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The role of flow in attitude formation and associative learning

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Augmented Reality Brand Storytelling: The Role of Flow in Attitude Formation and Associative Learning

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Abstract

Organizations and brands have long since used stories to communicate and resonate with their audiences. Nowadays, novel interactive media formats are used to enhance these brand-consumer interactions. Augmented reality (AR), in particular, holds the potential to aid brands in having immersive and exploratory interactions with consumers. The aim of this study is to examine the effects of AR in brand storytelling on brand attitude and brand associations, and to explore to what extent (the dimensions of) flow can explain these effects. A single factorial (Type of brand storytelling: AR vs. non-AR) between-subjects field experiment is conducted ($N = 83$). The results show that AR brand storytelling leads to a higher perceived flow than regular brand storytelling. Furthermore, flow mediates the effects of AR brand storytelling on both brand attitude and brand associations. Notably, the flow dimensions control and attention focus are found to be particularly important for explaining the effect on brand associations.

Keywords: augmented reality (AR), brand storytelling, flow, brand attitude, brand associations.

1 Introduction

Many brands use storytelling to strengthen their image and to communicate their branded messages to consumers. From a branding perspective, storytelling is considered an integral part of a brand's management strategy (Park et al., 2021). Also, it can offer brands a competitive advantage, because it allows them to resonate with consumers (Chiu et al., 2012). Nowadays, new technologies are used to enhance brand storytelling. One of the most promising of these is augmented reality (AR).

Augmented reality is a technology that integrates virtual information into real-life settings (Faust et al., 2012; Javornik, 2016a; Rauschnabel et al., 2019) and provides users the illusion that virtually depicted objects are present in their actual real-world environment (Verhagen et al., 2014). Many contemporary smartphones offer AR features, using the phone's geolocation, compass, accelerometer, and camera capabilities (Carmigniani et al., 2011). By leveraging AR technology, brands are

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believed to be able to establish more impactful brand-consumer relationships (Smink et al., 2019; 2021; Scholz & Duffy, 2018).

In a non-commercial context, Scholz and Smith (2017) demonstrated that AR storytelling can offer immersive experiences to users. For example, they showed that geo-based storytelling positively affects users' narrative transportation—for the story (world) is transported to the user while at the same time the user is transported into the story world. Furthermore, the interactive nature of AR is believed to have a positive impact on user's perceived *flow* when using an AR application. Flow is a psychological state, characterised by immersion and absorption into a specific activity (Csíkszentmihályi, 1990). In a commercial context, flow has been associated with both affective and cognitive brand responses (Javornik, 2016b).

The aim of this study is to examine to what extent perceived flow can explain the effects of AR on brand attitude and brand associations, in the context of brand storytelling. Furthermore, the study also explores the potential roles of four dimensions of flow (i.e., control, attention focus, curiosity, and intrinsic interest). Insights from flow theory (Csíkszentmihályi, 1990), the affect transfer hypothesis (Mackenzie et al., 1986), and associative learning theories (Van Osselaer & Janiszewski, 2001) are used to explain these effects.

Exploring the role of flow in explaining the effects AR on brand responses is relevant, because research into these effects showed mixed results. Some studies (e.g., Rauschnabel et al., 2019), for example, found that branded AR apps can lead to more positive brand responses, whereas other studies reported mixed results or no effects (e.g., Javornik, 2016b; Smink et al., 2020).

Furthermore, for marketing professionals, studying the effects of extended reality (XR) features on brand attitude and brand associations is relevant, because these are important indicators of successful marketing and/or advertising behaviour and indicative of strong consumer-brand relationships (Hess & Story, 2005; Wedel et al., 2020).

2 Theoretical Framework

2.1 Four Dimensions of Flow

Flow theory (Csíkszentmihályi, 1990) suggests that playful interactive experiences with media can be self-motivating, because they can lead users to experience a state of flow. Flow is a multidimensional construct (Webster et al., 1993; Nel et al., 1999) describing a psychological state in which users experience: (a) high levels of *control* of their interactions with a medium, (b) a narrowed *attention focus* on that which they interact with, (c) elevated levels of *curiosity* through cognitive and/or sensory stimulation while interacting, and (d) *intrinsic interest* and satisfaction with the interaction.

2.2 Flow & AR Brand Storytelling

For brand storytelling, incorporating AR features is expected to lead to higher levels of perceived flow among users—on each of its four dimensions:

First, an integral part of AR technology is that it allows users to place virtual objects in their direct environments. Users can interact with these objects, leading them to experience high levels of control over their interactions. In the context of branded storytelling, AR allows users to interact with objects relevant to the branded story.

Second, in addition to its distinct feature of virtual emplacement and augmentation, AR is characterized by the interaction between the user and the interface (Azuma et al., 2001). This is believed to increase attention focus and lead to higher levels of absorption in the interaction with the branded story. By design, AR apps redirect the attention of users away from their actual immediate environments, toward the augmented reality displayed on a screen (e.g., smartphone, tablet, AR headset). This attention focus, subsequently, is expected to lead to absorption.

Third, AR is believed to drive curiosity due to its cognitively and sensory stimulating and immersive nature (Xue et al., 2021). Like other XR technologies, AR allows for sensory immersion into the mediated environment and can offer users the illusion of 'being there' in (or interacting with) the virtual world (Sundar et al., 2015; Abels et al., 2021). This sensory illusion is in the XR literature generally referred to as presence (Hartmann et al., 2015; Van Berlo et al., 2020).

And fourth, AR is believed to lead to higher levels of intrinsic interest. The playful interactions AR enables are generally believed to be a fun and pleasurable experience, which subsequently result in satisfaction with the interaction (Zheleva et al., 2021).

All in all, it is hypothesized that AR brand storytelling (compared to non-AR brand storytelling) leads to higher levels of perceived flow, on all four dimensions:

H1: AR (vs. non-AR) brand storytelling has a positive direct effect on users' perceptions on all four flow dimensions: (a) control, (b) attention focus, (c) curiosity, and (d) intrinsic interest.

2.3 Explaining Effects on Brand Attitude via Flow

In a marketing context, flow, as a psychological state, has been associated with both affective and cognitive responses to interactive media formats (Van Noort et al., 2012; Javornik, 2016b).

The affective responses to flow are often explained by considering insights directly from flow theory (Csíkszentmihályi, 1990). This theory characterises the state of flow as an overall pleasurable experience rooted in the control of, absorption in, stimulation by, and satisfaction with the interaction with a medium (Webster et al., 1993; Nel et al., 1999). Users are subsequently expected to attribute the pleasure experienced while in a state of flow, first of all, to the medium they interact with—leading, in an AR context for example, to higher levels of app attitude mediated through flow (Javornik, 2016b). In addition, in line with the affect transfer hypothesis (Mackenzie et al., 1986), one could argue that this positive affective state could also transfer over to other consumer responses, like brand attitude. Similar effects have been found in other XR contexts (Van Berlo et al., 2021).

Even though several studies showed that branded AR apps can lead to more favourable attitudes towards the brand (e.g., Rauschnabel et al., 2019), the empirical evidence for the role of flow in explaining the effects of interactive media formats on

brand attitude is still inconclusive. Therefore, in line with flow theory (Csíkszentmihályi, 1990), the follow hypothesis is proposed:

H2: Users' perceived flow positively mediates the effect of AR (vs non-AR) brand storytelling on brand attitude.

2.4 Explaining Effects on Brand Associations via Flow

In addition to explaining affective responses to interactive media formats, flow is also expected to explain cognitive responses, like brand associations.

Brand associations refer to the aggregation of assets and liabilities of a brand and their connections in memory (Aaker, 1991) and contain the meaning of the brand for the consumers as 'informational nodes' (Keller, 2003). The construction of brand associations is a learning process, with these informational nodes being linked in consumers' minds to build an associative network of connections with the brand.

Van Osselaer and Janiszewski (2001) showed that the processes through which these associations are established are the human associative memory (HAM) models (Anderson & Bower, 1973) and the adaptive learning model (Janiszewski & Van Osselaer, 2000). These two models mainly differ from each other in terms of cue learning and interactivity—the former proposes that cues are learned independently, whereas the latter suggests that these cues interact. In other words, HAM models suggest that multiple brand associations can be promoted simultaneously, whereas the adaptive learning model proposes that the promotion of an association may be less effective when it is 'trained' with another association of greater salience. Even though the interaction differs, the above indicates that brand associations in both cases are being established (and/or strengthened) through a learning process.

Flow, experienced while interacting with AR content, is expected to facilitate this learning process—primarily because a flow state is characterized by a more narrow focus of awareness on the content that one is interacting with (cq. the branded content) and irrelevant perceptions are filtered out (Csíkszentmihályi, 1975). But also because, in human-computer interactions, perceptual interfaces increase engagement and the respective memory about these experiences (Reeves & Nass, 2000).

Previous studies, albeit not using an AR apps, have tried to explore the effects of interactive and immersive media on brand associations and learning through the perceived immersion into the story world. In the context of 3D virtual environments, Nah et al. (2011) affirmed the effect on learning, while showing that flow was the most relevant concept explaining this effect. Similarly, Bae et al. (2020) found in a mixed reality context (i.e., virtual hologram portrayals and projection mapping on a physical display wall) that feelings of immersion mediated the effects of mixed reality's interactivity on brand associations. In sum, flow is expected to mediate the effect of AR on brand associations. The following hypothesis is proposed:

H3: Users' perceived flow positively mediates the effect of AR (vs non-AR) brand storytelling on brand attitude.

2.5 Relative Effects of Flow Dimensions

Notably, previous studies (e.g., Javornik, 2016b) into the role of flow in the context of AR effects have exclusively operationalised flow as a unidimensional construct. It is however conceivable that some flow dimensions play a (relatively) more important role than others in explaining AR effects like attitude formation and associative learning. For attitude formation for example, the dimension 'intrinsic interest' seems particularly important, because this dimension is directly related to feelings of satisfaction and pleasure; whereas for associative learning the dimensions 'control' and 'attention focus' seem more relevant, because these dimensions can be linked to enhanced processing of information. However, due to the lack of existing empirical evidence, a research question is proposed instead of a hypothesis:

RQ1: What is the relative effect of each of the four dimensions of flow in explaining the effect of AR (vs non-AR) brand storytelling on users' (a) brand attitude and (b) brand associations?

3 Methods

3.1 Participants and Procedure

To test the hypotheses, a field experiment was conducted with a single-factor (Type of brand storytelling: AR vs non-AR) experimental design. Flow was measured as a mediator variable. The sample consisted of 83 young adults (41 identified as women, 39 as men, 2 as non-binary, and 1 preferred not to say) with an average age of 21.27 years old (SD_{age} = 2.25).

Data was collected in late 2021. Participants were approached on a university campus and asked to participate in a study. After giving informed consent, participants were randomly assigned to either the experimental (AR brand storytelling) or control (non-AR brand storytelling) condition. Participants in both conditions were instructed to read a short interactive brand story developed for this experiment on an app used for AR brand storytelling. In the experimental condition, the participants could, in addition to reading the story, also explore their environment using an AR feature in the app. In the control condition, participants were only able to read the story (meaning that the AR feature was disabled). Afterwards, all participants filled out a questionnaire measuring several demographic variables, perceived flow, brand attitude, and brand associations. Finally, everyone was debriefed and thanked for their participation.

3.2 Stimulus Materials

The stimulus material for this study was created using the AR storytelling app *Artelot*. This app allows users to read a (branded) story, which can be augmented using geo-located AR animations. For this study, a geo-located historical short-story was created based around a Nobel prize-winning professor from the university at which the data was collected. The host university served as the target brand of this study. In the story, the professor has a conversation with another person. Throughout the conversation, the *rich history*, *prestigiousness*, and *inclusiveness* of the host university

were highlighted. The words ‘historical’, ‘prestigious’, and ‘inclusive’ served as the three target associations that the narrative aimed to communicate.

Both conditions showed the exact same story in written format, accompanied by an image featuring the two characters of the story and the university’s logo on a solid-colour background. The only difference between the two conditions was the AR feature. In the experimental (AR) condition version of the story, users could use the AR interface to place (and interact with) the story’s characters in the real-world. A still image of the stimulus materials can be found as Fig. 1.

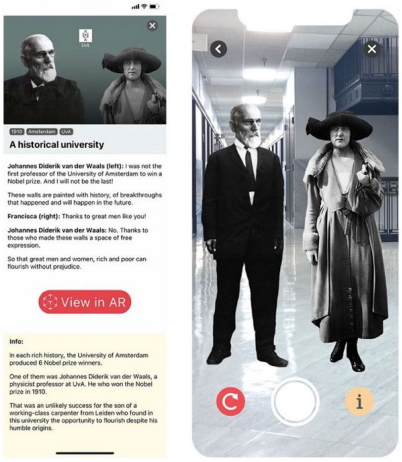

Fig. 1. Stimulus materials

3.3 Measures

Perceived Flow. To measure perceived flow, a twelve-item (e.g., “When I used the app I felt in control”, “Visiting the app excited my curiosity”, “The app was interesting”) 7-point Likert scale (1 = *strongly disagree*; 7 = *strongly agree*), was used. This scale, adapted from a validated scale by Nel et al. (1999), measured four dimensions of flow: Control (M = 4.85, SD = 1.44, Cronbach’s alpha = .80), attention focus (M = 4.26, SD = 1.28, Cronbach’s alpha = .69), curiosity (M = 4.98, SD = 1.43, Cronbach’s alpha = .84), and intrinsic interest (M = 4.94, SD = 1.26, Cronbach’s alpha = .83).

Brand Attitude. Brand attitude was measured on a five-item (e.g., ‘Bad/good’, ‘Unpleasant/pleasant’, ‘unlikable/likable’) 7-point semantic differential scale (Spears & Singh, 2004). The scale (M = 5.65, SD = 0.92) proved valid (EV = 3.42, R^2 = 0.68) and reliable (Cronbach’s alpha = 0.88).

Brand Associations. Following a procedure outlined by Dahlèn (2005), brand associations were measured by asking participants to indicate, on a three-item 7-point Likert scale (1 = *strongly disagree,* 7 = *strongly agree*), to what extent they felt the target brand could be described as ‘historical’, ‘prestigious’, and ‘inclusive’. The scale (M = 5.35, SD = 1.00) proved valid (EV = 1.90, R^2 = 0.63) and reliable (Cronbach’s alpha = 0.70).

4 Results

4.1 Direct Effects of AR Brand Storytelling

To test the effects of AR in brand storytelling on flow, four independent samples *t* tests were conducted. As shown in Table 1, all four tests were significant, meaning that people in the AR storytelling condition showed higher levels of control, attention focus, curiosity, and intrinsic interest, when compared to people in the non-AR storytelling condition. These findings support H1.

Table 1. Direct effects of AR brand storytelling on flow.

Measure	Brand Storytelling						
	AR (n = 44)		Non-AR (n = 39)				
	M	*SD*	*M*	*SD*	*t*	*p*	Cohen's *d*
Control	5.55	0.90	4.06	1.54	5.23	< .001	1.18
Attention focus	4.72	1.14	3.74	1.24	3.74	< .001	0.82
Curiosity	5.71	1.20	4.15	1.22	5.78	< .001	1.29
Intrinsic interest	5.57	1.00	4.22	1.14	5.62	< .001	1.26

Note. The tests described in this table have 81 degrees of freedom.

4.2 Indirect Effects of AR Brand Storytelling

To test hypotheses 2 and 3, two mediation models (Model 4) were estimated using the PROCESS macro by Hayes (2013). For the first model, type of storytelling served as independent variable, brand attitude as dependent variable, and the four dimensions of perceived flow as mediator variables. The second model differed from the first model in that brand associations were measured as dependent variable.

Brand Attitude. The first model was estimated to test the indirect effect of AR brand storytelling, via flow, on brand attitude. As shown in Table 2, the total indirect effect of AR brand storytelling on brand attitude was significant (b^* = 0.40, *SE* = 0.17, 95%CI [0.05, 0.71]). This means that the data support H2.

Notably, non-significant indirect effects were found for the individual flow dimensions control (b^* = 0.13), attention focus (b^* = 0.03), curiosity (b^* = 0.05), and intrinsic interest (b^* = 0.18).

Brand Associations. The second model was estimated to test the indirect effects of AR brand storytelling on brand associations. As shown in Table 3, the total indirect effect of AR brand storytelling on brand associations via flow was significant (b^* = 0.79, *SE* = 0.18, 95%CI [0.46, 1.16]). This means that the data support H3.

Furthermore, significant indirect effects were found for the individual flow dimensions control (b^* = 0.31) and attention focus (b^* = 0.34). The indirect effects of the flow dimension curiosity (b^* = 0.25) and intrinsic interest (b^* = -0.11), however, were non-significant.

Table 2. Direct and indirect effects of AR brand storytelling on brand attitude.

Measures	Brand Attitude

	Direct Effects			Indirect Effects		
	b	*SE*	95% CI	*b*	*SE*	95% CI
AR brand storytelling	0.26	0.24	[-0.22, 0.74]	-	-	-
Flow	-	-	-	**0.36**	0.17	[0.05, 0.71]
Control	0.08	0.09	[-0.11, 0.26]	0.12	0.14	[-0.17, 0.41]
Attention focus	0.03	0.10	[-0.17, 0.23]	0.03	0.10	[-0.18, 0.21]
Curiosity	0.03	0.12	[-0.21, 0.27]	0.04	0.18	[-0.30, 0.43]
Intrinsic interest	0.13	0.17	[-0.21, 0.46]	-0.17	0.22	[-0.28, 0.61]

Note. Regression coefficients presented in bold are significant at the .05 level.

Table 3. Direct and indirect effects of AR brand storytelling on brand associations.

Measures	Brand Associations					
	Direct Effects			Indirect Effects		
	b	*SE*	95% CI	*b*	*SE*	95% CI
AR brand storytelling	-0.17	0.22	[-0.61, 0.27]	-	-	-
Flow	-	-	-	**0.79**	0.21	[0.42, 1.23]
Control	**0.21**	0.08	[0.05, 0.36]	**0.31**	0.14	[0.06, 0.60]
Attention focus	**0.34**	0.09	[0.16, 0.52]	**0.34**	0.12	[0.13, 0.60]
Curiosity	0.16	0.10	[-0.03, 0.36]	0.25	0.16	[-0.03, 0.61]
Intrinsic interest	-0.08	0.14	[-0.37, 0.20]	-0.11	0.19	[-0.49, 0.25]

Note. Regression coefficients presented in bold are significant at the .05 level.

5 Discussion

The aim of this study was to examine how AR can be used to enhance the effect of brand storytelling on brand attitude and brand associations, and to what extent flow can explain these effects. Overall, AR in brand storytelling was found to have a positive effect on flow, which in turn explained the effects on brand attitude and brand associations. From the results three main conclusions can be drawn.

5.1 Flow & AR Brand Storytelling

First, the results show that the use of AR features can enhance flow. This is in line with previous research, suggesting that AR holds the potential to immerse and absorb its users into the story world and evoke a state of flow (Huang & Liao, 2017; Javornik, 2016b; Scholz & Smith, 2017; Sundar et al., 2015). Notably, AR was found to positively affect all four dimensions of flow (e.g., control, attention focus, curiosity, and intrinsic interest).

5.2 Effects on Brand Attitude via Flow

Second, flow was found to mediate the effect of AR storytelling on brand attitude. This is in line with flow theory (Csíkszentmihályi, 1990) and suggests that users attribute the overall pleasurable state of mind, experienced when in a state of flow, to the branded content they interact with. Moreover, given that positive valance, experienced during a state of flow, seems to be transferred over to the brand, these findings also support the affect transfer hypothesis (Mackenzie et al., 1986).

Notably, the results suggest that none of the flow dimensions individually explain a significant part of the effect of AR on brand attitude.

5.3 Effects on Brand Associations via Flow

Third, flow was found to mediate the effect of AR storytelling on brand associations. In line with previous research on the role of flow in mediating the effects of interactive media (e.g., Skadberg & Kimmel, 2004), flow was found to play an important role in the creation of brand associations (Skadberg & Kimmel, 2004). The current study shows that being in a state of flow can enhance (associative) learning processes.

Furthermore, the results also show that the flow dimensions control and attention focus are most important in explaining the effect of AR on brand associations. Control allows users to determine their own pace in processing information they interact with. Previous research into learning has shown that incorporating a modest amount of interactivity can promote deeper learning (Mayer & Chandler, 2001), which could potentially explain the mediating role of control. A potential explanation for the role of attention focus could be that when users become more absorbed into the activity, they are less distracted by other stimuli, which in turn could then improve the processing (encoding and retention) of information (Lang, 2000). Notably, the results suggest that the flow dimensions curiosity and intrinsic interest, albeit an integral part of the flow experience, seem less important for facilitating associative learning.

5.4 Limitations & Future Research

The current study offers novel insight into the workings of AR in brand storytelling and the role of flow. However, it also has its limitations. Arguably, the most pressing limitation of the study is the choice of target brand. By collecting data on the campus of the university that was also the target brand of the experiment, it is conceivable that participants already had strong pre-existing attitudes and associations with the brand. Where this does not have to be an issue per se, strong pre-existing attitudes and associations could have potentially led to ceiling effects (and thus suppressed the effects that were found). In the future, researchers are advised to use less known (or fictitious) brands in their stimulus materials, to avoid any potential confounds resulting from ceiling effects.

5.5 Implications for Theory and Practice

For theory, the most important implication of the current study is that it demonstrates how integrating flow as a multidimensional construct, rather than a unidimensional one, offers deeper insight in the understanding of the workings of flow. In particular, the results indicate that there can be relative differences in to what extent individual flow dimensions contribute to the overall explanation of the effects of AR. For example, on the one hand, when explaining of the effects on brand attitude, only the cumulative effect of all four flow dimensions was found to be significant (and the individual effects of the flow dimensions were not deemed meaningful). However, on the other hand, the effects on brand associations were explained more meaningfully by also considering the individual effects of the four dimensions of flow.

For practice, the findings show that AR can enhance a brand's efforts to communicate a convincing brand story to promote more positive brand attitudes and to establish brand associations. Concretely, to drive brand attitude and strengthen brand

associations, marketing professionals are advised to look for ways to integrate AR features into their brand storytelling efforts—and to ultimately deliver users experiences that offer them a greater sense of control, absorb them, and deliver them an interactive experience that is both stimulating and pleasurable.

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