Technological Forecasting & Social Change 181 (2022) 121752

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

journal homepage: www.elsevier.com/locate/techfore

Technology-enabled personalization: Impact of smart technology choice on consumer shopping behavior

Anne-Sophie Riegger[a], Katrin Merfeld[b,*], Jan F. Klein[c,1], Sven Henkel[a,2]

[a] EBS University, Germany
[b] Utrecht University School of Economics, The Netherlands
[c] Tilburg University, The Netherlands

ARTICLE INFO

Keywords:
Smart technology
Customer-facing retail technology
Assemblage
Personalization
Customer experience

ABSTRACT

Smart technologies promise to enhance customer experience to new levels in next-generation retail stores. Offline retailers increasingly employ technology-enabled personalization (TEP) strategies to digitally enhance in-store customer experience. To send personalized messages to in-store customers, retailers can choose from two types of smart devices: customer-owned smartphones or retailer-owned immersive screens. Although these smart devices may largely determine customers' experiences in future retail, research rarely addresses device-related determinants of the effectiveness of personalized messages in stores. Building on assemblage theory, the authors consider the role of these devices in influencing customer experience and eventually consumer shopping behavior. Through two experiments and a mediated moderation analysis, they investigate the interplay of personalized content and device technology in customers' response to TEP. The results illustrate that consumers react differently to message content depending on the device through which it is conveyed; that is, personalized (standardized) messages are more effective on customer-owned smartphones (retailer-owned screens) because they become integrated into (remain separate from) the customer's extended self. Relational customer experiences, or the extent to which a customer feels positively connected to store assemblages, mediate the effect on shopping behavior. To build TEP strategies, retailers should therefore use smart devices integrated into customers' extended selves.

Introduction

Imagine entering a store and being immediately and directly recognized, prompting a message on a large screen that welcomes you by name and suggests products you may be interested in buying. You thus find exactly what you are looking for immediately. This may sound like science fiction, but it represents a well-established personalization approach in online retail and is likely to revolutionize offline retail as consumer-facing smart technology becomes increasingly available for the next generation of offline stores (Hess et al., 2019; Inman & Nikolova, 2017; Roy et al., 2017). Retailers such as Urban Outfitters and Sephora are already pilot-testing smart technology to send personalized recommendations to customers' smartphones as soon as they enter stores (Bond, 2015); Lotus, a Chinese supermarket chain, has installed immersive screens at store entrances that display recommendations customized for each shopper (KanKan, 2019).

These retail strategies are examples of technology-enabled personalization (TEP) in offline stores; TEP refers to the integration of the digital and physical dimensions of personalization in physical retail to approach individual customers with relevant, context-specific information that leverages both historical and real-time data (Riegger et al., 2021). The objective of smart retail-driven personalization strategies is to improve customer experience and thus encourage particular shopping behaviors, such as browsing the store for longer or purchasing promoted products. Fundamentally, TEP consists of two dimensions: (1) personalized content and (2) the technology that transfers such content. In this relational setting, retailers establish TEP through various technological devices although they can be broadly classified as either

* Corresponding author at: Katrin Merfeld; Utrecht University School of Economics, Kriekenpitplein 21-22, 3584 EC Utrecht, the Netherlands
E-mail addresses: annesophie-riegger@gmx.de (A.-S. Riegger), k.merfeld@uu.nl (K. Merfeld), j.f.klein@tilburguniversity.edu (J.F. Klein), sven.henkel@ebs.edu (S. Henkel).
[1] +31 134662804
[2] +49 611 7102 2070

https://doi.org/10.1016/j.techfore.2022.121752
Received 29 March 2021; Received in revised form 30 March 2022; Accepted 15 May 2022
Available online 20 May 2022

customer-owned smart devices or retailer-owned immersive screens (Roy et al., 2017; von Briel, 2018). Accordingly, customers have different encounters and relationships with different devices and therefore with the TEP content and the retailer itself. These complex relationships reflect an assemblage of factors that define the customer experience (Hoffman & Novak, 2018; Novak & Hoffman, 2019), in which different devices, with their distinct ownership forms, are integrated into the customer's extended self to varying degrees (Belk, 1988). If customers sense a very close integration with the device, the nature of the interaction might enhance their experience (Brasel & Gips, 2014; Novak & Hoffman, 2019) and thus their sense of positive connection with the overall store environment and the retailer (Alhouti et al., 2015; Gahler et al., 2019).

Despite these potentially critical influences on TEP strategies, technology devices have been relatively less investigated in customer behavior research (Brasel & Gips, 2014) than the effects of specific personalized content on customers, whether in online (Aguirre et al., 2015) or offline (Hess et al., 2019) settings. This gap leaves retailers and store managers without clear insights into which technologies they should use to enable more personalized in-store experiences in future retail stores (Roy et al., 2017; von Briel, 2018; Willems et al., 2017). Technology developers and designers also require device-specific use cases that can help them predict customers' reactions to different TEP devices (Riegger et al., 2021). A total of $203.6 billion was spent on smart in-store technology in 2019 (Tech., 2019), and even greater investments are forecast as retail stores become smarter and better equipped with consumer-facing technologies (CB Insights, 2020). Also, recent academic findings state that TEP in retail stores can lead to customer reactance or even exit from stores (Hess et al., 2019). What if the euphoria with in-store technologies is actually misplaced (Boudet et al., 2020)?

To clarify these points and establish recommendations for retail managers and technology designers, we investigate different types of smart technology to display the content and their effects on customers' acceptance of personalized retail messages, with the prediction that retailers' technology choices influence the effect of TEP on customers. We first establish a theoretical background by reviewing relevant literature on TEP, assemblage theory, and the extended self and then build a conceptual model to reflect the importance of the devices used to display personalized content in physical retail settings. Subsequently, we conduct two experiments to investigate the effects empirically and conduct a mediated moderation analysis to test the underlying mechanism that drives the effects. Hence, we seek to make several contributions to existing research and managerial practice.

First, we emphasize the strategic importance of choosing an appropriate customer-facing smart technology to support future personalization efforts in store environments. This technology choice strongly influences personalization efforts in future retail stores, and the insights we establish help address a pressing change in offline retail as it transitions from traditional face-to-face to automated in-store interactions that use customer-facing smart technologies. They also advance the growing literature on future retail technologies, particularly smart versions applied in offline environments (e.g., Roy et al., 2017; von Briel, 2018; Willems et al., 2017).

Second, by investigating the interaction between personalization efforts and smart retail devices in TEP, we contribute to the evolving literature on how technologies can facilitate offline personalization strategies in smart retail. That is, although prior research has investigated customer- and retailer-owned devices, no studies have addressed the retailer's strategic choice to use one smart technology device over another and its implications for personalization effectiveness (Hess et al., 2019; Riegger et al., 2021). In clarifying how customers' perceptions of personalization efforts change when they are using their own or retailer-owned devices, we also provide a novel perspective on the personalization–privacy paradox by investigating the impact of the specific technological devices being used (Awad & Krishnan, 2006; Sutanto et al., 2013).

Third, on a broader societal level, our paper sheds light on the interaction between consumers and smart retail devices. Drawing on assemblage theory, we reveal how customers' acceptance of a retailer's personalization messages is contingent on their relationship with the device on which those messages appear, that is, the degree to which the technological device is integrated into their extended self. We specifically investigate how the content–device combination influences the relational customer's experience with the smart store assemblage as an underlying mechanism of the effects. So far, such behavioral consequences of device integration into the consumer's extended self have only received limited attention in research (Brasel & Gips, 2014) but are increasing in importance as consumers associate growing experiential value with technological devices (Novak & Hoffman, 2019; Roy et al., 2017). We provide guidance for retail managers on how to implement TEP in their offline stores and which customer-facing technologies to adopt according to their intentions to send personalized or standardized messages.

Theoretical Background

Technology-Enabled Personalization (TEP)

Personalization refers to a targeted marketing strategy at an individual level (Tam & Ho, 2006), in which the consumer takes a passive role, meaning that all personalization efforts are initiated by the company (e.g., Aguirre et al., 2015; Kalyanaraman & Sundar, 2006). The overall goal of personalization is relevance—a personalized experience must offer content that is of customers' interests and addresses their needs and thus "deliver[s] the right content to the right person at the right time" (Tam & Ho, 2006, p. 867).

Technological advancements support the spread of online personalization to the "real world," which in turn suggests the potential for disrupted retailing experiences. In traditional, face-to-face personalization, frontline employees collect real-time data and adapt their behaviors and offerings to the context (Weitz et al., 1986); meanwhile, online personalization instead draws on data about customers' past behaviors (Aguirre et al., 2015). Customer-facing smart technologies then integrate the advantages (context specificity, data-based information) of both personalization strategies (Hess et al., 2019). The integration of physical and digital personalization dimensions at the point of sale means customers receive relevant, context-specific information reflecting both historical and real-time data they have provided. Fundamentally, such TEP can be conceptualized according to the content it provides and the device used to transfer such content. The interplay of these components (personalized content and technological device) also requires careful consideration (Riegger et al., 2021).

When shopping online, customers use their own gadgets (e.g., smartphones, laptops), but in stores, retailers can offer TEP through either customer-owned (e.g., smartphone) or retailer-owned (e.g., interactive mirror) devices. To identify cutting-edge customer-facing smart retail technologies that facilitate TEP, we searched practitioner articles, company websites, and press announcements[3] and identified several pilot projects as detailed in Table 1. For example, in Thailand, 7-Eleven stores rely on facial recognition to identify customers and display personalized content on large retailer-owned screens (Reed, 2018). In the United States, the luxury department store chain Nordstrom takes a different approach by identifying individual customers when they enter stores using their smartphones and informing them about the current availability of items in their online shopping baskets (Mittal, 2016).

As Table 1 also outlines, these customer- or retailer-owned smart technologies can be classified further as immersive, hybrid, or mobile

[3] We used search terms such as "in-store personalization," "retail technology," "artificial intelligence in retail," and "connected retail."

Table 1
Overview of TEP Strategies and Device Technologies

Retailer/ Technology (Provider)	Country	Data Source/ Identifier	Data Type	Interface	Displayed Content	Level of Personalization	Sources
7-Eleven/ Remark (KanKan AI)	Thailand	Facial recognition, gesture and emotion tracking, loyalty card data	Individual identity (loyalty program members), emotions	Retailer-owned screen	Personalized product recommendations	Individual identification: content based on past behavior (loyalty card data)	Chan (2018), Reed (2018)
Crate and Barrel/ CloudTags	USA	In-store behavior	In-store location, interaction with products	Retailer-owned tablet	Individualized product recommendations based on current in-store behavior	Individualization based on current in-store behavior, no identification on personal level	O'Shea (2016)
Harman/ Samsung	USA	Facial recognition	Age range, gender	Retailer-owned screen	Individualized advertising, lighting scenes, and background audio based on demographic clusters	Demographic clusters based on outer appearance, no identification on personal level	Harman & Samsung SDS (2019)
KFC/Baidu	China	Facial recognition	Age range, mood	Retailer-owned screen	Individualized meal recommendations based on demographic clusters	Demographic clusters based on outer appearance, no identification on personal level	Hawkins (2017)
Lotus Supermarkets (KanKan AI)	China	Facial recognition, customer account data (visual and registered membership)	Individual identity (returning customers and members)	Retailer-owned screen	Personalized product recommendations and coupons, interactive games, and raffles	Individual identification: content based on past behavior (online and offline)	KanKan (2019), Remark Holdings, Inc. (2018)
Made/Cloud Tags	UK	In-store behavior	In-store location, interaction with products	Retailer-owned tablet	Individualized product recommendations based on current in-store behavior	Individualization based on current in-store behavior, no identification on personal level	Rigby (2014)
Nordstrom, Beacons	USA	Smartphone	Location tracking, context	Customer-owned smartphone	Personalized product recommendation and in-store navigation based on store proximity, in-store location, and online shopping bag	Individual identification: content based on smartphone data and customer account	Mittal (2016), Horwitz (2015)
Real Echion AG	Germany	Facial recognition: eye contact	Attention time, age range, gender	Retailer-owned screen	Individualized product recommendations based on demographic clusters	Demographic clusters based on outer appearance, no identification on personal level	Jansen (2017)
Tesco/ AMScreen	UK	Facial recognition	Age range, gender	Retailer-owned screen	Individualized advertisement based on demographic clusters, date and time	Demographic clusters based on outer appearance, no identification on personal level	Bosteels (2013)
Timberland/ CloudTags	USA	In-store behavior	In-store location, interaction with products	Retailer-owned tablet	Individualized product recommendations based on current in-store behavior	Individualization based on current in-store behavior, no identification on personal level	Hutchings (2016)
Urban Outfitters, Swirl (Beacons)	USA	Smartphone	Location tracking, context	Customer-owned smartphone	Personalized coupons and recommendations based on in-store location and past purchase behavior	Individual identification: content based on smartphone data and customer account	Bond (2015)

Note: The technology categories are adapted from Hess et al. (2019).

technologies (Pantano & Viassone, 2014). First, immersive screen technologies use retailer-owned immobile devices, such as smart mirrors, virtual fitting rooms, and touchscreens, which often function as self-service technologies that customers can approach as they choose (Pantano & Viassone, 2014). Second, hybrid technologies are retailer-owned, portable devices, like handheld scanners or tablets, which can generally scan in-store radio frequency identification tags to offer context-specific information (Wong et al., 2012). Third, mobile technologies are customer-owned and portable; they are mainly smartphones. These smartphones do not belong to the stores, yet we classify them as customer-facing smart retail technologies, as retailers often leverage them to track customers' in-store movements (e.g., using beacons) and then push context-specific information (Bues et al., 2017; Gao et al., 2013; Grewal et al., 2018).

To inform the increasing uses of these technologies, including retailers' strategic choices between technological devices, in efforts to provide effective personalized messages in stores, we focus on customer-owned smartphones and retailer-owned immersive screens that build on past customer behavior. These devices represent extreme categories of the technology spectrum and also the most advanced categories of pilot TEP efforts (see Table 1).

Consumer–Device Assemblages in TEP

Smart retail technologies should facilitate improved, more personalized customer experiences (Roy et al., 2017; Shankar, 2021). To predict the implications of partially autonomous and proactive smart retail technologies, we must move beyond a predominantly passive conceptualization of customer experience because the way "the consumer affects a smart object is as much a part of the experience as how the consumer is affected by a smart object" (Hoffman & Novak, 2018, p. 1181). Especially in TEP, the device gathers customer information, provides product information, and actively determines the customer experience, prompting bidirectional customer–technology links and a relational experience overall. This customer experience refers to consumer engagement not only with a single screen in the store but also with the smart store environment. The relational customer experience arising from this environment reflects the customer's sense of positive connection with the smart store environment, which in turn determines the retailer's bond with the customer (Alhouti et al., 2015; Gahler et al., 2019).

To conceptualize customers' interaction with technological entities, Hoffman and Novak (2018, p. 1181) propose the concept of assemblage, which they predict is particularly "applicable to larger macro-assemblages such as smart stores." Building on DeLanda's (2011, 2016) initial assemblage theory, they suggest that ongoing interactions between technology and customers produce new properties and dimensions pertaining to what the customers and smart objects can do and experience. Then the consumer and device(s) become an entity, the consumer–device assemblage, with a joint identity (sum of properties, capacities, and roles; Hoffman & Novak, 2018). That is, a consumer–device assemblage is a perceived entity that results from a consumer's relational interaction with an object and its extended network. Next, contingent on this consumer–device assemblage, a consumer experience assemblage arises through continued consumer-centric interactions (Hoffman & Novak, 2018). The nature of the consumer–device assemblage determines the customer experience (Novak & Hoffman, 2019).

The Effect of TEP on Consumer Shopping Behavior

For retailers, personalization can be a double-edged sword (Tucker, 2012): it can produce favorable consumer reactions, such as satisfaction, gratitude, or delight, by offering better matches with their preferences, reduced search costs, and diminished risk of information overload (Ansari & Mela, 2003; Baek & Morimoto, 2012; Bock et al., 2016; Shen, 2014; Vesanen, 2007), but it can also produce unfavorable consumer reactions, such as lower attitudes or negative behavioral intentions, by sparking privacy concerns, risk perceptions, and feelings of vulnerability (Aguirre et al., 2015; Bleier & Eisenbeiss, 2015; Cloarec, 2020; Hess et al., 2019). Predictions of favorable reactions are common in theories of self-referencing and adapted information processing as well as the elaboration likelihood model (Tam & Ho, 2006); predictions of unfavorable reactions usually draw on reactance theory (Aguirre et al., 2015; Esmark et al., 2017).

Applying assemblage theory, both opposing customer reactions could seemingly arise in response to TEP efforts (Hoffman & Novak, 2018): customers might have positive relational experiences with the assemblage and seek to interact with the technological device (i.e., self-extension) but also encounter some negative relational experiences with the same assemblage in that they willingly restrict their connections by avoiding some enabling technological devices (i.e., self-restriction). The coexistence of both positive and negative experiences reflects the personalization–privacy paradox, in which consumers value the benefits of personalization but also perceive the risk of disclosing personal information and intrusions to their privacy when their personal information is used (Aguirre et al., 2015; Awad & Krishnan, 2006; Sutanto et al., 2013). More specifically, research has indicated that "privacy concerns can induce reactant cognition and behaviors" (Zeng et al., 2020, p. 3) and even negatively impact purchase behavior (Phelps, D'Souza, & Novak, 2001), while personalization has also been shown to increase purchase intention (Bues et al., 2017). Accordingly, we predict that TEP efforts in smart retail settings can have positive and negative effects on shopping behaviors. While they can increase customers' purchase intentions toward a product in the store, they also can evoke customer reactance. "Reactance is a motivational state in which consumers resist something they find coercive by behaving in the opposite way to that intended" (Tucker, 2014, p. 546). In a personalization context, this refers to consumers' behavioral reactions to offset the perceived threat to freedom posed by a company's personalization efforts (Brehm & Brehm, 1981), commonly manifested by leaving the place where the personalization has occurred (Abernethy, 1991; Edwards et al., 2002; Esmark et al., 2017). Personalized retail content may pose a particular threat to freedom with a resulting strong behavioral reactance, as the restricted freedom is perceived to be personally directed toward a consumer (e.g., a specific item from the consumer's wish list is sold out), which is expected to elicit a greater reaction than when the threat is impersonal (e.g., gray T-shirts are sold out) (Fitzsimons & Lehmann, 2004). The result of reactance can be described as a boomerang effect in which the threat to freedom is diminished with an equal but opposing reaction (Clee & Wicklund, 1980). In the assemblage context in particular, reactance is linked to self-restrictive behavior in the interaction with the assemblage (e.g., taking action to avoid interaction with the assemblage) (Hoffman & Novak, 2018).

This ambiguity makes it difficult to predict customers' reactions to personalization efforts in smart retail environments. To acknowledge the diverging perspective on the positive versus negative role of personalization, we consider the impacts on shopping behavior by investigating both consumer reactance (negative result) and purchase intention (positive result). It is unclear whether personalized versus standardized messages are more effective in promoting shopping behavior (i.e., lower reactance, higher purchase intention); hence, we propose the following competing hypotheses for smart retail:

H1a: Sending *personalized* messages through smart technological devices in stores enhances customers' shopping behavior (i.e., lower reactance, higher purchase intention) compared with standardized messages.

H1b: Sending *standardized* messages through technological devices in stores enhances customers' shopping behaviors (i.e., lower reactance, higher purchase intention) compared with personalized messages.

Moderating Effect of the Device and Mediating Role of Relational Experiences

The current ambiguity of personalization efforts, as grounded in the personalization–privacy paradox, might be rooted in technology as a key moderator of the effect. In other words, the technology that provides personalization might determine whether it has positive or negative effects. In practical terms, retailers must choose whether to use a customer's own or a retailer-owned device to provide TEP in their efforts to enhance customers' experiences and thus alter their shopping behaviors. To derive hypotheses along these lines, we draw on the theory of the extended self and its application in assemblage theory, which proposes that product ownership is a key determinant of users' relationships with their devices (Belk, 1988). The "self" represents "a sense of who and what we are" (Kleine et al., 1993, p. 209); it includes physical appearance, experiences, goals, values, and beliefs, such that it combines physical and symbolic properties (Kunchamboo et al., 2017). The self relates to a person as a whole; the "extended self" then is a form of self-identity defined by possessions (Belk, 1988), with the prediction that consumers favor products that match their sense of self (Sirgy, 1982). That is, consumers "knowingly or unknowingly, intentionally or unintentionally" (Belk, 1988, p. 139) perceive their possessions as parts of their selves and use them to express their identities.

Assemblage theory proposes a wider definition of identity, so this self-extension becomes more comprehensive. Customers develop a joint identity with devices because of their relationship and interactions (customer–object assemblage), and then this relationship affects their experiences in a broader, environmental assemblage (Hoffman & Novak, 2018; Novak & Hoffman, 2019). As a consequence, consumers might develop a shared sense of identity with an object (Belk, 1988), and their interaction with that object also might influence their relational customer experience as part of the assemblage.

Belk (1988, p. 151) describes three "active and intentional ways of self-extension" by which objects get integrated into the extended self: knowing, creating, and controlling. First, objects become part of the extended self through knowledge of them; intimate knowledge of a device creates feelings of ownership and a view of the device as part of the extended self (Belk, 1988). The content such a device provides might also constitute part of the extended self (Belk, 2014) in that personalized content implies that the person has inherent knowledge of it. Second, in the creating process, the object gets incorporated into the extended self by building or shaping it with investments of effort, time, or attention. If a person invests "psychic energy" in a device, it may become part of the extended self in that it seems to have emerged from the self (Belk, 1988). Third, control is an important driver of object integration because it determines the strength of the link between the object and the extended self (McClelland, 1953).

Knowledge, creation, and control are all clearly relevant in relation to customer-owned smartphones. Customers have detailed knowledge of their smartphones' features and content, they invest time and energy into customizing their settings, and they exercise physical and virtual control over their devices. In this relational exchange with the device, they are "injecting their identity in the assemblage" (Hoffman & Novak, 2018, p. 1185), which should evoke positive self-extension experiences (Novak & Hoffman, 2019). In contrast, little self-integration occurs with retailer-owned devices, with which consumers have little personal relationship or history and possess only scant knowledge of them or their content. Nor do customers invest time or effort to customize (create) these devices. Finally, they have little control over immersive screens programmed by retailers.

According to these differing levels of integration into the customer's extended self, smartphones should encourage a stronger perception of a joint customer–device entity within the store assemblage than retailer screens do (Belk, 2014; Brasel & Gips, 2014). When such a customer–object assemblage exists, further interactions that correspond with this close relationship (i.e., personalization efforts) may enhance the relational customer experience in the store, which we refer to as the customer experience assemblage (Hoffman & Novak, 2018; Novak & Hoffman 2019). In other words, the device that delivers the personalized message should influence the relational customer experience in relation to that message and hence determine the customer's shopping behavior. When devices get integrated into the customer's extended self, personalization efforts transmitted through customer-owned smartphones should enhance the close, positive connection of the customer with the store and lead to more positive shopping behaviors, relative to personalization efforts transmitted through retailer-owned screens.

In short, a technological device's integration into the extended self should moderate the effect of a personalized message on customers' shopping behavior, and the relational customer experience should mediate this moderation effect. Thus, we propose the following hypotheses:

> **H2:** The technological device's integration into the extended self moderates the effect of personalized messages on customers' shopping behavior, such that when personalized messages are displayed on devices that are part of the extended self (i.e., customer-owned smartphones), shopping behaviors are more favorable (lower reactance, higher purchase intention) than when such messages are displayed on devices that are not part of the extended self (i.e., retailer-owned screens).
>
> **H3:** The interaction effect between personalization and devices on shopping behavior is mediated by the customer's relational experience with the store assemblage (i.e., mediated moderation).

Experimental Study 1

Procedure

Considering the configurations of smart technologies currently being used in pilot tests (see Table 1), we conducted a scenario-based experimental study to test the causal effect of personalization efforts on customers' shopping behavior depending on different smart technologies. We recruited 529 participants from an online panel to take part in a 2 (personalized vs. standardized message) × 2 (customer-owned vs. retailer-owned device) between-subjects design (34% women; mean age [M_{age}] = 33 years; standard deviation of age [SD_{age}] = 8.24). We compensated participants with $0.80 each for completing the survey.

The participants first read a short instruction: "Imagine you want to buy a new sweater. When you first start to look for sweaters, you browse the website of the brand KASO.[4] As you frequently buy apparel from KASO, you already have a customer account and app on your phone. You put one black sweater on your online wish list. As you are not sure about this sweater, you leave the online store without buying it and visit KASO's physical store a couple of days later." After this introduction, we randomly showed participants one of four manipulations in which they received a personalized message (greeting them personally and promoting the exact sweater from their wish list) or a standardized message (greeting customers in general and promoting a different sweater), on either the retailer's screen or their smartphones. We controlled for visual privacy by stating and showing that no other customers were present when the message was displayed. The experimental scenario and its manipulation are modeled on the configuration and usage of existing smart technologies (Table 1). Appendix 1 depicts the four manipulations.

Measures

After reading the instruction, the participants were asked to respond to six items that measured consumer reactance using semantic differentials (i.e., intention to leave the store; Esmark et al., 2017; Oliver & Swan, 1989) and two items that checked the personalization manipulation (Barnard, 2014). We measured consumer reactance on a seven-point semantic differential scale (see Esmark et al., 2017) and conducted a manipulation check using a seven-point Likert scale. The measures for consumer reactance (M = 5.04; SD = 1.55) and personalization (M = 5.58; SD = 1.08) demonstrated good reliability, with Cronbach's alphas above 0.7 (Hair et al., 2018); convergent validity, with average variance extracted (AVE) above 0.5; and discriminant validity, with AVE values greater than the squared correlations between the measures (Fornell & Larcker, 1981). We did not detect common-method bias (i.e., one-factor solution explains less than 50% of the variance). The manipulation check for personalization worked as intended: the participants in the personalized conditions perceived the message as significantly more personalized than those in the standardized conditions ($M_{personalized} = 5.85$, $M_{standardized} = 5.31$; $t[527] = 5.852$, $p < 0.001$).

Results

To test H1 and H2, we conducted an analysis of variance (ANOVA) with consumer reactance as the dependent variable and personalization, device type, and their interaction as the independent variables. Neither the main effect of personalization ($F[1,525] = 0.365$, $p = .546$) nor that of device usage ($F[1,525] = 0.122$, $p = .727$) was significant; we could not confirm either of the competing predictions in H1a or H1b. However, the personalization × device interaction effect on consumer reactance is significant ($F[1,525] = 8.008$, $p = .005$), which supports H2. As

[4] This fictional brand is described as one that sells apparel.

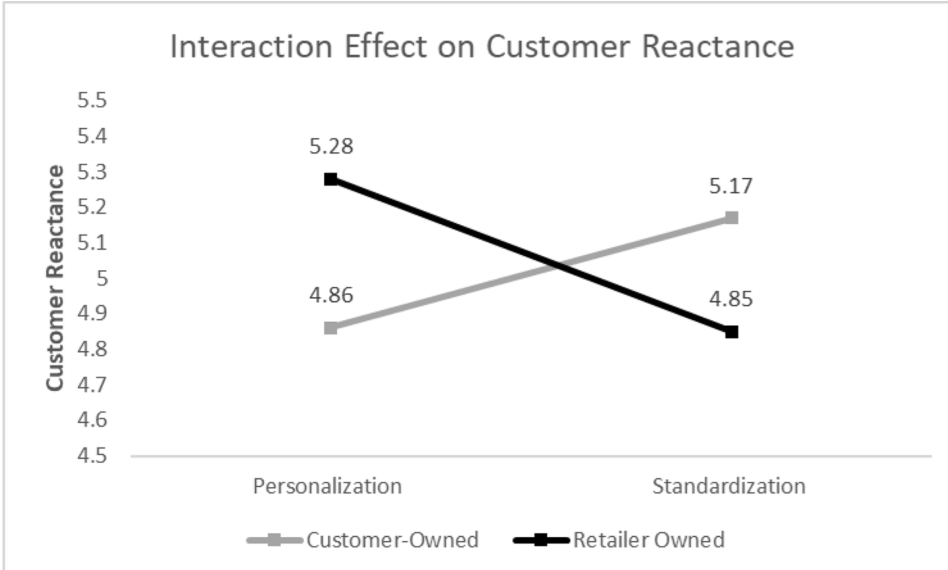

Fig. 1. Crossover Effect between Device Type and Message Content

Fig. 1 illustrates, participants who saw the message on their own devices expressed lower reactance to a personalized message versus a standardized one ($M_{personalized} = 4.86$; $M_{standardized} = 5.17$). In contrast, participants who read the message on a retailer-owned screen indicated lower reactance to a standardized message ($M_{personalized} = 5.28$; $M_{standardized} = 4.85$). That is, TEP had more positive effects on shopping behavior (i.e., lower reactance) on customer-owned devices, but standardized messages exerted more positive effects on retailer-owned devices. Besides providing support for H2, this crossover interaction effect helps explain the nonsignificant main effect of personalized content on customers' shopping behavior.

Experimental Study 2

Procedure

We pursued two research objectives with this follow-up experiment. First, we sought to replicate the interaction effects we found in Study 1 with a positive behavioral outcome (i.e., purchase intentions). Second, we wanted to test the underlying mechanism that explains the interaction effect of personalization and device usage on shopping outcomes using a mediated moderation model. The experimental setup matches that of Study 1, but the increasing complexity of data analysis for the mediated moderation test required us to collect a larger sample. Therefore, we recruited 1,572 participants from an online panel to take part in a 2 (personalized vs. standardized message) × 2 (customer-owned vs. retailer-owned device) between-subjects design (39.6% women; $M_{age} = 37.16$ years; $SD_{age} = 11.18$), and they were compensated with $0.80 for completing the survey.

Measures

These participants completed a six-item purchase intention scale (Esmark et al., 2017; Oliver & Swan, 1989), similar in its setup to the reactance scale from Study 1. For the mediator, we adapted a measure of relational customer experience (Alhouti et al., 2015; Gahler et al., 2019). The manipulation check used the same two-item assessment for personalization and then added two items to measure self-extension as a check for device manipulation (Sivadas & Machleit, 1994). We also included measures for age, gender, and shopping category involvement as covariates (Habel & Klarmann, 2015; Laurent & Kapferer, 1985). We used a seven-point semantic differential scale to measure purchase intention in line with Esmark et al., (2017); all other scales used seven-point Likert scale formats as detailed in Appendix 2.

These measures demonstrated good reliability, with Cronbach's alphas above 0.7 (Hair et al., 2018). In support of convergent validity, the AVE values were above 0.5; indicating discriminant validity, the AVE values were also greater than the squared correlations between measures (Fornell & Larcker, 1981). Again, we find no evidence of common-method bias (i.e., one-factor solution explains less than 50% of the variance). The manipulation check for personalization and the extended self worked as intended. Relative to those in the standardized condition, participants in the personalized conditions perceived the message as significantly more personalized ($M_{personalized} = 5.92$, $M_{standardized} = 4.99$; $t[1570] = 15.316$, $p < 0.001$), and those in the smartphone condition regarded it as part of their extended self, more so than those in the retailer-owned screen condition ($M_{smartphone} = 4.97$, $M_{screen} = 4.03$; $t[1570] = 10.817$, $p < 0.001$). We provide the descriptive statistics in Table 2.

Results

Replication

With a visual check of the results, we identified a similar response pattern across groups for the mean values of purchase intentions, in line with our expectations ($M_{PersoSmart} = 5.24$, $M_{PersoScreen} = 4.76$, $M_{StandardSmart} = 4.94$, $M_{StandardSreen} = 5.28$).[5] As illustrated in Fig. 2, we found a crossover interaction where the combinations of personalization and smartphones or standardization and screens are perceived more favorably by customers. We then conducted an ANOVA with purchase intention as the dependent variable and personalization, device type, and their interaction as the independent variables. In line with our results from experiment 1, we found that neither the main effect of personalization ($F[1,1568] = 2.355$, $p = .125$) nor the main effect of device usage ($F[1,1568] = 1.095$, $p = .296$) was significant, yet the personalization × device interaction again had a significant effect, this time on purchase intentions ($F[1,1568] = 33.285$, $p = .000$). This

[5] Note that in Experiment 2, we used a positive shopping outcome measure (i.e., purchase intention) whereas in Experiment 1, we used a negative outcome (consumer reactance). Thus, the fact that the results showed similar patterns and were in the opposite direction compared with experiment 1 replicated our findings.

Table 2
Descriptive Statistics and Correlations (Study 2)

	Mean	SD	1.		2.		3.		4.		5.		6.		7.
1. Purchase Intention	5.06	1.41	1												
2. Customer Experience	5.14	1.18	.73	***	1										
3. Personalization	5.46	1.29	.19	***	.32	***	1								
4. Self-Extension	4.50	1.78	.49	***	.60	***	.31	***	1						
5. Shopping Involvement	5.09	1.42	.55	***	.62	***	.23	***	.52	***	1				
6. Age	37.16	11.18	–.07	**	–.06	*	.03		–.15	***	–.13	***	1		
7. Gender	1.60	.49	.00		.04		.03		.08	**	–.06	*	–.09	***	1

***$p < .001$, **$p < .01$, *$p < .05$.

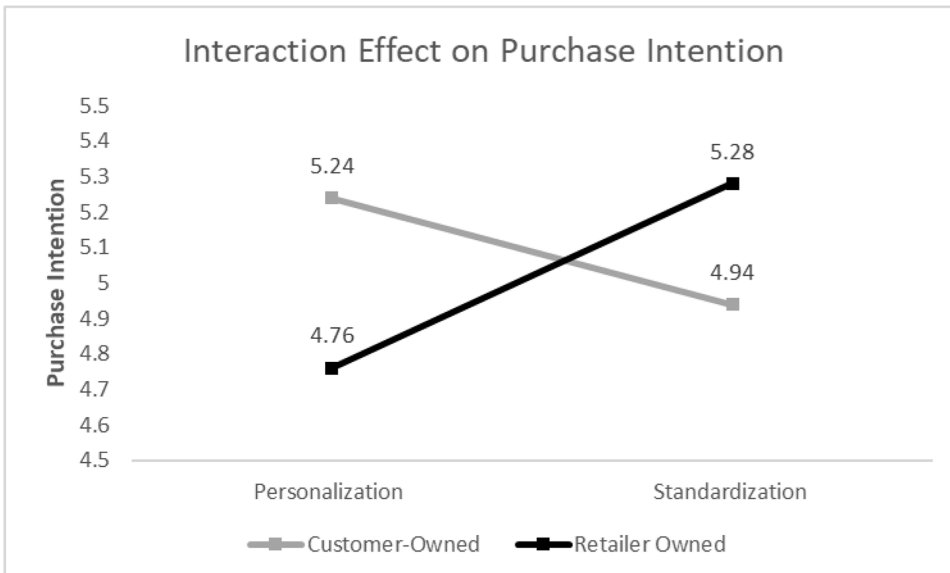

Fig. 2. Crossover Effect between Device Type and Message Content

replication of our Study 1 finding, with a positive shopping behavior outcome, offers further support for H2, affirms the robustness of our findings, and clarifies how devices influence whether personalization is perceived as beneficial.

Mediated Moderation Effect

We checked the interaction effect of personalization and device on relational customer experience, which was significant ($M_{PersoSmart}$ = 5.34, $M_{PersoScreen}$ = 4.95, $M_{StandardSmart}$ = 5.07, $M_{StandardSreen}$ = 5.19; F[1,1568] = 18.068, p = .000), in a pattern that was similar to the interaction effect on purchase intentions. With regard to the conditional indirect effects through relational customer experience on purchase intention, we used bias-corrected bootstrapping to assess mediation effect and moderated mediation (Hayes, 2018; Zhao et al., 2010), relying on 10,000 bootstrap samples with a 95% confidence interval (CI) and indicator coding. The standardization (vs. personalization) and screen (vs. smartphone) conditions represent baselines.

Among the conditional indirect effects, we found a negative effect (b = -0.2048, 95% CI [-0.3596, -0.0529]) of personalization on purchase intention though relational customer experience (CX) when the screen is the device but a positive indirect effect (b = 0.2312, 95% CI [0.0998, 0.3633]) when the smartphone is the device, as we predicted. In support of the mediated moderation of the interaction effect through CX, the index of moderated mediation, reflecting the difference from the conditional indirect effect, was 0.4361, with a bias-corrected 95% CI of [0.2346, 0.6536]. The results suggest partial mediation, as the interaction effect was significant (0.3773, p = .000) when we include the mediator. The findings thus support our mediated moderation H3.

Robustness Checks

As a final step, we checked the robustness of the results. We found that the results are robust when we include age, gender, and shopping category involvement as covariates. Specifically, from an analysis of covariance, we identified a significant interaction effect (F[1,1565] = 29.051, p = .000) and no significant main effects (personalization: F[1,1565] = 2.529, p = .112; device usage: F[1,1565] = 0.857, p = .355). Moreover, in support of the robustness of the mediated moderation effect, we still found moderated mediation when the covariates are included in the model (b = 0.2477, bias-corrected 95% CI [0.1050, 0.3928]).

Discussion

Theoretical Implications

Having revolutionized online retailing, smart retail technologies might also alter offline retailing by adding consumer-facing technology, leveraging either customers' smartphones or retailers' immersive screens. Offline retailers are working toward enhancing customer experiences in their physical retail spaces using digital elements to attract a new generation and meet their expectations of a connected, engaging retail experience (Kahn et al., 2018; Pantano et al., 2018; Willems et al., 2017). Yet despite such increased use of TEP in stores, scholarly research on TEP and its effects on consumers has been surprisingly scarce (Riegger et al., 2020). In contrast with online settings, TEP can occur through different types of devices, which profoundly affect customers' perception of the provided content, in ways that have not been clarified by prior consumer behavior or personalization literature (Brasel & Gips, 2014).

Drawing on data from two experimental studies and a mediated moderation analysis, we found an interesting crossover interaction between personalization and technological devices. Customers' shopping behavior in response to personalization efforts was more positive (i.e., lower reactance, higher purchase intention) when the personalized messages appeared on their own smartphones rather than on retailer screens. In contrast, retailer-owned devices were better suited for sending standardized messages. This crossover interaction effect, reflecting the moderating role of the device, helps explain our finding of no main effect of personalization on shopping behavior. Moreover, we identified the relational customer experience created by the message content and device combination as a psychological mechanism that drives the effect. That is, personalized messages on devices that are part of one's extended self, such as smartphones, link the customer more positively with the store assemblage and thus enhance customer experience, compared with devices external to the customer's extended self.

In illustrating the influence of technology choice on in-store communication efforts in retail stores, our findings highlight the need to choose the right consumer-facing smart technology, which also can help retailers address the challenges of transitioning their offline retail from traditional face-to-face to automated in-store approaches. The device used to display customer-facing technologies influences shoppers' perceptions of the content and then their behaviors, and by outlining these effects, we strengthen the discussion on the impact of consumer-facing smart retail technologies on consumer behavior (e.g., Grewal et al., 2020; Roy et al., 2017; von Briel, 2018; Willems et al., 2017).

By focusing on the influence of device type on the effect of personalized in-store messages, our findings also provided new insights into innovative personalization approaches in offline environments. To date, literature has considered customer-owned and retailer-owned devices separately in terms of their implications for in-store personalization (Hess et al., 2019; Riegger et al., 2021). To the best of our knowledge, our study is the first to include the impact of display devices on innovative in-store personalization strategies (Hess et al., 2019; Marketing Science Institute, 2018).

By establishing the moderating role of these technological devices, we also added to a more profound understanding of the personalization–privacy paradox (Awad & Krishnan, 2006; Sutanto et al., 2013). Since the effects of personalization change with the device, researchers investigating the personalization–privacy paradox must consider the integral role of technological devices. This result might help explain ambiguous findings regarding the effect of personalization efforts on shopping behavior; we posit that research on personalization efforts in smart retail should also go beyond the device to account more broadly for the customer's relational experience within store assemblages (i.e., bidirectional interactions of consumer and smart technology devices in retail stores). These findings represent a novel view of the personalization–privacy paradox based on device usage, which might enable more effective personalization strategies in new retail environments.

Drawing on assemblage theory and the theory of the extended self, we also showed that consumers' perceptions of personalization are contingent on the degree to which the technological device displaying the message is part of a customer–object assemblage and integrated into their extended self. Customers' experiences and subsequent behaviors are more positive when both the content and the device are part of their extended selves or else when neither is integrated into their extended selves. This integration of the device into the extended self—in addition to its content—is integral to consumers' experience of the content. In other words, the content–device combination influences customers' relational experience with store assemblage, which drives their shopping behaviors.

This finding is consistent with the idea that store assemblages between consumers and technological devices considerably shape customer experience (Hoffman & Novak, 2018). More generally, our findings shed light on the consequences of the interaction between customers and smart retail devices and of the integration of technological devices into the customer's extended self. Consumers assign increasing value to their technological devices and integrate them into their extended selves, so this extension of the self to owned technology is interesting not only from an academic perspective (Belk, 1988) but also with regard to the direct behavioral consequences for daily consumption behavior and retail opportunities. As we have noted, the behavioral consequences of technology integration into customers' extended selves have received limited attention thus far (Brasel & Gips, 2014; Roy et al., 2017).

Similarly, our results highlight the role of the extended self in determining the outcomes of new retail strategies that leverage smartphones. It is critical to account for the interaction of technology choices and consumer interactions with content communicated through different technological devices when developing retail strategies, as well as when conducting research on how retailers should implement innovative in-store technologies to influence customers (Shankar et al., 2011). Moreover, the crucial interplay between device and content is likely even more important for automated in-store services (Heller et al. 2021) and additional consumer-facing smart retail technologies (Roy et al., 2017).

Managerial Implications

Various forms of TEP appear extremely likely to be integral to an emerging aspect of the future's offline retail landscapes, with the potential to reshape retail experiences fundamentally. The shift in responsibilities from human sales personnel to technological devices emphasizes the need for adequate device designs and choices. The implementation of TEP in offline contexts differs from its online adoption, with distinct effects on consumers' reactions. Our findings can help retail managers implement TEP and choose the right technologies between customer- and retailer-owned devices. This choice determines which type of message (personalized vs. standardized) they should send to improve customer experience and influence shopping behaviors. In particular, customers' acceptance of innovative, personalized, digital, in-store communication is contingent on the devices that display the content. They show more reactance and lower purchase intentions in response to personalized messages on immersive screens, which retailers commonly use for their digital in-store communication. As we have shown, retailers can avoid negative outcomes by displaying personalized content on customer-owned smartphones and then using their own immersive screens only for sending standardized messages.

In the future, retailers could test the transferability of a sense of the extended self to other devices to inform better personalization strategies when customer-owned smartphones are not available. In addition to screens and smartphones, retailers have myriad innovative technologies at their disposal (e.g., smart mirrors, tablets) to communicate personally with customers. The concept of the extended self might extend to other retailer-owned devices if customers feel a sense of control over or the power to create on the devices. For example, customers can interact with smart mirrors using voice and gesture control (Kapfunde, n.d.) to personalize their in-store experiences. Such active participation in the content creation process could foster feelings of integration into the extended self, thereby increasing the effectiveness of TEP strategies relying on these novel devices.

Limitations and Avenues for Research

The TEP we studied relies on information about consumers' past behaviors with a particular brand; that is, we presented a scenario in which customers already had a personal account with the retailer such that it could identify them. Continued research might consider other types of consumer data as a basis for TEP. For example, new in-store technologies can collect real-time data about customers' outer appearances (e.g., gender, hair color, complexion, style) or analyze facial expressions to derive information about their emotional states. Another promising avenue might refer to whether customers' reactions to TEP that reflect their outer appearances or emotions differ from their reactions to TEP that is based on their behavioral data.

The technologies for delivering TEP might also extend to novel devices such as wearables (e.g., smartwatches) or humanoid, interactive technologies (e.g., service robots) as well as virtual and augmented reality. All these transmission options for TEP require further research consideration. In particular, it might be helpful to determine precisely which technologies encourage self-extensions from the customer to the device. Building on Belk (1988), we define knowledge, creation, and control as the three key characteristics that enable self-extension. However, more research is needed to understand the nuances of these characteristics and their capacity to help consumers extend their selves to the device. For example, in this context, it is unclear whether wearables might actually be better devices for personalization efforts than smartphones because they are worn, which might increase users' sense of control (Wittkowski et al., 2020). Finally, with regard to retailer-owned devices, continued research should clarify how design efforts might encourage customers to perceive these devices as part of their extended selves and thus react more favorably to personalization efforts.

Conclusion

This study adds to the growing body of literature on the future of offline retail and the role of smart technologies in this context. By empirically investigating the interplay of personalized content and device technology on customers' shopping behavior in a smart retail environment, we highlight the crucial role of the smart technological devices used to convey messages in determining people's perceptions of personalized content. Our findings demonstrate that acceptance of personalization efforts delivered through in-store smart technologies is contingent on the congruency of the device with the content, which depends on the integration into the extended self. Customers react differently to message content depending on the device through which it is conveyed; thus, personalized (cf. standardized) messages are more effective on customer-owned smartphones (cf. retailer-owned screens) that are integrated into (cf. separate from) the consumer's extended self because the device changes the customer's relational experience with the store assemblage. We conclude that in developing their TEP strategies, retailers should use smart technologies integrated into the extended self, such as consumers' smartphones, to send their personalized messages.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

No acknowledgements.

Appendix 1: Overview of Experimental Manipulations

Retailer Owned/Personalized

Customer Owned/Personalized

Retailer-Owned/Standardized

Customer-Owned/Standardized

Notes: In the personalization condition, both the participant's name and product (e.g., black vs. red sweater) were personalized according to the participant's inputs.

Appendix 2: Overview of Measures and Reliabilities

Construct	Item	Source	Cronbach's Alpha
Consumer Reactance	How likely are you to physically leave the area and the store without returning to that area? - Not at all likely/very likely - Nonexistent/existent - Not probable/very probable - Not possible/very possible - Not certain/very certain - Probably not/probably	Esmark et al. (2017); Oliver & Swan (1989)	.9521
Purchase Intention	How likely are you to buy the sweater during the current shopping trip? - Not at all likely/very likely - Nonexistent/existent - Not probable/very probable - Not possible/very possible - Not certain/very certain - Probably not/probably	Esmark et al. (2017); Oliver & Swan (1989)	.9462
Relational Customer Experience	I connected with the retailer. The retailer really cared about my needs. The retailer respected my decision-making process. The retailer gave me appropriate suggestions.	Alhouti et al. (2015); Gahler et al. (2019)	.8522
Personalization	- The ad featured a product I have seen in the past. - I felt the advertisement targeted me based on my past browsing behaviors.	Barnard (2014)	.8811 .7372
Extended Self	If the device featuring the ad is stolen from me, I will feel as if my identity has been snatched from me. The device featuring the ad is part of who I am.	Sivadas & Machleit (1994)	.8272
Shopping Category Involvement	I really enjoy buying sweaters. Whenever I buy sweaters, it's like giving myself a present. To me, it is quite a pleasure to buy sweaters.	Habel & Klarmann (2015); Laurent & Kapferer (1985)	.9062

[1]Study 1; [2]Study 2

References

Abernethy, A., 1991. Physical and Mechanical Avoidance of Television Commercials: An Exploratory Study of Zipping, Zapping and Leaving. Proc. Am. Assoc. Adv. 223–231.

Aguirre, E., Mahr, D., Grewal, D., de Ruyter, K., Wetzels, M., 2015. Unraveling the Personalization Paradox: The Effect of Information Collection and Trust-Building Strategies on Online Advertisement Effectiveness. J. Retail. 91 (1), 34–49.

Alhouti, S., Gillespie, E.A., Chang, W., Davis, L., 2015. The Thin Line between Love and Hate of Attention: The Customer Shopping Experience. J. Mark. Theory Pract. 23 (4), 415–433.

Ansari, A., Mela, C.F., 2003. E-Customization. J. Mark. Res. 40 (2), 131–145.

Awad, N.F., Krishnan, M.S., 2006. The Personalization Privacy Paradox: An Empirical Evaluation of Information Transparency and the Willingness to Be Profiled Online for Personalization. MIS Quarterly 30 (1), 13–28.

Baek, T.H., Morimoto, M., 2012. Stay Away from Me. J. of Adv. 41 (1), 59–76.

Barnard, L., 2014. The Cost of Creepiness: How Online Behavioral Advertising Affects Consumer Purchase Intention. The University of North Carolina at Chapel Hill.

Belk, R.W., 1988. Possessions and the Extended Self. J. Consum. Res. 15 (2), 139–168.

Belk, R.W., 2014. Digital Consumption and the Extended Self. J. Mark. Manag. 30 (11–12), 1101–1118. https://doi.org/10.1080/0267257X.2014.939217.

Bleier, A., Eisenbeiss, M., 2015. The Importance of Trust for Personalized Online Advertising. J. Retail. 91 (3), 390–409.

Bock, D.E., Mangus, S.M., Folse, J.A.G., 2016. The Road to Customer Loyalty Paved with Service Customization. J. Bus. Res. 69 (10), 3923–3932.

Bond, S. (2015). Retailers Look to Beacons to Help In-Store Shopping Mirror Online. Financial Times. Retrieved January 2020 from https://www.ft.com/content/658a5f98-0103-11e5-a60e-00144feabdc0.

Bosteels, K. (2013). Tesco Installing Facial Recognition Camera's for Advertisers. RetailDetail. Retrieved October 2020 from https://www.retaildetail.eu/en/news/general/tesco-installing-facial-recognition-camera%E2%80%99s-advertisers.

Boudet, J., Gregg, B., Rathje, K., Stein, E., & Vollhardt, K. (2020). Personalized Experience for Customers: Driving Differentiation in Retail. McKinsey & Company. Retrieved rom https://www.mckinsey.com/industries/retail/our-insights/personalizing-the-customer-experience-driving-differentiation-in-retail.

Brasel, S.A., Gips, J., 2014. Tablets, Touchscreens, and Touchpads: How Varying Touch Interfaces Trigger Psychological Ownership and Endowment. J. Consum. Psychol. 24 (2), 226–233.

Brehm, S.S., Brehm, J.W., 1981. Psychological Reactance, 1st Edition. Academic Press. https://www.elsevier.com/books/psychological-reactance/brehm/978-0-12-129840-1.

Bues, M., Steiner, M., Stafflage, M., Krafft, M., 2017. How Mobile In-Store Advertising Influences Purchase Intention: Value Drivers and Mediating Effects from a Consumer Perspective. Psychol. Mark. 34 (2), 157–174.

Chan, T. F. (2018). 7-Eleven is Bringing Facial-Recognition Technology Pioneered in China to its 11,000 Stores in Thailand. Business Insider. Retrieved March 2020 from https://www.businessinsider.com/7-eleven-facial-recognition-technology-introduced-in-thailand-2018-3.

Cloarec, J., 2020. The Personalization–Privacy Paradox in the Attention Economy. Technol. Forecast. Soc. Change 161, 120299.

DeLanda, M., 2011. Philosophy and Simulation: The Emergence of Synthetic Reason. Bloomsbury Publishing, London.

DeLanda, M., 2016. Assemblage Theory. Edinburgh University Press, Edinburgh.

Edwards, S.M., Li, H., Lee, J.-H., 2002. Forced Exposure and Psychological Reactance: Antecedents and Consequences of the Perceived Intrusiveness of Pop-Up Ads. J. of Adv. 31 (3), 83–95.

Esmark, C.L., Noble, S.M., Breazeale, M.J., 2017. I'll Be Watching You: Shoppers' Reactions to Perceptions of Being Watched by Employees. J. Retail. 93 (3), 336–349.

Fornell, C., Larcker, D.F., 1981. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. J. Mark. Res. 18 (1), 39–50.

Gahler, M., Klein, J. F., & Paul, M. (2019). "Measuring Customer Experiences: A Text-Based and Pictorial Scale," MSI Working Paper Series Report 19-119.

Gao, T., Rohm, A.J., Sultan, F., Pagani, M., 2013. Consumers Un-Tethered: A Three-Market Empirical Study of Consumers' Mobile Marketing Acceptance. J. Bus. Res. 66 (12), 2536–2544.

Grewal, D., Ahlbom, C.-P., Beitelspacher, L., Noble, S.M., Nordfält, J., 2018. In-Store Mobile Phone Use and Customer Shopping Behavior: Evidence from the Field. J. of Mark. 82 (4), 102–126.

Grewal, D., Noble, S.M., Roggeveen, A.L., Nordfalt, J., 2020. The Future of In-Store Technology. J. Acad. Mark. Sci. Rev. 48 (1), 96–113.

Habel, J., Klarmann, M., 2015. Customer Reactions to Downsizing: When and How Is Satisfaction Affected? J. Acad. Mark. Sci. Rev. 6 (43), 768–789.

Hair, J., Black, W., Anderson, R., Babin, B., 2018. Multivariate Data Analysis, 8 ed. Cengage Learning EMEA.

Harman, & Samsung SDS. (2019). Samsung Nexshop Analytics and Contextual Marketing Fuels the HARMAN NYC Customer Experience. Retrieved October 2020 from https://www.samsungsds.com/us/en/solutions/off/nde/nexshopdigitalexperience.html.

Hawkins, A. (2017). KFC China Is Using Facial Recognition Tech to Serve Customers—But Are They Buying It? The Guardian. Retrieved October 2020 formhttps://www.theguardian.com/technology/2017/jan/11/china-beijing-first-smart-restaurant-kfc-facial-recognition.

Hayes, A., 2018. Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach, 2nd ed. The Guilford Press, New York.

Heller, J., Chylinski, M., de Ruyter, K., Keeling, D.I., Hilken, T., Mahr, D., 2021. Tangible Service Automation: Decomposing the Technology-Enabled Engagement Process (TEEP) for Augmented Reality. J. Serv. Res. 24 (1), 84–103.

Hess, N.J., Kelley, C.M., Scott, M.L., Mende, M., Schumann, J.H., 2019. Getting Personal in Public!? How Consumers Respond to Public Personalized Advertising in Retail Stores. J. Retail. 96 (3), 344–361.

Hoffman, D.L., Novak, T.P., 2018. Consumer and Object Experience in the Internet of Things: An Assemblage Theory Approach. J. Consum. Res. 44 (6), 1178–1204.

Horwitz, L. (2015). Nordstrom Mines Beacon Benefits in Personalized Customer Service. TechTarget. Retrieved October 2020 from https://searchcustomerexperience.techtarget.com/news/4500246312/Nordstrom-mines-Beacon-benefits-in-personalized-customer-service.

Hutchings, E. (2016). Timberland's NYC Store Hands Shoppers a Digital Cart. Altavia. Retrieved November 2020 from https://www.altavia-group.com/en/non-classe-en/timberlands-nyc-store-hands-shoppers-a-digital-cart/.

Inman, J.J., Nikolova, H., 2017. Shopper-Facing Retail Technology: A Retailer Adoption Decision Framework Incorporating Shopper Attitudes and Privacy Concerns. J. Retail. 93 (1), 7–28.

Jansen, J. (2017). Supermarktkette Real testet Gesichtserkennung. Frankfurter Allgemeine - Netzwirtschaft. Retrieved October 2020 from https://www.faz.net/aktuell/wirtschaft/netzwirtschaft/supermarktkette-real-testet-gesichtserkennung-15039495.html.

Kahn, B.E., Inman, J.J., Verhoef, P.C., 2018. Introduction to Special Issue: Consumer Response to the Evolving Retailing Landscape. J. Consum. Res. 3 (3), 255–259.

KanKan. (2019). Smart Store, KANKAN AI Recognition Computing Platform. Retrieved October 2020 from https://www.kankan.ai/en/case/store/.

Kapfunde, M. (n.d.). H&M is Bang on Trend as Their Smart Mirror Wows Customers. Retrieved October 2020 from https://fashnerd.com/2018/06/hm-smartmirror-retail-technology-fashion/.

Kleine, R.E., Schultz Kleine, S., Kernan, J.B., 1993. Mundane Consumption and the Self: A Social-Identity Perspective. J. Consum. Psychol. 2 (3), 209–235.

Kunchamboo, V., Lee, C.K.C., Brace-Govan, J., 2017. Nature as Extended-Self: Sacred Nature Relationship and Implications for Responsible Consumption Behavior. J. Bus. Res. 74, 126–132.

Laurent, G., Kapferer, J.-N., 1985. Measuring Consumer Involvement Profiles. J. Mark. Res. 22 (1), 41–53.

Marketing Science Institute. (2018). 2018–2020 Research Priorities. Marketing Science Institute. Retrieved March 2020 from https://www.msi.orghttps://www.msi.org/research/2018-2020-research-priorities.

McClelland, D. C. (1953). Personality. Dryden Press. https://catalog.hathitrust.org/Record/000426430.

Mittal, S. (2016). Proximity Marketing Examples: 28 Retail Companies Nailing It with Their Campaigns. Beaconstac. Retrieved October 2020 from https://blog.beaconstac.com/2016/02/25-retailers-nailing-it-with-their-proximity-marketing-campaigns/.

Novak, T.P., Hoffman, D.L., 2019. Relationship Journeys in the Internet of Things: A New Framework for Understanding Interactions between Consumers and Smart Objects. J. Acad. Mark. Sci. Rev. 47 (2), 216–237.

Oliver, R.L., Swan, J.E., 1989. Consumer Perceptions of Interpersonal Equity and Satisfaction in Transactions: A Field Survey Approach. Journal of Marketing 53 (2), 21–35.

O'Shea, D. (2016). Crate and Barrel Turns to Tablets to Enhance In-Store Experience. Retail Dive. Retrieved October 2020 from https://www.retaildive.com/news/crate-and-barrel-turns-to-tablets-to-enhance-in-store-experience/428084/.

Pantano, E., Priporas, C.V., Dennis, C., 2018. A New Approach to Retailing for Successful Competition in the New Smart Scenario. Int. J. Retail. Distrib. Man. 46 (3), 264–282.

Pantano, E., Viassone, M., 2014. Demand Pull and Technology Push Perspective in Technology-Based Innovations for the Points of Sale: The Retailers Evaluation. J. Retail. and Cons. Ser. 21 (1), 43–47.

Phelps, J.E., D'Souza, G., Nowak, G.J, 2001. Antecedents and Consequences of Consumer Privacy Concerns: An Empirical Investigation. J. Interact. Mark. 15 (4), 2–17.

Reed, J. (2018). Thai 7-Eleven Stores to Adopt Facial Recognition Technology. Financial Times. Retrieved March 2020 from https://www.ft.com/content/1caa4ee4-2812-11e8-b27e-cc62a39d57a0.

Remark Holdings, Inc. (2018). KanKan AI Retail System Delivers Strong Initial Results for CP Lotus Supermarket. Remark Holdings, Inc.

Riegger, A.-S., Klein, J.F., Merfeld, K., Henkel, S., 2021. Technology-Enabled Personalization in Retail Stores: Understanding Drivers and Barriers. J. Bus. Res. 123, 140–155.

Rigby, C. (2014). Made.com Brings Digital Product Information into the Store. Retrieved November 2020 from https://internetretailing.net/product/product/madecom-brings-digital-product-information-into-the-store-12433.

Roy, S.K., Balaji, M.S., Sadeque, S., Nguyen, B., Melewar, T.C., 2017. Constituents and Consequences of Smart Customer Experience in Retailing. Technol. Forecast. Soc. Change 124, 257–270.

Shankar, V., Inman, J.J., Mantrala, M., Kelley, E., Rizley, R., 2011. Innovations in Shopper Marketing: Current Insights and Future Research Issues. J. Retail. 87, S29–S42.

Shen, A., 2014. Recommendations as Personalized Marketing: Insights from Customer Experiences. Journal of Services Marketing 28 (5), 414–427.

Sirgy, M.J., 1982. Self-Concept in Consumer Behavior: A Critical Review. J. Consum. Res. 9 (3), 287–300.

Sivadas, E., Machleit, K.A., 1994. A Scale to Determine the Extent of Object Incorporation in the Extended Self. In: Park, W., Smith, D.C. (Eds.), Marketing Theory and Applications. American Marketing Association, Chicago, IL, pp. 143–149. Vol. 5.

Sutanto, J., Palme, E., Tan, C.-H., Phang, C.W., 2013. Addressing the Personalization-Privacy Paradox: An Empirical Assessment from a Field Experiment on Smartphone Users. MIS Quarterly 37 (4), 1141–1164.

Tam, K.Y., Ho, S.Y., 2006. Understanding the Impact of Web Personalization on User Information Processing and Decision Outcomes. MIS Quarterly 30 (4), 865–890.

Tech. (2019). A World in Motion: Retail Digital Transformation across the Globe, and the Technology Supporting It. Retail Week, World Retail Congress. Retrieved March 2020 from https://www.tech-festival.com/tech-catalysts.

Tucker, C.E., 2012. The Economics of Advertising and Privacy. International Journal of Industrial Organization 30 (3), 326–329.

Tucker, C.E., 2014. Social networks, personalized advertising, and privacy controls. J. Mark. Res. 51 (5), 546–562.

Vesanen, J., 2007. What Is Personalization? A Conceptual Framework. European Journal of Marketing 41 (5/6), 409–418.

von Briel, F., 2018. The Future of Omnichannel Retail: A Four-Stage Delphi Study. Technol. Forecast. Soc. Change 132, 217–229.

Weitz, B.A., Sujan, H., Sujan, M., 1986. Knowledge, Motivation, and Adaptive Behavior: A Framework for Improving Selling Effectiveness. J. of Mark. 50 (4), 174–191.

Willems, K., Smolders, A., Brengman, M., Luyten, K., Schöning, J., 2017. The Path-to-Purchase Is Paved with Digital Opportunities: An Inventory of Shopper-Oriented Retail Technologies. Technol. Forecast. Soc. Change 124, 228–242.

Wittkowski, K., Klein, J.F., Falk, T., Sheppers, J., Aspara, J., Bergner, K., 2020. What Gets Measured Gets Done: Can Self-Tracking Technologies Enhance Advice Compliance? J. Serv. Res. 23 (3), 281–298.

Wong, W.K., Leung, S.Y.S., Guo, Z.X., Zeng, X.H., Mok, P.Y., 2012. Intelligent Product Cross-Selling System with Radio Frequency Identification Technology for Retailing. Int. J. Prod. Econ. 135 (1), 308–319.

Zhao, X., Lynch Jr., J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. J. Consum. Res., 37(2), 197–206.

Anne-Sophie Riegger (MSc., EBS University) is a research assistant and doctoral student at the Chair of Customer Behavior and Sales at EBS University in Germany. She holds a BSc in International Fashion Retail from Reutlingen University and a MSc in Management from EBS University. Anne-Sophie Riegger has gained practical experience in developing retail innovations and in consulting projects in the retailing and automotive industry. Her research is focused on personalization and consumers' perceptions of innovations in the retail industry and is published in the Journal of Business Research.

Katrin Merfeld (Dr., EBS University, Germany) is an Assistant Professor of Marketing at the Utrecht School of Economics. She holds a BSc in Business Administration from the University of Mannheim, a MSc in Management from KEDGE Business School in Bordeaux and a MSc in Marketing from EBS Business School. Katrin Merfeld has gained several years of experience in research and consulting projects with different partners in the automotive and mobility industry. Her research focuses on digitalization and consumer perceptions of innovations, with special attention to the sharing economy, autonomous driving, retail, and blockchain. She has published her research in Technological Forecasting and Social Change, Transportation Research Part C, and Business Horizons.

Jan F. Klein (Dr., EBS University, Germany) is an Assistant Professor of Marketing at Tilburg University. His main research focus is on customer experience management and large-scale experimentation. In his research projects, he closely collaborates with industry partners in Europe, Asia, and the US. His research is published in the Journal of Service Research and the Journal of Business Research. Before joining academia, he worked as a consultant in Germany and gained work experience in Mexico and India.

Sven Henkel (Dr., University of St. Gallen, Switzerland) is a Senior Professor of Customer Behavior and Sales at EBS University of Business and Law, Germany. Sven Henkel has more than ten years of experience in research and consulting projects with several partners in the automotive, mobility, and retail industry. His research interests include marketing communication and brand management, service management with a strong focus on the sharing economy, as well as innovation perception and future sales. His work is published in international top-ranked journals such as the Journal of Service Management, Journal of Economic Psychology, Transportation Research.