The Multi-Tasking Shopper: Mobile Eye-Tracking and In-Store Decision Making

Jacob Suher, University of Texas at Austin, USA
Wes Hutchinson, University of Pennsylvania, USA

We use an in-store mobile eye-tracking dataset to investigate how consumers allocate their attention during a shopping trip. We propose a general model of consumer multi-tasking that extends current work on specific purchase and store navigation by interrelating these two areas in terms of information search and decision planning.

[to cite]:

[url]:
http://www.acrwebsite.org/volumes/1017178/volumes/v42/NA-42

[copyright notice]:
This work is copyrighted by The Association for Consumer Research. For permission to copy or use this work in whole or in part, please contact the Copyright Clearance Center at http://www.copyright.com/.
Consumer Attention: Fresh Perspectives on a Classic Construct

Chairs: Ryan Rahinel (University of Minnesota)
Melanie Rudd (University of Houston)

Ryan Rahinel, University of Minnesota, USA
Rohini Ahluwalia, University of Minnesota, USA

Paper #2: Expand Your Breath, Expand Your Time: Slow Controlled Breathing Boosts Time Affluence
Melanie Rudd, University of Houston, USA

Paper #3: Attention Increases Emotional Intensity
Leaf Van Boven, University of Colorado (Boulder), USA
Kellen Mrkva, University of Colorado (Boulder), USA
Jacob Westfall, University of Colorado (Boulder), USA

Paper #4: The Multi-Tasking Shopper: Mobile Eye-Tracking and In-Store Decision Making
Jacob Suher, University of Texas at Austin, USA
Wes Hutchinson, University of Pennsylvania, USA

SESSION SUMMARY

In an increasingly cluttered world, marketers are working harder than ever for a share of consumers’ attention. This task is made difficult by the fact that attention typically ebbs and flows amongst a multitude of stimuli, from memories of the past, to thoughts about the present, to simulations of the future, and to perceptions of a variety of environmental stimuli that may be far afield from those related to a current purchase decision. And yet, despite attention’s status as a classic construct in consumer research, our understanding of attention as a fluid process that is often directed away from a focal marketing stimulus is underdeveloped. As such, the papers in this session report new findings that answer questions such as: “What are the novel consequences of consumers attending to different types and categories of stimuli?” and “What strategies can marketers use to shift consumers’ attention to different targets?” In doing so, the papers collectively uncover new and important ways that attention shapes consumer behavior.

The first two papers study the antecedents and consequences of attending to a broad category of stimuli, namely those in the present moment. In the first paper, Rahinel and Ahluwalia conceptualize attention as occurring along a spectrum from experiencing, where one attends to the current physical environment, to mind-wandering, where one instead attends to thoughts, feelings, and daydreams. They find that an experiencing (versus mind-wandering) attention mode leads one to believe that a changeable attribute—price—is more likely to change, and subsequently attach more weight to it in their decisions. Rudd shows that slow controlled breathing is an effective way to shift consumers’ attention to the present moment, which subsequently leads consumers to feel that time is more plentiful. This expanded perception of time, in turn, boosts creativity, life satisfaction, and procrastination.

The second two papers study the processes underlying and outcomes associated with attending to individual pieces of stimuli. Specifically, Van Boven, Mrkva, and Westfall study the link between attention and emotional intensity and find that merely attending to an emotionally neutral object leads it to be perceived as more emotionally evocative. This effect of attention on emotional intensity decays over time; however, the effect of attention on salience and memory does not. Suher and Hutchinson use a novel mobile eye-tracking method to record exact point-of-focus and field-of-vision for consumers on grocery shopping trips. They propose a general model of consumer multi-tasking that captures visual attention that is distributed between current and future purchase decisions.

These projects, all in advanced stages, offer new and interesting insights into the broad effects of consumer attention. Notably, they also appeal to a broad audience, as they intersect with a variety of other popular areas in consumer behavior such as attribute weighting, emotion, time-perception, in-store decision making, and creativity. Finally, the novel methodologies, interesting outcomes, and fresh perspectives on the topic promise a great fit with the conference theme by bringing fun back to this central and classic consumer behavior construct.

Attention Modes and Consumer Decision Making: Merely Attending to the Physical Environment Makes Price More Important

EXTENDED ABSTRACT

At any given moment, human attention varies along a spectrum from experiencing, where one attends to perceptions and cognitions related to their current physical environment, to mind-wandering where one instead attends to thoughts, feelings, and daydreams that are decoupled from their current physical environment (Barron et al. 2011; Smallwood and Schooler 2006). In this paper, we study how such attention modes systematically alter the weight attached to price in consumer decisions. Logic from previous work suggests that being an experiencing (versus mind-wandering) mode should lead one to consider more product attributes, thus decreasing the relative weight assigned to a salient attribute like price (Chakravarti et al. 2013; Lichtenstein et al. 1988; Rao and Monroe 1988). In contrast, we find the precise opposite: that an experiencing (versus mind-wandering) mode leads one to more heavily weight price in decisions.

Our framework describes this phenomenon as a byproduct of the intersection between attention modes and the importance one places on noticing change. Since attention is allocated based on one’s current goals (Pashler et al. 2001), it follows that an individual’s attention mode is governed by the emphasis one presently places on environment-related vs. environment-unrelated processes. We posit here that the more relative emphasis one places on environment-related processes (leading to more relative experiencing), the more interest one places in noticing change in their environment, since change signals that one may have to modify their interactions with the environment (Rensink 2002). Building from past work (Miller and Maner 2012; Schaller, Park, and Mueller 2003), we suggest that such interest should lead one to believe that a changeable stimulus (e.g., price) is more likely to change and, thus, assign it greater weight. Five studies support our conceptual framework.

Study 1 tests our framework in a basic context: object encoding. Participants first completed an experiencing-versus-mind-wandering (EvMW) measure, which we developed (in several preliminary studies) to capture attention mode as a trait variable. We then exposed participants to a collage that contained 12 pretested objects: four that were typically unchangeable (e.g., teddy bear), four that were typically changeable (e.g., dog), and four that were dynamically changing (e.g., animated walking man). After a seven second exposure, participants were given a recognition test that included all the items
in the collage as well as 12 foil items. As predicted, experiencers recognized more changeable objects than did mind-wanderers. There were no effects for either unchanged or dynamically-changing objects, both of which have confirmed states of change and therefore should not show the effect. The specific pattern of means showed that experiencers treated changeable stimuli like dynamically-changing stimuli, whereas mind-wanderers treated changeable stimuli like unchanged stimuli, thus suggesting that differences in beliefs of change likelihood may underlie the effect.

In study 2, we extended the effect to a consumer decision-making context, with price as the changeable attribute. Participants completed the EvMW and then viewed an advertisement for an office chair with six attributes, including price. Participants rated whether they would consider buying the chair and, as the dependent measure, how much weight they gave to each attribute. As predicted, experiencers attached more weight to price than did mind-wanderers, and this pattern did not exist for any other attribute.

In studies 3 and 4, we tested the proposed mechanism with different categories (all-weather running shoes and desk lamps, respectively) and non-price attributes. In study 3, we manipulated attention mode by having participants read a story and put themselves in the frame of mind of the protagonist, who was described as performing an activity in either an experiencing or mind-wandering mode. We then used an ad-viewing and attribute weighting procedure, similar to that in study 2. We also measured the degree to which participants believed the price for the product would change. Results again showed that an experiencing (vs. mind-wandering) mode led to a higher weighting of price. Moreover, this effect was mediated by beliefs that the price would change. Study 4 provided more process evidence by manipulating the changeability of price. Before completing the same attention mode manipulation as in study 3, participants read a fictional Consumer Reports article communicating that prices were either primarily changeable or primarily unchangeable. The basic effect found in study 3 was replicated in the price-is-changeable condition, but attenuated in the price-is-unchangeable condition.

Study 5 tested the effect in a different decision-making context (quality judgments), and in doing so, sought to rule out alternative explanations related to thrift motivations, construal level, and price diagnosticity. Before responding to the EvMW, participants read a description of a bottle of water and were asked to rate the quality of the water. The water was described using several attributes, with the final attribute being a low price, high price, low-reputation brand, or high-reputation brand. Results showed that experiencers predicted high-priced water to be of better quality than low-priced water, but there was no effect of price for mind-wanderers. Notably, this effect pattern did not carry over for brand (which was pretested as more diagnostic than price in this context), as both experiencers and mind-wanderers predicted that high-reputation branded water would be of higher quality than low-reputation branded water.

In sum, an experiencing (vs. mind-wandering) mode of attention leads one to believe that a changeable stimulus is indeed more likely to change and, therefore, attach more weight to it. This framework explains the weighting of price across the two attention modes, since price is a uniquely changeable attribute. Taken together, these theoretically counterintuitive findings shed new light on both price weighting and the underlying psychology of attention modes. More broadly, they also demonstrate how cognitive mechanisms built for the physical environment are co-opted for fundamental decision-making processes.

**Expand Your Breath, Expand Your Time: Slow Controlled Breathing Boosts Time Affluence**

**EXTENDED ABSTRACT**

Modern-day consumers frequently experience “time famine” (Perlow 1999): They feel there is too much to do and too little time. Unfortunately, such perceptions can take a toll on social, physical, and mental well-being (Hochschild 1997; Roxburgh 2004; Zuzanek 2004). Although science cannot expand the amount of time in each day, could it shift consumers’ perceptions of how much time they have? This research examines whether engaging in slow controlled breathing would increase consumers’ perceived time affluence and, consequently, impact their behavior and well-being.

Breathing can be either automatic or under voluntary control. Voluntary breathing can be performed either fast or slow and consists of conscious inhalation, retention, and exhalation (Chodzinski 2000). But, can slow controlled breathing increase perceived time affluence? Prior research and theory suggest so. For instance, a drug-induced reduction in breathing rate can reduce the perceived speed of one’s internal clock (Hawkes, Joy, and Evans 1962). Moreover, activities like mindfulness meditation and yoga, which generally involve slow controlled breathing, help direct the mind’s attention to the present moment (Brown and Gerbarg 2009; Brown and Ryan 2003; Kabat-Zinn et al. 1992). This is important because there is evidence that a stronger focus on the present expands time perceptions (Rudd 2013; Vohs and Schmichel 2003). Taken together, these results suggest slow controlled breathing would increase consumers’ perceived time affluence by strengthening their present-focus.

In Experiment 1, participants completed either a slow-controlled-breathing or fast-controlled-breathing exercise. Exercises differed in the breathing rate used, but took the same amount of time to complete. Posture, method of inhalation and exhalation, and depth and force of breath also did not differ across conditions. To manipulate breathing rate, participants in the slow- [fast-] controlled-breathing condition were instructed to “breathe so each complete breath (i.e., inhale plus exhale) lasts 11 counts [4 counts]” and told the inhale should last 5 [2] counts and the exhale should last 6 [2] counts. Participants in the slow- [fast-] controlled-breathing condition completed 3 “sets” of 7 eleven-count-long breaths [19 four-count-long breaths]. Because one could argue that any observed differences in time perceptions might be due to differences in arousal, feelings of arousal were measured after the breathing exercise. However, because both fast and slow controlled breathing exercises are often immediately followed by a physiological and psychological calming (Brown and Gerbarg 2005; Cappo and Holmes 1984; Kaushik et al. 2006; Khemka, Ramara, and Nagarathna 2010), arousal was not expected to differ across conditions. The other dependent variables were temporal focus (i.e., the extent participants were currently focused on the past, present, and future) and perceived time affluence (i.e., the extent participants currently felt “pressed for time”). Consistent with the hypotheses, those who engaged in slow (vs. fast) controlled breathing were more present-focused and felt less pressed for time. Moreover, a mediation analysis revealed that slow controlled breathing expanded perceptions of time by heightening people’s focus on the present. Importantly, arousal could not account for these effects.

One’s sense of time availability is often an indicator of psychological health, with mental health and well-being suffering when time feels compressed (Robinson and Godbey 1997; Roxburgh 2004). Thus, Experiment 2 tested whether slow controlled breathing would boost life satisfaction by increasing perceived time affluence. Experiment 2 followed the same procedures as Experiment 1, ex-
cept this time the dependent variables were perceived time affluence (i.e., participants’ current feelings of impatience) and life satisfaction (Kahneman et al. 2006). The results revealed that after engaging in slow (versus fast) controlled breathing, participants felt less impatient and more satisfied with life. Moreover, a mediation analysis demonstrated that those who engaged in slow controlled breathing experienced greater life satisfaction because they felt less impatient.

Prior research suggests feelings of time pressure can hinder creative thinking (Amabile, Hadley, and Kramer 2002; Andrews and Smith 1996). Therefore, Experiment 3 tested whether, by increasing perceived time affluence, slow controlled breathing would enhance creativity. For convergent validity, Experiment 3 added a control condition. After completing either the slow-controlled-breathing, fast-controlled-breathing, or no breathing exercise, participants reported their current feelings of time pressure and completed a divergent thinking task (in which they generated creative uses for a brick; Silvia et al. 2008). Creativity scores were determined by two independent raters and followed the scoring method outlined in Silvia et al. (2008). The results revealed that those who engaged in slow (versus fast or no) controlled breathing felt less pressed for time and were more creative. Moreover, mediation analyses demonstrated that those who engaged in slow controlled breathing were more creative because they felt less pressed for time.

A link between greater perceived time and greater procrastination is also suggested by prior research (Shu and Gneezy 2010; Vodanovich and Rupp 1999). Thus, Experiment 4 examined whether, by boosting perceived time affluence, slow controlled breathing would increase procrastination tendencies. After completing either the slow-controlled-breathing, fast-controlled-breathing, or no breathing exercise, participants reported the extent they currently felt pressed for time and the extent they would procrastinate in two scenarios (Scenario 1: They imagined they had just been assigned a 5 page paper that was due in 7 days and reported on what day they thought they would complete it; Scenario 2: They imagined they had to fill-out a 1 page form before the end of the week and reported on what day they thought they would return the completed form). The results revealed that participants who engaged in slow (versus fast or no) controlled breathing felt less pressed for time and reported a greater tendency to procrastinate in both scenarios. Moreover, mediation analyses demonstrated those who engaged in slow controlled breathing had greater procrastination tendencies because they felt less pressed for time—suggesting the consequences of expanding perceived time are not always positive.

In conclusion, slow controlled breathing strengthens one’s focus on the present, and this greater present-focus can increase perceived time affluence. Importantly, this greater perceived time affluence has important consequences for consumer behavior and well-being: it boosts life satisfaction, enhances creativity, and heightens procrastination tendencies.

**Attention Increases Emotional Intensity**

**EXTENDED ABSTRACT**

A growing number of studies have shown that attention influences emotional responses. Most of these previous studies have been designed to examine whether attention is necessary to produce emotional reactions. They have shown that introducing attentional distractors, attentional load, or shifts of attention away from a task decrease emotional responses to stimuli involved in the task. Affective reactions are weaker under high and moderate levels of attentional load compared to low load (Pessoa, Padmala, and Morland 2005). We intend to address a related question with more practical significance and applications: Does focused attention increase the intensity of emotional reactions? Does this increase in emotion have downstream consequences for variables like interest, memory, and choice? Our results seek to build on work showing that emotional responses are malleable and can have important effects on memory and decision making.

Past work has examined the emotional consequences of differential attention using distractor paradigms. Raymond, Fenske, and Tavassoli (2003) randomly assigned stimuli to serve as either targets or distractors in a perception task. Stimuli which served as distractors were subsequently rated lower on self-report measures of emotional tone (i.e. “cheeriness”) compared to target and neutral stimuli. Dickert and Slovic (2009) used a similar paradigm, presenting pictures of humanitarian crisis victims either as focal targets or as distractors. Participants reported less emotional sympathy for the victims assigned as distractors compared to those assigned as targets. The attention manipulation had downstream consequences. Participants were less willing to donate money to help victims who had been randomly assigned as “distractors”. These previous studies all demonstrate that the emotional intensity of unattended stimuli can decrease.

The current studies extend this work in a variety of ways, showing for the first time that directed attention can increase emotional intensity, and that attention also increases perceived distinctiveness and salience. They also demonstrate that attention has long-term effects on the processing of images (study 2). Finally, study 3 demonstrates applications to person perception and decision-making.

Across three studies, directed attention increased the intensity of emotional reactions to images. Participants were presented with a slideshow of images and were exposed to each image for the same duration but were instructed to attend most closely to one randomly-assigned image. Afterwards, they rated each image on emotional valence and intensity. They also completed a free recall task to assess memory, and the perceived salience of each image was measured. Study 3 added measures of choice and judgments about the stimuli, examining whether attention influences decisions, perhaps via its effects on emotional intensity.

Following the attention manipulation, participants judged the image they attended to as more emotionally intense than other images. Images that were neutral and low-intensity at baseline showed the largest effects, increasing sharply in intensity. This attention X baseline arousal interaction was significant in both studies. Study 2 further demonstrated that attention also improves memory and the salience of the image in memory. The effect of attention on emotional intensity went away after a delay of two days. However, enhanced memory and salience of the target stimuli remained. Study 3 used a similar study design to the first two, but used images of people as stimuli and assessed whether trait judgments about each person were influenced by attention. It demonstrated that attention increases the perceived distinctiveness of each person, influences judgments of each person’s trustworthiness, and may influence interest and choice.

Overall, these findings demonstrate that emotional reactions towards images and evaluations of objects are malleable, especially when those objects are initially neutral and low in emotional arousal. They also extend previous research in cognitive psychology and demonstrate that the relationship between attention and emotion is reciprocal. A large literature on attention has demonstrated that emotionally-intense stimuli capture and hold attention more than un-emotional stimuli (e.g. Ohman, Flykt, and Esteves 2001), and our program of research shows that attended-to stimuli take on greater emotional intensity. These findings have clear implications for marketing and consumer research. Brand names and products which are
initially neutral can become more emotionally-intense and evoke stronger reactions in consumers after being repeatedly attended to. Advertisements which are able to best capture and direct consumers' attention towards their products and brands may be most successful, increasing the salience of the product and increasing interest.

The Multi-Tasking Shopper: Mobile Eye-Tracking and In-Store Decision Making

EXTENDED ABSTRACT

Of all the ways to read a consumer’s mind during a decision making process, the most direct is to look through her eyes to see what she is seeing. This paper examines the pattern of attention to visual stimuli throughout a whole shopping trip. We conduct a grocery field study using mobile eye-tracking technology to record consumers’ exact point-of-focus while navigating the store and at the point-of-purchase. Each visual fixation is classified for its spatial and temporal position along with its visual content, such as price or brand. Using these rich data, we describe the patterns of attention throughout an entire shopping trip and propose a general model of consumer multi-tasking.

Eye-tracking technology has been used extensively in scene perception research, especially in advertising contexts. This body of work provides a broad consensus that eye-movements are informative about processes such as attention, information acquisition, and choice. While this technology has been used to “see through consumers’ eyes” for decades, there has been limited work on visual attention at the point-of-purchase (Chandon, Hutchinson, Bradlow, and Young 2009). The research that has examined point-of-purchase decision making has been limited to the laboratory setting. We contribute to this pool of research by using a novel data set that captures point-of-focus data in the field.

Our data consist of shopping trips made by 6 consumers in a medium-sized U.S. grocery store, including 68 purchases and eye-tracking of all visual search during each trip. Each consumer wore a mobile eye-tracking device to record her exact point-of-focus and field-of-vision throughout a complete shopping trip. To make our quantitative analyses possible, the video data was coded in two ways by video technicians. First, for each purchased product, technicians identified the start-point of the purchase and then watched the videos frame-by-frame, recording the spatial location and content of each visual fixation over time. Each fixation was mapped onto a still “snapshot” of the purchase display to make the points-of-focus spatially meaningful. The content of each fixation was categorized as picture, brand, description, price, variety, or other. Additional variables, such as product display characteristics and within and between shopper variables were also included in our database. Second, to gain greater insight into the whole shopping process, especially product categories that were considered but did not lead to a purchase, a number of scanning segments were analyzed in their entirety (i.e., including fixations while the consumer was walking and fixations on products far from the consumer’s current location). For these scanning segments, video technicians recorded the content of each fixation (e.g., product category, in-store signage, shoppers, etc.) and the distance between the fixation target and the shopper.

When making a purchase, the majority of consumers’ visual attention is on graphic elements of the product (26% of fixations) or brand name (25%). Textual messages and shelf edge prices together constitute another one third of the fixations (20% for text; 13% for price). The remaining visual fixations address variety or flavor (10%) and non-price shelf-edge messages (6%). Of the six types of visual fixations, the brand name or logo dominates the beginning of most of the purchase events. Graphic images, particularly of the product, closely follow brand identity and exceed the brand attention in the latter half of the purchase process. Attention to visual content varies widely across product categories. For instance, brand information makes up 38% of visual attention for snacks and sweets, whereas it constitutes only 22% of fixations for dairy products. Purchase duration also affects the patterns of fixations. When making longer purchases, shoppers pay more attention to price and brand information and less attention to the photo and product description.

An analysis of whole shopping trips revealed that while considering a nearby shelf or making a specific purchase, consumers are continuously monitoring the shopping environment with quick glances that fixate on objects that are further away. Some scans appear to be automatic (or even reflexive), such as people entering the aisle or approaching the shopper. Others are clearly related to planning later shopping decisions, such as glancing at more distant shelf displays and signage. State transition analysis demonstrates that shoppers tend to refixate at the same distance from the shopper 26% of the time, while shoppers refixate in a new location at least 3 feet further or closer to the shopper 68% of the time. The frequent changing of fixation distance supports our conjecture that shoppers sequentially switch between multiple tasks during the shopping trip.

Finally, to illustrate the multi-tasking nature of real-world shopping, we propose a general model of consumer multi-tasking that extends current work on specific purchase (usually eye-tracking data) and store navigation (usually shopper-view video and/or RFID cart location data) by interrelating these two areas in terms of information search and decision planning. We find that a finite mixture model with three distinct distributions explains the distribution of fixation distances better than a model that assumes a single cognitive process.

REFERENCES

For Rahinel and Ahlulwala


For Rudd


For Van Boven, Mrkva, and Westfall


For Suher and Hutchinson