

The Effects of Virtual Experience on Attitudes Toward Real Brands

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Abstract

Although the commercial availability and implementation of virtual reality interfaces has seen rapid growth in recent years, little research has been conducted on the potential for virtual reality to affect consumer behavior. One unaddressed issue is how our real world attitudes are affected when we have a virtual experience with the target of those attitudes. This study compared participant ($N=60$) attitudes toward car brands before and after a virtual test drive of those cars was provided. Results indicated that attitudes toward test brands changed after experience with virtual representations of those brands. Furthermore, manipulation of the quality of this experience (in this case modification of driving difficulty) was reflected in the direction of attitude change. We discuss these results in the context of the associative-propositional evaluation model.

Introduction

VIRTUAL EXPERIENCE, DEFINED AS the psychological and emotional states that consumers undergo while interacting with products in a 3D environment,¹ is a relative newcomer to the range of consumer experience. Traditionally, consumer product experience can vary from indirect to direct, depending on the depth of possible interactions with the product.² Listening to a product description or viewing product images are examples of an indirect experience, while hands-on product trials are typical of direct experience.³

Although virtual experiences are similar to indirect experiences in that they are both mediated,⁴ virtual experiences also contain characteristics of direct experiences by allowing for interaction with products (such as rotation, zooming, and in some cases virtual use, e.g., animations of product functioning). Virtual experience primarily takes place within *virtual environments*, or the digital spaces in which a user's movements are tracked, and his or her surroundings rendered, or digitally composed and displayed to the senses, in accordance with those movements.⁵ Despite the emergence of virtual reality and specifically video games (by far the most common form of virtual environments) as entertainment⁶ and advertising platforms,⁷ there have been few studies exploring the capacity for virtual experience to affect attitudes. Virtual experience has been found to influence the product knowledge, brand attitude, and purchase intention of consumers,⁸ and has also been shown to do so more effectively than traditional 2D and TV representations of products.⁹

Most recently, a series of experiments by Daughtery et al. showed that participants report significantly higher levels of product knowledge, brand attitude, and purchase intention after a virtual experience (3D product visualization) when compared to indirect experience (magazine advertisement). Furthermore, they found that virtual experience did not differ significantly from direct experience on those measures, and that both direct and indirect product experience proved to be more effective at influencing brand attitudes when preceded by virtual experience.¹⁰ While these results provide valuable insight into understanding the mechanisms of virtual experience, they were shown only in the context of novel product experience. The question of how virtual experience affects existing attitudes remains to be answered.

If virtual experience can influence brand attitude (as suggested by previous studies) and is in practice similar to direct experience, we expect that it should be similarly subject to attitude change along the lines of current theoretical frameworks and models. This study attempts to affect existing attitudes toward brand name products through experience with virtual representations of those products. By providing a virtual experience in which evaluations can be made, we expect to observe changes in attitudes explicitly measured before and after the experience. Our hypotheses are as follows:

H1: Virtual experience with brand representations will result in attitude change toward those brands as measured before and after the experiment.

H2: Attitude change will be moderated by qualitative manipulation of the virtual experience.

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In order to test these hypotheses, we constructed an experiment in which participants test-drove real brand cars in a virtual environment. By manipulating the difficulty of this experience, we hoped to create a scenario where attitude change processes could occur and be clearly exemplified.

Method

Sixty Polish university students (29 male) participated, ranging in age from 19 to 32 years ($M=23.52$, $SD=2.83$). Monetary compensation was offered for participation.

A 2×2 (Easy/Hard Driving Difficulty Assigned to Brand×Pre/Post Experiment Attitude Measures) repeated measures design was used. Driving difficulty was manipulated using in-game settings that modified traction control, braking assistance, and handling characteristics. Attitudes were measured a minimum of 5 days pre and immediately post experiment. Additionally, mood was controlled for using an adjective-based mood scale¹¹ after each driving session.

A desktop virtual reality system was used to provide a wide-angle viewing surface, with a Logitech force-feedback-enabled steering wheel and pedals as input devices. Need for Speed: Shift, a virtual racing simulator, was used as the testing environment. Game interface elements were eliminated, leaving participants with only those visual cues that they might find in a real car. In-game cars chosen for use in the experiment were the Honda Civic and the Ford Focus. These cars were chosen on the basis of their similarity in price, class, and popularity (as assessed by the Polish 2012 Automotive Industry Yearbook) (Fig. 1).

Attitude measures

Overall brand attitude. This was a dichotomous choice task in which participants were asked to choose between adjective pairs in response to the presentation of a given brand logo. The adjective pairs, chosen from a published

scale,¹² were as follows: bad–good, boring–interesting, unattractive–attractive, unpleasant–pleasant, untrustworthy–trustworthy, repelling–alluring, unconvincing–convincing, and dislike–like.

Attribute attitude. This was a novel attitude measure that asked participants to distribute 100 points across a set of brands as a rating for each of 12 different attributes. These attributes were split into three categories: global (quality, image, safety, economy), experienced (interior, exterior, drivability, enjoyability), and not experienced (headroom, field of vision, comfortable driver's chair, g-force from acceleration), with each category comprising a separate scale. "Experienced" and "not experienced" refers to those brand attributes that were and were not directly experienced during our test drive procedure.

Procedure

An online recruitment questionnaire was used to gather demographic information and data for our control variables: gender, age, driving frequency, previous experience with Need for Speed: Shift, and current/past ownership of the car brands used in this study (along with other brands in order to conceal our test brands). Participants were contacted individually and asked to complete the first attitude measures (overall brand attitude, attitude attributes) via an online platform. Attitudes were measured for our test brands (Honda, Ford) and two control brands (Skoda, Chevrolet).

Practice session. Once at the laboratory, participants were familiarized with our simulator's input controls, and were asked to complete a minimum of two practice laps (under the "easy" driving condition on the same test track that was later used during the experiment proper). Participants who still displayed difficulty in controlling the practice car (Volkswagen Golf) received additional practice. Participants were then randomly assigned to one of four possible testing conditions in which they would drive each test car (Honda Civic, Ford Focus) in sequence. Conditions were comprised of test car order and driving difficulty (easy, hard).

Test sessions. After a brief showcase in which car brand, car model, and a 3D model of the car being tested were presented, participants were (virtually) placed on the test track and asked to complete three laps in order to "explore the characteristics of the car." Upon completion, difficulty settings within the game were changed (unknown to participants), the second car was showcased, and instructions identical to the first test drive were repeated. Once both test sessions were completed, participants were asked to fill out a repeat of the pre-experiment attitude measures (overall brand attitude, attribute attitude) and thanked for their participation. It should be noted that participants were reminded of the car brand after each test session.

Results

All analyses were conducted using Bonferroni corrected mixed design analysis of variance (ANOVA) with pre and post attitude scores for each test brand as within-subject variables and driving difficulty condition as a between-subjects factor.

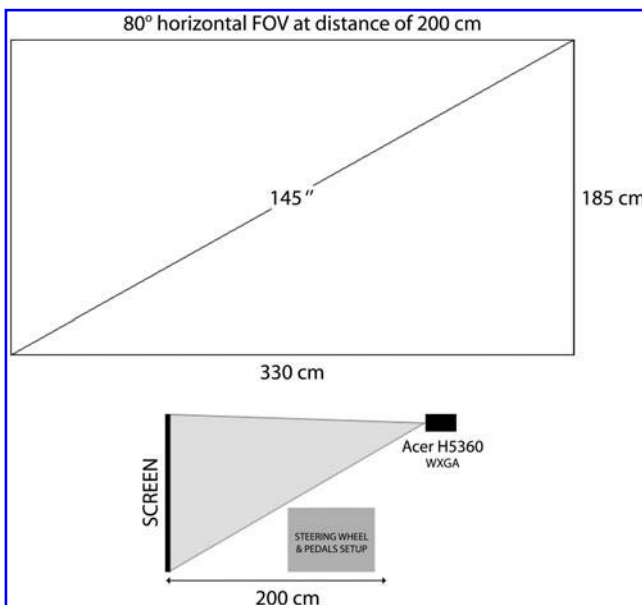


FIG. 1. A visual representation of the projected screen size and steering apparatus position. An Acer H5360 DLP projector at WXGA display resolution was used.

Overall brand attitude

A significant three-way interaction (pre-post measures \times brand \times driving difficulty) was found for our test cars: $F(1, 58) = 8.19$, $p = 0.006$, $\eta^2_p = 0.124$. Main effect comparisons revealed two significant effects. Compared to pretest scores for participants who test-drove the Honda under the hard driving difficulty, attitude scores decreased significantly: $F(1, 58) = 4.80$, $p = 0.032$, $\eta^2_p = 0.076$. For participants who drove the Ford under the easy driving difficulty, attitude scores increased significantly: $F(1, 58) = 17.24$, $p < 0.001$, $\eta^2_p = 0.229$.

Attribute attitudes

Analyses were also conducted for our global ($\alpha = 0.670$) and experienced ($\alpha = 0.805$) attribute attitude scales. Our “not experienced” attribute scale suffered from poor reliability and was excluded from analysis.

Global attributes

A significant two-way interaction (pre-post measures \times brand) was found for our test cars: $F(1, 59) = 12.55$, $p = 0.001$, $\eta^2_p = 0.178$. Main effect comparisons revealed a significant decrease between pre ($M = 29.21$, $SD = 10.33$) and post ($M = 26.67$, $SD = 9.29$) global attribute scores for the Honda ($F(1, 59) = 5.69$, $p = 0.020$, $\eta^2_p = 0.088$), and a significant increase between pre ($M = 24.14$, $SD = 9.51$) and post ($M = 28.12$, $SD = 7.89$) for the Ford ($F(1, 59) = 10.95$, $p = 0.002$, $\eta^2_p = 0.157$). Although a significant three-way interaction (pre-post \times brand \times driving difficulty) was not found for this measure (as it was in the measures above and below), it was close: $p = 0.067$.

Experienced attributes

A significant three-way interaction (pre-post measures \times brand \times driving difficulty) was found for “experienced” brand attributes: $F(1, 57) = 11.35$, $p = 0.001$, $\eta^2_p = 0.166$. Main effect comparisons (Bonferroni corrected) revealed three simple effects. Attribute scores increased significantly for participants who drove the Honda under easy driving difficulty ($F(1, 57) = 4.59$, $p = 0.036$, $\eta^2_p = 0.075$) and decreased significantly for the hard driving difficulty ($F(1, 57) = 5.6$,

$p = 0.021$, $\eta^2_p = 0.089$). For Ford, differences appeared only for easy driving difficulty ($F(1, 57) = 13.32$, $p = 0.001$, $\eta^2_p = 0.189$), with attribute scores increasing significantly between pre and post measures (Table 1).

Control variables

There were no significant effects of car presentation order, no significant pre-post changes in attitude toward our control cars, and no effects of gender, age, driving frequency, car ownership, or game experience on pre-post experiment attitudes. We observed no significant effects of mood on attitude scores and no significant differences between mood measures. Lap times, which were recorded for each session, were not a significant factor.

Discussion

All three of our attitude measures suggest a similar pattern: when driving difficulty is set to hard for the Honda and easy for the Ford, there is a decrease in attitude scores toward the Honda while scores for the Ford increase. In the context of the associative-propositional evaluation (APE) model, this result can be interpreted as an effect of our manipulation. According to the APE model, attitude change may result from the interplay of associative (implicit) and propositional (explicit) processes, which in turn produce changes to the associative evaluation of an attitude object.¹³

The activation of congruent (easy difficulty) and incongruent (hard difficulty) associative patterns in response to virtual experience resulted in the attribution of affective reactions evoked by these patterns to the vehicles being tested. Such an interpretation is supported by the fact that pre-experiment attitude scores were significantly higher for the Honda on two of our three measures.

The Honda provided an incongruent experience in the condition depicting it as more difficult to control than Ford, leading to an associative evaluation that produced attitude change. In the reverse condition, the experience was congruent and therefore did not result in attitude change. While the attitude measures we used were explicit, the observed changes occurred in response to the implicit influence of driving difficulty manipulation.

TABLE 1. PRE AND POST EXPERIMENT RATINGS FOR TEST BRANDS ACROSS EXPERIMENTAL CONDITIONS

	Experimental condition			
	Hard Honda/easy Ford		Easy Honda/hard Ford	
	Pre	Post	Pre	Post
<i>Overall brand attitude</i>				
Honda	7.29a (1.80)	6.39b (2.72)	6.78 (2.46)	6.81 (2.44)
Ford	5.43a (2.71)	7.29b (1.21)	5.97 (2.96)	6.34 (2.74)
<i>Global attributes scale</i>				
Honda	28.51 (11.34)	24.76 (9.04)	29.82 (9.50)	28.34 (9.31)
Ford	21.94 (8.08)	28.50 (7.43)	26.07 (10.35)	27.78 (8.38)
<i>Experienced attributes scale</i>				
Honda	31.92a (13.83)	26.63b (10.70)	28.98a (15.35)	33.75b (12.25)
Ford	21.57a (10.27)	31.79b (10.51)	28.42 (16.70)	27.46 (11.89)

Note. Standard deviations appear in parentheses following means. Differing subscripts in rows indicate significant pre-post differences based on simple main effects for pre-post \times brand \times driving difficulty computed for each attribute type.

Although these results are promising, a number of limitations should be pointed out. First, a comparison of both cars at the same difficulty condition was not included in our design. While this was not crucial for testing our hypotheses, including them could have provided a more complete understanding of our results. Second, there were many mediating/moderating variables specific to our test stimuli beyond those which we controlled for which could have been significant (e.g., driving accidents, brand experience). Finally, our sample of relatively young students may have decreased the relevance of our stimuli in terms of attitudes (but may have also minimized variables such as those described above).

Overall, the findings of previous research in which virtual experience was shown to be effective at influencing brand attitude⁸⁻¹⁰ are supported by the results of this study. We move one step forward by showing that virtual experience can significantly affect existing attitudes, and that its manipulation produces attitude change in line with what can be expected according to models such as APE. Future investigations using a similar methodological approach are necessary in order to confirm the obtained results and improve our understanding of virtual experience and its potential applications.

Author Disclosure Statement

No competing financial interests exist.

References

1. Li H, Daugherty T, Biocca F. Characteristics of virtual experience in electronic commerce: a protocol analysis. *Journal of Interactive Marketing* 2001; 3:13-30.
2. Mooy SC, Henry SJ. Managing consumers' product evaluations through direct product experience. *Journal of Product & Brand Management* 2002; 11:432-444.
3. Hamilton RW, Thompson DV. Is there a substitute for direct experience? Comparing consumers' preferences after direct and indirect product experiences. *Journal of Consumer Research* 2007; 34:546-555.
4. Heeter C. Interactivity in the context of designed experience. *Journal of Interactive Advertising* 2000; 1:4-15.
5. Fox J, Arena D, Bailenson J. Virtual reality: a survival guide for the social scientist. *Journal of Media Psychology* 2009; 21:95-113.
6. Grigorovici D. (2003) Persuasive effects of presence in immersive virtual environments. In Riva G, Fabrizio D, Wijnand AI, eds. *Being there: concepts, effects and measurements of user presence in synthetic environments*. Amsterdam: IOS Press, pp. 191-207.
7. DFC Intelligence Forecast. (2011) *Advertising and video games*. San Diego: DFC Intelligence.
8. Li H, Daugherty T, Biocca F. Impact of 3D advertising on product knowledge, brand attitude, and purchase intention: the mediating role of presence. *Journal of Advertising* 2002; 31:43-57.
9. Li H, Daugherty T, Biocca F. The role of virtual experience in consumer learning. *Journal of Consumer Psychology* 2003; 13:395-407.
10. Daugherty T, Li H, Biocca F. Consumer learning and the effects of virtual experience relative to indirect and direct product experience. *Psychology & Marketing* 2008; 25:568-586.
11. Ohme RK. Awareness of personal mood and positive-negative asymmetry of changes. *Studia Psychologiczne* 1997; 35:81-95.
12. Bruner GC. Standardization and justification: do ad scales measure up? *Journal of Current Issues & Research in Advertising* 1998; 1:1-18.
13. Gawronski B, Bodenhausen G. Associative and propositional processes in evaluation: an integrative review of implicit and explicit attitude change. *Psychological Bulletin* 2006; 132:692-731.

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