Exploratory shopping: Attention affects in-store exploration and unplanned purchasing

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ABSTRACT

A fundamental function of retailing is to bring products into the view of shoppers, because viewing products can activate forgotten or new needs. Retailers thus employ various strategies to entice shoppers to explore the product assortment and store environment, in the hopes of stimulating unplanned purchasing. Here we investigate consumers' breadth of attention as a mechanism of such in-store exploration and hence of unplanned purchasing. Specifically, *attentional breadth* is the focus that is directed to a wider or more limited area in processing visual scenes. In a series of lab and field experiments we show that shoppers' attentional breadth activates an exploratory mindset that stimulates visual and physical exploration of shopping environments, ultimately affecting their product choices and unplanned purchasing. We also show that more impulsive buyers are more susceptible to these effects. These results complement and constrain prior theorizing on mindset theory, attention, store exploration, and unplanned purchasing, all of which are of practical importance to both retailers and consumers.

Keywords: mindset, visual attention, in-store exploration, unplanned purchasing, impulsive buying

A fundamental function of retailing is to bring products into the view of shoppers. Such viewing of products can remind consumers about forgotten needs or wants, or may even evoke new ones (Inman, Winer and Ferraro 2009; Kollat and Willett 1967), often precipitating unplanned purchasing (Hui, Inman, Huang, and Suher 2013). Stimulating unplanned purchasing through in-store product exposure has thus become an important profit strategy for many retailers (Gilbride, Inman, and Stilley 2015). For example, some retailers reduce shoppers' degrees of freedom by designing a strict layout that forces shoppers to visit certain areas, as in IKEA's famously convoluted store layouts. More recently, some retailers have begun delivering mobile coupons to customers in-store, thereby attracting shoppers to different product areas (Hui et al. 2013). As these examples illustrate, retailers employ various strategies to entice shoppers to spatially explore the store environment, in the hopes of stimulating unplanned purchasing.

Consumers, of course, navigate retail shops with their own biases and constraints on in-store exploration and product purchasing. In terms of viewing, for instance, shoppers tend to look more at products located in the horizontal center of a shelf (Atalay, Bodur, and Rasolofoarison 2012; Chandon, Hutchinson, Bradlow and Young 2009). In terms of walking, as another example, shoppers tend to navigate primarily around the perimeter of the store, leaving much retail space unvisited (Hui, Bradlow, and Fader 2009; Hui et al. 2013; Larson, Bradlow, and Fader 2005). And in terms of purchasing, many shoppers arrive in-store with a shopping list (Block and Morwitz 1999; POPAI 2014) or mental budget (Stilley, Inman, and Wakefield 2010b). These consumer biases and constraints, whether intentional or not, may counteract retailers' attempts to induce unplanned purchasing.

Here we investigate another consumer constraint, which to our knowledge has not previously been examined in shopping behavior: breadth of visual attention. Simply put, *visual attentional breadth* refers to the focus that is directed to a wider or more limited area in processing visual scenes (Friedman, Fishbach, Förster, and Werth 2003; Wadlinger and

Isaacowitz 2006). In fact, all consumers shop with a visual attentional breadth somewhere on a continuum from narrow (focused) to broad (dispersed). Yet, nothing is known of the marketing consequences of consumers' attentional breadth. In the present research, we demonstrate in a series of lab and field experiments that viewing a short in-store presentation may activate broad or narrow attention, with downstream effects on exploration of shopping environments, ultimately affecting unplanned purchasing. We also show that more impulsive shoppers, due to their limited ability to control their visual attention (Büttner, Florack et al. 2014), are more susceptible to this effect.

A key contribution of this research is to advance the understanding of exploratory shopping. Although prior research has examined specific aspects of exploration, such as visual search (Janiszewski 1998), we develop the concept of an exploratory mindset that can be activated or inhibited and that can manifest as both visual exploration of an assortment and physical exploration of a store environment. This research also demonstrates that attentional breadth, by activating the exploratory mindset, can affect unplanned purchasing. Prior research has shown cognitive influences on unplanned purchasing, such as mental budgets (Gilbride et al. 2015) and in-store slack (Stilley, Inman, and Wakefield 2010a), but the present research is the first to reveal an attentional influence on unplanned spending. Finally, by showing that impulsive buyers are particularly prone to the aforementioned effects, this research also contributes to an emerging literature examining attentional influences on buying impulsiveness (Büttner, Florack et al. 2014).

PRIOR LITERATURE AND CONCEPTUAL FRAMEWORK

Unplanned Purchasing and Product Exposure

Unplanned purchases are those that have not been considered at the brand or category level before entering a store (Inman et al. 2009; Park, Iyer, and Smith 1989), accounting for about 62% of all purchases at mass merchants such as Walmart (POPAI 2014). Unplanned purchases increase retailers' profits (Gilbride et al. 2015), but consumers may also benefit

from purchasing unplanned, because they can learn about new products, capitalize on discount offers, or replace regularly consumed products by better alternatives (Iyer 1989). An important question, then, is what factors determine unplanned purchasing. Consumers' pre-shopping goals and constraints may influence unplanned purchasing (Bell, Corsten, and Knox 2011; Lee and Ariely 2006), but by virtue of being unplanned, such purchases typically result from in-store stimulation (Gilbride et al. 2015; Stilley et al. 2010b).

A common form of in-store stimulation is simply to expose consumers to potentially interesting products, thereby expanding their awareness sets of available products (Chandon et al. 2009). Increasing shoppers' awareness sets, in turn, can increase purchasing (Deng, Kahn, Unnava, and Lee 2016). In fact, many shoppers utilize product exposure for their own benefit, for example to remind themselves about forgotten needs or wants, or to discover new ones (Inman et al. 2009; Kollat and Willett 1967). Product exposure can even lead shoppers to experience a sudden, unreflective urge to buy the product, which results in impulse buying (Hoch and Loewenstein 1991; Rook 1987).

Retailers employ various strategies to entice shoppers to explore the product assortment and store environment, in the hopes of expanding shoppers' awareness sets (Chandon et al. 2009) and ultimately stimulating unplanned purchasing. Common methods for increasing a given product's likelihood of entering shoppers' awareness sets are to increase that product's shelf space or display it at multiple locations in the store, and indeed both are effective triggers of unplanned purchasing (Chandon et al. 2009). A further method for increasing shoppers' exposure to many products is to induce in-store travel. As shoppers travel farther in-store, they are exposed to more products, and hence their awareness sets of potentially interesting products may increase, often leading to unplanned purchasing (Granbois 1968). Indeed, the number of aisles visited and the distance traveled in-store both correlate positively with unplanned purchasing (Hui et al. 2013; Inman et al. 2009; Stilley et al. 2010a). Hence, retailers often spatially disperse frequently purchased products, or entice

shoppers to visit specific store zones by promotional offers, in the hopes of walking shoppers past products that otherwise would remain unseen (Granbois 1968; Hui et al. 2013; Iyer 1989). Specific store layouts may also increase exposure to products, such as the typical grid layout in supermarkets, which naturally induces walking up and down aisles displaying products on both sides (Newman and Cullen 2002). All these strategies exogenously increase shoppers' exposure to products, and hence stimulate unplanned purchasing. But not all product exposure is due to retailers' nudges, as we explain next.

Product Exposure by Shoppers' in-Store Exploration

A normative model for consumers' navigation of a shop, known as "the travelling salesman problem," assumes that shoppers minimize their total path length while collecting all their planned purchases (Hui et al. 2009). However, path-tracking research shows that very few shoppers minimize their path length. Instead, most shoppers mainly navigate the perimeter of the store, and only visit aisles that stock their needs (Hui and Bradlow 2012; Hui et al. 2013; Larson et al. 2005). This strategy, of course, leads to unproductive repetition of previously-seen products when consumers back-track to the perimeter, while also leaving much of the assortment unseen on aisles that are not visited. Moreover, the majority of shoppers' path length comes from deviating from the optimal path, and larger deviations are associated with larger basket sizes (Hui et al. 2009).

One factor that contributes to path deviations is *exploratory shopping*: Shoppers may explore the product assortment or store environment for hedonic or other reasons (Baumgartner and Steenkamp 1996; Titus and Everett 1995). Typical exploratory shopping behaviors include looking at displays (*visual* procedures; Janiszewski 1998) and walking around a shop (*motor* procedures; Titus and Everett 1995). Such exploratory behaviors naturally increase shoppers' exposure to the product assortment, and therefore presumably also increase unplanned purchasing. But the question remains: What determines whether a shopper explores or not? We propose that shoppers' breadth of visual attention critically

influences whether they explore more or less of a shop, and hence it also influences their unplanned purchasing.

Breadth of Visual Attention

Humans cannot simultaneously process all visual information in an environment. Thus, shoppers who casually view a product shelf will only "see" a subset of the products, and which subset they see depends on their visual attention (e.g., Chandon et al. 2009). One dimension of visual attention is its locus, that is, where in the visual field one is attending. For example, shoppers exhibit a central fixation bias, which is the tendency to look more at the horizontal center of shelves rather than the periphery (Atalay et al. 2012).

Another dimension is attentional breadth, which is "directing focus to a wider or more limited visual area" (Friedman et al. 2003, p. 279). *Narrow attention* entails focusing on only one or a few stimuli, and hence leads to ignoring other stimuli (Wadlinger and Isaacowitz 2006). In contrast, *broad attention* entails focusing on relatively more stimuli, which renders the viewer more susceptible to the visual environment. Although individuals may exhibit a chronic propensity toward broad or narrow attention (Hüttermann, Memmert, and Simons 2014; Pringle, Irwin, Kramer and Atchley 2001), attentional breadth is also malleable, more of a state than a trait. Several situational factors may affect attentional breadth, such as mood (Gasper and Clore 2002), approach motivation (Gable and Harmon-Jones 2010), and regulatory focus (Hüttermann and Memmert 2015). But attentional breadth is not only malleable; it is a type of behavioral mindset.

Attentional Breadth as a Behavioral Mindset

A behavioral mindset is a set of cognitive or motor procedures that are activated during one task and then influence judgment and behavior during a subsequent, unrelated task (Wyer and Xu 2010; Xu and Schwarz 2018). Prior research has identified a number of different mindsets (e.g., Gollwitzer 2012; Ülkümen, Chakravarti, and Morwitz 2010; Wyer and Xu 2010; Xu and Schwarz 2018). For instance, the theory of action phases distinguishes

between a deliberative mindset that is activated when individuals think about which goal to pursue, and an implemental mindset that is activated when individuals plan how to pursue that goal (Gollwitzer 2012). A defining feature of mindsets is that they can carry over to unrelated tasks. For instance, individuals process subsequent information in a more open-minded way with a deliberative mindset than with an implemental mindset.

Previous research indicates that attentional breadth acts as a behavioral mindset. In general, when participants are trained to use a particular strategy during a visual task, they continue to use that strategy in subsequent tasks (Cosman and Vecera 2013; Leber and Egeth 2006). Specifically, perceptual and conceptual processing can activate narrow or broad visual attention, and vice versa (e.g., Büttner, Wieber et al. 2014; Friedman et al. 2003). Further, this activation of attentional breadth may carry over to other tasks. For example, Friedman and colleagues (2003) visually primed broad or narrow attention by having participants attend to a relatively large or small visual area, respectively. That visual attentional breadth then affected participants' performance on a picture-completion task. Critically, behavioral mindsets can activate not only cognitive procedures, but also functionally relevant motor procedures (Wyer and Xu 2010). Below we argue that such cognitive and motor procedures could affect shopping behavior.

Attentional Breadth, In-Store Exploration, and Unplanned Purchasing

Given that attentional breadth acts as a behavioral mindset, we argue more specifically that broad visual attention activates an *exploratory mindset*, whereby shoppers with broad attention explore relatively more of a store's product assortment. Looking around (oculomotion) and walking around (locomotion) are visual and motor procedures, respectively, that functionally support exploration of shopping environments (cf. Baumgartner and Steenkamp 1996). Broad attention, by virtue of including a larger visual area, should induce shoppers to see and attend to relatively more products. That is, broad attention should elicit visual exploration (i.e., looking around). Moreover, because behavioral mindsets can

also activate motor procedures (Xu and Schwarz 2018), broad attention may also activate exploratory movements into other areas of a shop. That is, broad attention may elicit physical exploration (i.e., walking around). Narrow attention, by contrast, should focus shoppers on fewer products and within fewer areas of the shop. Thus, broad visual attention should induce an exploratory mindset, which may manifest as visual and/or physical exploration of a store's assortment.

Given that increased product exposure tends to increase unplanned purchasing, broad visual attention should therefore increase unplanned purchasing. In particular, broad attention could increase unplanned purchasing in two ways. First and most simply, by inducing shoppers to explore more of the store's assortment, broad attention should increase shoppers' visual awareness sets (Chandon et al. 2009), thereby reminding them of forgotten needs or activating new wants (Inman et al. 2009; Kollat and Willett 1967). Second, broad attention can also activate motor impulses for grasping. A classic view within cognitive psychology is that perception *affords* action, or in other words, "seeing is for doing" (Gibson 1979). When we see an object, the neuromotor system automatically prepares to act upon that object (for review see Garbarini and Adenzato 2004). For example, when products have handles (e.g., a cup), consumers automatically simulate grasping that product (Eelen, Dewitte, and Warlop 2013; Elder and Krishna 2012). Moreover, viewing an interesting product can trigger a spontaneous motor impulse to grab the product (Rook 1987), and as people grasp products, the likelihood of purchasing them increases (Peck and Childers 2006; Streicher and Estes 2016). Thus, as shoppers with broad attention view more and different products, they are naturally inclined to act upon them, thereby choosing to purchase more of them unplanned. In contrast, narrow attention should restrain shoppers' visual awareness sets, thereby minimizing their unplanned purchases.

Buying Impulsiveness and Attention

Consumers differ in their propensity to buy spontaneously on the spot. This is reflected in the trait *buying impulsiveness* (Rook and Fisher 1995). Low impulsive shoppers exhibit relatively more control over their shopping behavior (e.g., Rook 1987), whereas high impulsive shoppers are more prone to in-store browsing and hence more unplanned purchasing (Beatty and Ferrell 1998). Recently, buying impulsiveness has also been linked to individual differences in the ability to control the attentional focus while shopping. In an eye-tracking study, Büttner, Florack et al. (2014) presented to participants three products simultaneously. One of the products (i.e., the target) had a frame around it, whereas the other two (i.e., distracters) did not. Participants were instructed to attend only to the target product. In this paradigm, attending to the distracter products is tantamount to visual exploration. The study revealed that participants high in buying impulsiveness were more likely to attend to the distracter products, compared to participants with low buying impulsiveness. This implies that impulsive buyers explored the assortment more intensively, presumably with more distractor products entering their awareness sets.

We argued above that attentional breadth affects unplanned purchasing by influencing in-store exploration. If so, then given that buying impulsiveness relates to exploration, buying impulsiveness may moderate that presumed effect. In fact, this moderation could plausibly occur in either of two ways. One might expect attentional breadth to have a large effect among low-impulsive shoppers. Although such shoppers tend to browse very little (Beatty and Ferrell 1998), activating broad attention could increase their exploratory shopping, thereby producing a relatively large effect on unplanned purchasing. However, this seemed unlikely to us, because low-impulsives exhibit high attentional control (Büttner, Florack et al. 2014) and highly controlled shopping behavior (Hoch and Loewenstein 1991; Rook 1987). Consequently, low-impulsive shoppers should be relatively resistant to attentional nudges.

In contrast, because highly impulsive shoppers exhibit less attentional control and less controlled shopping behavior, they should be more susceptible to an attentional nudge and its effects on shopping and purchasing. For instance, Serfas, Büttner, and Florack (2016) found that activating implementation intentions reduced attention to non-focal distracter stimuli for impulsive buyers, not for non-impulsive buyers. Among high-impulsives, activating narrow attention might similarly attenuate their tendency to explore, and hence constrain their unplanned purchasing. And activating broad attention may accentuate that tendency to explore the store, thereby inflating their unplanned purchasing. Moreover, as described above, when a shopper views a product, the neuromotor system prepares to interact with it (Garbarini and Adenzato 2004; Gibson 1979). This motor preparation may be experienced as a spontaneous urge to grab the product, and importantly, such urges are especially strong among shoppers high in buying impulsiveness (Rook 1987). And ultimately, because more impulsive buyers have stronger urges to grab products off the shelves, this should result in more unplanned purchases. Thus, individual differences in buying impulsiveness should moderate the effect of attentional breadth on unplanned purchases, with more impulsive shoppers exhibiting a larger effect.

HYPOTHESES AND OVERVIEW OF STUDIES

In sum, we predicted that broad attention induces an exploratory mindset, increasing both visual and physical exploration of the store assortment. Ultimately, this increased in-store exploration should increase unplanned purchasing, as relatively more products enter the awareness set, with some of them activating forgotten or new needs or wants. Finally, because impulsive buyers are naturally prone to attentional and behavioral nudges, the effect of attentional breadth on in-store exploration and unplanned purchasing should be especially strong among more impulsive buyers. More formally,

H_1 (effect): Relative to narrow attention, broad attention increases unplanned purchasing.

H_2 (mediation): The effect of attentional breadth on unplanned purchasing is mediated by in-store exploration.

H_3 (moderation): The effect of attentional breadth on unplanned purchasing is larger among more impulsive buyers than among less impulsive buyers.

We report a series of studies that systematically test these hypotheses. In a Pilot Study, we show that manipulating participants' visual attentional breadth affected their attention to and memory of peripherally-located products in two retail-type displays. Having thus validated the effectiveness of our attentional manipulation, we then assessed the effect of attentional breadth in a real supermarket setting. In Study 1, we intercepted shoppers entering a supermarket, recorded their planned purchases, manipulated their attentional breadth, and then released them to shop. We then intercepted them again upon exiting the shop, and we found that broad attention increased unplanned purchasing, relative to both an untreated control group and a narrow attention group. In Study 2, we used mobile eye-tracking to reveal that shoppers with broad attention visually explored and chose more products than shoppers with narrow attention. In Study 3, we used pedometers to demonstrate that shoppers with broad attention also physically explored more of a store (i.e., distance travelled), in addition to making more unplanned purchases. Study 4 then demonstrates, with hypothetical purchases, that chronic buying impulsiveness moderates this effect, and finally Study 5 demonstrates again that shoppers high in buying impulsiveness are more susceptible to effects of attentional breadth, even when spending their own money on a real shopping trip.

We aim to provide several theoretical advances with this research. Foremost among them is to introduce the concept of an exploratory mindset, and to demonstrate its effects on shopper behavior. Prior research has revealed some aspects of how consumers explore their visual and physical environments (e.g., Baumgartner and Steenkamp 1996; Janiszewski 1998; Titus and Everett 1995). The present research goes further by conceptualizing exploratory shopping as a behavioral mindset that can be activated at one point and that can have multiple

manifestations on subsequent shopping behaviors. In particular, we demonstrate for the first time that attentional breadth can activate an exploratory mindset, which in turn can manifest in both visual procedures (i.e., looking around) and motor procedures (i.e., walking around).

A second important contribution of this research is to demonstrate that attentional breadth affects unplanned purchasing. Some prior research has revealed situational factors affecting unplanned purchasing, such as in-store promotions (Hui et al. 2013; Stilley et al. 2010b) and store layouts (Granbois 1968; Iyer 1989), and other research has revealed individual factors such as mental budgets to constrain spending (Gilbride et al. 2015) and in-store slack to allow for unplanned purchasing (Stilley et al. 2010a). To our knowledge, however, individual attentional mindsets have not previously been shown to affect unplanned purchasing. Another, related contribution is to demonstrate that impulsive buyers' attentional focus can accentuate or attenuate their tendency toward unplanned purchasing. Although impulsive buyers are known to make more unplanned purchases (Beatty and Ferrell 1998), very little is known of what role visual attention may play in that process (Büttner, Florack et al. 2014). We show that impulsive buyers are particularly susceptible to attentional manipulations, which can increase or decrease their unplanned purchasing.

PILOT STUDY: MANIPULATING ATTENTIONAL BREADTH

This study tested whether manipulating attentional breadth affects visual exploration of product displays (see Web Appendix A for full details). Inspired by Friedman and colleagues (2003), we manipulated participants' (N = 150, M = 23 years; 100% female) attentional breadth by showing them 20 object pairs (e.g., airplane and telephone), with one object in the center and the other in the periphery of the display (see Figure 1A). The peripheral object was equally likely to appear in any of the four corners of the display, and all objects were grayscale and easy to name. Each object pair remained onscreen for 2 seconds, and participants' task was to name aloud either the central object (*narrow attention* group) or the peripheral object (*broad attention* group) of all 20 pairs. Then we tested their attention to

and memory of peripherally-located products in two retail-type displays. First, in a *product memory* task, participants viewed an array of 15 products (Figure 2A). Unbeknownst to the participants, afterward we would ask them to recall all the products they could. We measured how far their recalled products were from the center of the display, and as expected, participants recalled significantly more peripheral products with broad attention (M = 13.18 cm from center) than with narrow attention (M = 11.72 cm), $t(148) = 3.22$, $p < .01$, Cohen's d = .53. Second, in an *oddball detection* task, participants viewed a series of 18 product shelves from a retail shop. Two of the product displays included a peripherally-located oddball product that did not belong in the shown array (e.g., a can of beer among sunscreen products; see Figures 2B and 2C), but participants were not informed of this. After viewing all 18 shelves, we asked participants to report any product(s) they saw that did not match the assortment. As expected, the likelihood of identifying a peripherally-located oddball product was higher in the broad attention group (16%) than in the narrow attention group (3%), $\chi^2 = 7.59$, $p < .01$. These results thus effectively validate the attentional manipulation: A relatively short (40 seconds) and simple attentional task appears to have robust effects on the subsequent visual exploration of product arrays. Moreover, the persistence of the effect across two tasks lasting approximately 5-10 minutes suggested that this manipulation could plausibly persist long enough to affect purchase decisions in-store.

STUDY 1: ATTENTIONAL BREADTH AFFECTS UNPLANNED PURCHASING

Having demonstrated in the Pilot Study that attentional breadth affects the subsequent visual exploration of retail displays, Study 1 tested whether attentional breadth also affects real shoppers spending their own money in a real supermarket. We intercepted customers entering a supermarket and asked them to list their planned purchases. We then manipulated their attentional breadth (as in the Pilot Study) and released them to shop. Unbeknownst to our participants, we would later intercept them again when exiting the shop, to identify their unplanned purchases. We predicted that shoppers would make more unplanned purchases

with broad attention than with narrow attention (**H_1**). We also included a control group who received no attentional manipulation prior to shopping, thus allowing us to determine whether broad attention increases unplanned purchasing, or narrow attention decreases it. Although we had no strong theoretical prediction about this, we assumed that the control group would more closely resemble the narrow attention group, because many consumers shop with specific products or needs in mind (i.e., they are narrowly focused).

We also included several control measures to test alternative explanations of the presumed effect. First, we recorded whether participants had a shopping list and any accompanying people, because both of those factors can influence unplanned purchasing (Inman et al. 2009; Luo 2005). Second, we assessed participants' mood, because broad attention is correlated with positive mood (Gasper and Clore 2002), and positive mood may facilitate consumption (Rook and Gardner 1993). Yet another potential explanation of the presumed effect is that broad attention may facilitate processing of the store assortment, which could improve attitudes toward the retailer and hence induce more purchasing (Deng et al. 2016). We therefore assessed participants' satisfaction with the store assortment and other hedonic aspects of the shopping trip. Finally, we also assessed participants' subjective breadth of attention, to explore whether they were consciously aware of their visual attention.

Methods

All studies reported herein were conducted in a mid-sized European city, and no individual participated in more than one of the studies.

Field Setting. The study was conducted in a large supermarket, with a sales floor of approximately 3600 m^2. The study took place across five consecutive weekdays.

Participants. One hundred ninety-two shoppers (M = 53 years; 75% female) were recruited in front of a supermarket and were randomly assigned to the broad attention, narrow attention, or control group (n = 64 in each group). None participated more than once during the five days of the study.

Pre-shopping Procedure. Participants were intercepted before entering the supermarket. They first reported their mood (four items from Allen and Janiszewski 1989; α = .84), and then we recorded their planned purchases. Following standard procedures (Bell et al. 2011; Gilbride et al. 2015; Hui et al. 2013; Inman et al. 2009; Kollat and Willet 1967; Park et al. 1989), we recorded planned purchases at the category level, without quantities. For instance, if a shopper planned to purchase M&Ms and Snickers, that would constitute one planned category (candy). See Web Appendix B for further details. Participants then completed the attentional manipulation task validated in the Pilot Study (except those in the control group, who did not undergo any attentional manipulation task), and were thanked for their participation and were released to shop. Critically, participants were not informed that we would approach them again. See Table 1 for full details of measures and items.

Post-shopping Procedure. After participants completed their shopping, we intercepted them again as they exited. The post-shopping procedure included several control measures (see Table 1) to test alternative explanations of the presumed effect: We re-assessed mood (α = .86), measured hedonic shopping value (three items, α = .81) and satisfaction with the store assortment (five items, α = .82), and recorded the number of accompanying people and whether the participant had a physical shopping list (e.g., on paper or a mobile phone). As an exploratory measure, we also assessed participants' subjective breadth of attention (two items, r = .49, p < .01). Next, we identified the participant's unplanned purchases (see below). Finally, participants were debriefed with the true purpose of the study, and they were offered reimbursement for their unplanned purchases by contacting the host university. (No participant in any of these studies sought reimbursement for unplanned purchases.)

Identification of Unplanned Purchases. Unplanned purchases were identified by two experimenters after participants exited the shop. Upon receiving the participant's consent, we examined his or her shopping receipt and compared those actual purchases to the participant's pre-shopping list of planned purchases. Following standard procedures (Bell et al. 2011;

Gilbride et al. 2015; Hui et al. 2013; Inman et al. 2009; Kollat and Willet 1967; Park et al. 1989), only purchases in categories that were absent from the shopper's pre-shopping plan were coded as *unplanned*. Further, unplanned purchases could occur at either the product- or category-level. For instance, if a shopper intended to purchase only candy, but then actually purchased two types of candy and two packs of potato chips, that would constitute two *unplanned products* (i.e., the two packs of chips) but only one *unplanned category* (i.e., salty snacks). The second type of candy would not count as an unplanned purchase because it was within a planned category. Finally, *unplanned spending* was calculated as the sum cost of all unplanned products.

Outliers, Analyses, and Covariates. The various dependent variables in the following studies were of different natures and exhibited different distributions. Some of our measures (i.e., hypothetical or real purchases) were count variables with a lower bound of zero and no upper bound. This introduces two potential sources of bias in the analyses and estimates. First, these measures are susceptible to distortion by extreme outliers. In all studies, we therefore adopt the default method of outlier identification in SPSS, which is based on interquartile ranges (Tukey 1977): Extreme outliers are data points below Q_1-3($Q_3 - Q_1$) or above Q_3+3($Q_3 - Q_1$). Additionally, to minimize alteration of the data, we replace those outliers with the most extreme non-outlier among the observed data (i.e., windsorizing; Hastings et al. 1947). This data treatment only affected the significance of a single dependent variable in a single study (i.e., unplanned spending in Study 5).

Second, such measures tend to deviate from normality. For these count variables (i.e., unplanned category purchases and unplanned product purchases), if the mean and variance were approximately equal, we used Poisson regression with a log link function. In most cases, however, the variance substantially exceeded the mean. In those cases, in order to account for the overdispersion, we instead used negative binomial regression with a log link function and with an estimated dispersion parameter. Note that in all Poisson and negative binomial

regressions we report the exponentiated coefficients, denoted B_{exp}, which is interpretable as an incidence rate ratio (i.e., (B_{exp} – 1) * 100). For example, if the attentional breadth factor (0 = narrow, 1 = broad) had a B_{exp} = 1.50 on unplanned purchases, that would indicate that broad attention increased unplanned purchases by 50% (i.e., (1.50 – 1) * 100).

Others of our measures were non-count continuous variables, such as spending (Studies 1-3, 5), distance travelled (Study 3), and buying impulsiveness (Studies 4-5). In such cases, we examined the distributions for normality. All variables that deviated from normality (skew > |1|) were log transformed, and in all cases, the transformed measures approximated normality (skew < |1|) and hence were analyzed via OLS regression or standard parametric analyses (e.g., *t*-test or ANOVA). As is standard practice, because zeros cannot be log-transformed, we added 1 to all values prior to transforming them.

In all studies reported hereafter, we tested for group differences in age and gender composition, and no significant group differences occurred. We therefore do not discuss age or gender further. In most studies (i.e., Studies 1, 3-5) we also measured mood, because mood is known to correlate with both attentional breadth (Gasper and Clore 2002) and unplanned purchasing (Rook and Gardner 1993). We therefore included mood as a covariate in our main analyses in each of those studies. However, because mood was a significant predictor of only a single dependent variable in a single study (i.e., unplanned category purchases in Study 3), we do not report results of this covariate in each analysis. Inclusion or exclusion of mood as a covariate had no effect on the results or conclusions of any study reported herein.

Results

All data from all studies reported herein are available at https://osf.io/fmjwa/.

Control Measures. The three attention groups did not differ significantly on any control or exploratory measure. As indicated by a χ^2, participants in the three groups did not differ in their likelihood of having a shopping list, $p = .74$. As revealed by one-way ANOVAs, nor did they differ in the number of product categories planned for purchasing (p =

.57), the number of accompanying peers (p = .74), hedonic shopping value (p = .96), satisfaction with the store assortment (p = .91), or their subjective breadth of attention (p = .63). Finally, we tested for potential mood effects via 2 (time: pre, post; within-participants) × 3 (group: broad, narrow, control; between-participants) mixed ANOVA, but no significant main effect or interaction emerged, all $p > .27$.

Unplanned Purchasing. Across the three measures of unplanned purchasing, only three outliers occurred, all in unplanned spending. See Table 2 for summary statistics of unplanned purchasing. First we compared the broad attention group to the control group. Negative binomial regressions with attentional breadth (0 = control, 1 = broad) as the focal predictor and mood (average of pre- and post-test) as a covariate indicated significant effects of broad attention on both unplanned categories, $B_{exp} = 1.72$, $\chi^2(1) = 10.93$, $p < .001$, and unplanned products, $B_{exp} = 1.68$, $\chi^2(1) = 7.65$, $p < .01$. Likewise, a linear regression on unplanned spending (log-transformed) revealed a significant effect of broad attention, $B = .56$, $SE = .19$, $t(125) = 2.89$, $p < .01$. Next we compared the broad attention group to the narrow attention group (0 = narrow, 1 = broad). Relative to narrow attention, broad attention elicited significantly more unplanned category purchases, $B_{exp} = 1.53$, $\chi^2(1) = 6.18$, $p < .05$, unplanned product purchases, $B_{exp} = 1.48$, $\chi^2(1) = 4.33$, $p < .05$, and unplanned spending, $B = .58$, $SE = .19$, $t(125) = 2.98$, $p < .01$. Finally we compared the narrow attention and untreated control groups (0 = control, 1 = narrow). Those groups did not differ in unplanned categories (p = .62), products (p = .63), or spending (p = .83). See Web Appendix C for additional details about planned purchases, planned spending, and total spending.

Discussion

Activating broad attention increased unplanned purchasing, thus supporting $\mathbf{H_1}$. The inclusion of an untreated control group revealed that broad attention increased unplanned purchases, rather than narrow attention decreasing purchases. Moreover, the additional control measures allow us to exclude several alternative explanations, such as that the broad

attention group may have been less likely to have a shopping list (Inman et al., 2009), or may have had more accompanying peers (Luo 2005). Or perhaps the attentional manipulation increased purchasing by improving shoppers' mood (Gasper and Clore 2002) or their satisfaction with the product assortment (Deng et al. 2016). We found no evidence for any of these alternative explanations. Rather, we suggest that broad attention increased unplanned purchasing by increasing in-store exploration. Before testing that claim (**H_2**) more directly, we first address another alternative explanation of the effect.

CONTROL STUDIES: CONCEPTUAL SCOPE

Attention can be allocated not only to external (perceptual) stimuli, but also to internal (conceptual) representations (Derryberry and Tucker 1994). And just as perceptual attention can be broad or narrow, so too can conceptual attention. The scope of conceptual attention, or *conceptual scope*, refers to the breadth of attention to one's mental representations (Derryberry and Tucker 1994). A narrow conceptual scope entails attending to relatively fewer, more accessible representations (akin to concentrated thought), whereas a broad conceptual scope involves activation of more and varied representations (akin to mind wandering). For instance, narrow attention tends to evoke thoughts of typical or frequent exemplars of a category (e.g., pigeon), whereas broad attention is more likely to evoke atypical or otherwise unusual category exemplars (e.g., ostrich).

Although conceptual scope is independent of perceptual (visual) scope, the two may also coincide (Förster et al. 2006). In the present context, our manipulation of visual attentional breadth could also inadvertently affect conceptual scope. Thus, our attentional manipulation could affect unplanned purchasing by inducing shoppers to visually explore more of the assortment (i.e., perceptual scope), or by bringing to shoppers' minds different and additional products they may need or want (i.e., conceptual scope).

To test whether the effect of our attentional manipulation on purchasing behavior was due primarily to conceptual scope, rather than perceptual (visual) scope, we conducted two

control studies in which we manipulated visual attention (as in our other studies) and then measured conceptual attention. Specifically, we measured conceptual scope in terms of shopping plans in Control Study 1, and in terms of the typicality of the exemplars that participants generate for a given category in Control Study 2. If the effect we observed on purchasing were due to conceptual scope, then we should see effects in these measures. Because positive mood is associated with both broad perceptual attention (Rowe, Hirsh, and Anderson 2007) and broad conceptual attention (Isen and Daubman 1984), we also measured mood in both studies. See Web Appendixes D and E for full details of both studies.

Control Study 1. We manipulated participants' (N = 167, M = 24 years; 49% female) attentional breadth exactly as in Study 1, again randomly assigning participants to a broad attention (n = 56), narrow attention (n = 56), or control group (untreated; n = 55). Immediately following the attentional task, participants reported their mood on the same measure used in Study 1 (Allen and Janiszewski 1989; α = .86).[1] Participants were then instructed: "Please imagine you are planning a shopping trip in a supermarket of your choice. The purchases should last for seven days. Please list all products that you would like to purchase on this trip." After completing their shopping list, participants responded to a series of control measures (Web Appendix D), including their planned spend on this trip (in €).

The three groups did not differ on any control factor, including mood (p = .67). To mimic the coding of unplanned purchasing in Study 1, here we examined (1) the number of *products* on each participant's shopping list, (2) the number of distinct *categories* included in the list, and (3) planned *spending* on the shopping trip. The three attentional groups did not differ in the number of products listed (M_{narrow} = 15.20, $M_{control}$ = 14.36, M_{broad} = 14.36), the number of categories listed (M_{narrow} = 10.00, $M_{control}$ = 9.95, M_{broad} = 10.13), or planned spending (M_{narrow} = €48.78, $M_{control}$ = €50.31, M_{broad} = €47.23), all p > .42. Thus, attentional

[1] Note that in Study 1, mood was measured *before* the attentional manipulation and then after exiting the shop. The present study instead measured mood *immediately after* the attentional manipulation, thereby providing a stronger test of whether the attentional manipulation affects mood.

breadth does not appear to affect shopping plans, in terms of quantity, variety, or cost. This study provided no evidence that the effect of broad attention on unplanned purchasing is due to conceptual scope. Rather than emerging in one's *shopping plans*, the effect appears to emerge *while shopping*, presumably in the form of in-store exploration.

Control Study 2. Participants (N = 144, M = 21 years; 50% female) first completed either the broad or narrow attentional manipulation used in Study 3 (see Figure 1B). Briefly, participants viewed a series of 20 products one at a time for 2 seconds each, presented as "Highlights of the Month" at a local retailer. In the narrow attention group (n = 74), all products appeared in the center of the display. In the broad attention group (n = 70), all products appeared randomly in one of the four corners of the display. They then reported their mood on Allen and Janiszewski's (1989) 4-item scale (α = .86), followed by the 10-item short form of the PANAS (Thompson 2007; α = .62). Participants then completed an exemplar generation task, in which they listed as many different animals as they could think of in 3 minutes (Hills, Jones, and Todd 2012; see Web Appendix E). If our attentional manipulation affects conceptual scope, then the narrow attention group should generate more frequent (i.e., typical) exemplars than the broad attention group.

The two mood measures correlated significantly, r = .51, p < .001, but the broad and narrow attention groups did not differ on either Allen and Janiszewski's measure (p = .92) or the PANAS measure (p = .60). We measured conceptual scope in two ways. First, we simply counted the number of exemplars generated. The broad (M = 28.79) and narrow (M = 29.08) attention groups did not differ in the number of exemplars generated, p = .79. Second, we calculated the average frequency of each participants' generated exemplars. For this measure we first created a comprehensive list of all exemplars generated by our participants (N = 290 unique animals), and then we counted the number of participants who listed each animal (i.e., its frequency). Finally, we calculated for each participant the average frequency of the animals that he or she listed. This measure therefore indicates the extent to which participants

generated more typical animals (higher scores) or less typical animals (lower scores). The broad (M = 62.75) and narrow (M = 65.00) attention groups did not differ on exemplar frequency, p = .30. Thus, the effect of our attentional manipulation on purchasing behavior does not appear to be due to either mood or conceptual scope.

STUDY 2: ATTENTIONAL BREADTH AFFECTS VISUAL EXPLORATION AND PRODUCT CHOICE

Study 2 provided an initial test of whether in-store exploration mediates the effect of attentional breadth on unplanned purchasing (**H_2**). The study was conducted in a field setting, but with hypothetical shopping behaviors. To simulate unplanned shopping behaviors in particular, we intercepted students on a university campus who specifically were not intending to shop at that time, and we escorted them to a nearby grocery shop, where they wore mobile eye-tracking glasses while completing a hypothetical shopping task. After manipulating their attentional breadth (as in the preceding studies), we directed participants to an aisle of candies and snacks, and we asked them to place in their basket any products they were interested in buying. The number of different shelf areas they viewed (i.e., fixated) served as our measure of visual exploration, which we predicted would mediate the presumed effect of attentional breadth on unplanned purchasing.

Methods

Field Setting. The study was conducted in a small retail shop, with a sales floor of approximately 400 m^2, near the entrance of a university campus.

Equipment. Participants wore mobile eye-tracking glasses (SMI ETG, SensoMotoric Instruments GmbH, Teltow, Germany) with a sampling rate of 60 Hz.

Participants. Seventy-nine students (M = 24 years; 48% female), all with normal or corrected-to-normal eyesight, participated voluntarily. They were assigned randomly to a broad or narrow attention group. The groups did not differ in gender composition (i.e.,

male/female ratio; $p = .62$) or age ($p = .42$). Due to technical attrition[2], the eye-tracking data of six participants were not recorded, thus leaving 73 valid participants in the eye-tracking data and 79 in the product choice data.

Procedure. Participants were intercepted on their way into the main campus building, which was immediately adjacent to the shop. Thus, as participants were specifically not intending to shop at that moment, they had no particular purchasing plans. They were recruited under the guise of a test program evaluating mobile eye-tracking glasses. They were escorted to a lounge area within the shop, where they put on the eye-tracking glasses and completed a standard calibration procedure. The attentional manipulation was then immediately presented as another part of the calibration procedure. The manipulation was the same as in the preceding studies (Figure 1A), presented on a 9.7-inch iPad tablet.

After being escorted to the designated shopping area, participants ($n_{narrow} = 42$; $n_{broad} = 37$) were guided to stand in front of shelves spanning 7 m wide × 1.8 m high. They stood 2 m away from the shelves, facing the horizontal center. The shelves contained candy and snacks displayed in 47 compartments, with several different products displayed within each compartment. Participants were handed a shopping basket and were instructed to "place candy and snack products in the basket which you would like to purchase if you were on a real shopping trip." Participants were informed that there was no time pressure, and they were left alone to shop from the designated shelves. After participants indicated that they were done shopping, the experimenters noted the chosen products and prices.

Results

Visual Exploration. We used as our measure of visual exploration the number of different compartments that participants fixated at least once (i.e., multiple fixations in the same compartment were counted only once). This measure captures both distance (because

[2] In eye-tracking studies, idiosyncratic behaviors such as excessive blinking or briefly closing one's eyes can cause the equipment to lose track of the eyes, at which point no further data are recorded. Such recording errors occurred for six participants during this, thus leaving 73 participants with valid eye-tracking data.

the compartments collectively covered the entire shopping space) and variety (because different compartments contained different products and brands). Figure 3 shows the distribution of fixations across the 47 compartments for the two groups separately. Linear regression (narrow = 0, broad = 1) confirmed that, as predicted, the broad attention group fixated significantly more compartments (M = 29.24) than the narrow attention group (M = 23.73), B = 5.52, SE = 2.03, $t(71) = 2.71$, $p < .01$. Participants in the broad attention group visually examined 62% of all shelf compartments, whereas participants in the narrow attention group examined only 50% of the compartments. Specifically, as shown in Figure 3, participants with narrow attention exhibited a central fixation bias, whereas participants with broad attention were more likely to fixate more peripheral compartments.

Product Choice. We created three measures of hypothetical purchasing: (1) *spending* is the total amount spent, (2) *chosen products* is the total number of products selected, and (3) *chosen brands* is the total number of different brands selected. To illustrate the difference between chosen products and chosen brands, consider a purchase of two Snickers and one Kit Kat. This would constitute 3 chosen products but only 2 chosen brands. Respectively these may be considered measures of choice quantity and choice variety. Spending was normally distributed and hence analyzed via linear regression. Chosen products and brands were analyzed via Poisson regression. The broad attention group hypothetically spent more money (M = €6.57), chose more products (M = 3.16), and chose more brands (M = 3.16)[3] than the narrow attention group (spending M = €5.01, B = 1.56, SE = .71, $t(77) = 2.20$, $p < .05$; chosen products M = 2.48, B_{exp} = 1.28, $\chi^2(1) = 3.29$, $p = .07$; chosen brands M = 2.40, B_{exp} = 1.32, $\chi^2(1) = 4.06$, $p < .05$).

Mediation. We considered spending, which is the most economically tangible of our measures, as our primary dependent variable. The correlation between the presumed mediator

[3] The identical means of products and brands chosen by the broad attention group (i.e., 3.16) simply indicates that none of those participants chose the same brand more than once.

(number of compartments fixated) and dependent variable (spending) was significant (r = .43, p < .001), and critically, it was within the "sweetspot" for meaningful mediation analysis (assuming the lenient criterion and reliability = .90; see Pieters 2017). We therefore conducted a bootstrap mediation analysis (Hayes 2013, model 4, 10K samples) with spending as the dependent variable. Results are shown in Figure 4A. As indicated by the prior analyses, the *A-path* from attentional focus to compartments fixated was significant, B = 5.52, SE = 2.03, $t(71) = 2.72$, p < .01. The *B-path* from compartments fixated to spending was also significant, B = .14, SE = .04, $t(71) = 3.58$, p < .01. Thus, the indirect effect was significant and positive, B = .79, SE = .37, 95% CI = .23 to 1.70, indicating mediation. The direct effect was nonsignificant, p = .45. We also tested the robustness of this mediation by replicating the analysis with chosen products and with chosen brands as the dependent variable, and the results were virtually identical: The indirect effect (i.e., mediation) was significant for both chosen products (B = .44, SE = .20, CI = .12 to .92) and chosen brands (B = .43, SE = .20, CI = .13 to .92). Thus, visual exploration robustly mediated the effect of attentional breadth on unplanned, hypothetical purchasing.

Discussion

These results provide further support for **H1**. Activating broad attention increased hypothetical purchasing, and this effect was robust across quantity, variety, and spending measures. Although our measure of purchasing was hypothetical, it nonetheless involved shoppers choosing real products in an actual retail shop. These results also support **H2**. By placing participants in front of a single shelf area, we limited their physical movements, thereby providing a measure of exploration that corresponded almost entirely to visual procedures (i.e., looking around). Visual exploration was measured precisely via mobile eye-tracking, and broad attention increased the number of different product compartments fixated, primarily by increasing fixations on peripheral locations. Thus, broad attention increased the awareness set, and ultimately the choice set. Next, we test whether similar effects of in-store

exploration are also observed during real shopping. Specifically, in Study 3 we examine a motor procedure of the exploratory mindset, in-store travel distance (i.e., walking around).

STUDY 3: ATTENTIONAL BREADTH AFFECTS PHYSICAL EXPLORATION AND UNPLANNED PURCHASING

Study 3 tested whether attentional breadth affects subsequent physical exploration, and whether this presumed physical exploration mediates the effect on unplanned purchasing (**H_2**). We again intercepted customers entering a supermarket and asked them to list their planned purchases, as in Study 1. In this study, however, we administered a more ecologically valid manipulation of attentional breadth. On a tablet computer we showed participants a short presentation of the "Highlights of the Month", which consisted of a series of 20 products (shown one at a time) that were available for purchase in the shop (see Figure 1B). Critically, each product appeared either in the center of each display (*narrow attention*), or in one of the four randomly-varying corners of the display (*broad attention* group). We then placed a pedometer on participants to record their travel distance, which served as a measure of physical exploration while participants shopped. As in Study 1, participants were not informed that we would examine their purchases. However, after participants checked out, we again compared their actual purchases to their pre-stated purchase plans, to determine which of them were unplanned.

Methods

Field setting. The study was conducted in the same supermarket as Study 1, again across five consecutive weekdays.

Participants. Seventy-four shoppers (M = 47 years; 69% female) were recruited in front of the supermarket and were randomly assigned to the broad or narrow attention group (both n = 37). None participated more than once during the five days of the study.

Stimuli. The attentional manipulation task consisted of a slideshow viewed on a 13-inch computer display and presented as a store advertisement. The introductory slide

presented the title “Highlights of the Month”, and the following 20 slides each showed a single different product that was available for purchase in the shop (e.g., lotion, scarf, milk, cookware, olive oil). Each product was shown for 2 seconds, for a total viewing time of 40 seconds (Figure 1B). In the broad attention group, each product appeared in one of the four corners of the display. Product location was randomized, with five products in each of the four corners. In the narrow attention group, all 20 products appeared in the center of the display. Product order was random. Importantly, the 20 products were selected for their locations in-store: Each product was from a different category, and they were located in different areas of the store. Note that the same 20 products were shown to both attention groups, so the in-store distance between advertised products was identical across conditions.

Equipment. While shopping, participants wore an Icefox 3D digital pedometer on a lanyard placed around the neck. The pedometers were adjusted to standard stride lengths of 26 and 30 inches for female and male participants respectively.

Procedure. All measures and items are listed in Table 1. Before entering the supermarket, participants reported their mood ($\alpha = .89$) and indicated their planned purchases, as in Study 1. Participants then watched the product advertisement slideshow, which served as the attentional manipulation. Participants next placed the lanyard with pedometer around their neck, and proceeded to shop. Later, as participants entered the check-out area, an experimenter removed the pedometer. Upon exiting the check-out area (i.e., after paying), participants again reported their mood ($\alpha = .93$). As in Study 1, we also measured their subjective breadth of attention ($r = .57$, $p < .01$), and we recorded whether the participant had a shopping list and the number of accompanying people. An experimenter then recorded the participant’s purchases and costs. Finally, we debriefed participants and offered reimbursement for their unplanned purchases.

Results

Control Measures. Participants in the broad and narrow attention groups did not differ in the number of product categories planned for purchasing ($p = .10$), their likelihood of having a shopping list ($p > .99$), the number of accompanying peers ($p = .86$), or their subjective breadth of attention ($p = .69$). A 2 (time: pre, post; within-participants) × 2 (group: broad, narrow; between-participants) mixed ANOVA on participants' mood showed no significant main effect or interaction, all $p > .56$.

Physical Exploration. Linear regression with mood (average of pre- and post-test) as a covariate confirmed that the broad attention group travelled farther ($M = 306.22$ meters) than the narrow attention group ($M = 242.97$ meters), $B = 64.67$, $SE = 27.27$, $t(71) = 2.37$, $p < .05$. Thus, broad attention generally increased physical exploration of the store.

Unplanned Purchasing. Unplanned categories, products, and spending were scored as in Study 1. Across the three measures of unplanned purchasing, only two outliers in unplanned products and two in unplanned spending occurred. Results are summarized in Table 2. Unplanned categories and products were analyzed via negative binomial regression, whereas unplanned spending (log) was analyzed via linear regression. All analyses included mood (average of pre- and post-test) as a covariate. As predicted, the broad attention group purchased significantly more unplanned categories, $B_{exp} = 2.48$, $\chi^2(1) = 14.76$, $p < .001$, and unplanned products, $B_{exp} = 2.64$, $\chi^2(1) = 14.80$, $p < .001$, than the narrow attention group. We further analyzed unplanned purchases of products that were presented in the attentional manipulation advertisement, and in fact, the broad attention group purchased significantly more unplanned of the advertised products ($M = .46$) than the narrow attention group ($M = .16$), $B_{exp} = 2.87$, $\chi^2(1) = 4.88$, $p < .05$. Overall then, the total unplanned spending (log-transformed) was significantly higher in the broad attention group than in the narrow attention group, $B = 1.01$, $SE = .24$, $t(71) = 4.24$, $p < .001$.

The effect of attentional breadth on unplanned categories (reported above) indicates that broad attention increased the *quantity* of categories purchased from unplanned, but it does not reveal the *type* or *variety* of categories in which those unplanned purchases occurred. We therefore identified 20 unique product categories, determined by the retailer's spatial grouping of products. We then simply counted the number of shoppers who made an unplanned purchase within each category (0 = no, 1 = yes). Visual examination of the histogram (see Figure 5) reveals that broad attention, relative to narrow attention, elicited more unplanned purchases across a wide variety of product categories, including both vices (e.g., sweets and alcoholic beverages) and virtues (e.g., fruits and vegetables). In fact, broad attention elicited more unplanned purchases than narrow attention in 18 of the 20 categories (90%), which was significantly more than chance (binomial $p < .001$).

To examine whether the effect of attentional breadth dissipated as shoppers travelled farther into the shop, we also calculated the distance of each product category from the shop entrance. Most of the product categories could be reached by several different paths; we simply calculated the distance of the shortest possible path to each category location. These distances are shown in Figure 5 ("Meters"), where it is evident that the effect persisted even to the farthest locations within the shop. For purposes of statistical comparison, we further grouped all product categories into near (1-30 meters), mid (30-60 meters), and far (61-90 meters) locations, and Poisson regressions showed that attentional breadth significantly affected the number of unplanned purchases in all three locations: near $B_{exp} = 4.00$, $\chi^2(1) = 7.69$, $p < .01$, mid $B_{exp} = 1.91$, $\chi^2(1) = 5.72$, $p < .05$, and far $B_{exp} = 2.12$, $\chi^2(1) = 15.77$, $p < .001$. Moreover, at each of the three locations, we also calculated an effect size in terms of the percentage of unplanned purchases that were made by shoppers in the broad attention group (i.e., number of unplanned purchases by broad group / total number of unplanned purchases). Scores higher than 50% indicate that the broad group made more unplanned purchases than the narrow group. As shown in Figure 6, the effect of attentional breadth was initially very

strong at near locations (80%), then declined somewhat at mid locations (66%) and persisted steadily even to far locations (68%). Thus, the attentional manipulation appears to persist across the shopping trip.[4]

Mediation. We further tested whether physical exploration mediated the effect of attentional breadth on unplanned purchasing. Our mediator was distance travelled, and as our dependent variable we used unplanned spending. Although the correlation between these variables (r = .55, p < .001) was slightly outside the "sweetspot" for mediation analysis (see Pieters 2017), we nonetheless suggest that travel distance and unplanned spending are distinct constructs.[5] We therefore conducted bootstrap mediation analysis (Hayes 2013, model 4, 10K samples). The model is shown in Figure 4B. Attentional breadth significantly predicted distance travelled, B = 31.62, SE = 13.67, $t(72)$ = 2.31, p < .05, and distance travelled significantly predicted unplanned spending, B = .04, SE = .01, $t(71)$ = 4.86, p < .01. The direct effect was significant in the presence of the mediator (p < .05). Most importantly, the indirect effect was significant and positive, B = 1.26, SE = .65, CI = .21–2.73, revealing mediation.

Discussion

These results support **H_1** and **H_2**. Activating broad attention increased shoppers' physical exploration of the store, which in turn increased their unplanned purchasing. Attentional breadth was manipulated via an advertisement highlighting specific products available in the store, thus introducing greater ecological validity than the prior studies. Physical exploration was measured by a motor exploratory procedure, distance travelled, which mediated the effect of attentional breadth on unplanned purchasing. Broad attention

[4] Although the effect of attentional breadth on unplanned purchases decreased slightly across the shopping trip (in terms of distance from entrance; Figure 6), unplanned purchases were overall most common at the farthest locations in the shop (Figure 5). We suspect that this non-intuitive pattern is simply due to store design. The farthest locations at this particular shop stocked many staple products such as bread, milk, drinks, and fruits and vegetables. Thus, the number of purchases from these areas is very high (hence the high numbers in Figure 5), and this is true regardless of shoppers' attentional breadth (hence the relatively smaller effect size in Figure 6). Even among these high-frequency categories, however, a majority of those unplanned purchases at far locations nonetheless were made by shoppers with broad attention.

[5] Travel distance correlated more strongly with unplanned categories and unplanned products, so mediation analyses using those dependent variables were less likely to be meaningful (see Pieters 2017).

increased purchases not only of the advertised products, but also of other unplanned products from a wide range of categories, including both vices and virtues, and both products near the entrance of the shop and products at the far corners of the shop.

STUDY 4: MODERATION BY BUYING IMPULSIVENESS

Given that more impulsive buyers are less able to intentionally control their attention (Büttner, Florack et al. 2014), they may be more strongly influenced by attentional manipulations. Before testing our hypothesis that buying impulsiveness moderates the effect of attentional breadth on unplanned purchasing (**H_3**) in the field, we first conducted a lab study with hypothetical product choices. We manipulated participants' attentional breadth as in Studies 1 and 2, and then participants viewed a computer-based display of refrigerators of frozen foods (see Figure 7A), clicking on all the products they would like to purchase, and finally they reported their buying impulsiveness (Rook and Fisher 1995). We predicted that the effect of attentional breadth on product choices would be accentuated for impulsive shoppers.

Methods

One hundred twenty-three students (M = 24 years; 49% female) at the same university as in Study 2 participated voluntarily and were rewarded with candy. The attentional priming task was that shown in Figure 1A. Afterward, participants were informed that they would see a product arrangement, and they were instructed to "examine the product arrangement and choose products that you would like to purchase if you were on a shopping trip. You can make a choice by placing the cursor on the respective product and clicking one time." Each click placed a red dot on the display, so participants could see all of their prior choices. Participants first familiarized themselves with the procedure by clicking in an empty rectangular field. Then they viewed a single photo showing nine different refrigerator sections from the frozen food aisle of a retailer (Figure 7A). Each section was photographed separately, and then the nine refrigerators were organized symmetrically so that the four left

and four right refrigerators contained identical product categories (i.e., pizza, instant meals, vegetables). The assortment was displayed across the full screen of a 24-inch monitor. Participants made their hypothetical choices (via clicks) and then proceeded to a series of four measures. We assessed their chronic buying impulsiveness via Rook and Fisher's (1995) 9-item scale ($\alpha = .84$). We also measured mood and subjective breadth of attention, as in the prior studies. Finally, we measured hunger as an additional control.

Results

Control measures. The broad and narrow attention groups did not differ in chronic buying impulsiveness, subjective breadth of attention, hunger, or mood (all $p > .14$).

Product choice. Hypothetical product choices, indicated by clicks, served as our dependent variable. Because it was normally distributed, we used a linear regression with mood as a covariate. The broad attention group hypothetically chose more products than the narrow attention group ($M_{broad} = 2.80$ vs. $M_{narrow} = 2.35$, $B = .45$, $SE = .21$, $t(120) = 2.14$, $p < .05$). The groups also differed in their spatial distribution of product choices. We grouped the nine refrigerator sections into left, central, and right locations (see Figure 7A), and then we summed the hypothetical purchases in each location. A 2 (broad, narrow attention; between-participants) × 3 (left, central, right section; within-participants) mixed ANOVA revealed a significant interaction, $F(2, 242) = 4.66$, $p = .01$, $\eta_p^2 = .04$. As shown in Figure 7B, participants in the narrow attention group tended to choose products from central locations, whereas those in the broad attention group tended to choose products from peripheral refrigerators. See Table A3 in Web Appendix F for full descriptive statistics.

Moderation. To test whether buying impulsiveness moderated the effect of attentional breadth on product choice, we conducted a floodlight analysis (Hayes 2013, model 1, 10K samples) with attentional breadth as independent variable (narrow = 1, broad = 2), number of products chosen as dependent variable, and chronic buying impulsiveness score as a continuous moderator. Results are shown in Figure 7C. A significant interaction indicated

moderation, $B = .48$, $SE = .19$, $t(119) = 2.56$, $p = .01$, with the Johnson–Neyman point at a buying impulsiveness score of 3.55 ($B = .41$, $SE = .21$; $Z = -.05$) on a scale that ranged from 1 (not at all impulsive) to 7 (extremely impulsive). Thus, the 46% of participants who were relatively low in buying impulsiveness were unaffected by attentional breadth, whereas it significantly affected product choices by the 54% of our sample whose buying impulsiveness score was greater than 3.55. For these participants, directing their attention to the center (periphery) induced them to make significantly fewer (more) hypothetical purchases. This moderation was also observed with a spotlight analysis (Spiller, Fitzsimons, Lynch, and McClelland 2013) on buying impulsiveness scores 1 *SD* below or above the mean (-1 *SD* = 2.50, $B = -.09$, $SE = .29$, $p = .75$; +1 *SD* = 4.72; $B = .97$, $SE = .29$, $p = .001$).

Discussion

These results provide further support for **H1**. Activating broad attention increased hypothetical purchases in a virtual shopping scenario (i.e., clicking on products displayed in a retail shop). In fact, broad attention increased not only product choices in general, but also product choices from the periphery of the display more specifically. These results also provide initial support for **H3**. The effect was accentuated among more impulsive shoppers, whereas non-impulsive shoppers were unaffected by the attentional breadth manipulation.

STUDY 5: MODERATION BY BUYING IMPULSIVENESS

Study 5 tested whether buying impulsiveness moderates the effect of attentional breadth on unplanned purchasing, in a real shopping scenario. We intercepted customers entering a supermarket, asked them to list their planned purchases, and administered an attentional manipulation before they shopped. When we later intercepted them again upon exiting the shop, in addition to recording their unplanned purchases, we also assessed their chronic buying impulsiveness. We predicted that more impulsive shoppers would exhibit a larger effect of attentional breadth on unplanned purchases (**H3**).

Methods

Field Setting. The study was conducted in a large supermarket, with a sales floor of approximately 3000 m^2, on five consecutive weekdays.

Participants. One hundred shoppers (M = 45 years; 75% female) were recruited in front of a local supermarket and were randomly assigned to the broad or narrow attention group (both n = 50). None participated more than once during the five days of the study.

Procedure. Before entering the supermarket, participants reported their mood (α = .86) and indicated their planned purchases, as in Studies 1 and 3. Participants then completed the attentional manipulation task used in Studies 1, 2, and 4 (Figure 1A), here administered on a 9.7-inch iPad tablet. They then were thanked for their participation and were released to shop. After they passed the cashier, participants again reported their mood (α = .92) and were asked to report their chronic buying impulsiveness (α = 87; Rook and Fisher 1995; see Table 1). The experimenter then identified unplanned purchases by comparing the participant's initial shopping list with his or her actual purchases.

Results

Control Measures. The broad and narrow attention groups did not differ in the number of product categories planned for purchasing (p = .32). A 2 (time: pre, post; within-participants) × 2 (group: broad, narrow; between-participants) mixed ANOVA on participants' mood revealed a significant main effect of time (p < .05). Although the effect was very small, mood was higher post-shopping (M = 6.11) than pre-shopping (M = 6.00). Neither the main effect of attention group nor its interaction with mood was significant.

Unplanned Purchasing. Across the three measures of unplanned purchasing, two outliers in unplanned categories, two in unplanned products, and one in unplanned spending occurred. Results are summarized in Table 2. Unplanned categories and unplanned products were analyzed via negative binomial regression, whereas unplanned spending (log) was analyzed via linear regression. Mood (average of pre- and post-test) was included as a

covariate. The broad attention group purchased significantly more unplanned categories, B_{exp} = 2.08, $\chi^2(1) = 10.69$, $p < .001$, and unplanned products, $B_{exp} = 1.91$, $\chi^2(1) = 6.92$, $p < .01$, and spent more unplanned, $B = .52$, $SE = .21$, $t(97) = 2.44$, $p < .05$, than the narrow attention group.

Moderation. As in Study 4, we again used bootstrap moderation analysis (Hayes 2013, model 1, 10K samples) with attentional breadth as independent variable (narrow = 1, broad = 2) and chronic buying impulsiveness as a continuous moderator. With unplanned category purchases as dependent variable, the interaction was significant, $B = .58$, $SE = .26$, $t(96) = 2.20$, $p < .05$, indicating moderation. As shown in Figure 8, the effect of attentional breadth on unplanned purchasing increased with higher buying impulsiveness scores. The Johnson–Neyman point was at 2.74 ($B = .69$, $SE = .35$, $Z = -.41$). Participants low in buying impulsiveness (i.e., impulse score < 2.74; 38% of participants) were unaffected by the attentional manipulation. In contrast, the attentional manipulation significantly affected unplanned purchases by participants whose buying impulsiveness score was greater than 2.74, which amounted to 62% of our sample. We also replicated this analysis, but with unplanned products and with unplanned spending as the dependent variable, and the results were very similar (Figure 8). Finally, the moderation was also replicated using spotlight analyses within each of the three dependent variables. See Web Appendix F for full details of these additional moderation analyses.

Discussion

Activating broad attention increased unplanned purchasing (**H_1**), especially by more impulsive shoppers, thus supporting **H_3**. The minority of prudent consumers (i.e., those low in buying impulsiveness) tended to purchase only from their planned categories on this particular shopping trip. In contrast, for the majority of shoppers, directing their attention to the center or periphery induced them to make significantly fewer or more unplanned purchases, respectively.

GENERAL DISCUSSION

Retailers frequently and effectively use in-store marketing to maximize shoppers' exposure to their product assortments, thereby increasing unplanned purchasing (Chandon et al. 2009; Gilbride et al. 2015; Granbois 1968; Hui et al. 2013; Inman et al. 2009). However, not all product exposure is due to retailers' nudges; shoppers also explore store environments of their own volition and with their own biases and constraints (Baumgartner and Steenkamp 1996; Titus and Everett 1995). One such endogenous factor that consumer researchers had yet to investigate is breadth of attention (Friedman et al. 2003). Consumers' visual attention can range from extremely narrow and focused to very broad and diffused. We therefore conducted a series of experiments in the lab and field to examine how shoppers' attentional breadth, induced via a short digital display prior to shopping, affects their subsequent shopping and purchasing behaviors. We tracked shoppers' eye movements and walking distances to reveal that shoppers with broad attention explore more of the product assortment and store environment. Consequently, activating broad visual attention increases unplanned purchasing, relative not only to narrow attention, but also to an untreated control group. Lastly, we demonstrated that the personality trait buying impulsiveness moderates this effect of attentional breadth on unplanned purchasing. Several control studies and measures indicate that this effect of attentional breadth is not due to broad attention elevating shoppers' mood (Gasper and Clore 2002), expanding their conceptual scope (Friedman et al. 2003), or improving their perceptions of the retailer (Deng et al. 2016). In sum, this research reveals that shoppers' attentional breadth affects their in-store exploration, which ultimately affects their unplanned purchasing.

THEORETICAL CONTRIBUTIONS

We believe that this research provides several novel theoretical contributions. Most generally, this research advances our understanding of attentional factors in consumer behavior. Prior consumer research has mainly focused on the *locus* of attention, such as

preferred viewing locations when choosing from online and offline product assortments (Atalay et al. 2012; Chandon et al. 2009). The present research instead demonstrates, for the first time, that *breadth* of visual attention also affects shopping behavior. And whereas the prior research in psychology has predominantly focused on the antecedents of attentional breadth, such as mood (Gasper and Clore 2002) and motivation (Gable and Harmon-Jones 2010), the present research is relatively unique in demonstrating its consequences (see also Friedman et al. 2003). We believe this to be an important theoretical contribution because all consumers shop with an attentional focus that is somewhere on a continuum from narrow to broad, and hence attentional breadth likely affects many consumer behaviors.

A second contribution of this research is to demonstrate that attentional breadth affects unplanned purchasing. Given that increasing product exposure tends to stimulate unplanned purchases (Granbois 1968), in-store strategies such as promotional offers, assortment organization, and store layout can increase unplanned purchasing by increasing shoppers' awareness of products (Gilbride et al. 2015; Hui et al. 2013; Inman et al. 2009). The present research reveals a new process by which unplanned purchases can evolve: Broadening shoppers' visual attention increases their awareness of the assortment, thereby leading them to purchase more unplanned.

This research also advances theoretical knowledge of impulsive buying. It has long been known that impulsive buyers make more unplanned purchases (e.g., Beatty and Ferrell 1998). More recently, research has also shown that impulsive buyers are less able to visually ignore non-focal stimuli (Büttner, Florack, et al. 2014). The present research is the first to integrate these previously-separate findings: We show that impulsive buyers' visual attention causally affects their unplanned purchasing. Specifically, we show that attentional breadth can accentuate or attenuate impulsive buyers' tendency toward unplanned purchasing. We also show that less impulsive buyers, who are better able to control their visual attention (Büttner,

Florack, et al. 2014) and other shopping behaviors (Hoch and Loewenstein 1991; Rook 1987), are less susceptible to this effect of attentional breadth on unplanned purchasing.

Having thus briefly described a few of our theoretical contributions, next we elaborate in greater detail on what we consider our most novel, thorough, and systematic contribution.

Exploratory Shopping. An important theoretical contribution of this research is to introduce and elaborate the concept of an *exploratory mindset*, thereby substantially advancing theoretical understanding of exploratory shopping. To be sure, prior research has illuminated many critical aspects of exploratory shopping. Titus and Everett (1995) theorized about how the characteristics of both the store environment and the shoppers within it can differentially influence more hedonic or more utilitarian, goal-based shopping behaviors. Similarly, Janiszewski (1998) differentiated exploratory visual search from goal-based search. Baumgartner and Steenkamp (1996) noted that exploratory shopping can entail both visual procedures and motor procedures, and several other formative works have investigated shoppers' exploratory navigation of the store layout (Hui and Bradlow 2012; Hui et al. 2009; Hui et al. 2013; Inman et al. 2009; Larson et al. 2005).

The present research contributes to this literature primarily by demonstrating that, at least in the present context, exploratory shopping is a behavioral mindset. A mindset is a set of cognitive or motor procedures that are activated during one task and subsequently influence other, unrelated judgments and behaviors (Wyer and Xu 2010; Xu and Schwarz 2018). Prior research has revealed mindsets pertaining to cognitions or behaviors such as categorization and action planning (e.g., Gollwitzer 2012; Ülkümen, Chakravarti, and Morwitz 2010; Wyer and Xu 2010; Xu and Schwarz 2018). We conceptualize the exploratory mindset as entailing both cognitions and behaviors. Specifically, the exploratory mindset can manifest in visual exploration (i.e., looking around) and/or physical exploration (e.g., walking around). Moreover, our research demonstrates that attentional breadth can activate that exploratory mindset, which in turn can increase unplanned spending. Thus, we go beyond the

prior research on exploratory shopping by providing a unifying concept that integrates much of the prior knowledge while also identifying a novel antecedent (attentional breadth) and a directly tangible consequence (unplanned purchasing).

We also hope to clarify the distinction between attentional breadth and other processing mindsets, such as construal level (Liberman, Trope, and Wakslak 2007) and global/local processing (Förster and Dannenberg 2010), both of which are forms of abstraction (Burgoon, Henderson, and Markman 2013). Intuitively, broad attention may seem similar to high-level construal and global processing, whereas narrow attention may seem like low-level, local processing: Viewing several trees may give the impression of a forest. However, this apparent similarity belies more fundamental differences. Abstraction (i.e., high-level construal and global processing) entails information reduction, where core commonalities among stimuli are identified (Burgoon et al. 2013). Attentional breadth instead describes the extent to which the environment is attended or explored, and broad attention entails sampling more stimuli in a given environment. That is, abstraction *reduces* information, whereas broad attention enables information *gain*. Thus, attentional breadth is both conceptually and functionally distinct from abstraction mindsets.

In the remainder of this section, we first review the evidence of the exploratory mindset that we have provided, and then we identify several important aspects of this mindset. We argue that the effect of attentional breadth on unplanned purchasing is due to an exploratory mindset. One approach to testing that mechanistic explanation is to measure exploratory behavior and test whether it statistically mediates the effect (i.e., "process by mediation"). Studies 2 and 3 did this by measuring exploration in terms of looking and walking respectively. By manipulating a single attribute of the exploratory mindset (i.e., attentional breadth), we activated other attributes of that mindset (i.e., looking around and walking around), causing tangible effects on unplanned purchasing. An alternative approach to testing that mechanistic explanation is to identify a factor that should affect exploratory

behavior and test whether that factor moderates the effect (i.e., "process by moderation"). Studies 4 and 5 did this by including buying impulsiveness as a continuous moderator. We examined buying impulsiveness because more impulsive buyers are less able to control their visual attention and are more likely to explore non-focal stimuli (Büttner, Florack, et al. 2014). So given that impulsive buyers are less able to control their visual attention, if our effect is due to (visual) exploration, then impulsive buyers should be especially susceptible to our effect. That is, our attentional manipulation should effectively attenuate (with narrow attention) or accentuate (with broad attention) impulsive buyers' natural tendency toward unplanned purchasing. And indeed, Studies 4 and 5 demonstrated this moderation. Thus, these studies provide both mediation and moderation evidence of the exploratory shopping process.

Several further aspects of the exploratory mindset are notable. First, we consider whether broad attention induces more peripheral attention in addition to central attention, or in lieu of it. To address this question, we will reduce it two potential effects: (1) Does broad attention decrease attention to central locations, and/or (2) does it increase attention to peripheral locations? Our two best sources of evidence are Studies 2 and 4. Regarding the first question, the evidence is mixed. By default, shoppers tend to look at centrally-located products (Atalay et al. 2012; Chandon et al. 2009). As shown in Figure 3, the broad and narrow attention groups appeared to fixate central shelves about equally, but the broad group fixated additional compartments at the peripheries. On the other hand, Figure 7B shows that the narrow attention group tended to choose products from central locations, whereas the broad attention group tended to choose products from peripheral locations. Thus, our data do not consistently indicate whether broad attention reduces attention to central locations (Study 4) or not (Study 2). Regarding the second question, however, our data clearly indicate that broad attention manifests as increased attention to peripheral locations. Figures 3 and 7B illustrate this reliable finding. By conceptually combining those two sources of evidence, we tentatively conclude that broad attention may have a small negative effect on attention to the

center, but that effect is more than offset by a large positive effect on attention to the peripheries. Ultimately, this net positive effect of broad attention on the number of products that shoppers view leads them to choose and purchase more products unplanned.

Second, although we did not explicitly aim to investigate variety-seeking behavior, these studies nonetheless do provide some evidence of this phenomenon, in terms of both exploration of the assortment and variety of purchases. We found that broad attention led shoppers not only to view more shelf areas (Study 2) and visit more distant store zones (Study 3), but also to purchase products from more categories (Studies 1, 3, and 5), including both vice (e.g., colas, candies) and virtue products (e.g., vegetables, personal hygiene; see Figure 5). Indeed, we consider the exploratory mindset to be naturally related to variety-seeking, and we believe this to be an important direction for further research.

Third, a potentially surprising aspect of these results is that a relatively short (40-second) attentional task had such long-lasting effects on shopping and purchasing. Indeed, if our manipulation merely induced a sort of attentional priming, one would expect only a fleeting, short-lived effect. Rather, the long-lasting nature of the effect supports our conceptualization of it as a mindset. Mindsets are longer-lasting states that continue to influence judgments and behaviors for some time (Xu and Schwarz 2018), more akin to a mood than to a fleeting emotion. These relatively long-lasting effects, continuing into the far areas of the shop (Study 3), may also be related to the dynamics of unplanned purchasing. Gilbride et al. (2015) found that unplanned purchases gradually increase across the course of a shopping trip. This dynamic is also evident in our Study 3 (see Figure 5), where the overall number of unplanned purchases was highest at the far locations in the shop. This general increase in unplanned purchasing later during the shopping trip likely facilitates the persistence of the effect of attentional breadth on those unplanned purchases.

Another notable finding is that shoppers were not consciously aware of their exploratory mindset. In Studies 1, 3, and 4, we assessed participants' subjective breadth of

attention by asking them to rate the extent to which they found themselves looking at many different products and were distracted by various products while shopping. Although Study 2 revealed that participants with broad attention do actually look at more different products, evidently shoppers with broad attention are unaware of this increased viewing of the assortment. At face value, this may seem rather surprising. However, a hallmark of behavioral mindsets is that they are typically enacted automatically, without conscious awareness of the activated cognitions, processes, or behaviors (Gollwitzer 2012; Wyer and Xu 2010; Xu and Schwarz 2018). Lack of awareness of the exploratory mindset thus is consistent with the broader literature.

In sum, this research introduces exploratory shopping as a behavioral mindset that can be activated at one point (e.g., by broad visual attention) and that can subsequently manifest in both visual procedures (i.e., looking around) and motor procedures (i.e., walking around), ultimately affecting unplanned purchasing, specifically among more impulsive buyers. This exploratory mindset appears to operate at the margins, increasing attention to products in peripheral shelf locations and distant store zones. As such, the exploratory mindset also seems naturally linked to variety-seeking. Finally, although shoppers appear to be unaware of it, the exploratory mindset nonetheless persists throughout the shopping trip. As explained next, these findings have important implications for both consumers and retail managers.

Practical Implications

Unplanned purchasing is a major profit source for many retailers. To stimulate such unplanned purchasing, retailers attempt to increase consumers' awareness sets. That is, essentially, retailers attempt to expose consumers to as many products as possible. The more products a consumer sees, the more likely it is that he or she will recognize a forgotten need or want, or discover a new one. Our research suggests that activating broad attention may be a simple, inexpensive, and effective "nudge" toward more visual exploration of the product assortment, more physical exploration of the store layout, and ultimately more unplanned

purchasing. Moreover, if one or the other mindset becomes activated it can remain effective even to the farthest locations in a supermarket. This has important implications for both management practice and consumer welfare.

Managerial Implications. In all studies, we manipulated attentional breadth on digital displays (i.e., iPads), which are similar to the digital displays that have become increasingly common in retail outlets such as advertisement screens in window displays, signage displays in store zones, displays on smart shopping carts, handheld product scanners, or smart phones which shoppers often use during their shopping. Critically, such displays viewed before or during shopping – whether endogenously motivated or exogenously delivered – may affect consumers' attentional patterns while shopping, thus potentially affecting their purchases. In fact, we suspect that most communications are rather center-focused, which presumably constrained shoppers' unplanned spending. To counteract this, retailers could design digital in-store communications that provide promotional offers, product pictures, or other visual elements in spatially alternating order as in our manipulations. Such dynamic in-store communications could be used on digital displays owned by the retailer but also on those ones that belong to the shoppers (e.g., mobile coupons delivered on smart phones). It is also important to note that the present implications could be easily integrated in online stores, where shoppers naturally view products and other information via screens, as in our Pilot Study and Study 4. Online and offline retailers are thus well advised to carefully plan their visual communications delivered via digital displays, because it can affect the purchase behavior of their store patronage by affecting breadth of attention.

Consumer Welfare. Some consumers often experience sudden, unreflective urges to purchase a product impulsively (Rook and Fisher 1995), which may lead to overspending. A more extreme and pathological form of buying behavior affects compulsive buyers, who chronically engage in excessive shopping (Ridgway, Kukar-Kinney, and Monroe 2008). Previous research suggests that problematic buyers can learn to control their visual attention

by using implementation intentions (Serfas, Büttner, and Florack 2016). That study, however, examined only visual distraction via eye-tracking, not purchase behavior. We thus demonstrate for the first time that narrowing attention is indeed a powerful intervention to constrain purchasing of shoppers who are otherwise less able to control their shopping behavior. Indeed, in our Studies 4 and 5, activating narrow attention did specifically help impulsive shoppers to decrease their unplanned purchasing. Thus, shoppers with constrained budgets, as well as those with difficulty controlling their buying impulses, would be advised to develop and adhere to a pre-shopping plan that includes not only creating a shopping list (Inman et al. 2009), but also maintaining a narrow attentional focus during the shopping trip (Serfas et al. 2016).

Limitations and future directions

These studies have important limitations, and also reveal some potentially fruitful directions for further research. One interesting question is which attentional breadth is the "default mode" for shoppers. In Study 1, we found that the untreated control group shopped like the narrow attention group, indicating an asymmetric effect whereby narrow attention was the default attentional breadth. This suggests that the shoppers in our study entered the store with a goal-directed rather than exploratory default search mode (Janiszewski 1998). This might be due to the fact that we focused on grocery stores, which are usually visited with specific purchase plans (Block and Morwitz 1999; POPAI 2014), mental budgets (Stilley et al. 2010b), and/or more utilitarian shopping orientations (Büttner, Florack, and Göritz 2013). However, broad attention may be the default when consumers shop with an experiential, hedonic shopping orientation, either due to situational influences such as an entertaining store environment or due to individual differences in shopping orientation (Büttner et al. 2013). In these cases, it may be that activating a narrow attention limits unplanned purchases (compared to a control group), rather than broad attention increasing unplanned purchases, as in our setting. Relatedly, it must be noted that among more impulsive buyers in Studies 4 and 5,

activating narrow attention appeared to reduce their unplanned purchases to the level exhibited by less impulsive buyers. Thus, it is not yet entirely clear whether the effect of attentional breadth is symmetric or asymmetric. More research is needed to clarify this.

We have demonstrated effects of attentional breadth on both visual and physical exploration, that is, on both looking around and walking around. An interesting question, unresolved by our studies, is the relation between these visual and physical manifestations of exploratory shopping. In the context of our studies, it seems likely that visual exploration preceded physical exploration, due to the visual nature of our attentional manipulation. Moreover, it also seems likely that by looking around more, shoppers see additional attractive products at peripheral shelf locations and possibly even at more distant store areas, thereby leading them to move to those additional and farther locations. Thus, we believe that visual exploration can induce physical exploration. However, it seems equally likely that physical exploration can induce visual exploration. As shoppers walk farther within the store, presumably they also look around as they go, which is tantamount to visual exploration on-the-fly. We therefore suspect that the relation between visual and physical exploration is dynamic, producing a self-perpetuating process in which more looking leads to more walking leads to more looking, so that a brief visual manipulation can have long-lasting effects even at the farthest reaches of the shop. We hope that our research will inspire further studies to better clarify the dynamic nature of this relation between visual and physical exploration.

An important limitation is that this research did not investigate potential longer-term effects on shopping behavior. Although this research reveals one method that retail managers could potentially use to encourage unplanned spending, managers should also beware that this method could potentially alienate consumers who detect and resent this persuasion attempt. Prior research has shown that consumers can learn to correct for influences of covert marketing if they become aware of it (Campbell, Mohr, and Verlegh 2013). For instance, marketing-savvy shoppers could infer that in-store attempts to manipulate their attentional

breadth are intended to increase their purchasing. Such shoppers could react by intentionally reducing their purchases, or patronizing a retail competitor. Thus, the longer-term effects of attentional breadth on shopper patronage and behavior are in real need of further research.

Another potentially important direction for future research is to identify other moderators of attentional breadth. For instance, hedonic categories may induce broader attention than utilitarian categories, due to the association between hedonic products, positive emotion, and broad attention (Yeung and Wyer 2004; Gasper and Clore 2002). Additionally, individual differences such as the trait breadth of attention (Mehrabian, 1977) might moderate the effect. Indeed, we suspect that several important boundary conditions of this effect remain to be discovered, and we hope that our initial demonstrations and explanation of this effect will spur further research on this aspect of consumer behavior.

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Table 1. Measures and items used in Studies 1, 3, and 5.

Study 1

Planned purchases (recorded by experimenter; see Web Appendix B)

Presence of shopping list (recorded by experimenter)

Number of accompanying people (recorded by experimenter)

Mood (Allen and Janiszewski 1989; pre-shopping α = .84; post-shopping α = .86)

At this moment I am feeling…
1 = bad, unpleasant, sad, negative; 7 = good, pleasant, happy, positive

Subjective breadth of attention (modified from the Need for Touch Scale (Peck and Childers 2003); r = .49, p < .01)

While I was shopping, I repeatedly caught myself looking at many different products; While I was shopping, I got easily distracted by various products.
1 = strongly disagree; 7 = strongly agree

Hedonic Shopping Value (modified from Kaltcheva and Weitz 2006; α = .81)

In this store, shopping is fun; In this store, shopping is entertaining; This store stimulates browsing.
1 = strongly disagree; 7 = strongly agree

Satisfaction with store assortment (Hoch, Bradlow, and Wansink 1999, α = .82)

This store offered the products that I wanted; I could not find the products I was looking for[a]; I found a lot of interesting products in the store; I've seen many attractive products that I would have liked to buy; There weren't any attractive products in the store[a].
1 = strongly disagree; 7 = strongly agree

Study 3

Planned purchases (see above)

Presence of shopping list (see above)

Number of accompanying people (see above)

Mood (see above; pre-shopping α = .89; post-shopping α = .93)

Subjective breadth of attention (see above; r = .57, p < .01)

Study 5

Planned purchases (see above)

Mood (see above; pre-shopping α = .86; post-shopping α = .92)

Buying Impulsiveness (Rook and Fisher 1995; α = .87)

I often buy things spontaneously; "Just do it" describes the way I buy things; I often buy things without thinking; I see it, I buy it" describes me; "Buy now, think about it later" describes me; Sometimes I feel like buying things on the spur-of-the-moment; I buy things according to how I feel at the moment; I carefully plan most of my purchases[a]; Sometimes I am a bit reckless about what I buy.
1 = strongly disagree; 7 = strongly agree

[a]Reverse-scored.

Table 2. Descriptive statistics, Studies 1, 3, and 5.

			Unplanned Categories (#)		Unplanned Products (#)		Unplanned Spending (€)	
Study	Condition	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	control	64	2.00	1.87	2.69	2.78	5.91	6.68
	narrow	64	2.22	2.40	3.00	3.25	5.79	6.92
	broad	64	3.39	2.89	4.44	4.48	10.60	10.57
3	narrow	37	1.38	1.67	2.41	3.02	4.44	5.63
	broad	37	3.24	2.85	6.41	5.86	11.95	12.03
5	narrow	50	1.00	1.26	1.34	1.89	3.56	5.33
	broad	50	2.00	1.92	2.50	2.59	5.59	6.71

Figure 1. (A) Procedure of attentional manipulation used in Pilot Study, Control Study 1, and Studies 1, 2, 4, and 5. Participants named aloud either the central object (*narrow attention* group) or the peripheral object (*broad attention* group) of all 20 object pairs. (**B**) Procedure of attentional manipulation, broad attention group, Control Study 2 and Study 3. The narrow attentional manipulation was identical, except that all products appeared in the center of the display instead of the periphery. Participants passively viewed the products without responding.

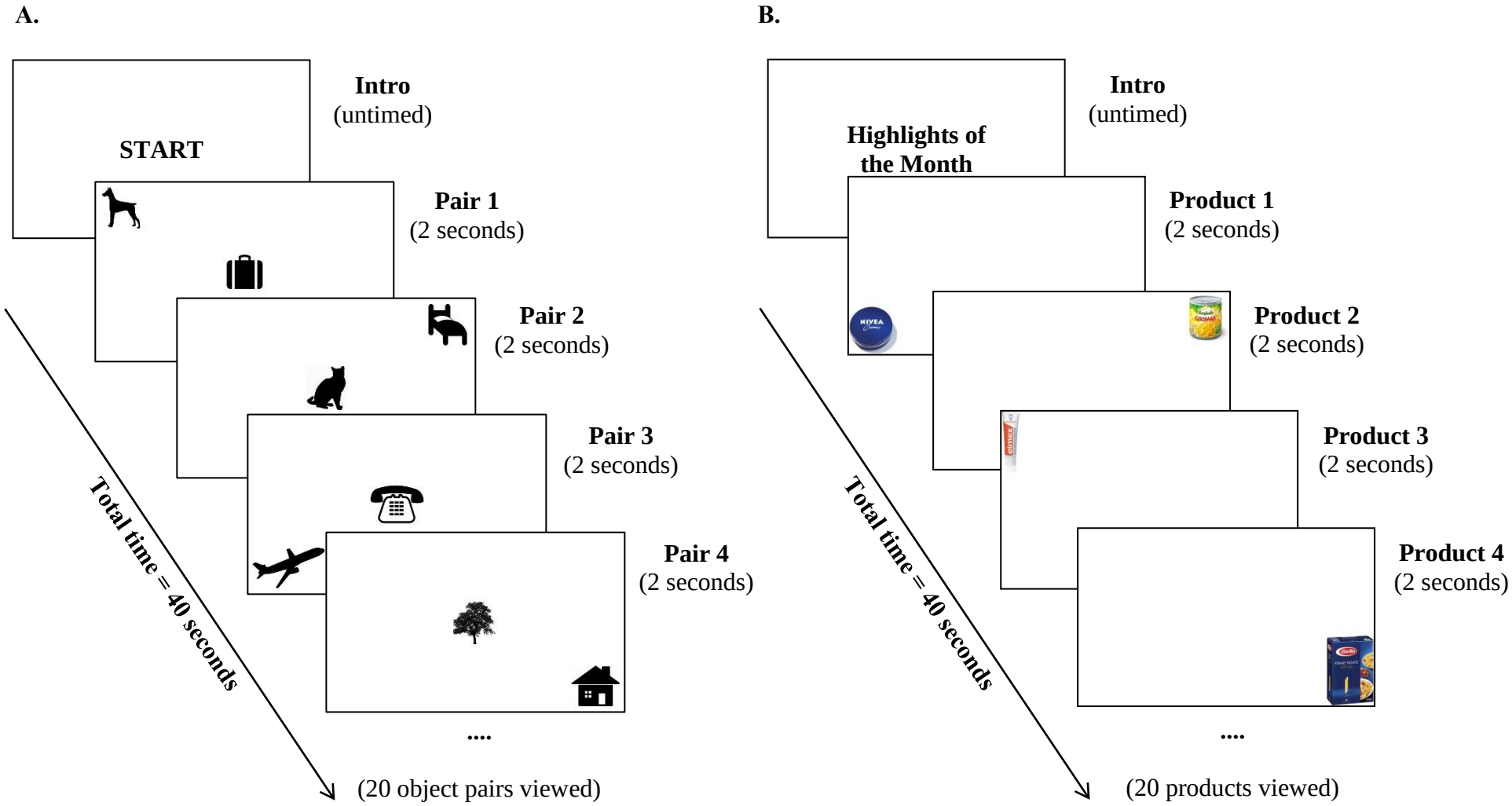
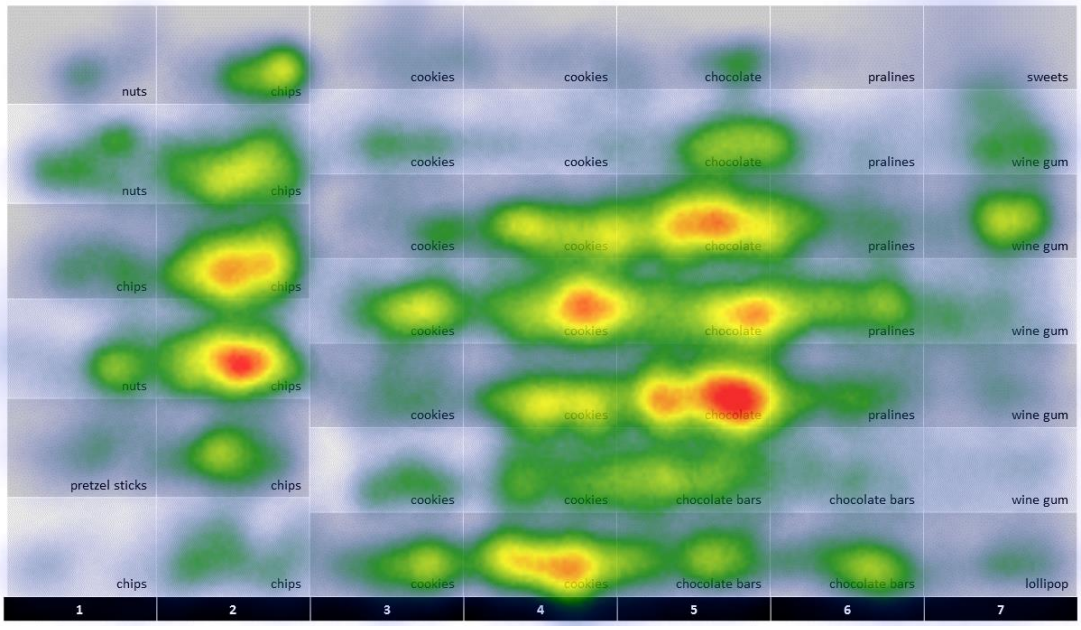


Figure 2. Stimuli of the Pilot Study: Product array from the product memory task (**A**), and product arrays from the oddball detection task. Oddball products were a can of beer (**B**) and a spray can of whipped cream (**C**), shown here circled in red.

A. **B.** **C.**

Figure 3: Distribution of visual attention (fixations) by the broad (**A**) and narrow (**B**) attention groups during product choice, Study 2.

A. **Broad Attention**



B. **Narrow Attention**

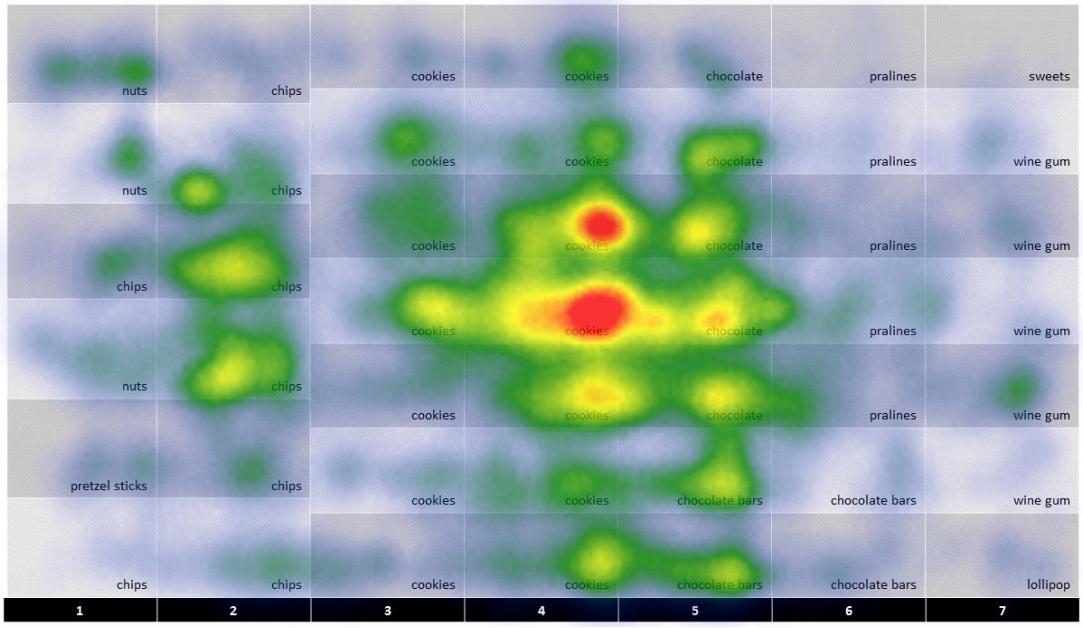
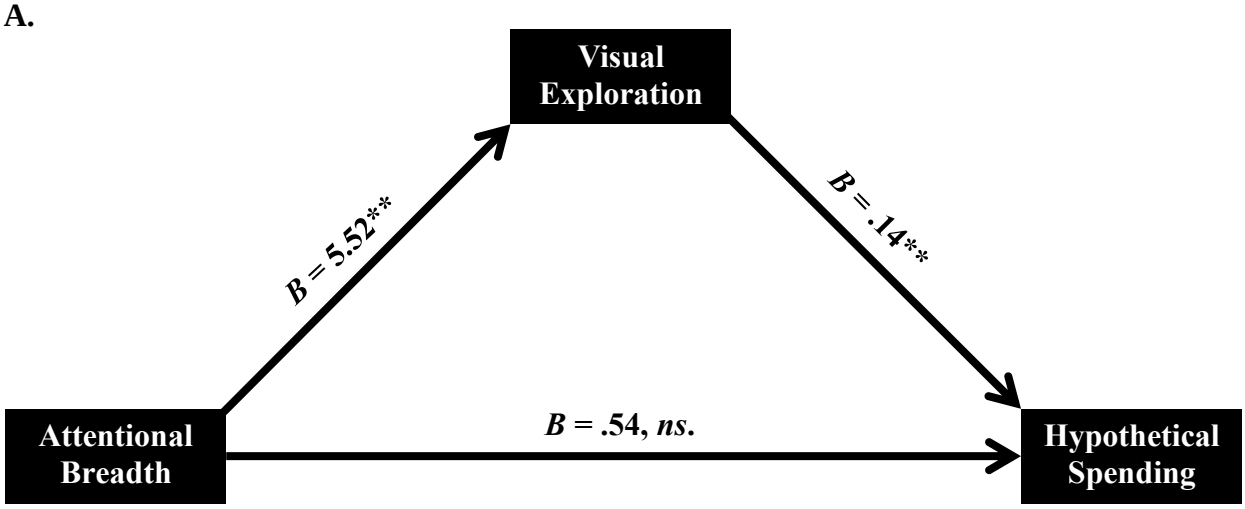


Figure 4. (A) The effect of attentional breadth (narrow = 1, broad = 2) on hypothetical spending (total cost of chosen products) was mediated by visual exploration (number of product compartments fixated) in Study 2. **(B)** The effect of attentional breadth (narrow = 1, broad = 2) on unplanned spending (total cost of unplanned purchases) was mediated by physical exploration (distance travelled in-store) in Study 3. * $p < .05$, ** $p < .01$

A.



B.

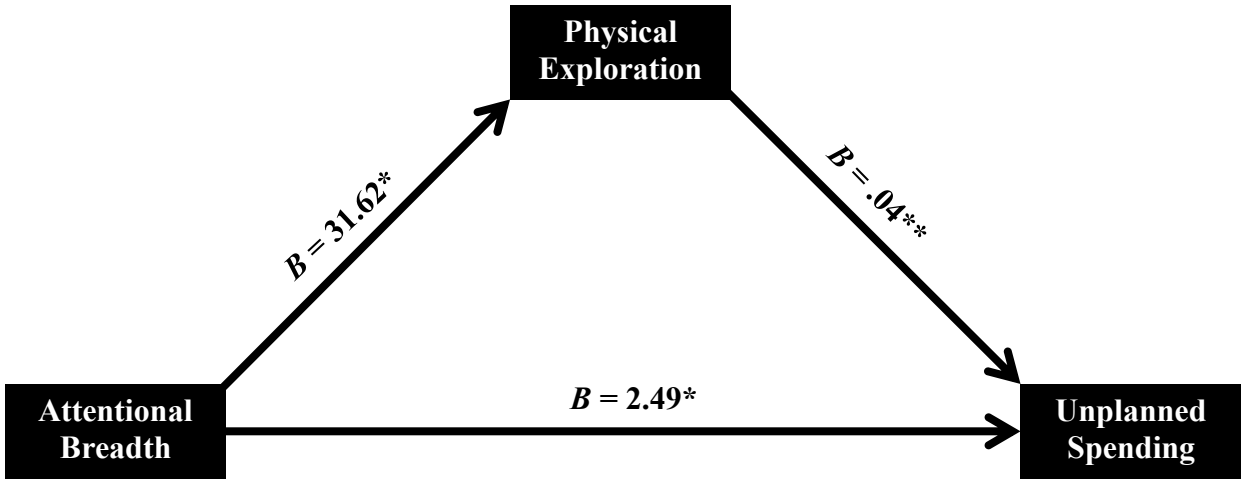
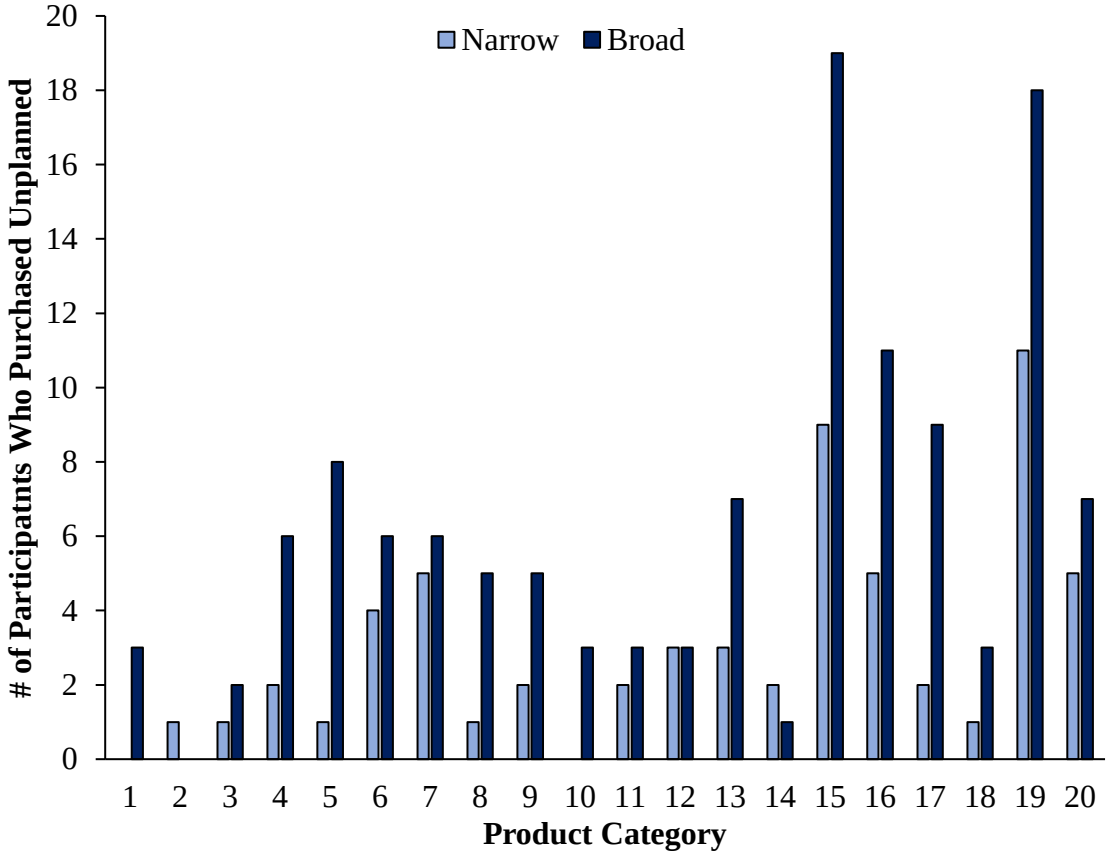


Figure 5. Effect of attentional breadth on unplanned purchasing across product categories, Study 3 (*n* = 37 per attention group). Product categories are presented in order of increasing distance (Meters) from the shop entrance, measured as the shortest possible route to that shelf location.



	Product Category	Meters
1	hygiene and health (e.g., toothpaste, vitamins)	6
2	deli sandwiches	8
3	print media (e.g., books, magazines)	18
4	pasta and rice	24
5	canned and jarred foods	29
6	household and cleaning (e.g., foil, detergent)	32
7	basic ingredients (e.g., flower, sugar)	37
8	breakfast foods (e.g., cereals, jams)	39
9	tea and coffee	42
10	pet supplies	47
11	salty snacks (e.g., chips, nuts, pretzels)	51
12	condiments (e.g., pepper, ketchup)	52
13	sweets (e.g., candy, cookies, desserts)	56
14	frozen foods	61
15	fruits and vegetables	62
16	drinks (cola, juices, water)	63
17	baked goods (e.g., bread, muffins, pastries)	69
18	alcoholic beverages	76
19	dairy (e.g., milk, cheese, butter)	77
20	meat and fish	90

Figure 6. Effect size (% of unplanned purchases made by shoppers with broad attention) as a function of distance from the shop entrance, Study 3. Scores above 50% indicate that unplanned purchases were more likely with broad attention than with narrow attention.

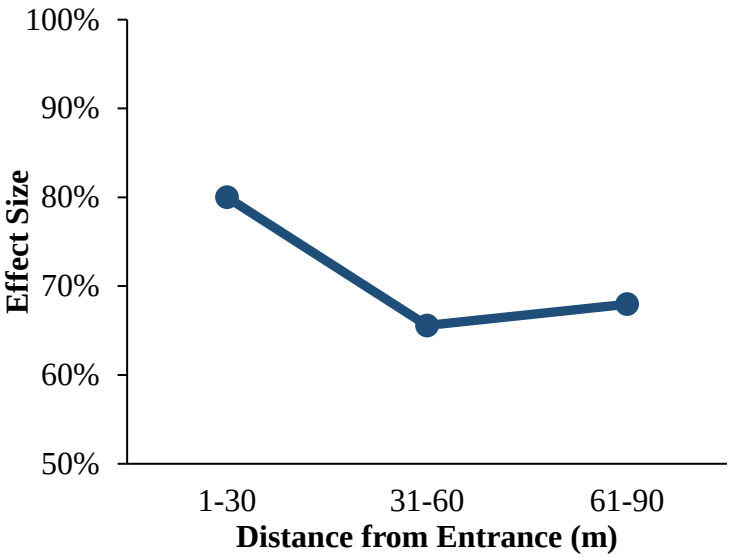
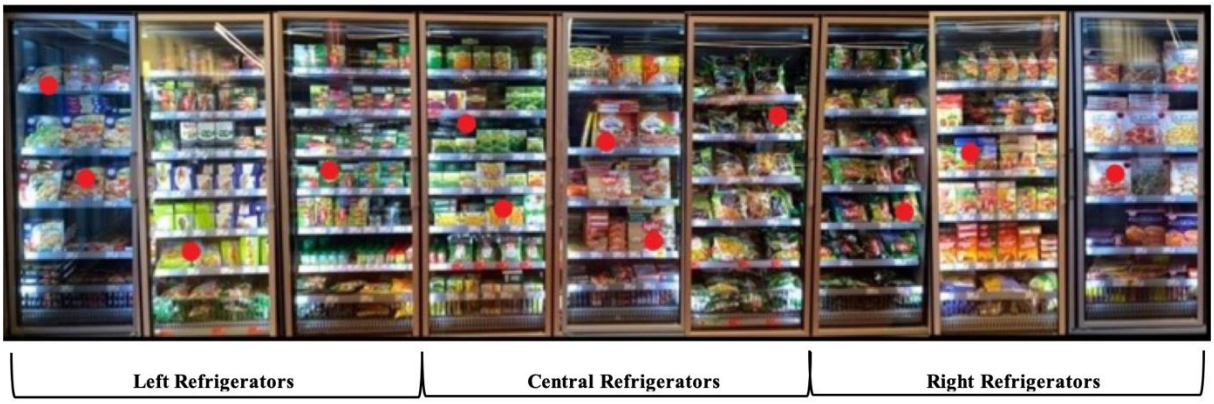
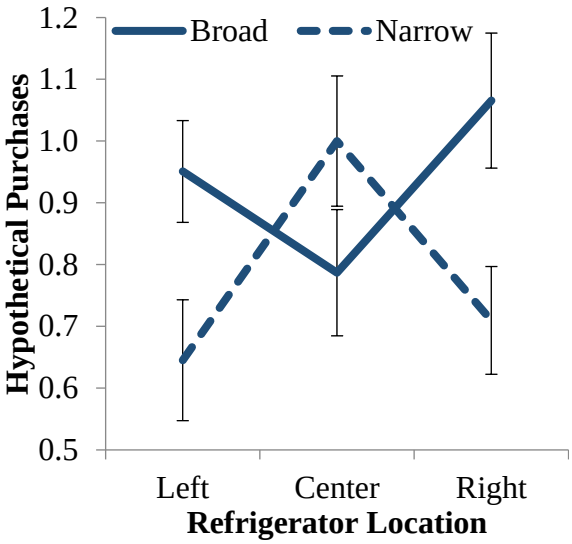


Figure 7. (A) Product array, Study 4. Participants hypothetically purchased products by clicking on them, which placed a red dot on each chosen product. **(B)** The effect of attentional breadth on choice of products from the left, central, and right refrigerator locations. **(C)** The effect of attentional breadth (broad v. narrow) on product choice (i.e., total products chosen) was moderated by buying impulsiveness. The solid diagonal line is the slope of the moderation, dotted lines are 95% *CI*s, and the solid vertical line is the Johnson-Neyman point, above which the moderation was significant.

A.



B.



C.

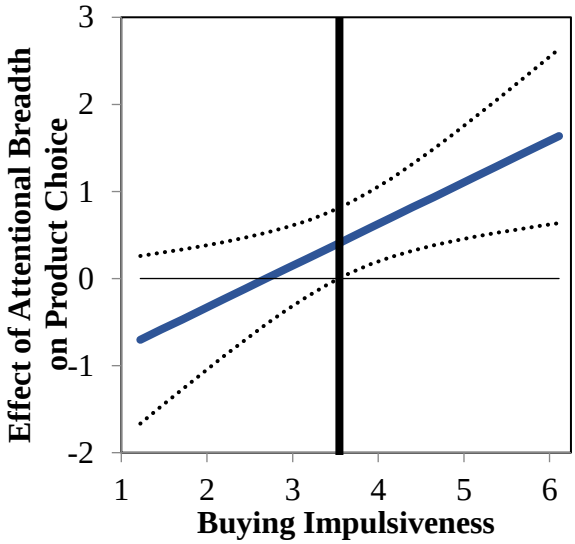
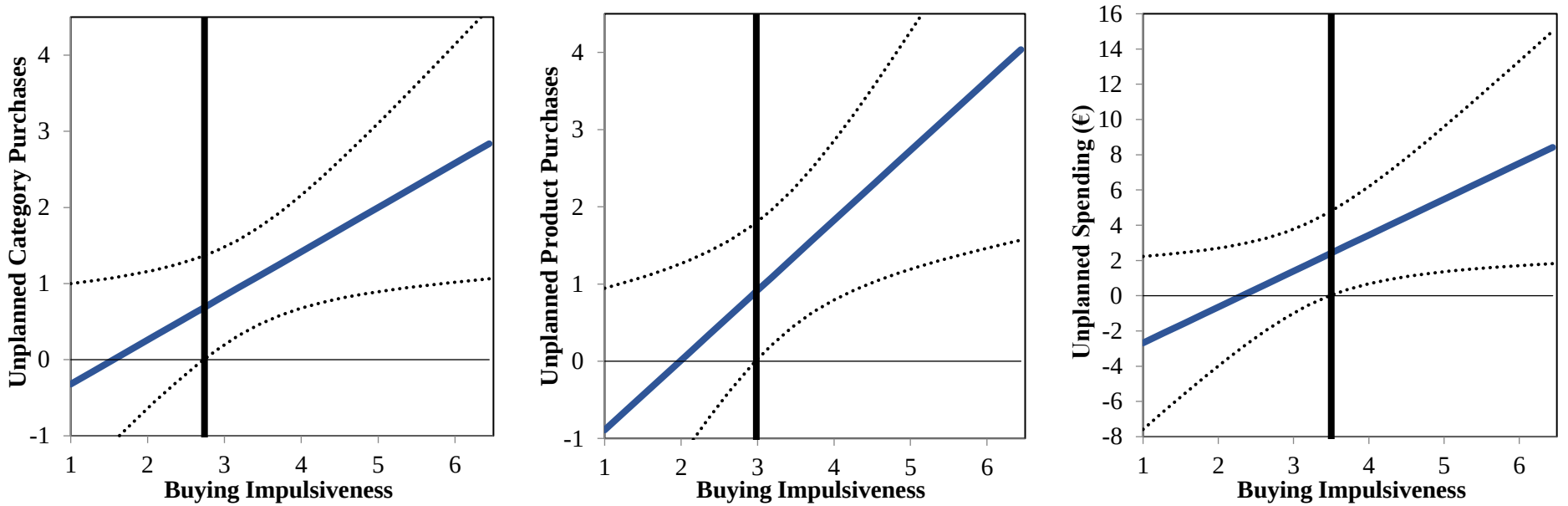


Figure 8. The effect of attentional breadth (broad v. narrow) on unplanned purchases (categories, products, and spending) was moderated by buying impulsiveness, Study 5. The solid diagonal line is the slope of the moderation, dotted lines are 95% *CI*s, and the solid vertical line is the Johnson-Neyman point, above which the moderation was significant.



WEB APPENDIX
Exploratory shopping: Attention affects in-store exploration and unplanned purchasing

This web appendix contains full details of the Pilot Study (Appendix A), procedures for recording planned purchases (B), additional measures and effect sizes (C), Control Study 1 (D), Control Study 2 (E), and additional moderation analyses (F).

APPENDIX A: PILOT STUDY

This study provided an initial test to validate the effectiveness of our attentional manipulation on subsequent exploration of product displays. Because people prefer to attend to centrally located products in product displays (Atalay et al. 2012) our rationale was that – if our manipulation is effective – activating broad visual attention should make participants attend more to products in the shelf periphery in subsequent situations. First, we manipulated participants' attentional breadth by showing them 20 object pairs (e.g., airplane and telephone), with one object in the center and the other in the periphery of the display (see Figure 1A), and having participants name aloud either the central object (*narrow attention* group) or the peripheral object (*broad attention* group) of all 20 pairs. Then we tested their attention to and memory of peripherally-located products in two retail-type displays. In a *product memory* task, participants first viewed an array of 15 products (Figure 2A) and then reported all the products they could recall. We measured how far their recalled products were from the center of the display. Next, participants viewed a series of 18 product shelves from a retail shop, two of which included a peripherally-located oddball product that did not belong in the shown array (e.g., a can of beer among sun screen products; see Figures 2B and 2C). We predicted that the broad attention group would recall more peripherally-located products and detect more peripherally-located oddball products than the narrow attention group, as both effects should result from increased visual exploration of a given display.

Methods

Participants. One hundred fifty students (M = 23 years; 100% female) at a European university participated voluntarily and were rewarded with a small gift (i.e., candy). We sampled only females because our tasks (described below) used feminine products (e.g., cosmetics), as Büttner et al. (2014) used in their study of impulse buying.

Stimuli. The experiment consisted of three tasks: (1) attentional manipulation, (2) product memory, and (3) oddball detection. Each task had different stimuli.

(1) The attentional manipulation task consisted of 20 images, each containing two common objects. In each of the 20 images, one object appeared in the center of the display, and another appeared in one of the four corners of the display (i.e., periphery), with random assignment to center or periphery. All objects were neutral, monochrome, and easy to name (e.g., airplane and telephone; see Figure 1A).

(2) The product memory task consisted of a single image displaying 15 cosmetic products distributed systematically across the visual array (see Figure 2A). Product position was held constant across experimental conditions.

(3) The oddball detection task consisted of 18 pictures of product shelves. The pictures were taken in a national retailer, and each picture included several shelves arranged vertically, with many products on each shelf. The prices of the products were blocked out from the images, so that only the shelves and products were visible. Critically, two of the eighteen shelves included one oddball product in the periphery that was from a different category from the other products shown: One oddball was a can of beer among 56 sunscreen products, and the other was a spray can of whipped cream among 56 hair sprays (Figures 2B and 2C). The oddball products were visually similar to the other products on the shelves, so

that recognition of the oddball would provide a sensitive and subtle measure of visual exploration.

Procedure. All participants completed three tasks, in this order: (1) attentional manipulation, (2) product memory, and (3) oddball detection. (4) Participants then answered a series of exploratory questions. See Table A1 for full list of measures and items.

(1) The attentional manipulation task was administered under the guise of a test for normal eyesight. The 20 object pairs were presented on a 24-inch computer display (approximately 40 cm viewing distance), one pair at a time. Participants in the *narrow attention* group (n = 74) were instructed to name the object appearing in the center of each display, whereas participants in the *broad attention* group (n = 76) named all objects appearing in the periphery. Each object pair appeared for two seconds, and all participants saw and named the same objects (order counterbalanced).

(2) In the product memory task, participants examined the array of 15 cosmetic products for 8 seconds. They were instructed to "Please look at the product arrangement and keep an impression of it in mind". Immediately thereafter, they were asked to recall all the products they could. We measured the distance of each product from the center of the display, and the mean distance of all recalled products served as each participant's index of visual exploration of the product display.

(3) In the oddball detection task, participants were informed that they would now see a sequence of 18 pictures of product shelves, which they would be asked about later. Each of the 18 shelf images appeared for 8 seconds. The two oddball images appeared on trials 7 and 11, with trials counterbalanced so that the two oddballs appeared equally often in each trial position. After participants viewed the 18 shelf images, we asked them to report any product(s) they saw that did not match the assortment. Reporting of the peripherally-located oddball products served as a measure of visual exploration.

(4) Next, participants answered a series of exploratory questions. Although our proposed mechanism concerned visual exploration of shopping environments, we additionally examined more general attitudes and cognitions toward the store (i.e., the 18 pictures). If the attentional manipulation task did indeed affect participants' visual exploration, this could plausibly influence other perceptions of the virtual shopping experience. Specifically, we measured participants' (a) satisfaction with the store assortment, (b) affective response to the store, (c) perceived choice overload and (d) purchase intention. All items were measured on 7-point scales. See Table A1 for full details of measures and items.

Results and Discussion

Visual exploration. In the product memory task, participants in the narrow (M = 5.20) and broad (M = 5.17) attention groups correctly recalled equivalent numbers of products overall, p = .91. However, they differed in the location of those recalled products. The 15 products were distributed systematically across the display (see Figure 2A). For each product, we calculated the distance from the center of the display to the center of the given product. Participants' attention to the periphery was then calculated as the mean distance from the center of the display of each correctly recalled product. As predicted, participants recalled significantly more peripheral products when primed for broad attention (M = 13.18 cm) relative to narrow attention (M = 11.72 cm), $t(148) = 3.22$, $p < .01$, Cohen's d = .53. In the oddball detection task, attention to the periphery was measured as the number of oddball products identified (from 0 to 2), since both oddballs appeared in the periphery of the shelf displays. As predicted, a Poisson regression confirmed that the broad attention group identified significantly more oddball products (M = .20) than the narrow attention group (M = .03), $B_{exp} = 7.30$, $\chi^2(1) = 6.98$, $p < .01$.

Shopping-related attitudes. The broad and narrow attention groups did not differ significantly in satisfaction with the store assortment, affective response to the store, perceived choice overload, or purchase intention (all $p > .37$). Thus, the attentional manipulation affected visual exploration but not more general attitudes toward the retailer.

Discussion. These results validate the effectiveness of our attentional manipulation. Prior literature suggests that by default people allocate relatively less attention to the periphery of product displays (Atalay et al. 2012). Our rationale was that with increased visual exploration attention to products should be more broadly dispersed when viewing product displays. Hence, if our manipulation was successful, activating broad (narrow) attention should increase (decrease) memory for products in a display's periphery. We used two separate product exposure tasks, a total of 19 different product displays, and found across both tasks that broad attention increased memory for peripherally-located products. Notably, a relatively short and simple attentional manipulation (40 seconds) successfully primed visual exploration on two subsequent tasks, indicating that the attentional manipulation is effective and persists for some time (i.e., product memory and oddball detection). Finally, these effects occurred incidentally, without participants knowing that we would test their attention to or memory of peripheral products. However, the attentional manipulation had no downstream effects on attitudes and cognitions toward the retailer (see for a more direct test of mood and conceptual scope, see Control Studies 1 and 2 below in Appendixes D and E). In sum, a relatively simple attentional manipulation appears to have robust, potentially long-lasting, and probably unconscious effects on visual exploration of shopping environments.

Table A1. Measures and items used in the Pilot Study.

Product recall
Please list all products which you have seen on the display!
Oddball detection:
When viewing the shelves, did you see products that did not match the rest of the shelf assortment?
Satisfaction with store assortment (modified from Hoch, Bradlow, and Wansink 1999, α = .82)
This store offered the products that I wanted; I could not find the products I was looking for[a]; I found a lot of interesting products in the store; I've seen many attractive products that I would have liked to buy; There weren't any attractive products in the store[a].
1 = strongly disagree; 7 = strongly agree
Affective Response to the Store (modified from Chaudhuri and Holbrook 2001; α = .90)
This store is attractive; I would like to shop at this store; I would recommend this store to family and friends.
1 = strongly disagree; 7 = strongly agree
Perceived choice overload (modified from Kahn and Wansink 2004; α = .78)
While viewing the pictures of the shelves, to what extent did you feel overwhelmed; How confused did you feel while viewing the pictures of the shelves; How difficult would choosing between brands be at this store?
1 = not at all; 7 = very much
Purchase Intention
How likely is it that you would buy something during your visit to this store?
1 = very unlikely; 7 = very likely

[a]Reverse-scored.

APPENDIX B: RECORDING OF PLANNED PURCHASES

Following standard procedures (Bell et al. 2011; Gilbride et al. 2015; Hui et al. 2013; Inman et al. 2009; Kollat and Willet 1967; Park et al. 1989), we recorded planned purchases at the category level, without quantities. For instance, if a shopper planned to purchase M&Ms and Snickers, that would constitute one planned category (candy). To increase reliability, research assistants (*RA*s) underwent a short training session with the lead researcher before data collection. To elicit planned purchases at the category level, the RAs were trained to ask shoppers "Which products do you plan to buy on this shopping trip? We don't need exact quantities." Informal pilot testing indicated that this prompt tended to elicit specific categories rather than vague responses (e.g., "something for breakfast") or brand-specific responses (e.g., "Red Bull"). The RAs were also trained, via discussion and examples from the lead researcher, to detect such vague and overly-specific responses, and in those cases the RAs further asked the shopper "Could you please give me a more precise idea what products you mean by this?" In practice, the vast majority of shoppers' responses were unambiguous (e.g., chocolate bar; toothpaste; juice), and only in rare cases did the RA need to resort to the second, clarifying prompt.

APPENDIX C: PLANNED PURCHASES, PLANNED SPENDING, AND TOTAL SPENDING

In this appendix we report further detail of the planned purchases, in terms of both participants' purchase plans (i.e., pre-shopping) and their actual purchases (i.e., post-shopping). *Planned categories* refers to the number of categories that shoppers listed in their pre-shopping purchase plans, whereas *planned spending* is the amount actually spent on those planned categories. Below we report these measures for each of our field experiments. For comparison, Table A2 also shows unplanned spending amounts (see the main text for full analyses) and total spending amounts. Finally, as an alternative measure of effect size, Table A2 also shows the percentage of spending that was on unplanned categories (i.e., % spending unplanned).

One question of interest is whether broad attention increased not only unplanned spending, but also planned spending and total spending. Alternatively, the increase in unplanned spending could have been offset by a decrease in planned spending, in a compensatory or substitutive manner. As shown below, however, attentional breadth had no effect on planned spending in any of the three studies. Thus, it appears that broad attention selectively increases unplanned purchasing without affecting planned purchasing.

In all analyses reported below, all spending measures were log transformed to correct for skew.

Study 1. The control (M = 3.97, SD = 2.69), narrow (M = 3.56, SD = 1.85), and broad (M = 3.67, SD = 2.05) groups did not differ in the number of planned categories, $F(2, 189) = .57$, $p = .57$. One participant, for whom planned and total spending were missing, was excluded from the results below. As shown in Table A2, the three groups did not differ in planned spending, $F(2, 188) = 1.18$, $p = .31$, or total spending, $F(2, 188) = 1.15$, $p = .32$. The percentage of spending that was unplanned was substantially higher in the broad attention group (39.35%) than in the control (21.36%) and narrow (24.04%) attention groups.

Study 3. The narrow (M = 3.14, SD = 2.11) and broad (M = 4.08, SD = 2.71) groups did not differ in the number of planned categories, $t(72) = 1.67$, $p = .10$. Although the two groups did not differ in planned spending, $t(72) = 1.32$, $p = .19$, the narrow group spent less overall than the broad group, $t(72) = 2.72$, $p < .01$. Once again, the percentage of spending that was unplanned was substantially higher in the broad attention group (44.16%) than in the narrow attention group (28.65%).

Study 5. The narrow (M = 3.28, SD = 2.48) and broad (M = 3.78, SD = 2.53) groups did not differ in the number of planned categories, $t(98) = 1.00$, $p = .32$. The groups also did not differ in planned spending, $t(98) = 1.02$, $p = .31$, or total spending, $t(98) = 1.60$, $p = .11$. The percentage of unplanned spending was slightly higher with broad attention (17.99%) than with narrow attention (13.34%).

Table A2. Additional measures of spending in Studies 1, 3, and 5.

		Unplanned Spending (€)		Planned Spending (€)		Total Spending (€)		% Spending
Study	Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*	Unplanned
1	control	5.91	6.68	21.76	23.53	27.67	23.66	21.36
	narrow	5.79	6.92	18.30	19.32	24.08	21.33	24.04
	broad	10.60	10.57	16.47	15.53	26.94	21.56	39.35
3	narrow	4.44	5.63	11.07	11.55	15.50	14.98	28.65
	broad	11.95	12.03	15.11	15.55	27.06	23.47	44.16
5	narrow	3.56	5.33	23.13	30.61	26.69	33.27	13.34
	broad	5.59	6.71	25.47	34.06	31.07	36.62	17.99

Note. % Spending Unplanned indicates the percentage of spending that was on unplanned categories.

APPENDIX D: CONTROL STUDY 1

This study provides a practical test of whether activation of attentional breadth affects mood or conceptual scope in a shopping context. Participants were randomly assigned to a narrow attention, broad attention, or untreated control group, exactly as in Study 1. Participants then reported their mood and composed a shopping list for a supermarket trip to buy products for the next seven days.

Methods

Participants. One hundred sixty-seven students (M = 24 years; 49% female) at a European university participated voluntarily and were rewarded with a small gift (i.e., candy).

Procedure. Participants were intercepted in the lobby of the university's main building and randomly assigned to one of three conditions (exactly as in Study 1). Next, participants reported their mood (Allen and Janiszewski 1989; $\alpha = .86$), and then were given a sheet with blank lines and were instructed as follows: "please imagine you are planning a shopping trip in a supermarket of your choice. The shopping should last for seven days. Please list all products that you would like to purchase on this trip."

After completing their shopping list, participants reported their task involvement (*I tried to list as many items as possible*; 1 = strongly disagree; 7 = strongly agree), how easy it was to compose the shopping list (1 = very difficult; 7 = very easy), how much they would spend on this trip (in Euros), and how much they would like to go shopping right now (1 = not at all; 7 = very much). Participants also reported their age, gender, the number of people living in their household, and their tendency to use shopping lists (*I usually prepare a shopping list before going grocery shopping*; 1 = strongly disagree; 7 = strongly agree).

Results

Controls. The three groups did not differ on any control factor: age ($p = .35$), sex ($p = .85$), task involvement ($p = .35$), task ease ($p = .20$), desire to shop ($p = .60$), household size ($p = .90$), or tendency to shop with a list ($p = .50$).

Mood. The three groups did not differ in mood ($p = .67$).

Shopping list. To mimic the coding of unplanned purchasing in Study 1, here we examined (1) the number of *products* on each participant's shopping list, (2) the number of distinct *categories* included in the list, and (3) planned *spending* on the shopping trip. We conducted linear regressions with the three attentional groups included as two dummy-coded variables, and with mood as a covariate. The three attentional groups did not differ in the number of products listed ($M_{narrow} = 15.20$, $M_{control} = 14.36$, $M_{broad} = 14.36$; both $p > .42$), the number of categories listed ($M_{narrow} = 10.00$, $M_{control} = 9.95$, $M_{broad} = 10.13$; both $p > .70$), or planned spending ($M_{narrow} = €48.78$, $M_{control} = €50.31$, $M_{broad} = €47.23$; log-transformed, both $p > .86$).

Discussion

Attentional breadth does not appear to affect shopping plans, in terms of quantity, variety, or cost. Despite a relatively large sample, and despite the similarity of measures to Study 1, this Control Study failed to support the alternative explanation that the effect of broad attention on unplanned purchasing is due to conceptual scope. Rather than emerging in one's *shopping plans*, the effect appears to emerge *while shopping*, presumably in the form of in-store exploration.

APPENDIX E: CONTROL STUDY 2

In this study, participants first completed either the broad or narrow attentional manipulation shown in Figure 1B and described fully in Study 3. They then reported their mood on Allen and Janiszewski's (1989) 4-item scale (α = .86), followed by the 10-item short form of the PANAS (Thompson 2007; α = .62). This was intended to demonstrate the convergent validity of the measure that we used in our studies (i.e., Allen and Janiszewski's measure) with a more thoroughly validated measure (i.e., PANAS). Participants then completed an exemplar generation task, following the procedure of Hills, Jones, and Todd (2012). Participants listed as many different animals as they could think of in 3 minutes. We then measured the frequency with which each animal was listed, to calculate the mean frequency of animals listed by each participant. If our attentional manipulation affects conceptual scope, then the narrow attention condition should generate more frequent exemplars than the broad attention group.

Methods

Participants. One hundred forty-four students (*M* = 21 years; 72 females) at a large European university participated for course credit.

Procedure. The experiment was conducted at individual computer workstations in a behavioral lab. Participants first completed either the broad or narrow attentional manipulation shown in Figure 1B. Briefly, participants viewed a series of 20 products one at a time for 2-seconds each, presented as "Highlights of the Month" at a local retailer. In the narrow attention group (*n* = 74), all products appeared in the center of the display. In the broad attention group (*n* = 70), all products appeared randomly in one of the four corners of the display. To induce participants to pay attention to the attentional manipulation task, participants were instructed to evaluate the product assortment during this task, and immediately after the attentional manipulation, participants evaluated their satisfaction with the product assortment on a 7-point scale. They then reported their mood on Allen and Janiszewski's (1989) 4-item scale (α = .86), followed by the 10-item short form of the PANAS (Thompson 2007; α = .62). Participants then completed an exemplar generation task. As in Hills et al. (2012), participants were instructed to type the names of as many animals as they could think of in 3 minutes. They were presented a page with 54 empty boxes, and they were instructed to type one animal name per box, until they ran out of names. We presented 54 boxes because that was the maximum number of animals produced by participants in Hills et al.'s study, and indeed only two of our 144 participants submitted 54 animals.

Results

Assortment Evaluation. To induce participants to pay attention to the attentional manipulation task, we asked them to evaluate the shown products. Based on results of the Pilot Study, we did not expect any effect on this measure. Indeed, the broad (*M* = 4.76) and narrow (*M* = 4.89) attention groups did not differ in evaluation of the product assortment, $t(142) = .60$, $p = .55$.

Mood. Allen and Janiszewski's (1989) measure of mood correlated significantly with scores on the PANAS (i.e., positive score – negative score), $r = .51$, $p < .001$, thus validating our use of the former measure in our other studies. The broad attention group (*M* = 5.06) and the narrow attention group (*M* = 5.08) did not differ on Allen and Janiszewski's measure, $t(142) = .10$, $p = 92$. The broad (*M* = 2.49) and narrow (*M* = 2.37) attention groups also did not differ on the PANAS, $t(142) = .53$, $p = .60$.

Conceptual Scope. We measured conceptual scope in two ways. First, we simply counted the number of exemplars generated. A linear regression with attentional breadth (0 = narrow, 1 = broad) as the predictor and with both mood measures included as control variables indicated that the broad (*M* = 28.79) and narrow (*M* = 29.08) attention groups did

not differ in the number of exemplars generated, $p = .79$. Second, we calculated the average frequency of each participants' generated exemplars. For this measure we created a comprehensive list of all exemplars generated by our participants ($N = 290$ unique animals). It was important for our frequency counts that all misspellings and other idiosyncrasies were corrected (e.g., "dolfin" became "dolphin"), and all plurals and synonyms were grouped with the dominant singular form (e.g., "cattle" became "cow"). We then counted the number of occurrences of each animal, that is, the number of participants who listed each animal. Finally, we calculated for each participant the average frequency of the animals that he or she listed. This measure therefore indicates the extent to which participants generated more typical animals (higher scores) or less typical animals (lower scores). The broad ($M = 62.75$) and narrow ($M = 65.00$) attention groups did not differ on exemplar frequency, $p = .30$.

Discussion

The attentional manipulation, which is the same as that used in our Study 3, had no effect on either measure of mood, nor on the number or frequency of exemplars generated. Thus, our attentional manipulation does not appear to affect mood or conceptual scope, and hence the effect of this attentional manipulation on purchasing behavior demonstrated in our other studies does not appear to be due to either mood or conceptual scope.

APPENDIX F: ADDITIONAL MODERATION ANALYSES

Study 4. For descriptive statistics of the moderation by refrigerator location (Figure 7B in the main text), see Table A3.

Table A3. Moderation by refrigerator location, Study 4.

	Refrigerator Location					
	Left		Central		Right	
Attention	*M*	*SD*	*M*	*SD*	*M*	*SD*
Narrow	0.65	0.77	1.00	0.83	0.71	0.69
Broad	0.95	0.64	0.79	0.80	1.07	0.85

As an additional test of whether buying impulsiveness moderated the effect of attentional breadth on product choice, we conducted a spotlight analysis (Spiller et al. 2013). Spotlights at one standard deviation above and below the mean buying impulsiveness score (BIS) showed that with increasing BIS the effect of attentional breadth on number of products chosen became more positive and significant (-1 *SD* BIS_{mean} = 2.50, *B* = -.10, *SE* = .29, *p* = .75; BIS_{mean} = 3.61, *B* = .44, *SE* = .21, *p* = .04; +1 *SD* BIS_{mean} = 4.72, *B* = .97, *SE* = .29, *p* = .001).

Study 5. As described in the main text, bootstrap moderation analyses (Hayes 2013, model 1, 10K samples) with attentional breadth as independent variable (narrow = 1, broad = 2) and chronic buying impulsiveness as a continuous moderator indicated significant moderation of unplanned product purchases, *B* = .91, *SE* = .37, *t*(96) = 2.46, *p* < .05, and the Johnson–Neyman point was 2.98 (*B* = .90, *SE* = .46, *Z* = -.21), with 56% of participants falling within the range of significant moderation. For unplanned spending, the interaction was also significant, *B* = 2.04, *SE* = .98, *t*(96) = 2.07, *p* < .05, and the Johnson-Neyman point was 3.50 (*B* = 2.42, *SE* = 1.22, *Z* = .02), with 41% of participants falling within the range of significant moderation.

Spotlight analysis showed that with increasing BIS the effect of attentional breadth on unplanned category purchases became more positive and significant (-1 *SD* BIS_{mean} = 2.02, *B* = .27, *SE* = .46, *p* = .56; BIS_{mean} = 3.24, *B* = .98, *SE* = .32, *p* = .003; +1 *SD* BIS_{mean} = 4.46, *B* = 1.68, *SE* = .45, *p* = .001). This moderation was also observed in both unplanned products (-1 *SD* BIS_{mean} = 2.02, *B* = .03, *SE* = .63, *p* = .96; BIS_{mean} = 3.24, *B* = 1.13, *SE* = .45, *p* = .01; +1 *SD* BIS_{mean} = 4.46, *B* = 2.24, *SE* = .63, *p* = .001), and unplanned spending (-1 *SD* BIS_{mean} = 2.02, *B* = -.60, *SE* = 1.69, *p* = .72; BIS_{mean} = 3.24, *B* = 1.88, *SE* = 1.69, *p* = .12; +1 *SD* BIS_{mean} = 4.46, *B* = 4.37, *SE* = 1.69, *p* = .01).