A Review of Sensory Imagery for Consumer Psychology

Ryan S. Elder

Brigham Young University

Aradhna Krishna

University of Michigan

Both authors contributed equally to the project and are listed in alphabetical order. Ryan S. Elder (rselder@byu.edu) is an associate professor of marketing at the Marriott School of Business, Brigham Young University, Provo, UT 84602. Aradhna Krishna (aradhna@umich.edu) is the Dwight F. Benton Professor of Marketing at the Ross School of Business, University of Michigan, Ann Arbor, MI 48109.

DR. RYAN S. ELDER (Orcid ID : 0000-0001-9184-2331)

DR. ARADHNA KRISHNA (Orcid ID : 0000-0003-2857-3276)

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Abstract

This review of mental imagery research has the core objective of fostering more research on the topic of sensory imagery. The review is organized around a conceptual framework highlighting (i) how mental imagery is formed, (ii) the elicitation and elaboration of mental imagery, (iii) the multi-modal nature of sensory imagery, and (iv) the consumer behavior consequences of mental imagery. This conceptual framework provides many new lenses through which researchers can view prior findings, and thereby motivates innovative new research ideas. Future research directions are provided in each section of the review, with additional unexplored opportunities presented in a final section.

A Review of Sensory Imagery for Consumer Psychology

Introduction

Consumer interactions with companies, products and services, and even friends, have become increasingly mediated through technology. Shopping behavior and advertising have simultaneously become increasingly digital. In 2019 (pre-pandemic), 40% of US shoppers and 64% of China shoppers reported that they spent more time shopping online than in person (Think with Google, 2019). In 2020, over 51% of global advertising spend was online, with only 28% for television (Guttman, 2021). As actual product interaction and sensory experiences give way

to technology-based interactions, it is critical to understand how imagined product interactions and sensory experiences influence consumer behavior.

Evoking the imagination has a powerful effect on behavior. As a consequence, mental imagery has been utilized as a strategy of influence in marketing for years. Apple used "Imagine the Possibilities" as their slogan when introducing Intel chips into their computers, Mattel used the same phrase to create a viral advertisement campaign for Barbie, and Samsung simply used "Imagine" for their corporate slogan for nearly a decade. Seeing with the mind's eye, hearing with the mind's ear, or even tasting with the mind's tongue, has proven to have a significant impact on consumer evaluations and behavior. A large and growing body of research documents these effects, providing support for the operative mechanism behind imagery's role in affecting consumer behavior, as well as delineating conditions wherein imagery is likely to have its greatest impact. We aim to synthesize this research, paying particular attention to sensory imagery, with the purpose of motivating future empirical exploration of these areas within the consumer psychology literature.
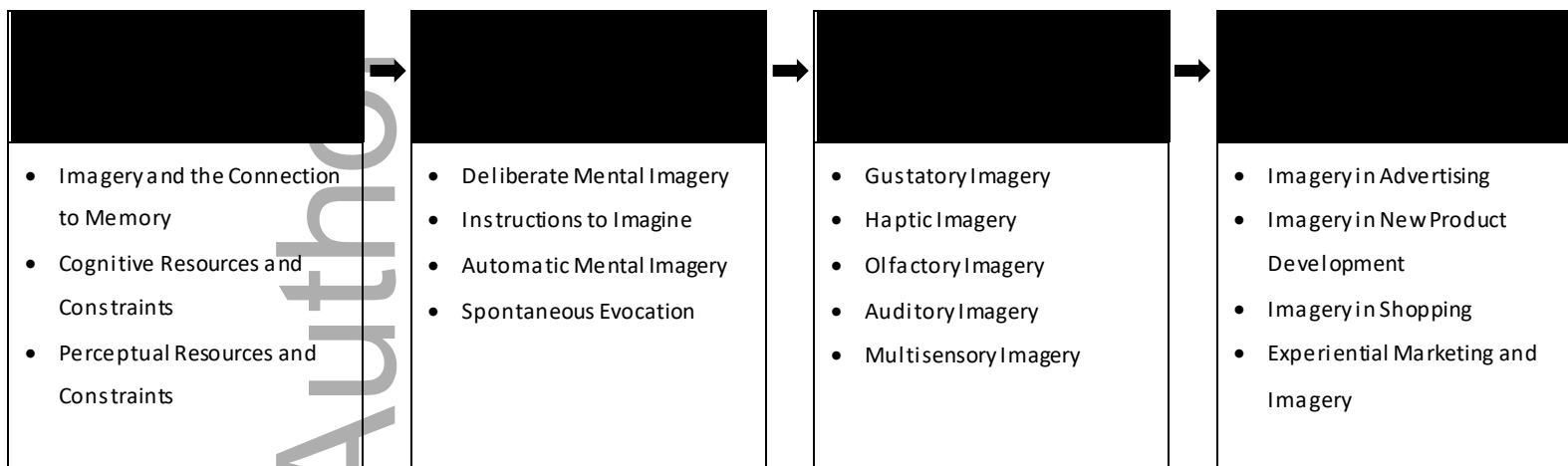
Despite a recurring debate regarding the resources underlying imagery (Kosslyn, Thompson, & Ganis, 2006; Pylyshyn, 1973), the broad consensus is that imagery is a perceptual or sensory representation of information drawn from memory or created by modifying information from memory (Kosslyn , Ganis, & Thompson, 2001; MacInnis & Price, 1987). This definition highlights the underlying cognitive and perceptual resources used to form images. It is also important to note that while the layperson's definition of imagery may only extend to visual imagery, researchers studying mental imagery have taken a much broader view, extending the focus of imagery to be the imagination of one's entire physical experience, subsuming all five senses. MacInnis and Price (1987) thus define imagery as "a process (not a structure) by which sensory information is represented in working memory" (p. 473).

We build on this definition of imagery to proffer the following definition: "Mental imagery is a prospective, multi-modal sensory and cognitive representation formed from memory that is evoked automatically or *deliberately."* This definition makes more explicit the sensory nature of imagery, its evocation, the role of memory in imagery formation, and how imagery differs from memory. Each of these aspects is explored more fully in the ensuing review.

In our review, we will focus on a few important aspects of the formation and consequences of imagery, which are highlighted in Figure 1, while primarily focusing on sensory imagery. We hope that this organizing framework for imagery will provide many new lenses

through which to view prior findings, and thus result in innovative new ideas (Davis, 1971; Healy, 2017; Kruglanski, 2001). First, we will focus on understanding imagery, its relationship to memory, and the cognitive and perceptual resources utilized when forming images. Perceptual resources especially play a critical role in sensory imagery. Next, we will focus on how mental imagery is elicited, both experimentally as well as in practice, and how this impacts elaboration. We will introduce a formal distinction between more deliberate and more automatic imagery, placing extant literature along this continuum. We identify the resources behind imagery formation, as well as how such imagery is elicited and elaborated upon. We will then highlight the multi-modal, sensory nature of imagery, as well as the interdependence between senses. While most prior research explores the consequences of visual imagery on consumer behavior, we will emphasize findings and provide future direction for imagery across the other senses as well. We then show the consequences of using imagery in marketing contexts. Thus, in this review we will focus on understanding sensory imagery, highlighting (i) how mental imagery is formed, (ii) the elicitation and elaboration of mental imagery, (iii) the multi-modal nature of sensory imagery, and (iv) the consumer behavior consequences of mental imagery. In each section, we highlight future research questions, and in a final section, we provide additional unexplored opportunities.

Figure 1: Conceptual Framework for Imagery Review

• Imagery and the Connection to Memory • Cognitive Resources and Constraints • Perceptual Resources and Constraints	• Deliberate Mental Imagery • Instructions to Imagine • Automatic Mental Imagery • Spontaneous Evocation	• Gustatory Imagery • Haptic Imagery • Olfactory Imagery • Auditory Imagery • Multisensory Imagery	• Imagery in Advertising • Imagery in New Product Development • Imagery in Shopping • Experiential Marketing and Imagery

The diversity of imagery research makes it impractical to provide a comprehensive review of all imagery research. We acknowledge the critical foundation provided by prior reviews. We aim to summarize much of this research while introducing new empirical and

conceptual advances. In an early review of imagery, MacInnis and Price (1987) set a clear direction for future research, defining imagery as a sensory process existing along an elaboration continuum. They further explore antecedents to imagery as well as the relevant consequences on consumer behavior. This initial review spurred much imagery research in the decades that have succeeded it.

Other reviews provide a key foundation for our sensory imagery review. Adaval (2018) provides a broad perspective of imagery research, including historical context for why research in this area has been somewhat controversial. In addition, Adaval provides insight into many other imagery topics that show the current state of imagery research in psychology and consumer behavior, including how visual imagery relates to its perceptual analog, how pictures and other visual cues impact imagery formation, how the self is implicated in imagery formation, and cultural differences in imagery. While our present review will address some similar topics to Adaval's review, such as the consequences of imagery on consumer behavior, we will diverge in significant ways. Specifically, whereas Adaval briefly summarizes some sensory imagery research, we will provide greater depth in this area, constituting one of the main focal points of the present review. A meta-analysis conducted by van Laer et al. (van Laer et al., 2014, discussed later) on narrative transportation, an elaborate form of imagery, highlights the antecedents and consequences of this form of imagery. Sensory marketing reviews (e.g., Krishna, 2012; Krishna, Cian, & Sokolova, 2016; Petit, Velasco, & Spence, 2019) also lay significant groundwork for our review. These reviews highlight how actual sensory activity impacts consumer behavior, whereas our review will focus on imagined sensory experiences.

How Mental Imagery is Formed

Imagery and the Connection to Memory

Forming an image in one's mind requires access to the same information that is stored in memory (Schacter & Addis, 2007; Schacter, Addis, & Buckner, 2007). One key difference between memory and imagery is that the projections for memory are retrospective, or focused on past experiences, and the projections for imagery are prospective, or focused on the future. For example, if one was asked to remember a past beach vacation or imagine a future beach vacation, the mental construction of these experiences will draw upon the similar cognitive and perceptual resources.

The imagination of future events (vs. past events), including simulations of product experience, is constructed rather than retrieved (Addis, Wong, & Schacter, 2007). When comparing the neural resources and processes underlying episodic memory and imagery using fMRI, Addis et al. (2007) showed neural overlap in both the construction and elaboration phases for both past and future images. Specifically, participants were provided with a cue word for elaboration (e.g., a dress) and were asked to recall a past event or imagine a future event within a particular timeframe that involved this object (e.g., a dress in the last year vs. next year). Participants were then instructed to construct the event in their minds and then elaborate on that event. The researchers found significant neural overlap in both the construction and elaboration phases between past and future images, particularly in the autobiographical memory network regions of the brain.

The important role of memory in image formation has direct implications for consumer behavior, since many of the appeals in advertising are not merely meant to facilitate retrieval of existing information in a consumer's memory, but are intended to lead to narrative transportation (Escalas, 2007; Green & Brock, 2000; Van Laer et al., 2014), and future-related imagery (Lee et al., 2017; Jiang et al., 2014).

The connection between memory and imagery has other critical consequences on consumer behavior, including the creation of false memories, which are more accurately defined as constructed mental images (Lakshmanan & Krishnan, 2009; Mazzoni & Memon, 2003; Rajagopal & Montgomery, 2011; Schlosser, 2006). As images for an experience increase in vividness, they are misremembered as perceived, or lived, rather than imagined experiences (Johnson, Hashtroudi, & Lindsay, 1993; Schlosser, 2006). Schlosser (2006) examined the relationship between false memories and imagery in the context of product attributes. In one study, participants virtually interacted with a camera on a website (vs. viewed pictures of the camera) and then used imagery (vs. discouraged to use imagery) to recognize different attributes of the camera. In this study, false positives of attributes served as the dependent variable. The use of imagery led to significantly more false positives than discouraging imagery, but only for those participants who visited the interactive site. The vividness of the imagery was proposed to lead participants to see items that were not present and create these false memories.

False memory effects also appear within an advertising context, impacting recollection of product consumption. Rajagopal and Montgomery (2011) presented participants in one study with an advertisement for popcorn that varied in imagery (high vs. low) and then participants

either ate the popcorn or not. One week after the initial study, participants reported their perceptions of the advertised product, including whether or not they had used the product. While imagery did not impact perceived usage for those who actually consumed the popcorn, those who did not consume the popcorn were significantly more likely to report that they had tried the product in the high imagery (vs. low imagery) condition. In addition, they were equally as likely to report usage as those who had consumed the popcorn. This research provides support for the connection between memory and imagery, with consumers misremembering their past experiences.

Imagery and Cognitive Constraints

Just as memory capacity is limited and influenced by occupying cognitive resources, so is the ability to cognitively construct imagery. When constraints on cognitive resources are imposed, imagery is impaired (MacInnis & Price, 1987). To the extent that imagery affects behavior, imposing cognitive constraints will affect these downstream measures as well.

Research has consistently shown the consequences of cognitive constraints on imagery. Shiv and Huber (2000) show the impact of anticipating satisfaction with a consumption experience on consumer preferences. They specifically show that anticipating satisfaction elicits images of vivid attributes, leading to an increased weighting of these attributes. When participants' cognitive resources are constrained through cognitive load (i.e., memorizing a nine-digit number), however, the impact of anticipating satisfaction on preference is attenuated. This reduction in the ability to imagine due to cognitive constraints, or by maintaining other information in working memory, is additionally shown to weaken the impact of imagery within advertising (Petrova & Cialdini, 2005). When participants were provided with factual information in addition to vivid information (vs. vivid information alone), imagery instructions led to a significant reduction in the choice of the experience advertised.

More recently, the impact of cognitive constraints on imagery generation has been shown in the context of physical proximity and persuasion, with participants' distance from the advertised message impacting persuasiveness (Jia et al., 2017). Being physically closer to a message increased the vividness of the mental image participants had of the message, leading to increased persuasiveness. However, when under cognitive load, the impact of physical proximity on imagery vividness was reduced, ultimately leading to lower persuasiveness of the message.

Perceptual Resources Used in Imagery

The process of imagery formation relies on the representation of sensory information from working memory (MacInnis & Price, 1987). As discussed, this information can be elicited and constructed through cognitive elaboration. Sensory information can also be elicited in the perceptual form it was processed in. A growing body of research, primarily within neuroscience, supports the multimodal nature of imagery and the considerable overlap between perceived and imagined sensory experiences (for an early review, see Kosslyn et al., 2001; for a review and meta-analysis of the neural processes of multisensory imagery see McNorgan, 2012).

The increased accessibility of neuroscience methods has led to a better understanding of the overlap between perception and imagery. Researchers consistently find that visual imagery functions similarly to perception, albeit at a weaker level (Pearson et al., 2015). Across several studies, support has been found for activation of the primary visual cortex during both perception and imagery (see Pearson, 2019 for a review). The overlap in perceptual resources used for visual perception and imagery exists for other sensory experiences as well. Using fMRI, Herholz, Halpern, and Zatorre (2012) show significant neural overlap between auditory perception and auditory imagery when participants listened to familiar songs and also imagined the same familiar songs while reading the lyrics for the song.

Similar findings for imagery and perception overlap occur with gustatory imagery (Kobayashi et al., 2004), haptic or tactile imagery (Schmidt & Blankerburg, 2019; Yoo et al., 2003), and olfactory imagery (Bensafi et al., 2003). For olfactory stimuli, the overlap between imagery and perception is not merely neural, but manifests in other physiological manners as well. Bensafi et al. (2003) had participants imagine or actually smell certain scents while wearing a nasal mask that measured nasal airflow. The core dependent measure was the amount of air intake, or sniffing, that occurred for the actual and imagined scents. Sniffs were greater for actual perception than for imagery. However, sniffs for olfactory imagery were greater than sniffs for auditory or visual imagery, suggesting that when individuals imagine an odor, they sniff to form that image. Interestingly, participants sniffed less while imagining negative scents than when imagining positive scents.

The neural overlap between imagery and perception is greater for vivid mental imagery (Dijkstra et al., 2017). The overlap is also greater for individuals who are able to construct more vivid mental images (Belardinelli et al., 2009; Cui et al., 2007.

Perceptual Constraints and Imagery

Just as cognitive constraints limit the access to working memory and impair imagery, perceptual constraints too limit the access to perceptual resources, also limiting imagery. Unnava, Agarwal, and Haugtvedt (1996) present one of the earlier behavioral manifestations of perceptual constraints on imagery, within the context of advertising. In one of their experiments, participants either visually read or heard an ad for a new car with both visual and auditory elements. Recall of the ad information served as the primary dependent variable. When the ad was presented visually, participants recalled more information that was rich in auditory imagery versus rich in visual imagery (i.e., reading curtailed visual imagery). Similarly, when the ad was presented auditorily, participants recalled more information that was rich in visual imagery versus rich in auditory imagery (i.e., hearing inhibited auditory imagery formation). These results suggest that when perceptual resources are used in one modality, imagery in that same modality is lowered. As sensory imagery formation requires perceptual resources, occupying these resources leads to weakened imagery.

Motor imagery, in which individuals imagine interaction with objects, can similarly be constrained by occupying one's hands or restricting movement (Elder & Krishna, 2012; Shen & Sengupta, 2012). Elder and Krishna (2012) show that orienting on object towards (vs. away from) one's dominant hand, increases imagery of interacting with the object, leading to heightened purchase intentions. When the hand that the object was oriented towards was physically occupied (i.e., by holding a clamp), the non-dominant hand was the only one available for imagined interaction, and the impact of product orientation on purchase intention was reversed. Across three studies, Shen and Sengupta (2012) provide similar findings. Specifically, when one's dominant hand was occupied, product evaluations were lower than when their non-dominant hand was occupied. However, when the object used to occupy participants hands was helpful in forming a sensory image of interacting with the depicted product (e.g., holding a fork when evaluating a plate of noodles), evaluations increased.

More recently, Shen, Zhang, and Krishna (2016) show that a touch interface, such as an iPad, increases choice of an affect-laden option (e.g., ice cream) versus a less affect-laden one (e.g., a thumb drive), compared to a non-touch interface (e.g., a desktop with a mouse). They suggest that a finger for choice facilitates mental simulation of reaching for the ice cream, whereas having a mouse in the hand impedes it (similar to a clamp as a perceptual impediment in Elder and Krishna 2012).

Future Research Questions

Much of what has been studied shows the impact of imagery on memory. However, very clearly, what one accurately remembers will have an influence on the mental images formed prospectively. Given the cognitive and perceptual resources used in imagery, it is important to understand how prior experiences, as well as one's current state, influence the type, valence, and vividness of images formed.

Relatedly, cognitive constraints in imagery research have largely been operationalized through imposing cognitive load. Research on the perceptual nature of imagery has primarily used motor restrictions for perceptual constraints. Each of these constraints exist in everyday consumer situations, highlighting the importance of understanding their interaction with imagery formation. For example, simply holding a mobile phone while viewing an advertisement might serve as both a perceptual and cognitive constraint. In general, much more research is needed to understand how imagery operates in more naturalistic consumer settings.

Many, if perhaps not most of the images individuals form are created from a combination of cognitive and perceptual resources. Thus, an open research question is how perceptual and cognitive images differentially impact consumer behavior. Does imagery that relies on cognitive resources have a greater impact on evaluative consequences while imagery that relies on perceptual resources has a greater impact on behavioral consequences? A summary of key findings, as well as research opportunities in the area of mental imagery formation, is provided in Table 1.

Table 1: How Mental Imagery is Formed
Synthesis of Key Findings and Future Research Questions

Synthesis of Key Findings
• Projections for memory are retrospective, or focused on past experiences, whereas projections for imagery are prospective, or focused on future experiences.
• Imagery and memory are inextricably linked, with the cognitive and perceptual resources used in retrospective memory also used in prospective imagery.
• Constraining cognitive resources directly impacts the ability to form mental images with consequences on advertising persuasiveness and product choice.

- Perceptual resources are also used in imagery formation, with significant overlap between perception and imagery.
- As a consequence of the connection between perceptual resources and imagery formation, constraining perceptual resources inhibits imagery formation.

Future Research Questions

- How do one's prior experiences and current state influence type, valence, and vividness of imagery formed?
- What perceptual and cognitive constraints inhibit imagery in consumers' lives?
- How do perceptual and cognitive images differentially impact consumer behavior?

Mental Imagery Elicitation and Elaboration

We would like to propose here another important dimension for research on imagery, namely, automatic versus deliberate imagery. In their early review, MacInnis and Price (1987) explicate the elaboration continuum of imagery. Within their proposed model, imagery can occur under conditions of low or high elaboration. While not classified as such, subsequent research in consumer behavior has focused on imagery that is consistent with low levels of elaboration or what we call "automatic imagery," (e.g., Rajagopal & Montgomery, 2011; Unnava & Burnkrant, 1991) whereas other research has focused on imagery more concordant with high elaboration or what we call "deliberate imagery," (e.g., Keller & McGill, 1994; Petrova & Cialdini, 2005). This is also the case with the literature in psychology—in fact, while some psychology research has used "mental simulation" to refer to a more automatic form of imagery (e.g., Barsalou, 2008; Decety & Grèzes, 2006; Jeannerod & Frak, 1999; Kent & Lamberts, 2008), other research has used the same term to refer to a more deliberate form of imagery (Castaño et al., 2008; Escalas & Luce, 2004; Morewedge, Huh, & Vosgerau, 2010; Thompson, Hamilton, & Petrova, 2009; Escalas, 2004a). If indeed deliberate and automatic imagery are different processes with correspondingly different consequences, the distinction is important to understand. We discuss relevant papers under the automatic-deliberate classification. We begin with deliberate imagery, also noting that we include narrative transportation within this form of imagery.

Deliberate Mental Imagery

We define deliberate imagery as images formed from a top-down, directed process. As such, instructions to imagine are a key way of initiating the deliberate imagery process. Instructions to imagine have been used within consumer behavior and psychology to examine the impact of imagery on memory (Childers & Houston, 1984; Paivio, 2007), product attitudes (Babin & Burns, 1997; Petrova & Cialdini, 2005; Zhao, Hoeffler, & Dahl, 2009), purchase intentions (Gregory, Cialdini, & Carpenter, 1982; McGill & Anand, 1989) and consumption (Morewedge et al., 2010). Operationally, instructions to imagine are either contained within an ad itself (e.g., Petrova & Cialdini, 2005), or given as experimental instructions prior to viewing or interacting with stimuli (e.g., McGill & Anand, 1989).

As deliberate imagery is a conscious process, measurement of the process is assessed through numerous self-report measures and scales. Most commonly, the amount, vividness of, and ease of generating imagery are measured (Bone & Ellen, 1992; Petrova & Cialdini, 2008). Additionally, participants' cognitive responses can be coded for the amount of imagery processing (e.g., Shiv & Huber, 2000; Lwin, Morrin, & Krishna, 2010). Research in neuroscience has also done much to elucidate the processes and properties of imagery (Grèzes & Decety, 2002; Kosslyn et al., 2001; Zatorre & Halpern, 2005).

In the neuroimaging research discussed earlier, neural activation from perception and imagery have been compared, with imagery being elicited through participants receiving explicit instructions to engage in imagery. It has been found that when participants are instructed to engage in visual imagery, the visual cortices within the brain are activated in a similar manner as with actual visual perception (Kosslyn et al., 1999); similarly, when told to imagine auditory experiences (e.g., the first four notes of Beethoven's Fifth Symphony), it has been found that subjects' auditory regions of the brain are active (Halpern & Zatorre, 1999). The process of deliberate imagery, therefore, can be seen in the brain activity measured by neuroimaging technology.

At the far end of the elaboration continuum for imagery is narrative transportation. This form of imagery is where people "construct hypothetical scenarios, which are usually in the form of stories or narratives" (Escalas, 2004a). In Escalas' work on narrative transportation, the imagery is evoked in a deliberate fashion (e.g., encouraging participants to imagine themselves running in (the) shoes through the park; Esacalas, 2004a). Narrative transportation work typically looks at changes in persuasion (often, persuasion of ads) when some consumers are asked to engage in such imagery/narrative transportation and others are not. Imagined stories encouraged

by narrative processing enhance self-brand connections because people generally think of the "meaning of their experiences by fitting them into a story" (Escalas, 2004b).

The specific role of narrative transportation on persuasion relies on immersion into the story presented (Green & Brock, 2000). Imagery vividness again plays a major role. To the extent that these stories promote vivid images of the characters and experiences portrayed, individuals are more immersed into the story and persuaded by it. Within an advertising context, this narrative transportation leads to more favorable brand evaluations, particularly when the self is implicated (Escalas, 2007). This self-referencing component of narrative transportation increases the perceived likelihood of events as consumers are able to imagine themselves in the story presented.

Jiang et al. (2014) show that the evaluative consequences of self-related imagery depend on the consistency of accompanying pictures. Specifically, when participants were instructed to generate self-related imagery of themselves at a hotel, their evaluations of the hotel were more favorable when each image was consistent in the perspective portrayed. This was true for participants that had a goal to create a story of themselves at the hotel, and not when they were given a goal to acquire information, or had no goal at all. The authors show that this effect occurs due to consistent perspectives leading to easier generation of imagery.

Van Laer et al. (2014) conducted a meta-analysis on the factors leading to narrative transportation as well as its consumer-relevant consequences and formulated an extended transportation-imagery model. Within this model, antecedents from the story teller and story receiver combine to impact narrative transportation and consequent consumer behavior, such as affective states, cognitions, attitudes, and intentions. Importantly, several of these antecedents relate to the consumers' ability to construct an image of the experience from memory. Factors such as identifiable characters, imaginable plots, and verisimilitude directly impact the ease with which consumers can construct the narrative in their minds, leading to increased transportation within the story.

Automatic Mental Imagery

Unlike deliberate mental imagery where participants are given instructions to form an image, we propose that automatic mental imagery occurs more spontaneously. For instance, automatic imagery can occur simply by viewing a picture, reading a concrete word or a description (Paivio, 1969), or seeing an object or person (Lutz & Lutz, 1978; MacInnis & Price,

1987). Automatic imagery functions at low levels of elaboration, is derived from the stimulus, and is likely more sensory in nature than deliberate imagery. Consequently, we propose that automatic imagery relies predominantly on perceptual resources rather than on cognitive resources.

Within consumer behavior and psychology, research has examined automatic imagery under the label of mental simulation (Barsalou, 2008; Grèzes & Decety, 2002; Kent & Lamberts, 2008). Per Barsalou (2008), mental simulations are "active automatically and unconsciously outside working memory" (Barsalou, 2008, p. 619). Many of these studies have focused on demonstrating the existence of mental simulation (e.g., Tucker & Ellis, 1998, 2001), whereas others have explored the evaluative consequences of mental simulation (e.g., Eelen et al., 2013; Elder & Krishna, 2012; Larson, Redden, & Elder, 2014; Ping, Dhillon, & Beilock, 2009; Shen & Sengupta, 2012; Shen, Zhang, & Krishna, 2016).

Since an automatic process cannot be fully assessed through self-report, support for automatic imagery comes both from neuroimaging and from laboratory experiments. In the neuroimaging literature, having participants read words strongly associated with smells, such as "garlic," activated the primary olfactory cortex (González et al., 2006), viewing pictures of food (e.g., hamburgers, cookies) activated both the primary and secondary taste cortices (Simmons, Martin, & Barsalou, 2005), and naming and viewing tools led to greater activation of the premotor cortex than viewing other objects (Chao & Martin, 2000). In laboratory experiments, the presence of automatic imagery is supported through downstream consequences on reaction time (e.g., Tucker & Ellis, 1998, 2001), purchase intentions (e.g., Elder & Krishna, 2012), and evaluations (Eelen et al., 2013; Larson et al., 2014; Shen & Sengupta, 2012). Within these laboratory experiments, researchers have also shown that automatic imagery relies on perceptual resources to operate (Elder & Krishna, 2012; Shen & Sengupta, 2012; Shen et al., 2016).

Future Research Questions

How do automatically evoked versus deliberately evoked imagery differ? How does elaboration impact this difference? Is automatic imagery largely perceptual, and deliberate imagery largely cognitive? All these questions warrant further research. Future research could also look at whether this bifurcation of imagery (automatic and deliberate) follows the system 1 versus system 2 dichotomy (i.e., dual system model of reasoning; Kahneman, 2011). While previous research has primarily explored the effects of automatic and deliberate in isolation,

another research question could be to compare the consequences of each, and for what situation which one is more suitable to evoke. For example, do automatic and deliberate imagery have different consequences on consumer behavior, even when one is imagining the same thing. It is possible that automatic imagery is tied to more behavioral consequences, with deliberate imagery leading to more evaluative consequences – but this itself needs to be studied. The elicitation as well as the elaboration on imagery is a key conceptual area to explore in future research. Table 2 summarizes key findings from prior research and potential future research questions related to mental imagery elicitation and elaboration.

Table 2: Mental Imagery Elicitation and Elaboration
Synthesis of Key Findings and Future Research Questions

Synthesis of Key Findings

- Mental imagery exists along a continuum ranging from automatic mental imagery to deliberate mental imagery.
- Deliberate mental imagery is a top-down, directed process with explicit instructions to imagine serving as one core way of eliciting deliberate mental imagery.
- Measurement of deliberate mental imagery is captured through self-report scales assessing amount, vividness, and ease of generating imagery.
- Narrative transportation is an elaborate form of deliberate mental imagery wherein individuals create scenarios and stories of experiences.
- Automatic mental imagery occurs spontaneously (from stimuli) at low levels of elaboration, and is thereby likely to be more sensory in initial formation than deliberate mental imagery.
- Automatic mental imagery is most accurately captured using psychophysiological instruments (such as fMRI), but can also be ascertained through downstream experimental consequences.

Future Research Questions

- How do the resources underlying automatic and deliberate mental imagery differ? Do they follow the proposed perceptual/cognitive connection?
- How would imagery research benefit from a dual model classification?
- In what ways can marketers elicit imagery without explicit instruction?

Sensory Imagery is Multi-Modal

The bulk of prior literature on imagery within consumer psychology has focused on visual imagery (Andrade et al., 2014). While recent research has examined the role of sensory imagery beyond visual imagery, more work is needed in this area (Krishna, 2012). We highlight work that has been done on imagery in each of the individual sensory experiences beyond vision.

Gustatory Imagery

Taste is a multisensory experience (Rolls, 2005; Small & Jones-Gotman, 2001), with flavor on the tongue being only a portion of the full sensory experience. Therefore, imagery for taste can be initiated by highlighting multiple sensory experiences from the consumption experience of a food or beverage. Advertising that focuses on multiple sensory experiences leads to thoughts and imagery of the taste of the food item, leading to more positive taste evaluations than ad that focus on the single sense of taste alone (Elder & Krishna, 2010). In one study, Elder and Krishna (2010) showed participants one of two advertisements for potato chips. One of the ads described sensory experiences across multiple senses whereas the other ad focused on the same number of sensory experiences, but all were taste related. Participants then consumed the potato chips. The imagery generated from the multiple-sense advertisement led to significantly more positive sensory thoughts and then resulted in more positive taste evaluations than the single-sense advertisement.

Multisensory imagery for food also impacts satisfaction with food portion size (Cornil & Chandon, 2016). When participants were instructed to imagine multiple sensory experiences of eating desserts (i.e., the dessert's taste, smell, and texture), they chose smaller portions than participants in a control condition. Importantly, participants in the multisensory imagery condition chose similar sized portions as participants who imagined repeated consumption, a technique shown to reduce consumption (Morewedge et al., 2010), but expected to enjoy the chosen portion significantly more.

Repeated imagery of consumption leads to habituation (a decrease in wanting food, per se; note that food satiation refers to a decrease in liking of specific foods with repeated intake), and consequently less actual consumption when participants are afforded the opportunity to consume (Larson et al., 2014; Morewedge et al., 2010). Morewedge et al. (2010) show that deliberate imagery of consumption impacts consumption. Specifically, in one study participants

were either instructed to imagine consuming 3 versus 30 M&M's. Participants who imagined consuming 30 M&M's consumed significantly fewer M&M's than those who imagined consuming 3 M&M's. Larson et al. (2014) showed similar effects for sensory specific satiety at a more automatic level of imagery formation. Specifically, in one study participants who viewed 60 pictures of salty foods rated the enjoyment of peanut consumption significantly lower than participants who viewed 20 pictures of salty foods; the rated enjoyment was also significantly lower than that of participants who viewed 20 or 60 pictures of sweet foods. The excessive imagery of consuming salty food items led to sensory specific satiety for similar sensory experiences.

Haptic Imagery

Much of what has been explored in haptic imagery relates to product ownership and interactivity. Physically holding a product can facilitate perceived ownership (Peck & Shu, 2009; Shu & Peck, 2011). Likewise, the act of imagining holding a product can facilitate perceived ownership (Peck, Barger, & Webb, 2013). Peck et al. (2013) showed that when participants were instructed to imagine holding a blanket or a soft toy ball with their eyes closed, they reported the same level of perceived ownership as participants who actually held and touched the objects. Closing one's eyes while imagining led to significantly greater vividness of the haptic images. Though not explicitly testing imagery, Brasel and Gips (2014) provide similar findings on perceived ownership through haptic interactivity using touchscreens. In their work, touchscreens versus those without a touch interface are more likely to result in perceived ownership and an endowment effect.

While exploring how the haptics of product packaging can impact taste perceptions, Krishna and Morrin (2008) also show that haptic imagery can similarly impact evaluations. The researchers had participants read descriptions of water bottles. In one condition, the bottle was described as firmer and sturdier than other brands. In the other condition, it was described as thinner or more flimsy than other brands. Participants were then asked to report their willingness to pay for the bottle of water. As participants were not interacting with actual bottles, these perceptions were imagined. The imagined haptic quality of the bottle only mattered for individuals with low scores on the autotelic dimension of the need for touch scale, as they are more heavily influenced by non-diagnostic haptic cues.

Olfactory Imagery

Krishna, Morrin, and Sayin (2014)'s work is among the earlier examples of research on olfactory imagery. Note that there are at least three different ways in which olfactory imagery can be shown to exist – through neuroimaging (overlap with actually smelling), self-report, and looking at whether consequences of olfactory imagery are similar to actually smelling. If the first (self-report) is used, people often state that they cannot imagine the smell. Self-reports for smell imagery are also prone to many problems, e.g., just the notion of asking someone if they can imagine the smell of X may prime them to think that they can (even when they actually cannot). Thus, Krishna et al. (2014) use the last to support the actuality of olfactory imagery and to study how it can be encouraged. They propose the term "smellize" for imagining smells just like visualize is used for imagining visuals. They examine the impact of advertising on consumers' ability to generate olfactory images of food. Given the strong connection between taste and smell, olfactory imagery plays a direct role in impacting desire for food consumption (Krishna et al., 2014). Imagining the smell of a food item elicits a physiological response similar to when food is present. Specifically, participants showed increased salivation when imagining the smell of chocolate cake, but only when a picture of the food is present. That is, the impact of olfactory imagery on consumption related consequences, including anticipatory responses such as salivation, is reliant on participants' ability to visually imagine or see the food item. Incorporating visual images of food in advertisements facilitated olfactory imagery. This cross-modal influence of different sensory imagery experiences represents a key area for future research and will be discussed later.

Some work also shows possible negative consequences of incorporating olfactory imagery into advertising (Lin, Cross, Laczniak, & Childers, 2018). Individuals differ in their sensitivity to olfactory cues (Lin, Cross, & Childers, 2018). Some individuals are hypersensitive to scents, with the greater intensity of perceived scents leading to negative evaluations of the scent as well as an inability to ignore scents. Others are either normal in their sensitivity or low in sensitivity. This perceptual sensitivity carries over to individuals' sensitivity to olfactory images, such that those who are hypersensitive imagine scents more intensely, often with negative consequences (Lin, Cross, Laczniak, & Childers, 2018). Participants with normal olfactory sensitivity had higher attitudes toward advertisements when they were instructed to imagine the scents portrayed in an advertisement (e.g., the smell of popcorn) versus when there were no instructions for olfactory imagery. However, participants with high olfactory sensitivity

had lower attitudes toward advertisements when instructed to imagine scents versus not. The authors propose that this is due to a desire to avoid evoking scent-related imagery due to scent intensity. Despite significant research showing the positive impacts of actual scents on advertising effectiveness (e.g., Bosmans, 2006; Morrin, Krishna, & Lwin, 2011) the role that olfactory imagery plays in advertising warrants further research.

Auditory Imagery

As noted earlier, auditory imagery has been shown to occupy similar resources as audition, with consequences on advertisement recall (Unnava et al., 1996). Elder, Schlosser, Poor, and Xu (2017) also explore auditory imagery and its consequences on consumer behavior in the context of psychological distance.

Elder et al. (2017) suggest that audition is a more distal sensory experience, with the possibility of hearing sounds from far away distances, compared to some other senses, e.g., taste. For example, an individual can hear the sound of an airplane from miles away. They show that this physical distance maps on to psychological distance with implications for advertising and persuasion. In one study, participants read about an upcoming festival. The festival was to occur either this weekend or next year and was described by using taste related words that facilitate gustatory imagery (e.g., "taste the amazing flavors") or by using sound related words that facilitate auditory imagery (e.g., "listen to the amazing sounds"). Participants then rated their interest in attending the festival. The results show that auditory imagery led to significantly greater interest when the festival was to occur in the distant future versus the upcoming weekend.

While Unnava et al. (1996) and Elder et al. (2017) have studied auditory imagery within the consumer psychology context, there is little other such research. A review of empirical findings primarily shows that auditory imagery exists, with consequences on recall and perception (Hubbard, 2010). Much more work is needed to understand the consumer implications for auditory imagery.

Multisensory Imagery

Several of the papers already discussed explore the consequences of multisensory imagery, with the combination of sensory images impacting projected enjoyment (Cornil & Chandon, 2016), taste perceptions (Elder & Krishna, 2010), recall (Unnava et al., 1996), and reported interest (Elder et al., 2017).

Just as multisensory perception can be cross-modal in impact, with individual sensory experiences impacting each other (e.g., Krishna, 2012; Krishna, Elder, & Caldara, 2010; Shen & Rao, 2016; Spence, 2012), so too can multisensory imagery. As discussed earlier, Krishna et al. (2014) show the cross-modal impact of olfactory imagery and visual imagery on anticipation, such that better visual imagers also seem to be more impacted by olfactory imagery.

Taking a very different tack, Lwin et al. (2010) look at how imagery across the five senses could be more or less related. While this is not the focus of their research, it helps show the process underlying their main result. They show the super-additive effects of olfactory imagery and visual imagery on recall. Whereas dual-coding theory (Paivio, 1969) shows that pictures aid recall for verbal information, Lwin et al. (2010) show that picture and smells attached to a stimulus have a super-additive effect on recall of the stimulus; and also, that smell potentiates the effect of visuals on enhancing recall for the verbal information. Importantly (for understanding imagery), they find that sensory imagery (imagining how a product looks, smells, feels, sounds, and tastes) loads on two factors which together account for 70.3% of the variation in response, namely "looks and smell" and "feel, sound and taste". The fact that olfactory and visual imagery load on the same factor helps explain their super-additivity result.

Future Research Questions

More work is needed to understand similarities and differences in sensory images. Since the cross-modal nature of imagery is not the focus of Lwin et al. (2010) research, this research is little known and not build upon. However, it offers a good foundation for future research. Elder et al. (2017; discussed in more detail later) show how touch and taste are considered psychologically more proximal than vision and hearing. Future research should continue to explore the cross-modal impact of multisensory imagery and the relation between the senses as it pertains to imagery. Some unexplored questions are: How do cross-modal sensory images differ from their perceptual counterparts? How do sensory experiences in one's environment influence the imagination of sensory experiences? Imagery and perception in the same sense compete for resources (Unnava et al., 1996), but do different senses compete for similar resources or are there interactive cross-modal effects when one sense is perceived and another is imagined?

As mentioned in the introduction, sensory imagery has become increasingly important in consumer behavior given the shift toward digital media consumption, online shopping, and advertising. In a recent review, Petit et al. (2019) highlight the important ways in which senses

can be experienced digitally or virtually, and imagery is a key methodological tool to facilitate such sensory experiences, such as smell, touch, and taste, which cannot be directly communicated virtually.

Which of the sensory experiences are more influential in driving behavior and does this vary by context? Examining sensory dominance, or the reliance on certain sensory cues more than others, might be a valuable place to start. Given its dominance in sensory experience, vision might serve as the default imagery formed. However, it may also require fewer cognitive or perceptual resources to form than other sensory images, leading to an increased salience and weighting to more novel imagined sensory experiences. Future research should look at which imagined sensory experiences are the most influential in driving behavior. Table 3 below gives a synopsis of major points brought up in this section, including key findings and future research questions.

Table 3: Sensory Imagery is Multi-Modal
Synthesis of Key Findings and Future Research Questions

Synthesis of Key Findings
• While the bulk of prior research in psychology and marketing has focused on visual imagery, mental imagery exists across all five senses – hence, also being termed sensory imagery.
• Gustatory imagery impacts not only taste perception, but portion size selection, consumption enjoyment, and consumption quantity.
• Haptic imagery has become increasingly important given the digital nature of shopping, with imagined haptic interaction impacting perceived ownership as well as perceived product quality.
• Olfactory imagery of a stimulus (e.g., food) elicits a similar physiological response as when the stimulus is actually present, with visual cues helping to facilitate this olfactory imagery.
• Auditory imagery has been shown to directly impact perceptions of product distance, but has received little attention in consumer psychology research.
• Multisensory imagery has been shown to impact projected enjoyment, taste perceptions, recall, and interest.

Future Research Questions
• How do cross-modal sensory images differ from perceptual experiences?
• What are the consequences for cross-modal sensory images when one sense is perceived and another is

imagined?

- How does sensory dominance influence imagery content, including the salience of specific sensory experiences?

Consumer Behavior Consequences of Mental Imagery

Numerous consequences of imagery have been explored in the consumer psychology literature in diverse contexts. We will discuss the impact of imagery appeals in advertising and design, as well as in new product development. The primary focus of this section will be on visual imagery appeals, since most of the imagery literature is concentrated there. [Note that a previous review of visual information processing by Adaval, Saluja, and Jiang (2019) also highlights many consequences of visual imagery within a consumer domain].

Imagery in Advertising

Within the consumer psychology literature, many of the consequences of imagery have been explored in the context of advertising. Petrova and Cialdini (2005) explored the role of vividness of a visual cue and the ease of generating imagery on product preferences. They assigned consumers into one of four conditions that varied by vividness (low vs. high) as well instructions to imagine (yes vs. no). Imagery vividness was manipulated by providing a photo filter to make the image appear more like a painting. The authors measured brand attitudes and purchase intentions for the experience displayed in the advertisement. When the advertisement was low in vividness, instructions to imagine led to a backfire effect, leading to lower brand attitudes and purchase intentions than when no instructions to imagine were present. This occurred due to an increased difficulty of generating consumption imagery.

Similar imagery processes are operative for design elements as well. Cian, Krishna, and Elder (2014) showed the consequences of dynamic imagery in logo design. Dynamic imagery is the continuation, in the brain, of implied movement from a static image (i.e., the static visual cue appears to be moving). The authors show that logos containing dymanic imagery can increase this perceived movement and thereby increase engagement with the logo, ultimately leading to more positive brand evaluations. Cian, Krishna, and Elder (2015) showed similar processes with icons on traffic signs, showing that more dynamic traffic signs (versus less dynamic ones) are

noticed earlier and therefore evoke a faster reaction. They suggest that responding more quickly to some traffic signs could make accidents less likely.

Other research has examined the impact of logo shape on consumer generated images. Jiang, Gorn, Galli, and Chattopadhyay (2016) find that specific shapes make certain associations more accessible. Once accessible, these associations impact the product imagery that consumers generate. For example, when participants were shown circular (vs. angular) logos for running shoes, comfort (durability) associations were activated, leading to more positive judgments of these attributes. In a subsequent study, the authors found that these types of effects were stronger for individuals high in dispositional imagery.

Imagery in New Product Development

Imagery as a prospective process has direct application to new product development, wherein the product has yet to be created. Relevant research has examined how imagery impacts new product design (Dahl, Chattopadhyay, & Gorn, 1999; Zhao et al., 2009), new product creativity (Herd & Mehta, 2019), as well as projected success of new products introduced to the market (DeRosia & Elder, 2019).

For new product design, there may be dramatic variance in how the different proposed new products are from the existing products. Design of new products that are only incrementally different to existing products may not require consumer imagery; however, really new products, those that represent significant changes from current products, are evaluated significantly more favorably by consumers following imagery visualization (Zhao et al., 2009). The type of information presented for new products also impacts the amount of imagery processing when consumers evaluate new products (Zhao, Dahl, & Hoeffler, 2014). When products are described using concrete language, consumer evaluations are more favorable when engaging in retrospective visual imagery. In contrast, when products are described using abstract language, consumer evaluations are more favorable when consumers engage in prospective, anticipatory visual imagery. The amount of imagery processing mediates the impact of description type on evaluations.

Imagery used by designers in the process of new product design directly impacts the outcome of the design process, including perceived originality, usefulness, and general appeal (Dahl et al., 1999). When designers focus on imagination (vs. memory) in the design process, their designs are evaluated by others as being more original and more appealing. Incorporating

imagery of the consumer using the product in the design process also increases perceived usefulness and appeal of the new product that has been designed, relative to when designers do not imagine the consumer using the product.

Imagery for new product development can vary in focus from a more affective focus to a more cognitive focus (Herd & Mehta, 2019). Herd and Mehta (2019) show that when designers focus on consumers' end feelings (vs. their thought processes), their designs are evaluated as more original, but not more useful. In one study, participants were asked to design the interior of a kindergarten and were additionally asked to imagine how the children would feel while in the space (vs. how the children would use the space). Focusing on feelings led to an increase in perceived design originality.

But, note that while most research recommends taking a consumer orientation when developing new products, this imagery can also have a downside (DeRosia & Elder, 2019). Focusing on the consumer during the screening phase of new product development has the consequence of managers engaging in mental imagery of the consumers interacting with the product. This imagery leads to increased optimism that the product will be successful and used by many consumers. The negative consequence of such imagery is that even weak product ideas are evaluated more favorably when managers consider the consumers.

Imagery in Shopping

Shopping experiences, whether online or offline, often rely on imagery. When consumers are simply making a choice between alternatives, functional or utilitarian dimensions are weighed more heavily; however, when consumers anticipate their experience with the product, they are more likely to engage in mental imagery, with sensory or hedonic dimensions becoming more salient in the decision (Shiv & Huber, 2000). How imagery impacts shopping behavior beyond the response to advertising is important to understand.

Whether or how consumers imagine using a product when shopping can be impacted by simply changing the design of (verbal) price deals. For instance, Aydinoğlu and Krishna (2019) show that retail-store deals which communicate stronger association between products (e.g., "get matching shirt free") can generate more consumption-imagery compared to those with weaker association (e.g., "get second item free"). They suggest that consumption-imagery (imagery about the consumption instance) subsumes all the senses and affects consumer attitudes toward the communication and the product. In one of their studies, they show, for instance, that a deal

for jeans which proclaims, "Second pair of jeans 50% off" does not result in as high product attitudes as a deal that offers "Matching shirt 50% off with purchase of jeans", even though it may be bigger in value. The latter, they argue, is more suggestive of the "consumption episode".

Consumers also imagine themselves using the products when shopping. A practice that has become very common in the clothing industry is that of vanity sizing for women's clothes. When practicing vanity sizing, clothing manufacturers use smaller size labels for clothes than what the clothes actually are (by objective measures – if history is a judge of this objectivity). Vanity sizing is understood to help sell clothes because it seems that women prefer to buy and to wear smaller size clothing labels to larger ones. Aydinoğlu and Krishna (2012) looked at why vanity sizing works – after all, women knew they had not lost weight; so, why should they feel better in smaller size clothes? They showed that smaller size labels evoked more positive self-related mental imagery – that is, by fitting into a smaller size, women imagined themselves as being thinner. This image of oneself has implications for subsequent shopping behavior and purchase intentions of clothing.

Experiential Marketing and Imagery

Brand experiences have been defined to contain sensing, feeling, thinking – both analytical and imaginative, acting, and relating to others, through the brand (Schmitt, Brakus, & Zarantonello, 2015). The sensory and imaginative components of brand experience are of particular relevance to this review. Imaginative brand experiences allow the consumer to both retrospectively and prospectively engage with the brand.

Hirschman and Holbrook's (1982) explanation of multisensory experiences explicates how experiences and imagery are connected and remains rife with ideas for research. They state that,

> "By multisensory we mean the receipt of experience in multiple sensory modalities including tastes, sounds, scents, tactile impressions and visual images…Individuals not only respond to multisensory impressions from external stimuli (a perfume) by encoding these sensory inputs but also react by generating multisensory images within themselves. For example, smelling a perfume may cause the consumer not only to perceive and encode its scent but also to generate internal imagery containing sights, sounds and tactile sensations, all of which are also 'experienced.'"

Imagery is also used to understand and enrich one's current experiences. For example, the experience of consuming art relies on the power of imagery. Joy and Sherry (2003) show that in order for the aesthetic experience of art to be appreciated more fully, sensory imagery is required. Specifically, the authors draw upon the connection between imagination and perception to propose that motor imagery helps consumers to envision themselves in the art depicted.

As a subset of experiential marketing, travel and tourism marketing research has also shown mental imagery to be a key cognitive process in both pre- and post-trip experiences (Le, Scott, & Lohmann, 2019). In a recent review, Le et al. (2019) show the role of imagery in travel and tourism marketing. Most directly, imagery impacts anticipation and savoring. Before a trip, consumers are prospectively engaging in imagery, comparing alternatives, and envisioning what the trips will be like. These detailed, elaborate images directly impact the likelihood of choice, as well as the anticipation that precedes a trip, affecting expectations (Goossens, 2000). Upon returning from a trip or other experience, consumers can vividly imagine their prior experiences, which allows for savoring (Filep, Jiang, & DeLacy, 2013; Huang, Huang, & Wyer, 2016).

Future Research Questions

Imagery vividness and the ease of generating imagery play a significant role in persuasion. As noted, consumer generation of images can be impacted by the stylistic properties of the visual cues used in the advertisement (Petrova & Cialdini, 2008). Extending these findings, researchers could explore how the realism (e.g., pictures vs. illustrations) of the source stimulus impacts the type of imagery formed as well as behavioral consequences. In a similar manner, researchers could explore how dynamic and static stimuli (e.g., videos and pictures, respectively) differentially impact imagery formation and elaboration.

The amount of self-referencing facilitated through imagery in advertising impacts attitudes and intentions (Aydinoğlu & Cian, 2012; Krishnamurthy & Sujan, 1999). How self-referencing generated through imagery impacts self-persuasion is a future question to answer. For example, does imagery generated by consumers, even when explicitly requested by the advertiser, become the attributable source for persuasion? Additionally, as advertising represents a context to study the impact of imagery, numerous other research questions presented earlier could be researched in relation to advertising. Other antecedents and consequences of process and outcome focused imagery could also be looked at. Additionally, like "process versus

outcome" and "more dynamic versus more static" are different dimensions of imagery, other dimensions of imagery could also be proposed and studied.

Imagery clearly plays a critical role in new product development, from both managerial and consumer perspectives. Future research should explore how the process of imagery formation influences managers. For example, it is possible that images that are easy to generate will lead to increased overconfidence, such as that shown by DeRosia and Elder (2019). The fluency of imagery generation from managers or consumers may lead to important marketing consequences.

Imagery can be evoked in shopping both in the physical and online environment. As shopping continues to move increasingly online, future research should identify which aspects of the shopping experience rely on imagery. While pictures of products and detailed descriptions evoke imagery (Paivio, 1969), videos and other more interactive forms of communication present more vivid alternatives (Schlosser, 2003). How these imagery laden communications impact the search, consideration, and purchase decisions within the shopping funnel, are important topics to address. In addition, as the traditional multisensory aspect of in store shopping is replaced by online shopping, how multisensory imagery can enhance this shopping experience remains a key question.

Anticipation for experiences has been shown to be a more positive experience than anticipation of material purchases (Kumar, Killingsworth, & Gilovich, 2014). It is likely that the efficacy of imagery is similarly greater for experiences than material purchases. Future research can explore this question within the context of brand experiences or trips specifically. It is also possible that experiences are more likely influenced by imagery in retrospect than simple interactions with products, representing greater malleability and susceptibility to advertising messages. We summarize the major themes from this section as well as future research questions in Table 4.

Table 4: Consumer Behavior Consequences of Mental Imagery
Synthesis of Key Findings and Future Research Questions

Synthesis of Key Findings

- Increases in the vividness of mental imagery positively impact the persuasive appeal of advertisements.

- Within the context of new product development, imagery generated by consumers, designers, and managers affects evaluations, creativity, and perceived product success.

- While much of the prior research exploring the consequences of mental imagery focuses on positive outcomes, mental imagery can also lead to negative outcomes, such as suboptimal decisions.

- Shopping experiences increasingly rely on mental imagery as consumers imagine product experiences in both physical and online settings.

- Experiences such as travel, tourism, theatre, film, and art appreciation are directly impacted by sensory imagery both before and after the consumption experience.

Future Research Questions

- How does the realism of the source stimulus impact imagery and related consequences?

- How does the fluency of imagery formation influence managerial confidence?

- Which aspects of the digital shopping experience are most reliant on imagery?

- Is imagery more effective for experiences or material purchases?

Additional Research Directions

With an evolving marketing landscape, imagery research will prove useful to marketing practitioners and consumers alike. In the discussion so far, we have presented many sample questions which are presented in Tables 1-4. We now highlight several additional areas where researchers can explore the role of imagery.

Evoking Imagery

Our discussion of imagery in different marketing contexts (ads, price deals, size labels, creativity for new products) shows different ways in which imagery can be evoked. Typically, people have used verbal instructions ("Imagine…") and pictures to evoke deliberate imagery (Petrova & Cialdini, 2005) and narrative transportation (Escalas, 2004a, 2004b). Automatic imagery may be evoked by pictures (Eelen et al., 2013; Elder & Krishna, 2012), by the way the price deal is framed (Aydinoğlu & Krishna, 2019), or even by the size label of a product (Aydinoğlu & Krishna, 2012).

Much more work can be done to explore new contexts and methods to evoke deliberate and/or automatic imagery. Importantly, many of the scenarios used in consumer psychology research instruct participants to "Imagine" the scenario. While the desired consequence is that research participants imagine the displayed scenarios, there is opportunity to explore how to facilitate involvement in these scenarios without explicit instructions. Alternative methods might lead to more naturalistic adoptions of perspectives from the scenarios. Importantly, future research should explore how different ways to encourage participants to imagine experimental scenarios impact the dependent variables of interest.

Measurement of Imagery

As stated earlier, imagery is measured through self-reports, neuroscience measures (brain activation) and consequences/behavior. We would like to mention a caveat here: self-report scales to measure automatic imagery only capture after the fact, retroactive recalled imagery, and do so in a deliberate fashion. As such, it is a big question whether they are, in fact, capturing automatic imagery. Often, such measures are used because of the great emphasis on showing process through mediation. We would urge the field to recognize that showing process through mediation is therefore not suitable for all contexts. In such cases, process may be shown through moderation, or not shown at all. Additionally, one could show the existence of imagery through consequences (as done in Krishna et al., 2014) rather than through self-reports and mediation models.

Psychophysiological methods of measuring imagery, such as fMRI (Knauff et al., 2000), EEG (Kaiser et al., 2014), or recently eye tracking (Lanata et al., 2020) represent another step for measuring imagery, but the field should recognize that these methods are not available to everyone and are expensive and cumbersome. Their use could constitute an independent paper (as is generally the case in neuroscience, cognitively psychology and medicine), and not be required as one of several studies in a paper for "additional evidence".

How imagery impacts evaluations is proposed to occur through several mechanisms. Measurement of these mechanisms has played a key role in understanding the operative process. Bone and Ellen (1992) created scales to measure imagery vividness (i.e., how clear, vivid, lifelike, sharp, defined the images were) and quantity of images formed (e.g., "As you listened to the ad, to what extent did any images come to mind?"), as well as the ease of creating the images (e.g., "I had no difficulty imagining the scene in my head"). These constructs have been critical

in guiding subsequent research in exploring how imagery operates within a persuasion context (e.g., Aydinoğlu & Krishna, 2012; Elder & Krishna, 2012; Escalas, 2007; Jia et al., 2017; Petrova & Cialdini, 2005; Schlosser, 2003). These scales have also been adapted to measure mental simulation (automatic imagery) by Elder and Krishna (2012) and used in ensuing mental simulation research (e.g., Larson et al., 2014; Si & Jiang, 2017).

Imagery Scales: Individual Differences

Capturing individual differences in sensory imagery in meaningful ways has also been notoriously difficult despite a number of (self-report) scales being available, especially for visual imagery. By meaningful we mean whether differences on these scales convert to differences in attitudes or behavior as would be expected. Most researchers working on imagery have unfortunately found that they often do not. Nonetheless, we note here some scales (not exhaustive) for the curious reader. For visual imagery, VVIQ (Marks, 1973) is a popular scale for self-reported differences in visual imagery; as is the visual component of the QMI scale (Sheehan, 1967). The QMI scale is additionally used for all senses (Sheehan, 1967). For more automatic imagery, scales often used for amount and ease of imagery are from Elder and Krishna (2012) – but note that Elder and Krishna (2012) built upon Bone and Ellen (1992); and also note their criticism of any measurement of automatic imagery discussed earlier. For more information on individual differences in imagery, see Adaval (2018).

The importance of individual differences in imagery ability depends largely on the context being researched, including the stimuli, evocation of imagery, as well as the sensory experiences imagined. However, it is clear that finding ways to capture such abilities in meaningful ways, showing consequential impact on the examined process, is important. Future research could focus on scale construction, scale validation, or pairing self-report measures with the imagery measured using the psychophysiological tools described earlier.

Imagery and Construal Level

Several recent papers have explored the relationship between level of construal and imagery (Elder et al., 2017; Jia et al., 2017; Lee et al., 2017). How far individuals are from information when they receive it impacts the vividness of the mental image they form, as well as the projected likelihood of that event occurring (Jia et al., 2017). The level of congruence between sensory imagery distance and psychological distance impacts product attitudes as well

as intentions (Elder et al., 2017). Thus, Elder et al. (2017) show that taste and touch, which need more physical proximity to be experienced also feel more psychologically proximal, whereas hearing and sight feel more psychologically distant.

Psychological distance also impacts the detail and color of images formed in the mind (Lee et al., 2017). Specifically, for events far in the future, the reported color of the images formed is less colorful than events in the near future. Lee et. al (2017) propose many insightful reasons for this including empirical use of black and white for the past and color for the future; and the actual "now" experience being colorful, whereas experiences in the past being drawn from distant memory and losing some of this color.

While this emerging stream of literature provides insights into how imagery and construal interact, more work is needed in this area. It is possible that engaging in mental imagery impacts one's construal. Future research should continue to explore the interaction between construal level and imagery beyond what has been shown.

Object Affordance and Purchase Behavior

One underlying theme in much of the automatic imagery research is that of object affordance. In order for humans to interact with objects around them (e.g., to pick up an object), they are always engaging in automatic mental simulation. The phenomenon of mental simulation has been demonstrated by Tucker and Ellis (2001) and this has been applied within the marketing context by Elder and Krishna 2012 (and also by Eelen et al., 2013Shen & Sengupta, 2012;). These consequences from product affordances have even been shown to impact consumer perceptions of nongraspable products (Maille, Morrin, & Reynolds-McIlnay, 2020). Maille et al. (2020) show that consumers are more positively inclined towards nongraspable products if another graspable object is located within the same visual field and appeals to their dominant hand. It is worth noting that object affordance is also a key principle in the design of everyday objects (see Donald Norman's "The Design of Everyday Things"; Norman, 2013).

There is much more room for research on object affordance and how it impacts purchase behavior. This can be facilitated by design elements as discussed. Videos showing product interaction may also engender these images, especially when the products or product interactions are novel and difficult to envisage.

Process and Outcome Imagery

Another area where more work can be done concerns process and outcome simulation/imagery. Work under "narrative transportation" (Escalas & Luce, 2004) has asked people to imagine the process of reaching a goal (called process simulation) or the feeling when a goal has been reached (called outcome simulation). This work shows that under low to moderate involvement, argument strength impacts behavioral intention more strongly if consumers are made to think of the process versus the outcome; however, this reverses under high involvement. While the imagery of the process (e.g., "we would like you to imagine the PROCESS of using the shampoo being advertised") and outcome (e.g., "we would like you to imagine the END BENEFITS that you would receive from the shampoo being advertised") simulation in this research is evoked more deliberately, Cian, Longoni and Krishna (2020) show that process and outcome simulation may also be generated more spontaneously (merely by viewing different visuals in an ad). They show this to be the case using before-after and progression ads (a series of pictures showing gradual change) for weight loss, hair loss, and other contexts where consumers desire change. They find that before-after ads evoke less process imagery than progression ads do.

Following on Cian et al.'s (2020) research, future research could explore the role that process or outcome imagery have on motivation for consumers. Previous research has shown that imagining success on a task from a third- versus first-person perspective is more motivating (Vasquez & Buehler, 2007). In a similar way, being able to envision intermediate steps along the way, such as those facilitated by process imagery, or seeing the finished product, such as the images facilitated by outcome imagery, may differentially motivate consumers. More research is needed on how different types of imagery map on to the outcome versus the process.

Using Imagery for Well-Being

We have primarily focused on the imagery research in consumer psychology; however, numerous future research questions could be identified by extending the literature from other disciplines. One such area for applications to consumer well-being is clinical psychology. Recent research in clinical psychology has highlighted the connection between depression and imagery (Holmes, Blackwell, Heyes, Renner, & Raes, 2016; Morina, Deeprose, Pusowski, Schmid, & Holmes, 2011). Specifically, individuals high in depression experience more negative, involuntary, intrusive images (Holmes et al., 2016). In addition, individuals with depression have

a harder time generating positive images for the future, with positive images being less vivid than negative images (Morina et al., 2011).

The intrusive negative images for individuals with depression are commonly memories that recur in ways similar to those who are dealing with anxiety or past trauma (Takanashi, Yoshinaga, Oshiro, Matsuki, Tanaka, Ibuki, Oshima, Urao, Matsuzawa, & Shimizu, 2020). One potential treatment for these individuals is imagery rescripting (Holmes et al., 2016; Strohm, Siegesleitner, Kunze, Ehring, & Wittekind, 2019; Takanashi et al., 2020). Imagery rescripting involves revisiting prior events in three ways: first-person as the event occurred, third-person as the present observer, and third person as an acting participant who is free to interact with one's prior self. Resulting from this imagery rescripting is an ability to better cope with negative emotions and reshape one's prior experiences.

One direct application of imagery rescripting for consumer well-being would be in terms of failed goals. For example, individuals who continually fail at improving their health through diet and exercise might have difficulty imagining future success and generating positive images. While not depression, the negative emotional consequences might lead to a similar process. Future research could examine how using imagery rescripting with consumers, potentially communicated through advertising, changes the vividness of success images as well as the consequent likelihood of continuing on with one's goals.

Negative Consequences of Imagery

Another potential area for future research is exploring the negative consequences of imagery. Imagery does not always impact consumer perceptions positively (DeRosia & Elder, 2019; Elder & Krishna, 2012; Lin, Cross, Laczniak, & Childers, 2018). Imagining a negative scenario in great detail likely increases the perceived likelihood of that event occurring (Rajagopal & Montgomery, 2011), and possibly even creates affectively negative false memories. Additionally, the more vividly one imagines the negative aspects of a future event, the more likely they are to avoid the event. For example, vividly imagining long flight delays, crying children, and cockroaches in one's hotel room would greatly reduce the intent to travel on vacation. For instance, in Elder and Krishna's (2012) studies, having a spoon on the right (versus left) of a bad tasting soup reduced purchase intention for this soup – presumably because the spoon on the right facilitated greater mental simulation of the bad tasting soup.

While understandably much of the imagery research in the consumer psychology literature has focused on enhancing positive outcomes, imagery can also be used to help individuals prevent negative outcomes, such as the consequences of poor health choices. How to effectively use imagery to reduce negative behaviors represents a broad area for future research.

Augmented Reality and Virtual Reality

Emerging technological advances such as augmented reality (AR) and virtual reality (VR) have imagery at their core (Schmitt, 2019). The immersion created through these experiences likely follows those of more traditional imagery processes, with potentially a stronger representation of their perceptual analogs than user-generated imagery. One opportunity that AR affords marketers and consumers is the ability to try the product in digital form prior to purchase. For example, virtual glasses that sit on one's face allow consumers to see themselves in the product. Makeup AR apps function similarly, allowing for multiple manifestations of the product offerings to be displayed. The mental simulation that is facilitated through AR and VR also allows for more elaborate scenarios to be depicted. Comparing the persuasive impact of actual perception, as well as imagery, to AR and VR presents an opportunity for future research.

In an early exposition of virtual product interaction, Schlosser (2003) showed that when participants were afforded the opportunity to interact with a product online (vs. passively view it), they engaged in greater imagery and had increased cognitive elaboration. Participants also had consequent higher attitudes and purchase intentions toward the depicted product. This level of virtual product interaction is greatly exceeded now by technology that offers opportunities to immerse oneself in a completely constructed virtual world.

Given the direct impact of imagery on attitudes and behavioral intentions, it is likely that more immersive content will greatly impact the persuasive appeal of advertising in augmented or virtual reality contexts. As augmented and virtual reality allow for an infinite range of possibilities for the advertiser, and consequently the consumer, understanding the imagery formed through such technology will continue to be an intriguing domain for research.

Conclusion

Imagery is a key construct within consumer psychology. The cognitive and perceptual processes have been clearly identified through decades of research. The managerial implications

have been identified through the success of innumerable campaigns employing imagery as a strategy of influence. Imagery plays a prominent role in impacting consumer and managerial behavior in advertising, new product development, promotions, and many other areas. One core purpose of this review is to highlight recent research contributing to each of these areas.

The consistent finding that imagery impacts evaluations as well as behavioral intentions provides a solid foundation upon which to build future research. In addition to highlighting extant research, we hope that this review spurs future research on the topic of imagery from both a theoretical and a substantive point of view. Over three decades ago, in an early review of imagery research, MacInnis and Price (1987) described imagery research as being "in its infancy" (p. 487). While the methodological and theoretical advancements have been considerable since then, there remains significant opportunity to further develop this field of research—perhaps only constrained by the imagination of the researcher.

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