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**BEYOND THE LOGO:  
TWO ESSAYS ON THE INFLUENCE OF LOGO DESIGN ON  
BRAND EVALUATIONS**

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By Ngoc Minh To

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**BEYOND THE LOGO: TWO ESSAYS ON THE INFLUENCE OF LOGO DESIGN ON  
BRAND EVALUATION**

We, the undersigned committee members have read and examined this manuscript. We certify that it is adequate in scope and quality as a thesis/dissertation for this graduate degree and indicate our approval of the content of the document to be submitted to the college/department for processing and acceptance.

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## **ABSTRACT**

Over the past decade, consumer researchers have highlighted the indispensable role of aesthetics in marketing. Consumers make inferences and decisions regarding a brand or an organization through the aesthetic features of a related product, from the logo design (Jiang, Gorn, and Chattopadhyay 2016; Hagtvedt 2011) to the packaging appeal (Krishna, Cian, and Aydınoğlu 2017; Sundar and Noseworthy 2014), from the choice of color (Wedel and Pieters 2014) to the dynamism of the visual cues (Cian, Krishna, and Elder 2015). In general, research finds that consumers do not simply observe these aesthetic cues but also draw their own inferences to form conclusions about a related brand or organization (Patrick 2016; Townsend 2017). With this dissertation, I seek to contribute to the consumer aesthetics literature by investigating how specific visual elements of a logo design, such as symmetry or negative space, can connote symbolic meaning and prompt consumer actions. The two essays of this dissertation proposal examine the visual elements of symmetry (Essay 1) and negative space (Essay 2).

In Essay 1 of my dissertation, I investigate how the visual symmetry of a logo design (symmetrical vs. asymmetrical logos) can convey the abstract concept of social inequality, which in turns motivates prosocial actions. Prior research has established that humans (even babies, Humphrey and Humphrey 1989; Humphrey, Humphrey, Muir, and Dodwell 1986) display a strong preference for symmetrical visual cues (Attneave 1955), and that symmetrical designs are perceived as more visually pleasing (Szilagyı and Baird 1977). Despite the large body of research on symmetry and its salience in human visual perception, little is known about people's perception of asymmetrical visual cues and whether asymmetry can evoke more favorable responses. Drawing on an anthropological perspective of symmetry (Washburn 1999), I propose that people form a strong association between visual symmetry and the state of equality, such

that asymmetrical visual cues (e.g. logo design) are associated with a state of inequality while symmetrical visual cues are associated with a state of equality. I define inequality as the general sense of the existence of unequal opportunities and resources for different social positions or statuses within a society (adapted from Schaefer 2007, Payne 2017). Further, because asymmetrical (vs. symmetrical) design is associated with greater perceptions of inequality, I posit that asymmetrical (vs. symmetrical) design will lead to greater prosocial actions because consumers are motivated to reduce the perceived inequality. I also postulate that the effect of visual symmetry (symmetrical vs. asymmetrical logos) on prosocial actions is moderated by the message frame, such that symmetrical (vs. asymmetrical) logo design can enhance the effectiveness of gain-framed (vs. loss-framed) donation appeals respectively. The essay aims to demonstrate how visual cues (e.g. symmetry) can convey abstract concepts (e.g. social inequality) to prompt consumer prosocial action.

In Essay 2 of my dissertation, I examine how negative space (vs. positive space) logo design can enhance consumer engagement and brand attitude. Negative space is defined as the empty or open space around and between the subject(s) of an image. Negative space is used in logo design when the space around (or in between) a visual subject (e.g., the brand name in a logo) is modified/constructed to form an interesting or artistically relevant form that lends added meaning to the main subject itself. A negative space logo often uses negative space to subtly convey a hidden message or image without the addition of design elements. In contrast, a positive space logo design simply adds additional design elements to a visual subject to directly (non-subtly) convey meaning. I propose that negative space (vs. positive space) logos evoke greater levels of engagement because consumers participate in the visual completion of the logo design. By enhancing engagement, negative space (vs. positive space) logos will also lead to

more favorable brand attitudes. Further, I postulate that the effect of logo design (negative space vs. positive space) on engagement and brand attitudes is moderated by brand characteristics (modern vs. traditional), such that negative space (positive space) enhances engagement and brand attitudes for modern (traditional) brands. The findings of the second essay aim to provide a better understanding of negative space in brand logos and to demonstrate how a logo design can become more engaging by ‘hiding’ away a visual element for consumers to discover.

## TABLE OF CONTENTS

<b>ACKNOWLEDGMENTS .....</b>	<b>III</b>
<b>ABSTRACT .....</b>	<b>V</b>
<b>LIST OF TABLES .....</b>	<b>XI</b>
<b>LIST OF FIGURES .....</b>	<b>XII</b>
<b>CHAPTER ONE. DISSERTATION OVERVIEW .....</b>	<b>1</b>
<b>VISUAL AESTHETICS AND CONSUMER BEHAVIOR .....</b>	<b>2</b>
Logo Design: An Overview of the Literature .....	4
<b>REFERENCES.....</b>	<b>7</b>
<b>CHAPTER TWO. ESSAY 1 .....</b>	<b>10</b>
<b>A SIGN OF INEQUALITY: WHEN AND HOW VISUAL ASYMMETRY MOTIVATES PROSOCIAL BEHAVIOR</b>	
<b>ABSTRACT .....</b>	<b>11</b>
<b>INTRODUCTION.....</b>	<b>12</b>
<b>THEORETICAL BACKGROUND .....</b>	<b>15</b>
Salience of Symmetry in Visual Perception .....	15
Symbolic Associations of Symmetry versus Asymmetry.....	17
Can Asymmetry Visually Represent Inequality?.....	18
Perceptions of Inequality Motivate Resolution via Prosocial Behaviors.....	21
<b>STUDY 1: CHARITY FIELD STUDY .....</b>	<b>23</b>
<b>STUDY 2A .....</b>	<b>26</b>
<b>STUDY 2B .....</b>	<b>29</b>
<b>INTERPLAY BETWEEN MESSAGE APPEAL AND VISUAL SYMMETRY .....</b>	<b>32</b>
<b>STUDY 3A: MODERATING ROLE OF MESSAGE APPEAL .....</b>	<b>34</b>
<b>STUDY 3B: VIRTUAL VOLUNTEERING DURING COVID-19.....</b>	<b>37</b>
<b>MODERATING ROLE OF SOCIOECONOMIC STATUS.....</b>	<b>42</b>



<b>STUDY 4: SOCIOECONOMIC STATUS .....</b>	<b>43</b>
<b>GENERAL DISCUSSION .....</b>	<b>47</b>
Theoretical Contributions .....	48
Managerial Implications and Directions for Future Research .....	48
<b>REFERENCES.....</b>	<b>51</b>
<b>APPENDIX A .....</b>	<b>74</b>
<b>APPENDIX B .....</b>	<b>75</b>
<b>APPENDIX C .....</b>	<b>77</b>
<b>APPENDIX D .....</b>	<b>78</b>
<b>APPENDIX E .....</b>	<b>79</b>
<b>APPENDIX F .....</b>	<b>80</b>
<b>CHAPTER THREE. ESSAY 2 .....</b>	<b>81</b>
<b>HIDDEN IN PLAIN SIGHT: NEGATIVE SPACE LOGOS VISUALLY ENGAGE CONSUMERS AND ENHANCE BRAND EVALUATIONS</b>	
<b>ABSTRACT.....</b>	<b>82</b>
<b>INTRODUCTION.....</b>	<b>83</b>
<b>THEORETICAL BACKGROUND .....</b>	<b>85</b>
Definition of Negative Space.....	85
Negative Space Logos Enhance Visual Engagement .....	88
Negative Space Logos Boost Brand Evaluations.....	90
<b>STUDY 1: HELPING HANDS FACEBOOK STUDY .....</b>	<b>91</b>
<b>STUDY 2A: NEGATIVE SPACE VERSUS ACTIVE WHITE SPACE LOGOS.....</b>	<b>93</b>
<b>STUDY 2B: NEGATIVE SPACE VERSUS. HIGH VISUAL CONTRAST LOGOS .....</b>	<b>99</b>
<b>STUDY 3A: THE “AHA” RESPONSE WHEN DISCOVERING THE HIDDEN IMAGERY.....</b>	<b>104</b>
<b>STUDY 3B: ASSESSING VISUAL ENGAGEMENT VIA EYE-TRACKING.....</b>	<b>108</b>
<b>MODERATING ROLE OF PRODUCT TYPE.....</b>	<b>112</b>

<b>STUDY 4: NEGATIVE SPACE LOGOS WORK HARDER FOR ORDINARY PRODUCTS.....</b>	<b>114</b>
<b>STUDY 5A: MANIPULATING PROCESSING STYLE .....</b>	<b>119</b>
<b>STUDY 5B: MEASURING PROCESSING STYLE .....</b>	<b>122</b>
<b>GENERAL DISCUSSION .....</b>	<b>124</b>
Theoretical Contributions and Managerial Implications .....	124
Directions for Future Research .....	126
<b>REFERENCES.....</b>	<b>128</b>
<b>APPENDIX G.....</b>	<b>144</b>
<b>APPENDIX H.....</b>	<b>149</b>
<b>APPENDIX I .....</b>	<b>151</b>
<b>APPENDIX J.....</b>	<b>152</b>
<b>APPENDIX K.....</b>	<b>153</b>
<b>APPENDIX L .....</b>	<b>154</b>
<b>APPENDIX M.....</b>	<b>155</b>

**LIST OF TABLES**

Table 1. Summary of Empirical Studies .....	134
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## LIST OF FIGURES

### CHAPTER TWO: “*A Sign of Inequality: When and How Visual Asymmetry Motivates Prosocial Behavior*”

Figure 1. Study 1 Stimuli (Banner for Display Booth) .....	61
Figure 2. Study 1 Stimuli (Online Facebook Ads) .....	62
Figure 3. Study 2a Stimuli .....	63
Figure 4. Study 2b stimuli.....	64
Figure 5. Conceptual Framework: Moderating Role of Message Appeals.....	65
Figure 6. Study 3a stimuli .....	66
Figure 7. Study 3a: Visual Symmetry × Message Appeal on Blood Donation Intentions. ....	67
Figure 8. Study 3a: Visual Symmetry × Message Appeal on Monetary Donation Intentions.....	68
Figure 9. Study 3b Stimuli .....	69
Figure 10. Study 3b: Visual Symmetry × Message Appeal on Volunteering Intentions.....	71
Figure 11. Study 3b: Visual Symmetry × Message Appeal on Behavioral Volunteering Intentions.....	72
Figure 12. Conceptual Framework: Moderating Role of SES .....	73

### CHAPTER THREE: “*Hidden in Plain Sight: Negative Space Logos Visually Engage Consumers and Enhance Brand Evaluations*”

Figure 13. Examples of Popular Negative Space Logos in the Market .....	135
Figure 14. Visual explanation of negative space, positive space, and negative space design. ....	136
Figure 15. Study 1 Stimuli .....	137
Figure 16. Study 2a Stimuli .....	138
Figure 17. Study 2b and Study 5a stimuli.....	139
Figure 18. Study 3a Stimuli .....	140
Figure 19. Study 3b Stimuli .....	141
Figure 20. Study 4 Stimuli .....	142
Figure 21. Study 5b Stimuli .....	143

## **CHAPTER ONE**

### **DISSERTATION OVERVIEW**

## **VISUAL AESTHETICS AND CONSUMER BEHAVIOR**

Earlier studies of aesthetics have often considered aesthetics as rooted in the philosophical perspective of art-centered aesthetics, such that only fine arts and the appreciation of arts or beautiful objects were considered the core subject matter of aesthetics (Saito 2007). Such philosophical aesthetic perspective thus considered an aesthetic object/experience as distinguished from ordinary experiences in general. While art remains to play a focal role in forming people's understanding of aesthetics, this art-centered perspective limits the scope of aesthetics and overlooks other dimensions of aesthetic experiences that people engage in almost daily, such as forming judgments and preferences, making design choices, or choosing certain courses of actions (Patrick 2016; Saito 2007). Given that consumers' engagement with aesthetics is not constantly provided by art or 'highbrow' art experiences, recent consumer aesthetics research has focused on the perspective of 'everyday aesthetics', which examines how "seemingly trivial, ordinary, innocuous aspects of consumer aesthetic life" can have significant impact on a whole host of consumption behaviors as well as political, moral, and social issues (Patrick 2016).

Recent research has investigated a broad set of aesthetic features and their impact on different facets of consumption experiences. The packaging design of a product can influence the consumption quantity (Deng and Srinivasan 2013), the perceptions of quality (Yan, Sengupta, and Wyer 2014), as well as the evaluation of brands (Hagtvedt and Patrick 2008). Color is a ubiquitous influence in the marketplace and affects a wide range consumer response, from product size perceptions (Hagtvedt and Brasel 2017) to judgments of ethicality (Sundar and Kellaris 2017). Consumers also form grounded embodied associations with certain aesthetic

elements. For example, since power is associated with height (Schubert 2005), consumers tend to prefer powerful brands when the brand logo is placed higher on the package design (Sundar and Noseworthy 2014). Similarly, because humans tend to associate the head and heart with abstract concepts of rationality and emotions, respectively, research has shown that consumers prefer rational elements of a product (e.g., healthiness) to be placed higher in the packaging while emotional elements of a product (e.g., tastiness) to be placed lower (Cian, Krishna, and Schwarz 2015).

Considering the diversity of aesthetic features and their impact on a wide range of consumer behaviors, aesthetic researchers have also attempted to investigate how aesthetics can intersect with public policy issues and motivate consumer actions. For instance, Cian, Krishna and Elder (2015) examined the effect of dynamic iconography in warning signs and showed that more visually dynamic icons enhanced the effectiveness of warning signs and lead to greater attentional vigilance when driving. Visual cues such as product distortion (Trudel and Argo 2013) and cuteness appeals (Wang, Mukhopadhyay, and Patrick 2017) can affect whether consumers engage in prosocial and sustainable behaviors. The current research seeks to contribute to this line of research findings by proposing that certain visual elements, such as symmetry and negative space, can motivate consumer actions by activating specific symbolic associations. Symbolism is defined as the meaning derived from visual elements (e.g., shape, color, and typeface) that allow consumers to discern certain properties of a brand (e.g., innovative, trustworthy, premium; Karjalaine 2007; Van Rompay, Pruyn, and Tieke 2009), even though such brand does not necessarily possess those properties. In this proposal, I examine the visual elements of symmetry and negative space in the context of logo design – a key visual

signature and representation of a brand or organization (Henderson and Cote 1998). Next, I discuss the importance of logo design in the marketplace and provide an overview of current logo design research.

### ***Logo Design: An Overview of the Literature***

A logoless company is a faceless man.

——— David Airey, author of *Logo Design Love*.

Logos can be traced back to the deep antiquity, when aristocracy expressed their hierarchy through complex emblems on shields and flags, and merchants indicated their trades with symbols of tools and animals (Phillips 2016). Today, consumers are bombarded with countless logos on a daily basis, from the moment they wake up to the moment they go to sleep, from clothing labels and running shoes to smart phones and personal laptops (Airey 2014). In fact, it is estimated that the average American sees between 4000-10,000 marketing messages per day. Given the rising number of emerging brands all seeking to attract new consumers, the challenge for brands is gaining consumer attention. The question arises: how do brands differentiate themselves visually in a crowded marketplace where logos even start to look increasingly similar to one another? (Airey 2014). This problem is not easily quantified by the amount of investment brands make in order to ‘stand out from the crowd’, since the most iconic logos can cost from \$0 (Coca-Cola) to only \$35 (Nike), but also can be up to \$1,000,000 (Pepsi; Piccio 2014).

In order to address the issue of brands becoming diluted in the omnipresence of logos while striving to build their visual signature (Snyder 1993), consumer researchers have investigated the impact of various logo characteristics on brand performance (Park, Eisingerich,



Pol, and Park 2013), brand recall and recognition (Henderson and Cote 1998), as well as brand perceptions (Schechter 1993). In terms of visual elements of logo designs, recent aesthetics research has examined how specific design features of logos can generate distinct symbolic connotations that shape brand perceptions. Hagtvedt (2011) found that visual completeness of logo affects consumer perceptions of firms, such that incomplete logos lead to higher perceptions of innovativeness while complete logos lead to higher perceptions of trustworthiness. Symbolic associations of logo shapes also play a role in consumer judgments of brand attributes. For instance, circular (angular) logos lead to greater perceptions of product comfortableness (durability) and as a result, a company using a circular logo is perceived as more sensitive (Jiang, et al. 2016). Subtle design features, such as logo frames, can affect consumption intent. Fajardo, Zhang, and Tsiros (2016) examined how a logo frame can lead to perceptions of confinement or protection depending on the level of risk associated with a purchase. Even the mere colors of logos can bias consumer judgments of ethicality, Sundar and Kellaris (2017) demonstrated how green or blue logos evoke stronger perceptions of eco-friendliness and can bias ethical judgments of retailers.

In contributing to the existing literature on logo design and symbolic connotations, I seek to examine how visual elements of logo design, symmetry and negative space, can motivate consumer actions through symbolic connotations. In Essay 1, I investigate how visual symmetry (symmetrical vs. asymmetrical) of logos can lead to perceptions of social inequality which motivate consumer prosocial actions. In this essay, I also demonstrate how the visual and verbal components of the message strategy can best work together to optimize consumer response, specifically the interaction of message framing (gain-frame vs. loss-frame) with visual symmetry

(symmetrical. vs asymmetrical) in enhancing prosocial intentions. Further, I also investigate how subjective socioeconomic status influences consumer response to visual asymmetry.

In Essay 2, I discuss the concept of negative space in logo designs and propose that negative space (vs. positive space) logo design leads to more favorable brand attitudes by enhancing visual engagement. In order to demonstrate the role of enhanced visual engagement elicited by negative space logos, I conducted eight multi-method experiments and incorporated a multimethod approach to measure engagement, including self-reported engagement, mouse-movements, and eye-tracking measures. Further, I identified three managerially relevant factors that impact the effectiveness of negative space logos: (1) the importance of consumer self-discovery in creating the “aha” response, (2) the ordinariness (vs. coolness) of the product design, and (3) the consumers’ holistic (vs. piecemeal) information processing style.

## REFERENCES

- Airey, David (2014), *Logo Design Love: A Guide to Creating Iconic Brand Identities*. Berkeley: CA. New Riders.
- Cian, Luca, Aradhna Krishna, and Norbert Schwarz (2015), "Positioning rationality and emotion: Rationality is up and emotion is down." *Journal of Consumer Research*, 42 (4), 632-651.
- Cian, Luca, Aradhna Krishna, and Ryan S. Elder (2015), "A Sign of Things to Come: Behavioral Change through Dynamic Iconography," *Journal of Consumer Research*, 41 (6), 1426-1446.
- Deng, Xiaoyan, and Raji Srinivasan (2013), "When Do Transparent Packages Increase (or Decrease) Food Consumption," *Journal of Marketing*, 77 (4), 104-117.
- Fajardo, Tatiana M., Jiao Zhang, and Michael Tsiros (2016), "The Contingent Nature of the Symbolic Associations of Visual Design Elements: The Case of Brand Logo Frames," *Journal of Consumer Research*, 43 (4), 549-566.
- Hagtvedt, Henrik (2011), "The Impact of Incomplete Typeface Logos on Perceptions of the Firm," *Journal of Marketing*, 75 (4), 86-93.
- Hagtvedt, Henrik and Vanessa M. Patrick (2008), "Art Infusion: The Influence of Visual Art on the Perception and Evaluation of Consumer Products," *Journal of Marketing Research*, 45 (3), 379-89.
- Hagtvedt, Henrik, and Adam S. Brasel (2017), "Color Saturation Increases Perceived Product Size," *Journal of Consumer Research*, 44 (2), 396-413.

- Henderson, Pamela W., and Joseph A. Cote (1998), "Guidelines for Selecting or Modifying Logos." *Journal of Marketing*, 62 (2), 14-30.
- Jiang, Yuwei, Gerald J. Gorn, Maria Galli, and Amitava Chattopadhyay, (2016), "Does Your Company Have the Right Logo? How and Why Circular-and Angular-logo Shapes Influence Brand Attribute Judgments." *Journal of Consumer Research*, 42 (5), 709-726.
- Karjalainen, Toni-Matti. (2007), "It Looks Like a Toyota: Educational Approaches to Designing for Visual Brand Recognition," *International Journal of design*, 1 (1).
- Park, C. Whan, Andreas B. Eisingerich, Gratiana Pol, and Jason Whan Park (2013), "The Role of Brand Logos in Firm Performance," *Journal of Business Research*, 66 (2), 180-187.
- Patrick, Vanessa M. (2016), "Everyday Consumer Aesthetics" *Current Opinion in Psychology*, 10, 60-64.
- Phillips, Katie (2016), "Is Your Logo Talking Behind Your Back?"  
<http://www.katiepdesign.com/blog/2016/2/18/is-your-logo-talking-behind-your-back>
- Piccio, Art (2014), "You'll Never Guess How Much These 15 Logos and Trademarks Cost,"  
<http://www.ucreative.com/biz-features/15-logos-and-trademarks-cost/>
- Saito, Yuriko (2007), *Everyday Aesthetics*. Oxford University Press.
- Snyder, Adam (1993), "Branding: Coming Up for More Air," *Brandweek*, 34 (6), 24-28.
- Schubert, Thomas W. (2005), "Your Highness: Vertical Positions as Perceptual Symbols of Power," *Journal of Personality and Social Psychology*, 89 (1), 1-21.
- Sundar, Aparna, and James J. Kellaris (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.

- Sundar, Aparna, and Theodore J. Noseworthy (2014), "Place the logo high or low? Using conceptual metaphors of power in packaging design," *Journal of Marketing*, 78 (5), 138-151.
- Trudel, Remi, and Jennifer J. Argo (2013), "The Effect of Product Size and Form Distortion on Consumer Recycling Behavior," *Journal of Consumer Research*, 40 (4), 632-643.
- Van Rompay, Thomas JL, Ad TH Pruyn, and Peter Tieke (2009), "Symbolic Meaning Integration in Design and its Influence on Product and Brand Evaluation," *International Journal of Design*, 3 (2), 19-28.
- Yan, Dengfeng, Jaideep Sengupta, and Robert S. Wyer Jr (2014), "Package Size and Perceived Quality: The Intervening Role of Unit Price Perceptions," *Journal of Consumer Psychology*, 24 (1), 4-17.
- Wang, Tingting, Anirban Mukhopadhyay, and Vanessa M. Patrick (2017), "Getting Consumers to Recycle NOW! When and Why Cuteness Appeals Influence Prosocial and Sustainable Behavior," *Journal of Public Policy & Marketing*, 36 (2), 269-283.

## **CHAPTER TWO**

### **ESSAY 1**

#### **A SIGN OF INEQUALITY: WHEN AND HOW VISUAL ASYMMETRY MOTIVATES PROSOCIAL BEHAVIOR**

\

## **ABSTRACT**

Drawing insights from anthropological and sociological perspectives of symmetry, the authors propose that asymmetrical visual cues can subtly connote social inequality, which when visually salient (e.g. in logos) can motivate prosocial behaviors. Six multi-method experiments (field and lab studies) illustrate that asymmetric visual cues (vs. symmetric) convey inequality and motivate individuals to restore social balance by engaging in prosocial behaviors. Study 1 is a field study (with online and offline components) conducted in collaboration with a charity to demonstrate that a charity appeal coupled with asymmetric logos resulted in significantly more people signing up to donate blood than when the same appeal utilized a symmetric logo. Studies 2a and 2b are lab experiments designed to implicate perceived inequality as the mechanism underlying our hypothesized effect using both vertical (Study 2a) and horizontal (Study 2b) asymmetric logos. Next we demonstrate how the visual and verbal components of the message strategy can best work together to optimize consumer response. Specifically, we show that verbal framing of the message appeal interacts with the visual cues such that loss-frame (gain-frame) messages are more effective when matched with asymmetrical (symmetrical) visual cues (Studies 3a and 3b). Further, we demonstrate how subjective socioeconomic status influences consumer response to visual asymmetry (Study 4). The theoretical and practical implications of the use of “visual calls to action” for profit and non-profit marketing are discussed along with directions for future research on the use of subtle visual cues to effectively connote social constructs like equity, inclusivity, democracy, and freedom.

## INTRODUCTION

*Inequality is the root of social evil.*

- Pope Francis, the 266th pope and head of the Roman Catholic Church (1936- )

*One lives not just for oneself but for one's community.*

-Ruth Bader Ginsburg, associate justice of the US Supreme Court (1933-2020)

The statistics on inequality in the US are simply astounding. About 22 people die each day while waiting for a transplant, every two seconds someone is in need of blood that they may not get, and about 21,000 people die every day of hunger or hunger-related causes. At the same time, the top 10 percent of Americans hold 76 percent of the nation's wealth while the richest 85 people in the world have more wealth than the poorest 3.5 billion (Payne 2017). The disparities in our society manifest in virtually every domain: health, housing, wealth and income, education, incarceration, social mobility, race and ethnicity. The surge of social movements from Black Lives Matter to #MeToo is evidence that consumers collectively want to be a force of social change and diminish the inequality that they witness in their daily lives (Buchanan, Bui and Patel 2020; Klein, 2020). Consequently, numerous charities, foundations, and non-profits have emerged to bridge the gap between the haves and the have-nots. Giving USA reports that in 2018, the nation's one million-plus charities received \$427.7 billion in donations (Barrett 2019).

Clearly, the success of any charitable organization hinges on its ability to engage the consumer and motivate them to support their cause. This has resulted in an emerging domain that investigates both aspects of the success of charitable organizations – the management and marketing of a charity brands as well as the factors that drive prosocial consumer behavior. Prosocial behavior refers to “behavior involving self-sacrifice for the good of others or of



society” (p. 107, Small and Cryder 2016). A great deal of prior work in marketing has identified ways in which the effectiveness of charitable advertisements may be enhanced via the facial expressions of the victims depicted (Small and Verocchi 2009), enhanced identifiability of victims (Small and Loewenstein 2003), and the use of emotional appeals (e.g., fear and empathy; Bagozzi and Moore 1993). Research also finds that prosocial behavior is motivated by consumers’ moral and political identity (Winterich, Mittal and Aquino 2013; Winterich, Zhang and Mittal 2012) and by the emotions they experience, such as elevation and outrage (Van de Vyver and Abrams 2015), empathy and justice (Lee, Winterich, and Ross 2014), and even awe (Piff, Dietze, Feinberg, Stancato, and Keltner 2015). Sometimes, consumers exhibit different motives for prosocial giving, including seeking to bolster self-image (Flynn 2003), deriving hedonic benefits from generous acts of giving (Dunn, Aknin, and Norton 2008), as well as seeking to demonstrate one’s goodness (Olivola and Shafir 2013). One significant gap in this large body of research is the role of the design and aesthetic elements of the charity brand (i.e., the look and feel of the charity brand) in shaping consumer’s prosocial response.

A key premise of the current research is that if a charity exists to resolve inequality, remove barriers and dispel disparities, then a logo that visually represents the nature of this work is likely to be more effective in motivating a prosocial consumer response. It is well-accepted that a brand’s logo is the face of a brand to its customers and other stakeholders, and consequently the brand logo design can have a significant impact on shaping consumers’ brand perception. Our focus in the current paper is on a specific aspect of the charity logo, the symbolic associations elicited by the symmetry versus the asymmetry of a logo design and when and how it shapes consumer prosocial response.

From a theoretical perspective, we build on a growing stream of research in which researchers examine how the symbolic associations elicited by visual stimuli like colors, typefaces and logos (Hagvtedt 2011; Henderson, Giese, and Cote 2004; Jiang et al. 2016; Labrecque, Patrick, and Milne 2013; Stamatogiannakis, Luffarelli, and Yang 2015) can drive consumers' product and brand perceptions and influence their behaviors. Our specific line of inquiry sheds light on how inequality as a social construct (similar work could be done for other constructs like equality, inclusivity and sustainability) might be visually represented by design elements in logos and other visual signage to motivate prosocial behavior. Drawing on symbolic interactionist theory (McCracken 1986; Shepard 1997) we propose a meaning-based approach to understand how visual communication cues can prompt desired consumer action. With some notable exceptions like Townsend's (2017) work on the importance of ornate aesthetics in donor solicitations or Wang, Mukhopadhyay and Patrick's (2017) research on how visual cuteness prompts recycling behavior, little research has examined how specific aesthetic features or design elements (e.g., logo design) of charitable organizations influence consumer prosociality.

From a managerial perspective, immense opportunity exists for design to convey meaning in subtle ways and nudge desired behavior. For example, product designers have found that a simple design change in the shape of toilet paper roll – from round to square – could slow down the dispensing motion to prevent the user from pulling too much and thus reduce resource consumption (Hara 2018). Since most of the research in consumer behavior is aligned with a “Hellenic tradition of valuing perfection, symmetry, grandeur, materials that withstand the test of time without aging” (Cooper 2013), when a designer or manager has to choose between an symmetric or asymmetric logo, they may choose symmetry to enhance the beauty of a logo

(Bajaj and Bond 2017) or asymmetry to enhance excitement for the brand (Luffarelli, Stamatogiannakis, and Yang 2019). However, for charities and non-profits, the choice of logo need not be based on the beauty or excitement it elicits, but instead on whether it can symbolically convey what the non-profit represents. While the role of brand logos in enhancing brand image (Henderson and Cote 1998), augmenting brand performance (Park et al. 2013), and boosting brand evaluations (Cian et al. 2014; Sundar and Noseworthy 2014) has been well established, limited research has examined how brand/organization logos can motivate consumers to engage in prosocial actions. Given the vast reach of visuals across online and offline media, marketers need to consider the strategic underpinnings of the logos they use and where necessary rely on them as a *visual calls to action*. The author Pauline Brown (2019) refers to the masterful use of aesthetics to achieve desired outcomes a form of intelligence she dubs Aesthetics Intelligence - the other AI. In the current research, we examine one specific design feature and how it serves as a visual call to action: the use of symmetrical (vs. asymmetrical) logo design to motivate prosocial consumer behavior.

## **THEORETICAL BACKGROUND**

### ***Salience of Symmetry in Visual Perception***

Visual symmetry refers to the degree to which a visual object can be split into two identical opposite halves which are reflected by a central axis. A *symmetrical* object/design is formed when a visual object can be split into two identical opposite halves which are reflected by a central axis. An *asymmetrical* object/design is formed when the two halves of a visual object are not identical and cannot be reflected by a median vertical/horizontal axis (adapted from Washburn and Crowe 2004). For the sake of clarity throughout this paper, we use the term

*'visual symmetry'* to refer to the overall degree of symmetrical/asymmetrical of a design object, *'symmetry'* or *'symmetrical'* to refer specifically to symmetrical objects, and *'asymmetry'* or *'asymmetrical'* to refer specifically to asymmetrical objects.

Symmetry is a salient perceptual feature that is ingrained in human development. For instance, the most easily perceived symmetry is across a vertical axis because human orientation to things in the world is gravitationally grounded in the upright bipedal form and stance (Washburn 1999). Research in visual perception has also supported this notion by demonstrating that bilateral vertical symmetry is perceived most quickly and found to be the least complex form of symmetry (Fox 1989; Rock and Leaman 1963). Given that symmetry search patterns occur early in human development and vertical symmetry is processed more fluently than any other symmetries, evolutionary theorists have proposed that the human ability to see symmetry can play an adaptive role in functional domains, such as mate selection, to signal higher genetic quality in potential mates (Thornhill and Gangestad 1993) that subsequently ensures the health and viability of offspring (Møller 1992; Thornhill 1992).

Like animals, humans also develop a strong preference for symmetrical visual cues. As physicist Hermann Weyl (1952, p. 3) argued in his classic book, “beauty is bound up with symmetry”. Experimental studies in visual perception have consistently found that symmetrical forms are easier to recognize, remember, and reproduce than asymmetrical forms (Attneave 1955; Deregowski 1978). In preference tasks, individuals judge symmetrical forms as more pleasing than asymmetrical forms (Garner 1970). Further, when asked to create “visual pleasing” design, most people choose to produce more symmetrical patterns (Szilagyi and Baird 1977). Recent visual processing research has also found that symmetry elicits more positive affect

(Pecchinenda, Bertamini, Makin, and Ruta 2014), and that preference for symmetry appeared to be implicit and automatic (Makin, Pecchinenda, and Bertamini 2012).

Although the vast body of evidence supports the claim that people generally prefer symmetrical stimuli over asymmetrical stimuli, the art world deems that ‘rigid symmetrical equivalences are boring and uninteresting’ (Washburn 1999). Indeed, artworks that are slightly asymmetrical in composition, like Vincent van Gogh's "The Starry Night" (1889), Mary Cassatt's "The Boating Party" (1893-94) and Hiroshige's "View of Mount Fuji from Harajuku" (1831) are aesthetically pleasing because of the tension created by the asymmetric composition.

Some consumer research has explored the influence of visual symmetry on consumer response. While visual symmetry is pleasing to the eye, asymmetrical designs evoke greater arousal and are well matched with a more exciting brand personality (Bajaj and Bond 2017; Luffarelli et al. 2019). In the following section, we review anthropological and social perspectives of visual symmetry that will provide the theoretical foundation for our central thesis that visual asymmetry motivates prosocial behavior.

### ***Symbolic Associations of Symmetry versus Asymmetry***

The majority of previous research has focused on the visual aspect of symmetry, which is the degree to which a visual object can be split into two identical opposite halves which are reflected by a central axis (adapted from Washburn and Crowe 2004). In standard modern English dictionaries, the term ‘symmetry’ is also used to describe the “quality of having balanced proportions” or “beauty of form of having balanced proportions” (Petroski 2006). However, the concept of symmetry can extend beyond visual perception and into the context of social structure (Baofu 2009). On one side of the social structure, there are social interactions that are symmetric

and emphasize equality. For examples, symmetrical interactions involve equal-power relationships such as reciprocity (mutual exchange), empathy (mutual interaction), or respect (equal treatment). On the other hand, there are social interactions that are asymmetrical and emphasize inequality. For examples, asymmetrical interactions involve unequal or one-sided power relationships such as hierarchies, first-person viewpoint, hatred, or envy. Here, the concepts of symmetry vs. asymmetry are used to describe a normative sense of equality and inequality respectively. Consequently, research in social psychology has often used the term ‘asymmetry’ to describe the imbalance of power in social interactions due to gender or academic competence (Duveen and Psaltis 2013; Psaltis 2011) or to express biased attributions in people’s judgments of discriminatory behavior by people with greater (vs. lesser) social power (Rodin et al. 1990). Drawing on this body of research, we posit that people form an association between social structure and visual symmetry because they experience inequality in asymmetrical social interactions (e.g., racial discrimination), whereas people are less likely to experience inequality in symmetrical social interactions (e.g., equal treatment; Flagg and Goldwasser 1998; Simon et al. 2013).

### ***Can Asymmetry Visually Represent Inequality?***

Can symmetrical/asymmetrical visual cues be used communicate the social concepts of equality/inequality, respectively? Although there is limited empirical evidence to answer this question, anthropologists have documented the presence of symmetry in a wide variety of cultural expressions (e.g. art) and proposed that these visual cues of symmetry/asymmetry appeared to evolve according to the social structure of a specific culture. For example, Hanson’s (1985) investigation on the Maori culture suggested that the predominance of bilateral symmetry

in Maori painted rafters, textiles, carved wooden boxes, and facial tattoos were symbolic of the Maori's pervasive duality and balanced social exchanges (i.e. symmetrical interactions). On the other hand, deviations from symmetry (Donnay and Donnay 1985) were metaphors of 'hunger for revenge' that also permeates the Maori society and results in numerous unbalanced social relationships (i.e. asymmetrical interactions; examples shown in Appendix A). In line with these findings, Washburn (1999) posit that visual symmetry in non-representational design patterns can metaphorically encode a culture's fundamental social relationships. For instance, Washburn's (1999) analysis of prehistoric Puebloan geometric art indicates that the presence of symmetry on the ceramic design was a metaphor for the equal contributions of each individual in the society. In contrast, the lack of symmetry in later design patterns was reflective of an imbalanced social structure associated with new socio-religious influences. These anthropological perspectives suggest that visual symmetry has been long used to reflect the inherent equality/inequality aspects of society.

Using a symbolic interactionist perspective, we can use this anthropological evidence to develop a theoretical lens that associates social structures with visual symmetry which gives rise to the association of symmetry/asymmetry with equality/inequality. According to the symbolic interactionist perspective (Solomon 1983), many products and brands possess symbolic meanings which can influence consumer evaluation or adoption of products and brands. These symbolic meanings refer to properties that consumers discern in products and brands, yet they are not visually part of product appearance (van Rompay, Pruyn, and Tieke 2009). Further, consumers often develop symbolic meanings of the visual elements of products and brands through their daily interactions or experiences with the visual surroundings. For example, prior

research has established that consumers often associate curved visual stimuli (e.g., logos, seating arrangements) with harmony and belonging, while angular visual stimuli is associated with aggression and individuality (Zhang, Feick, and Price 2006; Zhu and Argo 2013). These findings are grounded in visual perception research which suggested that in people's daily environments, angular visual objects represent a clash between a stimulus and its surroundings and thus signal aggression, whereas curved or rounded visual objects do not present such a clash between stimulus and surroundings (Bar and Neta 2005; Guthrie and Wiener 1966).

Research has also demonstrated that visual stimuli (colors, typefaces, and logo design) can impact consumer judgments through metaphorical or symbolic associations to inform consumer behavior. For example, Maimaran and Wheeler (2008) found that the presence of one unique shape in a visual geometric sequence design (e.g., ○○○○□○○) activates the symbolic construct of uniqueness and thus increases uniqueness-seeking choices. Similarly, Sundar and Noseworthy (2014) demonstrated that powerful brands' logos are more effective when placed higher on the brands' packaging because of the strong conceptual link between height and power. Along the same lines, Fajardo, Zhang, and Tsiros (2016) found that logo frames trigger the symbolic associations of either protection or confinement depending on the level of risk associated with a purchase. Specific logo elements can also convey meaning, for instance, logo incompleteness can convey innovativeness (Hagtvedt 2011), logo roundedness can convey harmony (Zhang, Feick, and Price 2006), circular versus angular logo shapes trigger softness and hardness associations, respectively (Jiang et al. 2016), and dynamic logo imagery can convey the notion of movement (Cian, Krishna, and Elder 2014). Contributing to this line of research, we theorize that visual asymmetry can activate the symbolic associations of inequality to motivate



prosocial behavior. Further, because prior research has often associated visual symmetry with the balance of social structure (Rodin et al. 1990), we conceptualize inequality as the general sense that there is the existence of unequal opportunities and resources for different social positions or status within a society (adapted from Schaefer 2007; Payne 2017).

### ***Perceptions of Inequality Motivate Resolution via Prosocial Behaviors***

People, in general, are motivated to resolve inconsistencies, ambiguity, or imbalance in their surrounding environments (Patrick and Hagtvedt 2011; Pavlova, Sokolov, and Sokolov 2005; Peracchio and Meyers-Levy 1994). For example, Peracchio and Meyers-Levy (1994) found that when seeing visual ambiguity that occurred due to ambiguously cropped objects, consumers may seek closure by mentally completing the image of the cropped object. Similarly, Patrick and Hagtvedt (2011) demonstrated that consumers are motivated to resolve aesthetic incongruity that arises when there is a mismatch between a newly acquired product and the existing consumption environment, and such incongruity resolution may be in the form of either returning the mismatched product or purchasing additional matching products. While prior research has chiefly focused on visual incongruity, we posit people are also motivated to resolve imbalance that occurs within the social environments.

Prior research has shown that when people perceive social inequality, they are motivated to engage in prosocial behavior in order to reduce the perceived inequality (Winterich and Zhang 2014). Leliveld, Vandijk, and Vanbeest (2011) demonstrated when people witnessed violations of justices (e.g., inequality in resource allocation), high empathic people are motivated to compensate the victims of inequality with their own resources. The converse is also true, such that when individuals have high perceptions of societal fairness (i.e., low perceived social

inequality), they are *less* likely to support policy programs that are designed to reduce inequality (Bjornskov, Dreher, and Fischer 2013). Building on the notion that people are motivated to resolve incongruity (e.g., perceived social inequality) in their environments, we posit that when faced with social inequality connotations elicited by visual asymmetry, consumers will be more likely to engage in prosocial behaviors to “resolve” the perceived inequality. In other words, it is reasonable to expect that because asymmetrical (vs. symmetrical) design leads to greater perceptions of inequality, asymmetrical (vs. symmetrical) design will generate greater prosocial intentions and behaviors. Based on the preceding arguments, we hypothesize the following:

H1: Asymmetrical (vs. symmetrical) design lead to more prosocial intentions and behaviors.

H2a: Asymmetrical design connotes a higher perception of social inequality than symmetrical visual cues.

H2b: Perceptions of social inequality mediate the effect of asymmetrical (vs. symmetrical) design on prosocial behaviors.

In what follows, we present six experiments that test our hypotheses. Study 1 is a Facebook field study that test the effect of visual symmetry on consumer response (Facebook clicks and blood drive signups) to a non-profit ad campaign (H1). Studies 2a and 2b are designed to (1) implicate visual engagement as the underlying mechanism (H2a and H2b). In studies 3a and 3b, we illustrate the moderating role of message appeal (loss-frame vs. gain-frame) in the effect of visual symmetry on prosocial behaviors. Finally, we conclude by examining the moderating effects of socioeconomic status (Study 4).

## STUDY 1: CHARITY FIELD STUDY

This study was designed to demonstrate the effect of asymmetrical (vs. symmetrical) design on prosocial behaviors in a real-world context. The study was conducted in collaboration with a non-profit organization, who was hosting a blood drive and wanted to conduct a marketing campaign to recruit more people to sign up for the blood drive. The campaign was conducted in both offline (signup booth) and online (Facebook ads) experimental settings. Since the blood drive was held on a Saturday and Sunday, the display booth experiment was run on Thursday and Friday and the online Facebook ad experiment was run from Tuesday to Friday.

### ***Method and Procedure***

*Signup booth (offline field experiment).* Participants in this experiment were office staff of two different office buildings in a metropolitan area. The display booth was set up in the lobbies of these two buildings over the course of four days (Tuesday – Friday). A large table was set up at the entrance of the building from 11am – 2pm. A large, highly visible banner (30 inch in width and 96 inch in height) was displayed next to the table. Key to the experiment, the design of this banner differed between the two lobbies. One of the banners featured an asymmetrical design while the other featured a symmetrical design (see Figure 1). Pretest revealed that these designs varied in the symmetry dimension, but were no different on all other aesthetic dimensions (see Appendix B). Two experimenters blind to the hypotheses were recruited for this setting. People who approached the table were greeted by an experimenter (one per lobby) and were asked if they would like to sign up for the blood drive over the weekend. The key dependent variable of this study was the number of signups across the four days.

[Insert Figure 1 about here]

*Facebook ads (online field experiment).* Two versions of an identical Facebook ad (see Figure 2) were created and featured two different visual design (asymmetrical vs. symmetrical). The ad ran over the course of 4 days (Tuesday – Friday) using Facebook’s split test function, which allowed us to test the two versions of the ads (see Appendix D) with random non-overlapping audience groups. When a Facebook user clicked on the ad, they were redirected to an online signup sheet where they could sign up to give blood at the blood drive. We obtained two key measures of ad effectiveness in this study: (1) number of ad clicks generated by each version of the ad versions over the 8 days, and (2) the number of people who signed up for the blood drive. Notably, the ads were set for desktop views only and the relevance score for both ads was identical (score = 9). Descriptive statistics of both Facebook ads are shown in Appendix B.

[Insert Figure 2 about here]

### ***Offline Data Results***

*Number of booth signups.* Across the four days of the experiment, the experimenters recorded (1) the number of people who approached the signup table and (2) the number of people who signed up for the blood drive after approach the table. In the asymmetrical condition, a total of 66 people approached the signup table and a total of 41 people signed up for the blood drive. In the symmetrical condition, a total of 61 people approached the signup table and a total of 35 people signed up for the blood drive. Given that the number of signups for each day was a count variable, a Poisson regression analysis (following protocol from Wan, Chen, and Jin 2017) was conducted to predict the number of signups based on the banner version (symmetrical vs. asymmetrical). Results of the analysis revealed a person who saw the asymmetrical banner was

4.40 times more likely to sign up for the blood donation drive than a person who saw the symmetrical banner ( $\text{Exp}(\beta) = 4.40$ ,  $\beta = 1.50$ ,  $\chi^2(1) = 3.79$ ,  $p = .052$ ). Results also showed that the display of an asymmetrical banner led to significantly greater number of signups per day compared to the display of a symmetrical banner ( $M_{\text{asymmetrical}} = 10.25$  vs.  $M_{\text{symmetrical}} = 8.75$ ,  $\chi^2 = 3.79$ ,  $p = .002$ ).

### ***Online Data Results***

*Number of ad clicks.* A similar Poisson regression analysis was conducted to predict the number of Facebook ad clicks over the course of the ad campaign based on the ad version. Results of the analysis revealed that a consumer who viewed the asymmetrical ad was 1.09 times more likely to click on the ad than a consumer who viewed the symmetrical ad ( $\text{Exp}(\beta) = 1.09$ ,  $\beta = .089$ ,  $\chi^2(1) = 9.15$ ,  $p = .002$ ). Results also showed that the asymmetrical ad generated more clicks than the symmetrical ad ( $M_{\text{asymmetrical}} = 610.75$  vs.  $M_{\text{symmetrical}} = 559.00$ ,  $\chi^2 = 9.15$ ,  $p = .002$ ).

*Number of online signups.* A similar Poisson regression analysis was conducted to analyze the number of online signups over the course of the ad campaign stemming from each ad version (asymmetrical vs. symmetrical). Results revealed that a consumer who clicked on and viewed the asymmetrical ad was 1.49 times more likely to sign up for the blood drive than a consumer who viewed the symmetrical ad ( $\text{Exp}(\beta) = 1.49$ ,  $\beta = .40$ ,  $\chi^2(1) = 5.45$ ,  $p = .02$ ). Results also showed that the asymmetrical ad generated a greater number of people signing up for the blood drive than the symmetrical ad ( $M_{\text{asymmetrical}} = 21.25$  vs.  $M_{\text{symmetrical}} = 14.25$ ,  $\chi^2 = 5.45$ ,  $p = .05$ ).

The results of Study 1 demonstrated the effect of visual asymmetry on consumer response to a real-world ad campaign. In the next two studies, we seek to (1) replicate the effects

observed in Study 1 in a controlled lab environment using both horizontal (Study 2a) and vertical (Study 2b) visual symmetry, and (2) implicate perceptions of inequality as the underlying mechanism.

## **STUDY 2A**

We seek to replicate the effects observed in Study 1 using horizontal visual symmetry (i.e., manipulating asymmetrical design via the horizontal axis) in a lab setting. The study was conducted in Houston, a major metropolitan city, four weeks after Hurricane Harvey hit the city in August 2017. The hurricane brought with it torrential rains and severe flooding, which caused many of the city's residents homeless thus providing a realistic and relatable context for the present study.

### ***Method and Procedure***

*Participants and Design.* Two-hundred-and-twenty-two undergraduate students (53.2% female,  $M_{age} = 21.45$ ) participated in this experiment in exchange for partial course credit. They were randomly assigned to one of two conditions (symmetrical vs. asymmetrical).

[Insert Figure 3 about here]

*Procedure.* Participants were presented with information about a Hurricane Harvey Relief fundraising collaboration between the University and a non-profit organization – All Hands Volunteers (AHV). Participants were shown an online flyer about AHV and the flyer would feature one of the two logo designs for the Hurricane Harvey Relief Fund (symmetrical vs. asymmetrical; see Figure 3). We then assessed participants' prosocial intentions. First, participants were asked to consider if they were to win a raffle prize of \$10 upon completion of this study, how much they would consider donating to the Hurricane Harvey Relief Fund (\$0-

\$10). Second, participants were told that there could be future volunteering opportunities to raise money and support for the Fund and were asked to indicate interest in volunteering through three 7-point items (“not at all interested/very interested”; “not at all willing/very willing”; “not at all inclined/very inclined”;  $\alpha = .95$ ). Next, we assessed participants’ perception of inequality by asking them to evaluate how they currently feel about the state of the world using four 7-point items (“unfair-fair,” “unjust-just,” “unreasonable/reasonable,” “unacceptable/acceptable”;  $\alpha = .94$ ; adapted from Robyn and Swim 2007). Participants then evaluated their attitude towards the Hurricane Harvey Relief Fund with five 7-point items (“unfavorable-favorable,” “negative-positive,” “bad-good,” “like-dislike,” “unpleasant-pleasant”;  $\alpha = .95$ ), and how familiar they were with the Hurricane Harvey Relief Fund. There were no significant differences between the two logo designs on participant’s familiarity and attitudes (all  $ps > .1$ ). We also assessed participants’ affective response (see Appendix F for measure items) and found no significant differences in the affective responses between the two logos (all  $ps > .1$ ). We also asked participants to evaluate the logo design on its aesthetic appeal, visual complexity, and visual stability and found no significant differences between the two logos in these visual dimensions (see Appendix B for items and results). In the remainder of the studies, the stimuli did not differ in these visual dimensions beyond visual symmetry; therefore, for brevity, we will report the results of these measures in Appendix B. Finally, participants completed a manipulation check of visual symmetry by evaluating on a 7-point scale how symmetrical/asymmetrical they perceived the logo design (1 = “very asymmetrical” and 7 = “very symmetrical”).

## ***Results and Discussion***

*Manipulation check: visual symmetry.* The two logos differ in terms of perceived visual symmetry ( $M_{\text{symmetrical}} = 6.12$ ,  $SD = 1.42$ ;  $M_{\text{asymmetrical}} = 3.34$ ,  $SD = 1.84$ ;  $F(1,218) = 153.75$ ,  $p < .001$ ,  $\eta^2 = .414$ ), with the asymmetrical logo perceived as significantly less symmetrical.

*Perception of inequality.* There was a significant effect of visual symmetry on perceptions of inequality ( $F(1,220) = 7.74$ ,  $p = .002$ ,  $\eta^2 = .034$ ). Participants who saw the asymmetric logo perceived the world as significantly less fair/just ( $M_{\text{asymmetrical}} = 3.80$ ,  $SD = 1.49$ ) compared to those who saw the symmetric logo ( $M_{\text{symmetrical}} = 4.35$ ,  $SD = 1.45$ ).

*Monetary donation intentions.* There was a significant effect of visual symmetry on monetary donation intention ( $F(1,220) = 7.83$ ,  $p = .006$ ,  $\eta^2 = .034$ ). Participants in the asymmetrical condition indicated greater monetary donation amount ( $M_{\text{asymmetrical}} = \$7.37$ ,  $SD = 2.08$ ) compared to those in the symmetrical condition ( $M_{\text{symmetrical}} = \$6.54$ ,  $SD = 2.32$ ).

*Volunteering intentions.* There was also a significant effect of visual symmetry on volunteering intentions ( $F(1, 220) = 10.05$ ,  $p = .002$ ,  $\eta^2 = .044$ ). Participants in the asymmetrical condition indicated greater volunteering intention ( $M_{\text{asymmetrical}} = 5.30$ ,  $SD = 1.57$ ) compared to those in the symmetrical condition ( $M_{\text{symmetrical}} = 4.63$ ,  $SD = 1.52$ ).

*Mediation analyses.* We tested H2 in a mediation analysis using Hayes (2018) PROCESS Model 4 bootstrapped with 5,000 resamples. With monetary donation intention as the dependent variable, visual symmetry as the independent variable, and perception of inequality as the mediator, the results revealed that the indirect path of the effects of visual symmetry on monetary donation intention through perception of inequality was significant, with the 95% confidence interval excluding zero ( $\beta = -.14$ ,  $SE = .08$ , 95%  $CI = [-.31, -.02]$ ). A similar analysis with



volunteering intention as the dependent variable also revealed the same significant indirect path through perceptions of inequality ( $\beta = -.11$ ,  $SE = .05$ , 95%  $CI = [-.23, -.02]$ ).

Study 2a supports our central hypothesis (H1), showing the impact of visual symmetry on prosocial intentions: asymmetrical design generates greater donation and volunteering intentions compared to symmetrical design. We also demonstrate the process behind this effect (H2), such that perception of inequality mediates the effect of visual symmetry on prosocial intentions.

## **STUDY 2B**

Study 2b is designed to replicate (1) the effects of visual symmetry in a similar blood donation context used in Study 1 and (2) the underlying mechanism of perceived inequality observed in Study 2a using vertical visual symmetry (i.e., manipulating asymmetrical design via the vertical axis).

### ***Method and Procedure***

*Participants and Design.* Two hundred and five undergraduate students (55.1% female,  $M_{age} = 21.84$ ) participated in this experiment in exchange for partial course credit. They were randomly assigned to one of the two conditions (symmetrical vs. asymmetrical).

[Insert Figure 4 about here]

*Procedure.* Participants were given a cover story that this study was intended to gauge students' awareness about a non-profit blood donation organization, Blood Centers of America (BCA), as the University was potentially going to collaborate with this organization in the future. They were then shown an online flyer that provides some information about BCA and the flyer would feature one of the two logo designs (symmetrical vs. asymmetrical; see Figure 4). We then assessed participants' prosocial intentions in two ways. First, participants were told that the BCA

was considering hosting a blood drive on campus in the near future and they were asked to indicate if they would consider to donate blood at the BCA blood drive (1 = “very unlikely” and 7 = “very likely”). Second, participants were then asked if they were given \$10 as a compensation for participating in this study, how much they would consider donating to the BCA (\$0-\$10). Next, we assessed participants’ perceptions of inequality, attitude towards the BCA organization, and familiarity with the BCA organization using the same scales as in Study 2a. There were no significant differences between the two logos in terms of attitude towards the organization ( $M_{\text{symmetrical}} = 5.95$ ,  $M_{\text{asymmetrical}} = 6.04$ ,  $p = .53$ ) and familiarity ( $M_{\text{symmetrical}} = 1.87$ ,  $M_{\text{asymmetrical}} = 1.77$ ,  $p = .59$ ). We also assessed participants’ affective response (seven-point scales; for details, see Appendix C) and found no significant differences in affective responses between the two logo conditions (all  $ps > .1$ ). Finally, participants completed a manipulation check identical to Study 2a.

## ***Results and Discussion***

*Manipulation check: visual symmetry.* The two logos differ in terms of perceived visual symmetry ( $M_{\text{symmetrical}} = 6.13$ ,  $SD = 1.50$ ;  $M_{\text{asymmetrical}} = 2.96$ ,  $SD = 1.91$ ;  $F(1,203) = 173.84$ ,  $p < .001$ ,  $\eta^2 = .461$ ), with the asymmetrical logo perceived as significantly less symmetrical.

*Perceptions of inequality.* There was a significant effect of visual symmetry on perceptions of inequality ( $F(1, 203) = 36.05$ ,  $p < .002$ ,  $\eta^2 = .151$ ). Participants exposed to the asymmetric logo perceived the world as significantly less fair/just ( $M_{\text{asymmetrical}} = 3.92$ ,  $SD = 1.72$ ) compared to those who saw the symmetric logo ( $M_{\text{symmetrical}} = 5.23$ ,  $SD = 1.39$ ).

*Blood donation intentions.* There was a significant effect of visual symmetry on blood donation intention ( $F(1, 203) = 14.48$ ,  $p < .001$ ,  $\eta^2 = .067$ ). Participants in the asymmetrical

condition indicated greater intention to donate blood ( $M_{\text{asymmetrical}} = 4.55$ ,  $SD = 1.88$ ) compared to those in the symmetrical condition ( $M_{\text{symmetrical}} = 3.54$ ,  $SD = 1.90$ ).

*Monetary donation intentions.* There was also a significant effect of visual symmetry on monetary donation intention ( $F(1, 203) = 10.89$ ,  $p = .001$ ,  $\eta^2 = .051$ ). Participants in the asymmetrical condition indicated greater monetary donation amount ( $M_{\text{asymmetrical}} = \$6.09$ ,  $SD = 2.33$ ) compared to those in the symmetrical condition ( $M_{\text{symmetrical}} = \$5.01$ ,  $SD = 2.35$ ).

*Mediation analyses.* We conducted a similar mediation analysis as Study 2a using Hayes' (2018) PROCESS Model 4 bootstrapped with 5,000 resamples. We used blood donation intention as the dependent variable, visual symmetry as the independent variable, and perception of inequality as the mediator. Results revealed that the indirect path of the effects of visual symmetry on blood donation intention through perception of inequality was significant, with the 95% confidence interval excluding zero ( $\beta = -.14$ ,  $SE = .07$ , 95%  $CI = [-.28, -.03]$ ). A similar analysis with monetary donation intention as the dependent variable revealed the same significant indirect path through perceptions of inequality ( $\beta = -.20$ ,  $SE = .10$ , 95%  $CI = [-.41, -.04]$ ).

The results of studies 2a and 2b demonstrate support for H1-H2b that asymmetrical logos motivate consumer prosocial intentions by connoting social inequality. In the following studies, we examine the interplay between the visual element (visual symmetry of the logo design) and the verbal element (framing of the message appeal) and demonstrate how they work in conjunction to motivate prosocial behaviors.

## **INTERPLAY BETWEEN MESSAGE APPEAL AND VISUAL SYMMETRY**

One commonly used framework to predict consumer behavior outcomes involves comparing messages that depict gain-framed messages (i.e. highlight the positive consequences of engaging in a particular behavior) versus loss-framed messages (highlight the negative consequences if the behavior is not undertaken; Shiv, Edell, and Payne 1997). Considerable research has examined loss- vs. gain- framed messages in health prevention behaviors such as mammography and colon cancer screening (Broemer 2002), as well as recycling actions (White, MacDonnell and Dahl 2011). Fewer studies have examined loss- vs. gain-framed messages in the context of prosocial behavior. Gain- and loss-framed appeals for prosocial behavior emphasize the consequences for others rather than the message recipients, e.g. “3 people die every day because there are not enough organ donors” (loss-frame) versus “You could save or transform up to 9 lives as an organ donor” (gain-frame; Behavioral Insights Team, 2013)

Because asymmetrical logos are associated with a state of inequality while symmetrical logos are associated with a state of equality, we propose that the effect of visual symmetry on donation intentions will be moderated by loss- vs. gain-framed appeals. Previous work (see Patrick, Atefi, and Hagtvedt 2017; Semin & Palma, 2014) has similarly drawn on grounded associations between visual elements and psychological constructs.

When people encounter information consistent with the mental representations they hold (e.g. perceptions of social equality when they read a loss-framed message) they are likely to experience greater ease of comprehension and enhanced fluency that results in the message “feeling right” (Reber, Schwarz, and Winkielman 2004). This sensation of feeling right, prior research has argued, can enhance evaluations “because people misattribute their feeling-right

experience to a higher quality of the focal event, be it a persuasive message or a consumption experience” (Kim, Rao, and Lee 2009, p. 879).

In our context of prosocial behavior, we suggest that the perceptions of inequality evoked by the asymmetric logo match the loss frame of the message which similarly highlights a state of inequality/imbalance that needs to be restored. On the other hand, a symmetric message that portrays equality and balance in the world fits better with a gain frame. In other words, consistent with prior research that shows that conceptually fluent sets of stimuli can increase perceived ease of engaging in conservation acts, such as recycling (White, MacDonnell, and Dahl 2011), a match between visual symmetry and verbal message frame can also promote prosocial actions. In contrast, a mismatch between the visual and verbal information can make the message feel disfluent, prompting greater scrutiny (Petty and Wegener 1998) and reduce the likelihood of prosocial behavior. Our proposed conceptual framework is visually depicted in Figure 5.

Similar matching and mismatching effects have been demonstrated in prior research. For instance, Feinberg and Willer (2011) has shown that when people held strong beliefs about a just world (i.e., higher perceptions of equality), they will respond more positively towards positively-framed (i.e. gain-framed) global warming messages, and more negatively towards negatively-framed (i.e. loss-framed) global warming messages. Kim et al. (2009) found that framing a message as an abstract “why” (concrete “how”) message was more effective when a voter’s decision was temporally distant (imminent).

Based on the preceding arguments, we hypothesize:

H3a: Visual symmetry will interact with message frame (loss vs. gain) of donation appeal to influence prosocial intentions. When a loss-frame appeal is used, asymmetrical (vs.

symmetrical) design generates greater prosocial intentions. When a gain-frame appeal is used, symmetrical (vs. asymmetrical) design generates greater prosocial intentions.

H3b: Perceptions of inequality mediate the interaction between visual symmetry and message framing.

[Insert Figure 5 about here]

### **STUDY 3A: MODERATING ROLE OF MESSAGE APPEAL**

We propose that the effect of visual design symmetry on prosocial intentions will be moderated by loss- vs. gain-framed ad message appeals (H3a) and perceptions of inequality mediate the effect (H3b). We test these hypotheses in the study that follows and expect that the asymmetrical visual design will be more effective in eliciting a prosocial response when it is paired with a loss-framed appeal, whereas the symmetrical visual design will be more effective when paired with a gain-framed appeal.

#### ***Method and Procedure***

*Participants and Design.* One-hundred-and-thirty-two undergraduate students (53.8% female,  $M_{age} = 21.74$ ) participated in this experiment in exchange for partial course credit. The experiment employed a 2 (visual symmetry: symmetrical vs. asymmetrical)  $\times$  2 (message appeal: gain-frame vs. loss-frame) between-subjects design.

[Insert Figure 6 about here]

*Procedure.* Study 3a employed a similar context and procedure used in Study 2b with some differences in the stimuli. After being instructed to read the information regarding BCA, they were each randomly assigned to one of the four experimental conditions and viewed the online flyer that featured one of two logo designs (symmetrical vs. asymmetrical) alongside one

of the two message appeals (gain-frame vs. loss-frame; see Figure 6). After viewing the flyer, participants completed the same measures of prosocial intentions (blood donation intention and monetary donation intention) and perception of inequality ( $\alpha = .97$ ) as in prior studies. Similar to prior studies, we found no significant differences between the two logos on attitude and familiarity with the organization (all  $ps > .2$ ). We also assessed participants' affective responses using the same measures as in prior studies and found no significant effects of visual symmetry or message appeal on affective responses (all  $ps > .2$ ). Finally, participants completed the same visual symmetry manipulation check as in prior studies and a message appeal manipulation check (see Appendix E for measure items).

### ***Results and Discussion***

*Manipulation check: visual symmetry.* The two logos differ in terms of perceived visual symmetry ( $M_{\text{symmetrical}} = 5.59$ ,  $SD = 1.48$ ;  $M_{\text{asymmetrical}} = 3.84$ ,  $SD = 2.00$ ;  $F(1,138) = 58.87$ ,  $p < .001$ ,  $\eta^2 = .198$ ), with the asymmetrical logo perceived as significantly less symmetrical.

*Manipulation check: message appeal.* A  $2$  (visual symmetry)  $\times$   $2$  (message appeal) analysis of variance (ANOVA) on the gain-frame manipulation check item revealed only a significant main effect for message appeal framing ( $F(1,128) = 32.26$ ,  $p < .001$ ,  $\eta^2 = .201$ ). Under the gain-frame (vs. loss-frame) condition, participants perceived the BCA ad as being focused more on the positive impact of donating blood ( $M_{\text{gain}} = 5.37$ ,  $SD = 1.91$ ;  $M_{\text{loss}} = 2.51$ ,  $SD = 1.98$ ). A similar analysis on the loss-frame manipulation check item also revealed a significant main effect for donation appeal framing ( $F(1,128) = 26.96$ ,  $p < .001$ ,  $\eta^2 = .174$ ). Under the loss-frame (vs. gain-frame) condition, participants perceived the BCA ad as being focused more on the negative impact of not donating blood ( $M_{\text{gain}} = 2.98$ ,  $SD = 2.07$ ;  $M_{\text{loss}} = 4.88$ ,  $SD = 2.10$ ).

*Perception of inequality.* A  $2$  (visual symmetry)  $\times$   $2$  (donation appeal) ANOVA on the perception of inequality index revealed only a significant main effect for visual symmetry ( $F(1, 128) = 155.44, p < .001, \eta^2 = .548$ ). Participants in the asymmetrical condition perceived the world as significantly less fair/just ( $M_{\text{asymmetrical}} = 2.92, SD = 1.05$ ) compared to those in the symmetrical condition ( $M_{\text{symmetrical}} = 5.55, SD = 1.35$ ).

*Blood donation intentions.* We conducted a  $2 \times 2$  ANOVA with visual symmetry and donation appeal as the independent variables and blood donation intention as the dependent variable. Results revealed a significant interaction between visual symmetry and donation appeal ( $F(1, 128) = 13.47, p < .001, \eta^2 = .095$ ). Planned contrasts revealed that within the loss-frame appeal condition, the asymmetrical logo design led to significantly higher blood donation intention than did symmetrical logo design ( $M_{\text{symmetrical}} = 4.00, SD = 1.89; M_{\text{asymmetrical}} = 5.31, SD = 1.20; F(1, 128) = 10.31, p = .002, \eta^2 = .075$ ). Within the gain-frame appeal condition, the symmetrical logo design led to significantly higher blood donation intention than did asymmetrical logo design ( $M_{\text{symmetrical}} = 5.19, SD = 1.62; M_{\text{asymmetrical}} = 4.36, SD = 1.85; F(1, 128) = 3.95, p = .049, \eta^2 = .030$ ). Graphical presentation of the results is shown in Figure 7.

[Insert Figure 7 about here]

*Monetary donation intentions.* A similar analysis with monetary donation intention as the dependent variable also revealed a significant interaction between visual symmetry and donation appeal ( $F(1, 128) = 36.04, p < .001, \eta^2 = .095$ ). Planned contrasts revealed that within the loss-frame appeal condition, the asymmetrical logo design led to greater higher monetary donation intent than did symmetrical logo design ( $M_{\text{symmetrical}} = \$6.10, SD = 2.62; M_{\text{asymmetrical}} = \$7.81, SD = 1.64; F(1, 128) = 9.05, p = .003, \eta^2 = .066$ ). Within the gain-frame appeal condition, the



symmetrical logo design led to significantly greater monetary donation intent than did asymmetrical logo design ( $M_{\text{symmetrical}} = \$7.61$ ,  $SD = 2.25$ ;  $M_{\text{asymmetrical}} = \$6.35$ ,  $SD = 2.62$ ;  $F(1,128) = 4.77$ ,  $p = .031$ ,  $\eta^2 = .036$ ). Graphical presentation of the results is shown in Figure 8.

[Insert Figure 8 about here]

*Mediation analyses.* Finally, we formally test our hypothesized moderated mediation model that aimed to corroborate H3a and H3b: visual symmetry  $\times$  message appeal interaction is mediated by perceptions of inequality. We tested this moderated mediation model using PROCESS Model 15 (Hayes 2018) bootstrapped with 5,000 resamples. We first tested the model with visual symmetry as the independent variable, blood donation intentions as the dependent variable, perception of inequality as the mediator, and message appeal as the moderator. As hypothesized, the indirect effect of visual symmetry on blood donation intention moderated by message appeal was significant. Perception of inequality explained why loss-appeal enhances blood donation intention when asymmetrical logo is used ( $\beta = 1.13$ ,  $SE = .53$ , 95% CI = [.13, 1.64]) and why gain-appeal enhances blood donation intention when symmetrical logo is used ( $\beta = -2.20$ ,  $SE = .55$ , 95% CI = [-2.46, -.87]). A similar analysis with monetary donation intentions as the dependent variable also revealed the same pattern of results ( $\beta = .83$ ,  $SE = .38$ , 95% CI = [.14, 2.20] for loss-appeal and  $\beta = -1.63$ ,  $SE = .41$ , 95% CI = [-3.35, -1.21] for gain appeal).

### **STUDY 3B: VIRTUAL VOLUNTEERING DURING COVID-19**

The purpose of Study 3b was (1) to replicate the moderating effects of message appeal observed in Study 3a in a different prosocial context – volunteered tutoring and (2) to offer an additional behavioral measure of prosocial intentions – virtual volunteering.

#### ***Method and Procedure***

*Participants and Design.* Two hundred and forty Amazon Mechanical Turk participants (41.1% female,  $M_{\text{age}} = 35.56$ ) participated in this experiment in exchange for monetary payments. The experiment employed a 2 (visual symmetry: symmetrical vs. asymmetrical)  $\times$  2 (donation appeal: gain-frame vs. loss-frame) between-subjects design.

*Procedure.* Study 3b was conducted during the COVID-19 pandemic. Participants were presented with information about a non-profit organization – the Starlight Foundation – and their tutoring program for children in need. Participants were each randomly assigned to one of the four experimental conditions and viewed the online Starlight flyer that featured one of two logo designs (symmetrical vs. asymmetrical) alongside one of the two donation appeals (gain-frame vs. loss-frame; see Figure 9).

[Insert Figure 9 about here]

We then assessed participants' prosocial intentions through two measures. First, participants were told that give the current impact of COVID-19 on education which has caused many schools to convert to remote instruction, Starlight may offer virtual tutoring for young students in need. Participants were then asked to indicate interest in volunteering using three 7-point items ("not at all interested/very interested"; "not at all willing/very willing"; "not at all inclined/very inclined";  $\alpha = .95$ ). Second, participants were given a list of clickable links to various webpages for virtual volunteering databases/charitable organizations that offered virtual volunteering opportunities and were asked to click on one or more of the links if they were interested in virtual volunteering and learning more about these volunteering opportunities. Whether or not a participant clicked on at least one of these links (0 = no, 1 = yes) served as a behavioral measure of volunteering intentions

We then assessed participants' perceptions of inequality ( $\alpha = .97$ ), attitude ( $\alpha = .95$ ) and familiarity with the Starlight foundation. Similar to previous studies, there were no significant differences between the two logo designs on participant's familiarity and attitudes (all  $ps > .1$ ). We also assessed participants' affective response using the same measures as in prior studies and found no significant differences in affective responses between the two logos (all  $ps > .1$ ). Finally, participants completed the same visual symmetry manipulation check and message appeal manipulation check similar to Study 3a (see Appendix E for details).

### ***Results and Discussion***

*Manipulation check: visual symmetry.* The two logos differ in terms of perceived visual symmetry ( $M_{\text{symmetrical}} = 5.82$ ,  $SD = 1.64$ ;  $M_{\text{asymmetrical}} = 3.65$ ,  $SD = 1.89$ ;  $F(1,130) = 49.88$ ,  $p < .001$ ,  $\eta^2 = .277$ ), with the asymmetrical logo perceived as significantly less symmetrical.

*Manipulation check: message appeal.* A  $2$  (visual symmetry)  $\times$   $2$  (donation appeal) analysis of variance (ANOVA) on the gain-frame manipulation check item revealed only a significant main effect for message appeal ( $F(1, 236) = 56.91$ ,  $p < .001$ ,  $\eta^2 = .602$ ). Under the gain-frame (vs. loss-frame) condition, participants perceived the Starlight banner as being focused more on what the students would gain from the tutoring program ( $M_{\text{gain}} = 5.43$ ,  $SD = 1.21$ ;  $M_{\text{loss}} = 2.50$ ,  $SD = 1.19$ ). A similar analysis on the loss-frame manipulation check item also revealed only a significant main effect for message appeal ( $F(1,236) = 56.61$ ,  $p < .001$ ,  $\eta^2 = .645$ ). Under the loss-frame (vs. gain-frame) condition, participants perceived the Starlight banner as being focused more on what the students would lose without the tutoring program ( $M_{\text{gain}} = 2.29$ ,  $SD = 1.28$ ;  $M_{\text{loss}} = 5.67$ ,  $SD = 1.25$ ).

*Perceptions of inequality.* A 2 (visual symmetry)  $\times$  2 (message appeal) ANOVA on the perception of inequality index revealed only a significant main effect for visual symmetry ( $F(1, 236) = 26.04, p < .001, \eta^2 = .10$ ). Participants in the asymmetrical condition perceived the world as significantly less fair/just ( $M_{\text{asymmetrical}} = 3.42, SD = 1.81$ ) compared to those in the symmetrical condition ( $M_{\text{symmetrical}} = 4.61, SD = 1.80$ ).

*Volunteering intentions.* We conducted a 2  $\times$  2 ANOVA with visual symmetry and message appeal as the independent variables and volunteering intentions as the dependent variable. Results revealed a significant interaction between visual symmetry and donation appeal ( $F(1, 236) = 6.47, p = .002, \eta^2 = .039$ ). Planned contrasts revealed that within the loss-frame appeal condition, the asymmetrical logo design led to significantly higher volunteering intentions than did symmetrical logo design ( $M_{\text{symmetrical}} = 3.69, SD = 2.04; M_{\text{asymmetrical}} = 4.56, SD = 1.91; F(1, 236) = 5.57, p = .019, \eta^2 = .023$ ). Within the gain-frame appeal condition, the symmetrical logo design led to significantly higher volunteering intentions than did asymmetrical logo design ( $M_{\text{symmetrical}} = 4.57, SD = 1.94; M_{\text{asymmetrical}} = 3.82, SD = 2.22; F(1, 236) = 3.98, p = .047, \eta^2 = .017$ ). Graphic presentation of the results is shown in Figure 10.

[Insert Figure 10 about here]

*Behavioral volunteering intentions.* A logistic regression was conducted to test the effect of visual symmetry  $\times$  message appeal on participants' choice to click on at least one volunteering link (0 = no, 1 = yes). Results revealed a significant visual symmetry  $\times$  message appeal interaction effect ( $b = -.87; \text{Exp}(B) = .42, \text{Wald} = 37.60, p < .001$ ). Crosstabs analysis showed that within the loss-frame condition ( $N = 122$ ), participants were more likely to click a volunteering link when they saw an asymmetrical banner (39.3%,  $n = 24$ ) than when they saw a

symmetrical banner (21.3%,  $n = 13$ ;  $p = .030$ ). Within the gain-frame condition ( $N = 118$ ), participants were more likely to click a volunteering link when they saw a symmetrical banner (37.9%,  $n = 22$ ) than when they saw an asymmetrical banner (20.0%,  $n = 12$ ;  $p = .048$ ). Graphic presentation of the results is shown in Figure 11.

[Insert Figure 11 about here]

*Mediation analyses.* Finally, we formally test our hypothesized moderated mediation model that aimed to corroborate H3a and H3b: visual symmetry  $\times$  message appeal interaction is mediated by perceptions of inequality. We tested this moderated mediation model using PROCESS Model 15 (Hayes 2018) bootstrapped with 5,000 resamples. We first tested the model with visual symmetry as the independent variable, volunteering intentions as the dependent variable, perception of inequality as the mediator, and message appeal as the moderator. As hypothesized, the indirect effect of visual symmetry on volunteering intentions moderated by message appeal was significant. Perception of inequality explained why loss-appeal enhances volunteering intentions when asymmetrical logo is used ( $\beta = 1.23$ ,  $SE = .73$ , 95%  $CI = [.23, 1.98]$ ) and why gain-appeal enhances volunteering intentions when symmetrical logo is used ( $\beta = -2.73$ ,  $SE = .50$ , 95%  $CI = [-2.45, -.98]$ ). A similar analysis with behavioral volunteering measure as the dependent variable also revealed the same pattern of results for loss appeal ( $\beta = .98$ ,  $SE = .38$ , 95%  $CI = [.15, 2.23]$ ) and for gain appeal ( $\beta = -1.72$ ,  $SE = .38$ , 95%  $CI = [-2.34, -1.59]$ ).

The results of studies 3a and 3b demonstrate that asymmetrical (symmetrical) logos are more effective in motivating prosocial behavior when matched with loss-frame (gain-frame) appeals, and perceptions of inequality mediate the effect.

## **MODERATING ROLE OF SOCIOECONOMIC STATUS**

According to Ken Stern, author of “With Charity for All,” one of the most surprising facts of charity in America is that “the people who can least afford to give are the ones who donate the greatest percentage of their income” (Stern 2013). Interestingly, research in social psychology has also documented while people in lower social class were more generous and believed they should give more of their annual income to charity (Adler et al. 2000; Piff et al. 2010), upper-class individuals were more likely to exhibit unethical decision-making tendencies and behaviors (Piff et al. 2012).

Why do those have less give more? Prior research suggests that people in lower social class are more compassionate and empathetic to the needs of others because they had had exposure to and identification with the challenges associated with lower social status (Piff et al. 2010). Further, lower-class individuals are more likely to have an external focus on what is going on their environment because their life outcomes (e.g., reduced material wealth, lower income) are more dependent on external forces (e.g., economic trends) in the social environment (Kraus, Côté, and Keltner 2010). In contrast, higher-class individuals tend to be more self-centered and focused on their own internal goals and motivations because they already possess greater resources, freedom, and independence from others (Piff et al. 2012).

Given the distinct differences in how socioeconomic status (SES) affects people’s response to their surrounding environments, we propose that subjective SES will influence consumer response to social inequality associations elicited through visual asymmetry. Prior research has demonstrated that consumers with stigmatized identities (e.g., racial minority) are more attentive to external cues that signal inclusion (e.g., a company’s racial diversity training

program) versus exclusion (e.g., racially offensive clothing) (Chaney, Sanchez, and Maimon 2018). Lower SES has also been shown to be a stigmatized identity that influence how people interact with others and express themselves (Garcia, Hallahan, and Rosenthal 2007). In line with these findings, we posit that individuals with lower SES are more attuned to the social inequality connotations elicited by visual asymmetry and thus are more likely to exhibit prosocial intentions. In contrast, we hypothesize that for individuals with higher SES, the effect of visual asymmetry on perceived inequality and prosocial intentions will be attenuated because higher SES individuals are less likely to attend to external social cues. Our conceptual framework is visually depicted in Figure 12. More formally:

H4a: Visual symmetry will interact with message frame (loss vs. gain) of donation appeal to influence prosocial intentions. When a loss-frame appeal is used, asymmetrical (vs. symmetrical) design generates greater prosocial intentions. When a gain-frame appeal is used, symmetrical (vs. asymmetrical) design generates greater prosocial intentions.

H4b: Perceptions of inequality mediate the interaction between visual symmetry and message framing.

[Insert Figure 12 about here]

#### **STUDY 4: SOCIOECONOMIC STATUS**

We propose that the effect of visual design symmetry on prosocial intentions will be attenuated by high socioeconomic status. Specifically, we hypothesize that the perception of inequality elicited by asymmetrical (vs. symmetrical) design will be more salient among low SES (vs. high SES) consumers. Therefore, for low SES consumers, we expect that asymmetrical

logo design will generate higher perception of inequality and greater prosocial intentions. For high SES consumers, we expect that the effects of visual asymmetry on perception of inequality and prosocial intentions will be diminished, such that there will be no significant differences between the two logo designs (symmetrical vs. asymmetrical).

### ***Method and Procedure***

*Participants and Design.* We recruited 218 adults on Amazon Mechanical Turk (42.9% female,  $M_{age} = 34.08$ ). The experiment employed a 2 (visual symmetry: symmetrical vs. asymmetrical)  $\times$  2 (SES: high vs. low) between-subjects design.

*Procedure.* Participants were told that they will be completing a set of ostensibly unrelated studies. In the first part of the experiment, we manipulated participants' subjective perception of SES using a procedure adapted from ). Participants were presented with a 10-rung ladder and instructed to think of the rungs as representative of where people stand in the United States regarding their SES (for details, see Appendix F). In the low SES condition, participants were instructed to write about a hypothetical interaction with a person whose social standing was at the very top of the ladder and describe the difference between themselves and that person. In the high SES condition, the comparison target was a person whose social standing is at the very bottom of the ladder. After the writing task, participants indicated their SES by choosing a position on the economic ladder (1 = lowest and 10 = highest). The second part of the experiment followed a similar procedure used in Study 3a. Participants were shown an online flyer of the BCA organization and asked to indicate their intentions to donate blood if BCA was hosting a blood drive near their location. As participants were compensated \$2.50 for participating in this study, they were also asked to indicate how much of the compensation they



would consider donating to the BCA. Participants then completed the same measure of perception of inequality ( $\alpha = .97$ ) as in prior studies. Similar to prior studies, we found no significant differences between the two logos on attitude and familiarity with the organization (all  $ps > .4$ ). Participants also evaluated the logo design on the same measures of aesthetic appeal, visual complexity, and visual stability, but there were no significant differences between the two logos (all  $ps > .2$ ). We also assessed participants' affective responses using the same measures as in prior studies and found no significant effects of visual symmetry or SES manipulations on affective responses (all  $ps > .3$ ). Finally, participants completed the visual symmetry manipulation check as in prior studies.

### ***Results and Discussion***

*Manipulation check: visual symmetry.* The two logos differ in terms of perceived visual symmetry ( $M_{\text{symmetrical}} = 6.20$ ,  $SD = 1.32$ ;  $M_{\text{asymmetrical}} = 3.53$ ,  $SD = 1.70$ ;  $F(1,217) = 168.20$ ,  $p < .001$ ), with the asymmetrical logo perceived as significantly less symmetrical.

*Manipulation check: SES.* A  $2$  (visual symmetry)  $\times$   $2$  (SES) ANOVA on the SES manipulation check item revealed only a significant main effect for SES ( $F(1, 215) = 37.97$ ,  $p < .001$ ). Participants in the low-SES condition placed themselves significantly lower on the ladder ( $M_{\text{low-SES}} = 3.12$ ,  $SD = 1.85$ ) than participants in the high-SES condition ( $M_{\text{high-SES}} = 5.90$ ,  $SD = 2.35$ ).

*Perception of inequality.* A  $2$  (visual symmetry)  $\times$   $2$  (SES) ANOVA on the perception of inequality index revealed a significant interaction effect ( $F(1,215) = 4.72$ ,  $p = .03$ ). Planned contrasts revealed that within the low-SES condition, participants in the asymmetrical condition perceived the world as less fair/just ( $M_{\text{asymmetrical}} = 3.56$ ,  $SD = 1.81$ ) compared to those in the

symmetrical condition ( $M_{\text{symmetrical}} = 4.66$ ,  $SD = 1.62$ ,  $F(1,215) = 11.52$ ,  $p = .001$ ). Within the high-SES condition, there were no significant differences in perception of inequality between the two visual symmetry conditions ( $M_{\text{symmetrical}} = 4.57$ ,  $M_{\text{asymmetrical}} = 4.52$ ,  $p = .89$ ).

*Prosocial intentions.* We conducted a  $2 \times 2$  ANOVA with visual symmetry and SES as the independent variables and blood donation intention as the dependent variable. Results revealed a significant interaction between visual symmetry and SES ( $F(1,215) = 8.28$ ,  $p = .004$ ). Planned contrasts revealed that within the low-SES condition, the asymmetrical logo design led to significantly higher blood donation intention than did symmetrical logo design ( $M_{\text{symmetrical}} = 3.52$ ,  $SD = 1.65$ ;  $M_{\text{asymmetrical}} = 4.66$ ,  $SD = 1.88$ ;  $F(1,215) = 12.65$ ,  $p < .001$ ). Within the high-SES condition, there were no significant differences in blood donation intention between the two visual symmetry conditions ( $M_{\text{symmetrical}} = 3.95$ ,  $M_{\text{asymmetrical}} = 3.79$ ;  $p = .62$ ).

A similar analysis with monetary donation intention as the dependent variable also revealed a significant interaction between visual symmetry and SES ( $F(1,215) = 4.64$ ,  $p = .03$ ). Planned contrasts revealed that within the low-SES condition, the asymmetrical logo design led to greater higher monetary donation intent than did symmetrical logo design ( $M_{\text{symmetrical}} = \$ .94$ ,  $SD = \$ .40$ ;  $M_{\text{asymmetrical}} = \$ 1.17$ ,  $SD = \$ .47$ ;  $F(1,215) = 8.49$ ,  $p = .004$ ). Within high-SES condition, there were no significant differences in monetary donation intention between the two visual symmetry conditions ( $M_{\text{symmetrical}} = \$ .96$ ,  $M_{\text{asymmetrical}} = \$ .95$ ;  $p = .91$ ).

*Mediation analyses.* Finally, we formally test our hypothesized mediated moderation model that aimed to corroborate H4 and H4b: visual symmetry  $\times$  SES interaction is mediated by perceptions of inequality. We tested this moderated mediation model using PROCESS Model 8 (Hayes 2018) bootstrapped with 5,000 resamples. We first tested the model with visual

symmetry as the independent variable, blood donation intention as the dependent variable, perception of inequality as the mediator, and SES as the moderator. Results revealed that the indirect effect of visual symmetry on blood donation intention moderated by SES was significant. Perception of inequality mediates the effect of visual symmetry on blood donation intentions under low-SES condition ( $\beta = -.30$ ,  $SE = .12$ , 95% CI = [.55, -.10]) but not under high-SES condition (95% CI = [-.22, .13]). A similar analysis with monetary donation intention as the dependent variable also revealed the same pattern of results. Perception of inequality mediates the effect of visual symmetry on monetary donation intention under low-SES condition ( $\beta = -.07$ ,  $SE = .03$ , 95% CI = [-.13, -.02]) but not under high-SES condition (95% CI = [-.05, .03]).

## **GENERAL DISCUSSION**

Aesthetics philosopher Yuriko Saito (2007, p. 171) describes the Japanese wabi aesthetic as a “celebration of irregularity, imperfection, incompleteness, and insufficiency...but it is not an indiscriminate celebration of anything imperfect, insufficient, or disorderly.” What this points to is the idea that the meaning of things and their beauty are better judged within the context in which they are used. Although it is well-known that symmetry is a key facet of beauty, the current research draws on the study of consumer aesthetics and prosociality to show that visual asymmetry (1) can serve as an effective design feature of non-profit/charity logos because (2) it symbolically represents societal social inequality and (3) when used in combination with a loss-loss-frame (vs. gain-frame) message appeal can (4) prompt a prosocial consumer response (e.g., charitable donations).

### ***Theoretical Contributions***

Our research makes three important theoretical contributions. First, we contribute to aesthetics and design theory by demonstrating a positive prosocial consequence of visual asymmetry, which is often considered a lesser or unattractive visual element by prior visual perception research (Attneave 1955; Deregowski 1978; Pecchinenda, Bertamini, Makin, and Ruta 2014; Makin, Pecchinenda, Bertamini 2012). Although symmetry may be preferable in the contexts of visual processing or even mate selection, in the context of prosocial giving, we find that asymmetry can motivate greater prosocial intentions by activating the symbolic connotations of social inequality. Second, other than some notable exceptions (Townsend 2017; Wang et al. 2017), virtually no research has examined how design elements can motivate prosociality. Third, we demonstrate how a specific visual design features, such as visual symmetry, can complement verbal message appeals to enhance the effectiveness of prosocial advertisements.

### ***Managerial Implications and Directions for Future Research***

This research also offers design-specific guidance for profit and non-profit managers on how to create effective “visual calls to action”. There is a growing body of work that looks at aesthetic nudges or visual prompts that shape consumer behavior or nudge them to action (Patrick 2016). For instance, researchers found that placing footprints that lead to garbage bins decreased littering, eyes painted above a bicycle stand decreased theft, and graphic cigarette warning labels may reduce the overall rate of smoking (Cornell 2015; Nettle, Nott, and Bateson 2012). Much research is needed to understand how aesthetic-based nudges may be used to alter people’s behavior in positive ways, yet not backfire by decreasing sensitivity to such nudges.

Although the present research has examined asymmetry in the context of logo designs, we expect the effects of asymmetry on prosocial giving would hold in the contexts of photography composition of charity advertisements or signage. Future research might build on this work to examine how other concepts and organizational values like equality, inclusivity and sustainability might be visually represented in logo design to inform consumer perceptions.

Moreover, given the symbolic connotation of inequality associated with visual symmetry, future research should look into individual consumer differences that might affect whether or not consumers pick up on the inequality connoted by asymmetry. Prior research has shown that countries with higher socio-economic status or higher power-distance belief have significantly lowered perceptions inequality, which resulted in lower charitable donations (Côté, House, and Willer 2015; Winterich and Zhang 2014). Other research has implicated political and moral identity in prosocial response (Winterich et al. 2011; 2013) which might play an important role in whether these subtle visual cues are picked up by consumers whose mental make-up may simply filter them out. These findings suggest that it is important for nonprofit managers to identify to whom their prosocial ads are being advertised to, since the connotation of inequality associated with visual symmetry may not be salient to some individuals e.g. those with higher socio-economic status. Although the current research examines visual symmetry in prosocial contexts, future research should consider how visual symmetry functions in other domains, such as money-saving practices. For instance, higher visual asymmetry between spending and budgeting could motivate an individual to engage in more saving behaviors.

Little research has examined whether there are individual differences in preferences for symmetry versus asymmetry, though people do appear to exhibit strong preferences for one over

another. For instance, for individuals engaging in the philosophical of Taoism, symmetry or repetition were considered fatal and should be avoided (e.g., when placing an incense burner, care should be taken not to put it in the exact center which would divide the space into equal halves; Fletcher 2001). On the other hand, many people are convinced that symmetry is synonymous with good taste, to the point that furniture and plants should be arranged symmetrically. Considering that the human preference for symmetry is innate (Humphrey and Humphrey 1989), this anecdotal evidence raises some interesting questions for future research to investigate why people may be drawn to symmetry over asymmetry and vice versa.

## REFERENCES

- Adler, Nancy E., Elissa S. Epel, Grace Castellazzo, and Jeannette R. Ickovics (2000), "Relationship of Subjective and Objective Social Status with Psychological and Physiological Functioning: Preliminary Data in Healthy, White Women." *Health Psychology*, 19 (6), 586-592.
- Attneave, Fred. (1955), "Symmetry, Information, and Memory for Patterns," *The American Journal of Psychology*, 68 (2), 209-222.
- Bajaj, Aditi, and Samuel D. Bond (2018), "Beyond Beauty: Design Symmetry and Brand Personality," *Journal of Consumer Psychology*, 28 (1), 77-98.
- Baofu, Peter (2009). *The Future of Post-Human Geometry: A Preface to a New Theory of Infinity, Symmetry, and Dimensionality*. Cambridge Scholars Publishing.
- Barrett, William P. (2019), "America's Top Charities 2019," <https://www.forbes.com/lists/top-charities/#6198ed7d5f50>
- Behavioral Insights Team (2013), "Applying Behavioural Insights to Organ Donation: Preliminary Results from a Randomised Controlled Trial," Cabinet Office: London.
- Broemer, Philip (2002), "Relative Effectiveness of Differently Framed Health Messages: The Influence of Ambivalence," *European Journal of Social Psychology*, 32 (5), 685-703.
- Brown, Pauline (2019), *Aesthetic Intelligence: How to Boost it and Use it in Business and Beyond*. New York: HarperCollins.
- Buchanan, Larry, Bui, Quoc Trung, and Patel, Jugal K. (2020), "Black Lives Matter may be the largest movement in U.S. history,"

<https://www.nytimes.com/interactive/2020/07/03/us/george-floyd-protests-crowd-size.html>

- Chaney, Kimberly E., Diana T. Sanchez, and Melanie R. Maimon (2019), “Stigmatized-Identity Cues in Consumer Spaces,” *Journal of Consumer Psychology*, 29 (1), 130-141.
- Cian, Luca, Aradhna Krishna, and Ryan S. Elder (2014), “This Logo Moves Me: Dynamic Imagery from Static Images,” *Journal of Marketing Research*, 51 (2), 184-197.
- Cooper, Tracy M. (2013), “The Wabi Sabi way: Antidote for a Dualistic Culture?” *Journal of Conscious Evolution*, 10 (10), 1-14.
- Cornell, Nicolas (2015), “The Aesthetic Toll of Nudging,” Georgetown Journal of Law & Public Policy, 841-862.
- Côté, Stéphane, Julian House, and Robb Willer (2015), “High Economic Inequality Leads Higher-Income Individuals to Be Less Generous,” *Proceedings of the National Academy of Sciences*, 112 (52), 15838-15843.
- Deregowski, Jan B. (1978), “On Reexamining Fortes' Data: Some Implications of Drawings Made by Children Who Have Never Drawn Before,” *Perception*, 7 (4), 479-484.
- Donnay, J. D. H., and Gabrielle Donna (1985), “Symmetry and Antisymmetry in Maori Rafter Designs,” *Empirical Studies of the Arts*, 3 (1), 23-45.
- Dunn, Elizabeth W., Lara B. Aknin, and Michael I. Norton (2008), “Spending Money on Others Promotes Happiness. *Science*, 319 (5870), 1687-1688.
- Duveen, Gerard, and Charis Psaltis (2013), “The Constructive Role of Asymmetry in Social Interaction,” *Development as a social process: Contributions of Gerard Duveen*, 133-154.



- Fajardo, Tatiana M., Jiao Zhang, and Michael Tsiros (2016), "The Contingent Nature of the Symbolic Associations of Visual Design Elements: The Case of Brand Logo Frames," *Journal of Consumer Research*, 43 (4), 549-566.
- Feinberg, Matthew, and Robb Willer (2011), "Apocalypse Soon? Dire Messages Reduce Relief in Global Warming by Contradicting Just-World Beliefs," *Psychological Science*, 22 (1), 34-38.
- Flagg, Barbara, and Katherine Goldwasser (1998), "Fighting for Truth, Justice, and the Asymmetrical Way" *Washington University Law Quarterly*, 76, 105-111.
- Fletcher, Alan (2001), *The Art of Looking Sideways*. New York: NY. Phaidon Press.
- Flynn, Francis J. (2003), "How Much Should I Give and How Often? The Effects of Generosity and Frequency of Favor Exchange on Social Status and Productivity. *Academy of Management Journal*, 46 (5), 539-553.
- Fox, Robin (1989), *The Search for Society: Quest for a Biosocial Science and Morality*. Rutgers University Press.
- Garcia, Stephen M., Mark Hallahan, and Robert Rosenthal (2007), "Poor Expression: Concealing Social Class Stigma," *Basic and Applied Social Psychology*, 29 (2)0, 99-107.
- Guthrie, Gerald, and Morton Wiener (1966), "Subliminal Perception or Perception of Partial cue with Pictorial Stimuli," *Journal of Personality and Social Psychology*, 3 (6), 619-628.
- Hagtvedt, Henrik (2011), "The Impact of Incomplete Typeface Logos on Perceptions of the Firm," *Journal of Marketing*, 75 (4), 86-93.
- Hanson, F. Allan (1985), "From Symmetry to Anthropophagy: The Cultural Context of Maori Art," *Empirical Studies of the Arts*, 3 (1), 47-62.

- Hara, Kenya (2011), *Designing Design*. Baden: Lars Muller Publishers.
- Henderson, Pamela W., Joan L. Giese, and Joseph A. Cote (2004), "Impression Management using Typeface Design," *Journal of Marketing*, 68 (4), 60-72.
- Humphrey, G. Keith, and Diane E. Humphrey (1989), "The Role of Structure in Infant Visual Pattern Perception," *Canadian Journal of Psychology/Revue canadienne de psychologie*, 43 (2), 165-182.
- Jespersen, S.M. (2012), "Green Nudge: Nudging into the Litter Bin,"  
<http://www.inudgeyou.com/green-nudge-nudging-litter-into-the-bin>.
- Jiang, Yuwei, Gerald J. Gorn, Maria Galli, and Amitava Chattopadhyay, (2016), "Does Your Company Have the Right Logo? How and Why Circular-and Angular-logo Shapes Influence Brand Attribute Judgments." *Journal of Consumer Research*, 42 (5), 709-726.
- Kim, Hakkyun, Akshay R. Rao, and Angela Y. Lee (2009), "It's Time to Vote: The Effect of Matching Message Orientation and Temporal Frame on Political Persuasion," *Journal of Consumer Research*, 35 (6), 877-889.
- Klein, Ezra (2020), "How to Topple Dictators and Transform Society,"  
<https://www.vox.com/podcasts/2020/1/3/21048121/ezra-klein-erica-chenoweth-nonviolence-topple-dictators>.
- Kraus, Michael W., Stéphane Côté, and Dacher Keltner (2010), "Social Class, Contextualism, and Empathic Accuracy," *Psychological Science*, 21 (11), 1716-1723.
- Labrecque, Lauren I., Vanessa M. Patrick, and George R. Milne (2013), "The Marketers' Prismatic Palette: A review of Color Research and Future Directions." *Psychology & Marketing*, 30 (2), 187-202.

- Leliveld, Marijke C., Eric van Dijk, and Ilja van Beest (2012), "Punishing and Compensating Others at Your Own Expense: The Role of Empathic Concern on Reactions to Distributive Injustice," *European Journal of Social Psychology*, 42 (2), 135-140.
- Luffarelli, Jonathan, Antonios Stamatogiannakis, and Haiyang Yang (2019), "The Visual Asymmetry Effect: An Interplay of Logo Design and Brand Personality on Brand Equity," *Journal of Marketing Research*, 56 (1), 89-103.
- Maimaran, Michal, and S. Christian Wheeler (2008), "Circles, Squares, and Choice: The Effect of Shape Arrays on Uniqueness and Variety Seeking," *Journal of Marketing Research*, 45 (6), 731-740.
- Makin, Alexis David James, Anna Pecchinenda, and Marco Bertamini (2012), "Implicit Affective Evaluation of Visual Symmetry," *Emotion*, 12 (5), 1021-1030.
- McCracken, Grant (1986), "Culture and Consumption: A Theoretical Account of the Structure and Movement of the Cultural Meaning of Consumer Goods," *Journal of Consumer Research*, 13 (1), 71-84.
- Møller, Anders Pape (1992), "Female Swallow Preference For Symmetrical Male Sexual Ornaments," *Nature*, 357 (6375), 238-240.
- Nettle, Daniel, Kenneth Nott, and Melissa Bateson (2012), "Cycle Thieves, We are Watching You: Impact of a Simple Signage Intervention against Bicycle Theft." *PloS one*, 7 (12), e51738. <https://doi.org/10.1371/journal.pone.0051738>.
- Olivola, Christopher Y., and Eldar Shafir (2013), "The Martyrdom Effect: When Pain and Effort Increase Prosocial Contributions," *Journal of Behavioral Decision Making*, 26 (1), 91-105.

- Patrick, Vanessa M., Yashar Atefi, and Henrik Hagtvedt (2017), "The Allure of the Hidden: How Product Unveiling Confers Value," *International Journal of Research in Marketing*, 34 (2), 430-441.
- Pavlova, Marina, Arseny A. Sokolov, and Alexander Sokolov (2005), "Perceived Dynamics of Static Images Enables Emotional Attribution," *Perception*, 34 (9), 1107-1116.
- Pecchinenda, Anna, Marco Bertamini, Alexis David James Makin, Nicole Ruta (2014), "The Pleasantness of Visual Symmetry: Always, Never or Sometimes," *PloS One*, 9 (3), 1-10.
- Park, C. Whan, Andreas B. Eisingerich, Gratiana Pol, and Jason Whan Park (2013), "The Role of Brand Logos in Firm Performance," *Journal of Business Research*, 66 (2), 180-187.
- Patrick, Vanessa M., and Henrik Hagtvedt (2011), "Aesthetic Incongruity Resolution," *Journal of Marketing Research*, 48 (2), 393-402.
- Payne, Keith (2017), *The Broken Ladder: How Inequality Affects the Way We Think, Live, and Die*. New York: NY. Penguin.
- Peracchio, Laura A., and Joan Meyers-Levy (1994), "How Ambiguous Cropped Objects in Ad Photos can Affect Product Evaluations," *Journal of Consumer Research*, 21 (1), 190-204.
- Petroski, Karen (2006), "The Rhetoric of Symmetry," *Valparaiso University Law Review*, 41 (3), 1165.
- Piff, Paul. "K., Michael W. Kraus, Stéphane Côté, Bonnie Hayden Cheng und Dacher Keltner (2010), "Having Less, Giving More: The Influence of Social Class on Prosocial Behavior," *Journal of Personality and Social Psychology*, 99 (5), 771-784.

- Piff, Paul K., Daniel M. Stancato, Stéphane Côté, Rodolfo Mendoza-Denton, and Dacher Keltner (2012), "Higher Social Class Predicts Increased Unethical Behavior," *Proceedings of the National Academy of Sciences*, 109 (11), 4086-4091.
- Piff, Paul K., Pia Dietze, Matthew Feinberg, Daniel M. Stancato, and Dacher Keltner (2015), "Awe, the Small Self, and Prosocial Behavior," *Journal of Personality and Social Psychology*, 108 (6), 883-899.
- Psaltis, Charis (2011), "The constructive Role of Gender Asymmetry in Social Interaction: Further Evidence," *British Journal of Developmental Psychology*, 29 (2), 305-312.
- Reber, Rolf, Norbert Schwarz, and Piotr Winkielman (2004), "Processing Fluency and Aesthetic Pleasure: Is Beauty in the Perceiver's Processing Experience?" *Personality and Social Psychology Review*, 8 (4), 364-382.
- Rock, Irvin, and Robin Leaman (1963), "An Experimental Analysis of Visual Symmetry," *Acta Psychologica*, 21, 171-183.
- Rodin, Miriam J., Judy M. Price, Jeff B. Bryson, and Francisco J. Sanchez (1990), "Asymmetry in Prejudice Attribution," *Journal of Experimental Social Psychology*, 26 (6), 481-504.
- Saito, Yuriko (2007), *Everyday Aesthetics*. Oxford University Press.
- Semin, Gün R., and Tomás A. Palma (2014), "Why the Bride Wears White: Grounding Gender with Brightness," *Journal of Consumer Psychology*, 24 (2), 217-225.
- Shepard, Barry (1997), "Creating Brand Equity by Managing Visual Signals," *Marketing Review*, 52 (1), 18-19.

- Shiv, Baba, Julie A. Edell, and John W. Payne (1997), "Factors Affecting the Impact of Negatively and Positively Framed Ad Messages," *Journal of Consumer Research*, 24 (3), 285-294.
- Solomon, Michael R. (1983), "The Role of Products as Social Stimuli: A Symbolic Interactionism Perspective," *Journal of Consumer Research*, 10 (3), 319-329.
- Small, Deborah A., and Cynthia Cryder (2016), "Prosocial Consumer Behavior," *Current Opinion in Psychology*, 10, 107-111.
- Small, Deborah A., and Nicole M. Verrochi (2009), "The Face of Need: Facial Emotion Expression on Charity Advertisements," *Journal of Marketing Research*, 46 (6), 777-787.
- Small, Deborah A., and George Loewenstein (2003), "Helping a Victim or Helping the Victim: Altruism and Identifiability," *Journal of Risk and Uncertainty*, 26 (1), 5-16.
- Sundar, Aparna, and Theodore J. Noseworthy (2014), "Place the Logo High or Low? Using Conceptual Metaphors of Power in Packaging Design," *Journal of Marketing*, 78 (5), 138-151.
- Szilagyi, Peter G., and John C. Baird (1977), "A Quantitative Approach to the Study of Visual Symmetry," *Attention, Perception, & Psychophysics*, 22 (3), 287-292.
- Stamatogiannakis, Antonios, Jonathan Luffarelli, Haiyang Yang, R. Batra, C. Seifert, and D. Brei (2015), "How to Use Visual Design to Boost Brand Equity," *The Psychology of Design: Creating Consumer Appeal*, 121-132.
- Stern, Kern (2013), "Why the Rich Don't Give to Charity,"  
<https://www.theatlantic.com/magazine/archive/2013/04/why-the-rich-dont-give/309254/>

- Thornhill, Randy (1992), "Fluctuating Asymmetry and the Mating System of the Japanese Scorpionfly, *Panorpa Japonica*," *Animal Behaviour*, 44 (5), 867-879.
- Thornhill, Randy and Steven W. Gangestad (1993), "Human Facial Beauty," *Human Nature*, 4 (3), 237-269.
- Townsend, Claudia (2017), "The Price of Beauty: Differential Effects of Design Elements with and without Cost Implications in Nonprofit Donor Solicitations," *Journal of Consumer Research*, 44 (4), 794-815.
- van Rompay, Thomas J. L., Ad T. H. Pruyn, and Peter Tieke (2009), "Symbolic Meaning Integration in Design and Its Influence on Product and Brand Evaluation," *International Journal of Design*, 3 (2), 19–26.
- Van de Vyver, Julie, and Dominic Abrams (2015), "Testing the Prosocial Effectiveness of the Prototypical Moral Emotions: Elevation Increases Benevolent Behaviors and Outrage Increases Justice Behaviors." *Journal of Experimental Social Psychology*, 58, 23-33.
- Wang, Tingting, Anirban Mukhopadhyay, and Vanessa M. Patrick (2017), "Getting Consumers to Recycle NOW! When and Why Cuteness Appeals Influence Prosocial and Sustainable Behavior," *Journal of Public Policy & Marketing*, 36 (2), 269-283.
- Washburn, Dorothy (1999), "Perceptual Anthropology: The Cultural Salience of Symmetry," *American Anthropologist*, 101 (3), 547-562.
- Wen Wan, Echo, Rocky Peng Chen, and Liyin Jin (2017), "Judging a Book by Its Cover? The Effect of Anthropomorphism on Product Attribute Processing and Consumer Preference," *Journal of Consumer Research*, 43 (6), 1008-1030.
- Weyl, Hermann (2015), *Symmetry*, Vol. 104. New Jersey. Princeton University Press.

- White, Katherine, Rhiannon MacDonnell, and Darren W. Dahl (2011), "It's the Mind-Set that Matters: The Role of Construal Level and Message Framing in Influencing Consumer Efficacy and Conservation Behaviors," *Journal of Marketing Research*, 48 (3), 472-485.
- Winterich, Karen Page, Yinlong Zhang, and Vikas Mittal (2012), "How Political Identity and Charity Positioning Increase Donations: Insights from Moral Foundations Theory." *International Journal of Research in Marketing*, 29 (4), 346-354.
- Winterich, Karen Page, Vikas Mittal, and Karl Aquino (2013), "When Does Recognition Increase Charitable Behavior? Toward a Moral Identity-Based Model," *Journal of Marketing*, 77 (3), 121-134.
- Winterich, Karen Page, and Yinlong Zhang (2014), "Accepting Inequality Deters Responsibility: How Power Distance Decreases Charitable Behavior," *Journal of Consumer Research*, 41 (2), 274-293.
- Zhang, Yinlong, Lawrence Feick, and Lydia J. Price (2006), "The Impact of Self-Construal on Aesthetic Preference for Angular versus Rounded shapes," *Personality and Social Psychology Bulletin*, 32 (6), 794-805.



Figure 1. Study 1 Stimuli (Banner for Display Booth)

Symmetrical Banner



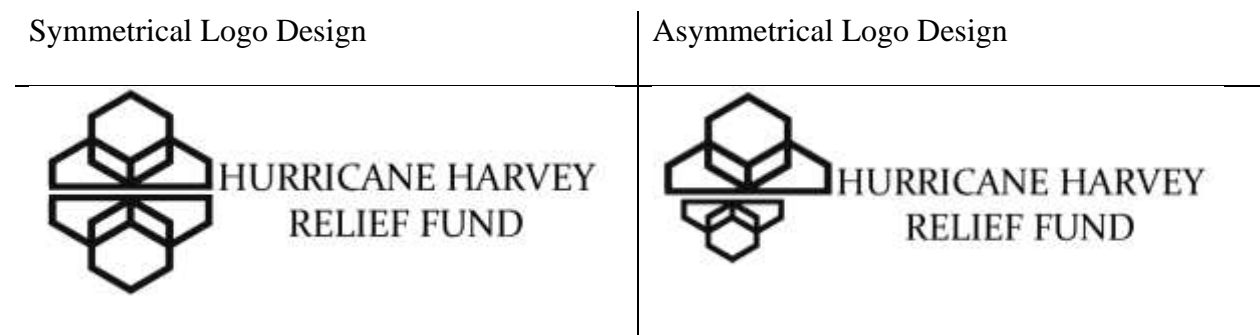
Asymmetrical Banner



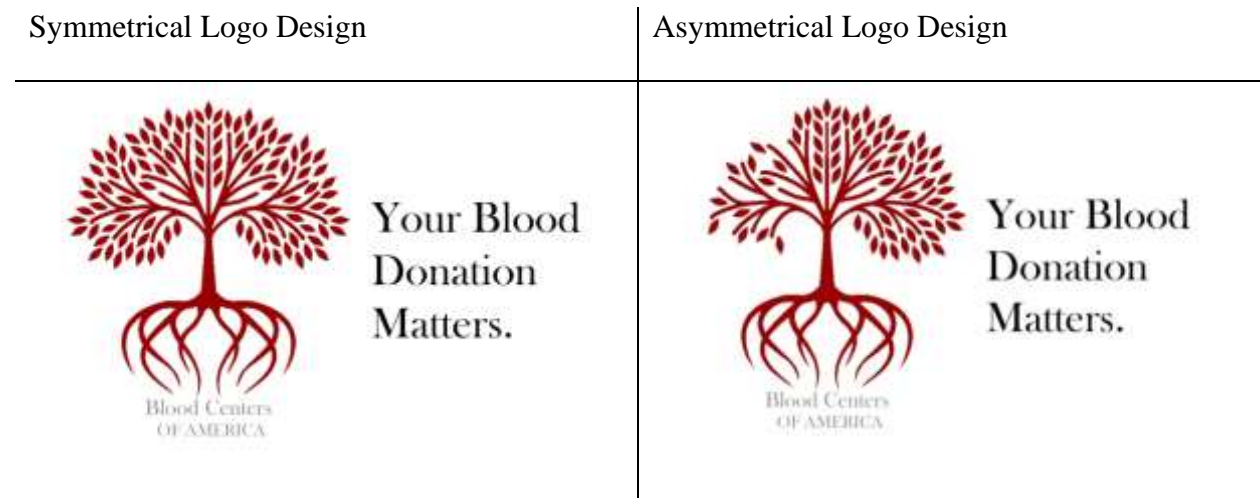
**Figure 2. Study 1 Stimuli (Online Facebook Ads)**

Symmetrical Facebook Ad	Asymmetrical Facebook Ad
<p><b>BE THE HERO</b></p> <p>Blood for Life. Share your 15 minutes.</p> <p><b>SIGN UP NOW!</b></p>  <p><b>Your blood donation matters.</b> Sign up to donate!</p> <p>Local Blood Drive July 27 - July 28</p> <p>Sign Up</p>	<p><b>BE THE HERO</b></p> <p>Blood for Life. Share your 15 minutes.</p> <p><b>SIGN UP NOW!</b></p>  <p><b>Your blood donation matters.</b> Sign up to donate!</p> <p>Local Blood Drive July 27 - July 28</p> <p>Sign Up</p>

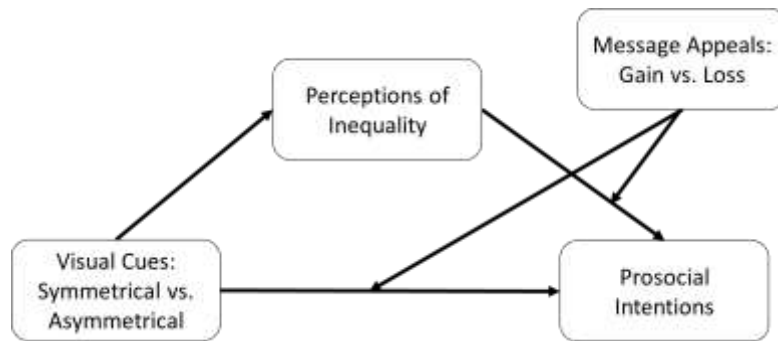
**Figure 3. Study 2a Stimuli**







**Figure 4. Study 2b stimuli**



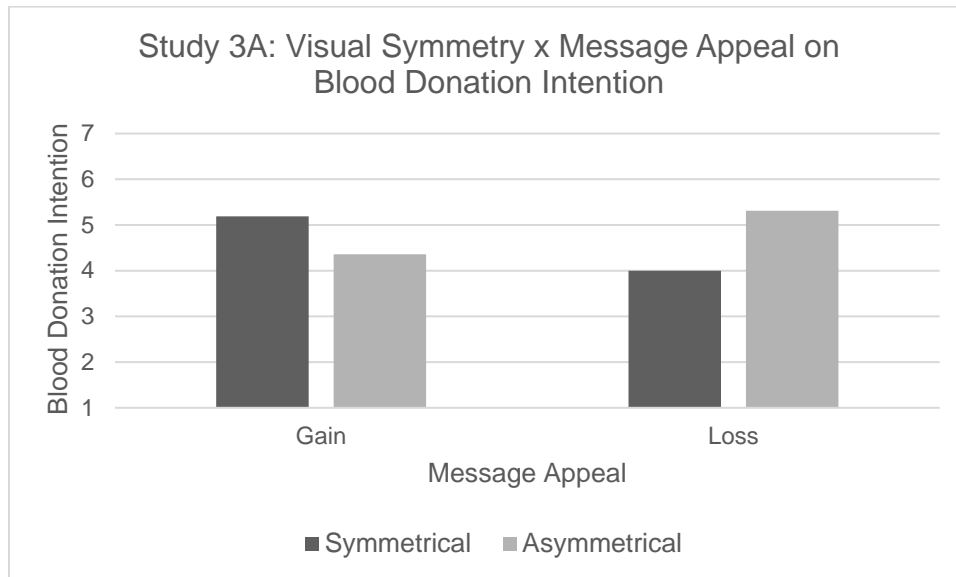
**Figure 5. Conceptual Framework: Moderating Role of Message Appeals**



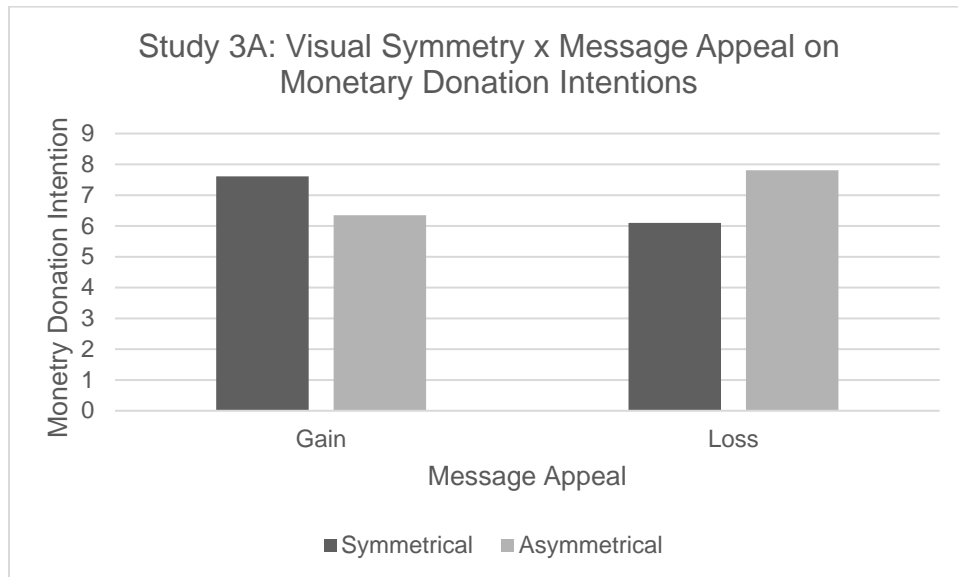
**Figure 6. Study 3a stimuli**

	Symmetrical Logo Design	Asymmetrical Logo Design
Gain-Frame	<p><i>Every two seconds</i> someone's life could be saved with a life-saving blood transfusion.  <i>Every day</i> one pint of donated blood can save up to three people's lives.</p> <p>Your Blood Donation Matters</p> 	<p><i>Every two seconds</i> someone's life could be saved with a life-saving blood transfusion.  <i>Every day</i> one pint of donated blood can save up to three people's lives.</p> <p>Your Blood Donation Matters</p> 
Loss-Frame	<p><i>Every two seconds</i> someone's life could be lost without life-saving blood transfusion.  <i>Every day</i> three people die because there are not enough blood donations.</p> <p>Your Blood Donation Matters</p> 	<p><i>Every two seconds</i> someone's life could be lost without life-saving blood transfusion.  <i>Every day</i> three people die because there are not enough blood donations.</p> <p>Your Blood Donation Matters</p> 

**Figure 7. Study 3a: Visual Symmetry × Message Appeal on Blood Donation Intentions.**

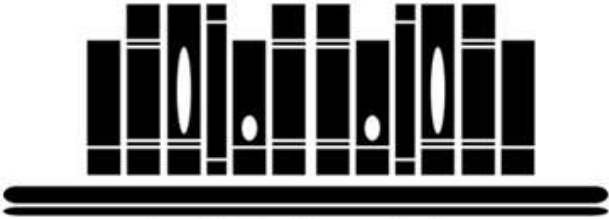
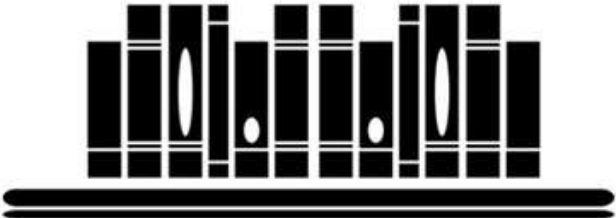


**Figure 8. Study 3a: Visual Symmetry × Message Appeal on Monetary Donation Intentions.**





**Figure 9. Study 3b Stimuli**

Symmetrical Logo Design	
Gain-Frame	 <p>Starlight Foundation EDUCATION FOR ALL CHILDREN</p> <p>Starlight Tutoring: <b>Fostering advancement in learning</b>          Starlight Tutoring aims to help underserved students in <b>increasing learning gains and achieving greater academic performance.</b>          With the additional educational support, 65% of students showed remarkable increases in their assessment scores.          We aim to help make our students lives better and more enriched.</p>
Loss-Frame	 <p>Starlight Foundation EDUCATION FOR ALL CHILDREN</p> <p>Starlight Tutoring: <b>Avoiding declines in learning</b>          Starlight Tutoring aims to prevent underserved students from <b>experiencing learning loss and falling behind in academic performance.</b>          Without any additional educational support, 35% of students showed significant learning losses that would cause them to fall behind by a grade level or more.          We aim to prevent our students lives from getting worse and more complicated.</p>

## Asymmetrical Logo Design

Gain-  
Frame



Starlight Foundation  
EDUCATION FOR ALL CHILDREN

Starlight Tutoring: **Fostering advancement in learning**

Starlight Tutoring aims to help underserved students in **increasing learning gains** and **achieving greater academic performance**. With the additional educational support, 65% of students showed remarkable increases in their assessment scores. We aim to help make our students lives better and more enriched.

Loss-  
Frame

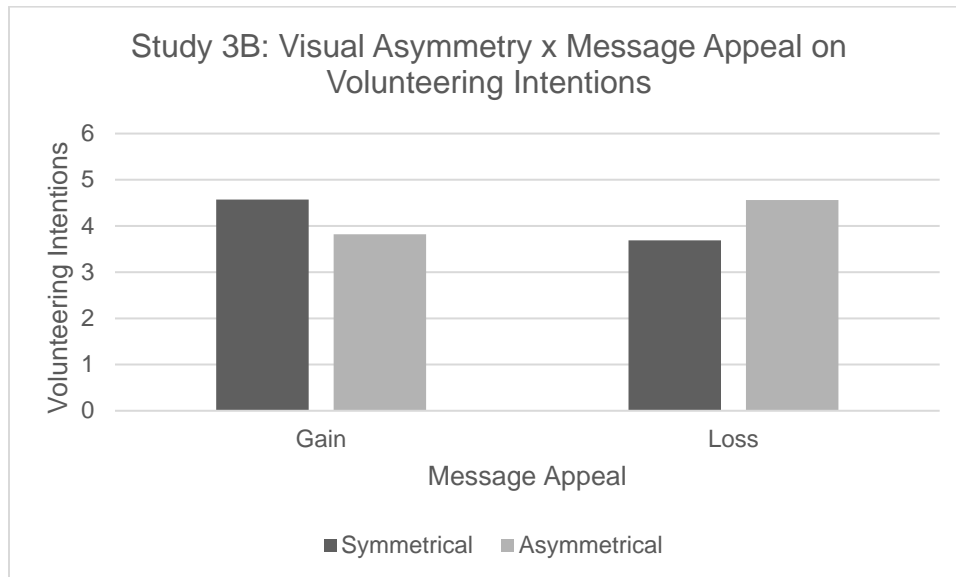


Starlight Foundation  
EDUCATION FOR ALL CHILDREN

Starlight Tutoring: **Avoiding declines in learning**

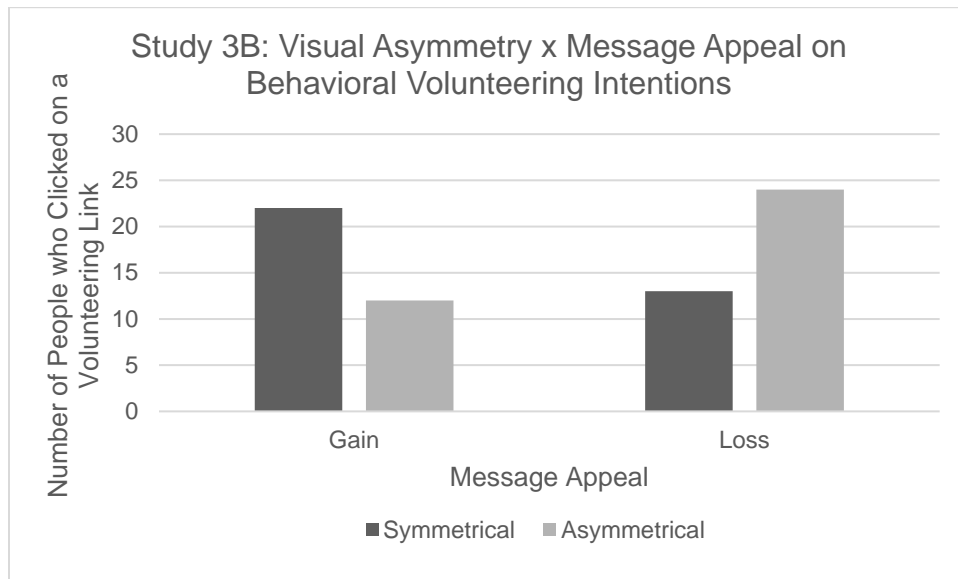
Starlight Tutoring aims to prevent underserved students from **experiencing learning loss** and **falling behind in academic performance**. Without any additional educational support, 35% of students showed significant learning losses that would cause them to fall behind by a grade level or more. We aim to prevent our students lives from getting worse and more complicated.

**Figure 10. Study 3b: Visual Symmetry × Message Appeal on Volunteering Intentions**

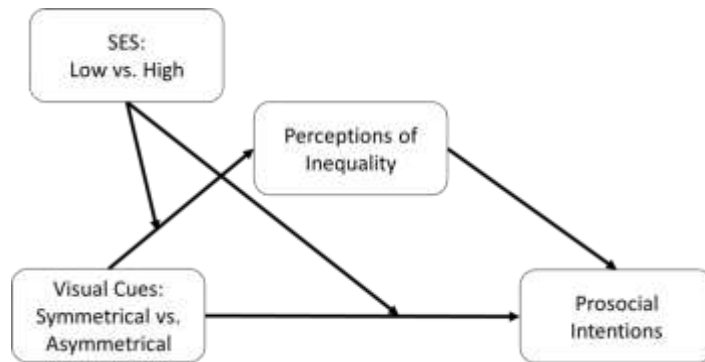


**Figure 11. Study 3b: Visual Symmetry × Message Appeal on Behavioral Volunteering**

**Intentions**



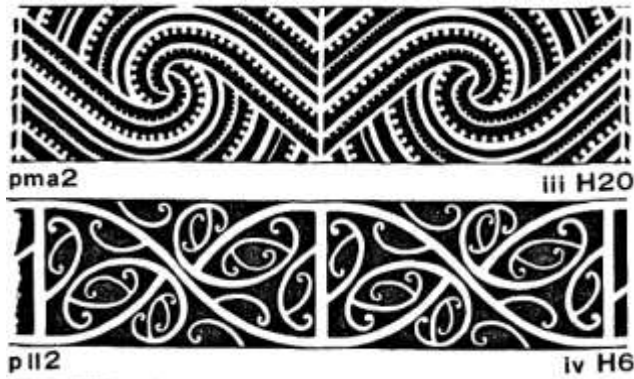
**Figure 12. Conceptual Framework: Moderating Role of SES**



## APPENDIX A

Examples of Symmetrical and Asymmetrical Visual Cues in Maori Culture (Hanson 1985; Donnay and Donnay 1985)

Symmetrical



Description

Symmetrical Maori Raft Patterns

Asymmetrical



Top: Assymetrical Maori Raft Patterns.



Bottom: In Maori culture, a person who is in an unbalanced social relationship (e.g., seeking revenge) can express this lack of balance by shaving one side of his head (i.e., an asymmetry in his appearance; Hanson 1985).

## APPENDIX B

Participants were asked to indicate how they would evaluate the logo's visual appeal using two 7-point items ("the logo is aesthetically appealing"; "the logo is attractive"; 1 = "strongly disagree" and 7 = "strongly agree"). Items were combined to create a visual appeal index. Participants then rated the logo's complexity using two 7-point items ("the logo is complex"; "the logo is complicated", 1 = "strongly disagree" and 7 = "strongly agree"). Items were combined to create a visual complexity index.

Finally, participants evaluated the logo's stability using two 7-point items ("the logo is unstable"; "the logo is unbalanced"; 1 = "strongly disagree" and 7 = "strongly agree"). Items were combined to create a visual stability index.

*Aesthetic Appeal:* Participants were asked to evaluate the overall aesthetic appeal of the logo using two 7-point items (aesthetically appealing; attractive ; 1 = "strongly disagree" and 7 = "strongly agree").

*Visual Complexity:* Participants were asked to evaluate the visual complexity of the logo using two 7-point items (complex; complicated; 1 = "strongly disagree" and 7 = "strongly agree").

*Visual Stability:* Participants were asked to evaluate the visual stability of the logo using two 7-point items (unstable; unbalanced 1 = "strongly disagree" and 7 = "strongly agree").

### Study 1 Pretest

	Symmetrical	Asymmetrical	<i>p</i> value
Aesthetic Appeal	5.67	5.73	<i>p</i> = .32
Visual Complexity	3.12	3.18	<i>p</i> = .49
Visual Stability	2.84	2.90	<i>p</i> = .19

### Study 2a

	Symmetrical	Asymmetrical	<i>p</i> value
Aesthetic Appeal	5.37	5.06	<i>p</i> = .11
Visual Complexity	3.52	3.28	<i>p</i> = .29
Visual Stability	2.88	3.21	<i>p</i> = .19

### Study 2b

	Symmetrical	Asymmetrical	<i>p</i> value
Aesthetic Appeal	4.60	4.74	<i>p</i> = .81

Visual Complexity	3.81	3.95	$p = .29$
Visual Stability	3.68	3.95	$p = .19$

#### Study 3a

	Symmetrical	Asymmetrical	$p$ value
Aesthetic Appeal	4.40	4.54	$p = .82$
Visual Complexity	3.21	3.33	$p = .39$
Visual Stability	3.78	3.80	$p = .93$

#### Study 3b

	Symmetrical	Asymmetrical	$p$ value
Aesthetic Appeal	4.52	4.56	$p = .89$
Visual Complexity	3.82	3.85	$p = .92$
Visual Stability	4.00	4.19	$p = .29$

#### Study 4

	Symmetrical	Asymmetrical	$p$ value
Aesthetic Appeal	4.53	4.60	$p = .21$
Visual Complexity	3.90	3.95	$p = .35$
Visual Stability	3.70	3.78	$p = .48$



## APPENDIX C

### AFFECTIVE RESPONSE MEASURE

How do you feel right now?

Not at all happy	1	2	3	4	5	6	7	Very happy
Not at all excited	1	2	3	4	5	6	7	Very excited
Not at all hopeful	1	2	3	4	5	6	7	Very hopeful
Not at all joyful	1	2	3	4	5	6	7	Very joyful
Not at all sad	1	2	3	4	5	6	7	Very sad
Not at all relaxed	1	2	3	4	5	6	7	Very relaxed
Not at all upset	1	2	3	4	5	6	7	Very upset
Not at all disgusted	1	2	3	4	5	6	7	Very disgusted
Not at all aroused	1	2	3	4	5	6	7	Very aroused
In a bad mood	1	2	3	4	5	6	7	In a good mood

## APPENDIX D

### Descriptive Statistics of Online Facebook Study

<b>Visual Symmetry</b>	<b>Reach</b>	<b>Clicks</b>	<b>CTR</b>	<b>Conversions (Signups)</b>	<b>CR</b>
Asymmetric	256,051	2441	0.9532%	46	0.0180%
Symmetric	256,560	2240	0.8733%	32	0.0125%

Reach = number of times the ad was shown, CTR = click-through rate ( $\text{clicks}/\text{reach} \times 100$ ),

CR = conversion rate ( $\text{conversions}/\text{reach} \times 100$ ).

## APPENDIX E

### MESSAGE APPEAL MANIPULATION CHECK

#### **Study 3a: Gain/Loss Appeal Manipulation Check**

-“To what extent did the BCA advertisement focus on the positive consequences of donating blood?”

-“To what extent did the BCA advertisement focus on the negative consequences of not donating blood?”

(1= not at all; 7= very well).

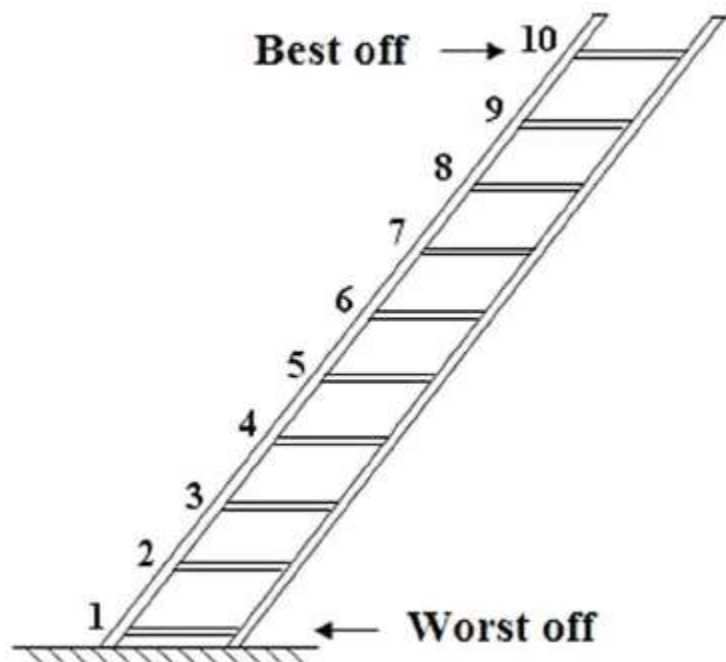
#### **Study 3b: Gain/Loss Appeal Manipulation Check**

To what extent did the Starlight banner focus on what the students gain from the tutoring program?

To what extent did the Starlight banner focus on what the students lose without the tutoring program?

(1= not at all; 7= very well).

## APPENDIX F



Think of this ladder as representing where people stand in our society. At the top of the ladder are the people who are the best off, those who have the most money, most education, and best jobs. At the bottom are the people who are the worst off, those who have the least money, least education, and worst jobs or no job.

Now please imagine yourself in the following scenario:

Consider that you first meet Alex, whose social standing is at the very top [bottom] of the ladder. How would you feel when getting acquainted with Alex? What would be the differences between you and Alex? Please write down below your thoughts on how your interaction with Alex would develop:

### *Low Social Class Condition*

Now, please compare yourself to the people at the very top of the ladder. These are people who are the best off—those who have the most money, most education, and the most respected jobs. In particular, we'd like you to think about how you are different from these people in terms of your own income, educational history, and job status. Where would you place yourself on this ladder relative to these people at the very top?

### *High Social Class Condition*

Now, please compare yourself to the people at the very bottom of the ladder. These are people who are the worst off—those who have the least money, least education, and the least respected jobs. In particular, we'd like you to think about how you are different from these people in terms of your own income, educational history, and job status. Where would you place yourself on this ladder relative to these people at the very bottom.

## **CHAPTER THREE**

### **ESSAY 2**

#### **HIDDEN IN PLAIN SIGHT: NEGATIVE SPACE LOGOS VISUALLY ENGAGE CONSUMERS AND ENHANCE BRAND EVALUATIONS**

## **ABSTRACT**

Building on the visual processing of subjective contours (Schumann 1904), we conceptualize negative space logos as those that creatively utilize the white space between logo elements to embed “hidden” imagery. Eight multi-method experiments illustrate when and how negative space logos should be employed by brands to enhance visual engagement and boost brand evaluations. A Facebook field experiment (Study 1) shows the effect of negative space logos on consumer response in a real-world ad campaign. To implicate the enhanced visual engagement afforded by negative space logos as the underlying process, we rely on self-reported engagement (Studies 2a and 2b), mouse-movements (Study 3a), and eye-tracking (Study 3b) measures. We identify three managerially relevant factors that impact the effectiveness of negative space logos: the importance of self-discovery of the hidden imagery in creating the “a-ha” response (Study 3a), the ordinariness (vs. coolness) of the product itself (Study 4), and the consumers’ holistic (vs. piecemeal) information processing style (Studies 5a and 5b). Our findings contribute to the body of literature dealing with logo design and provide insight and guidance to managers about when and how to utilize negative space logos to help break through the visual clutter and engage consumers to boost brand evaluations.

## INTRODUCTION

The FedEx logo without the hidden arrow is just plain vanilla—one plus one equals two. *With it*, it's one plus one equals three.

——— Lindon Leader, designer of the FedEx logo

The FedEx logo elicits greater scrutiny and prompts the question, “Is that an arrow in the FedEx logo?” more so than if the logo simply depicted the two-toned words “FedEx”. The FedEx logo, designed in 1994, is a well-known example of the effective use of negative space in logo design. The hidden arrow created through the white space between the “E” and “x” is a deliberate attempt to allow consumers to discover the “hidden” arrow – representing the FedEx brand message of speed and precision (Airey 2014). The FedEx logo has won over 40 design awards and was ranked as one of the eight best logos in the last 35 years by Rolling Stone magazine (Airey 2014). However, FedEx is not the only brand that creatively uses negative space in logo design. The dancing bear in the mountain of the Toblerone chocolate bar represents its Swiss origin by depicting the symbol of the city of Bern where the chocolate is produced. Similarly, the iconic Tour de France logo contained a “hidden” shape of cyclist in the word “Tour”, in which the “O” represented the back wheel of the bicycle while the “R” is transformed to look like the rider (McCauley 2017; Figure 1). As these examples illustrate, negative space logos creatively utilize the white space between logo elements to embed “hidden” imagery.

[Insert Figure 13 about here]

A brand logo is an essential component of the visual signature of a brand. Since logos visually represent what the brand stands for, a great deal of attention has been paid to how logo

characteristics influence consumer recall and recognition (Henderson and Cote 1998), brand perceptions (Cian, Krishna, and Elder 2014; Hagtvedt 2011; Jiang, Gorn, and Chattopadhyay 2016), and marketplace performance (Kim and Lim 2019). In a typical logo design, the focal subject (e.g., letters, images, or both) is depicted in a manner that is straightforward and easy to perceive (i.e., positive space logos). Consider the “H” logo designed by Michael Bierut for Hillary Clinton’s campaign that adorned campaign signage. The “H” uses an arrow, in a manner quite similar to FedEx (Bierut and Kinon 2016), but the arrow is bright red, clearly visible in the foreground and completely distinct from the empty space around it. Negative space logos are characterized by a design that manipulates the empty space around and between the focal visual elements of the logo to create a “hidden” visual brand-related message. From a design perspective, positive space and negative space logos are equivalent in terms of the focal visual elements used (Cote and Henderson 1998), are equally dynamic (Cian et al 2014), and equally descriptive (Lufarelli, Mukesh and Mahmood 2019). However, we posit that they are visually distinct from active white space logos (Sharma and Varki 2018), incomplete logos (Hagtvedt 2011) or those that have missing elements (Sengupta and Gorn 2002). We show that the appeal of negative space logos stems from the manipulation of empty space to create brand imagery that is “hidden in plain sight,” making the logo more engaging when that imagery is discovered.

In today’s visually cluttered world, consumers look at a great deal of information that they do not see or attend to. Marketers know that it is not enough to simply grab a consumer’s eyeballs for a fleeting moment, but instead strive to enhance visual engagement and encourage viewers to pay focused attention to the brand. The current research adopts a theoretical lens to explain when and why the designs of negative space logos increase visual engagement and



enhance brand evaluations. We begin with an exercise of theory specificity in which we demonstrate that negative space logos are more engaging and more likely to enhance brand evaluations compared to other closely related, but different, logo types (e.g., active white space logos, high-contrast positive space logos) using a variety of different engagement measures. We isolate the “a-ha” response underlying the revelation of the hidden imagery as the basis of the effectiveness of negative space logos and show that negative space logos work harder to boost engagement and evaluations of ordinary products that may be typically bypassed by consumers, but do not enhance evaluations of already cool and engaging products. Further, we find that a holistic processing style allows for the negative space logo to be viewed in its entirety resulting in more favorable response than a more piecemeal processing style.

## **THEORETICAL BACKGROUND**

### ***Definition of Negative Space***

We define negative space, positive space, and negative space designs as follows (a visual depiction with examples is presented in Figure 2): Negative space is the empty space around and between the focal subject(s) of an image. A popular, but simple, example of negative space is that of drawing two parallel black lines to reveal three lanes, since a white line is formed in the negative space. Positive space is the main foreground subject in an image. Negative space *design* (e.g., logo design) is formed when the space around (or in between) a focal visual subject is modified/constructed to form an artistically relevant visual form that lends added meaning to the main subject itself. A negative space logo uses the available negative space, i.e., the space between logo elements, to subtly convey a hidden brand-related message or image *without* the

addition of design elements. In contrast, a positive space logo design simply adds extra design elements to a visual subject to directly (non-subtly) convey meaning.

[Insert Figure 14 about here]

### The Psychology of Negative Space

According to Gestalt visual processing principles (Wagemans et al. 2012), the human eye tends to perceive similar visual elements in an image/design as a complete picture, shape, or group, even when those elements are separated. In particular, the human visual system often engages in “modal completion” (Wagemans et al. 2012, p. 1191), which occurs when an empty space is processed as a complete visual image with illusory or subjective contours, even though there are no actual contours presented to the eye. The visual phenomenon of the human visual system generating a subjective contrast border to complete an empty visual region is termed as “subjective contours” (Schumann 1904). While negative space design has not yet been explicitly examined in consumer psychology research, the visual phenomenon of subjective contours (SCs) shares some of the characteristics of negative space design. Some of the most well-known examples of SCs were developed by the Italian psychologist Kanizsa (1976), and the most notable is the “Kanizsa’s triangle”. Although there are no physical contours connecting the three incomplete circular shapes, a white triangle is nonetheless perceived because of subjective contours. SCs are described as “figures...in which a contour is subjectively completed,” (Woodworth 1938, p. 636) even though there are no physical or visible contours.

How are SCs perceived? Although the causes of SCs remain to be debated, cognitive theorists suggested that SCs are perceived due to the tendency of the visual system to complete

certain figural elements (Gregory 1972). For instance, the Kanizsa's triangle could be said to consist of only three angles and three circular sectors. However, people nonetheless see a white triangle on top of three black disks and another triangle with black border. The perception of the white triangle occurs because when viewing an array of visual stimuli, people seek a conceptual structure in order to simplify and organize the presented information (Pradny 1983). Such perceptual organization leads to a more stable and more balanced figure: the three angles of the incomplete circles form a triangle. In order for this perceptual organization to materialize, however, the white area in the center must have a border, and thus, the necessary contours are supplied by the visual system (Kanizsa 1976). The cognitive perspective of subjective contours is also supported by the view of Gestalt psychology, which posits that perception is best understood as organized patterns rather than separate elements (Köhler 1970).

Subsequently, visual psychologists have also documented how SCs evolved to be used in art and graphic design (Petry and Meyer 1987). Indeed, SCs provide a psychological foundation for negative space design by demonstrating (1) how the visual system is motivated to complete images thus allowing subjective contours (or negative space) to be perceived, and (2) how physical contours or boundaries are not necessarily required for a stimulus to be perceived. However, there are distinct differences between the two constructs. Negative space design does not necessarily hinge on the arrangement of different visual figures, although such arrangement may also create a negative space design (e.g., a Kanizsa's triangle). In most cases, negative space design is produced through modification of the empty space surrounding a central figure, so that a new visual design (e.g., a hidden arrow in the FedEx logo) can be perceived. Next, we discuss how negative space logo design can enhance visual engagement and brand evaluations.

## CONCEPTUAL FRAMEWORK

### *Negative Space Logos Enhance Visual Engagement*

A negative space logo design is created when the space around (or in between) a focal visual subject/positive space (e.g., a brand name) is modified/constructed to form a brand-relevant visual form. Therefore, a logo design can be perceived as being composed of predominantly positive space (i.e., positive space logos), or including an additional negative space element (i.e., negative space logos).

We acknowledge that prior research has examined related logo designs. However, the previously examined logo designs are conceptually and empirically different from our focus on negative space designs. Closely related research on active white space (AWS) logos defines AWS as the white space between individual logo design elements (Sharma and Varki 2018). Examples of AWS can be seen in Hagtvedt's (2011) research on incomplete typeface logos where parts of the typeface are intentionally left blank (e.g., IBM logo) or Sharma and Varki's (2018) work on how AWS in pictorial logos (e.g., Microsoft Windows logo) enhances visual evaluations. Negative space logos are not simply empty white space but are rather created through the creative use of white space to embed a hidden image. While AWS mainly serves to clearly outline and isolate individual logo elements, negative space logos involve modifying the negative space within the logo to produce "hidden" imagery. We empirically illustrate this distinction between AWS and negative space logos in Study 2a. Further, negative space logo designs are not those characterized by incomplete, absent, or missing elements (Hagtvedt 2011; Sengupta and Gorn 2002). The omission of visual elements relies on the brain to complete the image in a manner similar to optical illusions. In the case of incomplete or missing elements in

the logos, the image is completed by one's brain, but the element is simply not present in reality. In contrast, negative space design (e.g., the hidden arrow in the FedEx logo) has an image that is present and designed in the white space but remains "hidden" for consumers to discover. In our studies, we use logo designs that can be seen as visually clear and complete across all our studies.

Our central hypothesis is that negative space (vs. positive space) logos better enhance engagement because they allow viewers to discover the visual brand message concealed in the logo design (Lidwell, Holden, and Butler 2010). Hedonistic aesthetic theory would suggest that if viewers can "make meaning" of an image through the discovery of the signifiers or visual symbols that were "put in play by the artist/author" (Barthes 1971, p. 171), they are more likely to experience active engagement. Further, the visual processing literature on subjective contours supports our expectation that negative space logos are more engaging than positive space ones. Compared to real contours, subjective contours attract more attention (Pritchard and Warm 1983) and facilitate greater performance in visual discrimination tasks (Pomerantz et al. 1981). We define engagement as the extent to which consumers feel interested in and maintain attention to a specific visual stimulus (Cian et al. 2014; Pieters and Wedel 2007). We posit that when viewing negative space logos, the "hidden" element of the visual design is often not readily seen by consumers. As such, consumers are able to participate in deciphering the negative space design and thus experience greater engagement. Anecdotal evidence appears to support this hypothesis. Lindon Leader, the designer of the FedEx logo, proposed that what makes the logo particularly captivating to viewers is that the hidden arrow creates that 'aha moment' for people when they discover it (Airey 2014). If FedEx's PR firm had executed their initial idea to make the arrow

more obvious by filling it in with another color (i.e., the arrow would become positive space), consumers would not experience the ‘aha moment’ that makes the logo visually engaging.

### ***Negative Space Logos Boost Brand Evaluations***

Visually engaging logos play an important role in shaping brand evaluations. For instance, Wang (2006) found that when consumers are engaged, the effectiveness of message processing and evaluations towards the advertisement are enhanced. Similarly, Kilger and Romer (2007) showed that engagement is positively correlated with product purchase intentions. Aesthetics research has also examined how specific design features can enhance engagement and brand evaluations. Research on the design of branded mobile apps found that apps with more user-centered design style were more likely to enhance engagement and thus improve consumer connections to brands (Bellman et al. 2011) and visually engaging content increases purchase intent on Instagram (Valentini et al. 2018). In the context of logo design, prior research has demonstrated how more dynamic imagery can increase visual engagement, which can lead to more favorable brand evaluations (Cian et al. 2014) as well as more responsive behavioral change (Cian et al. 2015). In summary, the findings of previous research demonstrated the role of engagement in bolstering brand evaluations. Drawing on the preceding arguments, we propose:

H1: Negative space (vs. positive space) logos enhance visual engagement.

H2a: Negative space (vs. positive space) logos generate more favorable brand evaluations, and

H2b: Visual engagement mediates the effect of negative space (vs. positive space) logos on brand evaluations.

We present eight multi-method studies that test our hypotheses (see Table 1 for an overview). Study 1 is a Facebook field study that tests the effect of negative space logos on consumer response (Facebook clicks and volunteer signups) to an online ad campaign (H2a). Studies 2a and 2b are designed to (1) implicate visual engagement as the underlying mechanism (H1 and H2b), and (2) demonstrate the effect of negative space logos on brand evaluations (H2a) through various consequential measures (self-reported brand evaluations, website visits, and willingness to pay). These studies also empirically disentangle the effects of negative space logos from positive space logos (all studies), active white space (Study 2a) logos, and high visual contrast positive space logos (Study 2b). The remaining studies identify when negative space logos are most effective: Study 3a identifies the importance of the self-discovery of the negative space imagery. Study 4 demonstrates that negative space logos work better to enhance the evaluation of ordinary products, but do not have a significant impact on cool or extraordinary products. Studies 5a and 5b show that negative space logos are processed more readily when consumers have a holistic (vs. piecemeal) processing style. While each study provides process evidence to support visual engagement as the underlying mechanism, studies 3a and 3b are particularly notable from a methodological perspective as they employ novel implicit measures of visual engagement - mouse movements (Study 3a) and eye-tracking (Study 3b).

[Insert Table 1 about here]

### **STUDY 1: HELPING HANDS FACEBOOK STUDY**

This study was designed to demonstrate the effect of negative space (vs. positive space) logos on brand evaluations in a real-world context. The study was conducted in collaboration with a non-profit organization that was running an online campaign to attract volunteers for a

disaster relief fund. The campaign was conducted in the local area during flood season. Two versions of an identical Facebook ad were created using two different images (negative space vs. positive space). In the negative space version, the negative space within the letter H was modified into the imagery of two hands. In the positive space version, the image of two hands were added on top of the letter H. The ad ran over the course of 10 days (August 9<sup>th</sup> – August 18<sup>th</sup> 2019) using Facebook's split test function, which allowed us to test the two versions of the ads (see Figure 15) with random non-overlapping groups of audience. The ads were targeted towards both men and women aged 18-35 who had university-level education and were interested in charity and community issues. When a Facebook user clicked on the ad, he/she was redirected to a webpage that contains the same ad and a volunteer sign-up sheet in which the user could provide their contact information and sign up to volunteer for a flood disaster relief fund. We obtained two key measures of brand evaluations in this study: (1) number of ad clicks generated by each version of the ad versions over the 10 days, and (2) the number of volunteer signups from each ad. Notably, the ads were set for desktop views only and the relevance score for both ads was identical (score = 9).

[Insert Figure 15 about here]

*Number of ad clicks.* Given that the number of ad clicks was a count variable, a Poisson regression analysis (following protocol from Crolic and Janiszewski 2016; Kayrouz, Dear, Karin, and Titov 2016) was conducted to predict the number of ad clicks over the course of the ad campaign based on the ad version (negative space vs. positive space). Results of the analysis revealed that a consumer who viewed the negative space ad was .89 times more likely to click on the ad than a consumer who viewed the positive space ad ( $\text{Exp}(\beta) = .89$ ,  $\beta = -.12$ ,  $\chi^2(1) = 55.30$ ,



95% CI = [.86, .92],  $p < .001$ ). Results also showed that the negative space ad generated more clicks than positive space ad ( $M_{\text{positive-space}} = 833.67$  vs.  $M_{\text{negative-space}} = 935.50$ ).

*Number of volunteer signups.* A similar Poisson regression analysis was conducted to analyze the number of volunteer signups over the course of the ad campaign stemming from each ad version. Results revealed that when a consumer saw an ad with negative space design (vs. positive space design), he/she was .67 times more likely to sign up for the disaster relief fund ( $\text{Exp}(\beta) = .67$ ,  $\beta = -.40$ ,  $\chi^2(1) = 11.09$ , 95% CI = [.53, .85],  $p = .001$ ). Results also showed that the negative space ad generated a greater number of volunteer signups than the positive space ad ( $M_{\text{positive-space}} = 11.60$  vs.  $M_{\text{negative-space}} = 17.30$ ).

Results of Study 1 provides support for H2a that negative space logos can enhance brand evaluations (Facebook clicks and volunteer signups). In the two studies the follow, we replicate the effect of negative space logos on visual engagement and brand evaluations in a more controlled lab environment. To establish theory specificity, we compare the effects of negative space logos with active white space logos (Study 2a) and high visual contrast positive space logos (Study 2b) on visual engagement, brand evaluation, as well as consequential downstream variables such as website visits (Study 2a) and willingness to pay (Study 2b). We also rule out perceived logo creativity as an alternative underlying mechanism.

## **STUDY 2A: NEGATIVE SPACE VERSUS ACTIVE WHITE SPACE LOGOS**

The objective of Study 2a was to contrast the effect of logos that employ negative space design (when a design element is hidden within empty space) with active white space logos (empty space within an image that is vacant) and positive space logos (when a design element is explicitly incorporated into the logo). In particular, active white space logos contain no design

within either (1) the empty spaces that emerge within the structure of the logo (e.g., the empty spaces acting as borders between the squares of Microsoft windows logo; Sharma and Varki 2018), or (2) empty spaces that emerge within intentionally incomplete logos (e.g., IBM logo; Hagtvedt 2011). We aim to demonstrate that negative space (vs. active white space and vs. positive space) logos (1) enhance visual engagement (H1), (2) generate more favorable brand evaluations (H2a) via enhanced visual engagement (H2b), and (3) result in more website visits (click-throughs). We expect that a negative space logo is distinct in its effect, and that the active white space logo will be perceived as similar to a positive space logo, as active white space does not contain the hidden design elements that characterize negative space logos (Sharma and Varki 2018). We measure perceived visual creativity, and rule it out as an alternative explanation.

### ***Method***

*Participants and design.* One hundred and ninety-seven undergraduate students (54.8% female,  $M_{\text{age}} = 21.59$ ) participated in this experiment in exchange for partial course credit. The experiment employed a one-way between-subjects design with 3 logo design conditions: positive space versus active white space versus negative space.

[Insert Figure 16 about here]

*Procedure.* Participants were told that a new gourmet food and travel magazine called “American Food Writers” (AFW) is testing several logo designs. Participants were then instructed to view a potential logo design of AFW and to provide their evaluations of the logo. They were then shown one of the three logo designs (positive space vs. active white space vs. negative space; see Figure 16). We then assessed participants’ engagement using five 7-point items: involving, engagement, stimulating, captivating, interesting (1 = “not at all” and 7 =

“extremely”; adapted from Cian et al. 2014). Participants then evaluated the AFW magazine (1 = “unfavorable/negative/bad/unpleasant/dislike”; 7 = “favorable/positive/good/pleasant/like”; Hagtvedt and Patrick 2008). Next, participants were told that AFW magazine was considering a new issue at the University with a focus on local food culture. If they were interested, they could preview AFW website and were provided with a link to the website. If participants were not interested in previewing the website, they could proceed to the next section of the experiment.

Participants were then asked to evaluate other dimensions of the logo design, including aesthetic appeal, visual complexity, informativeness, novelty, visual creativity, visual clarity, visual completeness, and brand familiarity (seven-point items). No significant differences in these dimensions were found between the two logo designs, except for visual creativity (see Appendix G for measures)<sup>1</sup>. The active white space logo was perceived as significantly lower in visual creativity, in comparison to both positive space and negative space logos ( $M_{\text{active-white-space}} = 3.73$  (SD = 1.54) vs.  $M_{\text{positive-space}} = 4.91$  (SD = 1.62) vs.  $M_{\text{negative-space}} = 5.38$  (SD = 1.50),  $F(2, 194) = 19.67$ ,  $p < .001$ ,  $\eta^2 = .169$ ). Such differences in visual creativity demonstrate the distinction between negative space logo and active white space logo, but there was no significant difference in perceived creativity between the positive space and negative space logos. We assessed participants’ familiarity with negative space logos and did not find any significant differences ( $p > .10$ ; see Appendix G for measures) across the two conditions. Participants were also asked to indicate if they were able to see the embedded spoon within the positive space and negative space logo design (“Yes/No”) and all participants were able to identify the imagery

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<sup>1</sup>In the rest of the studies, the stimuli did not significantly differ in these visual dimensions and participants did not differ in terms of familiarity with negative space logos. For the sake of brevity, we report the results of these measures in Appendix G.

across both conditions<sup>2</sup>. Finally, participants completed a manipulation check of the logo design consisting of two items, “I think the logo is more of a positive space design” and “I think the logo is more of a negative space design” (1 = “strongly disagree” and 7 = “strongly agree”). In order to ensure that participants understand the difference between positive space and negative space, they were shown an example and description of the two concepts in the manipulation check (see Appendix H for details).

## ***Results and Discussion***

*Manipulation check: logo design.* A one-way ANOVA ( $F(2, 194) = 56.25, p < .001, \eta^2 = .367$ ) on the negative space manipulation check item revealed that the participants perceived the negative space logo as more of negative space design relative to the active white space logo ( $M_{\text{negative-space}} = 5.32$  (SD = 1.90) vs.  $M_{\text{active-white-space}} = 2.58$  (SD = 1.85),  $p < .001$ ) and relative to the positive space logo ( $M_{\text{positive-space}} = 2.38$  (SD = 1.57),  $p < .001$ ). For active white space logo and positive space logo, there were no significant differences in the negative space manipulation check ( $p = .508$ ). A similar analysis on the positive space manipulation check item ( $F(2, 194) = 24.39, p < .001, \eta^2 = .201$ ) revealed that participants perceived the positive space logo as more of a positive space design relative to the negative space logo ( $M_{\text{positive-space}} = 5.29$  (SD = 1.89) vs.  $M_{\text{negative-space}} = 3.12$  (SD = 1.93),  $p < .001$ ). Results did not reveal significant differences in the positive space manipulation check for the positive space logo and active white space logo ( $M_{\text{positive-space}} = 5.29$  vs.  $M_{\text{active-white-space}} = 4.95, p = .320$ ), which suggests the active white space logo is perceived similarly as a positive space logo, rather than as a negative space logo.

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<sup>2</sup> For all studies presented, all participants were able to identify the imagery embedded within each logo design across both positive space and negative space conditions.

*Engagement.* A one-way ANOVA on the engagement index ( $\alpha = .95$ ,  $F(2, 194) = 20.80$ ,  $p < .001$ ,  $\eta^2 = .177$ ) revealed a significant main effect of logo design such that the negative space logo generated significantly higher engagement relative to the positive space logo ( $M_{\text{negative-space}} = 4.78$  (SD = 1.51) vs.  $M_{\text{positive-space}} = 3.26$  (1.65),  $p < .001$ ) and active white space logo ( $M_{\text{active-white-space}} = 3.23$  (SD = 1.56),  $p < .001$ ). Results did not reveal significant differences in engagement between positive white space and active white space logos ( $p = .922$ ). This result provides support for H1.

*Brand evaluations.* A one-way ANOVA on brand evaluations ( $\alpha = .96$ ,  $F(2, 194) = 9.44$ ,  $p < .001$ ,  $\eta^2 = .089$ ) revealed a significant main effect of logo design such that the negative space logo generated significantly more favorable brand evaluations relative to the positive space logo ( $M_{\text{negative-space}} = 5.47$  (SD = 1.16) vs.  $M_{\text{positive-space}} = 4.62$  (SD = 1.60),  $p < .001$ ) and active white space logo ( $M_{\text{active-white-space}} = 4.54$  (SD = 1.27),  $p < .001$ ). Results did not reveal significant differences in brand evaluations between positive white space and active white space logos ( $p = .727$ ). This result provides support for H2a.

*Website visits.* A logistic regression analysis was conducted to test the effect of logo design (negative space logo was set at the reference category) on the likelihood of website visit (0 = no, 1 = yes). We predicted that participants in the negative space condition would be more likely to preview the brand's website than those in the positive space condition or active white space. The analyses supported this prediction for both 'negative space vs. positive space' comparison ( $b = .36$ ; Exp (B) = 2.80, Wald = 8.14,  $p = .004$ ) and 'negative space vs. active white space' comparison ( $b = .80$ ; Exp (B) = 2.23, Wald = 5.06,  $p = .024$ .) Crosstabs analysis revealed that 41 out of 66 (62.1%) participants in negative space condition clicked on the website preview

versus 28 out of 66 (42.4%;  $\chi^2(1) = 5.06, p = .024$ ) participants in the positive space condition clicked on the website preview. Relative to the negative space condition, analysis also revealed that only 24 out of 65 (36.9%;  $\chi^2(1) = 8.14, p = .004$ ) participants in the active white space condition clicked on the website preview. No significant differences in number of website visits were observed between positive space and negative space conditions ( $p = .910$ ).

*Mediation analyses.* We tested the mediating role of engagement on brand evaluations using PROCESS Model 4 with 5,000 bootstrapped resamples (Hayes 2018). Since logo design is a multi-categorical independent variable, we used an indicator coding system (negative space = 0, active white space = 1, positive space = 2) and set negative space as the reference group. Two dummy variables were coded for each of the active white space condition (X1) and positive space condition (X2). In the X1 analysis, the logo design (negative space = 0 and active white space = 1) was the independent variable, engagement was the mediator, and brand evaluations was the dependent variable. The X2 analysis was identical except the logo design (negative space = 0 and positive space = 1) was the independent variable. Results of both analyses revealed significant mediation effects (negative space vs. active white space:  $\beta = -.52, SE = .121, 95\% CI = [-.77, -.31]$ ; negative space vs. positive space:  $\beta = -.52, SE = .122, 95\% CI = [-.77, -.29]$ ), thereby indicating a significant indirect effect of engagement on the relationship between logo design and brand evaluations, supporting H2b. A similar mediation analysis was conducted with likelihood of website visit as the dependent variable. Results also revealed significant mediation effects (X1 = negative space vs. active white space:  $\beta = -.26, SE = .076, 95\% CI = [-.73, -.43]$ ; X2 = negative space vs. positive space:  $\beta = -.39, SE = .301, 95\% CI = [-.62, -.36]$ ), thereby

indicating a significant indirect effect of engagement on the relationship between logo design and website visits.

*Visual creativity as an alternative mediator.* We conducted a similar mediation analysis with visual creativity as the mediator and brand evaluations as the dependent variable. Results revealed a significant mediation effect for the X1 analysis (negative space vs. active white space:  $\beta = -.61$ ,  $SE = .138$ , 95% CI = [-.90, -.36]) but not for the X2 analysis (negative space vs. positive space: 95% CI = [-.40, -.02]). A similar mediation analysis was conducted with website visit as the dependent variable. Results also revealed a significant mediation effect for the X1 analysis (negative space vs. active white space:  $\beta = .32$ ,  $SE = .179$ , 95% CI = [.01, .71]) but not for the X2 analysis (negative space vs. positive space: 95% CI = [-.02, .28]).

The results of Study 2a provides support for our hypotheses 1-2b showing the impact of negative space logos on brand evaluations through enhanced visual engagement. Further, we also demonstrated the important distinction between active white space vs. negative space logo design. In the next study, we aim to replicate the effects observed in Study 2a using a high-contrast positive space logo design to enhance the specificity of the negative space logo effect.

## **STUDY 2B: NEGATIVE SPACE VERSUS. HIGH VISUAL CONTRAST LOGOS**

Study 2b is similar to Study 2a, except that instead of an active white space logo, we included an additional positive space logo design with high visual contrast (HC) to enhance the specificity of the negative space logo effect. We expect the negative space (vs. positive space vs. HC positive space) logo will enhance visual engagement and brand evaluations. We also measured willingness to pay (WTP) as an additional measure of positive brand evaluations.

## ***Method***

*Participants and design.* Three hundred and thirty-two undergraduate students (56.9% female,  $M_{\text{age}} = 20.77$ ) participated in this experiment in exchange for partial course credit. The experiment employed a between-subjects design with 3 conditions: positive space versus high-contrast (HC) positive space versus negative space.

[Insert Figure 17 about here]

*Procedure.* Participants were told that a clothing brand called “MyShirt” is testing several logo designs. Participants were then instructed to view a potential logo design of MyShirt and to provide their evaluations of the logo. They were then shown one of the three logo designs (positive space vs. HC positive space vs. negative space; see Figure 17). We then assessed participants’ engagement and brand evaluations using measures identical to Study 2a. Using a sliding scale, participants also indicated how much they were willing to pay for a MyShirt T-shirt, considering that the average price for a high-quality T-shirt is 20 dollars.

Participants were then asked to assess the visual contrast of the logo design (“very low contrast – very high contrast,” 7-point scale). Participants perceived the HC positive space logo to be significantly higher in visual contrast, in comparison to both positive space and negative space logos ( $M_{\text{HC-positive-space}} = 5.14$  ( $SD = 1.67$ ) vs  $M_{\text{positive-space}} = 3.86$  ( $SD = 1.96$ ) vs.  $M_{\text{negative-space}} = 3.98$  ( $SD = 2.00$ );  $F(2, 329) = 15.71$ ,  $p < .001$ ,  $\eta^2 = .087$ ). There were no significant differences in visual contrast between the positive space and negative space logos ( $p = .31$ ). Finally, participants completed the same logo design manipulation check.



## ***Results and Discussion***

*Manipulation check: logo design.* A one-way ANOVA on the negative space manipulation check revealed that participants perceived the negative space logo (vs. positive space logo vs. HC positive space logo) as more of a negative space design ( $M_{\text{negative-space}} = 5.88$  ( $SD = 1.32$ ) vs.  $M_{\text{positive-space}} = 2.82$  ( $SD = 1.97$ ) vs.  $M_{\text{HC-positive-space}} = 2.94$  ( $SD = 1.71$ );  $F(2, 329) = 115.53$ ,  $p < .001$ ,  $\eta^2 = .413$ ). On the other hand, participants perceived both the positive space logo and HC positive space logo (vs. negative space logo) as more of a positive space design ( $M_{\text{positive-space}} = 5.05$  ( $SD = 1.93$ ) vs.  $M_{\text{HC-positive-space}} = 5.36$  ( $SD = 1.82$ ) vs.  $M_{\text{negative-space}} = 3.00$  ( $SD = 1.88$ );  $F(3, 329) = 51.40$ ,  $p < .001$ ,  $\eta^2 = .238$ ). Contrast analysis showed that no significant differences emerged between positive space and HC positive space logos for both negative space manipulation check ( $p = .610$ ) and positive space manipulation check ( $p = .223$ ).

In the rest of the studies, the manipulation check results continued to replicate to show that negative space and positive space logos are perceived as significantly distinct; therefore, for brevity, we report the manipulation check results of the rest of the studies in Appendix H.

*Engagement.* A one-way ANOVA on the engagement index ( $\alpha = .97$ ) revealed a significant main effect of logo design ( $F(2, 329) = 14.05$ ,  $p < .001$ ,  $\eta^2 = .079$ ), such that negative space logo generated significantly greater engagement than both positive space and HC positive space logos ( $M_{\text{negative-space}} = 4.25$  ( $SD = 1.75$ ) vs.  $M_{\text{positive-space}} = 3.10$  ( $SD = 1.57$ ) vs.  $M_{\text{HC-positive-space}} = 3.34$  ( $SD = 1.80$ )), supporting H1. There were no significant differences in engagement between positive space and HC positive space logos ( $p = .332$ ).

*Brand evaluations.* A one-way ANOVA on brand evaluations ( $\alpha = .97$ ) revealed a significant main effect of logo design ( $F(2, 329) = 4.18$ ,  $p = .016$ ,  $\eta^2 = .025$ ) such that negative

space logo generated significantly more favorable brand evaluations than both positive space and HC positive space logos ( $M_{\text{negative-space}} = 4.70$  ( $SD = 1.50$ ) vs.  $M_{\text{positive-space}} = 4.13$  ( $SD = 1.44$ ) vs.  $M_{\text{HC-positive-space}} = 4.30$  ( $SD = 1.63$ )), supporting H2a. There were no significant differences in brand evaluations between positive and HC positive space logos ( $p = .501$ ).

*WTP.* A one-way ANOVA on WTP revealed a significant main effect of logo design ( $F(2, 329) = 5.74, p = .004, \eta^2 = .034$ ) such that participants in the negative space condition indicated greater WTP than those in the positive space and HC positive space conditions ( $M_{\text{negative-space}} = \$11.49$  ( $SD = 4.22$ ) vs.  $M_{\text{positive-space}} = \$10.12$  ( $SD = 3.87$ ) vs.  $M_{\text{HC-positive-space}} = \$9.64$  ( $SD = 4.52$ )). There were no significant differences in WTP between positive and HC positive space logos ( $p = .394$ ).

*Mediation analyses.* We tested the mediating role of engagement on brand evaluations using PROCESS Model 4 with 5,000 bootstrapped resamples (Hayes 2018). Since logo design is a multicategorical independent variable, we used an indicator coding system (negative space = 0, HC positive space = 1, positive space = 2) and set negative space as the reference group. Two dummy variables were coded for each of the HC positive space condition (X1) and positive space condition (X2). In the X1 analysis, the logo design (negative space = 0 and HC positive space = 1) was the independent variable, engagement was the mediator, and brand evaluations was the dependent variable. The X2 analysis was identical except the logo design (negative space = 0 and positive space = 1) was the independent variable. Results of both analyses revealed significant mediation effects (negative space vs. HC positive space:  $\beta = -.31, SE = .094, 95\% CI = [-.50, -.14]$ ; negative space vs. positive space:  $\beta = -.38, SE = .091, 95\% CI = [-.57, -.21]$ ), thereby indicating a significant indirect effect of engagement on the relationship between logo

design and brand evaluations, supporting H2b. A similar mediation analysis was conducted with likelihood of website visit as the dependent variable. Results also revealed significant mediation effects (X1 = negative space vs. HC positive space:  $\beta = -.26$ , SE = .076, 95% CI = [-.73, -.43]; X2 = negative space vs. positive space:  $\beta = -.39$ , SE = .301, 95% CI = [-.62, -.36]), indicating a significant indirect effect of engagement on the relationship between logo design and WTP.

Studies 2a and 2b provide support for H1-H2b that negative space logos boost brand evaluations by enhancing visual engagement, assessed using self-report measures. Next, we bolster our effects of negative space logos by measuring visual engagement through implicit measures, including mouse movements (Study 3a) and eye-tracking (Study 3b). Further, in Study 3a, we also demonstrate how visual engagement elicited by negative space logos hinges on the process of consumers discovering the hidden imagery (i.e., the “Aha” response).

Specifically, we propose that negative space logos generate higher engagement only when consumers participate in discovering the hidden imagery. We argue that negative space logos increase engagement because the “hidden” visual element is unexpected compared to the typical logo design, where the visual information is explicit. Once consumers ‘discover’ what is hidden in the logo design, such a resolution results in an ‘aha moment’ (Shultz 1972), which enhances visual engagement. In other words, when consumers discern the hidden imagery embedded in the negative space logo they are visually engaged, and this translates into higher brand evaluations. In contrast, when the imagery is explicitly revealed by the marketer, the visual engagement and subsequent brand evaluation is attenuated. Formally, we expect:

H3: Self-discovery of the hidden imagery embedded in negative space logos enhances visual engagement and brand evaluations, while revelation of the hidden imagery by the marketer (e.g., in advertising) attenuates the effect.

### **STUDY 3A: THE “AHA” RESPONSE WHEN DISCOVERING THE HIDDEN IMAGERY**

In this study, we sought to enhance our understanding of the negative space – engagement – brand evaluation relationship observed in studies 2a and 2b. In this study, we manipulate specifically *how* consumers come to discover the hidden imagery in negative space logos – via explicit presentation by the brand versus via self-discovery. We expect that the visual engagement elicited by negative space logos hinges on the process of consumers discovering the hidden visual imagery (H3). We expect that if the hidden imagery is explicitly revealed, the effect of negative space logos on engagement and brand evaluations will be attenuated. Further, we examine participants’ mouse movements when viewing a website that featured the brand logo as an additional measure by which to assess visual engagement.

#### ***Method***

*Participants and design.* Six hundred and ninety-three undergraduate students (56.4% female,  $M_{\text{age}} = 22.06$ ) participated in this experiment in exchange for partial course credit. The experiment employed a 2 (logo design: positive space vs. negative space)  $\times$  2 (source of engagement: self-discovery vs. brand presentation) between-subjects design

*Procedure.* Participants were told that an electronics brand called “NetCat” was testing several website and logo designs. Participants were randomly assigned to one of the four experimental conditions and were instructed to view a draft of NetCat homepage website. In the

‘self-discovery’ condition, participants saw the NetCat logo design (positive space vs. negative space) alongside the tagline “Need a new phone? We’re here for you!). In the ‘brand presentation’ condition, participants saw the same billboard with the tagline “Need a new phone? Look for the cat in our logo” (see Figure 18 for stimuli details). When participants viewed the website, their mouse movements were recorded by the embedded HTML code from <https://mouseflow.com/>. In particular, we obtained two key measures from participants’ mouse movements: (1) whether participants hover their mouse over the logo and (2) the amount of time participants’ mouse hovered over the logo. We then assessed participants’ engagement and brand evaluations using the same measures as in previous studies. As a manipulation check for source of engagement, participants were asked to identify the correct tagline they saw from the billboard. All participants correctly identified the tagline according to their assigned condition. Finally, participants completed the logo design manipulation check as used in prior studies.

### ***Results and Discussion***

*Hovering rate.* We capture the hovering rate of participants’ mouse movement in order to demonstrate the ‘aha’ moment when people discover the hidden imagery within the negative space logo. Specifically, we hypothesize that if people discover the hidden image within the negative logo, they will be more likely to hover over the hidden imagery. We created an area of interest (AOI) around the cat imagery within the logo and measured whether participants’ mouse hovered over the cat imagery (0 = ‘no’, 1 = ‘yes’). The mouse movement is automatically recorded as hovering if the mouse stayed over the AOI for more than 1 second. A logistical regression analysis was conducted to test the effect of logo design  $\times$  source of engagement (self-discovery vs. brand presentation) on hovering rate. Results revealed a significant logo design  $\times$

source of engagement interaction ( $b = -.45$ ;  $\text{Exp (B)} = .64$ ,  $\text{Wald} = 6.41$ ,  $p = .011$ ). Crosstabs analysis revealed that in the self-discovery condition ( $n = 344$ ), 111 (63.4%) out of 175 participants who viewed the negative space logo hovered over the AOI, whereas only 78 (46.2%) out of 169 participants who viewed the positive space logo hovered over the AOI ( $\chi^2(1) = 10.36$ ,  $p = .001$ ). In the brand-presentation condition ( $n = 349$ ), there were no significant differences in hovering rate between the positive space and negative space logo conditions ( $M_{\text{negative-space}} = 41.6\%$  ( $n = 171$ ) vs.  $M_{\text{positive-space}} = 48\%$  ( $n = 178$ ),  $p = .231$ )

*Duration of hovering.* We also obtained the duration of hovering over the AOI which we consider another measure of engagement. Since the duration of hovering is 0 for participants who did not hover over the AOI, we focused our analysis specifically to participants who hovered over the AOI. A 2 (logo design: positive space vs. negative space)  $\times$  2 (source: self-discovery vs. brand presentation) ANOVA on the duration of hovering revealed a significant logo design  $\times$  source of engagement interaction ( $F(1, 689) = 6.25$ ,  $p = .013$ ,  $\eta^2 = .009$ ). Contrast analysis showed that under the ‘self-discovery’ condition, participants who viewed the negative space logo hovered longer over the AOI than those who viewed the positive space logo ( $M_{\text{negative-space}} = 1.27$  ( $SD = 1.04$ ) vs.  $M_{\text{positive-space}} = .83$  ( $SD = .96$ );  $F(1, 689) = 18.11$ ,  $p < .001$ ,  $\eta^2 = .026$ ). In contrast, under the ‘brand presentation’ condition, the effects were diminished such that there were no significant differences in duration of hovering between the negative space and positive space logos ( $M_{\text{negative-space}} = .83$  vs.  $M_{\text{positive-space}} = .76$ ,  $p = .461$ ).

*Engagement.* A 2 (logo design: positive space vs. negative space)  $\times$  2 (source: self-discovery vs. brand presentation) ANOVA on the engagement index ( $\alpha = .97$ ) revealed a significant main effect of logo design ( $F(1, 689) = 19.44$ ,  $p < .001$ ,  $\eta^2 = .027$ ), such that negative

space logo generated significantly greater engagement than positive space logo ( $M_{\text{negative-space}} = 3.78$  ( $SD = 1.91$ ) vs.  $M_{\text{positive-space}} = 3.19$  ( $SD = 1.63$ )). Importantly, results also revealed a significant logo design  $\times$  source of engagement interaction ( $F(1, 689) = 16.78, p < .001, \eta^2 = .024$ ). Contrast analysis showed that under the ‘self-discovery’ condition, the negative space logo generated significantly higher engagement compared to the positive space logo ( $M_{\text{negative-space}} = 4.33$  ( $SD = 2.00$ ) vs.  $M_{\text{positive-space}} = 3.21$  ( $SD = 1.67$ );  $F(1, 689) = 35.92, p < .001, \eta^2 = .050$ ), replicating the effects observed in prior studies. In contrast, under the ‘brand presentation’ condition, the effects were diminished such that there were no significant differences in engagement between the negative space and positive space logos ( $M_{\text{negative-space}} = 3.22$  vs.  $M_{\text{positive-space}} = 3.18, p = .825$ ).

*Brand evaluations.* A 2 (logo design: positive space vs. negative space)  $\times$  2 (source: self-discovery vs. brand presentation) ANOVA on the brand attitude index ( $\alpha = .97$ ) revealed a significant main effect of logo design ( $F(1, 689) = 11.59, p = .001, \eta^2 = .017$ ), such that negative space logo generated more favorable brand evaluations than positive space logo ( $M_{\text{negative-space}} = 4.41$  ( $SD = 1.49$ ) vs.  $M_{\text{positive-space}} = 3.02$  ( $SD = 1.51$ )). Importantly, results also revealed a significant logo design  $\times$  source of engagement interaction ( $F(1, 689) = 8.90, p = .003, \eta^2 = .013$ ). Contrast analysis showed that under the ‘self-discovery’ condition, the negative space logo generated significantly more favorable brand evaluations compared to the positive space logo ( $M_{\text{negative-space}} = 4.80$  ( $SD = 1.46$ ) vs.  $M_{\text{positive-space}} = 4.09$  ( $SD = 1.47$ );  $F(1, 689) = 20.26, p < .001, \eta^2 = .029$ ). In contrast, under the ‘brand presentation’ condition, the effects were diminished such that there were no significant differences in brand evaluations between the negative space and positive space logos ( $M_{\text{negative-space}} = 3.95$  ( $SD = 1.55$ ),  $M_{\text{positive-space}} = 4.00$  ( $SD = 1.41$ ),  $p = .765$ ).

*Mediation analysis.* We conducted a mediated moderation analysis using PROCESS Model 8 (Hayes 2018) bootstrapped with 5,000 resamples. We tested the model with logo design as the independent variable, brand evaluations as the dependent variable, self-report engagement as the mediator, and source of engagement as the moderator. Results revealed that the indirect effect of logo design on brand evaluations moderated by source of engagement was significant (CI = [.15, .78]). However, the indirect effect through engagement was only significant under the ‘self-discovery’ condition ( $\beta = .48$ , SE = .12, 95% CI = [.26, .73]). Under the ‘brand presentation’ condition, the indirect effect was not significant (CI = [-.18, .24]).

### **STUDY 3B: ASSESSING VISUAL ENGAGEMENT VIA EYE-TRACKING**

Previous research has defined “engagement” as attention to an object, with longer gaze durations and higher attention selection as being representative of greater visual engagement (Cian et al. 2014; Pieters and Wedel 2007). In this study, we use eye-tracking technology to measure duration of fixation and attention intensity. Duration of fixation (measured in seconds) is defined as the amount of time an observer looks at a stimulus. Attention intensity (measured in percentages) is defined as how concentrated the observer’s attention is when fixating/looking at a stimulus. We also obtained heat maps of attention intensity, which provides a graphical representation of the participant’s eye movements and attention.

#### ***Data Collection***

Data collection was conducted in cooperation with RealEye, a company that specializes in high-definition online webcam eye-tracking. The company’s software uses face-tracking algorithms to detect the position of participants’ eyes through the webcam camera (see Appendix I for details) and can precisely track eye-movements in areas as small as 64 pixels (< 1cm). The



eye tracker allowed gaze capture at 60 frames per second. Participants in this study were recruited through RealEye's network of online panel testers. All panel testers of RealEye were required to be fluent in English and have access to a high-quality webcam in order to participate in the study. The quality of a tester's webcam is determined by the calibration test, which can indicate whether the software is able to detect both eyes and the eye movements through the webcam.

### ***Stimuli and Pretest***

[Insert Figure 19 about here]

We created ten logo designs – five negative space logos and five positive space logos (see Figure 19). In a pretest, 309 people from Amazon Mechanical Turk were randomly assigned to view only one of the ten logos in a between-subjects design. Similar to the previous studies, the participants completed the same measures of aesthetic appeal, visual complexity, informativeness, novelty, and brand familiarity. Results show no significant differences in these measures between the negative space and positive logos (all  $ps > .1$ ). Participants were also asked to evaluate if they perceive each logo to be a positive space or negative space design, using the same manipulation check from previous studies. Results showed that participants who viewed the negative space logos perceived the logo to be more of a negative space design ( $M_{\text{negative-space}} = 5.29$  vs.  $M_{\text{positive-space}} = 2.55$ ,  $F(1, 307) = 200.17$ ,  $p < .001$ ), while participants who viewed the positive space logos perceived the logo to be more of a positive space design ( $M_{\text{positive-space}} = 5.35$  vs.  $M_{\text{negative-space}} = 3.14$ ,  $F(1, 307) = 72.87$ ,  $p < .001$ ). In order to create a more realistic stimulus similar to a half-page magazine ad (Cian et al. 2014), each logo design was then placed within an ad that contains an image related to the brand's logo (e.g., NetCat

electronics' logo was displayed alongside a photo of mobile phones on a laptop). Please see Figure 19 for the ads.

### ***Main Study***

Three hundred panel testers (50.3% female,  $M_{\text{age}} = 30.30$ ) from RealEye participated in this study. Stimuli were designed to be displayed in  $1280 \times 768$  pixels. Each participant was first calibrated to ensure that eye-tracking software can correctly recognize both eyes and participants' eye movements. During the calibration, the participant was asked to look at specific points on the screen, also known as calibration dots. If calibration failed, participants were instructed to adjust their head position to center with the face algorithm through the webcam (as shown in Appendix I) before the calibration commenced again. Upon successful calibration, participants were provided with a brief instruction which informed them that they will be viewing a potential advertisement for a brand and was to view the ad freely. At this point, participants were randomly assigned to view one of the ten advertisements. Before the advertisement was presented, participants saw a "fixation clue (+)" in the middle of the screen for 1,000 milliseconds. The fixation clue allows for centering fixation and ensuring that every ad had the same attention focus. Each advertisement was presented for 10 seconds. At the end of study, participants provided their demographic information (age and gender).

### ***Results and Discussion***

To analyze our eye-tracking data, we created a specific area of interest (AOI) around the logo for each advertisement. The AOI was customized according to each logo and was identical for both negative and positive space logos. Examples of how the AOI is created for each logo are shown in Appendix I.

Our key dependent measures are (1) the duration of fixation (in seconds) – the total amount of time spent fixating within the AOI and (2) attention intensity (in percentages: amount of time spent looking at the AOI in comparison to the total time spent looking at the whole ad) – how concentrated the participant’s attention is when fixating within the AOI. As we observed no significant differences between these measures as a function of the logo shape (i.e., cat/house/tie/piano/pencil; all  $ps > .1$ ), we combined the data to focus on the logo design (negative space vs. positive space) as the independent variable.

*Fixation duration.* A one-way ANOVA with logo design (negative space vs. positive space) as the independent variable and fixation duration (measured in milliseconds, reported in seconds) as the dependent variable. Results revealed a significant difference in fixation duration between the logo designs, such that negative space logos lead to significantly higher fixation duration than positive space logo ( $M_{\text{negative-space}} = 4.89\text{s}$  vs.  $M_{\text{positive-space}} = 2.84\text{s}$ ;  $F(1, 298) = 140.29, p < .001$ )

*Attention intensity.* We conducted a similar analysis with attention intensity (measured in percentages) as the dependent variable. Higher percentages indicate that participants pay more attention when looking at the AOI, while lower percentages indicate that participants pay less attention when looking at the AOI. Results revealed a significant difference in attention intensity between the logo designs, such that the negative space logos lead to significantly higher attention intensity ( $M_{\text{negative-space}} = 46.07\%$  vs.  $M_{\text{positive-space}} = 31.30\%$ ;  $F(1, 298) = 70.99, p < .001$ ).

We also obtained an additional measure of attention intensity through heat maps (see Appendix J), which provide graphical representations of each participant’s eye-movements and attention. The aggregated heat map for each ad is presented below. Red (hot) areas indicate that

participants' attention are stronger and more concentrated, while yellow, green, and blue areas indicate weaker attention intensity. From a visual perspective, negative space logos appear to generate greater attention intensity (more red areas) compared to positive space.

The mouse movement effects of Study 3a and eye-tracking results of Study 3b provide implicit measures of engagement and demonstrate further support for our hypothesis (H1) that negative space logos enhance visual engagement. We found that compared to positive space logos, negative space logos lead to significantly longer time spent looking at the logo as well as greater attention intensity.

### **MODERATING ROLE OF PRODUCT TYPE**

*When* are negative space logos most effective? In line with previous research, logo designs often work better for some kinds of products or companies compared to others (Bajaj and Bond 2018; Hagtvedt 2011; Hagtvedt and Patrick 2008) based on what is described as a “spillover effect”. This body of research demonstrates that that salient design characteristics can spillover onto the product with which they are associated. In other words, a spillover effect occurs when the associations elicited by one design element (e.g., a logo) are assimilated into the evaluations of the product. For example, Hagtvedt and Patrick (2008) found that the presence of art images on products enhances brand evaluations through the spillover of luxury perceptions evoked by artwork. Similarly, Bajaj and Bond (2017) showed that visual asymmetry in brand elements evoked arousal which spilled over to perceptions of brands being more exciting. Consistent with these research findings, we posit that the engaging nature of negative space logos will spill over to enhance product evaluations, particularly for ordinary/uncool products (vs. innovative/cool products). Our hypotheses are grounded in prior work which demonstrated

that visual design that is composed of both typical/ordinary and complex elements may evoke the most liking. For example, Landwehr, Labroo, and Hermann (2011) found that car sales are highest for typical or ordinary car designs but with some element of visual complexity that makes the car more engaging and interesting. In line with these research findings, we predict that ordinary product designs will be evaluated more favorably when presented with negative space logos which generate more visual engagement. In other words, negative space logos work harder for ordinary products compared to those that are cool or innovative. Specifically, we hypothesize:

H4a: Negative space logos are more effective in enhancing brand evaluations of products perceived to be ordinary/uncool compared to products that are already perceived to be innovative/cool.

H4b: The spillover of visual engagement in negative space logos mediates this effect.

We test these hypotheses in the study that follows. A second objective of this study is to rule out logo descriptiveness as an alternative explanation by using a logo design that does not reflect the features of the product. Across the studies thus far, the negative space logo stimuli often incorporated a “hidden” imagery that is descriptive of the advertised product (e.g., a hidden shirt in MyShirt in Study 2b) or the advertised brand (e.g., the hidden hands in All Hands campaign logo in Study 1; the hidden cat in NetCat logo in Study 3a). In order to demonstrate the effect of negative space logos on visual engagement does not hinge on the descriptiveness of the hidden imagery, we use a logo design that does not incorporate features of the product/brand.

## STUDY 4: NEGATIVE SPACE LOGOS WORK HARDER FOR ORDINARY PRODUCTS

Study 4 is designed with two key objectives: (1) to demonstrate that negative space logos are more effective for ordinary/uncool products by increasing visual engagement, and (2) to rule out logo descriptiveness as an alternative explanation for the hypothesized effect.

### *Method*

*Participants and Design.* Three hundred and eighty-five undergraduate students (57.4% female,  $M_{age} = 21.76$ ) participated in this experiment in exchange for partial course credit. The experiment employed a 2 (logo design: positive space vs. negative space)  $\times$  2 (product: cool vs. ordinary) between-subjects design.

*Pretest.* We conducted a pretest to ensure that the chosen bottle designs are perceived as differing in design coolness but not in attitudes towards the design (see Appendix K for detailed measures adapted from Warren and Campbell 2014). One hundred and nineteen undergraduate students participated in the pretest and each participant was randomly assigned to view one of the two product designs (see Figure 20). Participants had equally positive attitudes towards the two bottle designs ( $M_{cool} = 4.70$  vs.  $M_{ordinary} = 4.72$ ;  $p = .941$ ) but perceived the cool bottle as being significantly cooler than the ordinary bottle ( $M_{cool} = 5.08$  vs.  $M_{ordinary} = 3.47$ ;  $F(1, 117) = 53.45$ ,  $p < .001$ )

[Insert Figure 20 about here]

*Procedure.* Participants were told that a popular European brand of household items, HighLow, was considering entry into the US market in 2021. Participants were then shown the

logo design (positive space vs. negative space) of HighLow and asked to assess the visual engagement of HighLow logo using the same measures as in previous studies.

Subsequently, participants were told that HighLow was promoting a new reusable water bottle design, and they will be viewing an advertisement that featured the new water bottle. Participants were randomly assigned to one of the four experimental conditions and viewed the HighLow advertisement (see Figure 20). We then assessed participants' product evaluations (1 = "unfavorable/negative/bad/unpleasant/dislike"; 7 = "favorable/positive/good/pleasant/like"; Hagtvedt and Patrick 2008). Next, participants were told that HighLow may consider sending a free water bottle to consumers as part of their product testing and that if they are interested, they can enter their e-mail to receive more information. Whether or not a participant chose to sign up for more information served as a behavioral measure of product evaluations. Participants then completed the same logo design manipulation check.

## ***Results and Discussion***

*Engagement.* A 2 (logo design)  $\times$  2 (product design) ANOVA on the engagement index ( $\alpha = .96$ ) only revealed as significant main effect of logo design. The negative space logo generated significantly greater engagement than the positive space logo ( $M_{\text{positive-space}} = 3.18$  (SD = 1.66 vs.  $M_{\text{negative-space}} = 4.92$  (SD = 1.57);  $F(1, 381) = 109.79, p < .001, \eta^2 = .224$ )

*Product evaluations.* A 2 (logo design)  $\times$  2 (product design) ANOVA on the product evaluation index ( $\alpha = .93$ ) reveal a significant logo design  $\times$  product design interaction effect ( $F(1, 381) = 4.64, p = .031, \eta^2 = .012$ ). Under the ordinary product condition, participants evaluated the product more favorable when they saw the negative space logo than when they saw a positive space logo ( $M_{\text{negative-space}} = 4.92$  (SD = 1.49) vs.  $M_{\text{positive-space}} = 4.23$  (SD = 1.78);  $F(1,$

381) = 8.80,  $p = .003$ ,  $\eta^2 = .023$ ). Under the cool product condition, both negative space and positive space logos led to equally favorable product evaluations ( $M_{\text{positive-space}} = 4.28$  vs.  $M_{\text{negative-space}} = 4.27$ ,  $p = .911$ ). These results support H4a.

*Behavioral measure of product evaluations.* A logistic regression analysis was conducted to test the effect of logo design  $\times$  product design on participants' choice to sign up for product testing. We predicted that for the ordinary bottle design, negative space logo (vs. positive space logo) will lead to higher number of signups for product testing. For the cool bottle design, there will be no significant differences in product testing signups. Results supported our hypotheses and revealed a significant logo design  $\times$  product design interaction effect ( $b = .46$ ;  $\text{Exp}(B) = 1.58$ , Wald = 19.31,  $p < .001$ ). Crosstabs analysis showed that within the ordinary product condition ( $n = 197$ ), participants were more likely to sign up for product testing when they saw a negative space logo (45.5%;  $n = 101$ ) than when they saw a positive space logo (30.2%;  $n = 96$ ;  $\chi^2(1) = 4.24$ ,  $p = .039$ ). Within the cool product condition ( $n = 188$ ), there were no significant differences ( $p = .327$ ) in number of product testing signups for both negative space logo (42.4%;  $n = 92$ ) and positive space logo (40.6%;  $n = 96$ ).

*Mediation analysis.* We tested a mediated moderation model using PROCESS Model 15 (Hayes 2018) bootstrapped with 5,000 resamples to support H4b, using logo design as the independent variable, product evaluations as the dependent variable, engagement as the mediator, and product type. As hypothesized, the indirect effect of logo design on brand evaluations moderated by processing style was significant (95% CI = [-.35, -.03]). Engagement mediated the positive effect of negative space logo on product evaluations for ordinary products ( $\beta = .14$ , SE = .07, 95% CI = [.02, .29]), but not for cool products (95% CI = [-.13, .12]).



We conducted a similar analysis with the product testing behavioral variable and found similar patterns of results (95% CI = [-.02, -.27]). Engagement mediated the positive effect of negative space logo on product testing for ordinary products ( $\beta = -.10$ , SE = .06, 95% CI = [-.23, -.01]), but not for cool products (95% CI = [-.09, .10]). Next, we seek to demonstrate how consumer processing style may influence how negative space logos are perceived by consumers.

### *MODERATING ROLE OF VISUAL PROCESSING STYLE*

According to Nisbett et al. (2001), an individual's social environment promotes certain cognitive processes than others. Individuals living in a complex social world with many role relations are more likely to understand relations among objects and events, thus leading to the perception of themselves as part of a larger whole. On the other hand, individuals living in a simpler social world with fewer social relations are more likely to see objects and events as exclusive from one another, thus leading to the perception of themselves as independent entities.

Individuals may thus employ piecemeal (dealing with local features) or holistic (utilizing global features) processes to aid object recognition and evaluation. Holistic processing refers to a style of processing that included an orientation to the context and heightened attention to relationships between objects and events (adapted from Nisbett et al. 2001). Individuals who process visual information in a holistic manner often perceive objects as wholes rather than in part-based fashion (Chua and Gauthier 2020). In contrast, piecemeal processing refers to a style of processing that included detachment of an object from its context and a stronger focus on attributes of an object. Individuals who process visual information in a piecemeal manner often perceive objects as being composed of distinct pieces or individual features (Khooshabeh, Hegarty, and Shipley 2011). Individual differences (holistic vs. piecemeal) in visual information

processing also affects how people recognize visual stimuli. For example, Mumaw et al. (1984) found that people with holistic processing style are better at recognizing visual stimuli that has been transformed because they have a gestalt/integrated representation of the image, whereas those with piecemeal processing styles had to process parts of the image individually. Bethell-Fox and Shepard (1988) suggested that individuals with holistic (vs. piecemeal) processing styles are better able to develop integrated representations of incomplete stimuli more rapidly.

How might holistic versus piecemeal processing style influence how negative space logos are perceived? As previously discussed, one of the key factors that allows for the perception of subjective contours (SCs) or negative space design is the fact that humans tend to perceive a set of individual elements as a single recognizable pattern, rather than multiple individual elements. This perspective of visual processing is stemmed from the view of Gestalt psychology and has been demonstrated to be a key principle in understanding how people are able to process incomplete visual information by subconsciously participating in visual completion (Lidwell et al. 2010). Much research supports the Gestalt view that SCs are perceived because of the visual system's organizing principles of 'parts into wholes' (Kanizsa 1976). Prior consumer research in visual processing has also demonstrated that people tend to process visual stimuli in a more gestalt manner and often visual assortment as a whole rather than individual parts (Townsend and Kahn 2014).

Because the perception of negative space design is rooted in how people perceive visual information as a whole rather than its parts (Köhler 1970), we propose that the effect of negative space (vs. positive space) logos on engagement and brand evaluations will be enhanced when consumers utilize a holistic (vs. piecemeal) processing style. More formally:

H5a: Processing style (holistic vs. piecemeal) will moderate the effect of logo designs on brand evaluations. For consumers with holistic processing style, negative space (vs. positive space) logos generate more favorable brand evaluations. For consumers with piecemeal processing style, the effect of negative space (vs. positive space) logos on brand evaluations is attenuated.

H5b: Visual engagement mediates the interaction between logo design (negative space vs. positive space) and processing style (holistic vs. piecemeal).

Next, we present two studies (studies 5a and 5b) that test these hypotheses.

### **STUDY 5A: MANIPULATING PROCESSING STYLE**

The goal of Study 5a was to examine the moderating role of processing style (holistic vs. piecemeal) on the effect of logo design (positive space vs. negative space) on engagement and brand evaluations (H5a and H5b). Specifically, we predicted that for individuals with holistic processing style, negative space (vs. positive space) logos will enhance engagement and brand evaluations. For individuals with piecemeal processing style, the effect of negative space (vs. positive) logos on engagement and brand evaluations will be attenuated. We manipulated processing style using an imagery task adapted from Monga and John (2008).

#### ***Method***

*Participants and design.* One hundred seventy-six undergraduate students (56.8% female,  $M_{\text{age}} = 22.15$ ) participated in this experiment in exchange for partial course credit. The experiment employed a 2 (logo design: positive space vs. negative space)  $\times$  2 (processing style: piecemeal vs. holistic) between-subjects design.

*Procedure.* Participants were told that they were participating in multiple ostensibly unrelated studies. In the first study, participants were randomly assigned to one of the two processing-style manipulations (holistic vs. piecemeal) in which they participated in an imagery task (see Appendix L). In piecemeal condition, participants was shown a black and white drawing that was composed of 11 smaller objects embedded in the scene (Monga and John 2008) and their given task were to find as many of the embedded objects as possible. Finding embedded figures encourages separating objects from contexts – a major characteristic of piecemeal processing. In the holistic condition, participants were asked to look at the same drawing and write about what they see in the scene as whole, particularly focusing on the background of the picture. Focusing on the background elements encourages greater attention to contextual cues – a major characteristic of holistic processing (Nisbett et al. 2001). After completing this task, participants proceeded to provide logo design evaluations of MyShirt logos similar to Study 2b. Participants completed two manipulation check measures. Participants then completed a measure of piecemeal-holistic processing styles (Choi, Koo, and Choi 2007; Appendix M) as manipulation check for processing style and a manipulation check of logo design identical to the previous studies.

## ***Results and Discussion***

*Manipulation check: processing style.* A 2 (logo design) x 2 (processing style) ANOVA on the processing style index ( $\alpha = .88$ ) revealed only the main effect of processing style. Participants in the holistic condition exhibited significantly more holistic processing style compared to those in the piecemeal condition ( $M_{\text{piecemeal}} = 4.07$  ( $SD = 1.30$ ) vs.  $M_{\text{holistic}} = 4.92$  ( $SD = 1.17$ );  $F(1, 172) = 20.78, p < .001$ ).

*Engagement.* A 2 (logo design)  $\times$  2 (processing style) ANOVA on the engagement index ( $\alpha = .97$ ) revealed a significant interaction ( $F(1, 172) = 6.19, p = .014$ ). In the holistic condition, the negative space logo generated significantly higher engagement compared to the positive space logo ( $M_{\text{negative-space}} = 4.83$  (SD = 1.55) vs.  $M_{\text{positive-space}} = 3.41$  (SD = 1.53);  $F(1, 172) = 14.49, p < .001$ ). In the piecemeal condition, there were no significant differences in engagement between the two logo designs ( $M_{\text{positive-space}} = 4.42, M_{\text{negative-space}} = 4.52, p = .79$ ).

*Brand evaluations.* A 2 (logo design: positive space vs. negative space)  $\times$  2 (processing style) ANOVA on brand evaluations ( $\alpha = .97$ ) revealed a significant interaction ( $F(1, 172) = 4.59, p = .034$ ). In the holistic condition, the negative space logo generated significantly more favorable brand evaluations compared to the positive space logo ( $M_{\text{negative-space}} = 4.77$  (SD = 1.51) vs.  $M_{\text{positive-space}} = 3.77$  (SD = 1.86);  $F(1, 172) = 9.00, p = .003$ ). In the piecemeal condition, there were no significant differences in brand evaluations between the two logo designs ( $M_{\text{positive-space}} = 4.68, M_{\text{negative-space}} = 4.67, p = .96$ ).

*Mediation analysis.* We tested a mediated moderation model using PROCESS Model 8 (Hayes 2018) bootstrapped with 5,000 resamples, to support H5b, using logo design as the independent variable, brand evaluations as the dependent variable, engagement as the mediator, and processing style as the moderator. The indirect effect of logo design on brand evaluations moderated by processing style was significant (95% CI = [.04, .65]). Engagement mediated the positive effect of negative space logo on brand evaluations for individuals with holistic processing style ( $\beta = .30, SE = .13, 95\% CI = [.07, .59]$ ), but not for individuals with piecemeal processing style (95% CI = [-.16, .20]).

Results of Study 5a provide support for the moderating role of processing in the effect of negative space logos on brand evaluations. We found that negative space logos enhance engagement and brand evaluations for individuals with holistic processing style, but not for those with piecemeal processing style. We conceptually replicated the effects observed in Study 5a in Study 5b using a measure of individual differences in processing style (Choi, Koo, and Choi 2007). We found that individuals who were holistic processors were more engaged and evaluated the negative space logo more favorably compared to those who were more piecemeal processors.

## **STUDY 5B: MEASURING PROCESSING STYLE**

### ***Method***

*Participants and Design.* Two hundred and forty-two undergraduate students (58% female,  $M_{age} = 21.76$ ) participated in this experiment in exchange for partial course credit in which logo design (positive space vs. negative space) was manipulated and processing style was measured.

*Procedure.* Similar to previous studies, participants were told about a retail company called “Pencil” and evaluated either a negative space or a positive logo (see Figure 21) in terms of visual engagement and brand evaluations. They completed an individual difference measure of piecemeal-holistic processing styles (Choi, Koo, and Choi 2007; see items in Appendix M), in which higher scores indicate that an individual engages in more holistic processing. Participants then completed the same manipulation check of logo design as in previous studies.

[Insert Figure 21 about here]

### ***Results and Discussion***

*Visual Engagement.* As processing style was a continuous variable, a spotlight analysis was conducted (PROCESS Model 1; Hayes 2018) with logo design as the independent variable, engagement as the dependent variable, and processing style as a moderator. Results revealed a significant logo design  $\times$  processing style interaction on engagement ( $\beta = .58$ ,  $SE = .22$   $p < .001$ ). To explore the interaction, we examine the effects of logo design on visual engagement at 1 standard deviation above (i.e., holistic processing;  $M = 5.67$ ) and 1 standard deviation below (piecemeal processing;  $M = 3.67$ ) the mean ( $M = 4.50$ ) for the processing style index. For participants with holistic processing style ( $M = 5.67$ ), the negative space logo generated significantly higher engagement compared to the positive space logo ( $M_{\text{positive-space}} = 3.63$  vs.  $M_{\text{negative-space}} = 5.31$ ,  $p < .01$ ). In contrast, for participants with piecemeal processing style ( $M = 3.67$ ), there were no significant differences in engagement between the two logo designs ( $M_{\text{positive-space}} = 3.20$ ,  $M_{\text{negative-space}} = 3.70$ ,  $p = .09$ ).

*Brand evaluations.* A similar spotlight analysis was conducted with brand evaluations as the dependent variable. Results revealed a significant logo design  $\times$  processing style interaction on brand evaluations ( $\beta = .61$ ,  $SE = .21$ ,  $p < .001$ ). For participants with holistic processing style, the negative space logo generated significantly more favorable brand evaluations compared to the positive space logo ( $M_{\text{positive-space}} = 4.12$  vs.  $M_{\text{negative-space}} = 5.57$ ,  $p < .001$ ). In contrast, for participants with piecemeal processing style, there were no significant differences in brand evaluations between the two logo designs ( $M_{\text{positive-space}} = 4.24$ ,  $M_{\text{negative-space}} = 4.47$ ,  $p = .43$ ).

*Mediation analysis.* We tested a mediated moderation model similar to study 5a. The indirect effect of logo design on brand evaluations moderated by processing style was significant (95% CI = [.06, .02]). Engagement mediated the positive effect of negative space logo on brand

evaluations for individuals with holistic processing ( $\beta = .36$ ,  $SE = .13$ , 95% CI = [.12, .64]), but not for individuals with piecemeal processing (95% CI = [-.01, .27])

## **GENERAL DISCUSSION**

Consumers are bombarded with countless visual images on a daily basis, from the moment they wake up to when they go to sleep, from clothing labels and running shoes to smart phones and personal laptops (Airey 2014). In fact, it is estimated that the average American sees between 4,000 – 10,000 marketing messages each day (Marshall 2015). Given the number of brands all clamoring for consumer attention, the question of what visually engages consumers is a pertinent one. Engaging consumers visually helps a brand differentiate itself in a crowded marketplace where logos have begun to look increasingly similar to one another (Airey 2014). The current research examines how brands can creatively utilize negative space to better engage with consumers and enhance brand evaluations.

### ***Theoretical Contributions and Managerial Implications***

The current research makes several theoretical contributions. First, by integrating the visual perception and consumer aesthetics literatures, we conceptualize and systematically investigate how negative space design enhances engagement and brand evaluations. Negative space design is becoming increasingly popular for logo design, but little evidence exists to show how they work and whether they can significantly impact consumer behaviors. With eight multi-method experiments, we demonstrate that negative space logos better enhance visual engagement and boost brand evaluations. Further we examine the effect of negative space logos on engagement not only through self-report measures (studies 2a and 2b), but also through mouse



movements (Study 3) and eye-tracking measures (Study 4). Second, we demonstrate negative space logos enhance visual engagement by allowing consumers to discover the “hidden” visual message (Study 3), as the effect of negative space logos on engagement is significantly diminished if the brand revealed their own hidden visual message. Third, we contribute to the visual processing literature to shed light on how individual differences in processing styles influence how the composition of the logo design is viewed. We find that while piecemeal processors focus on the central **object itself**, holistic processors are more likely to appreciate the negative space design of the logo by processing the visual elements in a gestalt manner.

Given that a logo is the face of a brand, it is important for brands to understand how certain logo designs, such as negative space design, works to engage with consumers. While the current research found that negative space logos are more engaging and create more favorable brand evaluations, our findings also do not indicate that all brands should immediately switch to employing negative space logos. Instead, the results of our studies suggest that it is imperative for marketers to understand the context of the logos (e.g., the type of product design being advertised) since the context also informs the design process of a logo. As consumers are now living among myriad of logos and labels, many brands have adopted the motto, “Less is More,” and simplified their logos with more negative space in order to stand out (Rhodes 2015). The current research seeks to provide some insights in logo design by demonstrating how negative space can make ‘less’ become ‘more’, and when brands should consider negative space design when creating their own visual signature.

### ***Directions for Future Research***

Negative space design raises some questions that provide several fruitful avenues for future research. For instance, recent work on typography design has demonstrated that intermittent ‘gaps’ or the negative space in each letter of a newly developed font, ‘Sans Forgetica’, helps people to process and retain the information that they read better when it is presented in that font (Telford 2018). Perhaps future research can determine whether the use of negative space design similarly leads to greater memory and recall of brand information.

Because logos play such an integral role in shaping a brand’s identity, they are often one of the primary brand associations that form in a consumer’s mind and the first to come to mind when a consumer thinks about the brand. In this research, we find that logos that creatively use negative space are not only engaging but also elicit positive brand evaluations. It is believed that the “strongest brands come to life at the intersection of story and design” (Kimball 2018). Future research might thus investigate how marketers can align the use of negative logos (or other brand design elements) with the brand story to keep consumers interested and engaged with the brand (e.g., the IBM’s Eye-Bee-M poster or the morphing L in Staples logo).

Future research could also consider how to leverage the affective outcomes associated with negative space design. In a marketplace where brands constantly try to attract and tell consumers who they are, negative space design somewhat provides an outlet where consumers get to discover something about the brand themselves, thereby conversing with rather than being spoken to by the brand. As such, negative space design could possibly reduce skepticism, enhance consumer trust, and forge a stronger consumer-brand relationship. Moreover, future research may also consider the effects of negative space logos on product attribute judgments

(Jiang et al. 2016). Since negative space logos are more engaging than positive space logos, consumers may also consider products with negative space logos to be more exciting and entertaining, while those with positive space logos to be more efficient and practical. The effect of negative space logos on brand personality judgments might be an interesting avenue for future investigation (Bajaj and Bond 2018).

## REFERENCES

- Airey, David (2014), *Logo Design Love: A Guide to Creating Iconic Brand Identities*. Berkeley, CA: New Riders.
- Bajaj, Aditi and Samuel D. Bond (2018), “Beyond Beauty: Design Symmetry and Brand Personality,” *Journal of Consumer Psychology*, 28 (1), 77-98.
- Barthes, Roland (1971), From Work to Text, in *Art After Modernism: Rethinking Representation* by Brian Wallis and Marcia Tucker, ed., 169-174, New York, NY: The New Museum of Contemporary Art.
- Bellman, Steven, Robert F. Potter, Shiree Treleaven-Hassard, Jennifer A. Robinson, and Duane Varan (2011), “The Effectiveness of Branded Mobile Phone Apps,” *Journal of Interactive Marketing*, 25 (4), 191-200.
- Bethell-Fox, Charles E., and Roger N. Shepard (1988), “Mental Rotation: Effects of Stimulus Complexity and Familiarity,” *Journal of Experimental Psychology: Human Perception and Performance*, 14 (1), 12-23.
- Bierut, Michael and Jennifer Kinon (2016), “Hillary for America,”  
<https://order.design/project/hillary-for-america>
- Choi, Incheol, Minkyung Koo, and Jong An Choi (2007), “Individual Differences in Analytic versus Holistic Thinking,” *Personality and Social Psychology Bulletin*, 33 (5), 691-705.
- Cian, Luca, Aradhna Krishna, and Ryan S. Elder (2014), “This Logo Moves Me: Dynamic Imagery from Static Images,” *Journal of Marketing Research*, 51 (April), 184-97.
- Gregory, Richard L. (1972), “Cognitive Contours,” *Nature*, 238 (5358), 51-52.

- Crolic, Cammy, and Chris Janiszewski (2016), "Hedonic Escalation: When Food Just Tastes Better and Better," *Journal of Consumer Research*, 43 (3), 388-406.
- Hagtvedt, Henrik (2011), "The Impact of Incomplete Typeface Logos on Perceptions of the Firm," *Journal of Marketing*, 75 (4), 86-93.
- Hagtvedt, Henrik and Vanessa M. Patrick (2008), "Art Infusion: The Influence of Visual Art on the Perception and Evaluation of Consumer Products," *Journal of Marketing Research*, 45 (3), 379-89.
- Hayes, Andrew F. (2018), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, New York, NY: The Guilford Press.
- Henderson, Pamela W. and Joseph A. Cote (1998), "Guidelines for Selecting or Modifying Logos," *Journal of Marketing*, 62 (April), 14-30.
- Jiang, Yuwei, Gerald J. Gorn, Maria Galli, and Amitava Chattopadhyay (2016), "Does Your Company Have the Right Logo? How and Why Circular-and Angular-Logo Shapes Influence Brand Attribute Judgments," *Journal of Consumer Research*, 42 (5), 709-26.
- Kanizsa, Gaetano (1976), "Subjective Contours," *Scientific American*, 234 (4), 48-53.
- Kayrouz, Rony, Blake F. Dear, Eyal Karin, and Nickolai Titov (2016), "Facebook as an Effective Recruitment Strategy for Mental Health Research of Hard to Reach Populations," *Internet Interventions*, 4 (1), 1-10.
- Khooshabeh, Peter, Mary Hegarty, and Thomas F. Shipley (2013), "Individual Differences in Mental Rotation: Piecemeal versus Holistic Processing," *Experimental Psychology*, 60 (3), 164-171.

Kilger, Max and Ellen Romer (2007), “Do Measures of Media Engagement Correlate with Product Purchase Likelihood?” *Journal of Advertising Research*, 47 (3), 313-25.

Kimball, Alex (2018), “Why Your Brand Should Align Story and Design,”

<https://newkind.com/branding-through-story-and-design/>

Kim, Min Jung, and Joon Ho Lim (2019), “A Comprehensive Review on Logo Literature: Research Topics, Findings, and Future Directions,” *Journal of Marketing Management*, 35 (13-14), 1291-1365.

Köhler, Wolfgang (1970), *Gestalt Psychology: An Introduction to New Concepts in Modern Psychology*, New York, NY: W.W Norton & Company.

Landwehr, Jan R., Aparna A. Labroo, and Andreas Herrmann (2011), “Gut Liking for the Ordinary: Incorporating Design Fluency Improves Automobile Sales Forecasts,” *Marketing Science*, 30 (3), 416-429.

Lidwell, William, Kritina Holden, and Jill Butler (2010), *Universal Principles of Design: 125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach Through Design*, Beverly, MA: Rockport Publishing.

Luffarelli, Jonathan, Mudra Mukesh, and Ammara Mahmood (2019), “Let the Logo Do the Talking: The Influence of Logo Descriptiveness on Brand Equity,” *Journal of Marketing Research*, 56 (5), 862-878.

Marshall, Ron (2015), “How Many Ads Do You See in One Day?”

<https://www.redcrowmarketing.com/2015/09/10/many-ads-see-one-day/>

McCauley, Jim (2017), “The Story of the Tour de France logo,”

<https://www.creativebloq.com/logo-design/tour-de-france-logo-71515677>

- Monga, Alokparna Basu and Deborah Roedder John (2008), "When Does Negative Brand Publicity Hurt? The Moderating Influence of Analytic versus Holistic Thinking," *Journal of Consumer Psychology*, 18 (4), 320-32.
- Mumaw, Randall J., and James W. Pellegrino (1984), "Individual Differences in Complex Spatial Processing," *Journal of Educational Psychology*, 76 (5), 920-939.
- Nisbett, Richard E., Kaiping Peng, Incheol Choi, and Ara Norenzayan (2001), "Culture and Systems of Thought: Holistic versus Analytic Cognition," *Psychological Review*, 108 (2), 291-310.
- Petry, Susan and Glenn E. Meyer (1987), *The Perception of Illusory Contours*, Garden City, NY: Springer Science & Business Media.
- Pieters, Rik and Michel Wedel (2007), "Goal Control of Attention to Advertising: The Yarnbus Implication," *Journal of Consumer Research*, 34 (August), 224-33.
- Pomerantz, James R., David M. Goldberg, Patrick S. Golder, and Sheldon Tetewsky (1981), "Subjective Contours can Facilitate Performance in a Reaction-Time Task," *Perception and Psychophysics*, 29 (60), 605-611.
- Pritchard, Walter S. and Joel S. Warm (1983), "Attentional Processing and the Subjective Contour Illusion," *Journal of Experimental Psychology: General*, 112 (2), 145-75.
- Rhodes, Margaret (2015), "Strip Down Your Logo and Make Your Brand a Classic---Now!"  
<https://www.wired.com/2015/09/strip-logo-make-brand-classic-now/>
- Schumann, Friedrich (1904), "Einige Beobachtungen Über die Zusammenfassung von Gesichtseindrücken zu Einheiten", *Psychologische Studien*, 1, 1-32.

- Sengupta, Jaideep, and Gerald J. Gorn (2002), "Absence Makes the Mind Grow Sharper: Effects of Element Omission on Subsequent Recall," *Journal of Marketing Research*, 39 (2), 186-201.
- Shultz, Thomas R. (1972), "The Role of Incongruity and Resolution in Children's Appreciation of Cartoon Humor," *Journal of Experimental Child Psychology*, 13 (3), 456-77.
- Valentini, Chiara, Stefania Romenti, Grazia Murtarelli, and Marta Pizzetti (2018), "Digital Visual Engagement: Influencing Purchase Intentions on Instagram," *Journal of Communication Management*, 22 (4), (362-381)
- Wagemans, Johan, James H. Elder, Michael Kubovy, Stephen E. Palmer, Mary A. Peterson, Manish Singh, and Rüdiger von der Heydt (2012), "A Century of Gestalt Psychology in Visual Perception: I. Perceptual Grouping and Figure–Ground Organization," *Psychological Bulletin*, 138 (6), 1172-1217.
- Wang, Alex (2006), "Advertising Engagement: A Driver of Message Involvement on Message Effects," *Journal of Advertising Research*, 46 (4), 355-68.
- Warren, Caleb, and Margaret C. Campbell (2014), "What Makes Things Cool? How Autonomy Influences Perceived Coolness," *Journal of Consumer Research*, 41 (2), 543-563.
- Woodworth, Robert S. (1938), *Experimental Psychology*, NY, New York: Henry Holt



**Table 1. Summary of Empirical Studies**

	<b>Study 1</b>	<b>Study 2a &amp; 2b</b>	<b>Study 3a &amp; 3b</b>
<b>Method</b>	Field experiment	Laboratory experiments	Laboratory experiment and online panel
<b>Sample</b>	Facebook users matched with target criteria: men and women aged 18-35, university-level education, interested in community issues.	2a: N = 197 undergraduates 2b: N = 332 undergraduates	3a: N = 693 undergraduates 3b: N = 300 panel testers
<b>Design/independent variables</b>	Logo design (negative space vs. positive space)	2a: 3 logo design conditions (positive space vs. active white space vs. negative space) 2b: 3 logo design conditions (positive space vs. high-contrast positive space vs. negative space)	3a: 2 (logo design: positive space vs. negative space) × 2 (source of engagement: self-discovery vs. brand presentation) between-subjects design 3b: Logo design (negative space vs. positive space)
<b>Stimuli/brands</b>	All Hands disaster relief fund	2a: American Food Writers magazine 2b: MyShirt T-shirt	3a: NetCat electronics 3b: Eleven music, Cool careers, NetCat electronics, Pencil retail store, YY house of fashion
<b>Dependent variables</b>	Number of ad clicks, volunteer signups	2a: Brand evaluations, website visits 2b: Brand evaluations, willingness to pay	3a: self-report engagement, mouse movements (duration of hovering and rate of hovering), brand evaluations. 3b: Eye-tracking measures (duration of fixation and attention intensity)
<b>Process variables</b>	None	Engagement	3a: Engagement (self-report) 3b: None
<b>Findings</b>	Banners with negative space logos led to higher click-throughs and sign-ups to volunteer.	Negative space logos led to greater visual engagement and more favorable brand evaluations.	Negative space logos elicited greater visual engagement which was measured implicitly through mouse movements and eye-tracking
<b>Unique study contributions</b>	Real-world field experiment. Demonstrates the effect of negative space logos on consumer response.	Controlled lab experiments testing different visual constructs (AWS, high visual contrast) with negative space logo design; measured brand evaluations through both self-report and consequential DV (website visits).	Controlled lab experiment that demonstrates the role of visual engagement in negative space logos through measures of mouse movements.

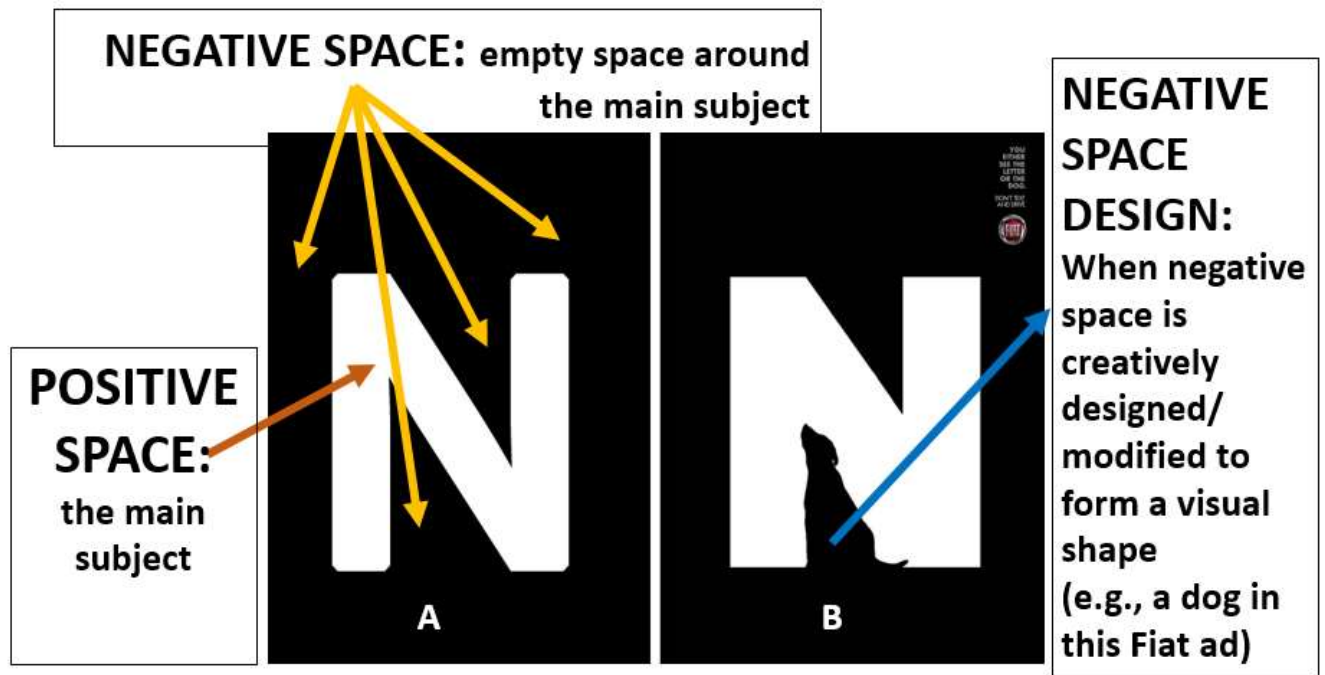
**Table 1. Summary of Empirical Studies (continued)**

	<b>Study 4</b>	<b>Study 5a &amp; 5b</b>
<b>Method</b>	Laboratory experiment	Laboratory Experiment
<b>Sample</b>	N = 385 undergraduate students	5a: N = 176 undergraduates 5b: N = 300 panel testers
<b>Design/independent variables</b>	2 (logo design: positive space vs. negative space) × 2 (product: cool vs. ordinary) between-subjects design	5a: 2 (logo design: positive space vs. negative space) × 2 (processing style: piecemeal vs. holistic) between-subjects design 5b: logo design (positive space vs. negative space). Processing style was measured.
<b>Stimuli/brands</b>	HighLow reusable water bottle	5a: MyShirt T-shirt 5b: Pencil retailer
<b>Dependent variables</b>	Self-report product evaluations and behavioral product evaluations (product testing signup)	Brand evaluations
<b>Process variables Findings</b>	Engagement Negative space logos work harder for ordinary/uncool products by increasing visual engagement.	Engagement (measured) The effect of negative space (vs. positive space) logos on engagement and brand evaluations is enhanced when consumers utilize a holistic (vs. piecemeal) processing style.
<b>Unique study contributions</b>	Controlled lab experiment that demonstrates how visual engagement in negative space logos can spill over to enhance product evaluations of ordinary products; to rule out logo descriptiveness as an alternative explanation for the effect of negative space logos on visual engagement.	Controlled lab experiment demonstrating the role of consumer processing style in how consumer responds to negative space logos.

Figure 13. Examples of Popular Negative Space Logos in the Market



**Figure 14. Visual explanation of negative space, positive space, and negative space design.**






In panel A, the letter N is the main subject/positive space and the empty space around the N is the negative space. In panel B, an example of negative space design in a Fiat safe-driving ad: the negative space under the letter N is creatively modified to form the shape of a dog, thus creating a negative space design.

**Figure 15. Study 1 Stimuli**

Positive Space	
Negative Space	

**Figure 16. Study 2a Stimuli**

Positive Space		Link for website visits: <a href="http://food-ps.launchaco.com">food-ps.launchaco.com</a>
Active White Space		Link for website visits: <a href="http://food-aws.launchaco.com">food-aws.launchaco.com</a>
Negative Space		Link for website visits: <a href="http://food-ns.launchaco.com">food-ns.launchaco.com</a>

**Figure 17. Study 2b and Study 5a stimuli**

Positive Space



High Contrast Positive Space



Negative Space



**Figure 18. Study 3a Stimuli**





	Brand-Presentation	Consumer Self-Discovery
Positive Space Logo	 <p><b>NETCAT</b> We bring you the best electronics (Need a new phone? Look for the cat in our logo!)</p> <p><a href="https://netcat-psbrand.launchaco.com/">https://netcat-psbrand.launchaco.com/</a></p>	 <p><b>NETCAT</b> We bring you the best electronics (Need a new phone? We're here for you!)</p> <p><a href="https://netcat-ps.launchaco.com/">https://netcat-ps.launchaco.com/</a></p>
Negative Space Logo	 <p><b>NETCAT</b> We bring you the best electronics (Need a new phone? Look for the cat in our logo!)</p> <p><a href="https://netcat-nsbrand.launchaco.com/">https://netcat-nsbrand.launchaco.com/</a></p>	 <p><b>NETCAT</b> We bring you the best electronics (Need a new phone? We're here for you!)</p> <p><a href="https://netcat-ns.launchaco.com/">https://netcat-ns.launchaco.com/</a></p>





Figure 19. Study 3b Stimuli

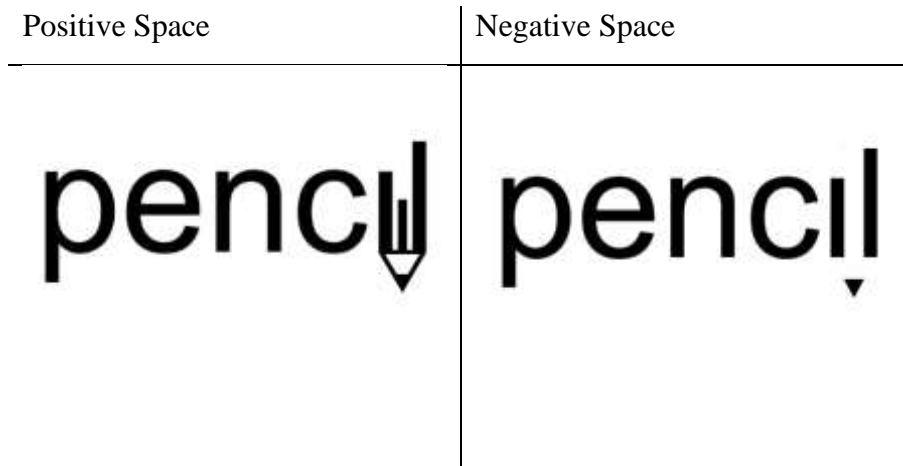


Figure 20. Study 4 Stimuli

Study 4 Stimuli

	Ordinary Product	Cool Product
Positive Space Logo		
Negative Space Logo		

**Figure 21. Study 5b Stimuli**



## APPENDIX G

### Scale Items: Control Measures of Other Logo Design's Dimensions

Aesthetic Appeal (aesthetically appealing; attractive)
Complexity (complex; complicated)
Informative (revealing; explanatory)
Novelty (novel; unusual)
Abstract (abstract)
Creativity (clever, inventive, creative)
Completeness (complete)
Clarity (clear, coherent, clearly expressed)
Brand Familiarity (how familiar are you with this brand?)
How familiar are you with negative space logos?
How often do you see negative space logos?

Items are shown in parentheses. Participants were asked to indicate how well the items described the logo design. 1 = “not at all” and 7 = “very well”.

### Results of Control Measures

#### Study 2a: American Food Writers Logo

	Active White Space	Positive Space	Negative Space
Aesthetic Appeal	4.33	4.46	4.62
Complexity	4.49	4.33	4.62
Informative	3.81	3.72	3.89
Novelty	4.18	4.23	4.18
Abstract	3.08	3.12	3.22
Creativity	3.73	4.91	5.38
Completeness	4.81	4.85	4.91
Clarity	4.89	4.87	4.90
Brand Familiarity	2.10	2.23	2.21
How familiar are you with negative space logos?	4.31	4.21	4.39
How often do you see negative space logos?	4.10	4.04	4.12

#### Study 2b: MyShirt logo (also used in Study 5a)

	High-Contrast Positive Space	Positive Space	Negative Space
Aesthetic Appeal	4.65	4.68	4.73
Complexity	4.12	4.21	4.14
Informative	3.89	3.90	3.83

Novelty	4.32	4.35	4.30
Abstract	3.00	3.12	3.22
Creativity	4.61	4.67	4.72
Brand Familiarity	2.10	2.23	2.21
Completeness	4.21	4.29	4.20
Clarity	4.92	4.87	4.91
How familiar are you with negative space logos?	4.32	4.39	4.33
How often do you see negative space logos?	4.14	4.20	4.19

### Study 3a: NetCat Logo

	Positive Space	Negative Space
Aesthetic Appeal	4.86	4.90
Complexity	4.00	4.08
Informative	3.91	3.89
Novelty	4.43	4.48
Abstract	3.24	3.30
Creativity	4.58	4.62
Completeness	4.52	4.68
Clarity	4.51	4.67
Brand Familiarity	3.21	3.29
How familiar are you with negative space logos?	4.25	4.29
How often do you see negative space logos?	4.12	4.19

### Study 3b: Eye-Tracking Study with 5 pairs of logos

Eleven Music Logo (also used in study 6)

	Positive Space	Negative Space
Aesthetic Appeal	4.50	4.59
Complexity	4.18	4.23
Informative	3.88	3.84
Novelty	4.32	4.29
Abstract	3.11	3.19
Creativity	4.81	4.89
Completeness	4.31	4.29
Clarity	4.87	4.90
Brand Familiarity	2.34	2.38

How familiar are you with negative space logos?	2.30	2.39
How often do you see negative space logos?	4.29	4.22

#### Cool Career Logo

	Positive Space	Negative Space
Aesthetic Appeal	4.83	4.90
Complexity	3.97	3.91
Informative	3.77	3.89
Novelty	4.13	4.20
Abstract	3.21	3.30
Creativity	4.81	4.48
Completeness	4.82	4.84
Clarity	4.97	4.90
Brand Familiarity	2.24	2.19
How familiar are you with negative space logos?	4.45	4.52
How often do you see negative space logos?	4.23	4.30

#### NetCat Logo

	Positive Space	Negative Space
Aesthetic Appeal	4.21	4.28
Complexity	4.30	4.34
Informative	3.12	3.19
Novelty	4.53	4.55
Abstract	3.20	3.25
Creativity	4.41	4.52
Completeness	4.67	4.59
Clarity	4.88	4.90
Brand Familiarity	2.12	2.20
How familiar are you with negative space logos?	4.21	4.39
How often do you see negative space logos?	4.39	4.45

#### Pencil Logo (also used in Study 5b)

	Positive Space	Negative Space
--	----------------	----------------

Aesthetic Appeal	4.56	4.60
Complexity	4.38	4.44
Informative	3.72	3.89
Novelty	4.32	4.39
Abstract	3.12	3.22
Creativity	4.41	4.45
Completeness	4.64	4.59
Clarity	4.30	4.41
Brand Familiarity	2.23	2.21
How familiar are you with negative space logos?	4.10	4.02
How often do you see negative space logos?	4.21	4.25

#### House of Fashion Logo

	Positive Space	Negative Space
Aesthetic Appeal	4.26	4.30
Complexity	4.46	4.52
Informative	3.92	3.90
Novelty	4.31	4.42
Abstract	3.22	3.29
Creativity	4.22	4.32
Completeness	4.21	4.29
Clarity	4.53	4.59
Brand Familiarity	2.10	2.18
How familiar are you with negative space logos?	4.34	4.42
How often do you see negative space logos?	4.34	4.32

#### Study 4: HighLow Logo

	Positive Space	Negative Space
Aesthetic Appeal	4.56	4.50
Complexity	4.20	4.17
Informative	3.40	3.34
Novelty	4.45	4.58
Abstract	3.34	3.50
Creativity	4.41	4.51
Completeness	4.34	4.40
Clarity	4.45	4.52

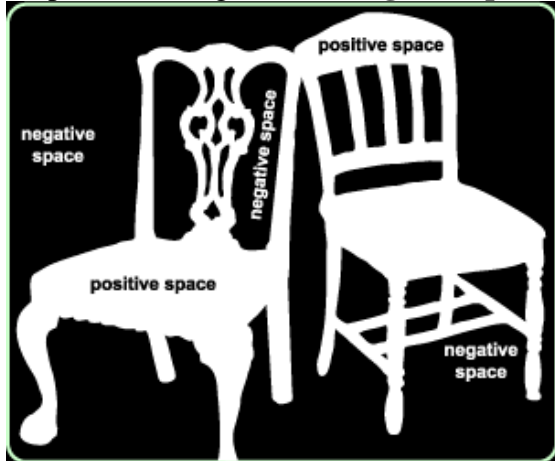
Brand Familiarity	2.10	2.20
How familiar are you with negative space logos?	4.30	4.39
How often do you see negative space logos?	4.90	4.79



## APPENDIX H

### Manipulation Check Measure Used in All Studies

When looking at a visual imagery, there are two dominant concepts: positive space and negative space. The positive shapes on the foreground occupy **positive space**. The area around positive shapes, the background, is **negative space**. Please look at the example below:



A visual design can be composed mainly of positive space (i.e., positive space design) or predominantly negative space (i.e., negative space design).

Would you consider the logo design below to be more of a positive space design or more of a negative space design?

#### **Study 3a**

*Manipulation check: logo design.* A 2 (logo design: positive space vs. negative space)  $\times$  2 (source of engagement: self-discovery vs. brand presentation) on both design manipulation check items revealed only the main effect of logo design. Participants perceived the negative space logo (vs. positive space logo) as more of a negative space design ( $M_{\text{negative-space}} = 5.17$  (SD = 1.86) vs.  $M_{\text{positive-space}} = 3.24$  (SD = 1.95);  $F(1, 689) = 178.91, p < .001, \eta^2 = .206$ ). On the other hand, participants perceived both the positive space logo (vs. negative space logo) as more of a positive space design ( $M_{\text{positive-space}} = 5.26$  (SD = 1.81) vs.  $M_{\text{negative-space}} = 3.03$  (SD = 1.88);  $F(1, 689) = 253.16, p < .001, \eta^2 = .269$ ).

#### **Study 4**

*Manipulation check: logo design.* A 2 (logo design: positive space vs. negative space)  $\times$  2 (source of engagement: self-discovery vs. brand presentation) on both design manipulation check items revealed only the main effect of logo design. Participants perceived the negative space logo as more of a negative space design ( $M_{\text{negative-space}} = 5.65$  (SD = 1.39) vs.  $M_{\text{positive-space}} = 2.97$  (SD = 1.26);  $F(1, 381) = 391.00, p < .001, \eta^2 = .506$ ). On the other hand, participants perceived the positive space logo as more of a positive space design ( $M_{\text{positive-space}} = 5.47$  (SD = 1.57) vs.  $M_{\text{negative-space}} = 2.98$  (SD = 1.50);  $F(1, 381) = 254.37, p < .001, \eta^2 = .400$ ).

### **Study 5a**

*Manipulation check: logo design.* A 2 (logo design) x 2 (processing style) ANOVA on both negative space manipulation check items revealed only the main effect of logo design. Participants perceived the negative space logo (vs. positive space logo) as more of a negative space design ( $M_{\text{negative-space}} = 5.15$  ( $SD = 1.43$ ) vs.  $M_{\text{positive-space}} = 3.13$  ( $SD = 1.53$ );  $F(1, 172) = 59.00$ ,  $p < .001$ ). On the other hand, participants perceived the positive space logo (vs. negative space logo) as more of a positive space design ( $M_{\text{positive-space}} = 4.68$  ( $SD = 1.93$ ) vs.  $M_{\text{negative-space}} = 2.97$  ( $SD = 1.73$ );  $F(1, 172) = 32.94$ ,  $p < .001$ ).

### **Study 5b**

*Manipulation check: logo design.* A one-way ANOVA on the negative space manipulation check item revealed that the participants perceived the negative space logo as more of a negative space design ( $M_{\text{negative-space}} = 4.97$  ( $SD = 1.94$ ) vs.  $M_{\text{positive-space}} = 3.16$  ( $SD = 1.06$ );  $F(1, 240) = 49.66$ ,  $p < .001$ ). A similar analysis on the positive space manipulation check item revealed that participants perceived the positive space logo as more of a positive space design ( $M_{\text{positive-space}} = 4.78$  ( $SD = 1.80$ ) vs.  $M_{\text{negative-space}} = 3.21$  ( $SD = 1.23$ );  $F(1, 240) = 33.37$ ,  $p < .001$ ).

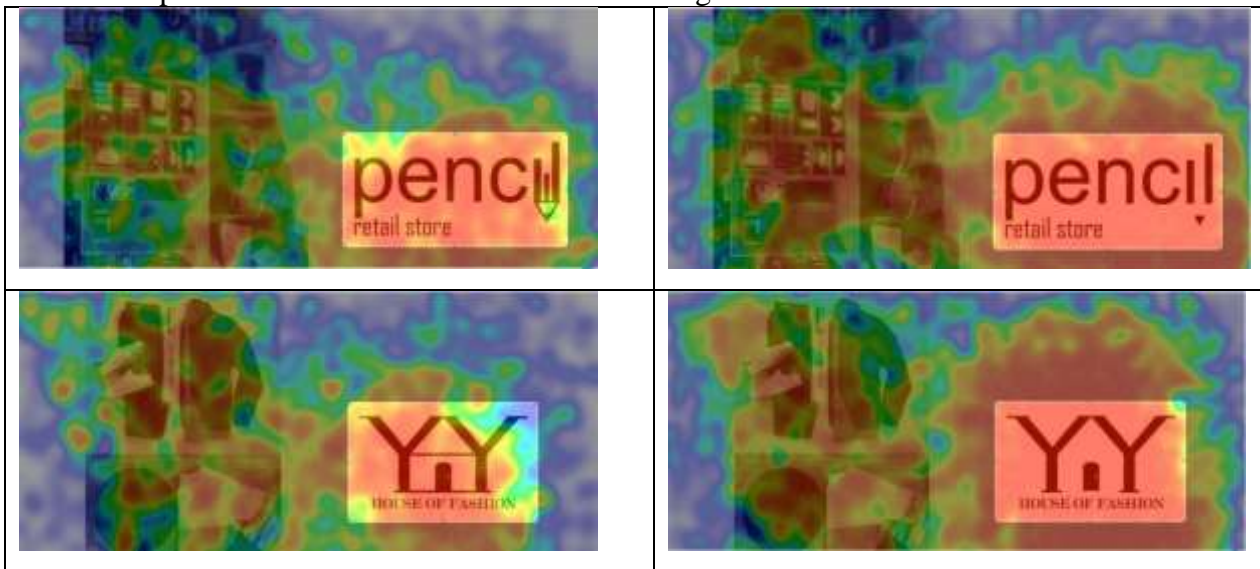
## APPENDIX I

### Eye-Tracking Software Details (Study 3b)

Below is an example of RealEye face-algorithm detecting the participant's eye positions prior to calibration test.

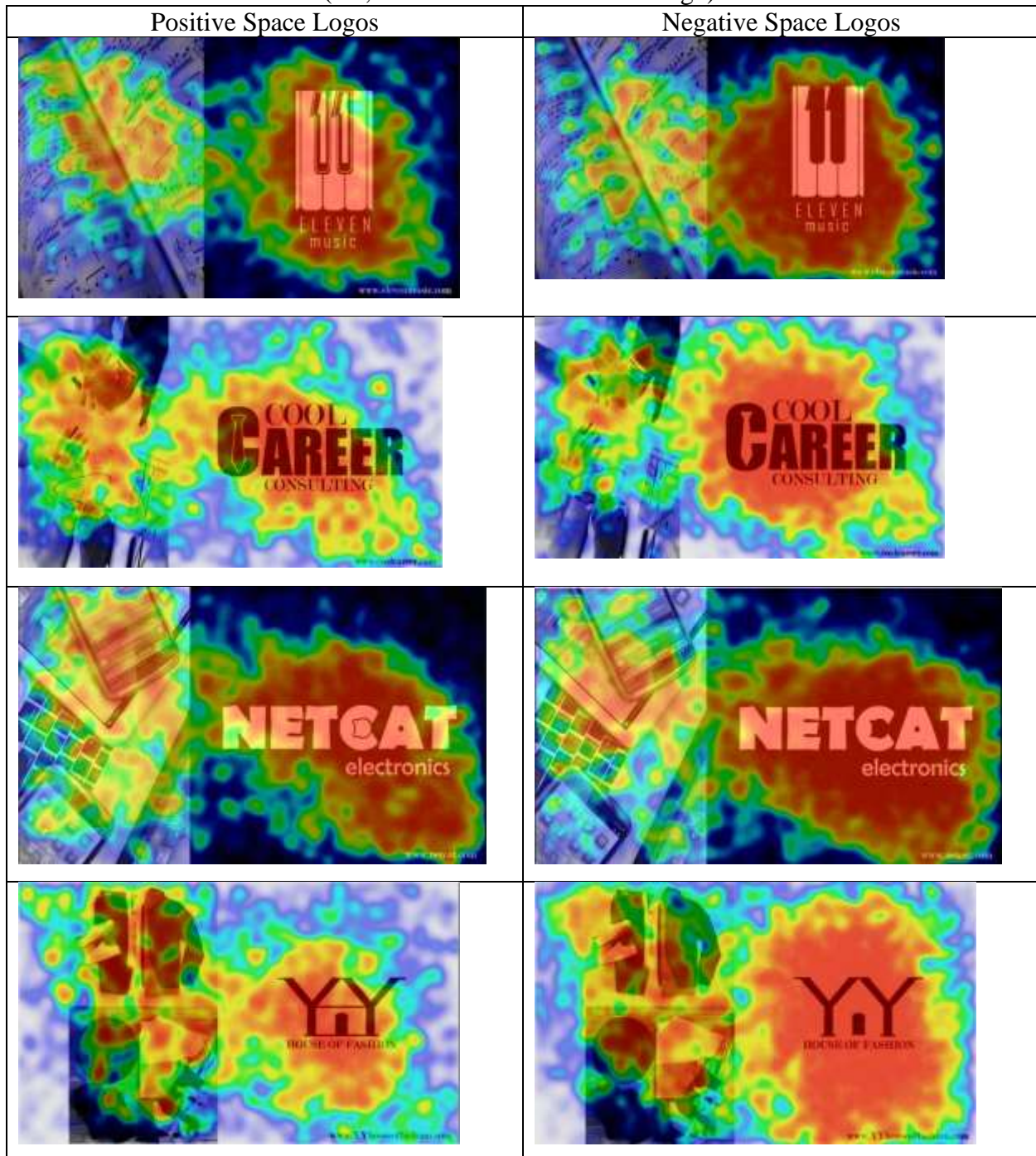


Examples of how the AOI is created for each logo are shown below.



## APPENDIX J

Study 3b Attention Intensity Heat Maps: Red areas indicate greater attention intensity. Visual heat maps demonstrate that negative space logos generate greater attention intensity/engagement (i.e., more red areas around the logo).



Due to space constraints, we present examples of heat maps demonstrating how negative space logos generate more engagement (i.e., more red areas) compared to positive space logos

## **APPENDIX K**

### **Pretest Scale Items (adapted from Warren and Campbell 2014):**

Product Design Attitude (I like the design; I would want to drink from water bottle like this; 1 = “strongly disagree” and 7 = “strongly agree”)

Perceived Coolness (Cool; Unique; Typical (r); Ordinary; 1 = “strongly disagree” and 7 = “strongly agree”)

## APPENDIX L

Imagery Task (Monga and John 2008) in Study 5

### PICTURE TASK (HOLISTIC)

Below is a picture of a scene. In the space provided below, please describe what you see in the scene. **Focus on the whole picture and what's going on the background. Spend about 4-5 minutes on this task or until you finish.**



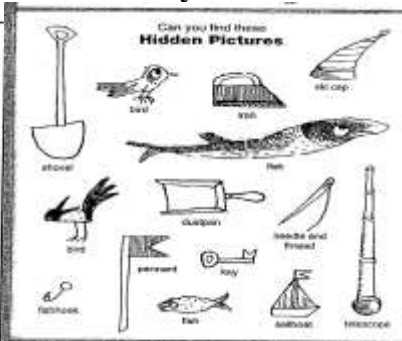
### PICTURE TASK (Piecemeal)

Below is a picture of a scene (panel A). Hidden within the scene are several smaller objects which are presented in panel B. Your task is to find the objects in panel B in the scene and **circle them in the scene itself with your mouse/cursor**.

**Spend about 4-5 minutes on this task or until you finish.**



**Panel A**



**Panel B**

## **APPENDIX M**

Measure of Piecemeal-Holistic Processing Styles (Choi, Koo, and Choi 2007) used in Studies 5a and 5b.

Please indicate your level of agreement or disagreement with each of the following (1 = “strongly disagree” and 7 = “strongly agree”)

- The whole, rather than its parts, should be considered in order to understand a phenomenon.
- It is more important to pay attention to the whole than its parts.
- The whole is greater than the sum of its parts.
- It is more important to pay attention to the whole context rather than the details.
- It is not possible to understand the parts without considering the whole picture.
- We should consider the situation a person is faced with, as well as his/her personality, in order to understand one’s behavior.