall that based on our categorization tension theoretical explanation, participants with lower levels of product category knowledge negatively evaluated the avatar-based ad versus the human-based ad because the realistic (human-like) features of avatars create perceptual tension for these individuals when they struggle to categorize the realistic characters' traits as human or nonhuman [19, 43]. Hence, following this perspective, these effects are likely to go away when the avatar is not perceived as very human-like. Providing empirical evidence that the observed results above go away when the avatar is perceived as not very human-like is important and provides stronger support for our propositions.

To do so, we followed two steps. First, we pretested an additional condition that consisted of an ad with cartoon animation to create a control

Table 1. Analysis of Covariance Results for Study 1 and Study 2.

		Dependent variable					
		Attitude toward the ad			Purchase intention		
Source	***df***	**Mean square**	***F*-value**	***p***	**Mean square**	***F*-value**	***p***
Study 1							
Treatment	4	92.078	46.435	0.000	125.088	63.929	0.000
Ad Type (ADT) (avatar vs. human)	1	23.049	11.624	0.001	18.119	9.260	0.003
Product Category Knowledge (PCK) (high/low)	1	1.396	0.704	0.402	2.740	1.401	0.238
ADT × PCK	1	13.121	6.617	0.011	18.464	9.436	0.002
Covariates							
Brand familiarity	1	311.401	157.041	0.000	440.708	225.234	0.000
Error	245	1.983					
Study 2							
Treatment	4	3.905	2.267	0.064	20.074	3.720	0.006
Imagery Inducement (II) (no vs. yes)	1	8.744	5.077	0.026	62.200	11.526	0.001
Product Category Knowledge (PCK) (high/low)	1	0.672	0.390	0.533	0.451	0.084	0.773
II × PCK	1	7.417	4.307	0.040	28.744	5.326	0.022
Covariates							
Brand familiarity	1	0.002	0.001	0.973	1.657	0.307	0.580
Error	166	1.722			5.397		

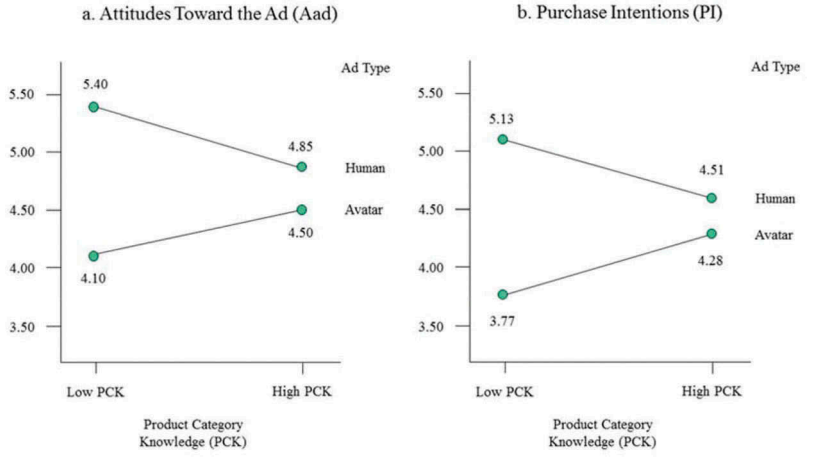

Figure 1A. Dependent Variables Means Across Product Category Knowledge Levels and Ad Type (Study 1)

condition where the avatar is not very human–like. The audio, content, context, and length of the ad were held constant to the other two ads in Study 1 (see online Appendixes A and B for details). Sixty-five undergraduate students participated in this pretest in exchange for extra credit. Participants were randomly assigned to one of three ad type conditions: human (same as Study 1 above), avatar (same as Study 1 above), or cartoon (not very human-like condition). We followed the same procedure as in Study 1. After the warmup exercise, participants watched the stimulus and answered the following four 7-point bipolar items to assess their perceptions of the humanness of the characters in the ads with lower/higher scores indicating that the characters in the ad were perceived less/more human (the character in the ad looked like: a drawing/real human; a cartoon/real human; fictitious/real human; animation/real human). Psychometric analysis of this measure showed that all four items load in one factor with 3.74 eigen value, 93.54 percent average variance extracted (AVE), and .97 Cronbach's alpha indicating good measurement quality. Analysis of variance results with ad type (human, avatar, cartoon) as the independent variable and perceptions of humanness of the characters in the ad as the dependent variable showed a significant main effect for ad type on the dependent variable ($F(1,64) = 71.678$, $p = .000$). Pairwise comparisons showed that the cartoon (not very human-like) condition was perceived less human than the avatar condition ($M_{\text{cartoon}} = 1.46 < M_{\text{avatar}} = 2.73$, $p = .004$) and the human conditions ($M_{\text{cartoon}} = 1.46 < M_{\text{human}} = 6.09$, $p = .000$).

Next, we ran a study to empirically establish that the observed results in Study 1 go away when the avatar is not very human-like. We recruited 182 undergraduate students to participate in the study in exchange for extra credit and randomly assigned them to one of two conditions: cartoon (control) or human ad (same as Study 1). We followed the same data collection procedure, used the same measures, and conducted the same analysis steps as in Study 1.

Psychometric Analysis

Psychometric analyses for study measures indicated good measurement quality. The items of attitudes toward the ad (eigen: 2.56, AVE 85.63 percent; alpha = .914), PCK (eigen: 2.75; 91.90 percent AVE; alpha = .956), purchase intention (eigen: 2.74; AVE 91.60 percent; alpha = .954), and brand familiarity (eigen: 2.73; 91.26 percent AVE; alpha = .949) showed one-factor solutions. Cronbach's alpha showed that the scales were reliable. Summated scales were created for all the scales.

Manipulation Check

Results of an ANOVA—with gender as the independent factor and the manipulation check measure for product category knowledge as the dependent variable—showed a main effect of gender ($F(1, 169) = 87.27$, $p = .000$).

Male participants reported lower levels of product category knowledge than female participants ($M_{male} = 2.97 < M_{female} = 4.98$).

Results

Next, a MANCOVA was conducted including ad type (cartoon-based vs. human-based) and product category knowledge (low vs. high) as the independent variables while attitudes toward the ad and purchase intentions served as the dependent variables with brand familiarity as a covariate. The results indicated a nonsignificant interaction effect between ad type and product category knowledge (Wilks's lambda$F(2, 165) = .162$, $p = .85$). Next, two separate ANCOVAs showed that the interaction effect between ad type and product category knowledge was nonsignificant for both dependent variables: attitudes toward the ad ($F(1,166) = .312$, $p = .577$) and purchase intention ($F(1,166) = .183$, $p = .670$). Figure 1B shows a graphic representation of the means across the experimental conditions for each dependent variable, respectively. As such, as expected H1 was not supported when the avatar was perceived as not very human–like, providing more credence to our propositions and findings in Study 1.

Study 2

Study 2 was designed to test Hypothesis 2, which posits that imagery inducement will reduce the negative effect of categorization tension experienced by individuals with low product category knowledge when evaluating avatar-based ads.

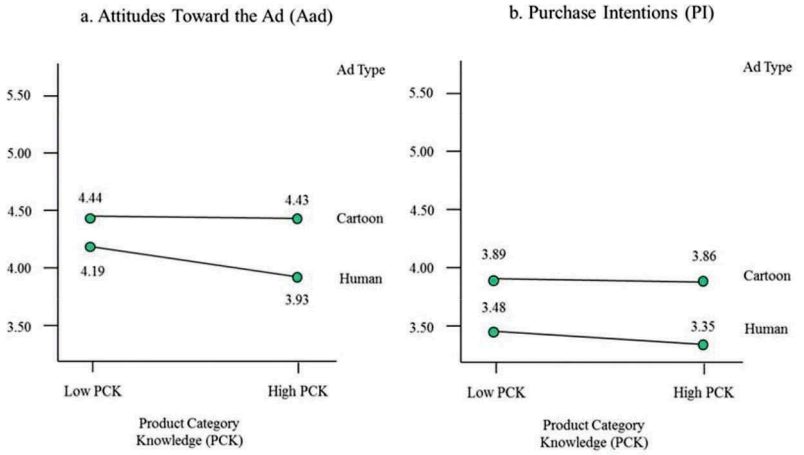

Figure 1B. Dependent Variables Means Across Product Category Knowledge Levels and Ad Type (Study 1 Follow-Up)

Method

Study 2 employed a 2 (Imagery Inducement: no vs. yes) × 2 (Product Category Knowledge: low vs. high) randomized block design. Imagery inducement was manipulated and product category knowledge was measured. The manipulation of imagery inducement was done by changing instructions given to participants [47]. In the no-inducement condition, participants were instructed to evaluate a TV ad that was already appearing in a nationwide television campaign. In the inducement condition, participants were told that the ad was a draft and would be edited based on their feedback before appearing in a nationwide campaign (viewing instructions in each condition appear in online Appendix D). We did not want to mention the word "imagine" to avoid confounding recall of the word imagination with their scores on the manipulation checks. A pretest (N = 38) showed that these instructions successfully triggered imagination. An avatar-based ad promoting a snowblower served as the stimulus (see online Appendixes A and B for details). The ad—part of Snow Joe's online advertising campaign—describes product features and portrays human-like avatars using the snowblower in an ordinary setting (i.e., using the snowblower in a home's driveway).

To ensure relatively low and high levels of product category knowledge, participants were recruited from different locations. For the low product category knowledge group, participants were recruited from a university in the southwestern United States where the city has an average annual snowfall of 5.3 inches. For the high product category knowledge group, participants were recruited from a university in the northwestern United States where the a city has an average snowfall of 30.5 inches a year.

Procedure and Measures

In exchange for extra credit, 179 undergraduate students participated in the study. Participants were instructed to follow the same procedure used in Study 1. After watching the ad, participants answered questions regarding the dependent variables, manipulation checks, and demographic questions. Consistent with Study 1, attitudes toward the ad and purchase intentions were used as the dependent variables. The measures for the dependent variables and product category knowledge were the same as used in Study 1. The measure for the manipulation check of imagery inducement involved three items from [16]. Scale items appear in online Appendix C.

Results

We included 171 valid responses in the final analysis. Eight responses with high levels of missing data were excluded. Participants were native English

speakers from different regions in the United States; 56.1 percent were male and 43.9 percent were female.

Psychometric Analysis

Following the procedures used in Study 1, the psychometric properties of the scales were assessed. As shown in online Appendix C, all study measures were valid, reliable, and one-dimensional.

Manipulation Checks

The results of ANOVA—with imagery inducement as the independent factor and the measure for the imagery inducement manipulation check as the dependent variable—showed a main effect of inducement ($F(1, 169) = 5.51$, $p = .02$). Participants instructed to evaluate a real ad reported lower imagery ($M = 2.98$) than participants instructed to evaluate a draft ($M = 3.67$). Hence, imagery inducement was successfully manipulated. Another ANOVA—with product category knowledge/location as the independent factor and the measure for product category knowledge as the dependent variable—indicated a main effect of product category knowledge ($F(1, 169) = 27.03$, $p = .000$). On average, participants from the Northwest reported higher scores on the manipulation check for product category knowledge ($M = 3.17$) than participants from the Southwest ($M = 1.96$). Hence, the groups of participants represent different levels of product category knowledge. Furthermore, we measured context plausibility by asking participants to assess the plausibility of the context/situation (i.e., snowblowing) in which the characters appear in the ad using the following four items (usual, probable, conceivable, and real) anchored by a scale ranging from 1 (*not at all*) to 7 (*extremely*). ANOVA results showed no main differences between the different locations (Northwest vs. Southwest) in their evaluation of the context plausibility ($M_{\text{high product category knowledge/northwest}} = 4.97$ and $M_{\text{low product category knowledge/southwest}} = 4.86$, F (1,165) = .356, $P = .552$). Furthermore, both groups' means were significantly higher than the scale midpoint (high product category knowledge/Northwest: $t_{df\ 101} = 13.21$, $p = .000$; low product category knowledge/Southwest: $t_{df\ 64} = 9.69$, $p = .000$). The results above indicate the plausibility of the snowblowing context for both locations.

Hypothesis Testing

To test H2, a multivariate analysis of variance (MANCOVA) was conducted including imagery inducement (no vs. yes) and product category knowledge (low vs. high) as the independent variables while attitudes toward the ad and purchase intentions served as the dependent variables with brand familiarity as a covariate. The results indicated an overall significant interaction effect between imagery

inducement and product category knowledge (Wilks's lambda $F(2, 165) = 3.757$, $p = .025$). Next, two separate ANCOVAs showed that the interaction effect between imagery inducement and product category knowledge was significant for both dependent variables: attitudes toward the ad ($F(1,166) = 4.31$, $p = .04$) and purchase intention ($F(1,166) = 5.33$, $p = .02$). Conducting the analyses without the covariate showed similar significant results with slight improvement from including the covariate. Table 1 shows the complete ANCOVA results for both dependent variables. Figure 2 shows a graphic representation of the interaction effect for each dependent variable.

Pairwise comparisons showed that for the low product category knowledge group, participants' evaluation of the avatar ad was significantly higher when imagery was induced than when imagery was not induced for both dependent variables (Aad: $M_{\text{inducement}} = 5.20 > M_{\text{no-inducement}} = 4.28$, $p = .002$; PI: $M_{\text{inducement}} = 6.89 > M_{\text{no-inducement}} = 4.69$, $p = .000$). For the high product category knowledge group, no differences were found between imagery inducement conditions for both dependent variables (Aad: $M_{\text{inducement}} = 4.63 > M_{\text{no-inducement}} = 4.59$, $p = .722$; PI: $M_{\text{inducement}} = 6.09 > M_{\text{no-inducement}} = 5.72$, $p = .323$). Hence, H2 was supported.

Summary

This study shows that imagery inducement influences avatar–based ad evaluation for individuals with low product category knowledge, but not for individuals with high product category knowledge. More specifically, consistent with a mental schema framework and supporting a categorization tension reduction reasoning as the mechanism underlying the effect of imagination, Study 2 shows that imagery inducement leads to higher avatar-

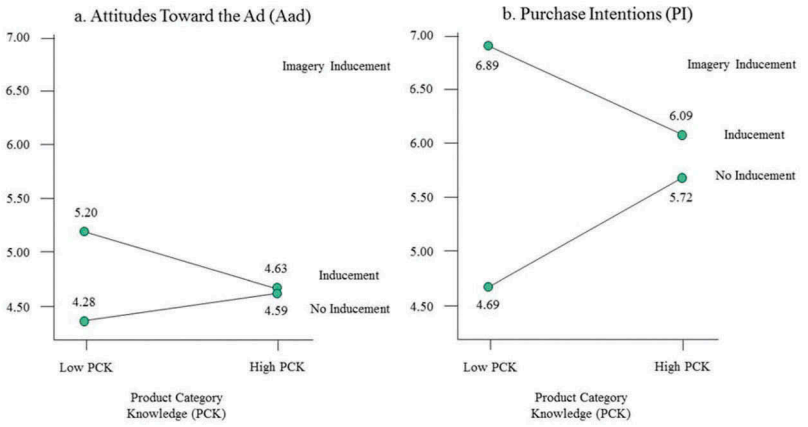

Figure 2. Dependent Variables Means Across Product Category Knowledge Levels and Imagery Inducement (Study 2).

based ad evaluations for individuals with low product category knowledge, but had no effects on avatar-based ad evaluations for individuals with high product category knowledge.

General Discussion

Avatars have become a useful online marketing tool. Avatar-based virtual communities have enabled millions of consumers to socialize with other consumers and engage in commercial transactions [5, 8, 25]. In addition, avatars have helped marketers reduce the impersonal nature of online company-customer interactions [26, 41, 55]. Avatars acting as online shopping assistants and online salespeople increase online consumers' purchase intentions and improve the online consumer experience [7, 17, 18, 26, 31, 38, 56]. The successful implementation of avatars in online settings and reduced production cost benefits have propelled the use of avatars in advertising and sparked academic interest. However, research on how consumers react to avatar-based advertising is notably lacking. This article proposes schema theory as a theoretical framework to understand how and when consumers react favorably to human-like avatars in advertising.

In support of H1, Study 1 results show that individuals with low product category knowledge reported lower evaluations for avatar-based ads versus human ads. As proposed, no differences in evaluations between the avatar ad and the human ad were observed for individuals with high product category knowledge. Supporting H2, Study 2 results indicate that inducing imagery alleviated the negative evaluation of the avatar-based ads for individuals with low product category knowledge. As expected, there was no effect of imagery inducement on avatar ad evaluation for individuals with high product category knowledge. Overall, these results are consistent with our theoretical reasoning. More specifically, as we postulated in H1, for individuals with low product category knowledge, the lack of existing schema, coupled with the appearance of animatics, heighten categorization tension leading to lower evaluations for avatar-based ads versus human ads. Furthermore, in H2 we contend that inducing individuals with low product category knowledge to imagine the consumption experience while watching an avatar-based ad will reduce the cognitive pressure to discern between fantasy and reality and, consequently, alleviate the negative outcomes of the categorization tension.

Theoretical and Managerial Implications

These research findings bring about significant implications for theory and practice. For theory, this research sheds light on the process consumers undertake to evaluate human-like avatar-based ads. As we discussed above, this is an important theoretical endeavor since the existing literature offers some mixed theoretical predictions regarding the effectiveness of human-like avatar-based ads. Our research posits that a mental schema

framework can be useful to explain and predict how and when consumers form positive evaluations of human-like avatar-based ads. Furthermore, we propose that categorization tension is the underlying mechanism explaining the effects of product category knowledge and imagination on consumers' evaluation of human-like avatar-based ads. Overall, the results of two studies suggest that avatar characters do not have a significant effect for consumers who are knowledgeable about the product category. These consumers evaluate ads by focusing on product information and deeming visual components secondary. In contrast, consumers who are less knowledgeable about the product category rely on visual components of the ad to form an evaluation. Hence, these consumers are susceptible to experience categorization tension from watching avatar characters in the ad. This tension, however, can be mitigated by inducing consumers to imagine.

The research findings also offer several recommendations for advertising professionals. The findings suggest that human-like avatars are less likely to generate negative evaluations among consumers who are experts in the product category. For this market segment, avatar characters are not a main factor affecting consumer evaluations. The use of avatars can significantly reduce production cost and production time. However, advertisers should be wary that avatar characters will have a strong impact on novice or less knowledgeable consumers. For these consumers, the human-like avatars are likely to generate categorization tension and result in negative evaluations toward the ad. To minimize this effect, advertisers can encourage consumers to imagine the consumption experience. Consumer imagery can be activated in different ways. In this research, we induced imagery with verbal cues. However, imagery can be activated through other means such as presenting avatars in fantastic, rather than mundane ordinary, contexts. By showing fictitious unfamiliar contexts, individuals' imagination could be enhanced and categorization tension mitigated. Furthermore, this finding suggests avatar-based ads could be more suitable to promote new products and novel consumption contexts.

Our results suggest that the effectiveness of the avatars online as salespeople or recommendation agents might be influenced by the user's level of product category knowledge. Knowledgeable customers will not be affected by the realism of the avatar, but new website visitors will be affected. Based on our findings, we recommend website managers stay away from the uncanny valley effect. That is, virtual company representatives should be either human or cartoon, but not human-like avatars.

Finally, it is important to note that human-like avatars could be effective when imagination is invoked. In this line, realistic human-like animations could still work well in video games or fictitious scenarios in which the customers have to imagine themselves using a product. This note is relevant for managers interested in the current trend toward gamification [51].

Limitations and Future Research

A limitation of the study is that the present research did not take into account individual differences regarding imagination. Past research has suggested that individuals have a different chronic tendency to imagine [47]. Future research could explore the role of chronic imagery fluency on the evaluation of human-like avatars. Also, we conducted Study 1 in the context of skin care protection and used gender as a proxy for product knowledge. Future studies should test differences in product category knowledge within gender groups in contexts that are less prone to gender bias. Another limitation is that the studies were conducted only in the United States where avatars could be more common. It is unclear how the novelty of the avatar-based ad and participants' overall familiarity with avatars reduce or enhance categorization tension. Future research should explore the role of ad novelty and familiarity with virtual or real human-like interactive technology (e.g., video games, Siri, virtual ATM tellers, robots, and virtual salespeople) in consumers' evaluations of avatars in advertising. For example, increased interaction with human-like technology is likely to reshape our mental schemata and expectations about the role of technology and animation in the marketplace. Becoming more familiar with human-like technology can reduce categorization tension. Thus, future research should explore whether familiarity with avatar characters affects the categorization tension and the evaluation of avatar-based ads. Can marketplace interactions between humans and human-like technology ever become akin to human-human interactions?

Given the findings, it is important for advertisers to know whether an avatar is perceived as human-like in a way that product knowledge may come into play. As such, future research is encouraged to examine the measurement of the degree of humanness of avatars and the dimensionality of this humanness. Furthermore, future research efforts should address how this measurement might change overtime. For example, would avatars that today seem human-like be seen as cartoonish as technology improves? Furthermore, future research is encouraged to further examine the proposed mediation process underlying our findings to provide more empirical evidence in support of our theoretical arguments. For example, the level of categorization tension could be measured and examined as a process mediator of the effect of product category knowledge and imagery on consumers' evaluations of avatar-based ads. In addition, because previous research has shown that (1) consumers' perceptual struggle to categorize an ad as real or fictitious has a negative effect on its credibility [61], and (2) ad credibility is positively related to attitudes toward the ad and purchase intention [37], ad credibility is another factor that could be examined as a potential process mediator of the effect of product category knowledge and imagery on consumers' evaluations of an avatar-based ad. Mediation analysis recommended by Zhao, Lynch, and Chen [68] and Preacher and Hayes [54] could be employed to examine potential mediation effects in which product category knowledge and imagery inducement are the independent variables, level of

categorization tension or ad credibility is the mediator, and attitudes toward the ad or purchase intentions are the dependent variables.

Supplemental File

Supplemental data for this article can be accessed on the publisher's website.

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