Increasing sustainable consumption: message framing and in-store technology

Anna-Katharina Jäger and Anja Weber
Deutsche Post Chair of Marketing Management, esp. E-Commerce and Cross-Media-Management, HHL Leipzig Graduate School of Management, Leipzig, Germany

Received 6 February 2019
Revised 26 February 2019
27 March 2019
9 January 2020
16 April 2020
Accepted 1 May 2020

Abstract

Purpose – This study investigates the potential of two different digital in-store technologies and advertisement message framings according to the construal-level theory for increasing sustainable consumption. This paper aims to provide managerial implications for the promotion of sustainable products at the point of sale as well as to theoretically contribute by integrating the literature streams of perceptual research, point-of-sale marketing and construal-level theory.

Design/methodology/approach – The authors tested their hypotheses in a two-week field experiment with a 2 (product label: organic vs local) × 2 (message framing: high vs low construal level) × 2 (presentation technology: digital signage vs augmented reality) between-subjects factorial design. The study was conducted in two grocery stores of different sizes using milk as a test product. Purchase data, as well as attention data gathered by facial recognition software, were analyzed.

Findings – Even though the magic mirror augmented reality application attracted significantly more attention, it did not significantly boost sales compared to the digital signage technology. In the larger store, the sales of the advertised sustainable products were significantly higher in both technology conditions than in the control condition without advertisement. If consumers pay enough attention to the promotion, results indicate that using messages with a concrete low-level construal is more useful for organic goods.

Originality/value – This study is the first investigating a combination of in-store technology and construal-level message framing for the promotion of sustainable products. It extends the retailing literature by proposing a two-step approach on how to use in-store technology effectively: (1) gaining attention and (2) matching messages to existing cognitions.

Keywords Digital signage, Augmented reality, Sustainable consumption, Construal-level theory, Sustainable food, Point-of-sale marketing

Paper type Research paper

1. Introduction

Currently, humanity is facing greater environmental challenges than ever before, and most of them are man-made. For example, private household consumption patterns are estimated to be responsible for up to 60% of the world's greenhouse gas emissions (Ivanova *et al.*, 2016). Above others, food production is accountable for a lion's share of these emissions (Scialabba and Müller-Lindenlauf, 2010). Shifting consumer choice toward more sustainable products could therefore help to substantially mitigate climate change and assure a more sustainable economy (Vandenbergh *et al.*, 2011). However, sustainable products remain niche products with market shares below 10% (Carrington *et al.*, 2014; Vermeir and Verbeke, 2006; Young *et al.*, 2009). This also causes sales losses for retailers who could benefit from the significantly higher margins of sustainable products (Pelsmacker *et al.*, 2005). Therefore, promoting sustainable consumption is highly important for both environmentalists and the retail industry.

While it may seem easiest to encourage sustainable consumption through short-term price promotions, in the long run, this is no viable strategy to promote a greener economy. Such promotions may cause sales peaks but no long-term behavioral changes among consumers

International Journal of Retail & Distribution Management
Vol. 48 No. 8, 2020
pp. 803-824

0959-0552
DOI 10.1108/IJRDM-02-2019-0044

(Pauwels *et al.*, 2002) or even negative effects on purchase intentions due to consumers' association of price with quality (Ngobo, 2011). Rather, it must be the goal of sustainability marketing to persuade consumers and engage them in more sustainable behavior. Retailers and researchers have put much emphasis on examining whether advertisement messages at the point of sale (POS) can activate environmentally friendly values and attitudes of consumers and thereby lead to more sustainable purchasing decisions (e.g. Cho *et al.*, 2018; Frank and Brock, 2018). Nevertheless, the hoped-for success often failed to materialize (Andorfer and Liebe, 2015) or can even be negative for some product categories (Daunfeldt and Rudholm, 2014). Currently, retail managers and researchers therefore turn to new digital in-store technologies as a novel opportunity to involve consumers (see, e.g. Dennis *et al.*, 2012; Grewal *et al.*, 2017). Technological solutions are becoming more sophisticated and diverse while the necessary hardware gets cheaper (Hagberg *et al.*, 2016; Javornik, 2016b), but their impact on consumers has hardly been scientifically investigated so far. In particular, their potential to increase sustainable consumption was mainly neglected. According to first studies, in-store technologies such as augmented reality (AR) displays might be able to address consumers both emotionally and intellectually (Dennis *et al.*, 2014; Javornik, 2016a), so research should more deeply investigate the technology's potential to promote sustainable products.

Perception research shows that stimuli first have to pass a selective attention filter before they might be processed (Broadbent, 1958). Therefore, we propose a two-step approach: we argue that in-store technologies may be able to pass this first filter by providing novel, interactive and nonstatic stimuli that increase customers' arousal and improve their shopping experience (Helmefalk and Berndt, 2018; Lecointre-Erickson *et al.*, 2018). In a second step, the information provided via the technologies has to emotionally and intellectually engage the customer; otherwise, it may only have a limited impact on behavior (Eagly and Chaiken, 1993; Hagberg *et al.*, 2016; Willems *et al.*, 2017). Previous research suggests that consumers' attitudes toward an object become more positive when the presented information is easy to process and its meaning is easy to grasp (Lee and Labroo, 2004). To design such information differentiated insights on how sustainable products are understood and processed by consumers are needed, also taking into account potential differences between sustainability attributes such as organic versus locally produced goods. The construal-level theory (CLT) of psychological distance (Trope and Liberman, 2010; Trope *et al.*, 2007) has already been applied in this context to explain why some advertisements for sustainable products lead to more positive reactions among consumers than others (e.g. Reczek *et al.*, 2018). Nevertheless, so far only purchase intentions, but no real consumer behaviors were investigated and no digital in-store technologies have been used (Cho *et al.*, 2018; Reczek *et al.*, 2018). Furthermore, previous studies did not distinguish between different types of sustainable food products. We aim to close these gaps by reasoning why different message framings may be more or less effective in promoting sales for organic versus locally produced food due to their fit to existing cognitive structures.

The results of a field experiment studying actual consumer data presented in this paper open up insights for marketers and retailers on how to promote sustainable products at the POS. To do so, research on POS marketing applying new technologies and consumer psychology research based on the CLT are integrated and contribute to a better understanding of purchase decisions. We analyze and compare the effects of two different message framings presented via two in-store technologies, namely digital signage (DS) and a magic mirror AR application, on two different outcome variables – the level of consumers' attention (attention filter) and real purchase data (activation of consumers). Thereby, this study contributes not only to sustainability marketing research but also to literature on POS marketing by being one of the first empirical papers investigating the effectivity of screen-based in-store technologies. This paper is organized into five sections: First, we describe the

theoretical background and derive hypotheses from existing literature. Then, the methodology as well as the results of the field experiment are explained. In the end, the scientific and managerial implications of the results are discussed before addressing limitations and future research.

2. Theoretical background and hypotheses

2.1 Digital in-store technologies: digital signage and augmented reality

Innovative in-store technologies such as DS or interactive AR applications open up new opportunities to enhance consumers' experience at the POS (Hagberg *et al.*, 2016). Drawing on perception research, they should be able to attract consumers' attention "bottom-up" by bringing in new, nonstatic and partially interactive stimuli into a familiar retail environment (Broadbent, 1958; Grewal *et al.*, 2017; Itti, 2005). This should enable the information presented via the respective technology to engage and activate consumers. However, scientific proof for the actual effectiveness of such digital promotion tools is rare (Burke, 2009; Willems *et al.*, 2017) and partly contradictory. While some studies find digital technologies to be an excellent opportunity for the retail industry (Lecointre-Erickson *et al.*, 2018), others assume that consumers completely ignore screens at the POS – the so-called phenomenon of "display blindness" (Memarovic *et al.*, 2007). The present study aims to counteract this confusion and gain new insights into the potential of innovative in-store technologies to engage consumers in more sustainable behavior. It takes a closer look at the effects of advertisements via DS/magic mirror AR applications on consumers' attention as well as the actual sales of sustainable products. In line with the rare existing studies on the effects of new digital technologies showing that they can attract customers' awareness and enhance their retail experience (Dennis *et al.*, 2014; Javornik, 2016a), we propose that they should be able to trigger sales for the advertised sustainable products.

H1. Advertising via digital in-store technologies increases the sales of sustainable products.

The technologies selected in this paper, namely noninteractive DS and magic mirror AR, are both evaluated as promising tools to apply in retail environments (Javornik, 2016b). However, there is a remarkable difference between the two technologies: the possibility for customers to *interact* with digital signs. Noninteractive DS is the "digital advancement" of classic posters allowing retailers more flexibility. It represents a development of classic posters by displaying dynamic content such as videos (Want and Schilit, 2012), which are suggested to catch more attention than static content such as text or still images (see, e.g. Huang *et al.*, 2008). Nevertheless, first empirical studies (e.g. Ervasti *et al.*, 2015) were not able to detect a significant difference between the effect of static versus nonstatic content; hence, effects are largely comparable to classic posters. The second technology, magic mirror AR, represents an opportunity for consumer engagement by allowing consumers to interact with the technology. How this affects consumer behavior has so far hardly been investigated and extant research is mainly conceptual (e.g. Boardman *et al.*, 2020) or only based on consumer reports (e.g. Poushneh, 2018), so further research is needed. Magic mirror applications showing consumers an augmented image of themselves might be particularly promising to attract customers' attention as the own face is detected significantly quicker among distractions than other faces (Tong and Nakayama, 1999). Devue *et al.* (2009) further found that peoples' attention is captivated longer by their faces or familiar faces, so a reflection of themselves seems to be a very attention-grabbing stimulus.

Furthermore, seeing oneself may also lead to a higher salience of social norms and thus to norm-conforming behavior according to the theory of objective self-awareness (Duval and Wicklund, 1972). The theory states that looking at one's own person in a (digital) mirror induces self-focused attention. This self-awareness triggers self-control with regard to social

norms (Silvia and Phillips, 2013) and can lead to the own behavior being more in line with the perceived expectation of others (Duval and Wicklund, 1972; Geller and Shaver, 1976). Assuming that "buying green" is a social norm nowadays (White *et al.*, 2019), magic mirror AR applications should increase not only customers' attention but also their sustainable purchases. So although we assume that both magic mirrors and noninteractive DS can draw consumers' attention to a product and thus promote its sales, magic mirrors are probably more effective in doing so.

H2a. The presentation of an advertising message via a magic mirror AR application gathers more attention than a presentation via DS.

H2b. The presentation of an advertising message via a magic mirror AR application is more effective to promote sustainable purchases than the presentation via DS.

2.2 Construal-level theory and message framing

Transforming the increased attention gained by new technologies into more sales of sustainable products requires communicating the right messages via those technologies. Research on information processing shows that the human brain processes information matching existing cognitions faster and easier (Lee and Labroo, 2004). This so-called process fluency stimulates a positive feeling, which can, in turn, lead to more positive attitudes toward advertisements and higher buying intentions (Storme *et al.*, 2015).

Former research has applied this effect to create effective advertising messages for sustainable products referring to the CLT of psychological distance (Trope and Liberman, 2010; Trope *et al.*, 2007). This theory has already been proven to be a suitable theoretical basis for researching sustainable consumption (Chang *et al.*, 2015; Ramirez *et al.*, 2015; Reczek *et al.*, 2018) and may be able to map existing cognitive structures. Thereby, it provides a basis to design "matching" advertisements.

According to the CLT, objects are represented in human minds on different mental levels – so-called construal levels – depending on their psychological distance. This distance is a subjective experience that something is close to or far away from the self, here and now (Trope and Liberman, 2010) and can be triggered through four different distance dimensions: (1) *spatial*, that is, how far away is something? (2) *temporal*, that is, is it happening now or in the future? (3) *social*, that is, does it concern myself or strangers? and (4) *hypothetical distance*, that is, how likely is something to happen? (Liberman *et al.*, 2007) All dimensions have similar effects on how objects are represented in human brains: psychologically near (i.e. temporally, socially or spatially close) objects are mentally construed on a low-construal level, that is, their mental representation rather focuses on details, whereas psychologically distant (i.e. temporally, socially or spatially remote) objects are thought of in a high construal level, that is, in high-level and abstract terms (Trope and Liberman, 2010).

Various studies show that messages matching the construal level an object category is associated with – that is, matching existing cognitions – can have positive effects on consumers' (buying) behavior (Chang *et al.*, 2015; Lucke and Koenigstorfer, 2018; Ramirez *et al.*, 2015; Trope *et al.*, 2007). There are different ways to manipulate the construal level of a message. Chang *et al.* (2015) and White *et al.* (2011) both manipulated the perceived temporal distance in messages mentioning either a near time (this year, today) or a remote time (each year in the future, tomorrow). Reczek *et al.* (2018), in turn, use a concrete versus abstract framing strategy: they advertised a car tire either with a very general description only calling it "environmentally friendly" or with a detailed description listing specifics about the tires' carbon footprint and impact on global warming. The positive effects of "construal-matching" of the message and existing product associations raise the question: Which construal level is congruent with sustainable products?

According to prior research, sustainability as a concept as well as sustainable products are perceived as psychologically more distant than conventional goods and are therefore represented on a high construal level in consumers' minds (Griffioen *et al.*, 2016; Reczek *et al.*, 2018). This results from the fact that the benefits for the environment appear rather abstract and future-oriented (Griffioen *et al.*, 2016; van Dam and van Trijp, 2011). Consumers cannot directly experience the positive effects that sustainable goods might potentially have in the future for the environment. Reczek *et al.* (2018) confirm that messages designed on a high construal level using rather abstract and distal terms are more effective in increasing purchase intentions for sustainable car tires than concrete, low-construal messages.

Nevertheless, research on CLT and sustainability is relatively rare and has never distinguished between *different* sustainable product categories, but treated sustainability as a uniform attribute (Chang *et al.*, 2015; Lucke and Koenigstorfer, 2018; Reczek *et al.*, 2018). However, in the context of sustainable food choices, consumers often face the decision between different kinds of sustainable products – for example, organic and locally produced food. Although both product types may be classified as "sustainable," they differ largely in their attributes, argumentation (van Herpen *et al.*, 2012) and probably also in their perceived psychological distances. While organic food products are presumably mainly associated with an overall benefit for climate, environment or society, locally produced goods include a promise to strengthen the economy in the direct surrounding of the buyer and to be "fresher" (Roininen *et al.*, 2006). So, associations with locally produced food may be rather psychologically close, and the products therefore depicted on a low construal level. Hence, we make the novel prediction that there might be an interaction effect with low-level construal messages being more effective for local food and high-level construal messages boosting sales for organic food.

H3a. High-construal advertising messages are more effective in increasing the sales of organic products than low-construal messages.

H3b. Low-construal advertising messages are more effective in increasing the sales of locally produced goods than high-construal messages.

With the integration of POS technology research and CLT message design research, we propose a multi-level process of how advertisements at the POS may increase purchases of sustainable food products. First, we compare the effectiveness of static DS and an interactive AR application to generate attention and increase sales. Second, we test different messages based on the idea that customers' associations with organic food are matching high-construal ads while associations with locally produced food match low-construal-level ads. The theoretical assumptions of this paper and the proposed hypotheses are graphically summarized in Figure 1.

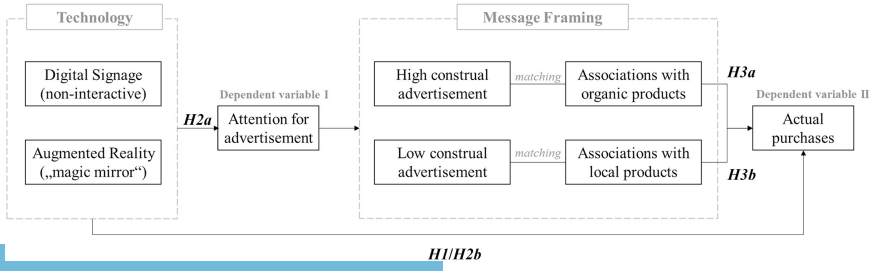

Figure 1.
Proposed two-step process model and hypotheses

3. Research methodology

To test the stated hypotheses, a two-week field experiment was conducted with a 2 (product label: organic vs local) × 2 (message framing: high vs low construal level) × 2 (presentation technology: DS vs magic mirror AR) design in cooperation with a German retailer and a start-up providing the in-store technology solutions.

3.1 Product selection

Products from the same category were compared, namely organic versus locally produced milk. This product category was selected since milk is one of the most frequently bought food products, so changes in consumer behavior could have a comparatively large positive impact on the environment. Consumers do not have strong brand preferences for milk as a low-involvement product (Thøgersen *et al.*, 2012), so stimulating behavioral change should be easier. Furthermore, prior research suggests that sustainable advertisements might be especially promising for low-involvement, virtue products such as milk (van Doorn and Verhoef, 2011; Thøgersen *et al.*, 2012). Lastly, it was possible to select organic and local brands in the milk category, which were similarly established in the test region and, therefore, comparable.

3.2 Message design and pretest

Four sets of four short advertisement messages were designed (organic vs local × high vs low construal) for presentation on the digital screens. The 16 messages were designed according to the CLT and in reference to recent studies (e.g. Tangari *et al.*, 2015; Willems *et al.*, 2017). Both distance dimensions and the degree of abstraction were manipulated to assure a clear difference between the messages. High-construal messages were all formulated holistically (i.e. abstract) and half of the slogans emphasized a future focus (i.e. high temporal construal, e.g. "think about the future", "do something good in the long run"), while the other half focused on collective benefits (i.e. high social construal, e.g. "because we take the responsibility for the environment!"). Low-construal messages addressed the consumer at a temporally/socially closer level, focusing on immediate or personal benefits and were formulated using concrete wording, for example, "because it contains 60% more healthy omega-3 fatty acids than conventional milk." The slogans were designed as similar as possible in all four conditions, only varying in relevant keywords. A pretest with 41 student participants was conducted to assess credibility and comprehensibility of the slogans and to check whether the manipulation was successful. The participants were randomly assigned to one of the four conditions (organic vs local × high vs low CL) and asked to rate all slogans for that condition regarding credibility and comprehensibility (seven-point semantic differentials ranging from 1 = "not credible/comprehensible at all" to 7 = "absolutely credible/comprehensible"). Unifactorial ANOVAs confirmed that the conditions did not differ in credibility or comprehensibility [overall credibility: $M_{\text{OrganicLow}} = 4.34$, $M_{\text{OrganicHigh}} = 4.18$, $M_{\text{LocalLow}} = 4.10$, $M_{\text{LocalHigh}} = 3.98$, $F(40) = 0.958$, $p > 0.05$); overall comprehensibility: $M_{\text{OrganicLow}} = 5.50$, $M_{\text{OrganicHigh}} = 5.48$, $M_{\text{LocalLow}} = 5.75$, $M_{\text{LocalHigh}} = 5.43$, $F(40) = 0.965$, $p > 0.05$]. Afterward, participants were asked to rate the manipulated dimensions of psychological distance for each slogan (seven-point semantic differentials; social distance: 1 = "benefit for myself", 7 = "benefit for others/the society" or temporal distance: 1 = "immediate benefit", 7 = "benefit in the future") and the overall concreteness/abstractness of the messages (1 = "very concrete", 7 = "very abstract"). The manipulation of the distance dimensions as well as abstractness between high- and low-construal messages was proven successful across all four slogans within independent samples *t*-tests [social/temporal distance: $M_{\text{Low}} = 2.36$, $M_{\text{High}} = 5.44$, $t(39) = -20.64$, $p < 0.001$; abstractness: $M_{\text{Low}} = 3.16$, $M_{\text{High}} = 4.96$, $t(39) = -12.49$, $p < 0.001$].

The stimuli were presented on digital screens provided by the cooperating technology start-up. In the DS version, speech bubbles containing the tested slogans appeared above the image of a model and changed every 3 s. In the magic mirror version, the customer saw himself/herself on the screen while the slogans were shown in speech bubbles around him/her and altered every 3 s. In the bottom part of the screen, a packshot of the advertised product was shown as well as the actual price (organic: €1.09, local: €1.29). Although the organic milk was slightly cheaper (≈16%) than the locally produced milk, the data show that customers still prefer the local milk brand (see section 4.1 and Appendix).

3.3 Experimental setting

Two grocery stores from the same German retailer were selected to position the advertising screens showing the slogans for two weeks. We conducted the study in two separate stores to increase the amount of comparable data gained during the experimentation weeks. Furthermore, two stores with a considerably different size and location were selected to be able to investigate potential interaction effects of the POS technologies and those factors. The first store was located in the downtown area and was noticeably smaller than the second one. According to our cooperating retailer, customers made smaller, immediate purchases in the downtown store (e.g. bought lunch in their lunch break), while the other store was located more remote and rather used for weekly grocery shopping. We suspected that people in the smaller downtown store experience more time pressure during shopping, are less open to new technologies at the POS and therefore less likely to be influenced by the advertisements (see Roggeveen *et al.*, 2016). A balanced display rotation was created to link the purchase data provided by the retailer with the respective experimental condition. Each of the four conditions (organic vs local × high- vs low-construal-level messages) was presented equally along with each technical condition and in each store. To achieve this, the displayed condition changed once a day, so a condition was active for a time slot of 6 h before the next condition was activated. We paused the screens for 1 h between the conditions every day to assure a clear separation of effects. In total, we gathered data for 24 time slots per store (two time slots per day × six days per week × two weeks).

3.4 Dependent variables

The number of sustainable milk purchases as well as the amount of milk purchased in the different experimental conditions was provided by the retailer and compared to each other as well as to a reference period (two weeks without promotion). Furthermore, visual attention data was collected by a facial recognition software integrated into the screens. The software captured how many people looked at the advertisement screen and how long they looked at it on average for each time slot. The facial recognition software classified customers into four different age groups (infant, young, middle or elder) and sorted by gender. Due to the data aggregation to time slot level, no conclusions regarding single customers were possible. Moreover, customers' anonymity was ensured as the video material of the customers was not saved by the screen.

4. Data analysis and results

4.1 Descriptive results and preparation of data analysis

In sum, 754 customers purchased milk in the large store during the two-week experimental period. Out of these purchases, customers chose 40 times the organic milk brand and 113 times the local milk brand (see Appendix). In the smaller store, 284 milk purchases were registered in the same time period, including 32 organic purchases and 40 local milk purchases. On average, customers spent 15–16 € per purchase (larger store: €15.93, smaller

store: €15.41) and bought 10–11 different items (larger store: 11.2, smaller store: 10.1). While the purchase value differed not significantly in both stores ($t(3,112) = 0.80$, $p > 0.1$), the difference between the number of purchased items was highly significant ($t(3,112) = 3.33$, $p < 0.001$).

To test the experimental effects, we only included purchases from the time slots in which the respective organic/local brand was advertised. Furthermore, as prices for different product variants slightly differ (organic/local milk with lower fat content is 4/10 cent cheaper), we only included purchases of the advertised product variant. Therefore, the final sample consisted of 122 purchases in total and 136 packages of organic or locally produced milk, respectively. Table 1 gives an overview of the outcome variables used for the statistical analyses of the purchases aggregated by time slot, namely the *number of organic/local packages bought* (PO, PL) and the *number of customers buying organic/local* (CO, CL).

Furthermore, the facial recognition software registered 5,218 customers and was also used to analyze the sociodemographic structure of shoppers visiting the store during the experimental weeks in terms of age and gender. As can be seen in Table 2, the people looking at the screens were dominantly male (AR: 68% men, DS: 62% men) and either younger or middle-aged (AR: 48% young, 44% middle-aged; DS: 46% young, 48% middle-aged). Hence, the distribution across gender and age groups was comparable for both technological conditions. A Kruskal–Wallis test of the attention data revealed that the numbers of men and women looking at the screen and the age of the customers did not differ significantly between the four message conditions (all $p > 0.05$), so we assume that the display rotation plan was successful and there were no biases due to the customer mix.

4.2 Results regarding in-store technologies

To test H1, the purchase data collected during the two experimental weeks was contrasted to the comparative data from two control weeks. Since these variables are not normally distributed (Kolmogorov–Smirnov test was highly significant for all variables, $p < 0.001$), we used nonparametrical Mann–Whitney U tests. When pooling the purchase data of both grocery stores, there existed no significant difference for any of the four outcome variables. Hence, overall, consumers did not buy significantly more organic or locally produced milk in the experimental conditions than without the advertisement. Nevertheless, some significant effects become visible when analyzing the two stores separately. In the larger store, significantly more packages of organic milk were bought during the experimental weeks than during the comparative weeks ($U_{PO} = 186.500$, $p < 0.05$) and marginally significant more customers bought organic milk ($U_{CO} = 204.000$, $p < 0.1$; see Figure 2). Furthermore, significantly more packages of local milk were bought during the experimental weeks ($U_{PL} = 195.000$, $p < 0.05$) by significantly more customers ($U_{CO} = 193.500$, $p < 0.05$). So, there is evidence for H1 for one of the two stores for both organic and local milk.

As a next step, we analyzed if magic mirror AR technology is more effective regarding generating attention (H2a) and promoting sales (H2b) compared to DS, using Mann–Whitney

	Organic milk	Locally produced milk
Number of packages bought per time slot*	PO (Mean: 1.31; SD: 1.52; Min: 0; Max: 6)	PL (Mean: 2.10 SD: 2.43; Min: 0; Max: 12)
Number of customers buying per time slot	CO (Mean: 0.92; SD: 1.11; Min: 0; Max: 6)	CL (Mean: 1.63; SD: 1.91; Min: 0; Max: 10)

Note(s): *Purchases of more than eight packages by one customer were excluded for further analyses since those purchases are outliers that disproportionally increase the purchase amount per time slot

Table 1.
Descriptive statistics of outcome variables used for further analyses of purchase data

Table 2. Comparison of the average number of customers looking at a screen per time slot in the two different technological conditions (AR/DS)

	Mean number of customers per time slot (6 h)						
	All customers	Men	Women	Infant	Young	Middle-aged	Elder
AR	234.75 (SD: 108.73; Min: 107; Max: 450)	159.63 (SD: 74.45; Min: 55; Max: 259)	75.13 (SD: 50.56; Min: 34; Max:191)	15.50 (SD: 12.00; Min: 2; Max: 37)	111.88 (SD: 76.33; Min: 49; Max: 295)	103.25 (SD: 54.77; Min: 42; Max: 185)	4.13 (SD: 4.70; Min: 0; Max: 13)
DS	116.08 (SD: 42.03; Min: 68; Max: 195)	72.00 (SD: 34.44; Min: 38; Max: 162)	43.33 (SD: 15.95; Min: 24; Max: 78)	3.67 (SD: 2.64; Min: 0; Max: 9)	53.58 (SD: 20.59; Min: 31; Max: 99)	55.92 (SD: 34.94; Min: 13; Max: 152)	2.92 (SD: 2.78; Min: 0; Max: 9)
U	11.000	12.000	23.000	15.500	10.000	18.000	46.500
p	<0.01	<0.01	<0.1	<0.05	<0.01	<0.05	=0.910

Note(s): AR = augmented reality, DS = digital signage

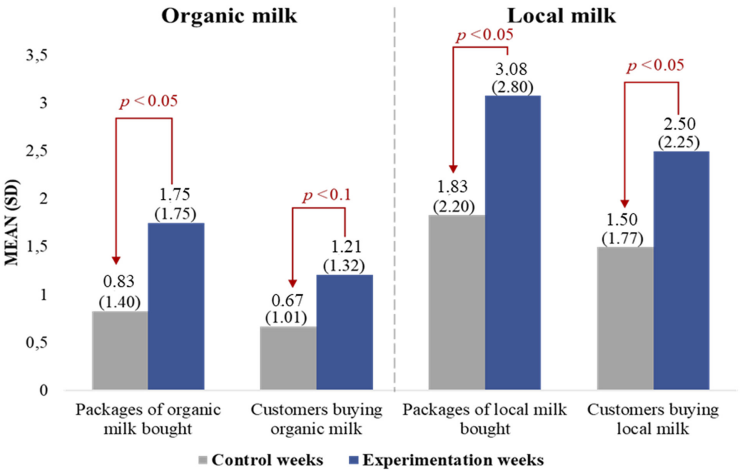

Figure 2.
Mean differences (and SD) between the sales of organic/local milk per time slot in the control weeks versus experimentation weeks in the large store (store 1)

U tests for the nonnormally distributed number of customers looking at the screen and *t*-tests for the normally distributed time spent by customers looking at the screen (see Tables 2 and 3).

Across all customer groups, we found that significantly more participants looked at the screen when an AR advertisement was active compared to time slots when a DS advertisement was shown (see Table 2). Only for older customers there was no significant difference, which might be caused by the small overall number of older customers. People spent on average 2.12 s in front of the screens (SD: 0.44, Min: 1.40, Max: 3.17). Independent sample *t*-tests revealed that all customer groups – except the elder ones – spent significantly more time in front of the screens when an AR advertisement was active than when a DS advertisement was active (see Table 3). Therefore, H2a is widely supported by the data.

Using Mann–Whitney *U* tests, it was investigated whether there were significant differences between the amounts of milk bought or the number of customers in the AR versus the DS conditions. However, neither for organic milk ($M_{PO\text{-}AR} = 0.92$, $M_{PO\text{-}DS} = 1.71$, $U_{PO} = 70.500$, $p = 0.927$; $M_{CO\text{-}AR} = 0.63$, $M_{CO\text{-}DS} = 1.21$, $U_{CO} = 67.500$, $p = 0.772$) nor for locally produced milk ($M_{PL\text{-}AR} = 2.58$, $M_{PL\text{-}DS} = 1.63$, $U_{PL} = 68.000$, $p = 0.813$; $M_{CL\text{-}AR} = 2.08$, $M_{CL\text{-}DS} = 1.17$, $U_{CL} = 65.000$, $p = 0.676$) there were any significant differences. Despite the "attention-boosting" effect of the AR technology, the two technologies had similar effects on the purchase behavior of the customers. Hence, H2b was not supported by the data.

4.3 Results regarding the message framing

To test the hypotheses H3a and H3b, it was analyzed if a specific advertisement (high vs low construal) is more effective for a certain sustainable product type (local vs organic) using Mann–Whitney *U* tests. Descriptively, we see an interaction effect (see Figure 3): purchases of local milk increase in the condition of high-construal advertisements, while purchases of organic milk increase when low-construal messages are shown. Thus, the direction of the interaction effect is against our original hypotheses. However, these differences were statistically mostly insignificant: we found a marginally significant difference for the amount of purchased organic milk ($U_{PO} = 39.500$, $p < 0.1$), while the number of customers buying organic milk differed not significantly ($U_{CO} = 48.000$, $p = 0.178$). For locally produced milk, neither the amount ($U_{PL} = 48.000$, $p = 0.178$) nor the number of customers differed significantly ($U_{CL} = 51.500$, $p = 0.242$).

Table 3. Comparison of the average time customers of different customer groups spent looking at a screen in the two different technological conditions (AR/DS)

	Mean time spent looking at the screen per customer (in seconds)						
	All customers	Men	Women	Infant	Young	Middle-aged	Elder
AR	2.53 (SD: 0.33; Min: 2.00; Max: 3.17)	2.52 (SD: 0.47; Min: 2.00; Max: 3.50)	2.40 (SD: 0.59; Min: 1.20; Max: 3.00)	1.43 (SD: 0.88; Min: 0.17; Max: 2.67)	2.27 (SD: 0.67; Min: 1.80; Max: 3.83)	2.61 (SD: 0.28; Min: 2.33; Max: 3.00)	0.85 (SD: 0.78; Min: 0.50; Max: 1.83)
DS	1.84 (SD: 0.24; Min: 1.40; Max: 2.20)	1.83 (SD: 0.29; Min: 1.33; Max: 2.33)	1.65 (SD: 0.25; Min: 1.33; Max: 2.20)	0.78 (SD: 0.61; Min: 0.33; Max: 2.20)	1.43 (SD: 0.28; Min: 1.00; Max: 1.50)	2.09 (SD: 0.34; Min: 1.50; Max: 2.80)	0.85 (SD: 0.60; Min: 0.20; Max: 2.00)
$t(19)$	5.50	4.05	3.90	1.94	3.89	3.57	0.22
P	<0.001	<0.01	<0.01	<0.1	<0.01	<0.01	=0.982

Note(s): AR = augmented reality, DS = digital signage

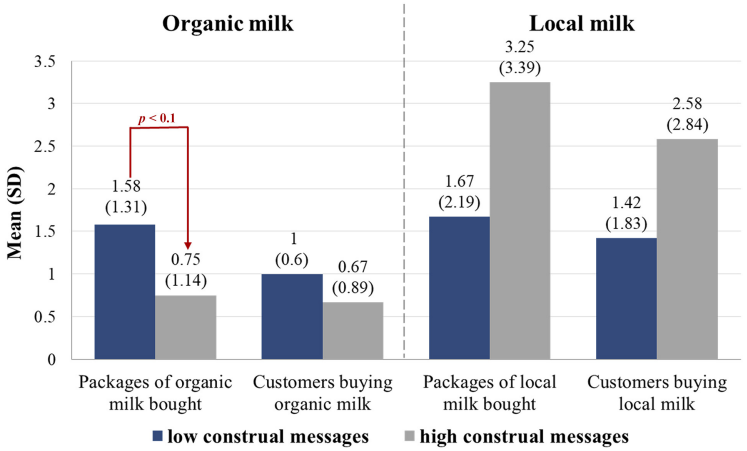

Figure 3.
Mean differences (and SD) between the sales of organic/local milk per time slot when low- versus high-construal-level messages were presented

As further investigations showed, the marginally significant effect on organic milk purchases is mainly evident in the AR time slots. In the AR condition, low-construal messages significantly increased organic milk purchases compared to high-construal messages ($U_{PO} = 3.000$, $p < 0.05$; $U_{CO} = 5.000$, $p < 0.5$; see Figure 4), but not in the DS condition ($M_{PO\text{-}LCL} = 1.44$, $M_{PO\text{-}HCL} = 0.89$, $U_{PO} = 16.500$, $p = 0.818$; $MC_{O\text{-}LCL} = 0.89$, $M_{CO\text{-}HCL} = 0.78$; $U_{CO} = 17.500$, $p = 0.937$). For local milk, still none of the differences is significant, even when AR and DS are analyzed separately.

Therefore, hypotheses H3a and H3b cannot be confirmed. Differently than expected, not high but *low*-construal-level messages work better to promote purchases of organic milk. Interestingly, we did not find such an advantage for locally produced milk – here, data suggests at least descriptively that high-construal messages are more effective. Thus, the general idea of an interaction effect, that is, that different construal levels need to be activated for different product types, seems to be supported by the data. This indicates that none of

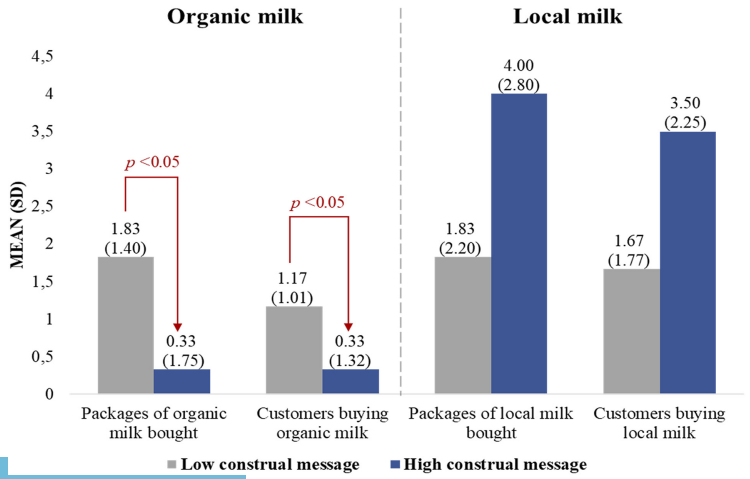

Figure 4.
Mean differences (and SD) between the sales of organic/local milk when low- versus high-construal-level messages were presented via magic mirror augmented reality

both message framing strategies is generally more successful than the other; instead, both strategies (messages on high and low construal level) seem to be successful, but each for different sustainable product type. However, these results should be considered with caution since we only found significant results for organic milk in the AR condition.

5. Discussion and implications

Within the present study, we investigate a two-step approach to increase sustainable consumption combining POS technology research and consumer psychology, namely: (1) gaining attention through POS technologies; (2) making best use of increased attention by messages matching existing cognitions. Conducting a two-week in-store experiment, we first analyze the potential of two different in-store technologies to raise consumers' attention to green advertisements. We confirm our hypothesis that consumers' attention for advertisements can be increased by the use of magic mirror AR applications compared to noninteractive DS. Further, advertising via both technologies increases the sales of the advertised products in one of the two investigated stores. Second, we assumed that the framing of the advertisement messages influences the advertising effectiveness if consumers pay enough attention to the presented message. In line with this assumption, we find a significant increase in sales figures of organic milk when concretely framed, low-construal advertisements are presented via the magic mirror AR application. We take these results as an indication that the proposed two-step approach can be used as a framework for future research as well as advertising practice.

5.1 Discussion of the effects of digital in-store technologies

Based on perceptual research, we propose that consumers' attention must first be attracted to engage and activate them with targeted messages. For this purpose, magic mirror AR applications can serve as a particularly innovative tool at the POS. In contrast, noninteractive DS is based on the same display principles as classical posters and relatively common in retail environments. We observe that in almost all customer groups, twice as many people spent about 1 s more time in front of the magic mirror screens compared to the noninteractive DS. This attention boost confirms the findings of previous research suggesting that one's own reflection can draw the visual attention of consumers (Tong and Nakayama, 1999; Devue *et al.*, 2009). Furthermore, we quantify this attention boost effect in a realistic retail setting: the magic mirror attracts 102% more customers and increases their attention span by more than 37% compared to the noninteractive DS. Consequently, marketers should shift their budgets toward more interactive digital promotion tools to benefit from greater attention. Further, we recommend assessing the success of POS promotions also in terms of brand and product awareness, which might have long-term brand effects beyond immediate sales numbers.

Irrespective of the type of sustainable product (organic vs local), the use of such POS technologies also increases sales compared to a control period without advertisement, however, only in one of the two test stores. The difference between the stores is supposedly mainly attributable to the different sizes and locations of the stores. In the smaller-sized downtown store, where no effects can be detected, customers are likely to experience more time pressure (e.g. when shopping during lunch break or on their way home). They might, therefore, not be ready to engage with any presented message and rather ignore them (Kao, 2011). Besides time pressure, this effect might also be caused by the physical conditions: in smaller stores, the optimal positioning of screens is more demanding. In our case, the display was, for example, partially covered by other goods from some viewing angles and consumers barely had room to stop in front of the screen. These explanations are also supported by another field study showing that displays have a positive effect on sales in larger stores, but even an adverse effect for small stores (Roggeveen *et al.*, 2016).

Referring to our two-stage process model, we therefore propose an extension: new technologies might indeed raise consumers' initial attention. Nevertheless, whether this initial attention is high enough to trigger actual purchases depends not only on the appropriate technology but also on situational factors. Enriching classical models of attention research (see, e.g. Broadbent, 1958), this means that the first attention filter is based not only on the physical conditions of a stimulus (e.g. novelty of stimulus, recognition of the own face) but probably also on situational factors such as consumers' time pressure or the physical store layout. Future studies should therefore examine these attention-inhibiting factors. It would also be of great interest whether technological and situational factors act independently or interact with each other. Based on the presented results, practitioners need to consider situational in-store factors when planning to adopt in-store technologies.

It should also be pointed out that magic mirrors do not lead to increased sales figures compared to the noninteractive DS. While one's reflection is apparently able to generate attention (Tong and Nakayama, 1999; Devue *et al.*, 2009), it does not automatically trigger purchase decisions by activating environmental norms, as we presumed based on the theory of objective self-awareness (Duval and Wicklund, 1972). We suspect this lack of direct influence is due to the latency that existed between the activation of the social norm – when seeing the screen at the store entrance – and the actual purchase decision in front of the shelf. Previous studies on norm-activation effects of self-awareness were predominantly laboratory experiments in which the behavioral task directly followed the manipulation of self-awareness (e.g. Silvia and Phillips, 2013; Geller and Shaver, 1976). In our field experiment, however, there was a certain spatial distance between the screen and the milk shelf, so consumers were confronted with various other impressions on their way and possibly made other purchase decisions. These distractions could have weakened the activated social norm. A strategy to avoid negative effects of temporal or spatial distance might be the application of digital technologies that are directly integrated into the shelf. Where this is not possible, the attention gained by magic mirrors must be directed to effective advertisement messages that are able to engage customers and trigger purchase decisions some minutes later. This might be reached by a specific framing of the advertisements.

5.2 Discussion of the effects of construal-level message framing

After passing the initial attention filter, we assume that a match between existing cognitions and the presented message leads to perceived process fluency (Lee and Labroo, 2004), which in turn facilitates information processing and thereby activates positive attitudes toward the advertised product. Based on construal-level research, we proposed an interaction effect between high (vs low) construal messages and organic (vs locally produced) products, which is not confirmed in the purchase data for multiple reasons.

First, significant differences between the message types only occur when the advertisements are presented via magic mirror AR, but not via noninteractive DS. We initially assumed that despite the attention advantage of the magic mirror application, advertising via noninteractive DS should also be able to generate sufficient attention for consumers to elaborate the presented messages. However, this is not the case. Apparently, only the longer attention span triggered by the magic mirror technology enables consumers to read the text messages and process them, which is why message framing only affects buying behavior in the AR condition. Referring to our two-step model, it can be deviated that the noninteractive DS is not able to pass the attention filter necessary for deeper processing of stimuli. In contrast, noninteractive DS seems to trigger a shallow information processing. The included visual stimuli (e.g. brand logo and product shot) enable customers to recognize the brand and product in a split second (van Meurs and Aristoff, 2009). The stimulated brand awareness is able to increase sales, also if consumers do not additionally process verbal information. These findings have far-reaching consequences for advertising practice: only

the magic mirror screens create sufficient processing depth for the inclusion of new information. Thus, if an advertisement campaign is designed to convey *new* product information to the consumer or present an *unknown* product, the presentation medium, that is, the selected POS technology, has to gain sufficient attention in the first place.

Regarding the direction of the message effect found in the magic mirror AR condition, the data contradict our expectations since concrete low-construal messages are more successful for organic milk than abstract high-construal ones. Construal-level research associates sustainability with abstractness (see Griffioen *et al.*, 2016; Reczek *et al.*, 2018), which would point to an advantage of high-construal messages. However, other studies show that health and taste considerations strongly motivate organic food consumption (Hughner *et al.*, 2007; McEachern *et al.*, 2005). These drivers represent personal benefits, which are psychologically very close to consumers and have already been argued to match with concrete low-construal messages (Yang *et al.*, 2015). Hence, from a consumer perspective, organic food is not primarily seen as an abstract means to sustainability, but as a concrete means for personal health and well-being. Accordingly, low-construal messages are more effective.

Concerning local products, we find no significantly different effects of message frames on consumers' purchase behavior. However, their sales were in total also increased by the in-store technologies – probably simply because of increased product and brand awareness. On the one hand, local products may be associated with spatial proximity as we proposed; on the other hand, however, "local production," unlike "organic," is not a protected term in Germany, which means that local products could be perceived as riskier (i.e. hypothetically distant). Due to this greater diversity of existing cognitions, the strategy of matching messages to cognitions is difficult to apply for local products. Future studies should therefore further investigate customers' associations with local products and explore new framing strategies for these products if no clear advantage of a high or low construal level can be determined.

5.3 Managerial implications

Drawing practical implications from these findings, we recommend the following for increasing green consumption at the POS: first, retailers have to enhance the retail environment by new, interesting stimuli improving the customer experience to attract customers' attention bottom-up. Compared to noninteractive DS, magic mirror AR screens are shown here to be especially promising since the reflection of the own face attracts greater attention (102% more customers, 37% longer attention span). In the future, close attention should be paid to new interactive technologies, for example, an artificial intelligence responding to verbal and nonverbal reactions by the consumer. Second, retailers have to find the right messages, which are easy to process and engage the consumer. As a general rule of thumb, messages should be kept as short as possible. Our data confirmed the results by Huang *et al.* (2008) stating that people only spend 2–3 s looking at a display. Although the AR magic mirror application expanded this time by about 1 s, retailers have to engage consumers very quickly. Organic products should rather be promoted with low-construal messages matching the self-benefit associations of better health and taste that customers have with those products. Fitting the low construal level of these associations, messages should use concrete and precise language to promote immediate benefits for the consumer herself or himself.

Our results further indicate that POS applications are more suitable for large stores where they can be positioned prominently, and consumers have enough time and space to interact with them. This raises the question of how sustainable consumption should then be stimulated in smaller shops among consumers with time pressure. Retailers might consider shaping consumers' choice situation, for example, through certain positioning or color-marking of products (see Lehner *et al.*, 2016), which future studies should further investigate. Overall, our results lead us to the conclusion that joint consideration of situational factors

such as store size and psychological factors such as attention-gaining stimuli and the interaction of message design and existing cognitions are crucial for engaging consumers into more sustainable consumption at the POS.

5.4 Limitations and future research

To guarantee a maximum of validity, we analyzed attention data gathered by a facial recognition software and real purchase behavior instead of relying on self-report data or purchase intentions. Hence, the methodological merits of this study are the use of objective outcome measures as well as an unobtrusive experimental design where consumers are not aware of being part of a study. Thereby, it was possible to control for response effects such as social desirability bias, which is often an issue for surveys on sustainable behavior based on self-reports (Carrington *et al.*, 2010). Nevertheless, there is still a potential for biases from confounding factors in field studies.

First of all, one weakness of this study might have been a price reduction of a competitor brand during the first week of the experiment. A logistic regression analysis confirmed that this led to an increase in sales of this nonsustainable milk brand in the first week of the experiment. While organic milk sales nevertheless increased in the first week of the experiment, sales of local milk only started to increase in the second week (see data for store 1 in Appendix). This suggests that the discounted milk competed particularly with the local milk and overshadowed the effects of the advertisement. However, promotions of competing nonsustainable products are a natural disruptive factor for sustainability marketing. Future research should therefore focus on interventions triggering stable long-term shifts to more sustainable purchasing behavior despite short-term competitions through nonsustainable alternatives.

Second, the selection of stores with different sizes may be partly responsible for some insignificant results in the smaller store, as discussed earlier. Third, the overall amount of milk sold during our two experimentation weeks and also during the control weeks was quite low, which also exacerbates finding significant effects due to low statistical power. Future studies should try to analyze greater amounts of data (e.g. selecting big stores with higher customer traffic and sales volumes). By conducting customer interviews, it should be checked if the manipulation by the advertising stimuli works as intended, not only in a pretest but also in the store environment. The design of the construal-level messages should be reconsidered according to which associations are dominant in consumers' minds for which type of sustainable product. To identify those associations, implicit association tests could be applied (Lucke and Koenigstorfer, 2018).

Future research should further explore the effects found here in a German retail context in different cultures for two reasons: first, POS technologies could generate a different level of initial attention in other countries, depending on how established the respective technology is. While noninteractive DS screens are relatively well known in the German retail environment for more than ten years (Zentes and Rittinger, 2009) and therefore generate less attention as shown in this study, they could still be highly effective in other countries, for example, in emerging markets for retail technologies and sustainable food such as India. In contrast, if the digital POS technologies are widely known, for example, in urban China (see, e.g. Lyu *et al.*, 2019), even magic mirror applications could fail their purpose due to customers' display blindness (Memarovic *et al.*, 2007). Newer, more engaging technologies might have to be adopted here, such as hologram advertisements. Furthermore, consumption habits and market shares of organic food products differ largely between countries and continents (Thøgersen, 2010; Willer and Lernoud, 2019). While consumers in Germany are quite familiar with different types of sustainable food and express a general intend to purchase environmentally friendly products (see, e.g. Hempel and Hamm, 2016), this might not be the case in other countries. A study by Liu *et al.* (2012) suggests, for example, that green

consumption is relatively rare in urban China, and consumers first need to be informed and educated about organic products before marketers can apply strategies such as construal-level framing to match existing cognitions and increase organic purchases. A moderating role of knowledge between antecedents of green consumption and green purchase intentions was also found in Tanzania and Kenya (Wang *et al.*, 2019), so educational advertisements might work better here. We would, therefore, particularly like to recommend researchers to explore the results found in this study further in emerging markets for sustainable consumption, where sustainable consumption patterns and established POS technologies differ from Western Europe.

Despite the weaknesses this study suffers from, it nevertheless opens up a promising field for future research on the promotion of different sustainable product categories at the POS. Therefore, other researchers shall be encouraged to proceed with the discussed ideas and conduct replication studies tackling the limitations and research gaps. Other sustainable products such as clothing, beauty products or high-involvement food categories should also be investigated to generalize the results and detect potential differences. Furthermore, different in-store technologies such as virtual reality glasses or mobile AR applications could be investigated on their potential to raise attention for sustainable products. The results of the present study support the proposed two-step model, combining the attention-boosting effect of new technologies at the POS with relevant psychological theories to design effective advertising messages. This approach may help to increase green consumption among a wide range of consumers. Only if a thorough understanding of consumer behavior and the underlying psychological processes is achieved by further research, it will be possible to use this knowledge for attaining an overall greener economy.

References

Andorfer, V.A. and Liebe, U. (2015), "Do information, price, or morals influence ethical consumption? A natural field experiment and customer survey on the purchase of Fair Trade coffee", *Social Science Research*, Vol. 52, pp. 330-350.

Boardman, R., Henninger, C.E. and Zhu, A. (2020), "Augmented reality and virtual reality: new drivers for fashion retail?", in Vignali, G., Reid, L.F., Ryding, D. and Henninger, C.E. (Eds), *Technology-driven Sustainability: Innovation in the Fashion Supply Chain*, Palgrave Macmillan, Cham, Switzerland, pp. 155-172.

Broadbent, D.E. (1958), *Perception and Communication*, Pergamon Press, Elmsford.

Burke, R.R. (2009), "Behavioral effects of digital signage", *Journal of Advertising Research*, Vol. 49 No. 2, pp. 180-185.

Carrington, M.J., Neville, B.A. and Whitwell, G.J. (2010), "Why ethical consumers don't walk their talk. Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers", *Journal of Business Ethics*, Vol. 97 No. 1, pp. 139-158.

Carrington, M.J., Neville, B.A. and Whitwell, G.J. (2014), "Lost in translation. Exploring the ethical consumer intention–behavior gap", *Journal of Business Research*, Vol. 67 No. 1, pp. 2759-2767.

Chang, H., Zhang, L. and Xie, G.-X. (2015), "Message framing in green advertising. The effect of construal level and consumer environmental concern", *International Journal of Advertising*, Vol. 34 No. 1, pp. 158-176.

Cho, Y.-N., Soster, R.L. and Burton, S. (2018), "Enhancing environmentally conscious consumption through standardized sustainability information", *Journal of Consumer Affairs*, Vol. 52 No. 2, pp. 393-414.

Daunfeldt, S.-O. and Rudholm, N. (2014), "Does shelf-labeling of organic foods increase sales? Results from a natural experiment", *Journal of Retailing and Consumer Services*, Vol. 21 No. 5, pp. 804-811.

Dennis, C., Michon, R., Brakus, J.J., Newman, A. and Alamanos, E. (2012), "New insights into the impact of digital signage as a retail atmospheric tool", *Journal of Consumer Behaviour*, Vol. 11 No. 6, pp. 454-466.

Dennis, C., Joško Brakus, J., Gupta, S. and Alamanos, E. (2014), "The effect of digital signage on shoppers' behavior. The role of the evoked experience", *Journal of Business Research*, Vol. 67 No. 11, pp. 2250-2257.

Devue, C., van der Stigchel, S., Brédart, S. and Theeuwes, J. (2009), "You do not find your own face faster; you just look at it longer", *Cognition*, Vol. 111 No. 1, pp. 114-122.

Duval, S. and Wicklund, R.A. (1972), *A Theory of Objective Self Awareness, Social Psychology*, Academic Press, New York.

Eagly, A.H. and Chaiken, S. (1993), *The Psychology of Attitudes*, Vol. 2, [print], Harcourt Brace Jovanovich, Fort Worth, Tex.

Ervasti, M., Häikiö, J., Isomursu, M., Isomursu, P. and Liuska, T. (2015), "Digital signage effectiveness in retail stores", in Abascal, J., Barbosa, S., Fetter, M., Gross, T., Palanque, P. and Winckler, M. (Eds), *Human-computer interaction - INTERACT 2015: 15th IFIP TC 13 International Conference, Bamberg, Germany*, September 14–18, 2015, *Proceedings, Part II, Lecture Notes in Computer Science*, Springer, Cham, pp. 455-462.

Frank, P. and Brock, C. (2018), "Bridging the intention-behavior gap among organic grocery customers. The crucial role of point-of-sale information", *Psychology and Marketing*, Vol. 35 No. 8, pp. 586-602.

Geller, V. and Shaver, P. (1976), "Cognitive consequences of self-awareness", *Journal of Experimental Social Psychology*, Vol. 12 No. 1, pp. 99-108.

Grewal, D., Roggeveen, A.L. and Nordfält, J. (2017), "The future of retailing", *Journal of Retailing*, Vol. 93 No. 1, pp. 1-6.

Griffioen, A.M., van Beek, J., Lindhout, S.N. and Handgraaf, M.J. J. (2016), "Distance makes the mind grow broader: An overview of psychological distance studies in the environmental and health domains", *Applied Studies in Agribusiness and Commerce*, Vol. 10 Nos 2-3, pp. 33-46.

Hagberg, J., Sundstrom, M. and Egels-Zandén, N. (2016), "The digitalization of retailing. An exploratory framework", *International Journal of Retail and Distribution Management*, Vol. 44 No. 7, pp. 694-712.

Helmefalk, M. and Berndt, A. (2018), "Shedding light on the use of single and multisensory cues and their effect on consumer behaviours", *International Journal of Retail and Distribution Management*, Vol. 46 Nos 11/12, pp. 1077-1091.

Hempel, C. and Hamm, U. (2016), "Local and/or organic. A study on consumer preferences for organic food and food from different origins", *International Journal of Consumer Studies*, Vol. 40 No. 6, pp. 732-741.

Huang, E., Koster, A. and Borchers, J. (2008), "Overcoming assumptions and uncovering practices: when does the public really look at public displays?", in Indulska, J. (Ed.), *Pervasive Computing: 6th International Conference, Pervasive 2008*, Sydney, Australia, May 19–22, 2008, *Proceedings, Lecture Notes in Computer Science*, Springer, Berlin.

Hughner, R.S., McDonagh, P., Prothero, A., Shultz, C.J. and Stanton, J. (2007), "Who are organic food consumers? A compilation and review of why people purchase organic food", *Journal of Consumer Behaviour*, Vol. 6 Nos 2-3, pp. 94-110.

Itti, L. (2005), "Models of bottom-up attention and saliency", in Itti, L., Rees, G. and Tsotsos, J.T. (Eds), *Neurobiology of Attention*, Academic Press, New York, pp. 576-582.

Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A. and Hertwich, E.G. (2016), "Environmental impact assessment of household consumption", *Journal of Industrial Ecology*, Vol. 20 No. 3, pp. 526-536.

Javornik, A. (2016a), "'It's an illusion, but it looks real!' Consumer affective, cognitive and behavioural responses to augmented reality applications", *Journal of Marketing Management*, Vol. 32 Nos 9-10, pp. 987-1011.

Javornik, A. (2016b), "Augmented reality. Research agenda for studying the impact of its media characteristics on consumer behaviour", *Journal of Retailing and Consumer Services*, Vol. 30, pp. 252-261.

Kao, D.T. (2011), "Message sidedness in advertising. The moderating roles of need for cognition and time pressure in persuasion", *Scandinavian Journal of Psychology*, Vol. 52 No. 4, pp. 329-340.

Lecointre-Erickson, D., Daucé, B. and Legohérel, P. (2018), "The influence of interactive window displays on expected shopping experience", *International Journal of Retail and Distribution Management*, Vol. 46 No. 9, pp. 802-819.

Lee, A.Y. and Labroo, A.A. (2004), "The effect of conceptual and perceptual fluency on brand evaluation", *Journal of Marketing Research*, Vol. 41 No. 2, pp. 151-165.

Lehner, M., Mont, O. and Heiskanen, E. (2016), "Nudging – a promising tool for sustainable consumption behaviour?", *Journal of Cleaner Production*, Vol. 134, pp. 166-177.

Liberman, N., Trope, Y. and Wakslak, C. (2007), "Construal level theory and consumer behavior", *Journal of Consumer Psychology*, Vol. 17 No. 2, pp. 113-117.

Liu, X., Wang, C., Shishime, T. and Fujitsuka, T. (2012), "Sustainable consumption. Green purchasing behaviours of urban residents in China", *Sustainable Development*, Vol. 20 No. 4, pp. 293-308.

Lucke, S. and Koenigstorfer, J. (2018), "Construal-level perspective on consumers' donation preferences in relation to the environment and health", *Marketing ZFP*, No. 1, pp. 21-34.

Lyu, F., Lim, H.-A. and Choi, J. (2019), "Customer acceptance of self-service technologies in retail. A case of convenience stores in China", *Asia Pacific Journal of Information Systems*, Vol. 29 No. 3, pp. 428-447.

McEachern, M., Padel, S. and Foster, C. (2005), "Exploring the gap between attitudes and behaviour", *British Food Journal*, Vol. 107 No. 8, pp. 606-625.

Memarovic, N., Clinch, S. and Alt, F. (2007), "Understanding display blindness in future display deployments", in Gehring, S. (Ed.), *Pervasive Displays: The 4th International Symposium on Pervasive Displays proceedings Saarbrücken*, Germany, June 10-12, 2015, Saarbruecken, Germany, 10/6/2015 - 12/6/2015, Association for Computing Machinery, New York, New York, pp. 7-14.

Ngobo, P.V. (2011), "What drives household choice of organic products in grocery stores?", *Journal of Retailing*, Vol. 87 No. 1, pp. 90-100.

Pauwels, K., Hanssens, D.M. and Siddarth, S. (2002), "The long-term effects of price promotions on category incidence, brand choice, and purchase quantity", *Journal of Marketing Research*, Vol. 39 No. 4, pp. 421-439.

Pelsmacker, P., Driesen, L. and Rayp, G. (2005), "Do consumers care about ethics? Willingness to pay for fair-trade coffee", *Journal of Consumer Affairs*, Vol. 39 No. 2, pp. 363-385.

Poushneh, A. (2018), "Augmented reality in retail. A trade-off between user's control of access to personal information and augmentation quality", *Journal of Retailing and Consumer Services*, Vol. 41, pp. 169-176.

Ramirez, E., Jiménez, F.R. and Gau, R. (2015), "Concrete and abstract goals associated with the consumption of environmentally sustainable products", *European Journal of Marketing*, Vol. 49 Nos 9/10, pp. 1645-1665.

Reczek, R.W., Trudel, R. and White, K. (2018), "Focusing on the forest or the trees. How abstract versus concrete construal level predicts responses to eco-friendly products", *Journal of Environmental Psychology*, Vol. 57, pp. 87-98.

Roggeveen, A.L., Nordfält, J. and Grewal, D. (2016), "Do digital displays enhance sales? Role of retail format and message content", *Journal of Retailing*, Vol. 92 No. 1, pp. 122-131.

Roininen, K., Arvola, A. and Lähteenmäki, L. (2006), "Exploring consumers' perceptions of local food with two different qualitative techniques. Laddering and word association", *Food Quality and Preference*, Vol. 17 Nos 1-2, pp. 20-30.

Scialabba, N.E.-H. and Müller-Lindenlauf, M. (2010), "Organic agriculture and climate change", *Renewable Agriculture and Food Systems*, Vol. 25 No. 02, pp. 158-169.

Silvia, P.J. and Phillips, A.G. (2013), "Self-awareness without awareness? Implicit self-focused attention and behavioral self-regulation", *Self and Identity the Journal of the International Society for Self and Identity*, Vol. 12 No. 2, pp. 114-127.

Storme, M., Myszkowski, N., Davila, A. and Bournois, F. (2015), "How subjective processing fluency predicts attitudes toward visual advertisements and purchase intention", *Journal of Consumer Marketing*, Vol. 32 No. 6, pp. 432-440.

Tangari, A.H., Burton, S. and Smith, R.J. (2015), "Now that's a bright idea. The influence of consumer elaboration and distance perceptions on sustainable choices", *Journal of Retailing*, Vol. 91 No. 3, pp. 410-421.

Thøgersen, J., Jørgensen, A.-K. and Sandager, S. (2012), "Consumer decision making regarding a "green" everyday product", *Psychology and Marketing*, Vol. 29 No. 4, pp. 187-197.

Thøgersen, J. (2010), "Country differences in sustainable consumption. The case of organic food", *Journal of Macromarketing*, Vol. 30 No. 2, pp. 171-185.

Tong, F. and Nakayama, K. (1999), "Robust representations for faces. Evidence from visual search", *Journal of Experimental Psychology: Human Perception and Performance*, Vol. 25 No. 4, pp. 1016-1035.

Trope, Y. and Liberman, N. (2010), "Construal-level theory of psychological distance", *Psychological Review*, Vol. 117 No. 2, pp. 440-463.

Trope, C., Liberman, N. and Wakslak, C. (2007), "Construal levels and psychological distance. Effects on representation, prediction, evaluation, and behavior", *Journal of Consumer Psychology*, Vol. 17 No. 2, pp. 83-95.

van Dam, Y.K. and van Trijp, H.C.M. (2011), "Cognitive and motivational structure of sustainability", *Journal of Economic Psychology*, Vol. 32 No. 5, pp. 726-741.

van Doorn, J. and Verhoef, P.C. (2011), "Willingness to pay for organic products. Differences between virtue and vice foods", *International Journal of Research in Marketing*, Vol. 28 No. 3, pp. 167-180.

van Herpen, E., van Nierop, E. and Sloot, L. (2012), "The relationship between in-store marketing and observed sales for organic versus fair trade products", *Marketing Letters*, Vol. 23 No. 1, pp. 293-308.

van Meurs, L. and Aristoff, M. (2009), "Split-second recognition. What makes outdoor advertising work?", *Journal of Advertising Research*, Vol. 49 No. 1, pp. 82-92.

Vandenbergh, M.P., Dietz, T. and Stern, P.C. (2011), "Time to try carbon labelling", *Nature Climate Change*, Vol. 1, 4 EP, pp. 4-6.

Vermeir, I. and Verbeke, W. (2006), "Sustainable food consumption. Exploring the consumer 'attitude – behavioral intention' gap", *Journal of Agricultural and Environmental Ethics*, Vol. 19 No. 2, pp. 169-194.

Wang, X., Pacho, F., Liu, J. and Kajungiro, R. (2019), "Factors influencing organic food purchase intention in developing countries and the moderating role of knowledge", *Sustainability*, Vol. 11 No. 1, p. 209.

Want, R. and Schilit, B.N. (2012), "Interactive digital signage", *Computer*, Vol. 45 No. 5, pp. 21-24.

White, K., MacDonnell, R. and Dahl, D.W. (2011), "It's the mind-set that matters. The role of construal level and message framing in influencing consumer efficacy and conservation behaviors", *Journal of Marketing Research*, Vol. 48 No. 3, pp. 472-485.

White, K., Hardisty, D. and Habib, R. (2019), "The elusive green consumer", *Harvard Business Review*, July/August, pp. 124-133.

Willems, K., Brengman, M. and van de Sanden, S. (2017), "In-store proximity marketing. Experimenting with digital point-of-sales communication", *International Journal of Retail and Distribution Management*, Vol. 45 Nos 7/8, pp. 910-927.

Willer, H. and Lernoud, J. (2019), "The world of organic agriculture. Statistics and emerging trends 2019", available at: https://www.organic-world.net/yearbook/yearbook-2019/pdf.html (accessed 31 March 2020).

Yang, D., Lu, Y., Zhu, W. and Su, C. (2015), "Going green. How different advertising appeals impact green consumption behavior", *Journal of Business Research*, Vol. 68 No. 12, pp. 2663-2675.

Young, W., Hwang, K., McDonald, S. and Oates, C.J. (2009), "Sustainable consumption. Green consumer behaviour when purchasing products", *Sustainable Development*, Vol. 37 No. 2, pp. n/a-n/a.

Zentes, J. and Rittinger, S. (2009), "Retailing in Germany: current landscape and future trends.", in Morschett, D., Rudolph, T., Schnedlitz, P., Schramm-Klein, H. and Swoboda, B. (Eds), *European Retail Research, European Retail Research*, Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, Wiesbaden, pp. 153-182.

Appendix

Table A1. Overview of milk sales during the experimental and comparison weeks in the two test stores (number of purchases including milk)

	Week	Total sales (all brands)	Total sales organic milk*	Organic milk sales (advertised product)	Total sales local milk*	Local milk sales (advertised product)
Store 1 (larger store)	Comparison 1	349	12	9	63	21
	Comparison 2	332	12	11	53	15
	Test 1	374	27	19	51	21
	Test 2	380	13	12	62	44
Store 2 (smaller store)	Comparison 1	153	20	12	30	15
	Comparison 2	165	19	12	30	16
	Test 1	165	15	9	26	11
	Test 2	119	17	11	14	9

Note(s): *Total sales organic/local includes product variants of the same brand (different fat content or packaging size)

Corresponding author
Anna-Katharina Jäger can be contacted at: anna.jaeger@hhl.de