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Augmented reality marketing: How mobile AR-apps can improve brands through inspiration

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ABSTRACT

Augmented Reality (AR) is a promising and growing field in marketing research and practice. Very little is known if, how, and why AR-apps can impact consumers' perception and evaluation of brands. The following research presents and empirically tests a framework that theorizes how consumers perceive and evaluate the benefits and augmentation quality of AR apps, and how this evaluation drives subsequent changes in brand attitude. The study reveals consumer inspiration as a mediating construct between the benefits consumers derive from AR apps and changes in brand attitude. Besides providing novel insights into AR marketing theory, the study also suggests that marketers should consider evaluating mobile AR apps based on the inspiration potential (and not simply based on consumer attitudes, such as star-ratings in app stores).

1. Introduction

Try to spell the word marketing without AR – it won't work. Try to develop an inspiring marketing strategy without AR – it won't work either.

Smartphones and other mobile technologies have become a necessary and fundamental component of modern consumption and life (Braun et al., 2016). Recent developments suggest a future where augmented reality (AR) will be similarly indispensable to both consumption and marketing. Consumers will operate in a reality that is consistently enriched with virtual content, and marketers need to find ways to integrate these new realities into their marketing strategies. The increasing importance of augmented reality in marketing can already be traced in practitioner-oriented publications (BCG, 2018; IDC, 2018; Kunkel et al., 2016; PwC, 2017) as well as recent academic work (e.g., Hilken et al., 2017; Javornik, 2016a; Poushneh and Vasquez-Parraga, 2017; Scholz and Duffy, 2018).

Augmented Reality represents an innovative media format that integrates virtual information into a user's perception of the real-world. The 'Pokémon Go' mobile app is a well-known example where users catch virtual creatures projected over the real-world as viewed through a smartphone (Rauschnabel et al., 2017). Applications such as virtual mirrors (screens where consumers can see themselves wearing virtual clothes; see Beck and Crié, 2016), furniture planners (apps that allow you to see furniture in your home; see Rese et al., 2014, 2017), and virtual make-up trials are examples of AR in marketing applications. Multiple forecasts have predicted substantial growth in AR usage (BCG, 2018; IDC, 2018; Kunkel et al., 2016; PwC, 2017; Technavio, 2017). For example, a market report by Technavio (2017) predicts the compound annual growth rate of the AR market to be 31% until 2021. A recent research report by BCG (2018) expects more than 120 million AR users in the US by 2021. This report concludes that, "[m]oving forward, we expect the AR ecosystem will continue to develop quickly … [and] players such as ad agencies, app and software developers, and ad networks are staking out their own roles in the value chain. Marketers can expect to have access to a wide array of AR-marketing options in the future." Surveys confirm that brand-related goals (e.g. awareness, brand favorability, consideration) comprise 86% of the primary business objectives of AR marketing while incremental sales play a significant but less important role (BCG, 2018). A Deloitte report summarizes that AR provides "new ways to interact with products and services… [and offers] companies opportunities to raise awareness, promote features, and inspire desire for their suites of goods" (Kunkel et al., 2016; p.1). However, surveys among managers also indicate that a lack of knowledge about AR, especially in terms of ROI, is still a major concern (BCG, 2018). Thus, AR managers will benefit from academic insight into how AR creates value for both the consumer and the firm.

Marketing scholars have recently realized the need for research on AR. In particular, extant research shows how and why consumers

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interact with branded AR (e.g., Huang and Hsu Liu, 2014; Poushneh, 2018), how AR drives consumer decision making (e.g., Beck and Crié, 2016; Hilken et al., 2017; Javornik, 2016a), factors that determine in-app purchases in AR games (e.g., Rauschnabel et al., 2017), and how scholars should address these challenges (e.g., Javornik, 2016b). Likewise, on a strategic level, a few studies proposed strategic frameworks for the management of AR (e.g., Scholz and Smith, 2016) or studied how companies promote AR (Feng and Mueller, in press). However, little is known about how AR impacts the brand or what factors drive branded AR usage. Although some of these topics are superficially addressed in extant research (e.g., Javornik, 2016b), the overall lack of a more comprehensive branding theory of AR has hindered adoption of these technologies. In addition, given the fundamental differences between AR and many existing media formats (e.g., AR integrates virtual content in a user's perception of the real world, whereas traditional media typically present content separately from reality), established frameworks might neglect potentially relevant factors such as the quality of augmentation in AR (e.g., Alnawas and Aburub, 2016). Finally, as Scholz and Duffy (2018) observe, much of the existing research on AR adopts an app-centric perspective that focuses on consumers' attitudes and motivations towards AR applications, rather than investigating the underlying processes and broader brand-related outcomes.

To address these issues, this study proposes a conceptual model where the change in brand attitude (after vs. before using the app) serves as the focal outcome variable; an approach that addresses the most current challenges facing the industry (BCG, 2018). More specifically, our research proposes that perceived augmentation quality, in addition to utilitarian and hedonic benefits, leads to positive evaluations of the app and triggers inspiration. These two factors are then proposed to determine changes in brand attitude. In other words, we model inspiration and attitudes toward the AR app as mediating variables for the relationship between the exogenous variables in the model (utilitarian benefits, hedonic benefits, and perceived augmentation quality) and the outcome variable (changes in brand attitudes).

The current study investigates how AR app usage impacts the individual using structural equation modeling. The results show that inspiration derived from the app transmits the benefits of AR app use to overall brand attitude (but attitude towards the app does not). By exploring the mediating role of inspiration, we contribute to recent advancements in the marketing literature (e.g. Böttger et al., 2017), and we outline one of the mechanisms that practitioners expect to play an important role in AR use and development (Kunkel et al., 2016). Furthermore, our study investigates the effect of utilitarian benefits, hedonic benefits, and perceived augmentation quality on attitudes toward the brand and follows the call from Scholz and Duffy (2018) to go beyond the app-centric focus of previous AR research. Thus, building on related AR studies that investigate the effect of AR on the brand (e.g., Javornik, 2016a), this study provides empirical evidence detailing how AR Marketing can significantly and positively impact the brand.

2. Augmented reality marketing: literature review and conceptual background

2.1. Augmented reality marketing

Similar to related work on social media marketing, where social media as a tool or platform is distinguished from social media marketing (e.g., Felix et al., 2017), we explicitly differentiate between AR and AR marketing. AR describes the visual alignment of virtual content with real-world contexts and has been defined as a "medium in which digital information is overlaid on the physical world that is in both spatial and temporal registration with the physical world and that is interactive in time" (Craig, 2013, p. 20). AR can be clearly distinguished from VR (virtual reality). Whereas VR completely separates the user from reality (typically through the use of special goggles) and the user consequently only moves in a fully virtual world (Rauschnabel, 2018), AR users are not disconnected from reality; rather, perceived reality is augmented with virtual information (Craig, 2013). AR applications are typically installed on either stationary (e.g. AR mirrors in retailing), mobile (e.g. smartphones), or wearable devices (e.g. AR smart glasses) (Rauschnabel, 2018).

As indicated above, we argue that it is useful to delineate AR as a technology or platform from AR marketing, which constitutes an activity conducted by firms or institutions. Although an increasing number of companies (including IKEA, BMW, Volkswagen, Audi, and Lego, among others) integrate AR into their marketing campaigns (Dacko, 2017), and previous academic research has pointed out the potential of AR for marketing purposes (e.g., Yaoyuneyong et al., 2016), scholars are still in the process of developing a working definition of AR marketing. We define AR marketing as a strategic concept that integrates digital information or objects into the subject's perception of the physical world, often in combination with other media, to expose, articulate, or demonstrate consumer benefits to achieve organizational goals. This proposed working definition has four noteworthy tenets. First, it suggests that AR marketing is a strategic firm capability that requires adequate planning as well as financial and organizational resources, which includes a profound understanding of user behavior from different perspectives and disciplines. Second, by emphasizing the integration of different types of digital and physical content without specifying requirements for interactivity or levels of realism, the definition remains sufficiently open and flexible to subsume a large number of AR techniques and technologies. Third, by defining the purpose of AR marketing as the achievement of organizational goals, we open AR marketing to commercial, profit-driven activities as well as non-profit marketing, political campaigns, or (in a more general way) the marketing of ideas. Finally, AR Marketing can build on and extend established marketing approaches, ranging from advertising to content marketing to storytelling. In this sense, AR marketing can be applied to technologies provided by the company (e.g. virtual mirrors in stores) or by the user (e.g. mobile devices such as tablets and smart glasses). AR Marketing can address multiple goals (e.g. branding, triggering purchases, improving after-sales service) along the customer journey (BCG, 2018). For example, some existing branded AR apps are linked to pre-purchase activities (e.g. planning furniture purchases), whereas others provide value after the purchase (e.g. playing with physical Legos that are enhanced with AR content through the Lego AR apps). Some common AR marketing activities use AR in isolation (e.g. a virtual mirror) whereas others use it in combination with other media (Yaoyuneyong et al., 2016). For example, the Italian scooter company Vespa created their own AR app where users can scan Vespa ads and receive additional content through AR (Augment.com, 2016). Organizations can use AR marketing to provide differing benefits to users depending on their stage in the customer journey (Bulearca and Tamarjan, 2010) or based on specific decision-making processes (e.g. purchase planning for a consumer in the pre-purchase-phase or customer service in the post-purchase-phase). Finally, AR marketing can be applied by all types of organizations to target multiple stakeholders including consumers, employees, and society at large.

2.2. Prior research on augmented reality marketing

Despite the important insights generated by previous research on AR, most studies have focused on attitudes, motivations, or reactions toward the AR app rather than on broader brand-related outcome variables (for an exception, see, e.g., Javornik, 2016a). Scholz and Smith (2016) created a strategic framework to guide managers' development of AR campaigns. They found that the construction of effective AR platforms requires a solid understanding of how consumers interact with AR technology (BCG, 2018). While few studies provide insights into the underlying mechanisms of AR (e.g., Huang and Hsu Liu, 2014), Scholz and Duffy (2018) showed that consumers incorporate AR apps

into their intimate space and their sense of selves, and Hilken et al. (2017) found that AR apps can influence purchase and word-of-mouth behaviors through increasing decision comfort along with both hedonic and utilitarian gratifications. Rauschnabel et al. (2017) showed that flow, social image, and social norms drive purchases through AR apps within the Pokémon Go game, but a cognitive evaluation of the process was unrelated to spending behavior. Javornik (2016a) developed and tested a model to understand consumers' affective and behavioral responses to branded AR technology. Her results showed that augmentation produced a flow experience which drove consumption-related constructs, such as brand attitude. Yim et al. (2017) and Yim and Park (2018) compared AR to more traditional ecommerce applications and showed that AR experiences are associated with greater immersion, usefulness, enjoyment and novelty. Likewise, Javornik et al. (2016) studied consumers' reaction to AR mirrors and showed surprise as consumers' initial reaction to AR marketing, followed by exploration of the technology.

In the context of shopping centers, Olsson et al. (2013) studied mobile AR apps and found that consumers associate them with numerous cognitive (e.g. knowledge, awareness) and emotional (e.g. pleasant and stimulating experiences) benefits. Similarly, Poncin and Mimoun (2014) conducted a retailing field study and identified a positive effect of AR on store atmospherics. Spreer and Kallweit (2014) also studied shopping experiences linking AR Marketing to both hedonic and utilitarian gratifications. Other research has focused on the consumer benefits provided by specific AR *technologies*. For example, Rauschnabel (2018) showed that fundamental human needs (e.g., the need for belonging, relatedness, or social connection) can be addressed through AR technologies, and tom Dieck and Jung (2018) report similar findings in a tourism context. Likewise, Rauschnabel et al. (2018) determined that Augmented Reality Smart Glasses provide hedonic, utilitarian, and symbolic benefits, and found that when it comes to AR technologies, people seem to care more about other people's privacy than about their own.

In summary, a number of recent studies have explored the role of AR in marketing applications. Specifically, as shown above, a substantial number of studies have investigated factors that either motivate or deter consumers from (re)using an AR app or technology. Thus, the extant literature remains incomplete with respect to how consumer benefits derived from AR use drive impressions of the overall brand, as well as potential mediators that may explain this process. Importantly, previous research has not investigated the extent to which AR technology inspires consumers, and whether or not higher levels of consumer inspiration subsequently influence attitude towards the brand. The current research addresses these issues by 1) introducing inspiration (Böttger et al., 2017; Oleynick et al., 2014) to the emerging stream of AR research, and 2) showing the effects of AR utilitarian benefits, hedonic benefits, and perceived augmentation quality on changes in brand attitude.

3. Theory and model

Our model hypothesizes that three factors determine consumers' attitude toward the app and inspiration: hedonic benefits, utilitarian benefits, and perceived augmentation quality. Attitude toward the app and inspiration then serve as mediators that determine changes in brand attitude, our focal construct. In the following sections, we discuss each hypothesis in detail (see Fig. 3 for a visualization).

3.1. Drivers of attitude toward the app

The extant marketing literature has convincingly demonstrated that both utilitarian and hedonic benefits can influence consumer attitudes (Carpenter and Moore, 2000; Chitturi et al., 2008; Han and Jung, 2019). Consistent with previous research in marketing, we juxtapose "utilitarian benefits" as functional, instrumental, and practical benefits with "hedonic benefits" like aesthetic, experiential, and enjoyment-related factors (Hilken et al., 2017; Chitturi et al., 2008; Rauschnabel, 2018). Previous research has shown that branded apps, including AR apps, can generate both utilitarian as well as hedonic benefits (Alnawas and Aburub, 2016; Hilken et al., 2017; Javornik, 2016a). Resonating with these findings, Yim et al. (2017) showed that usefulness (a utilitarian benefit) and enjoyment (a hedonic benefit) resulted in more positive attitudes toward the medium (an AR app for sunglasses and watches). Thus, based on the findings outlined above, we argue that because AR apps are able to generate both utilitarian and hedonic benefits, and because both utilitarian and hedonic benefits are relevant for AR users and typically influence attitudes, consumers' attitudes toward the AR app will be affected by the utilitarian and hedonic benefits provided through the AR app. We hypothesize the following:

H1. Utilitarian benefits have a positive effect on attitude toward the AR app.

H2. Hedonic benefits have a positive effect on attitude toward the AR app.

Moreover, we propose that perceived augmentation quality of the AR experience is a relevant criterion for the evaluation of AR apps and broader brand-related outcomes. Perceived augmentation quality refers to the extent to which a user perceives the augmented content as realistic. That is, at high levels of perceived augmentation quality, consumers feel that they are experiencing an authentic, situated experience where physical reality and virtual content seamlessly merge (Hilken et al., 2017). Our theoretical argument for the effect of perceived augmentation quality is grounded in perceptual fluency, which has been defined as the ease with which users can identify, process, and understand the features of a virtual stimulus augmenting a user's perception of the real-world (Labroo et al., 2007; Lee and Labroo, 2004). In cases of high augmentation quality, a user may not perceive the technology-mediated nature of a brand experience (Lombard and Snyder-Duch, 2001; Hilken et al., 2017) and become fully immersed in the app. In contrast, the virtual overlay and reality are inconsistent when augmentation quality is low, leading to an unrealistic experience that consumers perceive negatively. Thus, we hypothesize:

H3. Perceived augmentation quality has a positive effect on attitude toward the AR app.

3.2. Drivers of inspiration

While the previous section focused on the antecedents of consumers' attitude toward the AR app, we suggest psychological inspiration as a key construct connecting the antecedents of AR use to brand attitude. Although most people can easily indicate whether or not they are inspired, it is typically challenging to describe what inspiration is or how it was triggered. Thrash and Elliot (2003) suggest that we are inspired when "insights or ideas imbue a task with a sense of necessity and excitement" (p. 871). Thrash and Elliot (2004) observe that a common denominator across multiple conceptualizations of inspiration is that it involves activation and positive valence, and thus can be best described as an appetitive state. In this sense, inspiration involves emotion but is not itself an emotion (Thrash et al., 2014). Congruent with the literal sense of inspiration which relates to breathing or inhaling, inspiration in a figurative sense is evoked (that is, triggered by an exogenous stimulus) rather than initiated through an act of will or without any apparent cause (Thrash and Elliot, 2003; Thrash et al., 2014). Importantly, inspiration is a motivational state where new possibilities are revealed which may lead to the realization of new ideas (Böttger et al.,

2017; Oleynick et al., 2014). Thus, we argue that inspiration increases when consumers perceive emotional gratification (i.e., hedonic value) in an external stimulus, but because inspiration reveals new possibilities or the realization of new ideas, inspiration is also positively influenced by utilitarian value. Since AR is highly experiential (Bulearca and Tamarjan, 2010), it allows individuals to better comprehend how goods, products, and experiences could impact their offline life (Rauschnabel, 2018).

AR is a tool that enhances and supplements an individual's imagination, and it allows them to conceive and visualize a new reality (Hilken et al., 2017). For example, Ikea's AR app which allows consumers to virtually embed a new piece of furniture into their existing living room addresses consumers' hedonic motivations through aesthetics and the appreciation of form and color. On the other hand, inspiration depends on the assumption that possibilities can be realized (for example, one might argue that the level of inspiration for Ikea's AR app may decrease when consumers feel the functionality of the app is reduced because, e.g., the dimensions of different pieces of virtual furniture are not congruent). Thus, we hypothesize that in the context of AR applications, both utilitarian and hedonic value increase consumer inspiration:

H4. Utilitarian benefits have a positive effect on inspiration.

H5. Hedonic benefits have a positive effect on inspiration.

Further, because inspiration is evoked when an external stimulus leads to the intrinsic pursuit of a consumption-related goal (Böttger et al., 2017), we argue that it is difficult to generate inspiration without a minimum level of realism. That is, an AR app that draws consumers into a fantasy world of consumption may generate overall positive attitudes, but would not increase inspiration to the same extent as a similarly aesthetic AR app that provides consumers with an experience that they perceive as being real and thus relevant for their consumption goals and meaningful in the context of their current life situation. In other words, a more realistic AR experience increases the extent to which consumers can imagine and visualize possibilities and new ideas, which results in higher levels of inspiration. As described above, the current research operationalizes realism through the construct of perceived augmentation quality based on Hilken et al. (2017). Thus, we hypothesize:

H6. Perceived augmentation quality has a positive effect on inspiration.

In addition, we predict that inspiration will have a positive impact on attitude toward the app. Several authors (Böttger et al., 2017; Figgins et al., 2016; Oleynick et al., 2014) have shown that inspiration changes existing views and perceptions and thus can have attitudinal consequences. However, although inspiration is conceptualized as a positive construct (Thrash et al., 2014) and a generally positive influence of inspiration on attitudes is intuitively conceivable, one might argue that a one-time exposure to a stimulus (i.e., the AR app) may not be strong enough to generate a significant change in attitudes, which are by definition enduring evaluative judgments that are more stable than emotions (Böttger et al., 2017). For example, would the level of inspiration generated through a one-time exposure to the Ikea furniture app be sufficient to change attitudes toward the Ikea app? Our argument supporting this hypothesis is based on the highly experiential (and thus impactful) nature of AR. As numerous authors emphasize (e.g., Bulearca and Tamarjan, 2010; Javornik, 2016a; Poushneh and Vasquez-Parraga, 2017; Rauschnabel et al., 2018, Yim and Park, in press), the cognitive and emotional impact of AR is frequently stronger than similar exposures to traditional TV advertising or web-browsing. Further, inspiration itself, due to its focus on new possibilities and the realization of new ideas (Böttger et al., 2017; Oleynick et al., 2014), is an inherently powerful construct capable of influencing a plethora of desired states, such as efficiency, productivity, attachment, satisfaction, and customer loyalty (Böttger et al., 2017; Thrash et al., 2014). Thus, we hypothesize:

H7. Inspiration has a positive effect on attitude toward the AR app.

3.3. Consequences of inspiration and attitude toward the app

We investigate a managerially and theoretically relevant consequence of using branded AR apps: changes in overall attitude towards the brand itself. Our conceptualization of attitudes follows Conrey and Smith (2007), Gawronski and Bodenhausen (2007), and Schwarz (2007), who view attitudes not as enduring personal dispositions but rather as time-dependent evaluative judgments that are constructed in situ based on currently accessible information. Previous studies in brand management (McLelland et al., 2014; Park et al., 1993; Yang and Mattila, 2014) adopted this perspective by operationalizing changes in brand attitude as the difference between post and pre-brand attitude based on an intervention.

Furthermore, we conceptualize brands as associative semantic networks (Aaker, 1991; Griffiths et al., 2007; Keller, 1993). A network consists of nodes that are linked to each other. Nodes are sets of information, such as (other) brands or specific associations that are stored in consumers' long-term memory (Keller, 2003). For example, the brand IKEA might be linked to nodes such as 'modern furniture', 'good value', or 'low price'. In branding, these nodes are termed "brand associations" and are unique to each consumer who has his or her own network of associations for each brand. The strength of these associations can also vary, and strongly linked associations are activated more quickly than weakly-linked ones (Fazio, 1986). In addition, more effort is needed to add new or unlink existing associations when existing brand associations are strong (Simonin and Ruth, 1998). Consequently, it is usually easier to change brand associations for less well-known brands (e.g., a startup business) than it is for established, well-known brands (e.g. Coca Cola).

Reflecting on the IKEA example outlined above, depending on the strength of these associations, the personal relevance, and personal preferences, consumers create an overall evaluation of a brand ('how much do I like the brand IKEA?'), which is referred to as *brand attitude* (Keller, 1993; Wilkie, 1990). Since brand attitude is a function of the associated salient attributes of a specific brand (Fishbein and Ajzen, 1975; Keller, 1993), it denotes a "summary judgment and overall evaluation of any brand-related information" (Keller, 2003, p. 596). Following Park et al. (1993), a *change in brand attitude* represents the difference in brand attitude before vs. after using an AR app. In situations where consumers' evaluation of a specific brand improves (vs. deteriorates), changes in brand attitude are positive (vs. negative).

The theoretical rationale for why changes in brand attitude should occur following the use of a branded AR app is twofold. First, we argue that a positive (vs. negative) experience with a branded AR app adds positive (vs. negative) associations to the focal brand, predominantly through association transfers (Keller, 2003). Second, Information Integration Theory (Anderson, 1962) proposes that existing associations can be altered once new related information is processed and integrated into existing knowledge. In the context of brands, this means that brand attitudes are influenced when consumers receive, interpret, and evaluate new information (e.g. from an app) related to their existing brand associations (Simonin and Ruth, 1998). In the context of AR apps, this means that once consumers are exposed to branded AR content, associations of the app usage experience can 'spill over' to the brand (Keller, 2003; Schnittka et al., 2017). For example, if consumers rate an app as 'boring' or 'poorly designed', these negative associations can decrease

overall brand attitude. In contrast, if consumers rate an app as 'useful', 'enjoyable' and 'well-designed', these positive attributes can serve as new associations and thus, improve overall brand attitude. We propose that the more (vs. less) a consumer enjoys using an app, the more positively (vs. negatively) usage of the app will impact the overall brand. Thus,

H8. Attitude toward the app has a positive effect on changes in overall brand attitude.

Inspiration, as discussed above, allows individuals to see beyond what has traditionally been the limits of his or her abilities (Thrash and Elliot, 2004). Other scholars (e.g. Böttger et al., 2017; Figgins et al., 2016; Oleynick et al., 2014) show that inspiration changes existing views and perceptions, and inspiration can act to transmit or mediate between antecedents and consequences (Thrash et al., 2010). Thus, we argue that consumers who are inspired by the app transfer the benefits of the app to the brand (as hypothesized in H1 and H2). This transference results in improvements in overall brand attitude.

We expect this effect because, although consumers may feel inspired due to the possibilities demonstrated by the AR app, the brand behind the AR app remains salient. On some level, consumers are aware that the AR app is an element associated with a specific brand. Since the ultimate goal of most commercial apps is not to entertain consumers, but to increase brand attachment and purchase intention, firms typically ensure that the brand name is sufficiently salient to remind consumers that their positive experience with the AR app is associated with the brand. The positive, transcendent awakening of insight that is associated with inspiration (Böttger et al., 2017) will be transferred to attitudes toward the brand.

H9. Inspiration has a positive effect on changes in overall brand attitude.

4. Methodology and research design

Following related research (e.g. Javornik, 2016a; Rese et al., 2017), we developed a research design involving participants' use of the AR apps "IKEA Planner" and "Tunnel" (by "Die Fantastischen Vier", a German Hiphop Band) in a controlled environment. IKEA Planner is an AR app that allows users to virtually place furniture in a physical room. IKEA outlines multiple benefits of this app, such as a better planning and a lower risk of product returns. Extant research has shown that the practical and largely utilitarian benefits of the IKEA app (e.g. Rese et al., 2014, 2017) differ greatly from the playful and hedonic "Tunnel" app. Tunnel is the name of a song by "die Fantastischen Vier", and the AR app projects song-related information to a user's environment. The rationale for using two different apps is to generate variance in our variables of interest and to improve the generalizability of the findings. Screenshots of both apps are presented in Fig. 1.

Two-hundred and one respondents were recruited from a public university in Germany (47.3% female, mean age = 23.4 (SD = 4.5) years, 84.1% students) and offered candies or drink vouchers in return for participating in the study. Participants first answered general questions about new technologies and brand attitudes (toward IKEA [n = 85] or Die Fantastischen Vier [n = 116], respectively). One group of respondents was asked to place a KIVIK couch in the corner of the room using the Planner app. The other group was simply asked to experiment with the Tunnel app for approximately 5–10 min. After using the apps, participants were asked to evaluate the experience, the app, and the brand, and they completed some demographic items.

Established reflective multi-item measures were adapted to the context of each app using 7 point Likert-type scales where high values indicate high agreement or positive evaluations. We followed prior research in brand management (McLelland et al., 2014; Park et al., 1993; Yang and Mattila, 2014) by operationalizing *changes in brand attitude* as the difference – i.e. change – between post- and pre-brand attitude. Therefore, we calculated difference scores for two items (compare the Appendix), so that positive (vs. negative) values indicate an increase (vs. decrease) in brand attitude. We modeled these two difference scores as a reflective latent construct (that is, the difference scores for each of the two items represent the underlying construct of change in brand attitude).

Prior to the hypotheses testing, we ran a confirmatory factor analysis (CFA) in Mplus 8.0 to assess the psychometric characteristics of each construct (see Appendix A) and the measurement model as a whole (χ^2 = 213.9; df = 89; CFI = 0.96; TLI = 0.94; RMSEA = 0.08; SRMR = 0.04) on the pooled dataset. We assessed common method variance by applying the Harman Single Factor test. In particular, we compared the multi-factor model with a model in which all items loaded on a single factor (χ^2 = 899.2; df = 104; CFI = 0.71; TLI = 0.67; RMSEA = 0.20; SRMR = 0.09). This one-factor model displayed poor model fit compared to the multi-factor model ($\Delta\chi^2$ = 685.3; Δdf = 15; $p < .001$). Further, the Fornell & Larcker procedure, as reported in the Appendix, indicates sufficient discriminant validity.

5. Results

5.1. Descriptive statistics

Table 1 summarizes the means for the variables of interest for each app along with the means for the pooled data. Overall, the IKEA app received substantially higher ratings (all $p < .001$). The results showed significant improvement in brand attitude for both brands after using the app. Brand attitude for IKEA increased from M_{pre} = 5.64 to M_{post} = 5.94, and brand attitude for Die Fantastischen Vier improved from M_{pre} = 3.41 to M_{post} = 3.64. Repeated measures ANOVAs ($F(1, 114) = 5.961$, $p < .05$ for Tunnel; $F(1, 85) = 18.279$, $p < .001$ for IKEA) showed that usage of the app generated a significant difference on brand attitude as displayed in Fig. 2.

5.2. Hypotheses testing

To assess the proposed effects, we ran a structural equation model in Mplus 8.0. The overall assessment of model fit was excellent (χ2 = 216.5; df = 92; CFI = 0.96; TLI = 0.94; RMSEA = 0.08; SRMR = 0.04). Fig. 3 summarizes the results.

The results showed that attitude toward the app was influenced by both utilitarian (β = 0.45; $p < .001$) and hedonic benefits (β = 0.44; $p < .001$), supporting H1 and H2. The relationship between perceived augmentation quality and attitude toward the app was positive but not significant (β = 0.09; p = .18), which does not support H3. The data explained 84% of the variance in the attitude toward the AR construct.

Hedonic benefits (β = 0.28; $p < .001$) and perceived augmentation quality (β = 0.49; $p < .001$) both drove inspiration, supporting H5 and H6. However, the effect of utilitarian benefits on inspiration was in the proposed direction (β = 0.14) but did not reach significance (p = .15), rejecting H4. The model explained 63% of inspiration's variance. Finally, inspiration was not significantly linked to attitude toward the app (β = .05; p = .51), rejecting H7. However, inspiration significantly drove changes in brand attitude (β = 0.38; $p < .01$), supporting H9. In contrast, H8 was rejected as attitude toward the app did not significantly drive overall brand attitude (β = 0.11. p = .34). Overall, 22% of the variation in changes in brand attitude can be explained by the model.

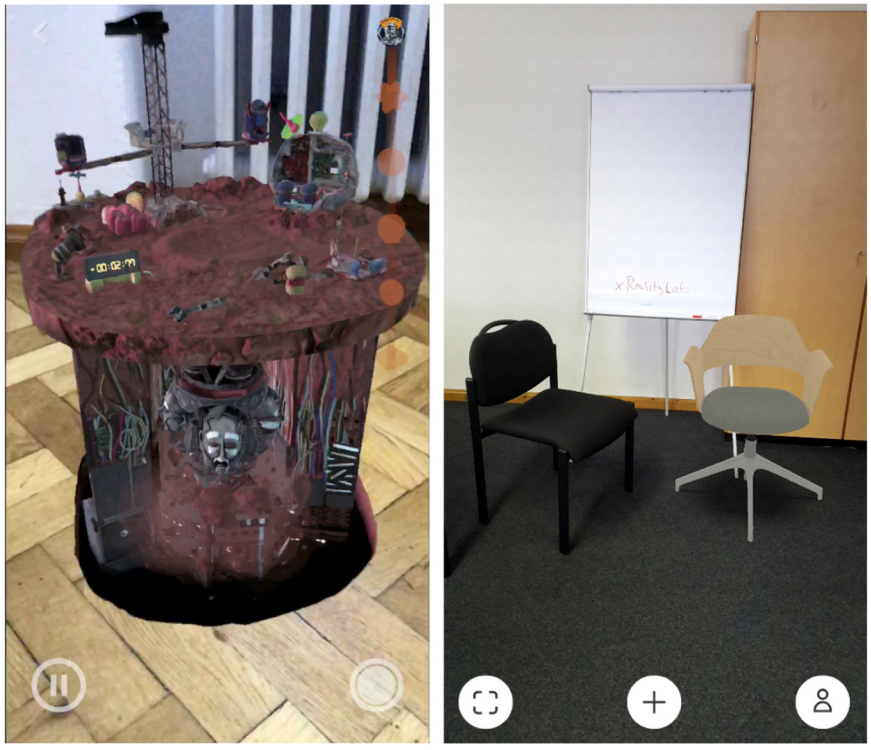

Fig. 1. Example Screenshots of the branded AR apps Left: Tunnel; Right: IKEA Place (left: real chair; right: virtual chair).

Table 1
Consumer evaluations of branded AR apps: Descriptive Statistics.

	Tunnel n = 115		**IKEA** n = 86		**Pooled Dataset** n = 201	
	Mean	SD	Mean	SD	Mean	SD
Pre Brand Attitude	3.41	1.70	5.64	1.12	4.35	1.84
Post Brand Attitude	3.64	1.66	5.94	1.04	4.61	1.83
Utilitarian Benefits	2.84	1.51	5.82	1.05	4.10	1.99
Hedonic Benefits	3.75	1.79	5.22	1.34	4.37	1.77
Perceived Augmentation Quality	3.19	1.52	4.55	1.70	3.77	1.73
Attitude toward the App	3.79	1.67	6.15	0.86	4.79	1.81
Inspiration	3.14	1.68	4.20	1.57	3.59	1.71

5.3. Mediation tests

The full model depicted in Fig. 3 places attitude towards the app and inspiration between the antecedents of AR app use (hedonic and utilitarian benefits along with perceived augmentation quality) and the consequences for the firm (namely a change in overall brand attitude). After accounting for the hypotheses that were not supported, several important mediation paths through inspiration (but not attitude toward the app) remain. Formal testing of inspiration as a mediator shed light on the mechanisms through which the antecedents of AR app use influence brand attitude. Understanding how the drivers of app use impact brand attitude will allow augmented reality marketers to craft apps that provide attributes that benefit both the consumer and the firm. Table 2 displays the significant mediation paths that were revealed following 5000 bootstrap samples in Mplus using the Maximum Likelihood estimator. Following Preacher and Hayes (2018), inspiration mediates paths from perceived augmentation quality and hedonic benefits to changes in brand attitude.

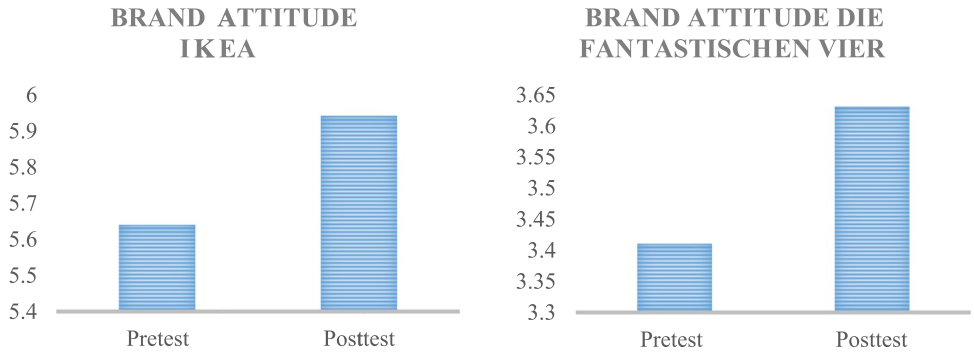

Fig. 2. Impact of AR usage on brand attitude.

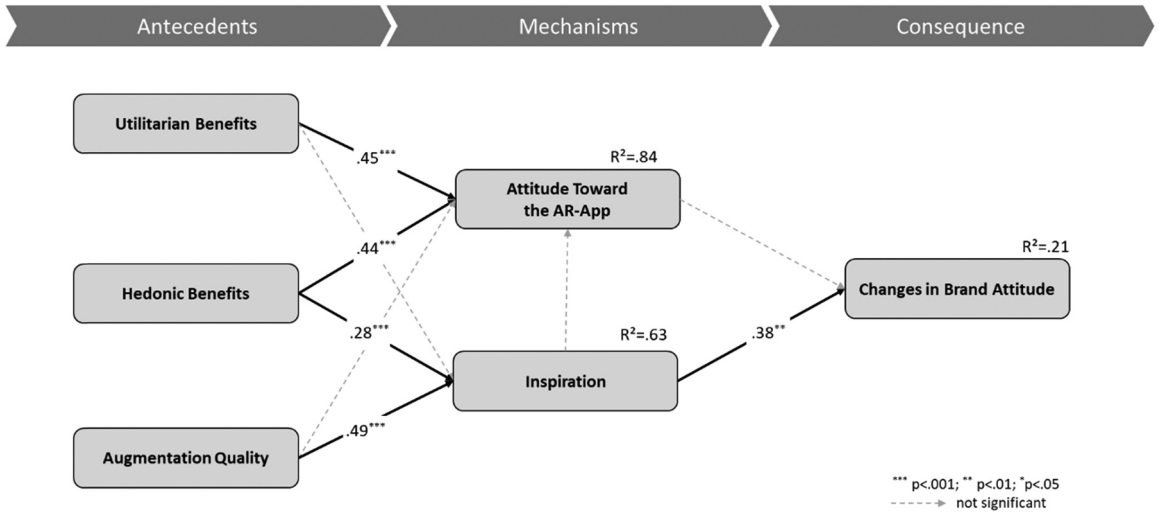

Fig. 3. Empirical results how branded AR apps impact brand attitude.

5.4. Robustness tests

We conducted multiple additional analyses to assess the stability of the findings. First, we modeled a more complex longitudinal model incorporating pre/post brand attitude similar to the one used by Simonin and Ruth (1998) to assess the robustness of difference score models (e.g., Yang and Mattila, 2014); the results were unchanged. Second, since construct reliabilities are often lower for latent difference score constructs (for a methodological discussion, see Collins, 1996 or Rogosa, 1988), we created a composite difference score and modeled this composite score as an endogenous single item variable; the results were stable. Third, we assessed the results when increasing model complexity by adding control variables, such as age, gender, and/or app type; and the results were similar.

6. Discussion

6.1. Summary of the findings

On its face, the most interesting finding for scholars and managers alike might be the positive effect of using a branded AR app on respondent's attitude toward the brand. Indeed, a study by BCG (2018) has shown that despite managers' high interest in the topic, a lack of understanding of AR's contribution to firm value remains a major barrier to AR implementation. The findings from our empirical study show that both brands benefitted through improved brand attitude following consumers' use of their AR app. This is particularly noteworthy since IKEA is already a very popular brand, and research shows that it is difficult to change perceptions of established brands (Simonin and Ruth, 1998).

Equally important, our research demonstrates the process through which AR app use influences brand attitudes. To examine these relationships formally, we developed a structural network of relationships and tested the model using SEM. Our findings suggest that inspiration, a motivational state that brings ideas to fruition (Oleynick et al., 2014), is a fundamental construct for understanding how AR impacts brand attitudes. Specifically, we find that changes in brand attitude are driven by high levels of inspiration, which develop through the quality and integration of virtual content onto the consumer's perception of the real-world. Inspiration is also driven by the hedonic benefits that the user derives from using the AR app, but not by utilitarian benefits. Utilitarian benefits, however, are important in shaping consumers' evaluations of the AR app. Thus, our study avoids the app-centric approach of previous AR research and integrates effects stemming from attitudes towards the app with effects based on inspiration.

6.2. Implications for AR marketing theory

Since AR Marketing is a relatively novel research field, this work addresses several gaps in the extant literature. First, this paper

Table 2
Mediation Paths: How Benefits and Augmentation Quality impact brand attitude.

Path	β	LCI	HCI	S.E	Est/SE	P	Mediation
Perceived Augmentation Quality							
→ Inspiration → Changes in Brand Attitude	0.18	0.06	0.33	0.08	2.23	0.03	Yes
→ Att. to App → Changes in Brand Attitude	0.01	−0.01	0.04	0.02	0.56	0.58	No
Σ indirect effects	0.19	0.07	0.32	0.08	2.48	0.01	Yes
Hedonic Benefits							
→ Inspiration → Changes in Brand Attitude	0.10	0.03	0.18	0.05	2.24	0.03	Yes
→ Att. to App → Changes in Brand Attitude	0.05	−0.05	0.15	0.06	0.78	0.44	No
Σ indirect effects	0.15	0.06	0.24	0.06	2.72	0.01	Yes
Utilitarian Benefits							
→ Inspiration → Changes in Brand Attitude	0.05	−0.02	0.15	0.05	1.01	0.31	No
→ Att. to App → Changes in Brand Attitude	0.05	−0.05	0.15	0.06	0.78	0.44	No
Σ indirect effects	0.10	−0.00	0.20	0.06	1.59	0.11	No

Note: Standardized effects presented only. ML estimator in Mplus. LCI = Lower Confidence Interval (5%), HCI = Higher Confidence Interval (5%).

continues the development of the field of AR marketing as a research area. Second, our model integrates antecedents, mediators, and outcomes derived through AR technology. Third, this study quantifies actual improvements in brand attitude and details the effectiveness of AR app usage. Finally, the current work introduces the inspiration construct as a mediator to explain how brand attitude can improve through AR use and thus goes beyond the app-centric approach to AR marketing utilized by most extant research.

New disciplines often emerge when marketers contemplate new technologies, and an evolving body of research has outlined selected facets of marketing-related issues in AR. For example, online marketing recently emerged and is now a staple of the marketing discipline (Li and Kannan, 2014). Similarly, the social media discipline is beginning to crystalize (Felix et al., 2017) though its academic study is barely a decade old. Given the practical relevance of AR research, our study contributes to AR marketing as an emerging discipline. In particular, we concur with BCG (2018) who propose that AR is a strategic and interdisciplinary concept that organizations can apply to interact with multiple stakeholders. Our research context (AR applications from a global furniture producer/retailer and a German hip hop band) reflects the view of AR technology as a marketing tool with potential impacts on long-term marketing strategy.

Second, prior studies have investigated multiple drivers of liking or disliking particular apps (Javornik, 2016a), and most of these have applied existing and established frameworks like the Technology Acceptance Model (e.g. Spreer and Kallweit, 2014). Most of these studies employed attitudinal measures – such as reuse intention or app characteristics – as focal dependent variables (Javornik, 2016a; Yaoyuneyong et al., 2016). The current study integrates antecedents (here: app characteristics and benefits), mechanisms (here: attitude toward the app and inspiration) and consequences (here: changes in brand attitude) in an integrative framework that provides insights into the psychological mechanisms that translate app characteristics and benefits into managerially relevant outcomes. For example, resonating with previous research (Rese et al., 2014), we find that attitude toward using an app (a commonly used focal construct in prior research) is primarily influenced by utilitarian benefits. However, we show that attitude toward the app does not have a significant impact on the most pertinent, long term outcome for brand managers (e.g. improvements in brand attitude). Thus, attitude toward an AR app may be relevant for usability and technology acceptance research, but this should be complemented with inspiration research if the results are to be used in a branding context.

Third, many studies have focused on attitude towards the app as a dependent variable and then highlighted correlations between app evaluations and marketing constructs (e.g., Rese et al., 2014). With few exceptions (e.g. the study by Hopp and Gangadharbatle (2016)), brand attitude has not been the focus of prior studies. However, while Hopp and Gangadharbatle proposed that brand attitude is a consequence of attitude toward the app, it can also be argued that brand attitude drives the evaluation of AR apps (e.g., a customer who really likes IKEA may like the AR app more). Our study reduces ambiguity regarding the direction of the effect by assessing changes in brand attitude based on a pre- and post-use brand attitude measure. More specifically, the current study provides a first attempt to quantify AR's impact on the brand since we measured brand attitude both before and after using the branded app. By assessing the differences in brand attitude and modeling them through SEM, we can quantify and explain the actual improvements in brand attitude through AR, which is a substantial improvement over previous publications on AR.

Finally, it is worth noting that this study also contributes to the research stream of consumer inspiration. Inspiration is an emerging and promising construct in marketing research (Böttger et al., 2017). The transmission model of inspiration suggests that inspiration acts as a mediator between an individual's experiences and future attitudes and behaviors (Thrash and Elliot, 2004; Thrash et al., 2010), and scholars propose that it can be triggered through new technologies (Böttger et al., 2017). However, the extant research has yet to explore this. The current study shows that inspiration mediates the relationship between the benefits subjects seek through engaging in AR apps and outcomes that matter to the firm. While others have conceptualized inspiration as a mediator in traditional point-of-sales marketing context (i.e. Böttger et al., 2017), this research is the first to model inspiration as a mediator between benefits sought through AR and changes in brand attitude. The flexibility afforded through AR can create substantial consumer value by stimulating and facilitating inspiration. The cost to manipulate a virtual representation of a product or service through AR is relatively modest while the benefits may approach levels similar to physical trial or physical manipulation as technology improves. We believe that AR marketing and inspiration will play an important role in areas beyond branding, such as cross-selling, up-selling, or pre-sales service.

6.3. Implications for AR marketing practice

Managers will need to understand the value of AR and how AR marketing can be exploited (BCG, 2018). The current research shows a significant improvement in brand attitude for both a lesser known (Die Fantastischen Vier) and a very established brand (IKEA) following the use of a branded AR app. We test the impact of the fundamental benefits that consumers seek through using AR apps, and we show how inspiration mediates the relationship between the benefits sought through AR use and overall brand attitude. Our findings provide managers with multiple avenues through which they can simultaneously provide value to consumers of AR apps and benefits to their brands and firms.

One approach to serving both consumers and the firm is to find ways to create inspirational apps. The findings from our study suggest that both hedonic benefits (H5) and perceived augmentation quality (i.e. high levels of perceived realism and integration) increase inspiration. Thus, one way of providing inspirational AR apps to consumers is to create entertaining and realistic content. Further, in order to maximize a “realistic representation,” AR marketers are betting on technological developments like increases in the computing power of mobile and wearable devices. 3D scanners, cameras, and computer aided manufacturing allow many firms to use CAD plans in their app development. Platforms such as Apple's ARKit2 or Google's AR Core are accessible on newer devices, and these platforms allow spacial recognition and exact tracking of real-life objects (Rajagopal et al., 2018). With the development of AR clouds (e.g. Chen et al., 2011) consumers and developers will have access to an increasing variety of AR content. Finally, forecasts indicate that AR smart glasses will soon enter the consumer market (for a summary, see Rauschnabel, 2018). Technologies such as Microsoft Hololens allow users to experience AR content hands-free, which will make the experience even more realistic than looking “through” a handheld device. On the contrary, poorly developed apps may suffer from a deficient user experience that may translate into negative effects on brands. Thus, as shown through H5, high levels of augmentation quality will likely trigger high levels of inspiration.

In order to create hedonic benefits, apps should incorporate humorous and entertaining elements. However, our findings indicate that utilitarian benefits seem not to relate to changes in brand attitude. Should managers therefore neglect utilitarian benefits in their apps? Definitely not. Utilitarian benefits may not trigger changes in brand attitude, but an app that users do not perceive as useful likely won’t be successful since consumers will not download or use it. In addition, an app with a low evaluation score may lead to negative consumer reviews which then negatively impact app downloads (compare Engler et al.,

2015).

Finally, marketers have a strong interest in identifying key performance indicators (KPIs) to assess their AR activities (Jetter et al., 2018). One simple KPI for consumer apps is the star rating that is publicly available in app stores. Conceptually, star ratings represent an attitudinal construct, similar to the "attitude toward using the app" construct in this study. If managers are interested in assessing the brand-improvement potential of apps, star ratings might not be the best measure to do so. The current study shows that assessing inspiration potential (e.g. through surveys or text mining user reviews) may lead to a better understanding of how an app will impact the brand. Rese et al. (2014) provide guidance on text mining approaches for AR apps. Prior research on Pokémon Go supplements this view. For example, Rauschnabel et al. (2017) show that players' attitude toward playing the AR game was not related to in-app purchases.

7. Limitations and future research

The fact that the participants in this research actually used the app and applied this experience to a brand with which they were likely familiar (IKEA) as well as to a brand with which they were likely less familiar (Tunnel/Die Fantastischen Vier) can be seen as a strength of this research. However, caution must be taken when extrapolating the findings to other apps or consumer groups. In addition, the short time between pre and post measures along with the laboratory setting likely increase internal validity, but this comes at the expense of external validity. Field experiments that test our hypotheses in a more natural context would increase confidence in our findings.

Future research should also assess other mechanisms that can impact brand perceptions. For example, Rauschnabel (2018) introduced a construct termed "Desired Enhancement of Reality." In a branding context, this means that consumers could virtually decorate their private sphere with branded objects. Rather than physically placing branded merchandising products (e.g. Coke signs) in one's home, consumers could decorate their rooms with virtual objects. This also indicates the huge potential of AR for storytelling, a fruitful research area that deserves scholarly attention. Consumers can craft brand focused stories through AR by highlighting brands they love while "blinding out" brands they do not like. However, in order for this to become relevant, we assume that wearable AR technologies must be affordable and prevalent.

Virtually all previous research emphasizes the potential of AR in marketing, but remains surprisingly silent on potential negative or distracting effects of AR. For example, one might argue that an underwhelming AR experience could transfer to consumers' perceptions about the product and thus harm brand equity. Providing a more balanced and possibly critical perspective on AR marketing by showing the boundary conditions when AR marketing could backfire and/or undesired spill-over effects occur would help to increase the theoretical grounding of AR marketing and provide marketing practitioners with important insights for their decision making. For example, the concept of vicarious consumption (Hinsch, 2011) is an extreme potential consequence of AR and VR technologies where the consumer might choose to neglect physical elements of the brand completely in favor of consuming and interacting around the brand solely in a computer-mediated space. Finally, whereas our study focuses on brand-related effects of AR, we expect companies to increasingly apply AR also in contexts outside of branding (compare, e.g., BCG, 2018). Future research should guide managers in developing AR-based sales strategies and investigate how AR can support after sales service and customer retention. Finally, we provide association transfer (Keller, 2003) as the underlying mechanism explaining why inspiration leads to improvements in brand attitude. Future research could assess this relationship in more detail. For example, does this effect hold for all brands similarly, or are there particular boundary conditions (moderators) that strengthen or weaken the effect? Likewise, future research could compare the findings of this study in related media formats, such as Virtual Reality.

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- Source of the epigraph: own.
- Conference presentations: EMAC 2019, Hamburg; 5th. intl ARVR Conference, Munich.

Appendix A

see Tables A1 and A2

Table A1
Squared latent correlations and Composite Reliability (diagonal).

		1	2	3	4	5	6
1	Attitude toward using the App	*.85*					
2	Inspiration	0.49	*0.73*				
3	Utilitarian Benefits	0.72	0.45	*0.76*			
4	Hedonic Benefits	0.69	0.41	0.47	*0.79*		
5	Perceived augmentation quality	0.46	0.54	0.48	0.29	*0.77*	
6	Changes in Brand Attitude	0.13	0.20	0.12	0.11	0.12	*0.42*

Table A2
Measurement Model.

Construct / Items	AVE	CR
Attitude toward using the App (adopted from Jahn and Kunz, 2012; Yang and Zhou, 2011)		
Overall, this app is good.	0.85	0.94
My attitude toward this app is positive		
The app met my expectations.		
Inspiration (adopted from Böttger et al., 2017; Thrash et al., 2017)		
This app has inspired me in a way.	0.73	0.89
This app stimulated my thinking.		
This app gave me new ideas and views.		
Utilitarian Benefits (adapted from Rauschnabel, 2018; Venkatesh et al., 2012)		
This app is useful.	0.76	0.86
This app helped me to better understand the [OBJECT]		
Hedonic Benefits (adapted from Venkatesh et al., 2012)		
This app is entertaining	0.79	0.92
Using this app is fun		
This app is a good time killer.		
Perceived Augmentation Quality (adapted from Hilken et al., 2017; Javornik, 2016a; Vorderer et al., 2004)		
I felt like the [OBJECT] was actually there in the real world.	0.77	0.91
It seemed as if the [OBJECT] had shifted from the tablet into the room.		
It seemed that everything I saw on the display was real.		
Changes in Brand Attitude (adopted from Jin and Sung, 2010; Yang and Zhou, 2011)		
I like [BRAND] (Post – Pre Measures)	0.42	0.58
Overall, I find the brand [BRAND] very good (Post – Pre Measures)		

Note: CR = Composite Reliability; AVE = Average Variance Extracted [OBJECT]: Couch for IKEA, and the Song "Tunnel" for "Die Fantastischen Vier" Overall Model fit: Chi2 = 213.9; df = 89; CFI = 0.96 TLI = 0.94 RMSEA = 0.08 SRMR = 0.04 Estimator: ML in Mplus 8.0 Scales: 7P scales, where higher values indicate higher agreement or better evaluations. We translated and adjusted all scales to the German study context, Augmented Reality and to the specific app, so that differences to the cited references may occur.

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