

20
20

INTERDISCIPLINARY JOURNAL OF SIGNAGE AND WAYFINDING

Vol. 4 / No. 2

SIGNS OF CHANGE: ROLE OF VISUAL INFORMATION
IN CONSUMER PERCEPTION

Dear Customers

Although No staff have
diagnosed with COVID-
With common sense and
that we have decided to
SHUT DOWN ORIGINALS. AT
UNTIL HEALTH CANADA DE
TART THE PEAK PERIOD
WE ARE DOING THIS FOR
OF OUR STAFF AND VALU
WE WISH EVERYONE THE
LUCK. LETS ALL STAY POS
GET THROUGH THIS TOGET
KEEPING A SAFE DISTANCE
ALL THE BEST TO YOU AND
MANAGEMENT

I ASSURE
YOU, WE'RE
OPEN!
FOR TAKE-OUT
+ DELIVERY

IN FOR
VERY &
COUT

ery/Takeout

Signs of Change: role of visual information in consumer perception

Aparna Sundar*

Affiliated to the
University of Washington (Bothell)
School of Business

asundar@uw.edu

Hélène Deval

Associate Professor
Rowe School of Business
Dalhousie University

hdeval@dal.ca

**corresponding author*

INTRODUCTION

The American Marketing Association emphasizes the role of communication as vital in marketing activities. Research on signage encompasses the ways individuals and businesses use this medium in effective communication (Kellaris and Machleit 2016). For many businesses, the most basic function of an on-premise sign is to communicate its location to customers (Auffrey and Hildebrandt 2017). Taylor et al. (2005) note that communication through signs is fundamental and that “next to the human voice, signage is the most available and ubiquitous form of speech” (xv). Most discussion on the research surrounding the use of signage includes an analysis of signage governance and regulations (Jourdan, Hurd, and Hawkins 2013; Chang and Killion 2015; Connolly 2012). When it comes to sign regulation, aesthetics refers to how signs are visually experienced and appreciated within their environmental context by individual viewers, and will vary based on personal tastes, cultural preferences, socioeconomic background, and education (Hein, Ngalamulume, and Robinson 2010). Researchers have long advocated for effective signage graphics as a way to influence consumer perception (Fontaine and Bradbury 2017). The visual experience of signage includes outcomes on consumer inferences that could be apparently straightforward such as the influence of visual depiction of movement on a sense of belonging in the community (Sundar et al. 2018), to more unintuitive findings such as the role and effect of visual disfluency as it increases sensitivity to missing information (Sundar et. al. 2019).

This issue centers on communication effectiveness at the intersection of consumers’ perception and consumers’ experience. Overall, this special issue explores the visual characteristics of signs as it influences evaluations, purchase

intentions, detection of omission, and compliance. Given the timing of this issue, the COVID-19 pandemic unsurprisingly provided a relevant context in which to study consumers' perception of visual information. The global shutdown began as we published our call for papers and researchers collected data. The emergency of the situation turned well-crafted marketing plans into fight-or-flight responses as the situation evolved day-by-day. Businesses faced unprecedented times (as seems to be the established expression).

When it comes to visual communication, ancient examples such as Ostia, Rome's original port town provides vital clues. Ostia, which was inhabited until Late Antiquity before it was abandoned and eventually buried, was a working town, the connection between Rome and the Mediterranean trade networks, and was organized around the Piazzale dei Corporazioni (Ashby 1912). Shipping and trading companies could set up stalls there, in the *mercatus* (from which the word marketing is derived), and sell the goods arriving on their ships. There was an interest in merchants setting up something distinctive to identify themselves. "The merchants from Musluvium trade here" mosaic was a way to identify the stall, but also likely to signal that they dealt in different and maybe more exotic goods than others (Ashby). Signage and Marketing are inexorably linked and have been throughout history. Importantly, the heart of that link is the processing of visual information by consumers. From antique signs to modern forms around us, the way potential consumers perceive and give meaning to information is a central aspect of all signage communication - the topic to which this special issue is devoted.

The literature in this stream has reached some significant milestones since the days of Musluvium signs. Their contribution to understanding signs, shedding light on consumer behavior and consumer perceptions, is still relevant and meaningful to our understanding of signage and constitutes an important foundation for all research on the topic. Recent attempts to deepen our knowledge of signage have brought us closer to understanding the complex ramifications and implications of such a simple form of communication. For example, philanthropists James and Sharon Weinel endowed two chairs at the University of Cincinnati

(James S. Womack / Gemini Corporation Chair of Signage and Visual Marketing at the Lindner College of Business and Terry Fruth / Gemini Chair of Signage Design and Community Planning at the College of Design, Art, Architecture, and Planning), which have successfully fostered research around the theme or signs and signage. A National Signage Research and Education Conferences (NSREC), held annually from 2010 to 2015, also advanced signage research via interdisciplinary presentations and the publication of proceeding papers that became an archived knowledge base.

The first presentation of signage research at the national American Marketing Association meeting was in 2010, "Marketing Students' Attitudes Towards and Beliefs About Commercial Signage" by James Kellaris. In 2015 the first publication of a signage paper in a major academic marketing journal, "A sign of things to come: Behavioral change through dynamic iconography" by Cian, Krishna, and Elder (2015) occurred. Establishing the Academic Advisory Council for Signage Research and Education (AACRE) in 2014 was another milestone, as it is the professional organization that launched this journal in 2016 and continues to sponsor. Signage and wayfinding are ubiquitous, and our understanding of a seemingly simple tool of communication consistently provides additional research avenues to improve efficiency and capture impact on elaborate outcomes. For example, in the context of places where people must rely heavily on signs, it is interesting to observe the nature of incremental change (Symonds 2017).

The present issue aims at further uncovering the puzzle that signage represents. This special issue considers the crucial theme of consumer visual information processing from multiple angles and disciplinary perspectives: (1) considering fundamental properties of signs regarding their features, content, complexity, and fluency (McNeish 2020; Wu et al. 2020; Knuth, Behe, and Huddleston 2020; Isaac 2020) (2) integrating the importance of the source of aspects of the message (Isaac) and (3) considering the broader context of signage use and its implications for information processing and heuristic processing (Kellaris, Machleit, and Gaffney 2020; Isaac). The focus on consumer perception is a fruitful avenue to contribute to the

signage literature as a whole. For instance, using the conceptual model of signage as a marketing communication proposed by Kellaris and Machleit (2016) as a framework, the papers presented here explore and contribute to our understanding of antecedents such as the characteristics of signs themselves; situational process of evaluation under mortality salience, and the potential role of cognitive load on a variety of outcomes such as compliance, likeliness to buy, or improved decisions (Kellaris, Machleit, and Gaffney; Knuth, Behe, and Huddleston; and Wu et al.).

The COVID-19 pandemic provided a timely event in which to study consumers' perception of visual information. The history of hazard warnings and signage is documented from as early as 1686 (Platt 2014). Our knowledge of the use and effectiveness of hazard signage typically rests on established systems with clear norms and codes (*see* Espiner 1999; Charlton 2006). The specific context of the pandemic, as leveraged by several of the contributors, extends the theoretical contribution to meaningful and concrete implications. Kellaris, Machleit, and Gaffney (2020) present a series of messages tied to safety measures required by social distancing. McNeish (2020) gathered evidence from business signs during Toronto's lockdown. Both articles contribute to our understanding of delivering immediate and information-based signs and to the literature from a different angle to hazard signage. While dealing with a situation that is inherently improvisational (contrary to most of the research on hazard signage), both in the characteristics of the message and its communication form, the fundamental elements of framing and efficiency remain.

Signage effectiveness ties into some fundamental questions of visual processing. Knuth, Behe, and Huddleston (2020) consider the amount of information presented on signs and provide insight on the delicate balance between a sign's attractiveness and its complexity. As the amount of information on a sign increases, so does its complexity; however, a certain threshold must be reached for the sign to contain enough information to be helpful. The authors observe this impact directly by recording the perceptual process and sign complexity level using eye tracking data. They develop prescriptive guidelines by observing the impact of sign complexity on consumers' likeliness to buy. Isaac's (2020) article contributes to the dialectic between sign complexity and clarity. A business' sign may contain information that comes from third-party sources in the form of an accolade or honor. Communicating about the source of the accolade increases complexity, so it is important to understand if such information is beneficial to the consumer. Isaac's research shows that attribution of an accolade claim increases the perceived credibility of the organization and provides evidence that source attribution in accolade claims has a positive impact on evaluations. This holds true in the context of physical signage when consumers are likely to be engaged in heuristic processing.

Wu et al.'s (2020) findings also tie into the role of complexity. They do not vary the amount of information on a sign, but instead alter the ease or difficulty that information can be perceived by changing the lettering and contrast of

the message and the background. In the context of research on the effects of perceptual information, this article shows that the impact of this perceptual fluency depends on the amount of time consumers have to process information (*see* Sundar et al. 2018). Taken together, the results of these papers provide interesting perspectives on the constitutive elements of signs: amount of information, lettering, background contrast. They also represent a range of signage communication outcomes, such as purchase and compliance intentions, as well as downstream reactions to new information.

Exploring further some of these fundamental questions of visual processing and sign effectiveness, Kellaris, Machleit, and Gaffney (2020) did not vary the amount of information or the difficulty to process it, but consider other essential characteristics of the message, such as framing a request as a demand or using rhyming language. They considered the way those interact with other elements on the sign or affect consumers outside of the sign itself (mortality cues). The interaction between the characteristics of the message and the state of anxiety of consumers leads to varying levels of compliance. Generally the papers in this issue provide a better understanding of the appropriate content and messaging that should be included in a sign by considering a sign's features as well as how they interact with the consumer's immediate situation and how broader contexts influence their evaluation. Each helps uncover a bit more of the fundamental mechanisms at play in sign communication and consumers' perception. The pandemic changed consumers' state of mind as they receive this information. It rapidly, radically, and universally changed out environments. In that context, Kellaris, Machleit, and Gaffney consider how mortality salience was heightened by the pandemic, impacted consumers' affect towards signs and ultimately their compliance with the message. They provide valuable insight into how messages should be communicated in emergency situations.

When modern technologies are unavailable to deliver adaptive and timely information and circumstances limit preparation time, retailers sometimes must rely on simple handwritten signs on doors and windows. McNeish (2020) observes that retailers will use a variety

of fast response techniques to immediately shape and guide consumer behavior in the face of changing conditions. They provide observations on how rapid response signs vary around the availability of time, business capabilities, and business size. Differences in sign type, size, and the front used connects to the importance of the sign features investigated by Knuth, Behe, and Huddleston (2020) and Wu et al. (2020). McNeish provides a fascinating account as they bear witness to Toronto shutting down and businesses having to communicate with potential consumers from a distance. From the sudden stop of business activity to new rules being communicated as they were being developed, signs were a necessary emergency communication channel. Consumers' response, however, is conditioned by more than the nature of the signs and the information they deliver.

We are pleased to offer this special issue on effective signage communication. We hope readers will find theoretical advances, empirical findings that can be used to inform evidence-based decisions, and a multitude of interesting ideas for future research.

August, 2020

REFERENCES

- Atkinson, R. C. and Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. *Psychology of Learning and Motivation* 2, 89–195.
- Ashby, T. (1912). Recent Discoveries at Ostia. *The Journal of Roman Studies* 2, 153-194.
- Auffrey, C. and Hildebrandt, H. (2017). Do motorists see business signs? Maybe. Maybe not. A study of the probability that motorists view on-premise signs. *Interdisciplinary Journal of Signage and Wayfinding* 1(2), 100-115.
- Charlton, S. G. (2006). Conspicuity, memorability, comprehension, and priming in road hazard warning signs. *Accident Analysis and Prevention* 38(3), 496–506.
- Cian, L., Krishna, A., and Elder, R. S. (2015). A sign of things to come: Behavioral change through dynamic iconography. *Journal of Consumer Research* 41(6), 1426-1446.
- Chang, C. and Killion, P. J. (2015). Sign languages: The regulatory authority of municipalities over commercial signage does not trump the first amendment. *Los Angeles Lawyer* 37, 28-35.
- Connolly, B. J. (2012) Environmental aesthetics and free speech: Toward a consistent content neutrality standard for outdoor sign regulation. *Michigan Journal of Environmental and Administrative Law* 2(1), 185-224.
- Espiner, S. (1999). *The use of hazard warning signs: managing visitor safety at Franz Josef and Fox glaciers*. Wellington: Department of Conservation.
- Fontaine, L. and Bradbury, S. L. (2017). Providing brand guidance for independent businesses: A supplement to District Signage Standards. *Interdisciplinary Journal of Signage and Wayfinding* 2(1), 5-33.
- Hein, C., Ngalamulume, K. and Robinson, R. J. (2010). Urban Planning and Aesthetics. *Urban Health: Global Perspectives* 18, 339–354.
- Isaac, M. (2020). A Sign of Trust? The value of source attribution in accolade claims. *Interdisciplinary Journal of Signage and Wayfinding* 4(2).
- Jourdan, D., Hurd, K., and Hawkins, H. G. (2013). Evidence-Based Sign Regulation: Regulating Signage on the Basis of Empirical Wisdom. *The Urban Lawyer* 45(2), 327–348.
- Kellaris, J. J. and Machleit, K. A. (2016). Signage as marketing communication: A conceptual model and research propositions. *Interdisciplinary Journal of Signage and Wayfinding* 1(1).
- Kellaris, J. J., Machleit, K. A., and Gaffney, D. R. (2020). Sign evaluation and compliance under mortality salience. *Interdisciplinary Journal of Signage and Wayfinding* 4(2).
- Knuth, M., Behe, B. K., and Huddleston, P. T. (2020). Simple or complex? Consumer response to display signs. *Interdisciplinary Journal of Signage and Wayfinding* 4(2).
- McNeish, J. (2020). Retail signage during the COVID-19 pandemic. *Interdisciplinary Journal of Signage and Wayfinding* 4(2).
- Platt, R. H. (2014). Shaping the human landscape: the interaction of geography and law. In: *Land Use and Society*. Washington D.C.: Island Press.
- Taylor, C. R., Claus, T. A., and Claus, S. L. (2005). *On-premise signs as storefront marketing devices and systems*. Washington D.C.: US Small Business Administration.
- Sundar, A., Gonsales, F., and Schafer, G. (2018). Synchronicity in signage promotes a sense of belonging. *Interdisciplinary Journal of Signage and Wayfinding* 2(2), 30-38.
- Sundar, A., Wu, R., and Kardes, F. R. (2019). Faded fonts. *Interdisciplinary Journal of Signage and Wayfinding* 3(1), 16-27.
- Symonds, P. (2017). Wayfinding signage considerations in international airports. *Interdisciplinary Journal of Signage and Wayfinding* 1(2), 60-80.
- Wu, R., Han, X., Liu, M., and Kardes, F. R. (2020). Effects of time for deliberation and disfluency on omission neglect. *Interdisciplinary Journal of Signage and Wayfinding* 4(2).

Simple or complex? Consumer response to display signs¹

Melinda Knuth

Doctoral Student
Department of
Horticultural Sciences,
Texas A&M University

melindaknuth@tamu.edu

Bridget K. Behe*

Professor
Department of
Horticulture,
Michigan State University

behe@msu.edu

Patricia T. Huddleston

Professor
Department of Advertising
& Public Relations,
Michigan State University

huddles2@msu.edu

**corresponding author*

INTRODUCTION

The retail environment can overwhelm consumers with visual cues such as merchandise, display fixtures, and signage. Signage is an important marketing communication tool which may influence and persuade consumers at the point of purchase (Kellaris and Machleit 2016). For unpackaged or minimally packaged goods (e.g. plants, apparel, produce), signs can facilitate the buying decision by providing product information that may not be readily discernable by simply viewing the product. Yet, what is the best level of signage information to motivate a purchase, without overwhelming consumers? Scant work has investigated retail sign complexity and its influence on purchase intention. In a study of print advertisements, Pieters et al. (2010) classified traditional measures of visual complexity as feature complexity; their research indicates that visual complexity, composed of both feature and design complexity, greatly differed in their impact on visual attention and attitude toward the ad. While increased feature complexity had mixed results on favorable evaluations, increased design complexity had a more consistent correlation with longer gazes and more favorable attitudes toward the visual display (Pieters et al.). Using those findings as the motivation for the present study, our goal was to investigate the role of sign complexity on likeliness to buy. We speculate that complexity will play a role in visual attention, sign attractiveness, and purchase intention.

LITERATURE REVIEW

Visual complexity

Perceived complexity, a subjective property of signage, is an evaluative label that consumers might attribute to a sign and may impact how consumers cognitively process the information presented (Kellaris and Machleit 2016).

¹ Funding for this study was provided by Metro-Detroit Flower Growers Association. Technical assistance by Lynne Sage was invaluable to completing this study.

Abstract /

Retail signage provides information from the marketer to facilitate product purchase. An increase in sign information creates greater sign complexity, which raises the question: for consumer product choices, what quantity of information is helpful versus overwhelming? We hypothesize that consumers would allocate more visual attention to complex signs and that sign complexity would be a predictor of likeliness to buy (LTB). Five experts rated 105 real garden center signs for complexity and five low, moderate, and high-complexity signs were selected for the study. Signs were incorporated into Tobii X1 Light Eye Tracker software, where 85 non-student subjects rated sign attractiveness and LTB from a display containing that sign. Subjects allocated greater visual attention (higher fixation count and longer total fixation duration) to more complex signs, which were also rated as most attractive. Initial regression results showed sign attractiveness and fixation count were positive predictors of LTB, while complexity and total fixation duration were inversely related to LTB. Mediation analysis showed that fixation duration fully mediates fixation count impact on purchase intention. Results suggest that information-rich messaging in high complexity signs, while seen as attractive, may give consumers too much information and higher cognitive load, which makes decision-making more difficult.

Keywords /

attractiveness; consumer; survey; complexity; retail sign

Processing fluency refers to the “subjective evaluation of how easily a stimulus is processed,” and this concept describes how people cognitively monitor the mental effort required for processing a stimulus (Orth and Crouch 2014, 526; Schwarz 2004). Visual complexity theory helps to explain the mechanism behind processing fluency and explains how “visual input interacts with the perceiver to generate behavior and experience” (Donderi 2006, 84). Berlyne’s (1974) aesthetic theory proposes an inverted U relationship of visual complexity with consumer response; the inverted U-curve depicts mid-range visual complexity as the most appealing and capturing the greatest consumer attention (Berlyne 1974; Tuch et al. 2009). In other words, moderately complex images may be more appealing and command more visual attention than simpler or more highly complex images.

Table 1 summarizes the current empirical literature on complexity with regards to design, purchasing intent, functionality, and cognitive processing and the inclusion of images. While many of the studies included images, not all did. Three assessed purchase intention and one measured purchase consideration. One study included a construct similar to attractiveness: aesthetic appeal. None of the literature in this review investigated the complexity of signs focusing instead on webpages, print advertisements, product images, product descriptions, brand logos, and shopping environments. The degree of complexity varied depending on the stimuli being observed. Complexity had an impact on purchase intent in these four studies: Anderson and Jolson (1980); Geissler et al. (2006); Puškarević et al. (2016); and Putrevu et al. (2004).

Simple Designs

Advertising managers have traditionally shown a preference for simplicity in advertisements, as less complex stimuli are generally easier to process, resulting in higher fluency (Anderson and Jolson 1980; Shuptrine and McVicker 1981; Janiszewski and Meyvis 2001; Reber, Schwarz, and Winkielman 2004; Reber, Wurtz, and Zimmermann 2004). Several studies have analyzed consumer responses to design complexity, for example Orth and Crouch (2014) demonstrate that lower complexity enhances the perceived attractiveness of products and packages and Eytam et al. (2017) find that the majority of subjects (~75%) rated simple designs as easiest to use but lower in functionality. Therefore, a bifurcation emerges: simplicity in design is to remove as many unnecessary elements as possible, yet the reduced functionality is not always appreciated by consumers (Berlyne 1974; Thompson et al. 2005). Simple designs may be easier to process and be most attractive but may not necessarily provide sufficient information, nor evoke the greatest likeliness to buy.

Medium and High Complexity Designs

Increasing the design complexity of a visual message is correlated with increased curiosity and sustained visual attention (Pieters et al. 2010). Moderate complexity has been associated with maximum appeal for message designs (Berlyne 1974; Geissler et al. 2006). Although medium complexity is generally preferred, lower levels of perceived complexity have been associated

Table 1 / Complexity Literature

Reference	Dependent Variable	Level of Complexity Measure	Finding	Images Included
Anderson & Jolson, 1980	Purchase Consideration	Nontechnical Partially technical Technical	Partially technical had greatest purchase intent; Technical second most purchase intent	Yes
Chassy et al., 2015	Fixation Count, aesthetic appraisal	Likert Scale from 1 to 9	Highly complex images were more preferred; moderately complex images were most aesthetically appealing	Yes
Dellaert & Stremersch, 2005	Mass Customization to Consumer	Low Moderate High	Complexity had negative effect on customization	Yes
Eytam et al., 2017	Choice for Users and Consumers	Simple Medium Complex	Medium complexity was most preferred for both Users and Consumers	Yes
Geissler et al., 2006	Purchase Intent	Least Moderate More Complex	Moderate complexity had highest purchase intent	Yes
Goodman & Irmak, 2013	Product satisfaction	Low (Feature Usage) Average High	Low complexity had highest product satisfaction	Yes
Janiszewski & Meyvis, 2001	Single-meaning Stimuli Multiple-meaning Stimuli	Likert Scale 1 to 7	Single-meaning: Low complexity preferred Multiple-meaning	Yes

Table 1 / cntd.

			Stimuli: High complexity preferred	
Lavie, 2000	Mean reaction times	Low High	Low requires less prime response time	No
Orth et al., 2016	Shopping experience	Low Moderate High	Low complexity had highest shopping experience	Yes
Pieters et al., 2010	Attitude towards the Ad	Low Moderate High	High complexity had greatest attitude towards ad	Yes
Puškarević et al. 2016	Purchase Intent	Figuration No Figuration	Figuration led to greatest purchase intent	Some stimuli had images, some did not
Putrevu et al., 2004	Purchase Intent	Likert Scale 1 to 7	High complexity had highest purchase intent	Yes
Shuptrine & McVicker, 1981	Education level of Magazine Audience	Readability of advertisements	Not correlated, leading experiments to perceive ads may be designed to meet the lowest education level regardless of what a magazine's general audience's education level may be.	No
Thompson et al., 2005	Usability Capability Expertise	Low features Medium features High features	High Features decreased usability; Increased capability and expertise	Some stimuli had images, some did not

Table 1 / cntd.

Tuch et al., 2009	Recognition Rate	Likert Scale 1 to 7	Low complexity had highest recognition rate	Some stimuli had images, some did not
-------------------	------------------	---------------------	---	---------------------------------------

with increased performance in search tasks, comprehension, and recall (Tuch et al. 2009).

Consumer characteristics influence the perception of complexity and complex designs can create both positive and negative associations. Knowledge can be a significant moderator for visual, technical, and lexical dimensions of complexity (Putrevu et al. 2004). Also, information-rich messages seem to be more effective for highly involved consumers, suggesting that those consumers were less likely to suffer from information overload and, hence, were persuaded by the information contained in more complex messages (Putrevu et al.). Dellaert and Stremersch (2005) and Eytam et al. (2017) further confirm that consumers are more willing to accept the complexity of a customized product if they perceive a higher product utility or functionality. Yet, high complexity may cause feature-fatigue because feature-laden products may frustrate users and reduce satisfaction (Goodman and Irmak 2013; Thompson et al. 2005). Negative feelings towards greater complexity may reduce purchase probabilities.

Characteristics associated with higher complexity such as irregular shapes, greater detail (such as visually rich photographs), and increased variety of objects increase the likelihood of higher order processing (Donderi 2006). However, higher complexity is not always seen as a positive. Orth and Wirtz (2014) sought to establish visual complexity effects on approach / avoidance behavior through processing fluency and perceived attractiveness of an environment. In their work, two stores were evaluated on their perceived complexity. The main result is that complexity has a significant negative effect on perceived attractiveness and on perceptual load. However, perceptual load (amount of distractor information) fully mediates the relationship between complexity and shopping experience. This confirms that complexity operates through perceptual load to negatively affect the shopping experience for consumers. In this case, more visually complex environments are detrimental to the shopping experience because of the increased load they place on customers (Orth et al. 2016).

Design Complexity and Attention

To process the visual information, visual attention must first be allocated to a stimulus, or sign (Kellaris and Machleit 2016; Tang 2020). This form of attention is related to processing ease and fluency (speed); for example, greater attention to complex words leads to shorter processing time (Rayner 2009). Complexity can influence visual attention negatively, as crowded shelf displays can disrupt shoppers' visual attention by slowing down the

cognitive processing required to locate an item (Pieters et al. 2010; Clement et al. 2013). This cognitive load, where individuals monitor and try to gain control over their thoughts and mental effort when processing input, can deplete a person's attention capacity (Lavie 2000; Schwartz et al. 2013). When visual complexity increases so does mental processing effort. Gilbert et al. (1988) show that individuals who try to actively control their visual attention and ignore nuisance stimuli (e.g. crowded displays) perform worse on a subsequent task than subjects who view the same meaningless stimuli but do not actively try to ignore them. Therefore, complex display designs may impede consumer purchase choice because the effort to cognitively process the display distracts from the goal of the display – to motivate purchase.

Eye Movement

Eye movement is an indicator of visual attention, decision-making processes, and choice (Ares et al. 2014; Behe et al. 2017; Hepworth et al. 2010; Huddleston et al. 2018; Milosavljevic et al. 2012; Mundel et al. 2018; Werthmann et al. 2013). This information is collected in an objective, non-invasive manner by observing gaze behavior and computing metrics, such as fixation duration and fixation count (Vu et al. 2016). Fixation duration is the length of visual stop on an object, while fixation count is the number of stops in a visual area of interest (AOI). For complex visual stimuli such as displays, eye fixations are necessary in identifying and cognitively processing objects (Chandon et al. 2009).

Humans are blind during physical eye movement (saccade), except for smooth pursuit saccade, an example of which would be watching a car drive past. "Visits" are a visual metric that include both saccades and fixations in a specific AOI. Given the inability to see during eye-movement, fixations, not visits, are the more common metric. Additionally, fixation count (FC) and total fixation duration (FD) are highly correlated. FC is the number of times a person views a specific area and FD is the sum of fixation times in a specific area of interest. If a subject had 10 fixations (FC=10) in a specific AOI, each lasting 0.1 second, the FD is 1 second. Although the measures are related, they do highlight different aspects of visual attention, as where FC indicates the number of "looks" an area

attracts FD is an aggregate measure of time in that area.

In consumer behavior contexts, eye-movements are thought to be controlled by top-down and bottom-up processes in choice tasks (Orquin and Loose 2013). Top-down processes refer to characteristics about the consumer, such as individual traits. Bottom-up factors, on the other hand, refer to characteristics about the stimulus, such as signs or products. Top-down and bottom-up factors contribute to attention and, thus, both affect meaning derived from the stimuli (Huddleston et al. 2015). Top-down information assessment is considered as goal-driven attention and bottom-up is commonly defined as stimulus-driven attention and is controlled by marketers who regulate the visual stimuli on displays (Corbetta and Shulman 2002).

The evidence linking FC to complexity is mixed. Huddleston et al. (2015) found a negative relationship between the FC and LTB in a retail center context while other studies have confirmed a positive relationship between visual complexity and FC (*see* Chassy et al. 2015; Wang et al. 2014). Interestingly, Wang et al. found that FD was similar for websites, despite varying degrees of complexity; however, for complex tasks on moderately complex websites, FD is greater. This could be attributed to load theory of attention, which explains how a person can filter unnecessary stimuli under conditions of high perceptual load (Wang et al. 2014). Van der Laan et al. (2015) investigate the effect of FD on choice and they found that the preferred choice was fixated upon longer. Thus, we hypothesize:

H1a: Signs classified as highly complex (vs. moderate or low) will have the highest FD;

H1b: Highly complex signs will have the greatest FC.

Attractiveness

Attractiveness, "the quality of being pleasing or appealing to the senses," is a subjective property, and several dimensions of attractiveness (aesthetics, arousal, functionality, and fluency) have been investigated in the context of product evaluation (Kellaris and Machleit 2016; "Attractiveness" 2020). Of these dimensions, aesthetics is a predictor of

preference across all levels of visual complexity regardless of user type (Eytam et al. 2017). Thus, if a consumer finds an item to be attractive, then regardless of the level of packaging or signage complexity, the consumer will prefer that particular item. These aesthetic appraisals happen within a few seconds and a key driver of attractiveness is how fluently viewers are able to process the stimulus (Lindgaard et al. 2006; Mollerup 2015; Tractinsky et al. 2006; Reber, Wurtz, and Zimmermann 2004).

Fluency is the subjective experience of ease with which a person processes a stimulus and an important source of information (Reber, Wurtz, and Zimmermann 2004). Sometimes consumers misattribute the fluency to the stimulus and associate more fluent stimuli with greater attractiveness (Schwarz). In Puškarević et al. (2016), a study similar to Wedel and Pieters (2008), consumer attitude towards advertisements with different typeface figurations were evaluated on a five-point Likert scale using three variables: likeable, favorable, and interesting. Findings show that consumers pay attention to and find advertisements most attractive when the short verbal cues are depicted through rhetorical figuration, indicative of the observation that simple advertisements are most attractive (Puškarević et al. 2016). In this study, we use signage as an advertising format and hypothesize that:

H2: Consumers will rate moderately complex signs as more attractive compared to simple or high-complexity signs;

H3a: Sign complexity is a predictor of Likelihood to Buy (LTB) a product from a display containing that sign;

H3b: More attractive signs will evoke a higher LTB;

H3c: Greater visual attention to the number of elements in the display (FC) will evoke a greater LTB;

H3d: More visual attention through total time processing (FD) will indicate a greater LTB.

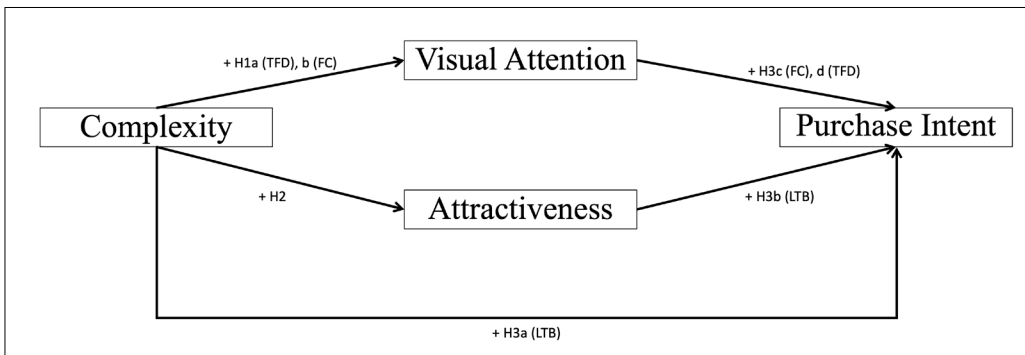


Figure 1 / Theoretical model predicting purchase intent showing hypotheses and measures

MATERIALS AND METHODS

Stimuli

To develop the study stimuli, a selection of 105 images were taken from displays in U.S. garden retailer centers. This selection was designed to ensure a broad array of sign complexity, based on attributes described in Pieters et al. (2010), was present. A team of five raters gauged sign complexity based upon the following criteria: quantity of objects (many = complex), irregularity of objects (irregular = complex), dissimilarity of objects (dissimilar = complex), detail of objects (detail = complex), asymmetry of object (asymmetric = complex), and irregularity of object arrangement (irregular = complex). The raters were trained independently, and each evaluated all of the images; their ratings were averaged and subject to mean separation by SPSS (data available upon request). Of the 105 images, 5 low, medium, and high complexity signs were then selected for the study, totaling 15.

Low complexity signs have mean scores at least one standard deviation (*SD*) above the minimum (1.00) and a *SD* of raters less than two-thirds the overall *SD* (1.12). Moderate complexity signs are scored at one *SD* above the mean (0.560) and a *SD* of the raters less than 2/3 of the overall *SD* (1.12). High complexity signs have 1 *SD* under the maximum and a *SD* of the raters less than 2/3 of the overall *SD* (1.12). To further reduce the number of images, those with the lowest standard deviations and with means closest to the overall minimum, mean, and maximum are chosen for the low, moderate, and high complexity categories, respectively. Figure 2 (below) shows the stimuli in each complexity level.

Images were then randomized and incorporated into the Tobii X1 Light Eye Tracker software and pre-tested with several subjects prior to study implementation to beta-test for subject fatigue and experiment timing. The eye-tracking camera was mounted on the study's computer monitor and the images were located centrally on the screen.

Procedure

To test our hypotheses, an experiment with a protocol and instrument approved by the University Committee on Research Involving Human Subjects was conducted using the selected signs (IRB# x18-1348e Category: Exempt 2). Collected data were analyzed with SAS System for Windows (Version 9.4). After visually evaluating each image, subjects rated their likeliness to buy (LTB) a product from a display and sign attractiveness. Attractiveness, consisting of a three-item scale (likeable, beautiful, and attractive) are measured using 5-point Likert scales. Likeliness to buy (LTB) is measured using a 11-point Juster scale (0=no probability of purchase, 10=certain probability of purchase). At the end of the experiment subjects complete a separate computer-based questionnaire (Qualtrics Online Survey Software) containing sociodemographic information.

Data were collected in the fall of 2018 at two large American universities and

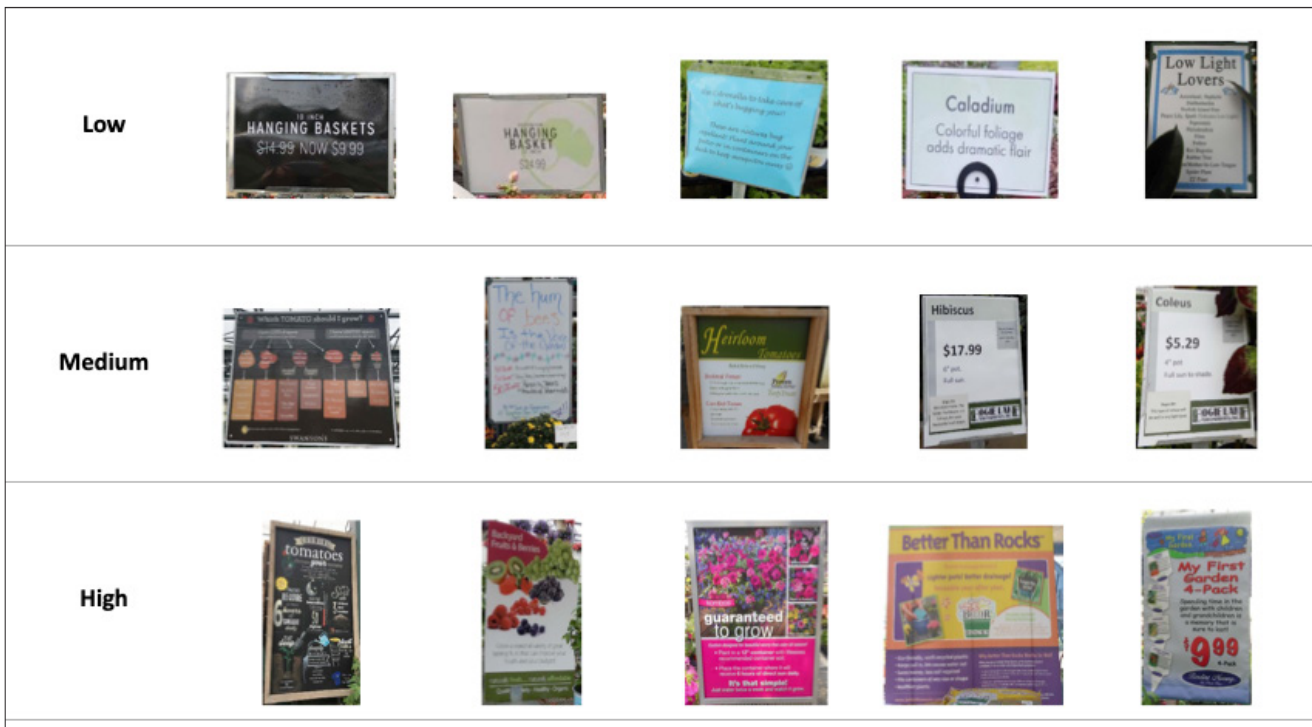


Figure 2 / Signs within experiment displayed by complexity category

subjects, largely non-student, were recruited through email invitations sent to departmental panels. Upon arrival at the testing location, subjects were greeted, provided with an informed consent form, and paid a \$10 incentive; they then conducted the eye-tracking portion of the study, followed by a purchase and demographic questionnaire.

Eye-movement tracking process

Once seated at the Tobii eye-tracking device, the eye-tracker was calibrated to the subjects (Behe et al. 2013). The study began with instruction and practice slides. Each of the 15 stimuli were preceded by a 2 second bull's eye to reposition the subject's gaze to one of the 4 corners of the screen to avoid central gaze bias. In addition to the LTB and attractiveness ratings, two visual measures of attention, fixation count (FC) and fixation duration (FD) with FD calibrated to a hundredth of a second, were extracted.

Sample Characteristics

The study sample is 73% female ($SD = 0.44$) and has a mean age of 34 years ($SD = 11.92$). There is an average of 2 adults per household (mean = 2.05, $SD = 0.79$) and 75% of the households have at least 1 child (mean = 0.75, $SD = 0.02$). The percentage of subjects who completed a 4-year college degree or greater is 80.2% of the sample (mean = 5.18; $SD = 1.36$). Household income averages \$62,559 ($SD = 49.21$). Ninety-five percent of the population is plant purchasers.

Regarding the participants' plant purchase habit, the three most purchased plant categories are herbs (58%, mean = 0.58, $SD = 0.5$), indoor foliage plants (49%, mean = 0.04, $SD = 0.50$), and annuals (44%, mean = 0.44, $SD = 0.5$). The average subject purchases plants in two of the plant categories listed (mean

= 2.42, $SD = 1.56$). These values are consistent with national statistics on plant purchases (Butterfield and Baldwin 2015).

Analyses

Sign complexity is the independent variable and the dependent variables are visual attention measures (fixation count and fixation duration), sign attractiveness, and likeliness to buy (LTB). Sign attractiveness is measured using a three-item construct: "How attractive is this sign?" (0=very unattractive, 5=very attractive) "How beautiful is this sign?" (0=not at all beautiful, 5=very beautiful) and "How likeable is this sign?" (0=very unlikeable, 5=very likeable), whereas LTB is measured using an 11-point Juster scale (0=no probability of purchase, 10=certain probability of purchase) (Juster 1966). The Principal Component Analysis of the three items used to measure attractiveness accounts for 85% of the variance (Cronbach Coefficient Alpha Standardized = 0.9281). The three items have loadings over 0.600 (Attractive = 0.9519, Beautiful = 0.9420, Likeable = 0.9111) and are used as a single construct to measure attractiveness.

A series of one-way ANOVA analyses, by complexity, was conducted to test H1a, H1b, and H2. Differences between sign complexity levels are tested with Tukey's HSD. To test all parts of H3, a regression assessed impact of sign complexity, sign attractiveness, and visual measures (FC and FD) has on LTB.

RESULTS

Hypothesis 1a: Signs classified as highly complex (v. moderate or low) will have the highest FD. Signs with high and moderate complexity have a similar FD (6.1_{high} vs. 5.8_{moderate}) which was greater than signs classified as low complexity (4.7_{low}) (see Table 2). Thus, Hypothesis 1a is partially supported.

Hypothesis 1b: Highly complex signs will have the greatest FC.

In partial support of Hypothesis 1b, signs categorized as highly complex have a greater FC as compared to signs categorized as low complexity (29.7_{high} vs. 24.1

$_{\text{low}}$), but FC in high complexity signs is similar to signs classified as moderately complex (28.9_{moderate}) (see Table 2).

Hypothesis 2: Consumers will rate moderately complex signs as more attractive compared to simple or high-complexity signs.

Using participants' composite rating of sign attractiveness for each of the 15 signs, results show that signs classified as highly complex have the greatest attractiveness (mean=0.678, SE= 0.02) compared to low (mean=0.134, SE=0.03) or moderate complexity signs (mean=-0.659, SE=0.04). This is confirmed with a Tukey's HSD (High v. Low =1.337, $p=0.0001$; Moderate v. Low=0.790, $p=0.0001$; High v. Moderate=0.554, $p=0.0001$). Thus, Hypothesis 2 is not supported; contrary to this hypothesis, highly complex signs are rated as most attractive while low complexity signs are rated as least attractive.

Hypothesis 3: Sign complexity, sign attractiveness, FD, and FC are predictors of LTB.

To test Hypotheses 3a-3d, we examined both simple pairwise correlations (Table 3) and conducted a regression. Sign Complexity ($\beta=-0.1936$), Attractiveness ($\beta=1.8868$), FC ($\beta=0.0093$), and FD ($\beta=-0.0404$) are all predictors of LTB, however, sign complexity and FD are inversely correlated to likeliness to buy. Therefore, regression results support Hypothesis 3b and 3c. Approximately two-thirds of the observed variation in LTB are explained by this model, with attractiveness having the greatest explanatory power ($R^2 = 0.6842$).

Because FD and sign complexity were negatively related to purchase intention, a mediation effect of FD is suspected and following Baron and Kenny's (1986) recommendation for testing mediation, a series of regressions was conducted. First, we found that FC is positively related to FD ($F=13342.08$, $p=0.0001$). Next, regressing FC on purchase intention uncovered a positive result ($F=20.4098$, $p=0.0001$), as did regressing FD on purchase intention ($F=17.5186$, $p=0.0001$). Simply stated, both FC and FD independently increased purchase intention, however, regressing FC and FD on purchase intention showed that FD was no longer a significant predictor of purchase intention (FC: $F=2.8856$,

Table 2 / Test of eye tracking means and standard deviations (SD) by sign¹

Sign Feature Complexity Level	Fixation Duration Mean (SD)	Fixation Count
		Mean (SD)
Low	4.670 b (2.943)	24.097 b (14.565)
Medium	5.825 a (3.918)	28.878 a (18.091)
High	6.057 a (4.470)	29.719 a (20.175)
(DF) F-value, p-value	(2, 1203) 22.27, <.0001	(2, 1203) 16.02, <.0001

¹Different letters within columns indicate significant differences of means at $\alpha = 0.05$.

(SAS for Windows, version 9.4, SAS Institute Inc., Cary, North Carolina).

Table 3 / Pairwise correlations of independent variables

Variable	By Variable	Correlation (r ²)	Significance Level (p-value)
FD	Complexity	0.0887	0.0002
FC	Complexity	0.0357	0.0005
FC	TFD	0.9390	0.0001
Attractiveness	Complexity	0.5327	0.0001
Attractiveness	FD	0.1233	0.0001
Attractiveness	FC	0.1201	0.0001

Table 4 / Regression Analysis of Likelihood to Buy (LTB) by Attractiveness, Sign Complexity, Fixation Count, and Fixation Duration

Attribute and Level	Standardized			
	Beta Estimate (SE)	Num DF	F value	Pr > F
Intercept	6.0593 (0.1012)	1	59.87	0.0001
Complexity	-0.1936 (0.0420)	1	21.2634	0.0001
Attractiveness	1.8868 (0.0346)	1	2966.357	0.0001
FC	0.0093 (0.0044)	1	4.5451	0.0331
FD	-0.0404 (0.0202)	1	4.0171	0.0452
AICC	5762.817			
BIC	5795.716			
R ²	0.6842			

Notes: n=1792; F-value= 967.8213; p-value= <0.0001.

(SAS for Windows, version 9.4, SAS Institute Inc., Cary, North Carolina)

$p=0.0895$; $FD: F=0.0240$, $p=0.8770$), indicating that FD mediates the effect of FC on purchase intention.

To summarize, subjects spent more time (higher FD) viewing high and moderately complex signs and across more areas (higher FC) as compared to lower complexity signs. Highly complex signs were found most attractive, with moderately and then low complexity signs following. A negative relationship between sign complexity and FD on purchase intention exists, meaning that lower complexity and a shorter glance increased purchase intention. However, there was a positive relationship between attractiveness and FC on purchase intention, indicating that a more aesthetically pleasing sign drew more looks increasing purchase intention. The series of regression analyses shows that FD mediates the relationships between FC and purchase intention, meaning that shorter viewing time decreased the number of possible areas at which to look or pieces of information that could be acquired.

DISCUSSION

The objective of this study is to explore the relationship between sign complexity, visual attention, perceived attractiveness of signage, and likeliness to buy. Pieters et al.'s (2010) complexity criteria are used by trained judges to characterize low, medium, and high complexity signs. Previous studies report that moderate complexity is most appealing to consumers, whereas our findings show the highest complexity level is rated as most attractive (Berlyne 1974; Pieters et al.). This could be the result of study participants finding greater functionality in the high-complexity signs (i.e. more salient information) and low functionality with low complexity signs and because plants are living products that are expected to grow and change, consumers may require more information before investing in a perishable product to reduce a perceived risk (Etyam 2017; Behe and Fry 2019). In this purchase context, and contrary to Thompson et al. (2005), reducing sign functionality is not desired. Also, consumers with an existing information base may need more detailed information provided by complex signage as a basis for comparison against that existing knowledge (Putrevu et al. 2004). This is confirmed by previous work that describes how consumers are more willing to accept the complexity of a customized product if that product allows them to achieve a higher product utility or functionality (Dellaert and Stremersch 2005).

The study participants found greater visual appeal in the higher complexity signs, potentially the result of finding highly complex signs more attractive because they have greater aesthetic appeal (see Janiszewski and Meyvis 2001; Reber et al. 2004a; 2004b). While we did not measure fluency, it is possible that consumers found greater fluency, a subjective measure based on the individuals' experience with the stimulus, in the combination of text and images present in highly complex signs. Since all the participants have previously purchased plants, they may have found greater fluency in highly complex signs because of their familiarity with these types of signs or products or expected to see this type of sign in a garden store or retail center. A relation-

ship between familiarity and perceived attractiveness has been found in previous work (Peskin and Newell 2004). Future studies should investigate the relationships between fluency, familiarity, and attractiveness, and in turn, the ability of these constructs to predict purchase intention.

Contrary to Hypotheses 3a-3d, complexity is inversely related to LTB (purchase intention), so, while the respondents found more complex signs to be more attractive, this did not result in higher purchase intention. A seeming disconnect, this aligns with Iyengar and Lepper's (2000) study, which finds that consumers are more attracted to a larger product display but are more likely to purchase from a limited product display. In forming purchase intention some information may be necessary, but too much information may lead to excessive higher order processing which in turn decreases purchase intention (Donderi 2006).

Hypotheses 1a and 1b, which explore visual attention and sign complexity, is supported; high complexity signs garnered more visual attention (i.e. higher fixation count and total fixation duration). This finding is consistent with Pieters et al. (2010), who confirm that advertising complexity increased visual attention, and with Morrison and Dainoff (1972), who show that greater sign complexity resulted in longer looking time.

A positive relationship exists between likeliness to buy and fixation count, thereby indicating that participants allocate more "looks" to the point of purchase signs. This allocation of visual attention supports Behe et al. (2014), in that consumers seek out and find desired or useful information faster when it is important to *them*, almost as if they unconsciously sort through the information present on the sign to "cherry-pick" what would help *them* make a purchase decision. This "cherry picking" would be supported in the observed higher FC. Further, the inverse relationship between fixation duration and likeliness to buy refutes previous studies (Atalay 2012; Glaholt and Reingold 2009; Krajbich 2010).

Finally, the study also found a mediation effect of FD on FC predicting purchase intention. Intuitively, a person would have fewer "looks" if they were not looking

as long. Maughn et al. (2007) reported that the study participants liked a bus advertisement more if they looked at it longer. Yet, the evidence in the present study shows that the time spent viewing a sign (FD) limits how many individual pieces of information (FC) can be gleaned from it.

CONCLUSIONS

The impetus for this study is the application of Pieters et al.'s (2010) visual complexity criteria to a retail setting (garden centers) using point of purchase signage. We found that moderate / high complexity signs captured more visual attention (FD) and motivated consumers to view more areas in the signs (FC), which was similar to Chassy et al. (2015). Based on previous research, we predicted that consumers would prefer moderately complex signs over simple/highly complex signs, but this was not the case. Highly complex signs are perceived as more attractive, but greater attractiveness did not enhance purchase intention. Perceived attractiveness and complexity are positively related, i.e. more elements created a richer image and a more pleasing view, however, simply finding a complex sign as attractive did not stimulate purchase intention. More information, while creating a more attractive image, could have cluttered the path to a purchase decision; not all of the information on a complex sign was useful to all of the study subjects.

The challenge for a retailer is to identify the information that is most useful to a broad customer base and strike a balance between information and quality. For example, price as a search attribute is quite often an important, if not essential, input to the purchase decision and needs to be included in a display sign. In this study, respondents were not asked to identify what information was useful, but future work should seek to capture usefulness of information and to whom it matters most. A perceived overabundance of information in the high complexity signs actually reduced the likelihood of purchase intention, but it is unknown what information is superfluous. For example, highlighting experience attributes, such as a tomato's flavor or basil's aroma, may be helpful in a purchase decision to some customers—others though may seek out credence attributes and would rather know if the plant was grown organically or from a local producer. Teas-

ing out the underpinnings of this intricate relationship should be a focus of future research.

From a managerial standpoint, the inverse relationship between likeliness to buy and complexity suggest that low complexity signs are appropriate for impulse purchases where the seller is trying to encourage a quick decision (Hausman 2000). In light of emergent text-based (SMS) marketing, there may be a mechanism to send a potential customer the customized information that reduces the perceived information clutter unintentionally communicated by highly complex signs. Future research should focus on the sign element combinations that lead to perceived attractiveness, which, as determined in this study, leads to purchase intention. For example, will using text to highlight the benefits (vs. features) of a plant or any other product resonate with consumers (Hall and Knuth 2019a; 2019b; 2019c)? How should images be integrated into the point of purchase signage? Will information-rich messaging create cognitive overload for consumers? What is the correct balance between information and images to enhance both perceived attractiveness and purchase intention? Another fruitful avenue for study is to measure both the perceived fluency and cognitive load that high and low complexity signs present and then analyze these constructs in light of purchase intention.

One potential limitation to this study is the lack of product images on low complexity signs. Since the complexity criteria for this study originated in Pieters and Wedel (2010), where the number of images were one of the evaluation criteria, the number of images for these signs were minimized. Choices of signage to reflect the different complexity levels in the main study were based on the mean / standard deviation of the judges' responses. As a result, some signs were primarily text and without images of the plant or produce and may have altered the sign's complexity rating. Perhaps also, other experts would have assessed the signs differently. Future studies should investigate a broader array of products and signs to determine how perceptions vary by product type or also include a complexity rating by participants.

In addition to the research questions previously mentioned, future research could investigate in what circumstances low or high complexity signs might be more effective in eliciting purchase intention (e.g. impulse purchases). For premium price points or for featured products a more complex sign could be more effective in motivating consumers to learn more about the product and dive into the details. Typically, in-store signs present other dimensions such as brand credibility and readability, which may influence perceived attractiveness, complexity and therefore, purchase intention. Top down factors (e.g. expertise, time, pressure) might also influence these constructs and will be considered as a future research area.

REFERENCES

- Anderson, R. E. and Jolson, M. A. (1980). Technical wording in advertising: Implications for market segmentation. *Journal of Marketing* 44(1), 57-66.
- Ares, G., Mawad, F., Giménez, A. and Maiche, A. (2014). Influence of rational and intuitive thinking styles on food choice: Preliminary evidence from an eye-tracking study with yogurt labels. *Food Quality and Preference* 31, 28-37.
- Atalay, A. S., Bodur, H. O., and Rasolofoarison, D. (2012). Shining in the center: Central gaze cascade effect on product choice. *Journal of Consumer Research* 39(4), 848-866.
- “Attractiveness.” (2020). *Oxford Online Dictionary*.
- Baron, R. M. and Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51, 1173-1182.
- Behe, B. K., Campbell, B. L., Khachatryan, H., Hall, C. R., Dennis, J. H., Huddleston, P. T., and Fernandez, R. (2014). Incorporating eye tracking technology and conjoint analysis to better understand the green industry consumer. *HortScience* 49(12), 1550-1557.
- Behe, B. K. and Fry, J. (2019). How do Plant Guarantees Reduce Consumer Risk Perceptions? *Journal of Risk Research*, 1-17.
- Behe, B. K., Huddleston, P. T., Hall, C. R., Khachatryan, H., and Campbell, B. (2017). Do real and fictitious plant brands differ in brand recognition, awareness, purchase intention, and visual activity? *HortScience* 52(4), 612-621.
- Behe, B. K., Fernandez, R. T., Huddleston, P. T., Minahan, S., Getter, K. L., Sage, L., and Jones, A. M. (2013). Practical field use of eye-tracking devices for consumer research in the retail environment. *HortTechnology* 23(4), 517-524.
- Berlyne, D. E. (1974). *Studies in the new experimental aesthetics*. Washington, DC: Hemisphere.
- Butterfield, B. and Baldwin, I. (2015). *National Gardening Survey*. Williston, VT: National Gardening Association.
- Chandon, P., Hutchinson, J. W., Bradlow, E. T., and Young, S. H. (2009). Does in-store marketing work? Effects of the number and position of shelf facings on brand attention and evaluation at the point of purchase. *Journal of Marketing* 73(6), 1-17.
- Chassy, P., Lindell, T. A. E., Jones, J. A., and Paramei, G. V. (2015). A relationship between visual complexity and aesthetic appraisal of car front images: An eye-tracker study. *Perception* 44(8-9), 1085-1097.
- Clement, J., Kristensen, T., and Grønhaug, K. (2013). Understanding consumers' in-store visual perception: The influence of package design features on visual attention. *Journal of Retailing and Consumer Services* 20(2), 234-239.
- Corbetta, M. and Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews in Neuroscience* 3(3), 201-215.
- Dellaert, B. G. and Stremersch, S. (2005). Marketing mass-customized products: Striking a balance between utility and complexity. *Journal of Marketing Research* 42(2), 219-227.
- Donderi, D. C. (2006). Visual complexity: A review. *Psychological Bulletin* 132(1), 73-97.
- Eytam, E., Tractinsky, N., and Lowengart, O. (2017). The paradox of simplicity: Effects of role on the preference and choice of product visual simplicity level. *International Journal of Human-Computer Studies* 105, 43-55.
- Geissler, G. L., Zinkhan, G. M., and Watson, R. T. (2006). The influence of home page complexity on consumer attention, attitudes, and purchase intent. *Journal of Advertising* 35(2), 69-80.
- Gilbert, D. T., Krull, D. S., and Pelham, B. W. (1988). Of thoughts unspoken: Social inference and the self-regulation of behavior. *Journal of Personality and Social Psychology* 55(5), 685.
- Glaholt, M. G. and Reingold, E. M. (2009). The time course of gaze bias in visual decision tasks. *Visual Cognition* 17(8), 1228-1243.
- Goodman, J. K. and Irmak, C. (2013). Having versus consuming: failure to estimate usage frequency makes consumers prefer multi-feature products. *Journal of Marketing Research* 50(1), 44-54.
- Hall, C. and Knuth, M. (2019a). An update of the literature supporting the well-being benefits of plants: A review of the emotional and mental health benefits of plants. *Journal of Environmental Horticulture* 37(1), 30-38.
- Hall, C. and Knuth, M. (2019b). An update of the literature supporting the well-being benefits of plants: Part 2 Psychological health benefits. *Journal of Environmental Horticulture* 37 (June), 63-73.
- Hall, C. and Knuth, M. (2019c). An Update of the Literature Supporting the Well-Being Benefits of Plants: Part 3-Social Benefits. *Journal of Environmental Horticulture* 37(4), 136-142.

- Hausman, A. (2000). A multi-method investigation of consumer motivations in impulse buying behavior. *Journal of Consumer Marketing* 17(5), 403-426.
- Hepworth, R., Mogg, K., Brignell, C., and Bradley, B. (2010). Negative mood increases selective attention to food cues and subjective appetite. *Appetite* 54(1), 134-142.
- Huddleston, P. T., Behe, B. K., Driesener, C., and Minahan, S. (2018). Inside-out: Using eye-tracking to investigate search-choice in the retail environment. *Journal of Retailing and Consumer Services* 43, 85-93.
- Huddleston, P. T., Behe, B. K., Minahan, S. M., and Fernandez, R. T. (2015). Seeking Attention: A study of in-store merchandise displays using eye-tracking. *International Journal of Retail and Distribution Management* 43(6), 561-574.
- Iyengar, S. S. and Lepper, M. R. (2000). When choice is demotivating: Can one desire too much of a good thing? *Journal of Personality and Social Psychology* 79(6), 995-1006.
- Janiszewski, C. and Meyvis, T. (2001). Effects of brand logo complexity, repetition, and spacing on processing fluency and judgment. *Journal of Consumer Research* 28(1), 18-32.
- Juster, F. T. (1966). Consumer buying intentions and purchase probability: An experiment in survey design. *Journal of the American Statistical Association* 61(315), 658-696.
- Kellaris, J. J. and Machleit, K. A. (2016). Signage as marketing communication: a conceptual model and research propositions. *Interdisciplinary Journal of Signage and Wayfinding* 1(1), 1-17.
- Krajbich, I., Armel, C., and Rangel, A. (2010). Visual fixations and the computation and comparison of value in simple choice. *Nature Neuroscience* 13(10), 1292.
- Lavie, N. (2000). Selective attention and cognitive control: Dissociating attentional functions through different types of load. *Attention Performance XVIII*, 175-194.
- Lindgaard, G., Fernandes, G., Dudek, C., and Brown, J. (2006). Attention web designers: you have 50 milliseconds to make a good first impression! *Behavioral Information Technology* 25(2), 115-126.
- Maughan, L., Gutnikov, S. and Stevens, R. (2007) Like more, look more. Look more, like more: The evidence from eye-tracking. *Journal of Brand Management* 14, 335-342.
- Milosavljevic, M., Navalpakkam, V., Koch, C., and Rangel, A. J. (2012). Relative visual saliency differences induce sizable bias in consumer choice. *Journal of Consumer Psychology* 22(1), 67-74.
- Mollerup, P. (2015). *Simplicity: A Matter of Design*. Amsterdam: BIS.
- Morrison, B. J., and Dainoff, M. J. (1972). Advertisement complexity and looking time. *Journal of marketing research* 9(4), 396-400.
- Mundel, J., Behe, B. K., and Huddleston, P.T. (2018). An eye tracking study of minimally branded products: Hedonism and branding as predictors of purchase intention. *Journal of Product and Brand Management* 27(2), 146-157.
- Orquin, J. L. and Loose, S. M. (2013). Attention and choice: A review on eye movements in decision making. *Acta Psychologica* 144(1), 190-206.
- Orth, U. R. and Crouch, R. C. (2014). Is beauty in the aisles of the retailer? Package processing in visually complex contexts. *Journal of Retailing* 90(4), 524-537.
- Orth, U. R. and Wirtz, J. (2014). Consumer processing of interior service environments: the interplay among visual complexity, processing fluency, and attractiveness. *Journal of Service Research* 17(3), 296-309.
- Orth, U. R., Wirtz, J. and McKinney, A. (2016). Shopping experiences in visually complex environments: a self-regulation account. *Journal of Service Management* 27(2), 194-217.
- Peskin, M. and Newell, F. N. (2004). Familiarity breeds attraction: Effects of exposure on the attractiveness of typical and distinctive faces. *Perception* 33(2), 147-157.
- Pieters, R., Wedel, M., and Batra, R. (2010). The stopping power of advertising: Measures and effects of visual complexity. *Journal of Marketing* 74(5), 48-60.
- Puškarović, I., Nedeljković, U., Dimovski, V., and Možina, K. (2016). An eye tracking study of attention to print advertisements: Effects of typeface figuration. *Journal of Eye Movement Research* 9(5), 1-18.
- Putrevu, S., Tan, J., and Lord, K. R. (2004). Consumer responses to complex advertisements: The moderating role of need for cognition, knowledge, and gender. *Journal of Current Issues and Research in Advertising* 26(1), 9-24.

- Rayner, K. (2009). Eye movements and attention in reading, scene perception, and visual search. *The Quarterly Journal of Experimental Psychology* 62(8), 1457-1506.
- Reber, R., Schwarz, N., and Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review* 8(4), 364-382.
- Reber, R., Wurtz, P., and Zimmermann, T.D. (2004). Exploring "fringe" consciousness: The subjective experience of perceptual fluency and its objective bases. *Consciousness and Cognition* 13(1), 47-60.
- Schwartz, R. N., Milne, C., Homer, B. D., and Plass, J. L. (2013). Designing and implementing effective animations and simulations for chemistry learning. In: *Pedagogic Roles of Animations Simulations in Chemistry Courses*, eds J. Suits and M. Sanger. Washington, DC: American Chemical Society.
- Schwarz, N. (2004). Metacognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology* 14(4), 332-348.
- Shuptrine, F. K. and McVicker, D. D. (1981). Readability levels of magazine ads. *Journal of Advertising Research* 21(5), 45-51.
- Tang, M. (2020). Analysis of signage using eye-tracking technology. *Interdisciplinary Journal of Signage and Wayfinding* 4(1), 61-72.
- Thompson, D. V., Hamilton, R. W., and Rust, R. T. (2005). Feature fatigue: When product capabilities become too much of a good thing. *Journal of Marketing Research* 42(4), 431-442.
- Tractinsky, N., Cokhavi, A., Kirschenbaum, M., and Sharfi, T. J. (2006). Evaluating the consistency of immediate aesthetic perceptions of web pages. *International Journal of Human-Computer Studies* 64(11), 1071-1083.
- Tuch, A. N., Bargas-Avila, J. A., Opwis, K., and Wilhelm, F. H. (2009). Visual complexity of websites: Effects on users' experience, physiology, performance, and memory. *International Journal of Human-Computer Studies* 67(9), 703-715.
- van der Laan, L. N., Hooge, I. T., De Ridder, D. T., Viergever, M. A., and Smeets, P. A. (2015). Do you like what you see? The role of first fixation and total fixation duration in consumer choice. *Food Quality and Preference* 39, 46-55.
- Vu, T. M. H., Tu, V. P., and Duerrschmid, K. (2016). Design factors influence consumers' gazing behaviour and decision time in an eye-tracking test: A study on food images. *Food Quality and Preference* 47, 130-138.
- Wang, Q., Sang, S., Liu, M., Cao, Z., and Ma, Q. (2014). An eye-tracking study of website complexity from cognitive load perspective. *Decision Science* 62, 1-10.
- Wedel, M. and Pieters, R. (2008). Eye tracking for visual marketing. *Foundations and Trends in Marketing* 1(4), 231-320.
- Werthmann, J., Roefs, A., Nederkoorn, C., and Jansen, A. J. (2013). Desire lies in the eyes: attention bias for chocolate is related to craving and self-endorsed eating permission. *Appetite* 70, 81-89.

A Sign of Trust? The value of source attribution in accolade claims

Mathew S. Isaac

Professor
Seattle University
Albers School of Business and Economics

isaacm@seattleu.edu

INTRODUCTION

When designing effective on-premise or outdoor signs, advertising agencies routinely stress the importance of simplicity. Clear Channel Outdoor, the oldest outdoor advertising company in the United States, notes on its website: “Simplicity is the fundamental guideline for creating good out-of-home design. The most effective out-of-home designs capture the essence of a message with lucid expression” (Clear Channel 2019). This fundamental design principle applies not only to outdoor signs, but also to on-premise signs. In its best practice standards, the United States Sign Council Foundation advocates short messages and simple typography for on-premise signs as those require less time to read and mentally process (Garvey et al. 2018). Academic research has corroborated the view that greater visibility (achieved through conspicuousness and legibility), in concert with lower informational density and complexity, usually enhances the effectiveness of a sign as a communication vehicle (see Bullough 2017; Stempler and Polger 2013; Van Loock, Vermeir, and Geuens 2010).

Signs, however, are often meant not only to educate and inform, but also to change attitudes and persuade potential customers. In such situations, richer and more detailed content—with greater informational density and complexity—may be more effective because it offers greater specificity and enhanced credibility (MacInnis et al. 1991; Morrison and Dainoff 1972; Phillips 1997). I contend that there is an inherent tension between simplicity and credibility in certain types of persuasive signage. The present research focuses specifically on signs that contain *accolade claims*, those which tout endorsements, awards, or honors that an organization has received—presumably from a third-party entity or accrediting body. When sharing news of its accolade with current or prospective customers, an organization must make decisions related to *source attribution*—that is, how much detail

Abstract /

Organizations that have received an accolade or honor often share this information with current or prospective customers, either in a digital (i.e., on their website, social media, etc.) or physical (i.e., on-premise signs, outdoor signs, etc.) format. When publicizing their achievement, marketers must make decisions related to *source attribution*—that is, how much detail to provide and how prominently (if at all) to mention the third-party entity that bestowed the accolade upon them. This is an important question, particularly with respect to physical signs where informational complexity is often detrimental and visual clarity is paramount. In this research, I examine whether source attribution in signage materially affects consumer evaluations and behavioral intentions. Across three studies, I find converging evidence that source attribution in accolade claims does in fact bolster evaluations and behavioral intentions, even in the context of physical signage when consumers are likely to be engaged in heuristic processing. Furthermore, I provide evidence that these more positive judgments arise because attribution increases perceived credibility of the organization receiving the accolade.

Keywords /

awards; credibility; source attribution; heuristic processing; advertising claims

to provide and how prominently (if at all) to mention the third-party entity that bestowed the accolade. For example, after being named by *Food and Wine* magazine as one of the best new restaurants of 2020, Nixta Taqueria might consider posting a *high source attribution* sign with detailed information about the accolade and the source or a *low source attribution* sign with limited information (Shah 2020). In the context of signage, I examine whether consumer attitudes and behaviors are materially influenced by the level of source attribution in an accolade claim.

ACCOLADE CLAIMS

Organizations whose products or services have received endorsements, awards, or honors from a third-party entity often share this information with current or prospective customers (*see* Isaac, Brough, and Grayson 2016). Although such accolades may be communicated digitally, they are routinely publicized via physical signs. Figures 1A and 1B respectively provide examples of outdoor signs and on-premise signs in which organizations have communicated accolades that they received.

The proliferation of accolade claims in signage suggests a belief among practitioners that such claims will have positive downstream consequences on consumer attitudes and purchasing behavior. This assumption is supported by prior research showing that consumers' evaluations tend to increase when they learn that an organization has received an honor or award (Balasubramanian, Mathur, and Thakur 2005; Dean and Biswas 2001).

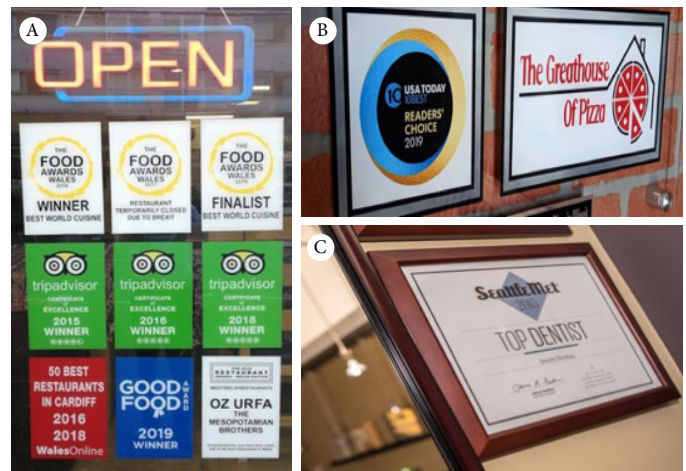


Figure 1B / Example (A): OZ Urfa Restaurant sign, Cardiff, Wales; (B): The Greathouse of Pizza sign, Casey, Illinois; (C): Goichi Shiotsu Dentistry sign, Mercer Island, Washington

Importantly, accolade claims vary considerably with respect to the level of detail provided about the accolade and even the third-party entity that conferred the accolade. The provision of fewer details is especially likely for signage, where physical space is at a premium and organizations may feel compelled to adhere to the principle of simplicity. Figure 2 provides examples of signage where the identity of the third-party entity who conferred the accolade to the organization is absent. Such claims are considered low in source attribution.

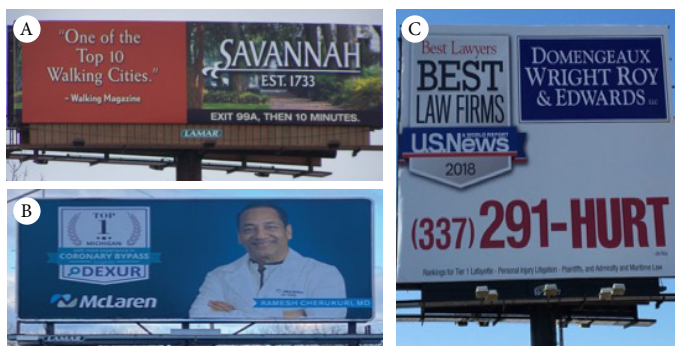


Figure 1A / Example (A): Top Walking Cities sign, Savannah, Georgia; (B): Top Doctor sign, Bay City, Michigan ; (C): Best Law Firm sign, Lafayette, Louisiana



Figure 2 / Example (A): Bar-B-Q Shop Restaurant sign, Memphis, Tennessee; (B): Biff-Burger Restaurant sign, St. Petersburg, Florida; (C): The Clever Cup Coffee Shop sign, Sarasota, Florida

THE CASE FOR LOW SOURCE ATTRIBUTION

Within the context of physical signs, are consumers sensitive to source attribution? The answer to this question is not straightforward because of the inherent tradeoff between simplicity and specificity in marketing communications—a tradeoff that may

be particularly pronounced in signage. According to the outdoor advertising company Capitol Outdoor, the average person views a billboard for about four seconds (Capitol 2020). As such, consumers may not have sufficient time to encode detailed source attribution information.

Furthermore, there is limited real estate on a physical sign and marketers must therefore be judicious in determining the content that merits inclusion. Adding source attribution information may make a sign appear more cluttered, which can interfere with conspicuousness and legibility (Bullough 2019). Prior work, largely in advertising, has repeatedly documented the benefits of simplicity in marketing communications (Anderson and Jolson 1980; Chamblee et al. 1993; Lowrey 1998; Morrison and Dainoff 1972; Rossiter and Percy 1983; Shuptrine and McVicker 1981). Research specifically on signage has also shown that cluttered and illegible signs tend to be ineffective at informing and/or persuading (*see* Bullough 2017; Van Loock, Vermeir, and Geuens 2010). A study examining traffic signs in mainland China, for example, concluded that simple signs tend to be more effective (Ng and Chan 2007). As another example, signage audits of libraries have shown that ineffective signs contain distracting visual clutter and “noise” (Stempler and Polger 2013; Yeaman 1989).

If signage appears cluttered, consumers may find it more difficult to understand, especially if viewing time is limited. Processing fluency (*see* Higgins 2000; Reber, Schwarz, and Winkielman 2004; Reber, Wurtz and Zimmermann 2004) has been defined as the ease with which new information can be processed (Schwarz 2004). It reflects the perceived ease of mental operations required to assign meaning to a stimulus and has been conceptualized as a continuum ranging from highly effortful (disfluent) to effortless (fluent) (Alter and Oppenheimer 2009). In general, increased processing fluency has positive effects on consumer evaluations by bolstering feelings of familiarity and liking (Whittlesea 1993; Whittlesea, Jacoby, and Girard 1990; King and Janiszewski 2011). In the context of signs, disfluency may cast a “dark cloud” over information and demotivate consumers to such a degree that they simply ignore the sign altogether

(Kellaris and Machleit 2016). To the extent that signage with low source attribution is simple, it may be expected to produce greater processing fluency and induce higher evaluations. Conversely, if signs with high source attribution are more complex, they may produce disfluency and lower evaluations.

Collectively, prior research on visual complexity and processing fluency suggests that consumers may value low source attribution (greater simplicity) over high source attribution (greater complexity) when processing accolade claims in signage. Of course, an alternative prediction is that level of source attribution will have negligible impact on consumer evaluations. This null effect prediction is consistent with recent work showing that people have difficulty differentiating “fake news” from real news and do not adequately discriminate between different sources, including native advertising and other content marketing, when making judgments about message credibility (*see* Wineburg et al. 2016; Wojdyski and Evans 2016). In contrast to both of these predictions, I make a case for a competing prediction—that consumers will prefer high source attribution in signs.

THE CASE FOR HIGH SOURCE ATTRIBUTION

Although greater effort is required to process a claim with high source attribution, as compared to one with low attribution, I contend that this difference is typically modest and so the previously conjectured benefits of low attribution in signage are limited. My proposition is that even accolade claims with high source attribution can be processed relatively quickly—with attribution serving as a salient indicator of credibility. According to most dual-process theories, consumers may either process information heuristically or systematically depending on the decision context and their own dispositional tendencies (*see* Chaiken et al. 1994). Heuristic processing tends to follow the peripheral route to persuasion, which leads consumers to emphasize message cues (e.g., message style, message sources) over the substantive content of a message when making evaluations (Petty and Cacioppo 1986). Certain decision-making contexts are more likely to prompt heuristic processing rather than systematic processing. For example, when processing messages quickly or when overwhelmed by information

overload, consumers may be especially motivated to reduce search costs by expending less effort and fewer resources (Chaiken 1980; Kirmani and Rao 2000; Zhang et al. 2014). When consumers encounter outdoor or on-premise signage, it seems likely that they will attend more closely to message cues than to detailed message content. Indeed, Burke (2009) suggests that audiences are unwilling to put much cognitive effort into processing messages on a sign. I posit that level of source attribution serves as a message cue that consumers employ—even when processing heuristically—to determine the credibility of an accolade claim.

Based on this argument, higher source attribution adds credibility to an accolade, particularly when the source is itself established and reputable. Accolade claims are typically experience claims that consumers cannot easily verify without incurring a cost. As such, the incremental credibility benefit provided by source attribution may exceed the modest increase in information processing costs. Jain and Posavac (2001) have pointed out that the endorsement of an experience claim by a credible source increases “evidence sufficiency,” which in turn increases the believability and persuasiveness of a message (170).

Research on accolade claims has provided corroborative evidence that consumers are able to quickly evaluate a marketing claim and make relatively sophisticated inferences. For example, consumers evaluated a bank more favorably when it claimed to be “one of the best banks” or “one of the 50 best banks,” as compared to “one of the 47 best banks” or “the 47th best bank” because they made different inferences about the bank’s position on the third-party list in each of these conditions (Isaac, Brough, and Grayson 2016). However, another study from the same paper found that consumers under time pressure were less discriminating about different rank claims. Thus, although I hypothesize that higher source attribution will have a positive effect on consumer evaluations by increasing perceptions of credibility, this is an empirical question that has not previously been examined in the context of signage. If my hypothesis is supported, the present work would constitute the first empirical evidence that signs with accolade claims are more persuasive when they employ high source attribution.

Over three studies, I examine the effects of source attribution in accolade claims on consumer evaluations and behavioral intentions. Full stimuli for these studies are provided in the Appendix. An important assumption of this research is that higher source attribution is associated with both lower visual simplicity and greater source credibility. To verify that this was indeed the case for the stimuli used in my studies, I conducted a pretest in which 280 participants (43.2% female, mean age = 38.54 years, $SD = 12.68$) from an online panel (Amazon Mechanical Turk) rated either the complexity or the credibility of the sign stimuli. As shown in Table 1, both complexity ratings (1 = fewer words / less complex, 10 = more words / more complex) and source credibility ratings (1 = not very believable / untrustworthy, 10 =

Table 1 / Pretest of Source Attribution Stimuli Across Studies

Source Attribution Condition	Study 1: Mean Rating (SD)		Study 2: Mean Rating (SD)		Study 3: Mean Rating (SD)	
	<i>Complexity</i>	<i>Credibility</i>	<i>Complexity</i>	<i>Credibility</i>	<i>Complexity</i>	<i>Credibility</i>
High	5.89 (2.38)	7.54 (1.98)	5.89 (2.38)	7.54 (1.98)	6.64 (1.89)	6.83 (2.43)
Medium	-	-	6.00 (2.45)	7.39 (2.02)	-	-
Low	5.43 (2.50)	7.32 (2.09)	5.14 (2.68)	7.28 (2.05)	6.18 (2.45)	6.40 (2.70)

very believable / trustworthy) were higher in the high source attribution conditions. If source attribution simultaneously increases visual complexity *and* source credibility, this creates a tradeoff given that the two concepts typically have opposing effects on consumer judgments. According to my theorizing, credibility will exert greater influence in a signage context, leading higher (vs. lower) source attribution to have a more positive effect on consumer evaluations and behavioral intentions.

STUDY 1

Study 1 tests whether consumers will be more inclined to visit an award-winning restaurant when an on-premise sign is high versus low in source attribution. I predict that when source attribution of an accolade is high, behavioral intentions to visit the restaurant will be higher.

Method

A total of 221 participants from a large American university (23.1% female, mean age = 20.58 years, *SD* = 1.00) completed this study in exchange for partial course credit. This study involved a single-factor between-participants design with two source attribution conditions (high vs. low).

Participants learned of a restaurant nearby that they had never visited. They were shown signage displayed near the entrance of the restaurant that they had noticed one day while walking home. Participants in both conditions saw a storefront’s brick façade on which two signs were affixed. The sign on the right, which was identical for all participants, displayed the name of the restaurant, “The Greathouse of Pizza,” and the restaurant’s logo. The sign on the left appeared to be a plaque depicting the restaurant’s selection as a “Reader’s Choice 2019” award-winner and its

selection on a “10 Best” list. My source attribution manipulation involved the inclusion or exclusion of a single word on this plaque. Specifically, the plaque shown to participants in the high attribution condition included the words *USA Today*, presumably indicating that the accolade was bestowed by the national newspaper. For participants in the low attribution condition, “USA” remained on the sign but the word “Today” was removed. This represents a conservative test of my prediction that consumers attend closely to source attribution in on-premise signage, as the only difference between conditions was a single word.

After qualitatively describing their reaction to the signage in a text box, participants responded to the key dependent variable. Specifically, participants indicated the extent to which this signage affected their likelihood to visit the restaurant (1 = less likely to visit, 10 = more likely to visit). Following this behavioral intention question, participants evaluated the credibility of the restaurant by responding to three items (1 = not very honest / not very trustworthy / not very believable, 10 = very honest / very trustworthy / very believable), which were combined to form a composite perceived credibility measure ($\alpha = .87$).

Perceived restaurant credibility was included as a potential mediator for the relationship between source attribution condition and restaurant visit likelihood. From a construct validity perspective, it is worth noting that although source credibility is inherently related to level of source attribution, restaurant credibility is a distinct and orthogonal construct and therefore a valid potential mediator. I predict that because it is endorsed by a credible source, an organization will itself be viewed as more credible. This prediction is consistent with prior work documenting positive spillover effects of reputation (see Kilduff and Krackhardt 1994).

Table 2 / Dependent Variables Across Studies

Source Attribution Condition	Study 1 (Student Sample): Mean Restaurant Visit Likelihood (SD)	Study 2 (MTurk Sample): Mean Restaurant Evaluation (SD)	Study 3 (MTurk Sample): Mean Law Firm Evaluation (SD)
High	8.18 (1.93)	8.10 (1.81)	5.44 (2.57)
Medium	-	7.53 (1.97)	-
Low	7.58 (2.17)	7.11 (2.12)	4.80 (2.74)

Results

I expected that greater source attribution would make participants more likely to visit the restaurant. In line with this prediction, likelihood to visit the restaurant was higher among participants in the high source attribution condition ($M = 8.18$, $SD = 1.93$, $N = 110$) versus the low source attribution condition ($M = 7.58$, $SD = 2.17$, $N = 111$; $t(219) = 2.19$, $p = .029$). Means for the key dependent variable in each study—behavioral intentions and/or consumer evaluations—are displayed in Table 2 (above).

In addition to being more likely to visit the restaurant, participants in the high source attribution condition ($M = 7.54$, $SD = 1.67$, $N = 110$) rated the restaurant as more credible than participants in the low source credibility condition ($M = 7.04$, $SD = 1.72$, $N = 111$; $t(219) = 2.21$, $p = .028$).

Finally, I conducted a mediation analysis using the PROCESS macro (Model 4) to test whether perceived credibility of the restaurant mediated the effect of source attribution on likelihood to visit the restaurant (Hayes 2017). This mediation analysis utilized bootstrapping with repeated extraction of 10,000 samples. For this purpose, the high attribution condition was coded as '1,' and the low attribution condition was coded as '0,' with likelihood to visit the restaurant as the dependent variable. I included perceived credibility as a potential mediator in the model. Results of the mediation analysis indicated that the indirect effect of source attribution through perceived credibility was positive ($B = .41$, $SE = .19$) and statistically different from zero (95% CI: .04, .80). Taken together, these results indicate that source attribution impacted perceived credibility of the restaurant, which influenced likelihood to visit.

Discussion

The results of Study 1 provide initial evidence that consumers attend to source information in on-premise signs. As a result, high source attribution is beneficial when an organization wishes to attract potential customers because it bolsters the organization's own credibility.

STUDY 2

In Study 2, I attempt to replicate the findings of Study 1 using a different sample and a different operationalization of source attribution, this time with three levels. In the present research, I adopt a broad definition of source attribution that not only includes how prominently (if at all) the third-party entity that bestowed the accolade upon the organization is mentioned, but also the amount of detail given about the accolade itself. In Study 2, the name of the third-party entity is provided in both the high and medium source attribution conditions, but the medium attribution claim provides fewer details about the accolade. Finding that consumer evaluations of the medium attribution claim fall in between evaluations of the other two claims would indicate that consumers are sensitive to both the identity of the source and the amount of information communicated about the accolade, which I consider two facets of source attribution.

Method

A total of 255 participants from an online panel (Amazon Mechanical Turk) (55.5% female, mean age = 39.59 years, $SD = 14.18$) completed this study in exchange for payment. This study involved a single-factor between-participants design with three source attribution conditions (high vs. medium vs. low).

Study 2 used the same restaurant context—"The Greathouse of Pizza"—as Study 1 and the procedure

was identical, except for the manipulation involving the attribution of the award. The high attribution condition in Study 2 resembled the corresponding condition in Study 1, in that it mentioned that the *USA Today* had included the restaurant in its “10 Best” list. Those in the medium attribution condition also learned that the award came from the *USA Today*, but no mention of the “10 Best” list was provided. Participants in the low attribution condition learned that the award involved selection in a “10 Best” list, but the source was missing, in that the name of the newspaper was not mentioned at all.

After qualitatively describing their reaction to the signage in a text box, participants responded to the key dependent variables. Specifically, participants evaluated the restaurant by responding to three items (1 = less likely to visit / more negative evaluation / less favorable attitude, 10 = more likely to visit / more positive evaluation / more favorable attitude), the first of which is a behavioral intention indicator. These three items were combined to form a composite restaurant evaluation measure ($\alpha = .95$). Subsequently, participants provided their opinion of the Reader’s Choice award that the restaurant had received by responding to three items (1 = not very impressive / not a major achievement / not a great honor, 10 = very impressive / a major achievement/a great honor). These three items were combined to form a composite award prestige measure ($\alpha = .97$). Finally, participants evaluated the credibility of the restaurant by responding to three items (1 = not very honest / not very trustworthy / not very believable, 10 = very honest / very trustworthy / very believable), which were combined to form a composite perceived credibility measure ($\alpha = .96$).

Results

I predicted that greater source attribution would lead to higher evaluations of the restaurant, which would be driven by higher award prestige and higher credibility of the restaurant. A one-way ANOVA confirmed that participants’ restaurant evaluations differed significantly by condition ($F(2, 252) = 5.39, p = .005; \eta_p^2 = .041$). Restaurant evaluations were higher among participants in the high attribution

condition ($M = 8.10, SD = 1.81, N = 85$) as compared to either the medium ($M = 7.53, SD = 1.97, N = 86; t(252) = 1.90, p = .058$) or low attribution condition ($M = 7.11, SD = 2.12, N = 84; t(252) = 3.27, p = .001$), although the former contrast attained only marginal significance. Although evaluations were directionally higher among participants in the medium attribution condition versus the low attribution condition (see Table 2), this contrast was non-significant ($t(252) = 1.38, p = .17$). Thus, my subsequent analysis focuses primarily on the high evaluation condition versus the other two conditions.

I conducted two additional one-way ANOVAs, first with award prestige as the dependent variable and then with perceived credibility as the dependent variable. Both ANOVAs returned a similar result. Specifically, the analysis confirmed that participants’ award prestige ratings differed marginally by condition ($F(2, 252) = 2.62, p = .075; \eta_p^2 = .020$). Means were 7.62 ($SD = 2.28$), 7.12 ($SD = 2.41$), and 6.77 ($SD = 2.55$) in the high, medium, and low source attribution conditions, respectively. Likewise, participants’ perceptions of the restaurant’s credibility differed significantly by condition ($F(2, 252) = 3.84, p = .023; \eta_p^2 = .030$). Means were 7.85 ($SD = 1.99$), 7.40 ($SD = 2.07$), and 6.97 ($SD = 2.12$) in the high, medium, and low source attribution conditions, respectively.

Finally, I conducted a mediation analysis using the PROCESS macro (Model 6) to test whether award prestige and/or perceived credibility mediated the effect of source attribution on restaurant evaluations (Hayes 2017). This mediation analysis utilized bootstrapping with repeated extraction of 10,000 samples. For this purpose, all the conditions were grouped into two source attribution cells (high attribution coded as ‘1’, medium and low attribution coded as ‘0’), with the composite restaurant evaluation measure as the dependent variable. Award prestige and perceived credibility were included as potential mediators in the model. Results of the mediation analysis indicated that the indirect effect of source attribution through perceived credibility was positive ($B = .37, SE = .17$) and statistically different from zero (95% CI: .06, .73). The indirect effect of condition through award prestige, however,

was not statistically different from zero ($B = .01$, $SE = .04$; 95% CI: $-.07$, $.10$). Furthermore, I found evidence of serial mediation from source attribution to perceived credibility, perceived credibility to award prestige, and from award prestige to restaurant evaluation ($B = .14$, $SE = .08$; 95% CI: $.01$, $.31$). Taken together, these results indicate that attribution impacted perceived credibility of the restaurant, which influenced award prestige, which in turn affected restaurant evaluations.

Discussion

The results of Study 2 provide additional evidence that high source attribution in on-premise signs is beneficial when firms wish to communicate an accolade to potential customers. Specifically, Study 2 shows that high source attribution increases perceived credibility of the firm, which makes the accolade appear even more impressive. Furthermore, I find that consumers are sensitive to two facets of source attribution, namely the identity of the source and the amount of information communicated about the accolade.

STUDY 3

Although the results of Studies 1 and 2 are consistent with my theorizing, participants were not under any time pressure when viewing the signs in either study. Given the fact that most consumers typically view certain types of signs, such as billboards, for only a few seconds, Study 3 tests whether the value of high source attribution will be observed even when participants are given only a few seconds to process the sign's content. The results of prior research suggest that consumers are able to quickly make sophisticated inferences from marketing communications and so high source attribution claims may still outperform low source attribution claims even under time pressure; however, this evidence is somewhat inconsistent and so my a priori hypothesis is somewhat tentative (*see* Isaac, Brough, and Grayson 2016).

Method

A total of 506 participants from an online panel (Amazon Mechanical Turk) (54.2% female, mean age = 36.64 years, $SD = 13.02$) completed this study in exchange for payment. This study involved a single-factor between-participants design with two source attribution conditions (high vs. low).

To ensure that participants felt sufficiently involved in the scenario, they learned that they had recently been in a traffic accident with another car in which they had sustained an injury. They disagreed with the other driver as to who was at fault and were considering hiring a lawyer to settle the dispute.

Next, they were shown an outdoor sign that they had purportedly encountered while driving to work. All participants encountered a billboard that stated the name of the law firm, Domengeaux Wright, Roy, and Edwards, included contact information, and touted the accolade "Best Lawyers, Best Law Firms." The billboard shown to participants in the high attribution condition included the words *U.S. News and World Report 2018*, presumably indicating

that this honor came from the national magazine. The billboard shown to participants in the low attribution condition did not include these words. However, the font size of the accolade claim was three times the size as the claim in the high attribution condition. This manipulation was meant to more strongly reflect the inherent tradeoff between simplicity and credibility in signage. Specifically, because it did not contain source attribution information, the low attribution sign could utilize this extra space to increase the visibility of the accolade claim itself.

To simulate the experience of driving past a billboard, the law firm billboard was shown on the screen quickly (i.e., for three seconds), at which point participants automatically advanced to a new screen where they answered follow-up questions. After qualitatively describing their reaction to the billboard in a text box, participants responded to the key dependent variable. Specifically, participants evaluated the law firm by responding to three items (1 = less likely to hire / more negative evaluation / less favorable attitude, 10 = more likely to hire / more positive evaluation / more favorable attitude), the first of which is a behavioral intention indicator. These three items were combined to form a composite law firm evaluation measure ($\alpha = .97$). Subsequently, participants were asked to indicate whether the billboard had mentioned an honor that the law firm had received (Yes / No). If they answered affirmatively, participants were asked to provide their opinion of the honor that the law firm had received by responding to three items (1 = not very impressive / not a major achievement / not a great honor, 10 = very impressive / a major achievement / a great honor). These three items were combined to form a composite award prestige measure ($\alpha = .96$). Finally, participants evaluated the credibility of the law firm by responding to three items (1 = not very honest / not very trustworthy / not very believable, 10 = very honest / very trustworthy / very believable), which were combined to form a composite perceived credibility measure ($\alpha = .92$).

Results

I predicted that greater source attribution would lead to higher evaluations of the law firm, which would be driven by higher credibility of the law firm. In

line with this prediction, evaluations of the law firm were higher among participants in the high source attribution condition ($M = 5.44, SD = 2.57, N = 248$) versus the low source attribution condition ($M = 4.80, SD = 2.74, N = 258; t(504) = 2.71, p = .007$) (see Table 2).

Furthermore, participants in the high source attribution condition ($M = 6.15, SD = 2.04, N = 248$) rated the law firm as more credible than participants in the low source attribution condition ($M = 5.38, SD = 2.32, N = 258; t(504) = 3.97, p < .001$).

Next, I conducted a mediation analysis using the PROCESS macro (Model 4) to test whether perceived credibility mediated the effect of source attribution on law firm evaluations (Hayes 2017). This mediation analysis utilized bootstrapping with repeated extraction of 10,000 samples. For this purpose, the high attribution condition was coded as '1,' and the low attribution condition was coded as '0,' with law firm evaluation as the dependent variable. I included perceived credibility as a potential mediator in the model. Results of the mediation analysis indicated that the indirect effect of source attribution through perceived credibility was positive ($B = .75, SE = .19$) and statistically different from zero (95% CI: .38, 1.12). Taken together, these results indicate that source attribution impacted perceived credibility of the law firm, which influenced law firm evaluations.

I also examined whether source attribution affected participants' likelihood of recognizing that the law firm had received an honor. Of participants in the high attribution condition, 62.5% (155 of 248) reported noticing the honor as compared to 32.6% of participants (84 of 258) in the low attribution condition, a statistically significant difference ($\chi^2(1) = 45.49, p < .001$). Among participants who recognized that the law firm had received an honor, ratings of award prestige did not differ ($M_{\text{high attribution}} = 6.44, SD = 2.23, N = 155$ vs. $M_{\text{low attribution}} = 6.56, SD = 2.47, N = 84; t(237) = -.37, p = .71$). This analysis suggests that even when viewing a sign quickly, consumers are sensitive to source attribution.

Discussion

Study 3 shows that consumers attend to source

information in outdoor signs, time notwithstanding. Furthermore, my analysis suggests that without sufficient attribution, an accolade claim may not even be encoded as a legitimate honor from a third-party entity and may therefore be dismissed as non-credible. Finally, this study provides corroborative evidence that source information in outdoor signs boosts evaluations by increasing perceptions of an organization's own credibility, even when higher source attribution reduces visibility of the accolade.

GENERAL DISCUSSION

Across three studies, I provide converging evidence that consumers respond favorably to higher source attribution when given an accolade claim, even in the context of signage where visual simplicity and processing fluency are of paramount importance. As shown in Table 2, this effect holds for different samples and stimuli, as well as for both behavioral intentions and composite evaluation measures.

I further show that the positive effects of higher source attribution result from greater perceived credibility of the organization, which in turn increases the prestige of the award. It is worth noting that this credibility measure relates to the organization, not the source. While it may be expected that increased source attribution would generally lead to increased source credibility (as confirmed by my pretest), my finding is that an organization that receives an award and displays a sign with high source attribution is also viewed as more credible. As demonstrated in Study 3, insufficient source attribution may lead consumers to not even recognize an accolade claim as a "true" award coming from an impartial third-party. Of course, the positive effects of source attribution are likely to be contingent on the third-party entity itself being familiar and credible to consumers and might not hold if the third-party is unknown or considered non-credible. Indeed, Isaac and Grayson (2020) recently showed that consumer ratings differed when an accolade was attributed to a reputable news source (i.e., BBC) as compared to a disreputable tabloid (i.e., TMZ). It is reasonable to assume that high source attribution will only boost evaluations when the source is itself considered credible.

Future research might identify additional boundary conditions for the effects observed in this article. For example, it seems likely that signs with an abundance of detailed and extraneous information about an award or the source of the award would be penalized rather than rewarded by consumers. Additionally, participants in my three studies either had unlimited time to review an accolade claim (Studies 1 and 2) or assumed a relatively high level of involvement in the given scenario (Study 3). It is possible that under different conditions, signs with low source attribution might outperform (or at least perform equally well as) signs with high source attribution. Relatedly, it is possible that consumers have different preferences for level of source attribution when viewing on-premise as compared to outdoor signs because they are at different stages of the consumer decision journey. In practice, on-premise sign viewers are more likely to be actual customers of the organization, given that they are already on site, whereas viewers of outdoor signs may only be prospective customers. As such, on-premise sign viewers may naturally be more involved with the organization and therefore especially amenable to high source attribution. Given the hypothetical nature of the studies reported in this article, I was unable to distinguish between consumer responses to source attribution in outdoor signs versus on-premise signs. I encourage future researchers to employ field experiments to provide more nuanced insights into potential distinctions based on sign type.

Although I found that low source attribution in signage tends to produce lower evaluations, it is important to note that not all low attribution signs are the same. For instance, some of the examples in Figure 2 of accolade claims with low source attribution might be interpreted as "tongue-in-cheek" or humorous puffery claims, as opposed to unsupported and non-credible accolades (Cowley 2006). Whereas the latter class of low attribution claims seem to adversely affect consumer judgments, it may be that consumers appreciate the attempt at humor in a puffery claim and actually reward organizations for this type of low attribution claim. Future research might investigate whether different types of low attribution claims have different effects on consumer evaluations.

Finally, prior research has demonstrated the role of norms in communication and has shown that minor variations in a communicator's word choice or framing can affect consumer evaluations and decisions (Grice 1975; McKenzie and Nelson 2003; Sher and McKenzie 2006). For certain types of signs, it may be more or less normative to provide source attribution information. Furthermore, certain ways of conveying source attribution—using a text description versus a logo of the third-party entity, for example—may be more or less effective. I encourage persuasion researchers to explore these intriguing avenues for future research.

REFERENCES

- Alter, A. L. and Oppenheimer, D. M. (2009). Uniting the tribes of fluency to form a metacognitive nation. *Personality and Social Psychology Review* 13(3), 219-235.
- Anderson, R. E. and Jolson, M. A. (1980). Technical wording in advertising: implications for market segmentation. *Journal of Marketing* 44, 57-66.
- Balasubramanian, S. K., Mathur, I., and Thakur, R. (2005). The impact of high-quality firm achievements on shareholder value: Focus on Malcolm Baldrige and JD Power and Associates awards. *Journal of the Academy of Marketing Science* 33(4), 413-422.
- Bullough, J. (2017). Factors affecting sign visibility, conspicuity, and legibility: Review and annotated bibliography. *Interdisciplinary Journal of Signage and Wayfinding* 1(2), 2-25.
- Bullough, J. D. (2019). Brief Communication: Impact of Sign Panel Luminance on Visual Comfort. *Interdisciplinary Journal of Signage and Wayfinding* 3(2), 3-7.
- Burke, R. R. (2009). Behavioral effects of digital signage. *Journal of Advertising Research* 49(2), 180-185.
- Capital Outdoor. (2020). "Measuring Billboard Effectiveness." *Capitol Outdoor*. <https://www.capitoloutdoor.com/measuring-billboard-advertising-effectiveness/>
- Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology* 39(5), 752-766.
- Chaiken, S. and Maheswaran, D. (1994). Heuristic processing can bias systematic processing: effects of source credibility, argument ambiguity, and task importance on attitude judgment. *Journal of Personality and Social Psychology*, 66(3), 460-473.
- Chamblée, R., Gilmore, R., Thomas, G., Soldow, G. (1993). When copy complexity can help ad readership. *Journal of Advertising Research* 33(3), 23-28.
- Clear Channel Outdoor. (2019). "Guidelines & specifications for designing out of home." *Clear Channel Outdoor*. <https://clearchanneloutdoor.com/get-creative/>
- Cowley, E. (2006). Processing exaggerated advertising claims. *Journal of Business Research* 59(6), 728-734.
- Dean, D. H. and Biswas, A. (2001). Third-party organization endorsement of products: An advertising cue affecting consumer prepurchase evaluation of goods and services. *Journal of Advertising* 30(4), 41-57.
- Garvey, P. M., Zineddin, A. Z., Porter, R. J., and Pietrucha, M. T. (2018). *Real world on-premise sign visibility: The impact of the driving task on sign detection and legibility*. Washington DC: United States Signage Council Foundation and The US Department of Transportation.
- Grice, H. P. (1975). *Logic and conversation*. *Speech Arts*. Leiden: Brill.
- Hayes, A. F. (2017). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guilford Press.
- Higgins, E. T. (2000). Making a good decision: value from fit. *American Psychologist* 55(11), 1217-1230.
- Isaac, M. S., Brough, A. R., and Grayson, K. (2016). Is top 10 better than top 9? The role of expectations in consumer response to imprecise rank claims. *Journal of Marketing Research* 53(3), 338-353.
- Isaac, M. S. and Grayson, K. (2020). Priming skepticism: Unintended consequences of one-sided persuasion knowledge access. *Psychology and Marketing* 37(3), 466-478.

- Jain, S. P. and Posavac, S. S. (2001). Prepurchase attribute verifiability, source credibility, and persuasion. *Journal of Consumer Psychology* 11(3), 169-180.
- Kellaris, J. J. and Machleit, K. A. (2016). Signage as marketing communication: A conceptual model and research propositions. *Interdisciplinary Journal of Signage and Wayfinding* 1(1).
- Kilduff, M. and Krackhardt, D. (1994). Bringing the individual back in: A structural analysis of the internal market for reputation in organizations. *Academy of Management Journal* 37(1), 87-108.
- King, D. and Janiszewski, C. (2011). The sources and consequences of the fluent processing of numbers. *Journal of Marketing Research* 48(2), 327-341.
- Kirmani, A. and Rao, A. R. (2000). No pain, no gain: A critical review of the literature on signaling unobservable product quality. *Journal of Marketing* 64(2), 66-79.
- Lowrey, T. M. (1998). The effects of syntactic complexity on advertising persuasiveness. *Journal of Consumer Psychology* 7(2), 187-206.
- MacInnis, D. J., Moorman, C., and Jaworski, B. J. (1991). Enhancing and measuring consumers' motivation, opportunity, and ability to process brand information from ads. *Journal of Marketing* 55(October), 32-53.
- McKenzie, C. R. and Nelson, J. D. (2003). What a speaker's choice of frame reveals: Reference points, frame selection, and framing effects. *Psychonomic Bulletin and Review* 10(3), 596-602.
- Morrison, B. J. and Dainoff, M. J. (1972). Advertisement complexity and looking time. *Journal of Marketing Research* 9(4), 396-400.
- Ng, A. W. Y. and Chan, A. H. S. (2007). Cognitive design features on traffic signs. In: *Recent Advances in Engineering and Computer Science*, ed. S. Ao. Hong Kong: Newswood Limited.
- Petty, R. E. and Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In: *Communication and Persuasion, Springer Series in Social Psychology*. New York: Springer.
- Phillips, B. J. (1997). Thinking into it: consumer interpretation of complex advertising images. *Journal of Advertising* 26 (2), 77-87.
- Reber, R., Schwarz, N., and Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review* 8(4), 364-382.
- Reber, R., Wurtz, P., and Zimmermann, T. D. (2004). Exploring "fringe" consciousness: The subjective experience of perceptual fluency and its objective bases. *Consciousness and Cognition* 13(1), 47-60.
- Rossiter, J. R. and Percy, L. (1983). Visual communication in advertising. In: *Information Processing Research in Advertising*, ed. R. Harris. Hillsdale: Lawrence Erlbaum Associates.
- Schwarz, N. (2004). Metacognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology* 14(4), 332-348.
- Shah, K. (2020). "Food & Wine best new restaurants 2020." *Food and Wine*, 16 June. <https://www.foodandwine.com/travel/restaurants/best-new-restaurants>
- Sher, S. and McKenzie, C. R. (2006). Information leakage from logically equivalent frames. *Cognition* 101(3), 467-494.
- Shuptrine, F. K. and McVicker, D. D. (1981). Readability levels of magazine ads. *Journal of Advertising Research* 21(5), 45-51.
- Stempler, A. F. and Polger, M. A. (2013). Do you see the signs? Evaluating language, branding, and design in a library signage audit. *Public Services Quarterly* 9(2), 121-135.
- Van Loock, N., Vermeir, I., and Geuens, M. (2010). Advertising repetition and complexity of digital signage advertisements: simplicity rules! In: *39th European Marketing Academy Conference*. Ghent: Department of Marketing.
- Whittlesea, B. W. (1993). Illusions of familiarity. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 19(6), 1235-1253.
- Whittlesea, B. W., Jacoby, L. L., and Girard, K. (1990). Illusions of immediate memory: Evidence of an attributional basis for feelings of familiarity and perceptual quality. *Journal of Memory and Language* 29(6), 716-732.
- Wineburg, S., McGrew, S., Breakstone, J., and Ortega, T. (2016). Evaluating information: The cornerstone of civic online reasoning. *Stanford Digital Repository*. <https://purl.stanford.edu/fv751yt5934>
- Wojdyski, B. W. and Evans, N. J. (2016). Going native: Effects of disclosure position and language on the recognition and evaluation of online native advertising. *Journal of Advertising*, 45(2), 157-168.
- Yeaman, A. R. (1989). Vital signs: Cures for confusion. *School Library Journal* 35(15), 23-27.
- Zhang, K. Z., Zhao, S. J., Cheung, C. M., and Lee, M. K. (2014). Examining the influence of online reviews on consumers' decision-making: A heuristic-systematic model. *Decision Support Systems* 67, 78-89.

APPENDIX

Study 1

Suppose there is a pizza place nearby that you have never visited before. One day, as you are walking home, you notice the following signage near the entrance of the restaurant.

High Source Attribution

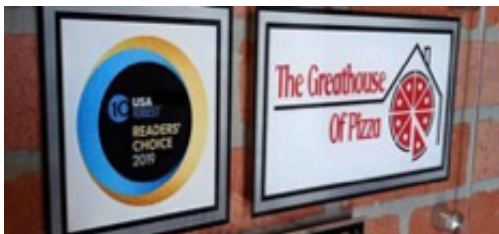
Next to a sign with the name and logo of the pizza place, “The Greathouse of Pizza,” is another sign which looks like a plaque. This sign indicates that the pizza place won a Reader’s Choice “10 Best” award in 2019. The sign indicates that this honor was bestowed upon The Greathouse of Pizza by the USA Today.



Low Source Attribution

Suppose there is a pizza place nearby that you have never visited before. One day, as you are walking home, you notice the signage near the entrance of the restaurant.

Next to a sign with the name and logo of the pizza place, “The Greathouse of Pizza,” is another sign which looks like a plaque. This sign indicates that the pizza place won a Reader’s Choice award in 2019.



Measures

What is your reaction to the Reader’s Choice signage (the sign on the left)? [Open-Ended Text Box]

BEHAVIORAL INTENTION

How does this signage affect your opinion of the pizza place?

1 = less likely to visit, 10 = more likely to visit

PERCEIVED CREDIBILITY

Based on its signage, what do you think of the pizza place?

1 = not very honest, 10 = very honest

1 = not very trustworthy, 10 = very trustworthy

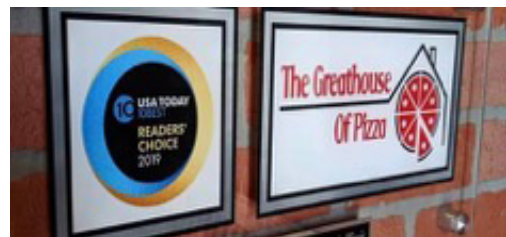
1 = not very believable, 10 = very believable

Study 2

Suppose there is a pizza place nearby that you have never visited before. One day, as you are walking home, you notice the following signage near the entrance of the restaurant.

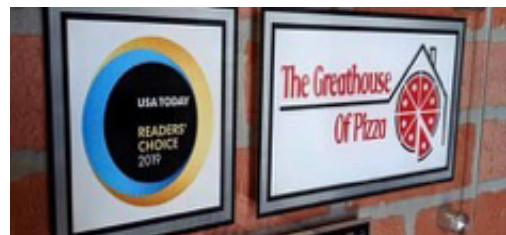
High Source Attribution

Next to a sign with the name and logo of the pizza place, “The Greathouse of Pizza,” is another sign which looks like a plaque. This sign indicates that the pizza place won a Reader’s Choice “10 Best” award in 2019. The sign indicates that this honor was bestowed upon The Greathouse of Pizza by the USA Today, a popular national newspaper.



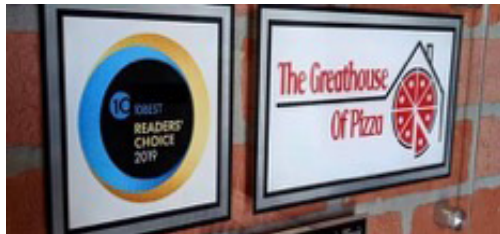
Medium Source Attribution

Next to a sign with the name and logo of the pizza place, “The Greathouse of Pizza,” is another sign which looks like a plaque. This sign indicates that the pizza place won a Reader’s Choice award in 2019. The sign indicates that this honor was bestowed upon The Greathouse of Pizza by the USA Today, a popular national newspaper.



Low Source Attribution

Next to a sign with the name and logo of the pizza place, “The Greathouse of Pizza,” is another sign which looks like a plaque. This sign indicates that the pizza place won a Reader’s Choice “10 Best” award in 2019. The sign does not indicate who bestowed this honor upon The Greathouse of Pizza.



Measures

What is your reaction to the Reader’s Choice signage (the sign on the left)? [Open-Ended Text Box]

RESTAURANT EVALUATION

How does this signage affect your opinion of the pizza place?
1 = less likely to visit, 10 = more likely to visit
1 = more negative evaluation, 10 = more positive evaluation
1 = less favorable attitude, 10 = more favorable attitude

AWARD PRESTIGE

What is your opinion of the pizza place’s Reader’s Choice award?
1 = not very impressive, 10 = very impressive
1 = not a major achievement, 10 = a major achievement
1 = not a great honor, 10 = a great honor

PERCEIVED CREDIBILITY

Based on its signage, what do you think of the pizza place?
1 = not very honest, 10 = very honest
1 = not very trustworthy, 10 = very trustworthy
1 = not very believable, 10 = very believable

Study 3

Suppose you were recently in a traffic accident in which you sustained an injury. You and the other driver disagree as to whose fault the accident was. You are considering hiring a lawyer.

As you are driving to work, you pass a billboard. Press -> to see the billboard. It will be shown on the screen quickly (for 3 seconds) and then you will advance to a new screen where you will answer a few questions.

High Source Attribution



Low Source Attribution



Measures

What was your reaction to the billboard? [Open-Ended Text Box]

LAW FIRM EVALUATION

How does the billboard affect your opinion of the law firm (Domengeaux Wright Roy & Edwards)?
1 = less likely to hire, 10 = more likely to hire
1 = more negative evaluation, 10 = more positive evaluation
1 = less favorable attitude, 10 = more favorable attitude

Did the billboard mention an honor that the law firm (Domengeaux Wright Roy & Edwards) had received?
1 = Yes, 2 = No

[IF YES]

What do you think of the honor that the law firm (Domengeaux Wright Roy & Edwards) received?
1 = not very impressive, 10 = very impressive
1 = not a major achievement, 10 = a major achievement
1 = not a great honor, 10 = a great honor

Did the billboard mention the third-party organization or magazine that bestowed the honor on the law firm (Domengeaux Wright Roy & Edwards)?

PERCEIVED CREDIBILITY

Based on its billboard, what do you think of the law firm (Domengeaux Wright Roy & Edwards)?
1 = not very honest, 10 = very honest
1 = not very trustworthy, 10 = very trustworthy
1 = not very believable, 10 = very believable

Effects of Time for Deliberation and Disfluency on Omission Neglect¹

Ruomeng Wu*

Assistant Professor
Department of Marketing
Gordon Ford College of Business,
Western Kentucky University

ruomeng.wu@wku.edu

Xiaoqi Han

Professor of Marketing,
Ansell School of Business,
Western Connecticut
State University

hanx@wcsu.edu

Meng Liu

Independent researcher

lium4@mail.uc.edu

Frank R. Kardes

Donald E. Weston Professor of Marketing
at the Lindner College of Business,
University of Cincinnati

frank.kardes@uc.edu

*corresponding author

INTRODUCTION

The background in which a product description appears should be designed carefully when marketers design visual marketing signs. Prior literature has demonstrated the importance of research on fonts and other visual presentations in marketing communications as they have been shown to significantly impact consumers' information processing, judgments, and decisions (Pieters, Warlop, and Wedel 2002; Dennis et al. 2010; Sundar, Wu, Kardes 2019; Yoon et al. 2014; Dynel 2011; Huddleston et al. 2018; Kim and Lennon 2008; Sundar, Gonsales, and Schafer 2018).

Prior research suggests that understanding the fluency and disfluency effect is important to predicting what drives consumer judgment and decision making in marketing communications with textual / visual messages on signage, billboards, and other forms of outdoor advertising (Sundar et al. 2019; Wu, Shah, and Kardes 2020). Fluency, or ease of processing, usually leads to more favorable evaluative and affective judgments (Lee and Labroo 2004). As a result, marketers often adopt easy-to-read information to facilitate feelings of fluency. For example, clear and readable messages are often adopted to increase the visibility and comprehensibility of marketing communications, and are believed to be especially appealing for outdoor advertisements, which are viewed, on average, for 5 to 10 seconds (Taylor, Franke, and Bang 2006; Morones 2016). Nevertheless, the benefits of disfluency, or the experience of difficulty in processing information, should also be recognized (Schwarz 2004). For instance, difficult-to-read lettering has been shown to improve syllogistic reasoning and analytic processing, which in turn improve the quality of information processing (Alter et al. 2007; Song and Schwarz 2008).

¹ Funding for this study was provided by the AACSB Emerging Fellowship grant.

Abstract /

The use of disfluency in marketing signage has more complex effects than what past research suggests. Time plays an important role in consumer information processing of signage presented disfluently. Three experimental studies suggest that the effects of disfluency on the awareness of missing information, purchase likelihood, and likelihood of future surprise depend on whether consumers have more or less time to process the information. When they have a limited amount of time, disfluency improves their awareness of missing information, leading to not only a lower likelihood of immediate purchase but also less surprise when important omissions are revealed later. Nevertheless, the effects are attenuated when consumers have a greater amount of time.

Keywords /

disfluency; time; omission neglect; signage marketing

In the current research, we investigate the effects of disfluency, arising from displays of special lettering and low word-background contrast, on consumers' judgment and decision making. First, we attempt to confirm the major characteristic of disfluency: difficulty to read or process (Alter et al. 2007; Song and Schwarz 2008). Then, we examine how this characteristic can impact information processing and judgment through the theoretical framework of omission neglect, the lack of awareness of missing information (Sanbonmatsu et al. 2003). Prior research demonstrates that disfluency reduces omission neglect in general (Sundar et al. 2019). Extending the discovery of this prior research, we examine the role of processing time in moderating the disfluency effect, as processing time is a critical variable both theoretically and practically. The amount of time that consumers attend to marketing stimuli may differ across contexts, individuals, and products and now though, consumers often have little time evaluating marketing information (Hobbs 2016). For instance, as they quickly pass by a billboard or scroll through feeds on the phone, they usually spend a limited amount of time viewing or pondering over the information. But in some cases, consumers can spend even more time evaluating marketing information due to the decreased cost of information search (Smith, Bailey and Brynjolfsson 1999). Besides factors in the marketing environment, individual traits (e.g., need for cognitive closure) may impact how much time consumers allocate to a task before judgment is reached (Heaton and Kruglanski 1991). In summary, it appears important to examine the effects of processing time on consumer judgment and decision making in the domain of marketing communications.

THE ROLE OF DISFLUENCY IN OMISSION NEGLECT

Fluency, or ease of processing, usually enhances evaluations because the degree of positive evaluation is attributed not only to product features but also to the conceptual or perceptual fluency that consumers experience (Lee and Labroo 2004). Conceptual fluency refers to the ease with which an idea or an association comes to mind whereas perceptual fluency describes the ease of identifying the characteristics of a stimulus (Tversky and Kahneman 1973; Jacoby and Dallas

1981). In this research we focus on the subsequent effects following changes in perceptual fluency. The instances of perceptual fluency enhancing marketing communications are numerous. For example, visibility in signage can break through clutter by improving the readability of information (Taylor et al. 2006). On the contrary, disfluency, or difficulty in processing, is often believed to move affective and evaluative judgments including liking, credibility, and persuasiveness to a negative end (see Novemsky et al. 2007). Indeed, prior research on disfluency focuses mainly on its negative effects (see Gill, Swann, and Silvera 1998; Novemsky et al. 2007; Roggeveen and Johar 2002; Schwarz 2004; Weisbuch and Mackie 2009). Nevertheless, understanding disfluency effects is also important because disfluency is a common experience; wear and tear on billboards and other outdoor signs caused by inclement weather, for example, are expected to increase disfluency (Visual 2016).

This research examines how consumers' experience of disfluency alters their sensitivity to missing information. Due to omission neglect, or the failure to detect missing information in marketing communications, consumers tend to overestimate the value of presented information and underestimate that of missing information (Sanbonmatsu et al. 2003; Silvera et al. 2005; Unkelbach, Fiedler, and Freytag 2007). As a result, they often form extreme judgments held with great confidence and make immediate purchase decisions that they later regret (Kardes et al. 2006; Sanbonmatsu et al. 2003). While it may seem tempting for marketers to foster omission neglect by providing only favorable information in their marketing communications, doing so may hurt a brand's image in the long run because of the higher likelihood of future regret (Sanbonmatsu et al.; Wu, Escoe, and Kardes 2017; Wu, Shah, and Kardes 2016). Therefore, it is important to understand how to debias omission neglect or to heighten consumers' awareness of missing information. Prior research demonstrates that disfluency increases analytic processing, encourages individuals to question their first impressions, and contributes to problem solving (Alter et al. 2007; Song and Schwarz 2008). Given that omission detection also requires effortful, analytic processing, disfluency may heighten consumers' sensitivity to

relevant information missing from product description and help them form less extreme judgments and decisions (Sanbonmatsu, Kardes, and Sansone 1991). This proposition is supported by recent research on signage and information processing that shows how difficult-to-read fonts increase one's awareness of missing information and ability to detect missing information, leading to lower evaluation extremity (Sundar et al. 2019).

THE MODERATING EFFECT OF PROCESSING TIME

We attempt to extend our understanding of the disfluency effect on omission neglect by exploring the influence of processing time. While consumers often spend a very short amount of time on surrounding ads and signs, they may pay more attention and are willing to spend more time when there is a wide price dispersion or when they make important buying decisions (Hobbs 2016; Kumar, Lang, and Peng 2005). As a result, the role of processing time is highly relevant to understanding how consumers process marketing communications.

Time has been investigated as an important factor in the perceptual fluency literature. Reber and Schwarz (2001) found that the positive fluency effect is more pronounced when the processing time is short (.3, 1, and 3 seconds) and it disappears over longer periods (10 seconds). They further explain that fluency most clearly improves stimulus identifications when processing time is short. Besides, if the effect of fluency is more pronounced with a shorter processing time, the positive evaluation should be attributed to the fluency experience itself, but not the intrinsic attractiveness of the object. In a similar vein, disfluency, which is like a cognitive glitch, may also be more noticeable and impactful under time pressure. When sufficient time is available, the effect may dissipate because consumers accommodate the disfluency.

The potential disfluency effect as a function of time has also been discussed in the need for cognitive closure literature, which suggests that as processing time decreases the need for cognitive closure is likely to increase, leading to a higher reliance on easier-to-process information and immediately avail-

able judgmental cues (Heaton and Kruglanski 1991; Kruglanski, Webster, and Klem 1993; Roets et al. 2015; Webster and Kruglanski 1994). As presented (vs. missing) information is easier to use, when consumers have limited time, they should be less sensitive to missing information (Sundar et al. 2019). As a result, their evaluations should be more extreme, and they are more likely to make immediate purchases of products with favorable evaluations. Despite the initial favorable outcomes to marketers, consumers should be more susceptible to future surprise and presumably a higher likelihood of regret when important omissions are revealed later. Nevertheless, as discussed before, since disfluency increases analytic processing, when information is presented in a disfluent manner, consumers should be more sensitive to missing information despite the short amount of processing time (Song and Schwarz 2008). On the contrary, when consumers have a long time, which encourages them to take more judgmental cues into considerations before reaching a solution, their sensitivity to missing information should already be heightened, with or without disfluency (Kruglanski and Freund 1983). Hence, the abundance of time should lead to an attenuated effect of disfluency on omission neglect.

To summarize, we predict that the effect of disfluency on omission detection should become more pronounced under the condition in which processing time is short (vs. long). When processing time is long, the debiasing effect should be attenuated. Our hypotheses follow:

H₁: When processing time is short, disfluency reduces omission neglect, leading to lower immediate purchase intentions and less future surprise.

H₂: When processing time is long, the effect of disfluency on omission neglect is attenuated.

OVERVIEW OF STUDIES

The proposed conceptual model is presented in Figure 1 (below). Across three experimental studies, we manipulate disfluency via the uniqueness of fonts and the text-background color contrasts. Study 1A and Study 1B show the key interactive effect between

time and disfluency on omission neglect. Study 2 confirms the effect captured in the first two studies and extends it from information processing to behavioral intentions. We predict that when consumers have a limited amount of time to view product information, disfluency will debias omission neglect by reducing perceived information sufficiency and increasing the likelihood to detect missing information, leading to lower immediate purchase intentions and less surprise if unexpected information is revealed later (Kardes et al. 2006; Sundar et al. 2019). Nevertheless, when a longer time is spent viewing product information, the difference between the disfluency and the fluency conditions will be attenuated or disappear.

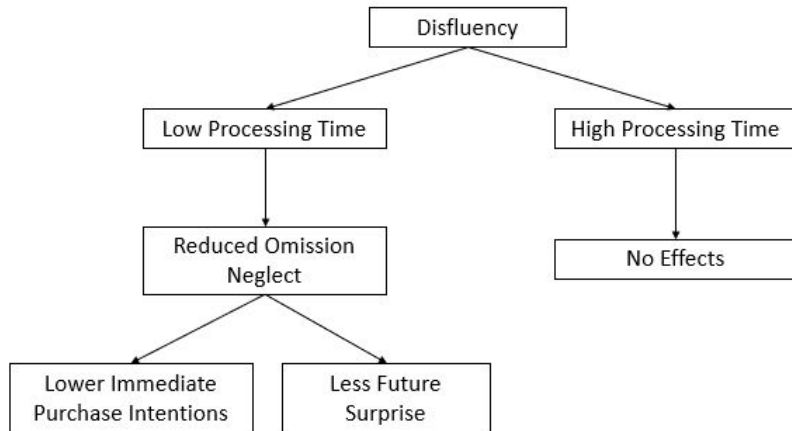


Figure 1 / The Conceptual Model

STUDY 1A

Study 1A has a twofold purpose. First, we sought to replicate the debiasing effect of disfluency on omission neglect (Sundar et al. 2019). In particular, we predicted that information presented in a disfluent font would improve the awareness of missing information by decreasing the perceived sufficiency of the current information. Second, we tested our primary hypothesis concerning time’s moderating effect. We predicted that when the information was easy to read, participants who spent a shorter time viewing the information would be less sensitive to missing information as they would concentrate on the presented information for easier judgmental cues. When the information was difficult to read, however, we predicted that participants would be more sensitive to missing information, even if they spent only a little time processing the available information. Moreover, as more time was spent processing the information, the differential impact between fluency and disfluency on omission detection / neglect should disappear.

Method

Participants consisted of 154 adults ($M_{age} = 35.23$; 54.9 % female) who were recruited via an online database (Amazon Mechanical Turk) and received a small amount of money to participate in the research. A 2 (font: difficult-to-read vs. easy-to-read) x 2 (time: shorter vs. longer) between-subject design was adopted.

Participants were invited to evaluate a delivery app and based on a random assignment, participants had either a shorter or a longer time evaluating it. The time manipulation was adapted from Heaton and Kruglanski (1991). In the shorter-time condition, participants were informed that they would have only 5 seconds to view the information; it was explained that evaluating products must often be fast and a consumer often takes a very short time to evaluate a product. In the longer-time condition, participants were told that they could take as much time desired with the information. In this condition, it was stressed that evaluating products must be slow and that a careful consumer took a long time to evaluate a product. Participants were then randomly presented a billboard ad in either an easy- or difficult-to-read font (see Appendix A for the detailed stimuli). After viewing the information, all participants indicated how sufficient the information was for them to make an evaluation of the delivery app (1= *not sufficient at all*; 7 = *extremely sufficient*). The higher the perceived sufficiency, the lower the awareness of missing information (Kardes et al. 2006; Sundar et al. 2019). They also reported how easy or difficult it was to read the information (1=*very easy*; 7= *very difficult*). Participants concluded by providing basic demographic information.

Results

Manipulation checks

A 2 x 2 (font x time) analysis of variance performed on perceived difficulty revealed only a main effect of font ($F(1, 150) = 50.43, p < .001$). Specifically, participants rated the information in the difficult-to-read condition as more difficult to read ($M = 5.05, SD = 1.87$) than that in the easy-to-read condition ($M = 2.97, SD = 1.79$). Moreover, participants spent more time viewing the information in the longer-time condition ($M_{\text{shorter}} = 4.86, SD = .77$ vs. $M_{\text{longer}} = 15.29, SD = 19.22; F(1, 150) = 22.59, p < .001$).

Sufficiency

A 2 x 2 (font x time) analysis of variance performed on sufficiency yielded a main effect of font ($F(1, 150) = 4.14, p = .044$), such that participants perceived the information as more sufficient when it was easy to read ($M_{\text{easy}} = 4.87, SD = 1.57$ vs. $M_{\text{difficult}} = 4.31, SD = 1.83$).

More importantly, there was a two-way interaction between font and time ($F(1, 150) = 4.87, p = .029$; see Figure 2). When the available time was shorter, perceived sufficiency was higher if the information was easier to read ($M_{\text{easy}} = 5.13, SD = 1.47$ vs. $M_{\text{difficult}} = 3.97, SD = 1.78; F = 9.70, p = .003$). When the time was longer, on the other hand, participants rated the information as equally sufficient, regardless of whether it was easy or difficult to read ($M_{\text{easy}} = 4.59, SD = 1.62$ vs. $M_{\text{difficult}} = 4.64, SD = 1.83; F < 1$).

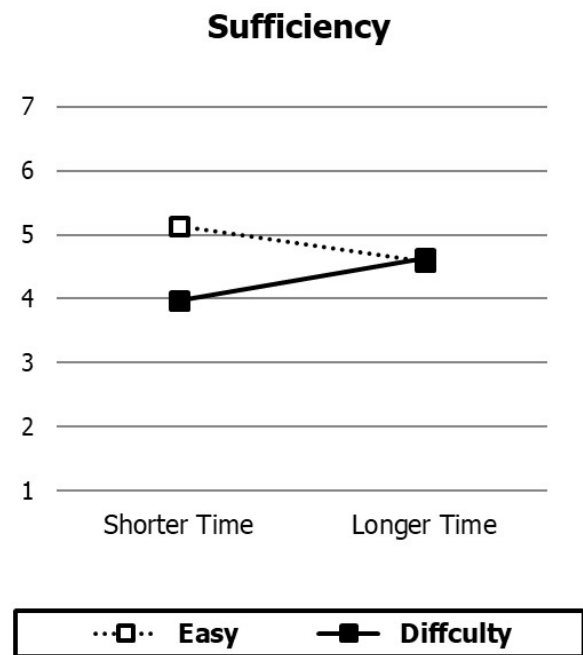


Figure 2 / Sufficiency as a Function of Font and Time in Study 1A

Discussion

In Study 1A, we investigated how disfluency interacts with time to impact omission neglect. We replicated Sundar et al.'s (2019) finding by showing that disfluency increases the awareness of missing information. More importantly, we found that the debiasing effect of disfluency is more pronounced when consumers do not have much time to evaluate the information and that the effect becomes attenuated when consumers spend a longer time processing the information carefully. Our findings are consistent with both the fluency and the need for cognitive closure literatures, such that when processing time is short (vs. long), disfluency stimulates consumers to consider a more complete set of judgmental cues before reaching a

conclusion (Reber and Schwarz 2001; Kruglanski and Freund 1983; *see* Roets et al. 2015).

STUDY 1B

In Study 1B, we designed another scenario in which consumers were exposed to a billboard, and tested omission neglect via a more direct measure. Specifically, we asked participants to report how likely it was that relevant information was missing. Building upon the first study, we predicted that information presented in a disfluent word-background contrast would result in a heightened awareness of missing information when participants spent a limited amount of time viewing the information. When participants spent more time viewing the presented information, we expected that the effect of disfluency on omission neglect would become weaker.

In this study, we chose to measure processing time instead of manipulating it, thereby allowing idiosyncrasies, which contribute to variations in processing time, to come into play. Consumers can sometimes be forced to process information under time pressure as in Study 1A, but in other cases, they can freely decide how much time to attend to marketing stimuli. For instance, as they scroll through social media feeds, they may just skim over posts and spend little time digesting any single piece of information. When they make more serious decisions such as buying a car or viewing a job posting, however, their processing time may greatly increase. Even for the same product, processing time can differ across individuals based on their need for cognitive closure and other individual traits (*see* Heaton and Kruglanski 1991). Considering the practical relevance, we believe it is important to examine the effects of both manipulated and measured processing time.

Method

One-hundred three adult participants ($M_{\text{age}} = 35.47$; 52.5 % female) were recruited via an online database (Amazon Mechanical Turk) and received a small amount of money to participate in the research. A 2 (contrast: difficult-to-read vs. easy-to-read) \times time (continuous) between-subject design was adopted. Participants were randomly assigned to one of the two contrast conditions.

Participants were invited to evaluate a protein bar based on a billboard advertisement. The procedure adopted to induce a contrast color-based disfluency was adapted from Sundar et al. (2019). Participants were randomly assigned to view the billboard information in an easy or difficult-to-read word-background contrast (*see* Appendix B for the detailed stimuli). Since participants were given as much processing time as desired, the processing time each participant spent on viewing the billboard ad was recorded. After viewing the ad, participants reported how likely relevant information was missing (1=*extremely unlikely*; 7=*extremely likely*) and how easy or difficult it was to read the information (1=*very easy*; 7=*very difficult*). They concluded the study by reporting basic demographic information such as gender and age.

Results

Manipulation check

ANOVA performed on perceived difficulty revealed a main effect of contrast ($F(1, 100) = 74.10, p < .001$). Specifically, participants rated the information in the difficult-to-read condition as more difficult to read ($M = 5.88, SD = 1.76$) than that in the easy-to-read condition ($M = 2.76, SD = 1.89$).

Omission Detection

We then submitted omission detection to a hierarchical regression analysis with time, contrast, and their interaction as predictors. Prior to the interaction analysis, we centered time by setting the mean to 0. The main effect terms were entered in step 1, and the two-way interaction term was entered in step 2. Coding was used for the contrast (easy-to-read = 0, difficult-to-read = 1). This procedure followed the recommendations from Cohen et al. (2003). The analyses revealed the key interactive effect between contrast and time ($B = -.13, t(99) = -2.45, p = .016$; *see* Figure 3). Using simple slope analysis, as demonstrated by Aiken and West (1991), we found that when the processing time was shorter (0.7 seconds, 1 SD below the mean), participants detected more missing information if the billboard was difficult to read ($B = 1.00, t(99) = 2.19, p = .031$). When more time was spent viewing the information (13.52 seconds, 1 SD above the mean), there was no difference between the two contrast conditions ($B = -.60, t(99) = -1.29,$

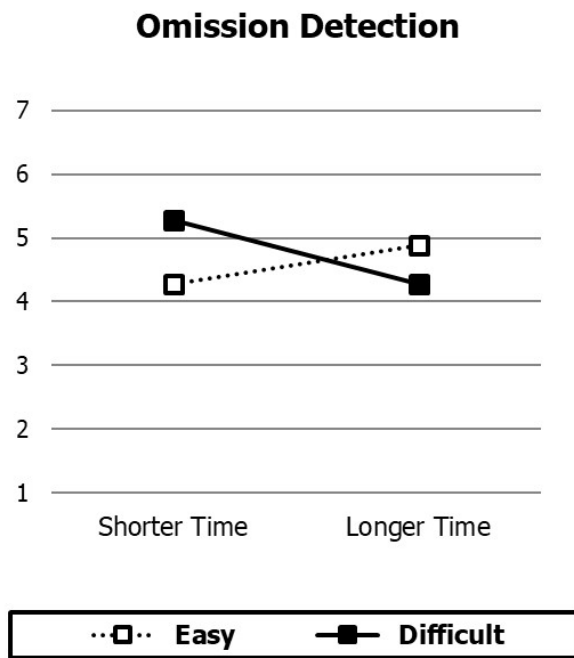


Figure 3 / Omission Detection as a Function of Font and Time in Study 1B

Discussion

Study 1B confirms the debiasing effect of disfluency on omission neglect when processing time is short. Further, when information is presented fluently, consumers tend to be more sensitive to missing information if their processing time is longer. The pattern of the results shows no debiasing effect of disfluency when the time is greater (1 SD above the mean). In other words, when processing time becomes longer, consumers appear to be equally (in)sensitive to missing information regardless of disfluency or fluency.

Looking at the pattern of results in greater detail, we observed a backfiring effect of disfluency when consumers spend a very long time viewing the sign. Specifically, during an excessively long processing time (19.92 seconds; 2 SD above the mean), disfluency reduced omission detection ($B = -1.40$, $t(99) = -1.91$, $p = .059$), suggesting that they showed even a greater tendency of omission neglect. The backfiring tendency potentially emerges because when information is presented disfluently and consumers with sufficient time attempt to interpret the information more effortfully. In other words, they may direct too much

effort toward the disfluent presentation in order to see through it. This possibility is consistent with the self-regulation theory, which suggests that as difficulty increases, individuals allocate more cognitive effort to the focal task (Brehm and Self 1989; Nielsen and Escalas 2010). That effort may lead them to focus just on the presented information and neglect information not available at the time; processing disfluency has indeed been shown to result in more favorable (extreme) product evaluations, a consequence of heightened omission neglect (Nielsen and Escalas; Unkelbach et al. 2007). Based on the finding from this study and prior research, we suspect that when processing time is excessively long, disfluency may backfire by reducing sensitivity to missing information.

STUDY 2

After showing the interactive effect on omission neglect between disfluency and time, we sought to investigate the effect on behavioral intention. It was anticipated that when consumers spent a limited amount of time viewing the billboard, disfluent presentations, as compared to fluent ones, would heighten the awareness of missing information. This awareness would, in turn, reduce their immediate purchase intentions but also reduce the likelihood of future regret. Additionally, we tested perceived prettiness to rule out the possibility that participants had lower purchase intentions simply because they thought the ad was unattractive. We attempted to show that the effect on purchase intentions is due to heightened awareness of missing information, not the information's reduced attractiveness.

Method

One-hundred two participants ($M_{age} = 35.96$; 58% female) were recruited via an online resource (Amazon Mechanical Turk). This study adopted a 2 (contrast: difficult- vs. easy-to-read) x processing time (continuous) between-subject design. Participants were randomly assigned to one of the two contrast conditions.

Participants were invited to evaluate a delivery app based on a billboard advertisement. They were randomly assigned to view information in an easy-

or difficult-to-read word-background contrast (see Appendix C for the detailed stimuli) and we recorded the processing time each participant spent on viewing the billboard ad. After viewing the ad, participants reported their intentions to order deliveries through the advertised app (1= *not likely at all*; 7= *very likely*), how sufficient the information was for them to make an evaluation of the app (1= *not sufficient at all*; 7= *extremely sufficient*), how pretty the design was (1= *very ugly*; 7= *very pretty*). They also reported how easy or difficult it was to read (1= *very easy*; 7= *very difficult*) and how much attention was given to the information on the billboard (1= *very little*; 7= *very much*).

Next, on a separate page, we asked participants to imagine that they later found out this delivery app is rated 3 out of 5 by online reviewers. Following this, they reported how much they agreed or disagreed that this piece of information was unexpected (1= *strongly disagree*; 7= *strongly agree*). As with the other studies, basic demographic information was collected.

Results

Manipulation checks

ANOVA performed on perceived difficulty revealed a main effect of contrast ($F(1, 99) = 112.57, p < .001$). Specifically, participants rated the information in the difficult-to-read condition as more difficult to read ($M = 5.00, SD = 1.53$) than the easy-to-read condition ($M = 2.02, SD = 1.27$). The disfluency manipulation did not impact the attention paid to the billboard ($F(1, 99) = 1.83, p = .18$). As expected, a regression analysis showed that the longer participants stayed on the page viewing the billboard, the more attention they paid to it in general ($B = .03, t(97) = 2.13, p = .036$).

Purchase Intentions

We then submitted purchase intentions to a hierarchical regression analysis with time, contrast, and their interaction as predictors. The analyses showed no main effects ($ps > .24$) but revealed the proposed interactive effect between contrast and time ($B = .11, t(97) = 2.11, p = .037$; see Figure 4). Using the simple slope analysis from Aiken and West (1991), we found that when the time was shorter (4.33 seconds; 1 *SD* below the mean), participants showed lower purchase intentions when

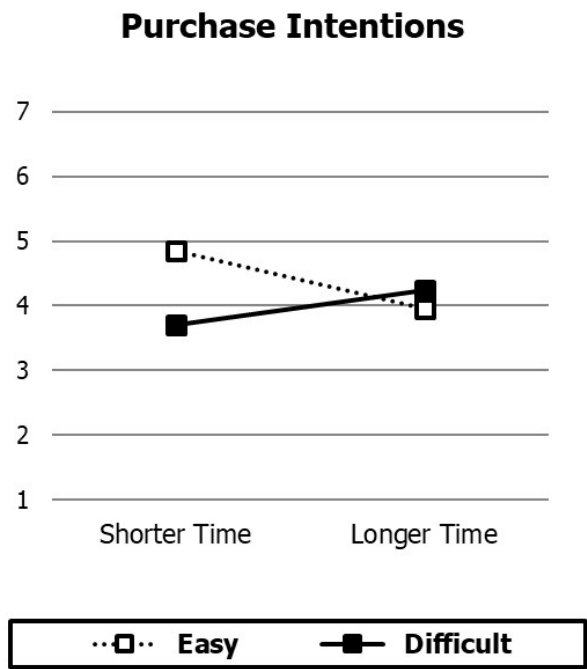


Figure 4 / Purchase Intentions as a Function of Font and Time in Study 2

the billboard was difficult to read ($B = -1.14, t(97) = -2.35, p = .021$). When the time was longer (17.82 seconds; 1 *SD* above the mean), no difference was observed between the two contrast conditions ($B = .29, t(97) = .62, p = .54$).

Sufficiency

The analyses on sufficiency showed no main effects ($ps > .24$) but revealed the proposed interactive effect between contrast and time ($B = .14, t(97) = 2.73, p = .008$; see Figure 5). Using simple slope analysis, we found that when the time was shorter (4.33 seconds; 1 *SD* below the mean), participants perceived the information as less sufficient if the billboard was difficult (vs. easy) to read ($B = -1.43, t(97) = -2.80, p = .006$). When the time was longer (17.82 seconds; 1 *SD* above the mean), no difference was observed between the two contrast conditions ($B = .50, t(97) = .102, p = .31$).

Surprise

Consistently, the analyses performed on perceived surprise showed no main effects ($ps > .75$) but revealed the proposed interactive effect between contrast and time ($B = .10, t(97) = 2.07, p = .041$; see Figure 6). With a slope analysis, we found that when time was shorter

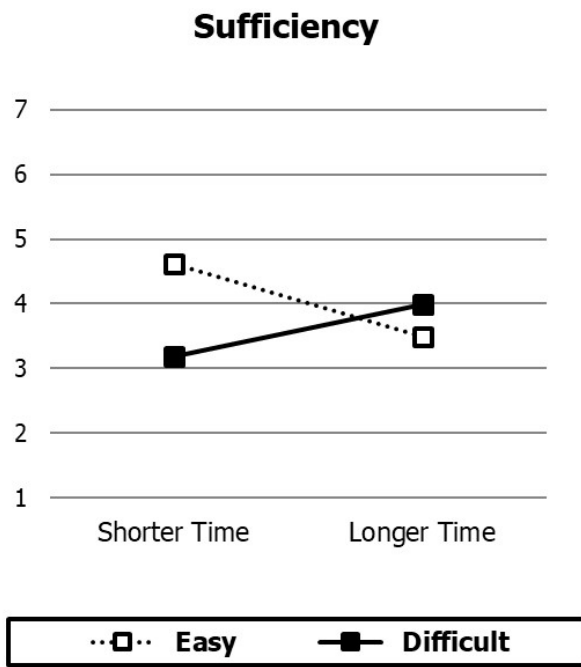


Figure 5 / Sufficiency as a Function of Font and Time in Study 2

(4.33 seconds; 1 SD below the mean), participants experienced less surprise afterward when the billboard was difficult (vs. easy) to read ($B = -1.01, t(97) = -1.86, p = .066$). When the time was longer (17.82 seconds;

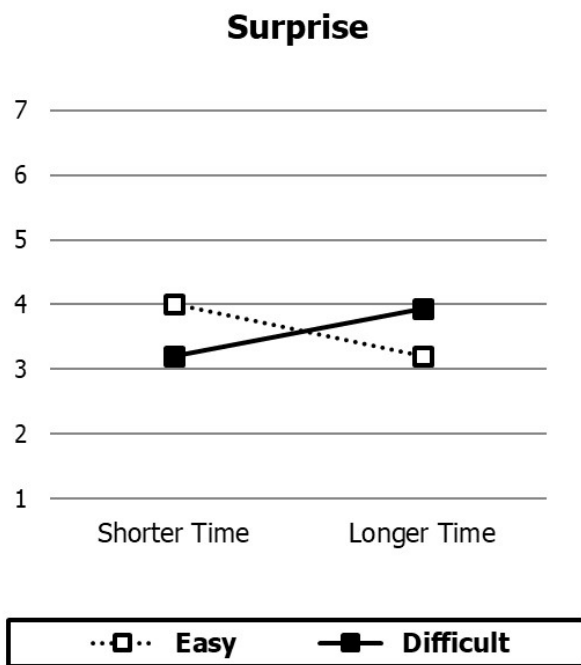


Figure 6 / Surprise as a Function of Font and Time in Study 2

1 SD above the mean), no effect of the contrast was observed ($B = .54, t(97) = 1.22, p = .23$).

Mediation analyses

Next, we used bootstrapping procedures to assess the extent to which the interactive effect on purchase intentions and surprise are driven by omission neglect (Hayes 2018). The results revealed significant mediating pathways for both variables (indirect effect_{purchase intentions} = .09, 95% CI: .0211, .1481; indirect effect_{surprise} = .04, 95% CI: .0055, .0851). In other words, sufficiency, as a measure of omission neglect (Kardes et al. 2006), increased immediate purchase likelihood but resulted in surprise later.

Prettiness

The analyses on perceived prettiness showed no interactive effect between contrast and time ($B = .08, t(97) = 1.48, p = .14$). This result ruled out prettiness as an alternative explanation.

DISCUSSION

Study 2 replicates the proposed interactive effect between disfluency and processing time, yet in another context. Disfluency reduces omission neglect by decreasing perceived information sufficiency when consumers spend only a limited amount of time evaluating the ad. This decreased omission neglect reduces the immediate purchase likelihood, but also the likelihood of surprise when the missing information is revealed later. When consumers spend a longer time viewing the stimuli, the difference between disfluency and fluency disappears. The pattern of the results suggests that the debiasing effect of disfluency become more effective among individuals who choose to process information faster. In this study, we have also ruled out perceived prettiness as an alternative explanation for the effects.

Additionally, as shown through the pattern in Study 1B, disfluency shows a backfiring tendency by increasing the susceptibility to omission neglect when processing time becomes much more abundant. Specifically, when the time became very long (20.22 seconds; 2 SD above the mean), disfluency led to marginally higher perceived sufficiency ($B = 1.47, t(97) = 1.86, p = .066$) and more surprise ($B = 1.21, t(97) = 1.71, p = .09$).

GENERAL DISCUSSION

This research investigates how processing time impacts the way consumers interpret disfluent information. It reconciles the effects of disfluency on deliberative, analytic processing through omission neglect (*see* Alter et al. 2007; Unkelbach et al. 2007). Past research suggests that disfluency can increase one's awareness of missing information, leading to improved information processing and decision making (Sundar et al. 2019). Our research extends the omission neglect literature by identifying the role of processing time, as both a manipulated, dichotomous variable and a measured, continuous variable (*see* Unkelbach et al.). As variations exist in the amount of time individuals need to encode and comprehend information before judgment or a decision is made, studying processing time as a continuous variable offers a higher degree of external validity. We find that with limited processing time, disfluency results in decreased omission neglect and improved decisions at the time the judgment or choice is made. Under this circumstance, consumers have lower immediate purchase intentions and experience less unfavorable surprise once exposed to omissions. When they spend more time, however, the difference between the disfluency and the fluency conditions is attenuated, and when processing time becomes overly long, disfluency even backfires by increasing omission neglect; disfluency may require consumers to direct more effort to the presented information at the expense of noticing missing attributes. This interesting pattern potentially contributes to backfiring research (Sanna and Schwarz 2003; 2006; Sanna, Schwarz, and Stocker 2002).

Besides the theoretical contributions, our research is of practical importance to both businesses and consumers. Presenting information fluently through easy-to-read designs is often perceived as beneficial for printed ads or billboards because difficulty can lead to lowered evaluations (Gill et al. 1998). This may seem especially true for billboards, which are viewed for but a few seconds, or when consumers do not have much time viewing the information (Morones 2016). However, our research suggests that in order to facilitate more prudent information processing, marketers should strategically take advantage of conceptual or perceptual disfluency, allowing consumers to notice missing information and form less extreme, albeit more stable, evaluations of a brand. For example, when the quality of a consumer's decision (e.g., a medical choice or a refund request) matters to both the company and the clients, marketers can use disfluency to trigger a less extreme product evaluation and a more cautious purchase decision.

Our research consistently suggests that although easy-to-read signage can induce consumers to focus more on the presented favorable information, such omission neglect may lead to more surprise later and that surprise may negatively impact customer satisfaction and repurchase likelihood in the long term. The benefits of using difficult-to-process designs may become especially relevant when marketers want to initiate and maintain long-term relationships with consumers (*see* Alter et al. 2007). For example, mature brands that value long-term relationships over first impressions may find

disfluent presentations in outdoor signs or other visual marketing communications more beneficial. When the evaluation time of a sign is limited, disfluency created through special fonts or low word-background contrast colors can encourage consumers to consider a more complete set of criteria before making a conclusion, therefore improving the quality of their decisions.

While marketers may assume that more time improves information processing and decision quality, the current research suggests this is not always so. When consumers spend too much time evaluating a sign, disfluent presentations may backfire by shifting attention to the presented information. Therefore, when consumers make important decisions and are known to take a long time evaluating a set of criteria carefully, it may be effective to present information in an easy-to-process way as disfluency may increase their susceptibility to omission neglect. Similarly, consumers can benefit from our research by understanding how they may be impacted by the time they spend on marketing stimuli and the information's format.

This research focused on advertising billboards, for which consumers may not have complete control over how much time they have to view and process information. Future research might explore how time and disfluency impact information processing and decision making in other marketing contexts (e.g., marketing through smartphones, laptops, or tablets) where consumers have more control over the pace of information flow. The practical importance of our research might be extended to digital technologies where consumers quickly scroll through information. We would expect factors such as individual traits to have a bigger impact in a context where consumers have more control over the pace of information processing. Prior research, for example shows that individuals with a higher level of conscientiousness more readily adjust to greater task difficulty by allocating more effort to the task (Yeo and Neal 2008). Based on our findings, they may be less receptive to the debiasing effect of disfluency. Since processing time and the need for cognitive closure are closely related but remain different constructs, it is worth exploring how

the need for cognitive closure might interact with disfluency to impact decisions through omission neglect (Kruglanski and Freund 1983).

Finally, our research indicates an interesting backfiring effect of disfluency on omission neglect when processing time becomes overly long. While we focus on the debiasing role of disfluency when the processing time is short in the current article, the backfiring effect might be worth exploring in greater detail in future research, which could look at more theoretical and practical implications of disfluency's effects across different time spans to guide future marketing designs. Through this work we offer a new, theoretical account of how consumers respond to disfluent presentations of information as a function of processing time. Our investigation presents new opportunities for future theoretical research and we encourage more practical research to study the parameters regarding the topic. We hope our contributions to the field of signage will inspire future research to continue the advancements suggested in this article.

REFERENCES

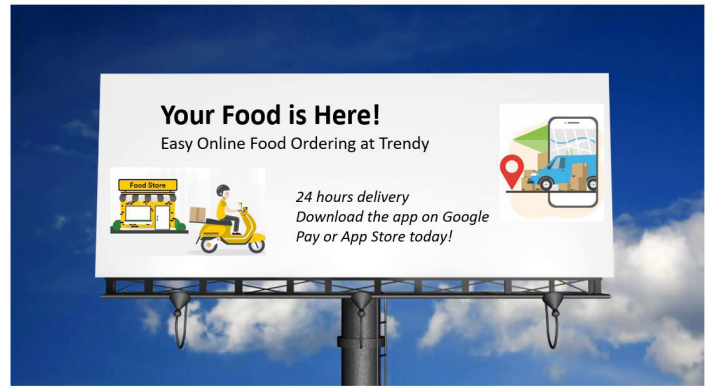
- Alter, A. L., Oppenheimer, D. M., Epley, N., and Eyre, R. N. (2007). Overcoming intuition: metacognitive difficulty activates analytic reasoning. *Journal of Experimental Psychology: General* 136, 569-576.
- Brehm, J. W. and Self, E. A. (1989). The intensity of motivation. *Annual Review of Psychology* 40(1), 109-131.
- Cohen, J., Cohen, P., West, S. G., and Aiken, L. S. (eds). (2013). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Mahwah: Lawrence Erlbaum.
- Dennis, C., Newman, A., Michon, R., Brakus, J. J., and Wright, L. T. (2010). The mediating effects of perception and emotion: Digital signage in mall atmospherics. *Journal of Retailing and Consumer Services* 17, 205-215.
- Dynel, M. (2011). Blending the incongruity-resolution model and the conceptual integration theory: The case of blends in pictorial advertising. *International Review of Pragmatics* 3, 59-83.
- Gill, M. J., Swann Jr, W. B., and Silvera, D. H. (1998). On the genesis of confidence. *Journal of Personality and Social Psychology* 75(5), 1101-1114.
- Hayes, A. F. (2018). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guilford.
- Heaton, A. W. and Kruglanski, A. W. (1991). Person perception by introverts and extraverts under time pressure: Effects of need for closure. *Personality and Social Psychology Bulletin* 17, 161-165.
- Hobbs, T. (2016). "Marketers continue to 'waste money' as only 9% of digital ads are viewed for more than a second." *Marketing Week*, 26 June. <https://www.marketingweek.com/marketers-continue-to-waste-money-as-only-9-of-digital-ads-are-viewed-for-more-than-a-second/>
- Huddleston, P. T., Behe, B. K., Driesener, C., and Minahan, S. (2018). Inside-outside: Using eye-tracking to investigate search-choice processes in the retail environment. *Journal of Retailing and Consumer Services* 43, 85-93.
- Jacoby, L. L. and Dallas, M. (1981). On the relationship between autobiographical memory and perceptual learning. *Journal of Experimental Psychology: General* 110(3), 306.
- Kardes, F. R., Posavac, S. S., Silvera, D., Cronley, M. L., Sanbonmatsu, D. M., Schertzer, S., and Chandrashekar, M. (2006). Debiasing omission neglect. *Journal of Business Research* 59, 786-792.
- Kim, M. and Lennon, S. (2008). The effects of visual and verbal information on attitudes and purchase intentions in internet shopping. *Psychology and Marketing* 25, 146-178.
- Kumar, N., Lang, K. R., and Peng, Q. (2005). Consumer search behavior in online shopping environments. *Proceedings of the 38th Annual Hawaii International Conference on System Sciences* 3(3), 87-102.
- Kruglanski, A. W. and Freund, T. (1983). The freezing and unfreezing of lay-inferences: Effects on impression primacy, ethnic stereotyping, and numerical anchoring. *Journal of Experimental Social Psychology* 19, 448-468.
- Kruglanski, A. W., Webster, D. M., and Klem, A. (1993). Motivated resistance and openness to persuasion in the presence or absence of prior information. *Journal of Personality and Social Psychology* 65, 861-876.
- Lee, A. Y., and Labroo, A. A. (2004). The effect of conceptual and perceptual fluency on brand evaluation. *Journal of Marketing Research* 41, 151-165.
- Morones, H. (2008). 5 rules of effective billboard design and advertising. *99 Designs*. <https://99designs.com/blog/tips/billboard-design-tips/>
- Nielsen, J. H., and Escalas, J. E. (2010). Easier is not always better: The moderating role of processing type on preference fluency. *Journal of Consumer Psychology* 20, 295-305.
- Novemsky, N., Dhar, R., Schwarz, N., and Simonson, I. (2007). Preference fluency in choice. *Journal of Marketing Research* 44, 347-356.
- Pieters, R., Warlop, L., and Wedel, M. (2002). Breaking through the clutter: Benefits of advertisement originality and familiarity for brand attention and memory. *Management Science* 48, 765-781.
- Reber, R. and Schwarz, N. (2001). The hot fringes of consciousness: Perceptual fluency and affect. *Consciousness and Emotion* 2, 223-231.
- Roets, A., Kruglanski, A. W., Kossowska, M., Pierro, A., and Hong, Y. Y. (2015). The motivated gatekeeper of our minds: New directions in need for cognitive closure theory and research. *Advances in Experimental Social Psychology* 52, 221-283.
- Roggeveen, A. L., and Johar, G. V. (2002). Perceived source variability versus familiarity: Testing competing explanations for the truth effect. *Journal of Consumer Psychology* 12, 81-91.

- Sanbonmatsu, D. M., Kardes, F. R., Houghton, D. C., Ho, E. A., and Posavac, S. S. (2003). Overestimating the importance of the given information in multiattribute consumer judgment. *Journal of Consumer Psychology* 13(3), 289-300.
- Sanbonmatsu, D. M., Kardes, F. R., and Sansone, C. (1991). Remembering less and inferring more: Effects of time of judgment on inferences about unknown attributes. *Journal of Personality and Social Psychology* 61(4), 546-554.
- Sanna, L. J. and Schwarz, N. (2003). Debiasing the hindsight bias: The role of accessibility experiences and (mis) attributions. *Journal of Experimental Social Psychology* 39, 287-295.
- Sanna, L. J., and Schwarz, N. (2006). Metacognitive experiences and human judgment: The case of hindsight bias and its debiasing. *Current Directions in Psychological Science* 15, 172-176.
- Sanna, L. J., Schwarz, N., and Stocker, S. L. (2002). When debiasing backfires: Accessible content and accessibility experiences in debiasing hindsight. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 28, 497-302.
- Schwarz, N. (2004). Metacognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology* 14(4), 332-348.
- Silvera, D. H., Kardes, F. R., Harvey, N., Cronley, M. L., and Houghton, D. C. (2005). Contextual influences on omission neglect in the fault tree paradigm. *Journal of Consumer Psychology* 15(2), 117-126.
- Smith, M. D., Bailey, J., and Brynjolfsson, E. (1999). *Understanding digital markets: review and assessment*. MIT Press, Cambridge.
- Song, H. and Schwarz, N. (2008). Fluency and the detection of misleading questions: Low processing fluency attenuates the Moses illusion. *Social Cognition* 26, 791-799.
- Sundar, A., Wu, R., and Kardes, F. R. (2019). Faded fonts. *Interdisciplinary Journal of Signage and Wayfinding* 3, 16-27.
- Sundar, A., Gonsales, F., and Schafer, G. (2018). Synchronicity in signage promotes a sense of belonging. *Interdisciplinary Journal of Signage and Wayfinding* 2(2), 30-40.
- Taylor, C. R., Franke, G. R., and Bang, H. K. (2006). Use and effectiveness of billboards: perspectives from selective-perception theory and retail-gravity models. *Journal of Advertising* 35, 21-34.
- Tversky, A. and Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology* 5(2), 207-232.
- Unkelbach, C., Fiedler, K., and Freytag, P. (2007). Information repetition in evaluative judgments: Easy to monitor, hard to control. *Organizational Behavior and Human Decision Processes* 103(1), 37-52.
- Visual, P. (2016). Common signage problems and how to deal with them. *PB Visual*, 27 April. <http://pbvisual.com.au/how-to-deal-with-4-common-signage-problems/>
- Webster, D. M. and Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, 67, 1049-1062.
- Weisbuch, M. and Mackie, D. (2009). False fame, perceptual clarity, or persuasion? Flexible fluency attribution in spokesperson familiarity effects. *Journal of Consumer Psychology* 19, 62-72.
- Wu, R., Escoe, B., and Kardes, F. (2017). You are not as smart as you think you are: Effects of self-perceived knowledge on consumer information processing and decision making. *ACR North American Advances*.
- Wu, R., Shah, E., and Kardes, F. (2016). Disfluency effects on inference and evaluation. *ACR North American Advances*.
- Wu, R., Shah, E., and Kardes, F. (2020). "The struggle isn't real:" How need for cognitive closure moderates inferences from disfluency. *Journal of Business Research* 109, 585-594.
- Yeo, G. and Neal, A. (2008). Subjective cognitive effort: A model of states, traits, and time. *Journal of Applied Psychology* 93(3), 617-631.
- Yoon, A. Choi, S.M., Hong, J., Hahn, D., Kang, M., and Lee, S. (2014). Motivational Signage Promotes Physical Activity on a College Campus. *Medicine and Science in Sports and Exercise* 46, 108.

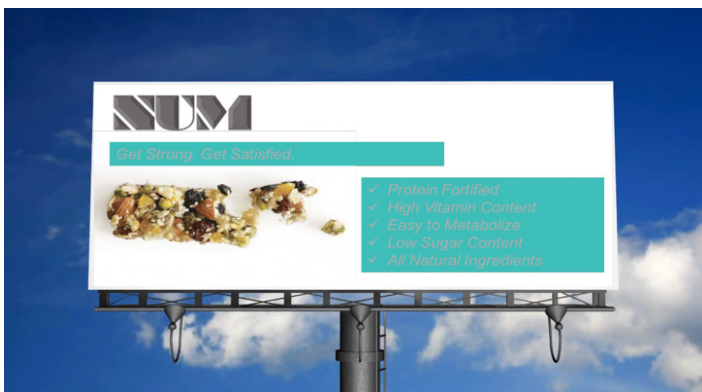
APPENDICES



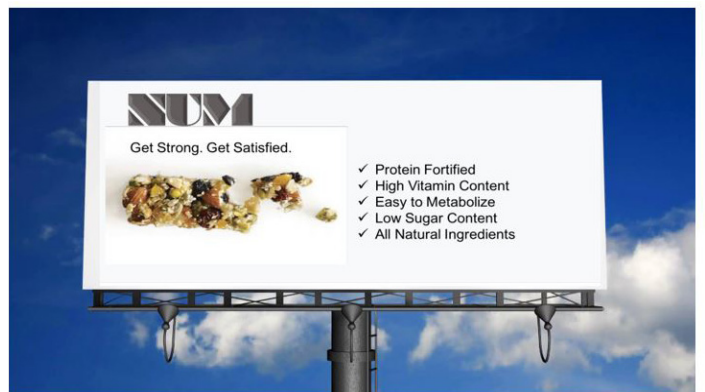
Appendix A / Difficult to Read Font



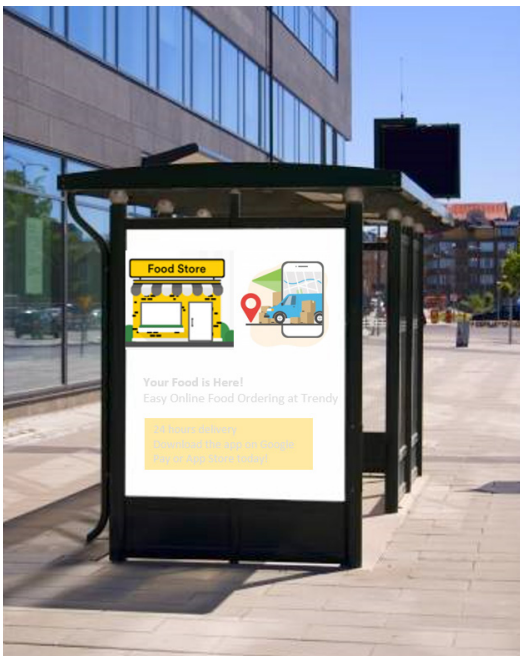
Appendix A / Easy to Read Font



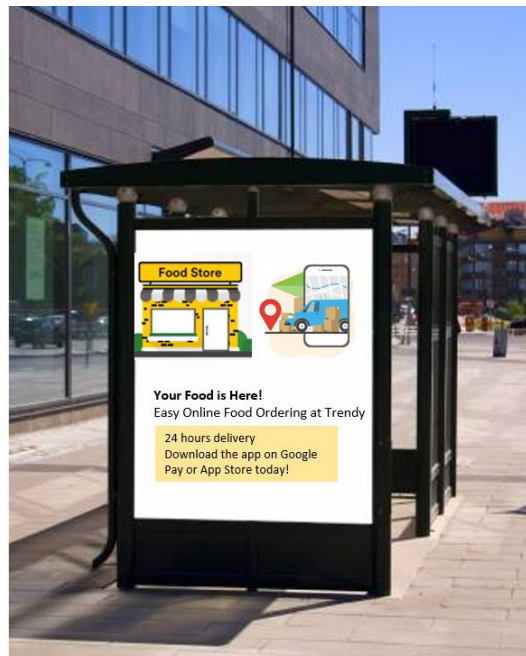
Appendix B / Difficult to Read Contrast



Appendix B / Easy to Read Contrast



Appendix C / Difficulty to Read Contrast



Appendix C / Easy to Read Contrast

Sign Evaluation and Compliance Under Mortality Salience: lessons from a pandemic

James J. Kellaris*

James S. Womack / Gemini
Corporation Professor of
Signage and Visual Marketing
Department of Marketing
Carl H. Lindner College of Business
University of Cincinnati

james.kellaris@uc.edu

Karen A. Machleit

Professor and Head of Department
Department of Marketing
Carl H. Lindner College of Business
University of Cincinnati

karen.machleit@uc.edu

Donald R. Gaffney

PhD Candidate
Department of Marketing
Carl H. Lindner College of Business
University of Cincinnati

gaffnedd@mail.uc.edu

*corresponding author

INTRODUCTION

At the time of this writing we find ourselves in the midst of a pandemic. Daily news reports of fatalities from COVID-19 and ever-increasing death counts make mortality salient in the minds of the public. This unusual circumstance presents an opportunity to explore the influence of mortality salience on the processing and acceptance of messages conveyed by signs.

Signs play an important role in conveying information to the public (Calori 2007; Kellaris and Machleit 2016; Taylor et al. 2005). The importance of this role is magnified when the information concerns public health or safety, such as signs conveying health warnings or soliciting cooperation with mitigation strategies to combat health threats (Cian et al. 2015). Examples from the COVID-19 pandemic include handwashing signs, restricted shopping hours for vulnerable groups, maintaining physical distance, and wearing protective face masks in public to reduce contagion, among others. A significant communication challenge with such signage is that by calling attention to potentially fatal consequences, mortality salience can be triggered.

Mortality salience is mindfulness of the inevitability of one's own death (Greenberg et al. 1986). According to terror management theory, reminders of mortality evoke feelings of anxiety, which in turn activate defensive coping mechanisms (Spielberger 1966; Greenberg et al. 1986; Greenberg et al. 2003). These defense mechanisms include becoming more entrenched in a shared worldview, which sets standards concerning how one should behave, and self-esteem, which reflects one's assessment of how we live up to those standards (Ferraro et al. 2005). Additionally, people tend to respond to mortality salience by seeking the comfort of in-groups and close others (Mikulincer et al. 2003). Pyszczynski et al. (1997) explain this tendency to retreat to one's comfort zone

Abstract /

This article examines sign communication effectiveness in the context of COVID-19 pandemic-related signs that promote behavioral changes. A program of four experiments assessed the influence of mortality salience on responses to signs promoting frequent handwashing (Study 1), restricted shopping hours for vulnerable groups (Study 2), maintaining physical distance (Study 3), and mask wearing (Study 4). Findings support a conceptual model proposing a serial mediation process whereby mortality cues trigger a chain of events (feelings and thoughts) that ultimately shape evaluations of and intentions to comply with signs. Findings offer evidence-based guidelines for effective signage communication.

Keywords /

sign communication; mortality salience; sign evaluation; behavioral intentions

in the face of existential threat as identifying at a symbolic level with things that will outlast one's own existence.

The effects of mortality salience are broad and far-reaching, impacting decision-making in domains as disparate as financial allocation, to selecting chocolate cake over fruit salad (Kasser and Sheldon 2000; Arndt et al. 2004; Salisbury and Nenkov 2016; Ferraro et al. 2005). Mandel and Smeesters (2008) document a general tendency to over-eat when primed with thoughts of mortality—an effect they explain in terms of escape from self-awareness.

Germane to this research, Cai and Wyer (2015) show that people process information differently when they are conscious of their own mortality. Specifically, the relative effectiveness of appeals to help (in the wake of a natural disaster) differs according to the viewer's state of mind. Whereas "need-focused" appeals are more effective when people are not thinking about their own mortality, "bandwagon" appeals (i.e., join the many other people that are doing something) are more effective when mortality is salient. This is consistent with the basic premise of terror management theory, that mortality salience motivates people to reaffirm their cultural worldview (Greenberg et al. 1986). Presumably, the behavior of others exemplifies the predominant worldview to which mortality-conscious people are motivated to conform.

We propose another possibility. Feelings of anxiety triggered by thoughts of mortality may be experienced as a generalized "bad feeling." Negative affect attendant to uncomfortable thoughts has potential to influence the evaluation of information (Schwartz 2012). Signs that raise mortality salience may also induce changes in affective reactions to the sign, which may influence the evaluation of the information presented. Specifically, whereas positive affect should encourage positive evaluations, negative affect may color subsequent evaluations. Good feelings produce good evaluations, and this general principle should apply to positive affect toward a sign engendering favorable evaluations of itself.

Why are evaluations of a sign important if compliance is the communication goal? Simply put, people are motivated to maintain internal consistency. According to cognitive consistency theory, people tend to act in accordance with beliefs and intentions formulated on the basis of those beliefs (Abelson 1968). This means that positive evaluations should instill positive behavioral intentions. In the case of processing sign information, a "liked" sign opens the door to positive behavioral intentions with regard to the message of the sign.

In this study, we examine how sign information is processed under conditions of a looming threat to public health, with the ultimate goal of understanding how to design sign messages that encourage positive behaviors. Specifically, we address the following research questions: How does mortality salience influence viewers' responses to signs that advocate behavioral change? By

what process does this influence operate? Does positive evaluation of signs predict compliance with sign messages?

Although this program of experimentation is largely exploratory, we hypothesize on the basis theory and previous findings that mortality salience will ultimately influence behavioral intentions to comply with sign messages via a serial mediation process as depicted in the conceptual model shown in Figure 1 (below). Specifically, the level of mortality salience (MS) evoked by a sign should influence viewers' anxiety levels, with higher (vs. lower) MS producing greater states of anxiety. Anxiety levels should influence affective reactions to the sign, which in turn should influence evaluations of the sign. Finally, these evaluations should influence behavioral intentions to comply with the advocacy of the sign, with more positive evaluations leading to greater compliance.

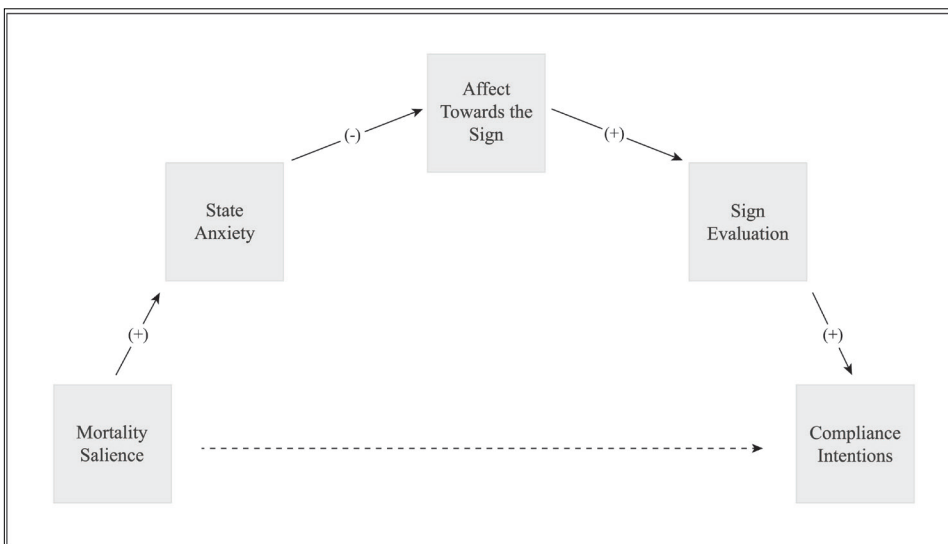


Figure 1 / Conceptual Model

STUDY 1

Our initial exploration of sign communication effectiveness under mortality salience exposed participants to variants of a sign designed to promote handwashing as a COVID-19 abatement strategy.

Method

Participants ($N = 113$) were recruited from an online panel in exchange for monetary compensation. Their ages ranged from 18 to 73 years with an average age of 31.5 (median=29) and the majority were female (56%), with 4% electing to not disclose their gender identity. Stimulus materials were simulated handwashing signs created by a graphic artist. Variants of the sign represented low / high mortality salience (MS), crossed with the presence or absence of an in-group appeal in a 2 x 2 between-subjects experimental design (See Appendix 1). After obtaining informed consent, participants were asked to view a sign and then answer questions about the sign and about themselves.

Measures

The dependent variable was behavioral intent to comply with the advocacy of the sign (“Compliance”), represented by a seven-point agreement scale (1=strongly disagree, 7=strongly agree) preceded by the statement “I am likely to comply with the sign’s message.”

The first mediator variable, state anxiety, was captured by a seven-item, four-point agreement scale patterned after an instrument by Marteau and Bekker (1992). Participants were asked to respond to the prompt: “There are many ways people can react to messages on signs. We are interested in the extent to which (if at all) the sign you viewed made you feel...” with the words: “worried, tense, nervous, apprehensive, ill-at-ease, upset, and anxious” and rate each from 1-4 (1=not at all, 2=perhaps somewhat, 3=moderately so, 4=very much so). These were combined into a summed and averaged composite scale ($\alpha = .941$).

The second mediator, affective reaction to the sign (“affect”) was measured via a three-item, seven-point agreement scale adapted from Madden et al. (1988). Participants responded to the prompt: “Viewing this sign made me feel...” with “good / bad, happy / sad, positive / negative.” This seven-point semantic differential scale was reversed, with larger values representing more positive affect. These too were combined into a composite scale ($\alpha = .918$).

The third mediator, evaluation of the sign (“SignEval”), was represented by a five-item, seven-point agreement scale (1=strongly disagree, 7=strongly agree). For this variable, participants responded to the statement “The following questions concern your evaluation of the sign you just saw...” with: “The sign communicated its message effectively,” “The intent of the message was clear,” “The message was easy to understand,” “Given its purpose, this was a good sign,” and “Given the purpose of the sign, the message was well worded.” These also were combined into a summed and averaged composite scale ($\alpha = .881$).

The questionnaire also included manipulation and reality checks. To verify the integrity of our experimental manipulations, mortality salience

was assessed by five, seven-point agreement items: “The message on the sign made me think of human mortality,” “Viewed in the context of a pandemic, the sign reminded me that fatalities can occur if people do not wash their hands frequently,” “The sign implied that viruses can be deadly,” “The sign called to mind that my loved ones won’t live forever,” and “The sign made me think of my own mortality”. These were summed and averaged to form a composite scale ($\alpha = .864$). The in-group appeals treatment was assessed via three, seven-point agreement items (“I thought of family and friends when I saw the sign,” “The sign made me think of my loved ones,” “The sign called to mind those who are closest to me”), which were combined into a composite scale ($\alpha = .947$).

‘Reality checks’ are items included to verify participants’ attentiveness, mindfulness, and cooperation with the experimental task, e.g., “I did not take this study seriously or strive to provide thoughtful answers” (1=strongly disagree, 7 = strongly agree). These allow for the exclusion of aberrant responses from statistical analyses. The questions concluded with standard demographic items (e.g., gender, age) to facilitate sample description.

Results

Manipulation checks

Low / high mortality salience groups differ statistically on the MS manipulation check measure ($Mean_{low}=3.97$, $Mean_{high}=5.37$; $t = -5.53$, $df=111$, $p < .001$, two-tailed). Additionally, low/high in-group treatment groups differ statistically on the in-group manipulation check measure ($Mean_{low}=3.70$, $Mean_{high}=5.04$; $t = -3.68$, $df=111$, $p < .001$, two-tailed). However, we note that the two manipulation check measures are correlated ($r = .48$, $p < .001$), which led us to investigate the impact of the mortality salience treatment on the in-group manipulation check measure. Evidence suggests that although MS and in-group appeals were manipulated orthogonally, it appears that mortality salience “overpowered” the in-group manipulation, with high MS making people mindful of their loved ones (i.e., in-group). Further analyses were performed both with and without the in-group treatment variable.

Moderation analysis

Whereas we expected the interplay between mortality salience and in-group appeals to influence compliance intentions indirectly by triggering anxiety, we ran an initial analysis via PROCESS macro model 1 to examine the interactive effect of the treatments on anxiety (Hayes 2018). Results indicate a strong, direct effect of MS on anxiety ($p = .0037$), but the interaction was not statistically significant ($p = .0788$, CI: $-.0502$, $.9081$). Moreover, MS had a significant, positive effect on anxiety under both low ($p = .0037$) and high ($p < .0001$) in-group conditions. Hence, further analyses omitted the in-group treatment variable.

Serial mediation analysis

To test the implicit hypotheses suggested by our conceptual model (Figure 1), we conducted a serial mediation analysis using PROCESS macro model 6 (Hayes 2018), whereby the 95% confidence intervals (CIs) used to generate each indirect effect were performed using 5,000 bootstrap samples. Consistent with our conceptual model, anxiety (M1), affect (M2) and sign evaluation (M3) mediate the effect of mortality salience (IV) on sign compliance (DV) ($-.1198$, CI: $-.2624$, $-.0414$). There was no evidence that MS influenced compliance intentions directly, independent of its effect on anxiety and ensuing events in the causal chain ($.1872$, CI: $-.2154$, $.5899$). This analytic technique permits the efficient assessment of direct and indirect effects, and showed a fully mediated path whereby MS determines anxiety levels ($.7517$, $p < .0001$), anxiety contributes negatively to affect toward the sign (-1.0167 , $p < .0001$), affect shapes evaluations of the sign ($.3576$, $p < .0001$), and evaluations exert a positive influence on compliance intentions ($.4384$, $p < .0001$).

Discussion

Findings provide initial evidence in support of the conceptual model. It appears that mortality salience exerts an indirect influence on intentions to comply with the advocacy of signs by triggering emotions that influence cognitive evaluations of those signs. Provisionally, we speculate that evaluations of signs are the primary driver of compliance intentions, and that lowering (vs. raising) mortality salience in sign messages should engender favorable downstream effects. To gather corroborative evidence, we conducted

a conceptual replication of Study 1.

STUDY 2

Study 2 is a conceptual replication of Study 1, using different stimuli to see if results from the context of encouraging positive behavior (washing hands) hold when the message is about restricting a behavior, which in this instance was limited business hours. Participants ($N = 112$, 60.6% female, median age = 28) were exposed to signs asking for voluntary compliance with store hours restricted for vulnerable population use only. The experimental design and method were similar to those of Study 1, although different stimulus materials were used (see Appendix 2). The measures were identical with the exception of the Sign Evaluation and Compliance scales, which used a 100-point sliding scale in Study 2 to capture more subtle variability in responses.

Results

Manipulation checks show that treatment group means differ in the expected directions but did not differ statistically on the corresponding manipulation check measures for either MS ($p = .855$) or in-group ($p = .312$). Consequently, we performed subsequent analyses using measured MS as the independent variable (IV) rather than treatment group membership.

Serial mediation analysis

As in Study 1, we conducted a serial mediation analysis using PROCESS macro model 6 (Hayes 2018). Consistent with our conceptual model and results obtained in Study 1, anxiety (M1), affect (M2) and sign evaluation (M3) mediate the effect of measured mortality salience (IV) on sign compliance (DV) ($-.0535$, CI: $-.1582$, $-.0004$). There was no evidence that MS influenced compliance intentions directly, independent of its effect on anxiety and ensuing events in the causal chain ($.3109$, CI: $-.9582$, 1.5801). Again, results showed a fully mediated path whereby MS determines anxiety levels ($.1006$, $p = .0075$), anxiety contributes negatively to affect toward the sign ($-.5661$, $p = .026$), affect shapes evaluations of the sign (2.8480 , $p = .013$), and evaluations exert a positive influence on compliance intentions ($.3296$, $p < .0001$).

Discussion

Study 2 provides further evidence in support of the conceptual model. It appears that MS exerts a significant and indirect influence on sign compliance through the emotions and evaluations that arise from a causal chain triggered by MS. Moreover, evidence suggests that the model holds even when the context shifts from a positive frame (do wash hands) to a negative, restrictive frame (don't shop during certain hours).

Regarding the failure of the MS manipulation, we note two things. The signs used in Study 2 contained more information than those used in Study 1. We speculate post hoc that the higher informational density may dilute the impact of mortality salience cues, lowering the high group mean and raising the low group mean. Gravitation to the mean might also reflect people's pre-existing beliefs about COVID-19; if some in the high MS conditions believe that COVID-19 is not a threat, or some in the low MS condition believe COVID-19 is an existential threat, that would result in the means gravitating to the center of the distribution.

Additionally, we note that the signs in Study 2 asked for cooperation to reduce a mortality threat to groups that are out-groups for the majority of participants. For example, restricted hours designed to protect senior citizens may have seemed less personally relevant and therefore did not trigger MS among the comparatively young participants (range = 18 to 61 years, median = 28 years). In fact, age is positively correlated with evaluations of signs across conditions ($r = .332, p < .001$, two-tailed), suggesting that older participants were generally more favorably disposed to the idea of restricted shopping hours to benefit special population segments, regardless of their MS level.

Nevertheless, measured MS provided a strong test of the model, providing convergent evidence that behaved consistent with theory, exactly as the model predicted. We are concerned, however, that the looming presence of the pandemic threat and the informational density of the signs used in Study 2 overwhelmed the treatment effect of our manipulation. This concern motivated a third study, in which the prior studies are extended by examining a mechanism that intensifies message reception.

STUDY 3

Study 3 is a conceptual replication and extension of the two previously described studies, but incorporates different stimuli and an additional experimental manipulation. Participants ($N = 268$, 55% female, median age = 34.5) were exposed to signs promoting the practice of social distancing. Variants of these signs represented low / high mortality salience, crossed with the presence or absence of an in-group appeal, and an additional factor: verbal information that did or did not rhyme, in a $2 \times 2 \times 2$ between-subject experimental design (see Appendix 3). Measures were identical to those in Study 2.

Results

Manipulation checks verified the integrity of the mortality salience treatment. Low / high MS groups differ statistically on the MS manipulation check measure ($\text{Mean}_{\text{low}} = 4.58, \text{Mean}_{\text{high}} = 5.08; t = -2.98, df = 266, p < .003$, two-tailed). The low / high in-group manipulation did not produce statistical differences on the post-test manipulation check. As in Study 1, the MS and in-group manipulation check measures were positively correlated ($r = .564, p < .001$, two-tailed), which we construe as evidence that MS overwhelmed any potential impact of the in-group treatment. The in-group treatment was excluded from further analyses.

Serial mediation analysis - conceptual replication of studies 1 and 2

As in Studies 1 and 2, we conducted a serial mediation analysis using PROCESS macro model 6, whereby the 95% confidence intervals used to ascertain each indirect effect were generated using 5,000 bootstrap samples (Hayes 2018). There was no evidence that MS influenced compliance intentions directly, independent of its effect on anxiety and ensuing events in the causal chain ($-.1032, CI: -3.1386, 2.9322$). Results partially replicated prior results, in that MS determines anxiety levels ($.3036, p = .0002$) and anxiety contributes negatively to affect toward the sign ($-.4123, p = .0018$). However, affect did not have a statistical effect on evaluations of the sign ($.9085, p = n.s.$). Evaluations did exert a positive influence on compliance intentions ($.7603, p < .0001$). To summarize, the indirect effect of MS on compliance via the full mediational path ($-.0865, CI: -.2574, .0114$) broke down between

affect and evaluation. Our explorations to understand this inconsistency led us to consider the role rhyming messages might play in making messages more salient.

Serial mediation analysis on rhyming text sub-sample

We conducted an additional serial mediation analysis using PROCESS macro model 6 on data from the subset of participants exposed to rhyming versions of the sign message (Hayes 2018). Consistent with our conceptual model and results obtained in Study 1, anxiety (M1), affect (M2) and sign evaluation (M3) mediate the effect of measured mortality salience (IV) on sign compliance (DV) (-.2192, CI: -.6361, -.0119). There was no evidence that MS influenced compliance intentions directly, independent of its effect on anxiety and ensuing events in the causal chain (-1.5955, CI: -6.7581, 3.5670). Again, consistent with our conceptual model, results showed a fully mediated path whereby MS determines anxiety levels (.3642, $p = .002$), anxiety contributes negatively to affect toward the sign (-.4905, $p = .0033$), affect has a positive effect on evaluations of the sign (1.5472, $p = .0689$), and evaluations exert a positive influence on compliance intentions (.7931, $p < .0001$).

A closer examination of the “rhyming effect” shows a significant, positive association between affect and evaluations among participants exposed a sign featuring a rhymed version of the message ($r = .223$, $p < .008$, two-tailed), but not among those exposed to non-rhyming versions ($r = .005$, n.s.).

Discussion

Findings provide additional corroborative evidence in support of the conceptual model and demonstrate a potentially important technique for amplifying sign messages. Rhymed messages appear to be more effective in traveling the path from feelings (affect) to thoughts (evaluations) to intended actions (compliance). We speculate that this is the result of being more salient in the minds of receivers and thus more accessible in memory as evaluations are formed (Feldman and Lynch 1988). The ease with which a sign message is retrieved during evaluation may also confer a beneficial fluency effect, whereby the feeling of ease is construed as positive information in and of itself (Schwarz 2012).

STUDY 4

Study 4 is a replication and extension of all the previously described studies, utilizing different stimuli and a new experimental manipulation. Participants ($N = 201$, 58% female, median age = 34.0) were exposed to signs regarding wearing a face mask in a store. Variants of these signs represented low/high mortality salience, crossed with framing the store face mask policy as a request (please wear a face mask) as opposed to a demand (must wear a face mask), in a 2 x 2 between-subject experimental design with a control group (see Appendix 4). Measures of anxiety, affect, sign evaluations, and behavioral intent, with respect to compliance, were identical to those used in the previous studies.

The following measures were also included: shopping intentions (“I am likely to shop at this store on this trip,” and “I am likely to shop at this store in the future,” both 100 point sliding agreement scales); and reasons for compliance (“To reduce the threat to my own health,” “To gain admission to the store to accomplish my shopping,” “To protect the health of fellow shoppers,” “To be a good citizen,” seven-point importance scales, 1=not at all important, 7=extremely important).

We also included items to measure beliefs about the level of threat posed by COVID-19, including “Most people need to take the COVID-19 coronavirus more seriously*,” “The government is over-reacting because the chance of getting the COVID-19 virus is low*,” “I see too many people not taking adequate precautions to protect the community from the virus*,” “My chance of getting the COVID-19 virus is low, so I’m not going to live in fear of this*,” “In general, COVID-19 is not a grave threat to my existence,” “Even if I get infected with COVID-19, it’s not going to kill me,” “The threat of COVID-19 to the lives of my family and friends is relatively small*,” “Taking minor precautions reduces the threat of COVID-19 to near zero,” “Early in the pandemic, COVID-19 seemed to be a bigger threat, but over the course of the pandemic my beliefs about COVID-19 have changed.*” Each item was followed by a seven-point agreement scale (1=strongly disagree, 7=strongly agree). We formed a summed and averaged composite scale of six items (*) that loaded highly on

a single factor ($\alpha = .896$). Low / high perceived threat groups were formed via median split.

Additionally, we measured the following COVID-19-related behaviors: “I wash my hands longer and more frequently than I did at this time last year,” “I own a face mask,” and “Typically, I don’t wear a face mask when I go out in public,” each followed by a seven-point agreement scale (1=strongly disagree, 7=strongly agree).

Results

Manipulation checks verified the integrity of the mortality salience treatment. Low/high mortality salience groups differ statistically on the MS manipulation check measure ($Mean_{low} = 2.72$, $Mean_{high} = 4.19$; $t = -8.4$, $df = 162$, $p < .001$ two-tailed). Mortality salience was higher in all treatment conditions as compared with the control group (mean = 1.82), suggesting that MS was relatively lower, but not absent, in the low (vs. high) MS condition. Mortality salience did not differ between the framing treatment groups (mean_{request} = 3.43; mean_{demand} = 3.51, n.s.).

Serial mediation analysis - conceptual replication

As in prior studies, we conducted a serial mediation analysis using PROCESS macro model 6, whereby the 95% confidence intervals (CIs) used to generate each indirect effect were performed using 5,000 bootstrap samples (Hayes 2018). Consistent with our conceptual model and results obtained in the prior studies, anxiety (M1), affect (M2) and sign evaluation (M3) mediate the effect of mortality salience (IV) on sign compliance (DV) (-.3380, CI: -.8978, -.0353). There was no evidence that MS influenced compliance intentions directly, independent of its effect on anxiety and ensuing events in the causal chain (3.2009, CI: -3.6957, 10.0975). Again, results showed a fully mediated path whereby MS determines anxiety levels (.3186, $p = .0002$), anxiety contributes negatively to affect toward the sign (-.8768, $p < .0001$), affect shapes evaluations of the sign (4.9083, $p < .0001$), and evaluations exert a positive influence on compliance intentions (.2465, $p < .0412$).

Message framing as a request vs. requirement

Interestingly, framing neither affected feelings about the sign nor its evaluation, but rather had a direct effect

on intentions to comply. Moreover, those intentions appear to drive present and future shopping intentions (an extension of our conceptual model to consider downstream consequences of sign compliance intentions). A serial mediation model using PROCESS macro model 6 shows framing influences compliance intentions such that compliance intentions are lower (86.7%) when mask wearing is framed as a request, and higher (94.0%) when framed as a requirement (7.2643, $p = .0339$) (Hayes 2018). Compliance intentions contribute positively to the intentions to shop on the present trip (.7597, $p < .0001$), which contribute positively to intentions to shop at the same store in the future (.8434, $p < .0001$). There is no evidence of a direct effect of framing on future shopping intentions (2.1852, CI: -1.3899, 5.7603), but rather an indirect effect mediated via sign compliance and immediate shopping intentions (4.6545, CI: .6116, 9.2320).

The role of beliefs about COVID-19

Individuals differ widely with respect to beliefs about the level of perceived threat the COVID-19 pandemic presents. Participants in our sample ranged from 1.17 to 6.83 on the seven-point COVID-19 threat scale (mean = 5.17, median = 5.50), essentially representing a wide range of beliefs, from “COVID-19 is a hoax” denial to grave concern about the seriousness of the threat. (As a side note, we observed that the strongest predictor of beliefs about the magnitude of the COVID-19 threat is level of education, with more education associated with higher perceived threat, $r = .185$, $p = .018$ two-tailed.) What role might such beliefs play vis-à-vis reactions to sign communication?

Beliefs about COVID-19 threat levels are positively associated with feelings about the sign ($r = .412$, $p < .001$), evaluations of the sign ($r = .218$, $p < .005$), compliance ($r = .407$, $p < .001$), and shopping intentions ($r_{now} = .451$, $p < .001$; $r_{future} = .424$, $p < .001$). COVID-19 beliefs are not statistically associated with anxiety levels ($r = .11$, n.s.), nor does exposure to mortality cues have any effect on such beliefs ($r = .023$, n.s.). That is, those who take the threat more seriously do not feel more worried; rather, they are simply more likely to engage in threat reduction behaviors such as increased hand washing ($r = .418$, $p < .001$), owning a face mask ($r = .427$, $p < .001$), and using a mask in public (as indicated

by disagreement with the statement “typically I don’t wear a face mask when I go out in public” ($r = -.587, p < .001$). Moreover, COVID-19 beliefs appear to operate via serial mediation in a path similar to the framing reported above, with beliefs influencing compliance with downstream effects on shopping intentions.

Motivations for compliance

Although our conceptual model proposes that compliance intentions are driven by sign evaluations, we measured and assessed additional antecedents of compliance, including self-oriented and others-oriented motives. “To protect the health of other shoppers” appears to be an important motive for compliance with the face mask sign ($r = .561, p < .001$), as is “To be a good citizen” ($r = .499, p < .001$). “To reduce the threat to my own health” is also a significant reason for compliance ($r = .371, p < .001$), albeit smaller in magnitude. “To gain admission to the store to accomplish my shopping” appears to influence compliance contingently, depending upon beliefs about the magnitude of the threat posed by COVID-19. To examine this contingency, we ran an analysis via PROCESS macro model 1 (Hayes 2018). Results indicate direct effects of both the “gain admission” motive (14.2035, $p = .0009$) and beliefs about the level of threat posed by COVID-19 (20.8641, $p < .0001$) on compliance intentions, and a significant interactive effect (-2.5568, $p = .0014$, CI: -4.1117, -1.0019). There is a positive effect of this motive on compliance among individuals that believe the threat of COVID-19 is low (3.9762, $p = .0052$, CI: 1.2031, 6.7494), and a non-significant, negative effect among individuals that believe the threat of COVID-19 is high (-2.4158, $p = .1153$).

Discussion

Evidence from this study provides further support for our conceptual model in yet another context - that of a store face mask policy. Verbal and visual cues that raise mortality salience above control group levels appear to raise anxiety, which are generalized as negative affect attributed to the sign. Affect colors evaluations of the sign, which drive compliance intentions with the advocacy of the sign message. Extending the conceptual model to consider downstream consequences of compliance intentions, it appears that such intentions influence present and

future shopping intentions.

Regarding framing a desired behavior as a request vs. a demand, it appears that a polite request does not take the sting out of mortality cues. Nor does it engender positive feelings that one might expect under general circumstances. Politesse should engender liking. However, we note that study participants did not have an opportunity to compare request/demand messages side-by-side in our between-subjects design. Hence the “demand” condition did not suffer from contrast with the polite request. Whereas the purpose of the sign’s message was to reduce a public health threat, compliance intentions were relatively high across framing conditions, but compliance intentions were more positive when the store policy was presented as a requirement. We attribute this to heuristic reasoning triggered by context: a brief exposure that does not permit much critical evaluation, and a threatening situation. Under such circumstance, the mindless tendency is simply to “obey authority” as a self-preservation reflex (Cialdini 2001).

Not surprisingly, given that the signs in this study conveyed a message about a COVID-19 prevention measure, beliefs about the level of threat posed by COVID-19 are positively associated with feelings toward the sign, ensuing evaluations, and intentions to comply and shop. To generalize in the abstract, sign messages that are congruent with shoppers’ previously formed beliefs should be received more positively. This suggests a strategy for improving sign communication effectiveness among target audiences with known beliefs.

Regarding motives for compliance that are extraneous to our model, both self-oriented and others-oriented motives appear to offer reasons for compliance. As a caveat, we note that direct questions about motivations are subject to social desirability bias, wherein people offer responses that are socially expected or make them look good in the eyes of others. Nevertheless, statistical evidence suggests that there may be reasons in addition to cognitive evaluations of a sign driving compliance with the sign’s message. Moreover, beliefs about COVID-19 appear to be an important contingency underlying the operation of self-oriented, utilitarian

goals such as gaining admission to a store to accomplish a shopping task. To generalize in the abstract, if people do not believe the underlying basis of a sign message, they may nevertheless be coaxed into compliance through a different route.

GENERAL DISCUSSION

When human health is threatened, compliance with mitigation strategies is a tremendously important outcome of sign communication. It may seem hyperbolic to claim that “signs save lives,” yet in the case of COVID-19 prevention signs, this may literally be true. Signs can play a vital role in encouraging behavioral changes. The present research demonstrates a process by which this occurs.

Starting with the end goal, compliance with the call for judicious hand washing, observing restricted store hours for the protection of vulnerable populations, social distancing, and wearing a face mask while shopping, our model and evidence suggest that how a sign is evaluated is a significant driver of behavioral intentions. When a sign is judged as communicating effectively, conveying the intended message clearly, is well-worded and easy to understand, and judged to be a “good” sign, such positive evaluations of the sign itself enhance the veridicality of the message and pave the way for compliance via cognitive consistency. If one likes a sign and judges it to be “good,” rejecting its advocacy would be illogical and internally inconsistent; “good” signs should motivate compliance.

What influences the evaluation of signs? Much of the past research on this topic has focused on design features of signs that contribute to aesthetics and ease of processing (Kellaris and Machleit 2016). This research, however, looks at signs under unusual circumstances created by the COVID-19 pandemic. The importance of pleasing design features diminishes under a looming existential threat when viewers process information under the stress of mortality salience. The state of anxiety attendant to mortality salience has potential to induce negative feelings, which can color evaluations unfavorably and actually lower compliance with the very behaviors that can reduce the threat.

The good news, however, is that the reverse is also true. Messages featuring low levels of mortality salience may abate anxiety, allowing more positive affect to blossom, with beneficial consequences on sign evaluation. The challenge, of course, is how can one craft a message that takes the sting out of mortality salience when the implicit message is “you/others could die if you don’t adopt these behaviors”? Rhyming a message might abate the negative connotation associated with this idea; however, our findings show that is simply not true. Rhymed and non-rhyming versions of the social distancing signs are evaluated similarly (89 vs. 88, $p = .437$) and produce identical compliance intentions ($p = .788$). The role of rhyming is more subtle: rhymed messages appear to facilitate the transfer of affect to evaluations, without inflating positive affect ($p = .365$). Framing messages as requests vs. demands can also shape desirable outcomes,

depending upon circumstances. The natural tendency is to craft a “polite” message, but we found people respond more favorably to a direct demand; “do this” or “you must” seems off-putting at first glance, yet may be a more effective framing when dealing with a threatening situation.

Implications for practice

Findings from four studies offer evidence-based guidelines for effective communication under exceptional circumstances, which may extend beyond the present pandemic to other threatening situations, including natural disasters, national emergencies, or warning signs. The primary lesson in this work is that people process information differently when mortality salience, anxiety, and negative feelings intervene. Ironically, the very information that can help reduce a threat may be disregarded, poorly evaluated, or not complied with depending upon how it is presented. Directly highlighting a threat, for example, may be counter-productive. This is roughly analogous to the failure of fear appeals when the level of fear is too high (Leventhal 1971). Mortality salience is not a fear appeal, but rather a psychological mindset of heightened awareness of one’s mortality, an uncomfortable and often anxiety-producing thought. Indeed, recent news reports demonstrate that some are so strongly motivated to avoid the uncomfortable truth—their mortality—that they harness denial as a coping mechanism (Wolf 2020).

To communicate effectively under conditions that raise mortality salience, sign creators must consider the viewer’s state of mind, how messages are likely to be processed, and strive to convey a message in a way that sparks positive evaluations of the sign. Our evidence suggests that positive sign evaluations are requisite— an essential antecedent— to compliance with a sign’s message. It is a large leap from exposure to a message to compliance with that message. This research begins to unravel what happens in between and suggests that shaping feelings and thoughts to engender positive evaluations of signs is the surest route to gain compliance.

How then can creators of signs in the public and private sectors influence behavioral intentions of

citizens / consumers? The present work reminds us that responses are sensitive to how a message is framed, for example as “do this” (Studies 1, 3) or “don’t do that” (Study 2), or as a request vs. a demand (Study 4). Desired outcomes can also be influenced at any stage of our process model. The anxiety component can be shaped by avoiding mortality cues and by using anxiety reduction messages, which may be as simple as “take a deep breath.” The affective component can be influenced directly by use of visual cues that foster positive affect, such as use of vivid colors or foreground/background combinations that promote fluency (Kellaris and Machleit 2016). The evaluation component can be addressed directly by pre-testing alternative sign messages and designs, and by suggesting evaluative criteria. For example, a sign that includes the question “Is the message clear?” suggests that clarity should be the criterion for judging the sign rather than, say, attractiveness. Further, it seems unlikely that signs can influence behavioral change directly (e.g., shop here! or buy this!). Understanding the sequence of events that precedes and determines behavioral change gives sign communicators numerous strategies to foster desired results.

Implications for research

There are some features of our research that may limit the general applicability of the findings, including the particulars of our online samples, stimuli, and the viewing context. Our evidence comes from simulation experiments, in which a small number of participants were asked to imagine seeing a sign prominently displayed in a public space. This was an exercise in imagination, of course, because what participants saw was an image of a sign displayed on their computer screen, not a sign they happened upon in a public space, among numerous distractions, where passive, voluntary exposure to the sign might happen. For this reason, we recommend field studies or additional lab studies that use an incidental exposure protocol.

The present research also identifies a mediational path—a sequence of mental events— by which mortality salience exerted an indirect influence on compliance intentions. Whereas our model shows a general case, there are likely contingencies— conditions within which these processes work. Identification of such

boundary conditions (moderator variables) would be an important next step in refining our conceptual model. Might individuals differ with respect to their proneness to mortality salience? As we think about people in our circle of acquaintances, we can probably identify individuals who might react differently to mortality salience sparked by a sign. The present research begins to paint a picture of how mortality salience works in sign communication. It remains to discover when, where, and with whom it works - all exciting possibilities for the advancement of sign communication research.

CONCLUSION

Use of mortality cues seems natural, perhaps unavoidable, in communication designed to address the threat of a pandemic, or other threatening, emergency situations. The present findings, however, suggest that raising mortality salience does not serve the cause of compliance with sign messages. Rather than triggering compliance as a coping mechanism for dealing with the threat of COVID-19, raising mortality salience appears to give rise to negative feelings that color evaluations and subsequent compliance.

Findings suggest that the communication effectiveness of signs may be enhanced by the use of rhyming messages (Study 3), which have a positive effect on affective evaluations and may be more memorable, and by framing desired behaviors as a demand (Study 4). Whereas requests may be perceived as polite, demands carry the weight of authority, which may trigger automatic compliance in the face of a perceived threat (Cialdini 2001).

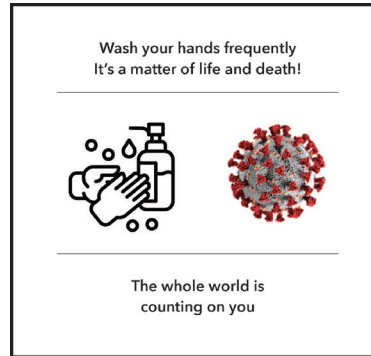
REFERENCES

- Abelson, R. P., Aronson, E., McGuire, W. J., Newcomb, T. M., Rosenberg, M. J., and Tannenbaum, P. H. (eds). (1968). *Theories of cognitive consistency: A sourcebook*. Chicago: Rand-McNally.
- Arndt, J., Solomon, S., Kasser, T., and Sheldon, K. M. (2004). The Urge to Splurge: A Terror Management Account of Materialism and Consumer Behavior. *Journal of Consumer Psychology* 14(3), 198–212.
- Burke, B. L., Martens, A., and Faucher, E. H. (2010). Two decades of terror management theory: a meta-analysis of mortality salience research. *Pers. Soc. Psychol. Rev.* 14, 155–195.
- Cai, F., and Wyer, R. S. (2015). The impact of mortality salience on the relative effectiveness of donation appeals. *Journal of Consumer Psychology* 25(1), 101-112.
- Calori, C. (2007). *Signage and Wayfinding Design*. Hoboken: John Wiley and Sons.
- Cialdini, R. B. (2001). *Social Influence: Science and Practice*. Boston: Allyn and Bacon.
- Cian, L., Krishna, A., and Elder, R. S. (2015). A sign of things to come: Behavioral change through dynamic iconography. *Journal of Consumer Research* 41, 1426-1446.
- Feldman, J. M. and Lynch, J. G. (1988). Self-generated validity and other effects of measurement on belief, attitude, intention and behavior. *Journal of Applied Psychology* 73 (August), 421-435.
- Ferraro, R., Shiv, B. and Bettman, J. R. (2005). Let us eat and drink, for tomorrow we shall die: Effects of mortality salience and self-esteem on self-regulation in consumer choice. *Journal of Consumer Research* 32 (June), 65–75.
- Greenberg, J., Pyszczynski, T., and Solomon, S. (1986). The causes and consequences of the need for self-esteem: A terror management theory. In: *Public Self and Private Self*, ed. R. F. Baumeister. New York: Springer-Verlag.

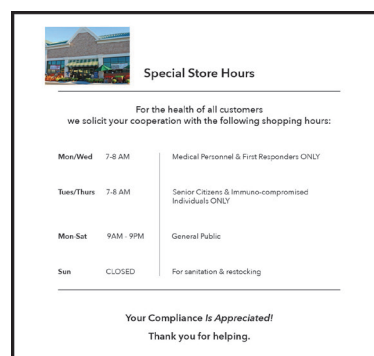
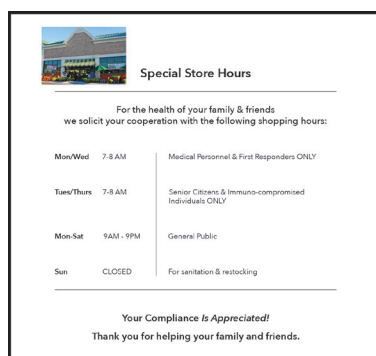
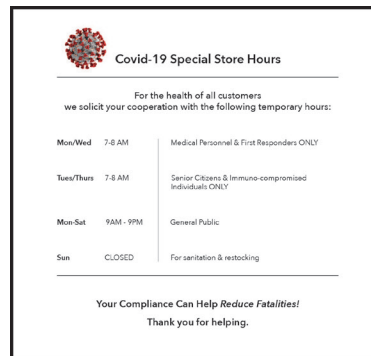
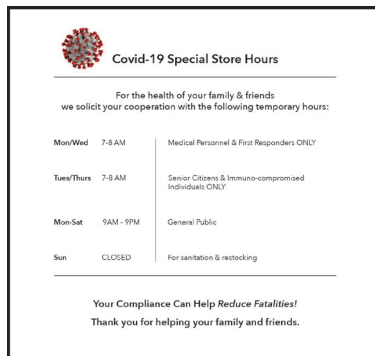
- Greenberg, J., Martens, A., Jonas, E., Eisenstadt, D., Pyszczynski, T., and Solomon, S. (2003). Psychological defense in anticipation of anxiety. *Psychological Science* 14, 516–519.
- Hayes, A. F. (2018). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression Approach*. New York: Guilford.
- Kasser, T., and Sheldon, K. M. (2000). Of wealth and death: Materialism, mortality salience, and consumption behavior. *Psychological Science* 11 (July), 348–51.
- Kellaris, J. J. and Machleit, K.A. (2016). Signage as marketing communication: A conceptual model and research propositions. *Interdisciplinary Journal of Signage and Wayfinding* 1(1), 1-17.
- Leventhal, H. (1971). Fear appeals and persuasion: the differentiation of a motivational construct. *American Journal of Public Health* 61(6), 1208-1224.
- Madden, T. J., Allen, C. T., and Twible, J. L. (1988). Attitude toward the ad: An assessment of diverse measurement indices under different processing 'sets.' *Journal of Marketing Research* 25(3), 242-252.
- Mandel, N. and Smeesters, D. (2008). The sweet escape: Effects of mortality salience on consumption quantities for high- and low-self-esteem consumers. *Journal of Consumer Research* 35(2), 309-323.
- Marteau, T. and Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger State-Trait Anxiety Inventory (STAI). *British Journal of Psychology* 31(3), 301–306.
- Mikulincer, M., Florian, V., and Hirschberger, G. (2003). The existential function of close relationships: Introducing death into the science of love. *Pers. Soc. Psychol. Rev.* 7, 20–40.
- Pyszczynski, T., Greenberg, J., and Solomon, S. (1997). Why do we need what we need? A terror management perspective on the roots of human social motivation. *Psychol. Inq.* 8, 1–20.
- Salisbury, L. C. and Nenkov, G. Y. (2016). Solving the annuity puzzle: The role of mortality salience in retirement savings decumulation decisions. *Journal of Consumer Psychology*. 26(3), 417-425.
- Schwarz, N. (2012). Feelings-as-information theory. In: *Handbook of Theories of Social Psychology*, eds P. van Lange, A. Kruglanski, and E. Higgins. Thousand Oaks: Sage.
- Spielberger, C. D. (1966). Theory and research on anxiety. In: *Anxiety and Behavior*, ed. C. D. Spielberger. New York: Academic Press.
- Taylor, C. R., Claus, T. A., and Claus, S. L. (2005). *On-premises Signs as Storefront Marketing Devices and Systems*. U.S. Small Business Administration and The Signage Foundation.
- Wolf, Z. B. (2020). "The social-distancing deniers have arrived." *CNN*, April 1. <https://www.cnn.com/2020/04/16/politics/what-matters-april-16/index.html>.

APPENDICES

Appendix 1 / Signs Used in Study 1

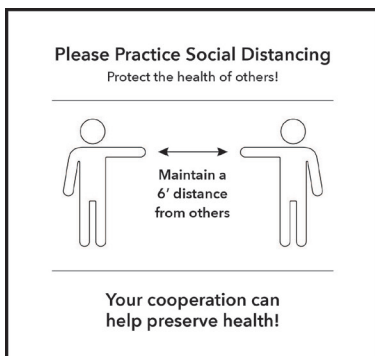


Appendix 2 / Signs Used in Study 2



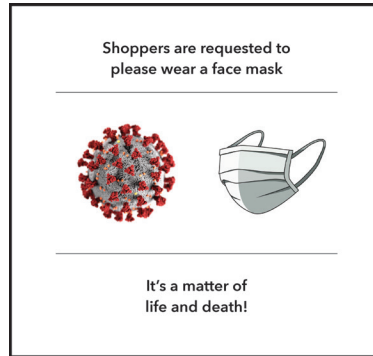
APPENDICES

Appendix 3 / Signs Used in Study 3

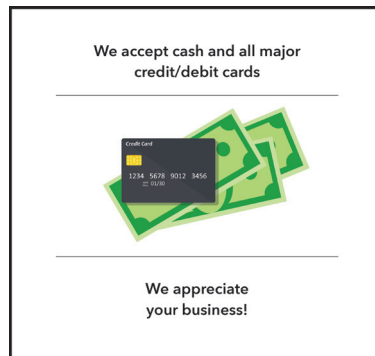


APPENDICES

Appendix 4 / Signs Used in Study 4



Control Condition



Retail Signage During the COVID-19 Pandemic

Joanne E. McNeish

Associate Professor
School of Business Management
Ryerson University

jmcneish@ryerson.ca

INTRODUCTION

If someone had proposed the need to introduce and reinforce social distancing on the world, over a very short time period, most people would have thought it impossible (Furman University 2020). Yet in the first quarter of 2020, and as each country in the world encountered COVID 19, social distancing became a necessary social norm and one of the only defenses to this new highly transmittable respiratory virus. To support the government's communication and regulatory efforts, retail store signs became important in creating awareness of, educating about, and reinforcing social distancing behavior. This paper first describes the signs used by retailers in March and April 2020 and then speculates on their meaning beyond their conventional role in geographic wayfinding.

Social distancing is a term used in public health to describe the necessary actions taken to avoid infectious contact. Given the magnitude of this pandemic and the general lack of public awareness of the term, the Public Health Agency of Canada (2020) began explaining social distancing and the actions that people needed to take in early March, using press briefings, public service announcements, information posted to their website and on social media. Social distancing behaviors initially included avoiding crowded places and non-essential gatherings, avoiding greetings that involve touching, and limiting contact with high risk populations (Public Health Agency of Canada 2020). Over time, formal stay at home, mask, and group size orders were enacted and governments impressed upon their populations to maintain two-meter / six-foot distance from non-family members and consistent hand-washing practices.

Rapidly breaking habits of human touch and close physical distance required clear and consistent communication by health and government officials.

Abstract /

Early in 2020 the COVID-19 pandemic began to impact countries across the world. Within weeks, people's normal social behavior had to be changed in order to stop the spread of the disease. In Canada, where this study takes place, governments and public health departments were the primary and trusted information sources. Photographs of retail signs were taken by the author in one neighborhood in a major Canadian city in March and April. Along with descriptive information, the author speculates on the meaning conveyed by the printer-paper signs, beyond their traditional role of supporting wayfinding. Paper's relative fragility may have simultaneously reflected the uncertainty that people felt in the early days of the pandemic, while its familiar and timeless presence may have provided a sense of emotional security and direction. Marking a return to "business as usual", stores replaced many, but not all of the informal signs with professionally produced and branded signs suggesting that the early "blind panic" had been replaced by a form of "steady state". One could say that retailers demonstrated corporate social responsibility through their efforts in creating and posting the signs to create awareness of, educate, and reinforce the new and changing social distancing behaviors.

Keywords /

retail; social distancing; COVID-19 pandemic; paper signs

Social distancing was at first suggested and then recommended; non-urgent voluntary compliance was replaced with urgent and stern warnings, and finally with regulations and financial penalties for non-compliance (Benzie 2020; DeClerq 2020; Tumilty 2020). As the situation became dire, and in order to keep as many people as possible at home, governments closed down non-essential services. Closing down meant that employees had to be sent home to continue to work, or if the work could not be performed at home, to be laid off until the pandemic subsided. The list of non-essential services included many types of retail stores but excluded, for example, grocery stores, pharmacies, and banks (Ontario Government 2020). Table 1, as shown in the Appendix, traces the timing of the emergency orders and the businesses deemed essential, or not.

Retailers often play a role in supporting the communication of socially desirable changes advocated by government (Pollay 2007). Two recent Canadian examples, reducing obesity levels and discouraging tobacco smoking are discussed here. In 2017, Ontario restaurants with 20 or more locations were required to include the caloric count of food and drink on menus and in-store signage (Moghimi and Wiktorowicz 2019). Studies have found that consumers find this type of messaging useful in making food choices that reduce fat and sugar intake, or portion sizes (Adam and Jensen 2016). In 2018, the Ontario government reduced the visibility of tobacco and vaping products and limited in-store signs to unbranded information in order to decrease awareness of the products, particularly among teenagers. Retail stores received rules for the size, shape, color, and messages of in-store signs and displays (Ottawa Public Health 2020). These regulations were introduced after extensive and lengthy consultations with retailers and their associations, and lengthy timelines allowed for retailers to prepare for, and comply with the regulations gradually. One could characterize the behavior of retailers in supporting the socially desirable changes as evidence of corporate social responsibility, where “business decision making [is] linked to ethical values, compliance with legal requirements, and respect for people, communities, and the environment around the world” (Aaronson 2003, 310).

COVID-19, on the other hand, was an unprecedented event and consultations were simply not possible given the severity of the situation. Government and retailers had very little warning of the events that would overtake them and even less time to react. As a result, retailers received the same general information at almost the same time as their customers and without much time for discussion or training, retailers had to figure how the information applied to their physical operations, employees, and customers.

Retailers make extensive use of professionally produced physical and/or digital signs outside, and inside their stores. These signs are used to convey information such as: the name of the company, opening and closing hours, pricing and sales, coupons and promotions, product, and service-related information (Carpenter and Moore 2006; Vizcaíno 2018). Typically, in-store signs serve the purpose of providing information and acting as prompts. Lehman and Geller (2004) discuss the importance of prompts in reminding people of how to behave. Using specific colors and fonts, signs also support the retailer’s brand image (Huddleston et al. 2015).

Under normal operating circumstances, one would rarely see a business using signs printed on 8.5 x 11, run of the mill printer paper. Yet, during the early stages of the pandemic, businesses of all sizes used paper signs extensively to convey information about the required social distancing behaviors. One wonders why, in a country such as Canada where literacy levels are high and technology and digital communication is widely available, that retailers used paper so extensively to communicate with their customers.

This paper explores the way in which signs were used in the early months of the COVID-19 pandemic in one area of Toronto, Canada. It documents the transition from paper signs to professionally produced and branded signs as a way to understand the real-time development of retailers’ communication efforts.

METHOD

This is an unusual study. First, the COVID-19 virus rapidly spread across the globe and there appears to be no natural immunity. There is (at the time

of writing) no cure or vaccine. Second, the rapidly unfolding events, meant that there was no time to conduct a research study that involved customer or retailer interviews.

Phenomenological research makes use of the observer's lived experience as the starting point for understanding an experience (Neubauer, Witkop, and Varpio 2019). The author is both the researcher and the observer. In the same way as other customers, the author used informal signs for their functional wayfinding purpose (what to do, where to stand and move, and how to behave) (Mollerup 2005). At the same, the author felt compelled to photograph them in order to preserve them. Across the world, journalists and other people also photographed retailers' signs online (Carlberg 2020; Fortin 2020; Mercer 2020; Toh 2020).

In this study, "informal sign" is used to describe the signs with messages printed or handwritten on standard printer paper. To create the informal signs, businesses used ordinary white printer paper, probably 20lb bond, and produced signs on local office printers or photocopiers. A few were printed or written on card stock or cloth material (Quill n.d.). "Professional sign" refers to signs that were created and produced by a printing company and that use the brand's colors, fonts, logos, or images.

The data collected for this study was restricted to a small geographic area of one large city because of the social distancing requirements imposed by the Canadian federal, provincial, and municipal governments. In March and April, the Emergency Management and Civil Protection Act restricted residents to their homes only leaving them for groceries and essential goods such as prescriptions, and to exercise or walk pets.

Operating within those restrictions, the author took photographs of exterior and interior retail store signs within a two and half kilometer radius of their home, in Toronto's 16th electoral ward. Figure 1 is a simplified map of the area photographed, showing the open-air shopping malls (green circles) plus single location or multi-location businesses (marked as thicker red lines and white arrows).

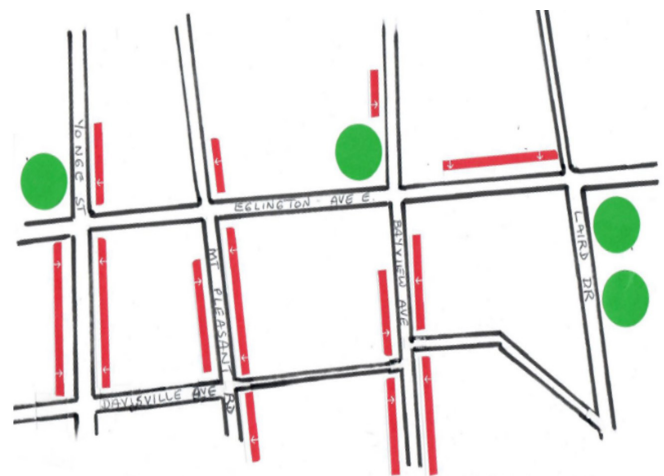


Figure 1 / Map of the photographed area

This area is a mix of residential types, including single-family and townhomes and low and high-rise apartment buildings, and commercial businesses. The residents of the two areas are comparatively affluent, with above average rates of income and education. The retail stores and businesses range in size; some are small, single location businesses while others are part of large companies that have multiple locations. Other researchers interested in comparing the data in this study to other areas, can find detailed census data for Ward 16 on the City of Toronto's website.

Using an iPhone, the author photographed the signs linked to COVID-19 used by retailers between March 13 and April 27, 2020. Using photographs as a way to understand human and organizational behavior is appropriate under many conditions, and photographs may be especially useful in a fast-moving and unprecedented situation like this one to capture the rapidly changing environment. Photographs provide "clues about the embodied nature of organizational practices as well as the latent emotional processes and reactions" (Ray and Smith 2012, 295).

Approximately 500 photographs were taken, randomly at first, and as the situation continued a more systematic sampling approach was used, all the while still social distancing. The stores that the author could enter, grocery stores and pharmacies, were visited once a week. Each of the major streets in Ward 16 was visited every three to four days. The outside doors and windows of the stores along Bayview Avenue, Mt.

Pleasant Road, Yonge Street, and Laird Avenue were inspected to identify changes over time. At least one restaurant was visited daily.

In this study, the term “retailer” is used to describe to any business with a physical location. Retailers under this definition include grocery stores, pharmacies, clothing stores, hardware stores, office goods, restaurants, physicians, dentists, lawyers, hair and nail salons, spas, pet stores and grooming services, veterinarians, and real estate agents.

FINDINGS

This section begins with a timeline of key events, regulations, and legislation from January to April 2020. This is followed by a description of the signs used by small single location retailers and large multi-location retailers.

The timeline presented in Table 2 (in Appendix) provides background information to the study. Of particular note is the speed at which the retailers and citizens adjusted to new and continuously changing conditions. The first presumptive case of a Canadian contracting COVID-19 was recorded in January 2020, however, the first event visibly affecting retailers and their customers did not occur until March 4. This is when a ban on reusable cups and containers was introduced. On March 6 the World Health Organization declared COVID-19 a pandemic and just over a week later the Ontario government evoked the Emergency Management and Civil Protection Act (Ontario 2020) that mandated new behavior. From this point onwards, the situation escalated rapidly for a month and a half, with frequent behavioral changes required from both consumers and retailers. On April 27, with curve of COVID-19 virus cases beginning to flatten, the Ontario government announced a three-step plan to reopen the province’s businesses. They cautioned that the reopening would continue only if key statistics remain positive (the number of deaths remains low and declining and the time between doubling of identified cases continues to lengthen). They also declared that social distancing would continue for an unknown time-period.

General Observations

Throughout March, most informal signs were printed on 8.5 x 11 white printer paper. The fonts used were mostly black, on-serif, and a mix of upper- and lower-case letters, with italicization and color used infrequently. Bold was used to emphasize key points. Exterior signs were placed at various locations and heights on doors and windows. Among the locations that remained open to customers, signs could be found in the interior front entrances and throughout the store (on walls and poles, stands, shelves, and on the floor). Regular scotch tape or duct tape was used to affix the signs to walls, no matter the size of the retailer. Through March and April, digital signs were used only to present product and pricing information. They were not observed to display any COVID-related information.

With each new behavior imposed by government, new signs were required. These were often posted alongside existing signs. By early April, stores that remained open to customers had started to replace many, but not all, of the informal signs with professional ones. The rapidly changing information, which required the original signs to be quickly and frequently changed, gave way to information that was required for the long term, such as social distancing. Thus, the cost and effort required to create professional signs could be justified by retailers.

Single Location Retailers

Single location retailers who were required by law and/or chose to close, took a more personal approach to announce their operating status. Almost all of these informal signs were typed using in black, non-serif, small font in upper- and lower-case letters. Those that were handwritten, used mainly black or blue ink pens, while a few others used colored markers.

Some signs had concise messages, while others filled up a page. Most presented the personal reaction of the retailer to the pandemic. “We are all in this together” was a major theme along with a focus on the customers and community’s well-being. Some of the informal signs reflected the thinking at the time, which was that this would be a short-term (two-week) closure. One might wonder if that perception (that the situation would be short term) was the reason why most small businesses that closed, did not provide alternative methods of contact such as email, phone number, social media, or website. Almost none of the businesses who closed under the first order on March 24 changed the information on their signs over the period of this study.



Figure 2

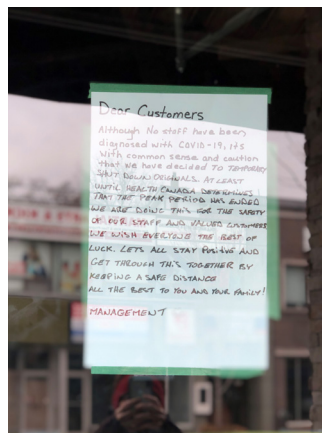


Figure 3

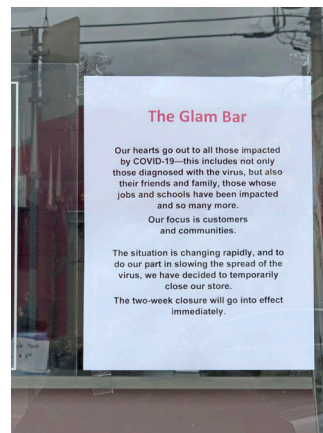


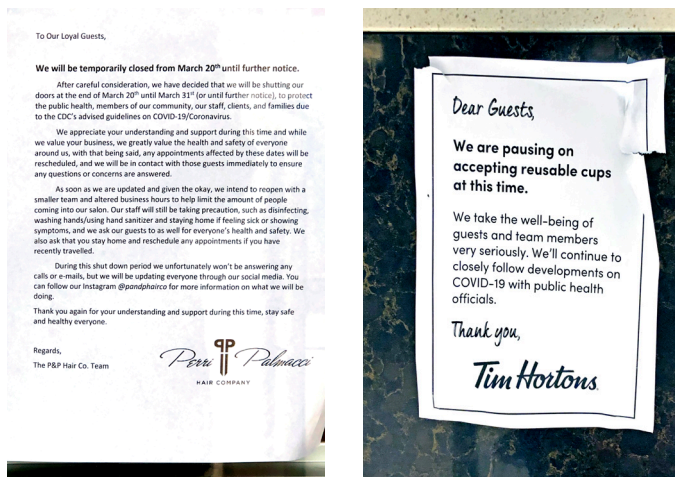
Figure 4

Large Multi-Location Retailers

In early March there was little understanding among most retailers (or almost anyone else) that the situation would escalate, with the requirement for social distancing to continue for months. The first sign of COVID-19’s impact came to customers through informal signs at coffee shops. Tim Hortons (Figure 6), for example, indicated that the restaurant would temporarily stop filling

customers' reusable cups. As is typical of most early signs, the information was on 8.5 x 11 printer paper using black, sans-serif font. Unlike many of the signs posted in early March, the restaurant used the brand's logo as a signature.

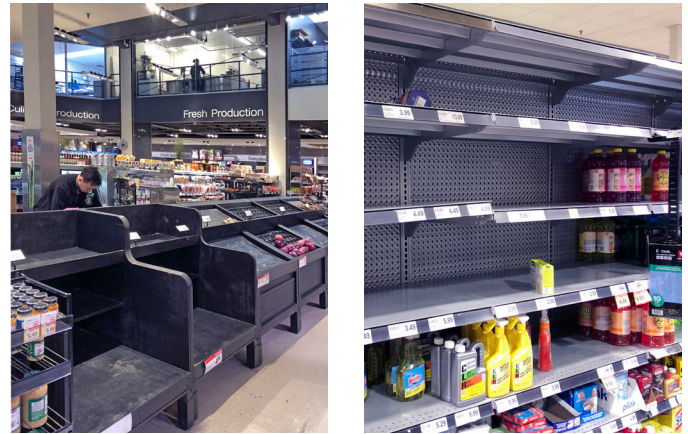
Note the ripped and slightly crumpled features of the sign after just a few days of use. Over the study period, the sign was never replaced, becoming increasingly worn and served as an artifact that communicated the initial changes in behavior necessary to protect guests (customers) and team members (customer facing-employees) from COVID-19 exposure. Other retailers also stopped the use of customers' recyclable containers (e.g. bulk bin) but not all put up signs, rather leaving it up to the employees to inform customers.



Figures 5 and 6

On March 13 the Ontario government closed schools, universities, and colleges and encouraged citizens to prepare for a nation-wide lockdown (Beck 2020). Heeding this information and anticipating being at home for at least 14 days, people started to panic buy staple goods (Stern 2020). Store shelves and bins went bare, as toilet paper, produce with longer shelf lives, cleaning materials, bottled water, and baking supplies were rapidly sold out. No in-store signs indicated why the shelves are empty. In a city where product stock-outs are unusual due to Canada's robust supply chain, grocery stores were overwhelmed by the sudden and unanticipated demand for certain products.

By March 20, grocery stores put up informal signs telling customers about out of stock items, and to manage the supply of scarce items. Signs emerged that indicated how much of limited products could be purchased by each customer. One of the messages



Figures 7 and 8

reinforced sharing with others: "In order to respect and serve all our customers" and the text was bolded and capitalized in a sans-serif font (Figure 9). A space for the number of items that could be purchased was left blank, indicating the likelihood of continued supply-chain disruption. The number of items could be easily written in by hand as the situation unfolded. Note the specific signs for toilet paper (Figure 10): "Attention Customers. There is a 2-unit limit on toilet paper. Thank you for your cooperation." The salutation is starred, and the message is both bolded and capitalized.



Figures 9 and 10

Most retailers have multiple customer touchpoints including entering the store, moving around the aisles of the store, and checking out. As the situation progressed, stores had to bring changes to the customer’s attention before they even entered the store. One sign indicates the change in reusable bags usage. Note that early in March customers could still bring and use their own bags in stores, however check-out employees were no longer allowed to bag them. Plastic bags were offered for purchase, as is typical in Canada. As the situation progressed, informal signs were attached to check-out stations to indicate newly required social distancing behavior. The use of regular tape to attach the signs was prevalent. Some of the signs had instructions to indicate where employees should place it, whereas others did not. Different messaging was used with some signs reading as instructions and in a neutral tone, “Please follow these steps at Checkout to support social distancing” while another sign communicated a more forceful message: “...guidelines to support the importance of social distancing.” The signs indicated that reusable bags were no longer welcome in stores. Now, plastic bags would be offered to customers, without charge, and check-out employees would bag all groceries. The reason for this change was to reduce congestion at the end of the check-out station created by self-bagging and to minimize contact between customers.



Figure 11

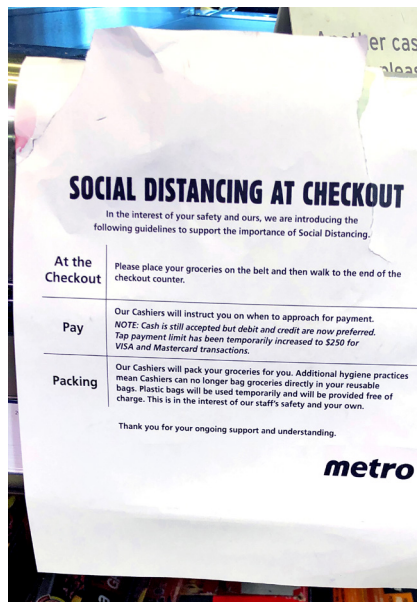


Figure 12

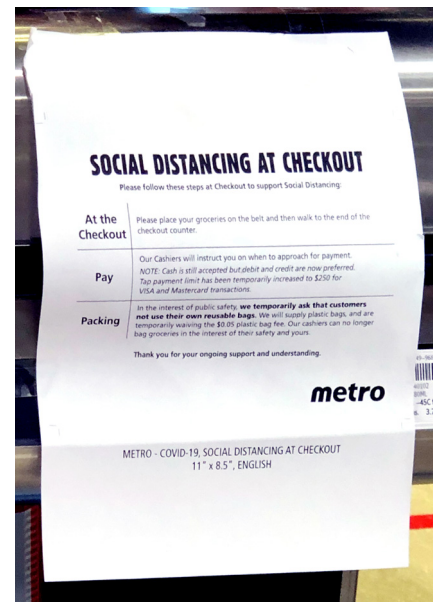


Figure 13

Initially, the information about social distancing provided to consumers was general. However, shopping became a specific activity that required more elaborate rules as the pandemic wore on. By mid-March, informal signs outlining nine actions for social distancing in grocery stores, were taped to store windows and doors. By the end of March, to reinforce the information, poster-stands near the store entrance that normally hold promotional flyers was repurposed, to offer customers copies of the sign to take home.



Figures 14 and 15

By April, informal signs were beginning to be replaced with professional, poster-sized signs and often produced in the brand colors of the retailer. These signs were posted and placed in stands outside the store. Often, the original informal sign remained taped to the window remain right behind the new sign stand (see Figure 16). Some retailers announced that weekly printed flyers would no longer be printed and delivered, and instead presented product information and pricing only on their website or app. Recognizing that not all customers would have access to the digitized information, and that paper flyers support memory and motivate purchase, poster stands were repurposed to hold eight sheets of printer paper with the product and price deals of the week, taped to a piece of cardboard (McNeish 2019; Ziliani et al. 2019) (Figure 17).

Customer Uncertainty

It took time for some retailers, ones that remained open, to realize the level of customer uncertainty. Stating that they were open, indicating their services, and their hours of operation were three basic messages retailers chose to post in signs. Unfortunately, the use of small font muted the message's impact, as they were largely unreadable from a distance. While most signs were on standard white printer paper, a few were colored and the use of color in the midst of several white signs drew more attention. It is not clear if retailers intended to do this. In Figure 19, the pink sign had font large enough to read from two meters away ("Curbside Pickup. Other Entrance"). One sign using a yellow colored but larger font was difficult to read, even close up (Figure 18).



Figures 18 and 19



Figures 16 and 17

Multiple informal signs printed in small font resulted in a visually messy and unorganized presentation of information. It is hard to know whether this was a deliberate action, but one can only speculate as to why many small retailers added additional informal signs rather than removing some or consolidating the information onto larger professionally made signs. They may not have had access to the financial means to hire a company to design and print poster size signs.

In addition, the stress of the situation could mean that they perceive signs to be less important than other aspects of their business. Regardless of their reasons, it has the effect of increasing the cognitive load on



Figure 20

consumers during a stressful time and may contribute to customers’ confusion around these retailers’ status.

Over time, some businesses realized that they needed larger signs that could be read from a distance and that would attract customers’ attention. As was true in March, stores used materials they had on hand. Although the promotional strategy may have been similar, that is, to draw attention to the fact the store was open, stores used different approaches. Some added additional signs alongside, or even over top of the original ones and some, but not all, used a larger font.

One retailer added a larger handmade sign that was mounted over the original smaller signs. The message was printed on cloth and stuck to the window with several pieces of grey duct tape. While the lettering and appearance is child-like and haphazard, the wording is formal: “I assure you, we’re open!” It also indicates the services being provided in order to avoid customer confusion or misunderstanding, “For take-out and delivery.”

As of April 4, pet stores were only allowed to operate via curbside pick-up or home delivery. One pet food store, presenting the message “We are open,” used nine sheets of white printer paper, printing one letter per sheet to create the impression of a singular large ‘sign.’ As noted was often the case, the original sign posted a month earlier remains in the window (Figure 21).



Figure 21



Figure 22

Dollarama, a multi-location discount store that was permitted to stay open because it sells food, handwrote a message on four green neon colored heavy paper stock that stood out and conveyed the message that “We are open!” With two store locations in the area of study doing the same thing, it appears as if these informal signs were part of the communication strategy of the Dollarama chain.



Figure 23

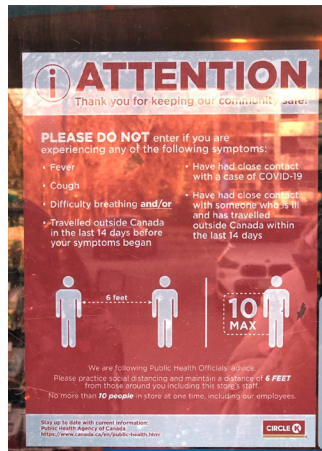
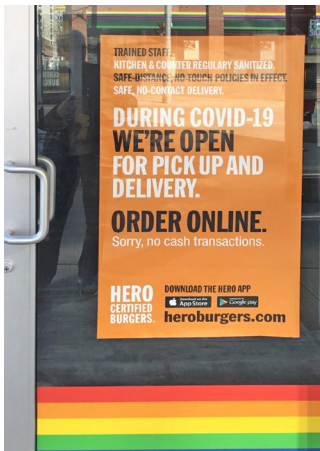
Another retailer’s sign indicated that they offered free local delivery, along with their phone number in a font large enough to be read across the road. The use of a serif font and wide tracking and leading, allowed for a more legible sign, as compared to others. The combination of serif font and more spaced meant this sign was more readable and effective than other signs.



Figure 24

By the end of March, public health agencies and government websites made available a number of standardized signs to communicate COVID-19 symptoms and social distancing behaviors (Government of Canada 2020). Unlike their large counterparts, very few small businesses, whether open or not, posted these signs.

Multi-location retailers have an advantage by being able to hire specialized employees who are skilled at developing signage and messaging. As a result, by April most had transitioned to corporate poster-sized signs that used color to attract attention and large font readable from two meters away for the key messages. Professional signs convey the necessary information in an organized visually appealing way, whereas informal signs are more disorganized in their construction.



Figures 25 and 26

As the rules of social distancing were modified, retailers continued to remind customers not to enter the store if they had COVID-19 symptoms, to practice social distancing, and to use signs to indicate the maximum number of people allowed in the store at any one time. Professional signs accomplish this through cohesive color and font schemes and the use of multiple font sizes and capitalization. Pictograms indicate the required spacing between people and the number of customers allowed in the store at any one time. Professional signs generally convey more information more clearly than informal signs, however, some of the font size and colors were unreadable at a distance.

By April, large businesses had replaced some of the informal signs with professional ones. Inside grocery stores, for example, shelf signs were added to remind customers about social distancing. Key messages in brand colors and fonts, were printed on heavy paper stock, laminated, and hung with plastic shelf hangers. Side by side with these professional signs were some of the informal signs. There could be several reasons for using both informal and professional signs. These include the cost and effort to design and produce the professional signs or perhaps the uncertainty as to whether the information will be soon outdated. I speculate that professional signs reflect information, social distancing measures, for example, that retailers believe will hold true for months, whereas informal signs are for information about short-lived situations.



Figures 27 and 28

Further supporting the efforts to educate and reinforce social distancing to customers, branded decals appeared on floors along with duct tape to mark direction of travel in the store, or to ensure adequate side-to-side spacing for passing. Early on, various colors of duct tape was used to indicate two-meter spacing and where to stand while waiting in line. In some stores, two different colors of duct tape were used, especially near the check-out stations, to communicate how to maneuver in a space that could be prone to crowding.

By early April, red tape and red circular decals became standard for large stores. A few, red-brown rectangular decals were observed, often at the entrance, at times combined with circular decals. The use of circular



Figure 29

deals may not be accidental. They may have been designed deliberately, to remind the viewer of a red traffic stop sign. The assumption being that customers would be familiar with the required action, that is, to stop and look before proceeding further.

In the early stages of the pandemic, customers moved freely in and out of retail locations. The informal signs were typically on interior doors with none on the exterior doors. Photographs taken at a pharmacy show six informal signs on an interior door. As conditions changed, professional signs appeared on the exterior door (see Figures 31 and 32). The signs asked customers to consider whether to enter or not (due to COVID symptoms), pictograms limiting the number of customers in-store, and to stay six meters apart. The early signs were all text while the professional signs are larger and include pictograms. The informal sign communicating the reduced store hours was moved from the interior door to the exterior door.



Figure 30

Multi-location businesses that remained staffed, but closed to customers, transitioned to customer pick-up, and delivery to home. Initially, informal signs were used to explain the process to customers. Over time those were replaced with professionally designed and made ones. Whether inside the store or out, duct tape was the most often observed choice for marking the direction of travel and to indicate where to stand (see Figures 33 and 34).

DISCUSSION

In the first quarter of 2020, COVID-19 began to significantly impact countries across the world. In a few short weeks, people's normal social behavior had to be changed in order to stop the spread of the disease. Government directives are abstractions until people see tangible manifestations of them or have personal experience of them. While governments mandated social distancing behaviors, it was up to retailers to determine how to implement and communicate them

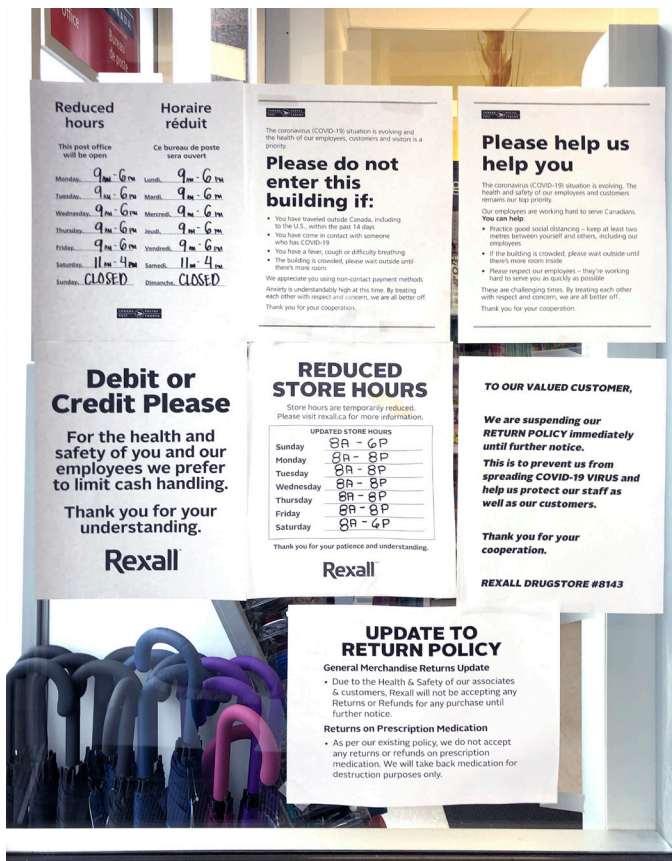


Figure 31



Figure 32

to customers and employees. One could argue that the retailers acted only to avoid the fines and penalties put in place by the government (News Staff 2020). Alternatively, one could say that retailers demonstrated corporate social responsibility and that their efforts in creating and posting signage was an integral part of creating awareness of and reinforcing new and evolving social distancing behaviors.

Schwabe and Wolf (2009) report that stress reduces comprehension of new information. Prompts such as signs, when presented in an uncertain and constantly changing situations, must be easy to follow and placed close to where behaviors will occur (Werner, et al. 1998). The informal signs that appeared early in the pandemic represented retailers' interpretation of what was required, made customers aware that shopping had changed and educated them about new norms. The signs explained store policies, indicated stock-outs or restrictions on the number of products that customers could purchase, provided guidance where to stand, and how to move around the store, while maintaining social distancing.



Figures 33 - 34

In previous situations (e.g. adding calorie count to menus and in-store signage) larger retailers had an easier time complying with government regulations because of the greater financial and personnel resources available to them (Moghimi and Wiktorowicz 2019). In the case of COVID-19, the situation changed so rapidly that there was no size advantage to initially, at least, in terms of informal signage.

Printer paper was the ideal material in the early stages of the pandemic. Signs made of paper could be replaced frequently to respond to changing guidelines at negligible cost. Using regular tape, they could be attached to doors, windows, and throughout the store. However, paper has its disadvantages. The Canadian weather in the spring can vary dramatically and inclement weather like rain, snow, and wind adversely affects papers longevity. Weather notwithstanding, it is simply not robust enough for long term use. The use of paper without some sort of protection, such as a plastic sleeve, suggests that retailers considered the situation temporary, or as is often true in a crisis, protecting paper from the elements was not a priority.

Almost all of the informal signs were printed on 8.5 x 11 white printer paper, suggesting that office printers or photocopiers were readily available at the retail location. Sundar and Kellaris (2017) find that the font color used in a logo affects the consumer's perception of a retailer. Most informal signs used black, small, and sans-serif font on unlined paper and using black font is likely the result of cost and the availability of black-only printers in retail locations. Additionally, in this situation, it seems an appropriate choice as black font may have communicated to customers that the business was taking the situation seriously and acting professionally.

Ease of comprehension is particularly important when people are distracted and struggling to retain new and changing information (Juni and Gross 2008). Thus, the use of small and sans-serif fonts is a suboptimal approach. Small font is unreadable unless the viewer is close to the sign and without lines on paper, a sans-serif font can appear to float. Per Craig et al. (2006) rows of text in serif font are more legible and easier to comprehend, and since the viewer can focus on comprehending the message, their recall is improved (Glasser et al. 2005). Studies have found that some of the positive results for serif were the result of combining it with slightly wider letter distance, larger size, or row height (Moret-Tatay and Perea 2011). Using serif, black, and larger fonts improves sign readability. The font should be large enough to be legibly communicate to passersby from two meters away, and to allow the maintenance of the correct amount of physical

distance from customers entering or leaving the store.

Once retailers ascertained which social distancing measures would continue, informal signs began to give way to professional ones. Multi-location retailers that remained open worked to standardize the customer experience over the store network. The government also assisted retailers' efforts by making information available on their websites in the form of printable documents (Government of Canada 2020). Professional signs proved to be more robust, as they were laminated or coated, and printed on heavier stock that could stand up to daily abuse and the Canadian climate. By increasing the size of the signs, the readability from a distance for those passing on the sidewalk or road was improved, and key information could be consolidated on a single sign rather than multiple smaller ones.

The type of signs used by retailers could also be considered a reflection of their emotional state. The first emotions of uncertainty and unknowing were over time replaced by "certainty and knowing." The informal signs, signaling frequently changing information, used early in the pandemic were subsequently replaced by professional signs that signaled "business as usual" with less frequently changing information as the pandemic continued.

While some retailers removed the informal signs, curiously others added professional signs alongside the original ones. Do the informal signs continue to exist in the same way as physical landmarks, such as rock formations, rivers, or mountains? In the past, these physical landmarks would have been the only signs for wayfinding, as was true in the early stage of the pandemic, but in modern times, co-exist with the professional signs for wayfinding in, for example, national parks or nature trails (Sarjakoski et al. 2013). Could it be that the informal signs have become part of the "landscape" of the new world of COVID?

Rahman and Mehta (2020) comment that signs are an important part of place-based communication in that they may reflect the nature of the neighborhood. However, when non-local retail brands enter, their signs may or may not reflect the nature of the

neighborhood. Consistent with this, a majority of the informal signs used by single-location retailers seemed to convey a sense of community and caring in terms of their customers and employees. They were often emotional in tone, conveying regret for closing, gratitude to the community, and with well-wishes for the safety of the reader. In contrast, the majority of the informal signs used by large multi-location retailers were educational and practical. They conveyed facts about the behavior expected from their employees and customers.

Most single location retailers that closed did not provide their customers with alternative methods of contacting them, and adding a phone number, email, or a social media account to their informal signs would have given customers a chance to stay connected with retailers throughout the crisis. Since their signs communicated that they viewed themselves as part of the community, local retailers adding contact information to their signs is something they should consider in future crisis management planning. It is important to acknowledge that most small retailers, unlike large retailers, do not have employees dedicated to communication and crisis management planning. In addition to their specialized corporate workforce, large retailers have a comprehensive digital footprint with many ways to connect with customers. Using transactional websites or apps, customers continued to purchase products and services from them, thereby facilitating their ability to continue to operate even when closed to in-person customers, while small retailers without that infrastructure had to completely shut down.

Some readers might find it surprising that paper signs were preferred to digital signs. While single location retailers are generally less likely to have digital signs, multi-location retailers commonly use digital signs to present products, services, pricing, and promotional information in normal conditions (Roggeveen, Nordfält, and Grewal 2016). Rather than use them to provide up-to-date COVID-19 information, digital signs continued to display pre-pandemic advertising.

There are several possible explanations for not using digital signs during the pandemic. It could be that the

cost and size of digital signs prohibits their placement in multiple locations inside and outside the store (Xnage 2020). The variation in regulations between geographic locations would have required different content and that could make it difficult to create and post the correct information in rapidly changing circumstances. It could also be that the technical expertise required to update the signs was deployed to other tasks such as maintaining store operations or getting non-essential employees set up to work from home. In March it was reported that there were little readily available COVID-19 content or necessary software code for digital signs (Haynes 2020). By mid-April while companies began advertising the necessary content and software code, digital signs remained COVID-19 content free.

Badami (2018) writes about the Indian practice of “jugaad,” which expresses the idea of objects repaired, repurposed or re-engineered. Interest in this practice, which is commonplace in poorer countries, emerged as an economic and sustainable practice in wealthier ones following the 2008 financial crisis. The practice of repurposing printer paper as signs, duct tape placed on sidewalks and floors to indicate direction of travel, and equipment such as poster and flyer stands used in unexpected ways, emerged during the pandemic. Given the uncertainty and rapidity of events, repurposing equipment became another coping mechanism for retailers to manage their operations and communication efforts.

While one can hope that a crisis of this magnitude will not occur again, companies and governments often face crises that require rapid communication during events such as earthquakes, floods, or hurricanes and in their immediate aftermath. Paper signs, along with pens / markers and duct tape can be rapidly deployed in these circumstances, as a way to identify where buildings or people are located, give directions, provide updates as to the state of events, and inform citizens of safety regulations. Aside from future crises, as governments begins to open their economies, retailers that have been closed will need to learn how to operate under the conditions of social distancing. Among other operational changes, they will need to learn how to use signs effectively.

LIMITATIONS OF RESEARCH AND SUGGESTIONS FOR FUTURE RESEARCH

The data collected for this study was limited to one area within walking distance of the principal researcher's home the result of the restrictions imposed by the Canadian government during the COVID-19 crisis. The language and content posted on the signs will likely vary across geographic areas and follow-up research in other geographic areas could be done using the photographs of informal signs found in many media stories posted online (see Carlberg 2020; Fortin 2020; Mercer 2020; Toh 2020).

Given the seriousness of the situation, the author did not feel it appropriate to talk with retailers or solicit customer input about posted signs. Follow-up research with retailers to explore why both small, single location and large multi-location businesses chose to use paper signs is future research avenue. One should not overlook the functional qualities of paper (easy to produce, easy to change) and its low cost compared to professional signs to explain their use by retailers. In addition, retailers may have decided that with information changing rapidly, committing to professional signs was not practical. Also, the number of retailers demanding signs compared to the ability of printing companies to produce the required number in a timely fashion may have contributed to the limited supply of professional signs.

While this research documented the objective characteristics of signs during COVID-19, follow-up research with customers could assess the subjective properties of the signs. Kellaris and Machleit (2016) propose the following characteristics: attractiveness, perceived quality, novelty / familiarity, interestingness, perceived complexity, legibility, perceived clarity/ambiguity, congruity with expectations (or surprisingness), and congruity (or incongruity) with architecture or surrounding environment ("aesthetic congruity"). Further, now that some companies are using professional signs to communicate social distancing behaviors, it would be interesting to consider the effect on brand image. Huddleston et al. (2015) demonstrated that store signage is linked to brand image and positive purchase intent. One might wonder if retailers are connecting their brand to a negative

event, or alternatively are demonstrating corporate social responsibility, and reassuring customers that, with retailers' signs returning to normal, their lives may also start to be more predictable. Finding out why retailers did not use their digital signs to present COVID information would be a first step to understanding their place in future crises. If it were the case that digital signs commanded technical resources that were deployed elsewhere, an opportunity to develop more easily programmed digital signs presents itself.

Retail signs not only helped people understand what to do and how to behave, but they provided a way to navigate the new and unfamiliar world of a global pandemic. Physical signs provide the viewer with information to help them make a decision when they are uncertain how to proceed (Mollerup 2005). Thus, it is fitting that an old technology, paper, was the dominant material used to create ad-hoc retail signs. Paper's fragility may have simultaneously reflected the uncertainty that people felt in the early days of the pandemic, while its familiar and timeless presence may have provided a sense of emotional security and direction.

REFERENCES

- Adam A. and Jensen J. D. (2016). What is the effectiveness of obesity related interventions at retail grocery stores and supermarkets? A Systematic Review. *BMC Public Health* 16(1), 1247-1271.
- Aaronson, S. A. (2003). Corporate responsibility in the global village: The British role model and the American laggard. *Business and Society Review* 10(3), 309-38.
- Badami, N. (2018). Informality as fix repurposing jugaad in the post-crisis economy. *Third Text* 32(1), 46-54.
- Beck, L. (2020). "How to stock your pantry if you're worried about a coronavirus quarantine. *Globe and Mail*, 6 March. <https://www.the-globeandmail.com/life/health-and-fitness/article-how-to-stock-your-pantry-if-youre-worried-about-a-coronavirus/>
- Benzie, R. (2020). "Disobeying the covid-19 emergency law could cost you \$100,000 and one year in jail." *The Toronto Star*, 31 March. <https://www.thestar.com/politics/federal/2020/03/31/disobeying-the-covid-19-emergency-law-could-cost-you-100000-and-one-year-in-jail.html>
- Brown, D. (2020). "Individuals, businesses that defy emergency orders could be fined." *CBC News*, 20 March. <https://www.cbc.ca/news/canada/toronto/opp-warns-businesses-social-distancing-1.5505439>
- Calabretta, D. (2020). "Panic buying and hoarding begins." *Strategy*, 14 March. <https://strategyonline.ca/2020/04/23/metro-wants-people-to-get-through-the-pandemic-together/>
- Carlberg, A. (2020). "Signs posted outside Toronto restaurants show new normal." *blogTO*, 11 April. https://www.blogto.com/eat_drink/2020/03/signs-posted-outside-toronto-restaurants-show-new-normal/
- Carpenter, J. M. and Moore, M. (2006). Consumer demographics, store attributes, and retail format choice in the US grocery market. *International Journal of Retail and Distribution Management* 34(6), 434-452.
- City of Toronto. (2016). "Ward 15-Don Valley West." *Canadian Census Data*. <https://www.toronto.ca/city-government/data-research-maps/neighbourhoods-communities/ward-profiles/ward-15-don-valley-west/>
- Craig, J., Scala, I. K. and Bevington, W. (2006). *Designing with Type: The Essential Guide to Typography*. New York: Watson-Guptill.
- Da Silva, R. V. and Alwi, S. (2006). Cognitive, affective attributes and conative, behavioral responses in retail corporate branding. *Journal of Product and Brand Management* 15(5), 293-305.
- Declerq, K. (2020). "Ontario corporations, individuals could face 'staggering' fines for price gouging." *CTV News*, 30 March. <https://toronto.ctvnews.ca/ontario-corporations-individuals-could-face-staggering-fines-for-price-gouging-1.4872588>
- Donnelly, A. (2020). "What Canada is doing to contain COVID-19 as coronavirus inches closer to being declared a pandemic." *National Post*, 28 February. <https://nationalpost.com/health/what-canada-is-doing-to-contain-covid-19>
- Fortin, J. (2020). "Starbucks goes from sip and stay to grab and go." *New York Times*, 16 March. <https://www.nytimes.com/2020/03/16/business/starbucks-to-go-coronavirus.html>
- Gasser, M., Boeke, J., Haffernan, M. and Tan, R. (2005). The Influence of Font Type on Information Recall. *North American Journal of Psychology* 7(2), 181-188.
- Government of Canada. (2020). "Coronavirus disease (COVID-19): Awareness resources." 26 March. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/awareness-resources.html>
- Harris, R. (2020). "How will our grocery supply chain weather the pandemic?" *Canadian Grocer*, 5 June <http://www.canadiangrocer.com/worth-reading/how-will-our-grocery-supply-chain-weather-the-pandemic-95311>
- Haynes, D. (2020). "Wanted and needed: coronavirus PSAs that digital signage networks can use." *Sixteen-Nine*, 10 March. <https://www.sixteen-nine.net/2020/03/10/wanted-and-needed-coronavirus-psas-that-digital-signage-networks-can-use/>
- Huddleston, P., Behe, B. K., Minahan, S. and Fernandez, R. T. (2015). Seeking attention: An eye tracking study of in-store merchandise displays. *International Journal of Retail and Distribution Management* 43(6), 561-574.
- Jenkins, R. (2020). "Coronavirus: the stages of public concern." *Polling Guru*, 1 April. <http://pollingguru.ca/coronavirus/>
- Juni, S., and Gross, J. S. (2008). Emotional and persuasive perception of fonts. *Perceptual and Motor Skills* 106(1), 35-42.
- Kaspar, K., Wehlitz, T., von Knobelsdorff, S., Wulf, T., Antoinette, M. and von Saldern, O. (2015). A matter of font type: The effect of serifs on the evaluation of scientific abstracts. *International Journal of Psychology*. 50(5), 372-378.
- Kellaris, J. J. and Machleit, K. A. (2016). Signage as marketing communication: A conceptual model and research propositions. *Interdisciplinary Journal of Signage and Wayfinding* 1(1), 1-17.

- Khachatryan, H., Rihn, A., Behe, B., Hall, C., Campbell, B., Dennis, J. and Yue, C. (2018). Visual attention, buying impulsiveness, and consumer behavior. *Marketing Letters* 29(2), 23–35.
- Leger. (2020). “How concerned are Canadians about the Coronavirus?: A Leger poll.” 14 February. <https://leger360.com/surveys/canadians-concerns-about-the-coronavirus/>
- Lehman, P. H. and Geller, E. S. (2004). Behavior analysis and environmental protection: Accomplishments and potential for more. *Behavior and Social Issues* 13(1), 13-32.
- McCarthy-Tetrault (2020). “COVID-19: Emergency measures tracker.” <https://www.mccarthy.ca/en/insights/articles/covid-19-emergency-measures-tracker>.
- McNeish, J. (2019). Paper Flyers in the Age of Social Media. *Conference on Historical Analysis and Research in Marketing (CHARM): Exploring Identity Building: Marketing History as an Instrument of Transformation* 19, 380-383.
- Mercer, J. (2020). “Signs of the times: a study of COVID-19 business closure notices in St. John’s.” *The Telegram*, 8 April. <https://www.thetelegram.com/news/local/signs-of-the-times-a-study-of-covid-19-business-closure-notices-in-st-johns-435524/>
- Mollerup, P. (2005). *Wayshowing. A Guide to Environmental Signage Principles and Practices*. Baden: Lars Muller.
- Moret-Tatay, C. and Perea, M. (2011). Do serifs provide an advantage in the recognition of written words? *Journal of Cognitive Psychology* 23(5), 619–624.
- Moghim, E. and Wiktorowicz, M. E. (2019). Regulating the fast-food landscape: Canadian news media representation of the healthy menu choices act. *International Journal of Environmental Research and Public Health* 16(24), 4939-4960.
- News Staff. (2020). “Torontonians face up to \$5k fine for violating physical distancing by-law.” *CityNews*, 2 April. <https://toronto.citynews.ca/2020/04/02/torontonians-face-up-to-5k-fine-for-violating-physical-distancing-by-law/>
- Ontario Government. (2020). “List of essential workplaces.” 3 April. <https://www.ontario.ca/page/list-essential-workplaces#section-3>
- Ontario Government. (2020). O. Reg. 82/20: Order Under Subsection 7.0.2 (4). Closure of Places of Non-Essential Businesses under Emergency Management and Civil Protection Act, R.S.O. 1990, c. E.9, Versions: April 16, 2020-May 6, 2020; April 9, 2020-April 15, 2020; April 3, 2020-April 8, 2020; March 24, 2020-April 2, 2020. <https://www.ontario.ca/laws/regulation/200082>
- Ottawa Public Health. (2020). SFOA 2017 Guide for Retailers (updated 2020). 3 January. www.ottawapublichealth.ca/en/public-health-topics/resources/Documents/SFOA-2017-Guide-for-Retailers-2020---2020-01-28.pdf
- Public Health Agency of Canada. (2020). “Coronavirus Disease (COVID-19).” <https://www.canada.ca/en/public-health.html>
- Quill (n.d.). “When to use multipurpose paper vs. copy paper.” <https://www.quill.com/content/index/paper-buying-guide/paper-comparisons/default.cshtml>
- Rahman, M. N. and Mehta, V. (2020). Signage form and character: A window to neighborhood visual identity. *Interdisciplinary Journal of Signage and Wayfinding* 4(1), 35-48.
- Ray, J. L. and Smith, A. D. (2012). Using photographs to research organizations: Evidence, considerations, and application in a field study. *Organizational Research Methods* 15(2), 288-315.
- Robertson, S. K. (2020). “Could social distancing create a long-term shift for the grocery industry?” *Globe and Mail*, 5 April. <https://www.theglobeandmail.com/business/article-could-social-distancing-create-a-long-term-shift-for-the-grocery/>
- Roggeveen, A., Nordfält, J. and Grewal, D. (2013). Do digital displays enhance sales? Role of retail format and message content. *Journal of Retailing* 9(1), 122-131.
- Shaikh, D., Chaparro, B., and Fox, D. (2006). Perception of fonts: Perceived personality traits and uses. *Usability News* 8(1), 1–8.
- SignMedia. (2020). COVID-19 and what it means for the sign industry.” *SignMedia*, 13 April. <https://www.signmedia.ca/covid-19-and-what-it-means-for-the-sign-industry/>
- Sarjakoski, T., Kettunen, P., Halkosaari, H.-M., Laakso, M., Rönneberg, M., and Stigmar, H. (2013). Landmarks and a hiking ontology to support wayfinding in a National Park during different seasons. In: *Cognitive and Linguistic Aspects of Geographic Space. Lecture Notes in Geoinformation and Cartography*, eds. M. Raubal, D. Mark, and A. Frank. Berlin: Springer.
- Stern, N. (2020). “Four waves of change are coming to grocery retail in the wake of the Coronavirus outbreak.” *Forbes*, 30 March. <https://www-forbes-com.cdn.ampproject.org/c/s/www.forbes.com/sites/neilstern/2020/03/30/grocery-retail-four-waves-of-change-are-coming/amp/>
- Sundar, A. and Kellaris, J. J. (2017). How logo colors influence shoppers’ judgments of retailer ethicality: The mediating role of perceived eco-friendliness. *Journal of Business Ethics* 146(3), 685–701.

- Toh, M. (2020). "It's crazy: Panic buying forces stores to limit purchases of toilet paper and mask." *CNN*, 6 March. <https://www.cnn.com/2020/03/06/business/coronavirus-global-panic-buying-toilet-paper/index.html>
- Tumilty, R. (2020). COVID-19: "Trudeau to Canadians: Enough is enough. go home and stay home." *The National Post*, 23 March. <https://nationalpost.com/news/canada/covid-19-ontario-reports-78-new-cases-the-most-in-one-day-so-far>
- Vizcaíno, F. V. (2018). Beyond window signs: Understanding the affect-based effects of window signs on store patronage intentions. *Psychology and Marketing* 35(7), 542-552.
- Werner, C. M., Rhodes, M. U., and Partain, K. K. (1998). Designing effective instructional signs with schema theory: Case studies of polystyrene recycling. *Environment and Behavior* 30(5), 709-735.
- World Health Organization. (2020). "Key considerations for repatriation and quarantine of travellers in relation to the outbreak of novel coronavirus." *WHO*, 11 February. <https://www.who.int/news-room/articles-detail/key-considerations-for-repatriation-and-quarantine-of-travellers-in-relation-to-the-outbreak-of-novel-coronavirus-2019-ncov>
- World Health Organization. (2020). *International Health Regulations, 2005*. Geneva: WHO.
- Xnage. (2020). "How much does digital signage cost? An exclusive guide." <https://www.xynage.io/blog/digital-signage-cost/>.
- Ziliani, C., Ieva, M., Gázquez-Abad, J. C., and D'Attoma, I. (2019). Retail promotional communication: The comparative effectiveness of print versus online In: *Exploring Omnichannel Retailing 2019*, eds W. Piotrowicz and R. Cuthbertson. Oxford: Springer.

APPENDIX

Table 1 / Retail Businesses Deemed Essential Based on Ontario Emergency Act by Date of Order

March 24-April 2, 2020	April 3-8, 2020	April 9-15, 2020	April 16-May 6, 2020
Businesses engaged in retail and wholesale sale of food, pet food and supplies, and household consumer products necessary to maintain the safety, sanitation and essential operations of residences and businesses, including grocery stores, supermarkets, convenience stores, markets and other similar retailers	Businesses that <i>primarily</i> sell food, beverages and consumer products necessary to maintain households and businesses including supermarkets and grocery stores; convenience stores; discount and big box retailers selling groceries		
Restaurants and other food facilities that prepare and serve food, but only for delivery or takeaway, together with food delivery services	Restaurants (take-out, drive-through and delivery service only).		
Beer, wine and liquor stores and alcohol producers, and stores that sell beer and wine through arrangements with authorized providers, cannabis stores and producers	Beer and wine and liquor stores.		
Motor vehicle, auto-supply, auto and motor-vehicle-repair, including bicycle repair, aircraft repair, heavy equipment repair, watercraft/ marine craft repairs, car and truck dealerships and related facilities	Vehicle and equipment repair and essential maintenance and vehicle and equipment rental services. Vehicle parts and supplies stores that provide products to customers <i>only through an alternative method of sale</i> such as curb side pick-up or delivery		
Hardware stores and stores that provide hardware products necessary to the essential operations of residences and businesses	Hardware stores that provide products to the customer <i>only through an alternative method of sale</i> such as curb side pick-up or delivery		
Businesses that supply office products and services, including providing computer products and related repair and maintenance services, for people working from home and essential businesses	Office supplies and computer products including computer repair stores that provide products to customers <i>only through an alternative method of sale</i> such as curb side pick-up or delivery		
Businesses that provide essential items for health and welfare of animals, including feed, animal food, pet food and animal supplies	Pet and animal supplies stores that provide products to customers <i>only through an alternative method of sale</i> such as curb side pick-up or delivery		
Banks/credit unions; Insurance; Real estate agents	Banks/credit unions; Insurance; Real estate agents		
Professional services - accountants	Financial services including payroll and payment processing and accounting and tax services		

Health care professionals providing emergency care including dentists optometrists and physio-therapists	Regulated health professionals (<i>urgent care only</i>) including dentists, optometrists, chiropractic services, ophthalmologists, physical and occupational therapists and podiatrists
Businesses providing mailing, shipping, courier and delivery services, including post office boxes;	Courier, postal, shipping, moving and delivery services
Gas stations, diesel, propane and heating fuel providers including providers of motor vehicle, aircraft and water/marine craft fuels	Gas stations and other fuel suppliers.
Business providing pharmaceuticals/pharmaceutical services, including pharmacies and dispensaries	Pharmacies
Businesses that sell, rent or repair assistive/mobility/medical devices, aids and/or supplies	Businesses that sell, rent, or repair assistive/mobility/medical devices, aids and/or supplies.
Laundromats, dry cleaners and laundry service providers	Laundromats and drycleaners
Businesses providing security services including private security guards; monitoring or surveillance equipment and services	Security services for residences, businesses and other properties
Businesses that provide for health and welfare of animals, including veterinarians, farms, boarding kennels, stables, animal shelters, zoos, aquariums, research facilities and other service providers	Veterinary services (<i>urgent care only</i>) and other businesses that provide for the health and welfare of animals, including farms, boarding kennels, stables, animal shelters, zoos, aquariums and research facilities

(Ontario Government 2020)

Table 2 / Timeline of Key Events, Regulations and Legislation from January to April 2020

Month	Key Events	Regulations and Legislation
Jan.	-Jan 26: first presumptive case of COVID-19 recorded in Toronto, Ontario, Canada -Public Health Agency of Canada increases government briefings and preparation	
Feb.	-No restrictions imposed on Canadians -People continue to travel with very few restrictions (e.g. from/to Hunan Province, China; Daegu and Cheongdo, South Korea)	Feb 6: World Health Organization (WHO) issues advisory that countries should prepare for containment (active surveillance, early detection, isolation and case management, contact tracing,

		prevention of onward spread, and data sharing)
	-Feb 14: 7% of Canadians concerned about contracting COVID-19 -Feb 29: 16 cases reported in Canada, imported from other countries	-Public Health Agencies begins recommending that people: increase hand washing; avoid touching face; cough or sneeze into elbow; stay home and avoid hospitals or long-term care homes, if sick Canadians advised to make preparations should they fall ill, by stockpiling food and medication for 14 days
March	-Mar 4: Major coffee chain begin banning customer's recyclable cups, and in-restaurant hard plastic and ceramic mugs	
		Mar 11: WHO declares COVID-19, a Pandemic
	Mar 13: Ontario public schools, universities and colleges ordered to close	
	Mar 16: Some retailers ask customers to bag their own reusable bags, or use plastic bags	
	-Reports of panic buying at grocery stores as customers worry what happens if they can't get food and essential items -Temporary shortages (e.g. toilet paper, cleaning supplies, water, canned goods, baking supplies, fruits and longer lasting fruits and vegetables) -Government encourages public not to overreact and advises that Canadian supply chain has sufficient products for all, and that shelves will be restocked quickly	
	Municipal, Provincial and Federal governments begin daily media briefings	Mar 17: Ontario government declares provincial state of emergency to help contain spread of COVID-19
	March 19: 62% of Canadians are afraid of contracting COVID-19	

	<ul style="list-style-type: none"> -Businesses, still operating at a place of business, reduce their hours of operation to do extra cleaning and give employees time off -Grocery stores add seniors/vulnerable population shopping hours -Certain products continue to be in short supply (e.g. toilet paper, cleaning supplies, canned goods, baking supplies) -Some products are reserved for customer-facing employees and first responders (e.g. surgical masks, hand sanitizers, isopropyl alcohol, Lysol wipes, and gloves) -Retailers announce a preference debit and credit cards, but most continue to accept cash -Restaurants/food delivery services begin to use the term ‘contactless delivery’ (reduction in touching during food preparation; limited/no interaction with customers during pick-up and delivery) -Tap limits on debit and credit cards raised from \$100 to \$250 -Check-out employees no longer permitted to pack customers’ reusable bags. Some stores waive 5 cent fee for plastic bags -March 26: Some stores stop producing and/or delivering printed promotional flyers 	<p>Mar 24: First group of non-essential businesses closed to employees and customers (i.e. employees and customers may not be in the place of business)</p> <ul style="list-style-type: none"> -Businesses deemed essential remains open to employees and customers, must implement measures to ensure that persons in the place of business are able to maintain a separation of at least two meters from others -Penalties introduced to combat price gouging on “necessary goods” -Social distancing measures introduced -Gatherings of 50 people or more prohibited
April	<ul style="list-style-type: none"> -Some essential multi-locations businesses reduce the number of locations open to the public -Beer and wine bottle return halted -Customers’ reusable bags and shopping totes no longer allowed into stores. Plastic shopping bags offered for free. -Some stores add security guards to manage number of customers entering location -Seniors/vulnerable population shopping hours continue -First responder priority store entry added 	<p>Apr 4: Additional non-essential businesses closed to customers. They are allowed to operate with employees inside store but must interact with customers using alternative methods such as click and collect and delivery to home (hardware products; vehicle supplies; pet/animal supplies; office supplies, computer products; safety supplies)</p>
	<p>April 20: 58% of Canadians are afraid of contracting COVID-19</p>	<ul style="list-style-type: none"> -Fines imposed for not remaining two meters apart or gathering in groups of more than five people -Individuals faced fines up to \$5,000 and corporations up to \$500,000 -More labor inspectors hired to communicate COVID-19 safety guidelines to essential workplaces, enforce social distancing on job sites and ensure non-essential businesses are closed
	<p>Most retailers that remained open have replaced many, but not all of the informal signs with professional signs</p>	<p>Apr 27: Ontario government releases its “Framework for Reopening Our Province”</p>