June 2017

Product Shadows and Ad Evaluations

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Product Shadows and Ad Evaluations

by

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration
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Date of Approval:
June 20, 2017

Keywords: Cast Shadows, Advertising, Product Aesthetics, Visual Processing

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DEDICATION

To my parents for always being there for me. Thank you dad for all your love, warmth, patience, prayers, company, and food. Thank you mom for being my champion in times of distress, and for always reminding me to weigh positives more than the negatives. My best moments in the Ph.D. program were those spent with you both here with me.
ACKNOWLEDGEMENTS

I am forever indebted to my chair, Dr. Stock for his confidence in me. He has been an inspiration to me from my very first semester at USF. A highly accomplished intellectual but a humbly selfless mentor who puts his students first. I hope to be like him one day.

I am grateful to my committee members, Dr. Biswas for his practical guidance on publishing my research, Dr. Kumar for his motivation to pursue my artistic passions through research with conceptual rigor, and Dr. Kim for her statistical training in understanding my data with all its strengths and weaknesses.

Thank you to all my professors at USF, fellows in the Ph.D. program, and office staff at the USF marketing department. A warm thank you to all my students in the marketing research courses that I received the privilege to teach at USF.
# TABLE OF CONTENTS

List of Tables ................................................................................................................ iv

List of Figures .................................................................................................................. v

Abstract ........................................................................................................................... vi

Chapter One: Introduction .............................................................................................. 1
  Problem relevancy ........................................................................................................ 2
  Research questions ...................................................................................................... 4
  Structural overview of dissertation ............................................................................ 5

Chapter Two: Literature Review ..................................................................................... 7
  Shadows: an art perspective ......................................................................................... 8
  Shadows: a visual-cognition perspective ..................................................................... 9
  The implicit nature of shadows ................................................................................... 11
  Defining stylistic properties ....................................................................................... 13
  Product aesthetics ....................................................................................................... 14
  Ad evaluations (or Ad attitudes) – the focal outcome ............................................... 16
  Ad communication efficacy – an ancillary outcome ................................................... 17
  Centrality of Visual Product Aesthetics (CVPA) – a moderator ............................... 18
  Gestalt versus component-based visual processing – a moderator ............................. 20
  Product luxury – a moderator .................................................................................... 21

Chapter Three: Conceptual Framework and Hypotheses ............................................. 24
  Ad evaluations and product’s aesthetic appraisal based on cast shadows .................. 24
  Ad evaluations based on cast shadow and individual aesthetics ............................... 27
  Ad assessments based on cast shadow and visual processing style ........................... 28
  Ad communication efficacy and cast shadows ............................................................ 29
  Ad evaluations based on cast shadow and luxury perceptions .................................... 30

Chapter Four: Empirical Studies .................................................................................... 32
  Study 1A: Product shadow and ad evaluations ............................................................ 33
    Pretest ....................................................................................................................... 34
    Design, Participants, Procedure ............................................................................. 36
    Results ...................................................................................................................... 37
    Discussion ............................................................................................................... 37
  Study 1B: Replication using a different product category .......................................... 38
    Design, Participants, Procedure ............................................................................. 38
    Results ...................................................................................................................... 39
Discussion .............................................................................................................. 40
Study 1C: Isolated effects of a product shadow on ad evaluations ....................... 40
  Design, Participants, Procedure ........................................................................ 40
  Results .................................................................................................................. 41
  Discussion .......................................................................................................... 41
Study 2: Moderation by centrality of visual product aesthetics .......................... 42
  Pretest .................................................................................................................. 42
  Design, Participants, Procedure ........................................................................ 44
  Results .................................................................................................................. 47
  Posttest ................................................................................................................ 48
  Discussion and limitations .................................................................................. 48
Study 3A: Moderation by the visual processing mode ....................................... 50
  Pretest .................................................................................................................. 51
  Design, Participants, Procedure ........................................................................ 52
  Results .................................................................................................................. 54
  Discussion .......................................................................................................... 56
  Posttest ................................................................................................................ 57
Study 3B: Product shadow and ad efficacy in the case of a real brand ............... 58
  Design, Participants, Procedure ........................................................................ 58
  Pretest 1 .............................................................................................................. 59
  Pretest 2 .............................................................................................................. 60
  Results ................................................................................................................ 62
  Discussion .......................................................................................................... 63
Study 4A: Moderation by luxury versus non-luxury positioning ....................... 64
  Design, Participants, Procedure ........................................................................ 64
  Manipulation check ............................................................................................. 66
  Results .................................................................................................................. 66
Study 4B: Replication for moderation by luxury versus non-luxury positioning ... 68
  Design, Participants, Procedure ........................................................................ 68
  Manipulation check ............................................................................................. 70
  Results .................................................................................................................. 70
  Discussion and limitations .................................................................................. 73

Chapter Five: General Discussion ......................................................................... 75
  Current research limitations ............................................................................. 77
  Theoretical contributions .................................................................................. 79
  Managerial contributions .................................................................................. 81
  Future scope ...................................................................................................... 84

References ............................................................................................................. 86

Appendices ............................................................................................................ 97
  Appendix A: Qualitative survey responses ....................................................... 97
  Appendix B: Stimuli used in study 1A, 1B and 1C .......................................... 99
  Appendix C: Stimuli used in study 2 ................................................................. 100
  Appendix D: Stimuli used in study 3A ............................................................... 101
Appendix E: Stimuli used in study 3B ................................................................. 102
Appendix F: Stimuli used in study 4A ................................................................. 105
Appendix G: Stimuli used in study 4B ................................................................. 106
Appendix H: Analysis of variance assumption testing ........................................ 107
Appendix I: IRB approval letter ........................................................................ 108
LIST OF TABLES

Table 1: PCA on ad evaluation and product appraisal measures in study 1B .........................39
Table 2: PCA on ad evaluation and product appraisal measures in study 2 ..........................45
Table 3: PCA on CVPA items in study 2 ............................................................................46
Table 4: Means and SDs for pretest to study 3A ................................................................51
Table 5: PCA on ad evaluation and ad efficacy items in the pretest to study 3A ..............52
Table 6: PCA on ad evaluation and ad efficacy items in study 3A .....................................54
Table 7: Means and SDs for study 3A ..................................................................................55
Table 8: Means and SDs for posttest to study 3A ...............................................................57
Table 9: Means and SDs for pretests to study 3B ...............................................................61
Table 10: Means and SDs for main study 3B .....................................................................63
Table 11: PCA on ad evaluation and product luxury items in study 4A .........................65
Table 12: Means and SDs for study 4A ..............................................................................66
Table 13: PCA on ad evaluation, product luxury and product appraisal items in study 4B ....69
Table 14: Means and SDs for study 4B ..............................................................................71
Table 15: Summary table for hypotheses, studies and findings .........................................74
Table 16: Content analysis .................................................................................................81
LIST OF FIGURES

Figure 1: Overall conceptual model.................................................................5
Figure 2: Individual and product factors..............................................................6
Figure 3: Empirical framework........................................................................32
Figure 4: Results for study 3A........................................................................55
Figure 5: Results for study 3B ........................................................................63
Figure 6: Results for study 4A........................................................................67
Figure 7: Manipulation check in study 4B............................................................70
Figure 8: Results for study 4B........................................................................72
Figure 9: Print ads from Lego incorporating unrealistic shadows......................84
ABSTRACT

Prior research shows that stylistic ad manipulations (i.e., the style or manner in which product visuals are presented in an ad) impact consumer perceptions (Yang, Zhang and Peracchio 2010). This dissertation explores the impact of presence (versus absence) of a product’s shadow in the ad frame, as a visual stylistic manipulation influencing consumer ad perceptions. While many stylistic manipulations have been explored in the past, product shadows in how they impact ad perceptions have not been explored.

Drawing on a holistic understanding on object shadows from the visual art, cognition and psychophysics literature streams, this dissertation investigates how product shadows impact ad perceptions. It applies theoretical tenants of Gestalt psychology, Construal Level Theory (CLT), and information paradigms including Signal Detection Theory (SDT) in deriving seven specific hypotheses. It also tests for moderating factors (such as individual consumer aesthetics, gestalt versus component visual processing modes, and product luxury positioning) that may alter consumer ad evaluations and ad effectiveness perceptions based on this stylistic manipulation of product shadow.

Findings from this dissertation reveal that the presence (vs. absence) of a product’s shadow in an ad frame enhances the product’s visual form. This visual appraisal of the product in the ad frame further improves the ad’s overall evaluations. The effects of a product shadow on ad attitudes is positively moderated by an individual’s aesthetic tendencies (specifically their response tendencies towards visual aesthetics), a gestalt-focused (vs. component-focused) visual processing mode, as well as a luxury based ad’s positioning. There is also some support for negative effects
of product shadows in component-focused ad scenarios, where they act as visual impairments rather than enhancers of the product form and aesthetics.

Theoretically, this dissertation extends prior research on stylistic manipulations of product images in visual ad frames, while building upon established ad communication paradigms, including AIDA and Hierarchical Processing Model, HPM (Peracchio and Meyers-Levy 2005; Yang, Zhang and Peracchio 2010). Managerially, findings from this dissertation have implications for print, online, in-store and thus, any form of visual advertising portraying a product form. It outlines specific contexts under which managers can systematically employ (or evade) product shadows to not only enhance ad evaluations, but also to optimize their ad message efficacies.

Stylistic image manipulations comprise production elements (e.g., camera angles), and only affect the way in which the product is displayed, i.e., not the core product image itself (Peracchio and Meyers-Levy 2005; Yang, Zhang and Peracchio 2010). Hence, these can be employed as strategic tools towards ad effectiveness (Barry and Howard 1990). Marketers can not only specifically target and position promotions incorporating product shadows towards aesthetically-attuned consumers, but also save advertising costs by omitting them if their presence hinders the communication of the intended message in certain scenarios.
CHAPTER ONE:
INTRODUCTION

Advertising literature highlights the power of visual images in influencing consumer attitudes (Edell and Staelin 1983; Rossiter and Percy 1980; Scott 1994). Product visuals not only capture attention, but are also assimilated and recalled better (Berger, Wagner and Schwand 2012; Pieters and Wedel 2004; Pieters, Wedel and Batra 2010). A stream of advertising literature suggests that visual images influence attitudes more than the verbal copy (Hornik 1980; Rossiter and Percy 1980).

Some researchers propose that pictures depict reality, stimulate greater cognitive elaboration, and are easier to assimilate and recall (Edell and Staelin 1983; Homer 1995; Kisielius 1982; Scott 1994). Others highlight their capability of drawing attention and inducing affect, depending upon the picture’s size, location, position or layout in an ad (Chae and Hoegg 2013; Deng and Kahn 2009; Janiszewski 1990a; Meyers-Levy and Peracchio 1992; Pieters and Wedel 2004, 2007). Visual product images not only affect consumer perceptions, but also impact consumer actions, such as their choice behaviors (Jia, Shiv and Rao 2014).

While product images are impactful in themselves, the way or manner in which product images are presented (i.e. their stylistic manipulations) also impacts consumer perceptions. For example, if the product is presented on the left-hand side or right-hand side of the ad copy, top or bottom of a package design, or vertically versus diagonally in a visual frame (Chae and Hoegg 2013; Deng and Kahn 2009; Peracchio and Meyers-Levy 2005). Stylistic manipulations of visuals
include use of different camera-angles (high versus low), image sizes (small or large), image colors (versus greyscale), and image layouts (with respect to other ad elements) (Atalay, Bodur and Rasolofoarison 2012; Houston, Childers and Heckler 1987; Lee, et al. 2014; Meyers-Levy and Peracchio 1992; Schindler 1986; Valenzuela and Raghubir 2009, 2010).

Presence of product shadows seems natural in a photographic ad frame. However, while several stylistic ad manipulations have been explored in the past, product shadows (as stylistic elements) in how they impact consumer ad perceptions has not been examined. Specifically, this dissertation explores the impact of a product’s ‘cast’ shadow (cast by the focal product in the ad’s background) as another visual stylistic element.

Visual art literature identifies shadows as instrumental for artists in adding realism, contrast, depth, and dimensionality to their renderings (Casati 2004; Mamassian 2008). Visual cognition research also notes the importance of an object’s ‘cast’ shadow in inferring its shape, form, and spatial placement (Cavanagh and Leclere 1989; Mamassian 2004; Mamassian, Knill and Kersten 1998). This dissertation leverages an understanding of cast shadows from visual art and cognition literatures onto product advertising. It demonstrates how the presence (versus absence) of a product’s cast shadow influences consumer ad evaluations.

Problem relevancy

Product shadows are ubiquitous in many real world advertisements. Brands such as Apple, Omega and Samsung commonly employ product shadows in their promotions. Sometimes, a same brand showcases its products with shadows in some promotions, and no such elements in others (e.g. Apple, Coca Cola). Managers seem to rely on their own tastes when incorporating product shadows as stylistic complements in visual frames.
In an online, qualitative survey with professional marketing executives, when asked about their past experiences with product shadows, and if they follow formal guidelines while using shadows in ad frames, the marketing director of a large New York based grocery brand mentioned “We do not have any guidelines. Sometimes the product image looks sparse without it so we use the shadow to fill up the frame. Sometimes the shadow makes the image look too crowded so we remove it.” (Female, Age = 40 years, Professional experience = 11 years) (See Appendix A).

An art director currently positioned at a large North American (S&P 500), beauty products manufacturer (headquartered in New York) mentioned having to think about including or excluding product shadows from an ad frame, “most of the time” (Female, Age = 46 years, Professional experience = 20 years). She stated that “Without a shadow, a product can look fake, unrealistic, and out of context. If you are looking for realism, include a shadow. A shadow is almost always needed unless you are going for a different type of look or graphic style: flat”. When asked about instances of having to disapprove of product shadows she mentioned, “When shadows are too dark, poorly rendered (by computer), or bleeding off the page” (See Appendix A).

Providing specific examples, she told us about her experience with different types of shadows - “Designing watch advertising, the soft, grey shadow would help keep the watch from floating in white space. When working on fashion ads we chose strong, harsh shadows to imply flash, digital photos from a cell phone. It seemed more impulsive and lifestyle. The type of shadow is always a consideration and is part of the thought process when choosing a photographer”.

Both these executives mentioned an ad’s overall visual complexity (i.e. the total number of images in the ad and their layout) as a determining factor in including or excluding product shadows. Some other factors they mentioned included the stylistic need for highlighting a product’s realism and brand image considerations such as its luxury appeal.
Overall, the qualitative responses from these executives suggest that (a) product shadows are an important part of ad-execution decisions, (b) product shadows are not always acceptable in ad frames and actively avoided in certain cases, (c) the type of product shadow (light or dark) employed may differ based on the product category type, and (d) an ad’s complexity acts as a determining factor in deciding to use or avoid shadows.

It is interesting to note that while both the professionals admitted to incorporating or omitting product shadows in their extended professional experiences, their decisions seemed to be guided mainly by intuitions. In the academic literature as well, there is no formal criteria explaining the effects of product shadows (except, Sharma 2016). Therefore, this dissertation attempts to systematically investigate the impact of presence (versus absence) of product shadows in an ad frame on the overall consumer ad evaluations.

Research questions

First, this dissertation explores if the presence of such subtle visual elements (i.e. product’s cast shadows) impacts consumer ad perceptions. Second, if so, how do these influence consumer ad attitudes or evaluations, i.e., what is the underlying process? Third, are there any qualitative differences in how consumers with varied individual aesthetic tendencies perceive an ad with (or without) the product’s shadow? Fourth, do these elements enhance ad evaluations more (or less) for certain visual processing modes and product positioning types (e.g. gestalt versus component, luxury versus non-luxury)? Three broad research questions investigated in this dissertation are:

**RQ 1.** How does the presence (versus absence) of a product’s shadow in a promotional frame impact consumer ad evaluations?
RQ 2. What underlying process explains the effect of presence (versus absence) of product shadow in an ad frame on the consumer ad evaluations?

RQ 3. Which individual level factors (e.g. individual aesthetic tendencies and visual processing styles – gestalt vs. component), and product based aspects (e.g. product level differences – gestalt vs. component and luxury perceptions) moderate the effects of presence (versus absence) of product shadows in ad frames on consumer ad assessments (including relatively more affective ad attitudes and relatively more cognitive ad communication efficacy perceptions)?

Structural overview of the dissertation

The following chapter (chapter two) outlines a comprehensive literature review on shadows, stylistic manipulations in advertising, product aesthetics, and some relevant moderating factors. After discussing the background literature and defining focal constructs in chapter two, a discussion on model conceptualization follows in chapter three. Identifying parallels from findings on shadows in art, vision and perception literatures, ad evaluations are proposed to be enhanced in the presence of its shadow based on an improvement in the product’s overall visual appraisal (See Figure 1). A complete theoretical account for this model is presented in chapter three.

![Figure 1. Overarching conceptual model](image-url)
Additionally, individual and product level factors, relevant to the stylistic manipulation of a product’s cast shadow have been identified in chapter two and hypothesized for in chapter three (See Figure 2.). Chapter three proposes seven specific hypotheses which are then systematically tested through four major studies in chapter four. A last chapter five discusses the current research limitations, theoretical and managerial implications of this research, and an encouraging scope for future work.

![Diagram](image-url)

**Figure 2.** Individual and product factors
CHAPTER TWO:
LITERATURE REVIEW

This chapter provides a comprehensive literature review of the relevant research streams including research on object shadows, stylistic manipulations in advertising, product aesthetics, and the relevant individual and product level factors that are proposed to influence the focal relationships (i.e. product shadow and ad evaluations). An understanding from this chapter is applied towards model building and hypothesis development in chapter three.

Early advertising literature suggests that visual ad content is as effective as the verbal content in impacting consumer attitudes (See Dual Loop Theory, Rossiter and Percy 1980). Overtime, a dominant stream of research evidencing the importance of visual content has emerged (Chae and Hoegg 2013; Janiszewski 1990b; Leonhardt, Catlin and Pirouz 2015; Peracchio and Meyers-Levy 2005). This stream demonstrates a significant role of visuals in determining an ad’s appeal on accounts of drawing attention, simulating realism, stimulating imagination, getting easily assimilated as well as recalled from memory, and inducing affect, and evoking emotions (Chae and Hoegg 2013; Edell and Staelin 1983; Finn 1988; Homer 1995; Hornik 1980; Janiszewski 1990a; Messaris 1997; Meyers-Levy and Peracchio 1992; Pieters and Wedel 2004, 2007).

This is not to say that verbal ad content is less important. Some advertising research shows that verbal claims can be equally and at times more important in attitude formation, e.g. when the ad’s visual emphasis is low or less is known about a particular brand or product (Bergkvist,
Eiderbäck and Palombo 2012; Phillips, McQuarrie and Griffin 2014; Rossiter and Percy 1980). Research on visual metaphors in advertising also highlights the importance of verbal anchoring in improving the overall ad comprehension and liking (Van Kerckhove, Geuens and Vermeir 2015). This dissertation assesses the effectiveness of a typical ad communication as determined by both visual and verbal ad components, however, the primary focus in this case is visual (especially given that the focal manipulation is based on the product’s image and presence vs. absence of the product’s cast shadow alongside).

Please note that it is important to understand the importance of both the visual and verbal ad aspects in the current research, because the focal outcomes constitute ad evaluations and ad effectiveness. These measures are more holistic, and result from an interplay between all the ad elements (visual as well as verbal e.g. the brand name, product claims, and the product image). The goal of this research is to understand how a specific stylistic property of product presentation (i.e. product presented with or without its cast shadow) influences a consumer’s overall ad assessment. In the study designs, manipulations of product gestalt and luxury are in fact achieved through changes in the verbal claims (See chapter four for details).

**Shadows: an art perspective**

Rosenfield (1963) refers to the appearance and disappearance of shadow as a symbol of spiritual immortality. He relates negative emotions of fear with the duality of a man and his shadow (Rosenfield 1963). Shadows have been used to dramatize art compositions, to depict demonic art, and to convey negative emotions through the use of dominating shadow shapes and sizes (Mamassian 2008). In contrast, Arnheim (1965) mentions that shadows invoke perceptions of space around the object thereby improving the aesthetics of the artistic frame. Casati (2004) also
mentions the importance of shadows in gaining viewers’ attention, in recovering an object’s shape in two and three dimensional drawings (through shading), and in resolving dimensional ambiguities for the focal object.

Early depictions of shadows in art were limited to their presence for ordinary objects and their absence for supernatural entities until the renaissance period (1200-1525, (Casati 2004)). Post renaissance, shadows were objectively characterized as instrumental in specifying the spatial position of an object, imitate an object’s shape, gain attention, anchor objects to the background, create object divergence, enhance background surface, and sometimes deliberately mistaken to create an effect (Casati 2004).

**Shadows: a visual-cognition perspective**

From a primarily visual perspective, shadows act as useful cues in providing information about an object’s shape, the placement of the light source, and the properties of the surface on which it is cast such as its texture (Cavanagh and Leclerc 1989; Dee and Santos 2011; Mamassian, Knill and Kersten 1998). For the focal object, they help in determining its form, structure, orientation, and spatial layout (Cavanagh and Leclerc 1989; Madison et al. 2001). By spatially anchoring the object to the background surface, shadows provide depth and dimensionality to an object and enhance its vividness in the frame (Cavanagh and Leclerc 1989; Dee and Santos 2011; Mamassian, Knill and Kersten 1998). Given these findings, shadows are valuable in determining both the object properties as well as the properties of the background surface.

Cognition research categorizes shadows into two broad types: *attached shadows* and *cast shadows* (Mamassian, Knill and Kersten 1998). An *attached* shadow is formed when an object obstructs light falling on itself and a *cast* shadow is formed when the object blocks another surface
(such as a background) from a light source, thus imitating the object’s basic shape or form (Mamassian, Knill and Kersten 1998). This research focuses on the latter, i.e. ‘cast’ shadows which are naturally occurring to any object presented under a light source and more frequently observed (Mamassian 2004, 2008).

Cast shadows are processed through a rapid interpretation system by the human visual system, where vision extracts coarse scene information, as quickly as 100 milliseconds of the stimulus encounter (Dee and Santos 2011; Rensink and Cavanagh 2004). They influence perceptions by facilitating a quick processing of the coarse or global features of the visual field (Casati 2004; Cavanagh and Leclerc 1989; Dee and Santos 2011; Liu, et al. 2007). Mamassian (2008, p. 2146) mentions that “by default, shadows contribute to the low spatial frequency information in an image”¹.

Visual marketing distinguishes between the foveal and peripheral visions, where the former is slow, localized, detailed, and sensitive to high spatial frequencies and the latter is fast-paced, coarse, and prone to low spatial frequencies (Wedel and Pieters 2012). Therefore, in addition to being deconstructed quickly using a holistic, gestalt-based visual perspective (i.e. shadow abstraction), cast shadows are processed by the peripheral (compared to foveal) vision, since they constitute low spatial frequency elements in a scene (Tormala and Petty 2004; Ward 1982).

Vision literature also documents two major perceptual difficulties in shadow processing: a) shadow segregation and b) shadow correspondence problem (Dee and Santos 2011). Even though it is a quick process, an observer may have to recover the object from the shadow’s shape, substance and outline, and then distinguish it from the focal object (i.e. shadow segregation).

¹Spatial frequency is expressed as the number of cycles per degree of visual angle on which the visual cortex operates in order to deconstruct an image based on the magnitude of differences in the intensities of light (i.e. contrasts) (De Valois 1977).
At the same time, it should also be able to unambiguously anchor that shadow back to its appropriate caster (i.e. *shadow correspondence*), if needed for higher-order mental evaluations (Dee and Santos 2011). Both these require effort from the visual-motor as well as the mental-perceptual system.

Rensink and Cavanagh (2004) find that a deviation from natural occurrences with respect to shadows increases response times in visual search tasks, e.g. when the shadows are presented upside-down versus upright. Existence of shadows obstruct access to lower-level features in the completion of rapid-vision, grouping, and search tasks; by hampering the registration of distinctive object features (Rensink and Cavanagh 2004). Hence, cast shadows create a visual slowdown and hinder the low-level feature search as well as recognition. Such experiments provide evidence regarding the visual effort expended towards shadow segregation and correspondence.

**The implicit nature of shadows**

Visual shadow processing occurs mostly without an observer’s explicit awareness (Dee and Santos 2011; Mamassian 2004, 2008). This is because shadows that are natural to any object presented under a light source (i.e. they are *con-substantial*) (Dee and Santos 2011). The human visual system has evolved towards their peripheral and quick assimilation (Dee and Santos 2011). Literatures document that subjects remain insensitive to violations of optical physics depicted through inconsistent shadows (Casati 2004; Jacobson and Werner 2004; Mamassian 2008). For example, the visual brain recognizes shadows as unfailingly darker than their immediate surroundings, but not if the shadow is cast on the wrong side of the object (Cavanagh 2005). However, this does not mean that subliminal and peripheral shadow processing does not impact the visual-motor as well as higher-level mental evaluations of an observer.
First, incongruities in art are usually more conveniently ignored in comparison to realistic scenarios (such as a photograph) because art is usually an artificially simulated depiction of reality (Dee and Santos 2011). Second, as per visual cognition literature, theoretically impossible shadows do evidence a slowdown of respondent response times for correct classifications showing that such incongruities are not entirely ignored by the visual processing system (Mamassian 2004).

Third, a sensory modality (i.e. visual in this case) can work independent of the overt perceptual experiences of a stimulus (Castiello, Paulignan and Jeannerod 1991). Vision research mentions that foveal and peripheral visions are qualitatively different, but can work in parallel to help the brain grasp meaning from a stimuli (Wedel and Pieters 2012). Therefore, while being assimilated by the visual-motor system, shadows can influence higher-level reasoning, judgments and evaluations, although not always consciously.

Overall, the above discussion suggests that shadows help in some contexts by orienting an object spatially in the frame and facilitate its holistic abstraction. In other cases, they act as a visual impediments, especially when it is more important to comprehend an object’s details. Additionally, they are processed peripherally and implicitly in most cases.

However, regardless of the process (shadow abstraction, shadow segregation or shadow correspondence), shadow processing by the visual-motor system can impact an observer’s higher-level mental processing and perceptive judgments (Dee and Santos 2011; Rensink and Cavanagh 2004). Therefore, in an advertising context, peripheral, low spatial frequency elements such as product shadows can impact consumer perceptions in a covert manner, while the foveal vision is overtly processing the focal product.
Defining stylistic properties

Visual advertising can be considered as a communication channel (or medium) for conveying product aesthetics. The way in which a product is visually presented in a promotional frame has a significant impact on how consumers formulate product perceptions (Reimann and Schilke 2011). For instance, research demonstrates that stylistic properties of a product image e.g. camera angle (i.e. upward versus downward looking) can significantly impact advertising persuasion and effectiveness (Yang, Zhang and Peracchio 2010).

In another investigation, researchers found that an inward-facing (versus an outward-facing) product image profile enhances processing fluency in an ad frame, thereby improving overall consumer ad evaluations (Leonhardt, Catlin and Pirouz 2015). Stylistic properties are defined as “a variety of factors that impact the manner in which visual material is displayed, such as camera angles, visual perspectives, the orientation (e.g. vertical, diagonal) of objects displayed in a scene, as well as other production elements” (Peracchio and Meyers-Levy 2005; Yang, Zhang and Peracchio 2010).

Researchers have looked at many such stylistic properties such as, changes in the relative emphasis on the visual versus the verbal ad content (Rossiter and Percy 1980); variations in illustration color and size (Finn 1988; Hornik 1980); sequencing of ad elements (Edell and Staelin 1983; Finn 1988); changes to the ad layout (Janiszewski 1990b; Reid, Rotfeld and Barnes 1984); changes in camera angles (Kraft 1987; Meyers-Levy and Peracchio 1992); image-cropping (Peracchio and Meyers-Levy 1994); changes in the overall ad size (Homer 1995); effects of white space (Ambler and Hollier 2004; Olsen, Pracejus and O'Guinn 2012; Pracejus, Olsen and O’Guinn 2006); image orientation (Chae and Hoegg 2013; Leonhardt, Catlin and Pirouz 2015); and single
versus multiple product shots (Jia, Shiv and Rao 2014). However, there is no evidence of how product shadows (as stylistic ad elements) affect consumer ad assessments.

**Product aesthetics**

Attention to product aesthetics leads to positive spillover effects on downstream constructs such as product judgments (Bloch 1995; Raghbir and Greenleaf 2006). Aesthetic package designs are chosen more over other alternatives and command higher prices (Reimann and Schilke 2011; Townsend and Sood 2012). Neurophysiological research shows that aesthetic packages have such an influence due to the activation of the brain’s reward centers (Reimann et al. 2010).

Research on visual aesthetics of websites shows its positive implications on consumer usability, interaction, and service quality perceptions (Lavie and Tractinsky 2004). Aesthetics of information presentation is even shown to positively influence consumer perceptions regarding financial products such as a company’s annual report (Townsend and Shu 2010).

In evaluating the role of product appearance in consumer choice-making, researchers found that the role of ‘*aesthetic appearance of the product*’ as the most-often cited criteria in judgment and decision making (about 65%, compared to symbolic, functions, ergonomic, and other factors) (Creusen and Schoormans 2005). A product’s aesthetic value is attributed to its beauty and sublimity (Charters 2006; Creusen and Schoormans 2005).

The term *aesthetics* pertains to sensitivity to beauty as well as sense perception (Veryzer Jr 1993). Venkatesh and Meamber (2008) use the term *aesthetics* to refer to “*visual forms of objects and sensory experiences associated with, texture, harmony, order and beauty*”. Others have used the terms such as ‘*artistically beautiful*’, or ‘*pleasing appearance*’ to define aesthetics (Lavie and Tractinsky 2004).
According to these definitions, the idea of aesthetics is to communicate based on sensory and perceptual experience from a stimulus rather than strict logical reasoning (Veryzer Jr 1993; Creusen and Schoorman 2005). It relates to affect and pleasure derived from stimulus characteristics such as the configuration of design features (Veryzer Jr 1993). Consumer aesthetics involve higher-order feature interactions as a part of a gestalt leading to appreciative overall mental responses (Holbrook 1986; Koffka 1936). Wagner (1999) presents aesthetic value as intrinsic, self-oriented and reactive (i.e. where the experience controls the consumer responses). Affective, hedonic and viscerally-pleasurable aspects are evident in this typology.

Some researchers have attempted to understand the nature of aesthetics more systematically. For example unity (i.e. “congruity among the design elements such that they create a visual connection”) and prototypicality (i.e. “degree to which an object is representative of a category”) are considered as positive determinants of aesthetic responses (Deng, Hui and Hutchinson 2010; Veryzer and Hutchinson 1998). Kumar and Garg (2010) show that a product’s aesthetic properties (such as harmony and typicality) evoke consumer emotions through cognitive appraisals of attention and pleasantness. However, the intrinsic, primal and affective feelings derived from aesthetic appraisals cannot be strictly delineated from such cognitive aspects.

In this dissertation, product aesthetics are conceptualized as the overall appreciative mental responses towards a product’s beauty, sublimity, and form, evoked at the consumer’s end by a combination of visual (sensory), cognitive (objective), and affective (subjective) design-appraisal of the product’s stimulus properties in the visual frame (Charters 2006; Hagtvedt and Patrick 2008). In the current research, a product’s aesthetic appraisal is proposed as the underlying process (mediator) that enhances the overall ad evaluations in the presence of product shadow as a stylistic ad element (see chapter three for details).
Ad evaluations (or ad attitudes) – the focal outcome

Ad attitude has been broadly defined as a “pre-disposition to respond in a favorable or unfavorable manner to a particular advertising stimulus during a particular exposure occasion” (Lutz 1985; MacKenzie, Lutz and Belch 1986). Attitude (comprising both cognitive and affective consumer responses) as influenced by the visual ad components (including stylistic manipulations) has been shown to further impact the assessments of product attributes, product beliefs, as well as brand beliefs (Miniard, et al. 1991; Mitchell 1986; Percy and Rossiter 1992).

Ad attitude acts as a significant mediator (above and beyond product attitudes) in predicting consumer purchase intentions, overall brand attitudes, and brand choice behaviors (Gardner 1985; Homer 1990; Mitchell and Olsen 2000; Shimp 1981). Prior advertising research documents the role of visual ad content in not only influencing product attitudes, but also directly influencing brand attitudes (MacKenzie, Lutz and Belch 1986; Mitchell 1986). In other words, physical product experience is not a necessary condition for the ad evaluations to impact brand attitudes.

Given the importance of ad attitudes in affecting downstream constructs like product and brand beliefs, overall ad evaluations (or ad attitude) has been chosen as a focal outcome of interest in this dissertation to assess how it gets affected by product shadows as stylistic elements.

Past researchers have included both ad-related affect and ad-related cognitions in conceptualizing the construct of ad attitude (MacKenzie, Lutz and Belch 1986). In line with these conceptualizations, this dissertation defines ad evaluations (or ad attitude) as a combination of affective and cognitive consumer responses, as evaluations to the overall ad stimulus (including visual and verbal aspects, focally and non-attended, as well as in-situ or contextually processed) (Janiszewski 1990b; Percy and Rossiter 1992; Rossiter and Percy 1980).
Ad communication efficacy – an ancillary outcome

Another outcome of interest to this research is the overall ad communication efficacy or ad effectiveness perceptions. According to information-communication theories, advertising acts as a message vehicle and has strong implications for long-term Customer Based Brand Equity, CBBE (Keller 1993). The ad contents should therefore be designed diligently to maximize the likelihood of proper communication. A firm should be able to meaningfully convey its message based on proper encoding of the ad elements, which can then be conveniently and correctly decoded by the consumers (Finn 1988; Janiszewski 1990a; Percy and Rossiter 1992; Scott 1994).

Ad communication efficacy would be high if Signal to Noise ratio (S/N) is high, based on the proper choice of the ad elements (including stylistic elements like product shadows) (Signal Detection Theory, Shannon 1949). Prior advertising research shows that a fit between all the ad elements or congruity between them enhances ad communication efficacy (Hernandez, Wright and Feminiano Rodrigues 2015; Leonhardt, Catlin and Pirouz 2015; Till and Busler 2000). In contrast, incongruence between the ad elements including instances of increased visual complexity lower this communication efficacy (Lee and Aaker 2004; Pieters, Wedel and Batra 2010).

This dissertation looks at ad communication efficacy as an ancillary outcome to ad evaluations to investigate conditions under which a product’s cast shadow (as a stylistic element) improves communication efficacy of the intended message, in contrast to cases where it diminishes it by acting as noise to the intended signal (Shannon 1949).

Compared to ad evaluations (or ad attitude), ad communication efficacy may be considered relatively more cognitive as a construct with its focus on the ‘information’ and message appropriateness as gathered from an ad. However, in line with prior research, this dissertation also considers it as comprising both cognitive and affective ad-related information (Edell and Staelin
1983; MacKenzie, Lutz and Belch 1986). The affect part of communication efficacy construct follows ‘Affect as Information’ paradigm, which suggests that affect can also act as a source of information in driving cognitive judgment and decision-making, rather than being irrational and inconsequential (Clore and Storbeck 2006; Finn 1988).

Ad communication efficacy in this research is defined as the overall judgments of effectiveness of the ad in conveying the product information, derived from interactions between all the ad elements (verbal and visual), attended to focally or non-focally in an ad frame by the consumer (Hernandez, Wright and Ferminiano Rodrigues 2015; Leonhardt, Catlin and Pirouz 2015; Miniard, et al. 1991, Pieters, Wedel and Batra 2010; Scott 1994, Till and Busler 2000).

Please note that the nature of this construct is conceptually distinct from ad evaluations (or ad attitude) as elucidated by their definitions. In addition to face validities, empirical validities were checked for ad evaluations and ad efficacy constructs, respectively in chapter four (See Study 3A) (Bhattacherjee 2012).

**Centrality of Visual Product Aesthetics (CVPA) – a moderator**

As a general consumer trait, aesthetic acumen varies along different consumer segments. Heterogeneity in consumer aesthetic judgments regarding stylistic manipulations (such as how individuals respond to the presence of product shadows in ad frames) can create challenges for designers and marketers in devising appropriately targeted promotions. Holbrook (1986) used cluster analysis to segment consumers based on psychological dimensions such as, visualizing-verbalizing tendency; intrinsic-extrinsic motivation; and romanticism-classicism.

Later, Bloch, Brunel and Arnold (2003) developed a more nuanced scale to measure individual aesthetic differences called the *Centrality of Visual Product Aesthetics* (CVPA), defined
as “the level of significance that visual aesthetics hold for a particular consumer in his/her relationship with products”. Specifically, CVPA can be used to segment consumers’ on the bases of 

- the extent to which they value visual aesthetics, 
- their level of visual aesthetic acumen, and 
- the extent to which they respond to promotional frames with higher visual aesthetics (Bloch, Brunel and Arnold 2003).

As a measured or captured construct, marketers can use CVPA to classify consumers on the basis of how much importance visual aesthetics hold for them individually, and then cater customized ad messages (including appropriate stylistic elements such as product shadows) to those specific consumer segments. Additionally, CVPA captures a general sense of an individual’s visual product aesthetics rather than preferences for any particular aesthetic style, thus making it an easily executable tool for marketers (Bloch, Brunel and Arnold 2003).

Consumers with high CVPA provide keener aesthetic product evaluations, hold more positive product attitudes, exhibit greater purchase intentions towards aesthetic products, and are willing to pay a price premium for a product with a greater aesthetic appeal (Bloch, Brunel and Arnold 2003). Aesthetic evaluations arising from perceptual distances between a product and its stereotype, as well as a product and its ideal (Stereotype-Object-Ideal or SOI model) are moderated by an individual’s aesthetic expertise (Brunel and Swain 2007).

Aesthetically-sensitive consumers respond more positively to stylistic information regarding a product and infer greater perceived meaningfulness from a design (Phillips, McQuarrie and Griffin 2014; Schnurr and Stokburger-Sauer 2016). In the current research, given that a product shadow is proposed to enhance the product’s visual aesthetics (see chapter three for details), CVPA has been identified as a relevant moderating variable.
Gestalt versus component-based visual processing – a moderator

According to the Construal Level Theory (CLT), abstract construals are more general and concrete construals are more specific (Kardes, Cronley and Kim 2006; Liberman and Trope 1998). Along a continuum, these two construals represent the degree of abstractness of visual or mental representation, which increases with temporal, spatial, or sensory distance (Kardes, Cronley and Kim 2006).

Visual perception studies demonstrate that high-level construals of information entail abstraction of a coherent form based on fragmented visual inputs (See Gestalt Completion Tasks, Street 1931; Ekstrom et al. 1976; Trope and Liberman 2010). Thus, from a purely visual perspective, abstract construals extract the gist from the available information such as a few core features, and concrete construals focus on incidental features (Trope, Liberman and Wakslak 2007).

Early perceptual psychology research considered global processing as the visual default (Navon 1977). However, a host of following research exhibits that the contextual focus on a specific construal (abstract versus concrete) differentially impacts the downstream variables such as, near and distant future decisions, preference stability, preference-behavior correspondence, consumer processing, evaluation, choice and decision making (Amit, Algom and Trope 2009; Dhar and Kim 2007; Kardes, Cronley and Kim 2006; Kim, Zhang and Li 2008; Liberman and Trope 1998; Trope, Liberman and Wakslak 2007; Van Kerckhove, Geuens and Vermeir 2015).

In other words, depending upon a context, either a gestalt (abstract) or a component (concrete) visual processing mode may be more effective and appropriate. For instance, when evaluating certain products that are similar in component-level aspects, but are differentiated by
their gestalt features (e.g. the shapes of lamp shades and car wheels), consumers may automatically shift towards abstract processing (Jia, Shiv and Rao 2014).

On the other hand, to assess detailed, concrete features (e.g. the screen quality of a high definition TV or that of a touch screen phone), component-based processing would be more helpful (Jia, Shiv and Rao 2014). The types of product attributes (gestalt or component-based) and a complementary the visual processing type invoked to evaluate those can significantly impact the overall evaluations (Jia, Shiv and Rao 2014).

Gestalt products are assessed by their abstract aspects such as shape, size, symmetry, style, balance, proportions, and contours (Hekkert and Leder 2008; Veryzer Jr 1993). On the other hand, component products are identified by their individual attributes, distinctiveness, and details (Jia, Shiv and Rao 2014). Compared to component style, gestalt processing complements the parameters of aesthetic appreciation, where the focus is on the form than the function (Bloch 1995). Given that cast shadows facilitate abstract processing and hurt detailed gestalts, gestalt versus component visual processing is identified as another relevant moderating factor to the proposed effects of product’s shadow on overall ad evaluations (See chapter three for more details).

**Product luxury – a moderator**

Past literature shows that consumer luxury preferences are influenced by societal prominence and conspicuity signals (Berthon, et al. 2009; Dubois, Rucker and Galinsky 2012; Han, Nunes and Drèze 2010); individual’s perceived status, competitiveness, and power compared to others in society (Iglesias et al. 2011; Rucker and Galinsky 2009; Wang and Griskevicius 2014); the ideals of gaining success, respect, popularity, prestige, and getting noticed in the society (Amaldoss and Jain 2005; Mandel, Petrova and Cialdini 2006; Ordabayeva and Chandon 2011).
Gender differences reveal that men use luxury products to attract mates and women use such products to deter other female rivals (Wang and Griskevicius 2014). Compared to these status-seeking aspects, research on the role of visual aesthetics in the luxury domain is relatively scarce, even though visual aesthetics is a large influencer in this domain (Hagtvedt and Patrick 2009; Sharma 2016).

Preferences in the luxury domain are not only driven by an individual’s need for status, but also by the lure of visually-pleasurable (hedonic), aesthetic aspects of a product’s presentation. A relatively narrow stream of luxury research shows that the promise of ‘hedonic potential’ or pleasure drives brand extendibility, which include dimensions like product’s exquisiteness, and glamour (Hagtvedt and Patrick 2009; Sharma, 2016; Vigneron and Johnson 2004).

Incorporating visual art on product packaging is shown to enhance a brand’s image along with perceptions of product’s luxury further leading to favorability of brand extensions (Hagtvedt and Patrick 2008, 2009). Aesthetic aspects of luxury products such as their rareness, uniqueness, and attractiveness have been shown to drive consumer purchase intentions for such products (Iglesias et al. 2011).

Luxury brands such as Gucci, Louis Vuitton, Ralph Lauren, Prada, and Armani use visually aesthetic elements including trademarked logos, patented product patterns, and colors to elevate their prestige-oriented brand image in the minds of consumers (Vogue.com; Keller 1993). Therefore, a luxury product’s overall appeal is determined not only by its status-conferring benefits but also by its visually-gratifying, aesthetic aspects (Hagtvedt and Patrick 2009; Han, Nunes and Drèze 2010; Vigneron and Johnson 2004).
Such aesthetic aspects include a product’s display and presentation in advertising contexts (Berger and Ward 2010; Hagtvedt and Patrick 2009; Han, Nunes and Drèze 2010). Specifically in advertising, luxury perceptions have been shown to be influenced by the incorporation of white (or negative) space which can be considered a stylistic manipulation (Ambler and Hollier 2004; Olsen, Pracejus and O’Guinn 2012; Pracejus, Olsen and O’Guinn 2006). This dissertation proposes product luxury as another relevant moderator to the effect of product shadow on ad evaluations, given the enhanced product aesthetic appraisal in the presence of product shadow (please see chapter three for more details).
CHAPTER THREE:
CONCEPTUAL FRAMEWORK AND HYPOTHESES

This chapter builds upon the literature presented in chapter two in proposing the conceptual framework for this dissertation. For conceptualization, it draws upon tenants of Gestalt psychology, Construal Level Theory (CLT), Information-communication Theory, and Signal Detection Theory (SDT). This chapter proposes seven hypotheses which are then empirically tested through experimentally designed studies in chapter four.

Ad evaluations and product’s aesthetic appraisal based on cast shadows

As per Construal Level Theory (CLT), abstract construals extract gist from the available information, while ignoring the incidental, lower-level details (Liberman, Trope and Wakslak 2007; Trope and Liberman 2010). Abstract construals are more general, superordinate, and schematic, while concrete construals are specific, subordinate and localized (Kardes, Cronley and Kim 2006; Liberman and Trope 1998). “High-level construal of visual information often entails abstraction of coherent images from a fragmented visual input” (Trope and Liberman 2010, p. 9). Therefore, based on the nature of object shadows as low spatial frequency content (i.e. coarse), and the type of visual system invoked for processing them (i.e. peripheral), shadows complement abstract visual processing.

Gestalt psychology plays a major role in consumer aesthetic perceptions, where one pays more attention to the overall stimulus rather than to the isolated parts (Berkowitz 1987; Bloch
In marketing, numerous researchers have applied gestalt principles to understand differences in product evaluations (Baxter 1995; Crozier 1994; Cupchik and Gebotys 1988; Veryzer Jr 1993; Veryzer and Hutchinson 1998). Many consumer studies evidence overall aesthetic responses towards a stimulus as more than just the sum of its individual parts (Cho and Schwarz 2010; Joy and Sherry 2003).

Gestalt psychologists propose some global rules that create an ideal form for an object, making it universally attractive (Coates 2002; Crilly, Moultrie and Clarkson 2004). These include unity, contrast, balance, proportion, symmetry, good-continuance, repetition, closure, and proximity (Baxter 1995; Crilly, Moultrie and Clarkson 2004; Koffka 1936; Veryzer Jr 1993). Following Gestalt principles enhances the aesthetic value of an object in its presentation frame. Upon application of such principles a visual connection is created, which further drives an individual’s aesthetic response, not just based on the extrinsically manipulated properties of the stimulus design, but also intrinsically (Veryzer Jr 1993).

In marketing, Crader and Zaichkowski (2007) talk about the key elements of visual aesthetics: color, contrast, and gestalt. Color is sometimes manipulated through in-store lighting or through brand logos such as Starbucks is green and 7-Eleven is orange; contrast through background color, size and shelf orientation to cut visual noise and enhance the product’s vividness and gestalt through organizing all the store elements together (Crader and Zaichkowski 2007).

In the current context, presence (versus absence) of the product’s shadow (as a stylistic manipulation) should improve many aesthetic aspects including space perceptions around the product; product’s contrast relative to the ad’s background and dimensionality; product’s overall form or shape, as well as its realism (Arnheim 1965; Casati 2004; Dee and Santos 2011; Mamassian 2008; Veryzer Jr 1993). Since shadows are visually deconstructed under an abstract
gestalt (in line with CLT), they would foster higher-order feature interactions improving the overall appreciative consumer responses towards the product’s aesthetics (Holbrook 1986; Koffka 1936). Therefore, an ad presenting a product’s image along with its shadow in the visual frame will be appraised more positively, following a gestalt perspective.

The presence (compared to absence) of the product’s cast shadow in the ad frame would augment its form, shape, contrast, and depth in a three-dimensional ad space, thus, making it visually more attractive and aesthetically appealing to consumers (Casati 2004; Cavanagh and Leclerc 1989; Dee and Santos 2011; Liu et al. 2007; Mamassian 2004, 2008; Schindler 1986). As defined in chapter two, product aesthetics pertain to positive visual sensory experiences. Hence, the presence of a product’s cast shadow will enhance its overall visual appeal by improving the pleasantness of the product’s form and appearance (Venkatesh and Meamber 2008).

Based on Gestalt principles, CLT, and following the definition of ad attitudes in chapter two, it is hypothesized that the overall ad evaluations, as well as the visual aesthetic appraisal of the product will be higher, when a product shadow is included as a stylistic element in the ad frame, in comparison to its exclusion (H1 and H2). The impact of the presence (compared to absence) of a product’s cast shadow on the overall ad evaluations will be mediated by the enhanced product visual appraisal in the presence of its cast shadow (H3).

**H1**: The overall ad evaluations will be higher, when a product is presented with its cast shadow in the ad frame than without it.

**H2**: The product’s visual appraisal will be higher in the presence of the product’s cast shadow in comparison to its absence from the ad frame.

**H3**: The impact of the product’s cast shadow on the overall ad evaluations will be mediated by the product’s visual appraisal in the shadow’s presence (versus absence).
Ad evaluations based on cast shadow and individual aesthetics

As discussed in chapter two, positive responses towards product aesthetics do not only arise from the objective, Gestalt-based design appraisals of stimuli, but also from the subjective appraisal of the stimuli by an individual. Prior research shows that the aesthetic appraisal process is more holistic than cognitive for individuals with higher levels of taste, since they derive an emotional response based on a richer set of experiences (Hoyer and Stokburger-Sauer 2012).

Even a same stylistic configuration can evoke different responses among different consumer segments. Research shows that consumers with dissimilar verbalizing-visualizing tendencies, needs for cognition, needs for visual structure, and aesthetic sensitivities evaluate the same stimulus differently (Chae and Hoegg 2013; Hagtvedt and Patrick 2014; Holbrook 1986; Peracchio and Meyers-Levy 2005; Schnurr and Stokburger-Sauer 2016).

Hence, while stylistic elements such as a product’s cast shadow may have an overall aesthetic appeal (following the Gestalt principles of unity, contrast, and form), such effects should be higher for individuals possessing a higher Centrality of Visual Product Aesthetics, CVPA. As discussed in chapter two, CVPA is conceptualized as an individual’s value to, acumen for, and response towards visual aesthetics (Bloch, Brunel and Arnold 2003). While incorporation of a product’s cast shadow as a stylistic element is proposed to improve a consumer’s overall ad attitude through improved visual product appraisal, such effects should be further enhanced for individuals possessing high CVPA. Therefore, H4 states that,

**H4**: The effect of a product’s cast shadow on the overall ad evaluations is moderated by an individual’s Centrality of Visual Product Aesthetics (CVPA), such that the effect is stronger for an individual with a higher CVPA.
Please note that CVPA has three dimensions as per literature (value, acumen and response; \( \alpha = 0.89 \)) (Bloch, Brunel and Arnold 2003). Given a preliminary attempt, the current research uses the entire CVPA scale in assessing an individual’s aesthetics. While analyzing data, it makes an attempt to delineate the interaction effects of these individual CVPA dimensions with the product shadow manipulation on the overall ad evaluations (See major study 2 in chapter four).

**Ad assessments based on cast shadow and visual processing style**

As discussed in chapter two, cast shadows act as noise and reduce performance in detailed oriented tasks like visual search, object recognition and shape recovery estimations (Cavanagh and Leclerc 1989; Rensink and Cavanagh 2004). Their presence hurts concrete construals that require a relatively stronger focus on the individual, incidental object-details (Liberman and Trope 1998). Therefore, even though cast shadows are congruent with abstract visual processing, their presence can act as noise in concrete construals, where effort needs to be expended in discounting them (see chapter two). Shadows being darker than the surroundings may dominate a scene and add discomfort while assessing an object’s details (Mamassian 2008).

Marketing research evidences that depending upon a context, consumers may shift their visual processing style. For instance, when evaluating products that are differentiated by their gestalt features (e.g. shapes for lamp shades), consumers engage in abstract or gestalt processing (Jia, Shiv and Rao 2014). Gestalt products are identified by their abstract aspects including shape, size, style, proportions, and contours (Hekkert and Leder 2008; Veryzer Jr 1993). Given the compatibility of cast shadows with abstract construals, ad attitudes should be higher when a context entails gestalt-based product focus. On the other hand, component products require focus
on their lower-level details, such as buttons or icons on the screen of a phone (Jia, Shiv and Rao 2014). Thus, product shadows will hurt ad evaluations under a component-based product focus.

Following the principles of Gestalt psychology (i.e. perceptions are influenced by the overall, holistic stimulus, rather than based on the perception of its individual parts), the complementarity of product shadow with an abstract construal has already been discussed. Therefore, ads focusing on the gestalt (or abstract) features of a product such as shape, size, style, and contours should be evaluated better in the presence of product’s cast shadow (see H5a below).

In contrast, product shadows will add visual complexity and optical noise in a component-based, concrete visual processing scenario. Consumers will have to expend extra visual-cognitive effort in discounting the product’s shadow (i.e. shadow segregation), and determine if that discounted shadow is later needed in formulating an overall ad evaluation (i.e. shadow correspondence) (Pieters, Wedel and Batra 2010). Also, adding a cast shadow to the ad frame of a component-based visual focus increases competition for attention amongst various ad elements (Berlyne 1970). Therefore, presence of a product’s shadow in an ad frame is proposed to hurt the ad evaluations in a component-based visual processing mode (see H5b).

**H5**: The effect of a product’s cast shadow on the overall ad evaluation is moderated by the visual processing style, such that the effect is positive for gestalt-based processing (H5a), but negative for component-based processing (H5b).

**Ad communication efficacy and cast shadows**

Information-communication paradigms have been used in the past to suggest that advertising act as a channel (or medium) in transferring intended information (or message) from the firm’s end to the consumer (Barry and Howard 1990; Shannon 1949). Visual images and the
way in which a product is portrayed in these images (i.e. stylistic manipulations) can be considered as encoding mechanisms. Following communication theory, these images are then decoded by consumers (as audiences or receivers). The overall signal to noise (S/N) ratio in these mediums should be high for communication effectiveness (Rossiter and Percy 1985; Shannon 1949; Stern 1994). This is because an effective communication in turn predicts consumer preferences, intentions and behaviors (Vakratsas and Ambler 1999).

Advertising effectiveness is determined by a proper encoding of all the ad elements (including non-focal elements such as shadows) to convey the intended message accurately (Janiszewski 1990a; Percy and Rossiter 1992; Stern 1994). The presence of a cast shadow in a gestalt-based ad frame can be seen as a signal enhancer based on its complementarity with the gestalt-based product focus. In contrast, its presence in a component-based ad frame will not only increase the visual complexity by adding noise but also lower the processing efficiency for the product’s intricate details, thereby lowering the intended signal quality of the ad’s message. Therefore, it is hypothesized that:

**H6**: The effect of a product’s cast shadow on the overall ad communication efficacy is moderated by the visual processing style, such that the effect is positive for gestalt-based processing (H6a), but negative for component-based processing (H6b).

**Ad evaluations based on cast shadow and luxury perceptions**

Past literature on luxury is focused mainly on status-seeking aspects of luxury consumption, as discussed in chapter two (Berger and Ward 2010). However, product aesthetics are also salient from a luxury standpoint since consumers derive hedonic pleasure or visual gratification from owning and using such products (Hagtvedt and Patrick 2009; Sharma 2016).
It is proposed that the presence of a product’s cast shadow in the ad frame would benefit the overall ad evaluations of a luxury-positioned product more than that of a non-luxury product. This is because the presence of a product’s shadow would highlight the product’s visual appeal that complements a luxury product more (than a non-luxury product), given the importance of visual gratification in a luxury product’s ad frame (Lee and Aaker 2004; Lee and Labroo 2004; Wadhwa and Zhang 2015). Therefore,

**H7**: The effect of the presence (versus absence) of a product’s cast shadow on ad evaluation will be moderated by the product’s ad positioning, such that the effect will be greater for a luxury (or prestige) positioned product compared to non-luxury positioned product.

Overall, this chapter incorporated relevant literature review (discussed in chapter two) and some established theoretical frameworks in outlining specific hypotheses. In order to test these hypotheses, the following chapter (chapter four) presents a series of experimentally designed studies, including different product categories as stimuli, and a mix of different consumer demographics for a greater reliability and external validity of the findings.
CHAPTER FOUR:
EMPIRICAL STUDIES

In this chapter, four studies are outlined using the experimental design approach. Study 1 tests the main effects of a product shadow’s presence (versus absence) on the overall ad evaluations and on the product’s visual appraisal in the ad frame. It attempts to validate hypotheses 1 and 2. The data from this study is also used to test hypothesis 3, i.e. mediation of the proposed effect of shadow on ad evaluations through changes in the product’s visual appraisal (See Figure 3.).

Figure 3. Empirical framework
Study 2 is designed to test hypothesis 4 by measuring individual CVPA and testing for the proposed interaction of this variable with the product shadow manipulation. In study 3, the goal is to evaluate the interaction between visual processing modes (gestalt versus component) and product shadow on not only ad evaluations but also on ad communication efficacy, i.e. hypotheses 5 and 6. Lastly, study 4 manipulates product luxury perceptions in addition to the product shadow to assess changes in the overall ad evaluations, i.e. hypothesis 7.

**Study 1A: Product shadow and ad evaluations**

The purpose of study 1A was to examine the main effects of a product’s cast shadow on ad evaluations and on the product’s overall visual appraisal. It also tested product’s visual appraisal as the proposed mediator to the effect of product shadow on ad evaluations. This study made a first attempt towards testing hypotheses 1, 2 and 3.

Before conducting the main study 1A, a pretest was conducted to *a*) explore the main effects of product shadow on ad evaluations for the chosen stimuli (music speaker), and *b*) test for interaction between product shadow and interest in product category.

In regards to the latter, please note that in all the current studies (including different product types), interest in product category was a consistent, significant covariate. To ensure that interest in product category is not a boundary condition for the proposed effects to hold, its interaction with the product shadow manipulation was tested for significance. According to the proposed conceptual framework, this interaction should not be significant. A non-significant interaction would establish interest in product category as covariate, and not a focal predictive variable.

From a theoretical standpoint, interest in product category is a relevant covariate in the current context. This is because according to advertising models such as AIDA (Awareness or
Attention, Interest, Desire, and Action) and Hierarchical Processing Model (HPM), consumer pre-attention, interest or involvement is almost a pre-requisite for an effective advertising communication process (Barry and Howard 1990; Greenwald and Leavitt 1984; Strong 1925).

HPM states that there are four levels of consumer involvement: pre-attention (sensory buffering and feature analysis), focal attention (channel selection, perceptual and semantic processing), comprehension (syntactic analysis), and elaboration (conceptual analysis) (Greenwald and Leavitt 1984). The visual ad content (including stylistic manipulation of product shadow) follows a stimulus-driven approach in capturing pre-attention, at the very minimum (Finn 1988; Greenwald and Leavitt 1984). A pre-attention is further predicted by a consumer’s inherent interest in the advertised product category, especially amidst the ad clutter encountered by an average consumer across different media types (Elliott and Speck 1998).

However, to rule out any moderating role of interest in product category empirically and to establish it as a covariate for all the further studies, a full-factorial design (testing for main effects of product shadow, interest in product category, as well as for the interaction between product shadow and interest in product category) was implemented in this pretest. The details on this pretest are as follows.

**Pretest**

Following a single-factor, between-subjects design (presence vs. absence of the product’s shadow in the ad frame), it employed a black and white image of a music speaker guised under a fictitious brand name, and supported by some generic product claims to simulate realism (See Appendix B). Students from an undergraduate marketing course were solicited for this paper and pencil based study, in exchange for extra course credit.
Students were randomly provided with a product ad in a printed form either with or without its cast shadow. Following the ad exposure, they were asked to provide their assessments on three, 9-point, bipolar scales (poor/excellent, unfavorable/favorable, and negative/positive; α = .89) (Hernandez, Wright and Ferminiano Rodrigues 2015; MacKenzie, Lutz and Belch 1986). They finished the survey by reporting their general interest in the category of music speakers, followed by their gender and age. A total of 74 students participated in this study (56% Males, $M_{age} = 22$ years). Two students did not follow the instructions properly and hence, their responses were excluded from the final analysis, leaving a final sample size of 72.

A full-factorial ANOVA with product shadow (present vs. absent), interest in the product category (measured), as well as the interaction term on the overall ad evaluations revealed significant main effects of the product shadow ($F(1, 68) = 3.90, p = .05$) and interest in product category ($F(1, 68) = 11.09, p < .05$). However, the interaction between product shadow and interest in product category was not significant ($p > .10$). The overall ad evaluation was higher in the shadow-present condition compared to the shadow-absent condition ($M_{\text{shadow}} = 5.16$ vs. $M_{\text{no-shadow}} = 4.70$; $M_{\text{difference}} = .63, p = .09$). This provides preliminary support for H1.

More importantly, the interaction between shadow and interest in product category was not significant. Thus, interest in product category was established as a statistical covariate and not a boundary condition for the effects of product’s shadow on ad evaluations to hold. Henceforth, interest in product category is used as a consistent covariate in all studies and not discussed further. Following this pretest, study 1A was conducted with the same product stimuli.
Design, Participants, Procedure

Study 1A employed a single-factor, between-subjects design with the presence (versus absence) of the product’s shadow in the ad frame as the manipulated factor. Each experimental condition consisted of the product ad pretested before (music speaker). Participants were solicited online from Amazon’s Mechanical Turk platform for a nominal compensation ($0.20) (Goodman and Imrak 2013). MTurk provides an easy access to a diversified respondent pool. Given the concerns of representativeness and self-selection biases with MTurk, care was taken to screen participants (Hit approval rate > 90% and location = United States) for high data quality across all the current studies (Goodman and Paolacci 2017).

Please note that different compensation amounts have been used across all the current dissertation studies depending upon, a) the anticipated time commitment based on the length of the study survey, b) MTurk’s guidelines of fair compensation for such tasks, and c) the amount of individual effort entailed by specific tasks such as visual priming (e.g. study 3) (Buhrmester, Kwang and Gosling 2011; Goodman and Paolacci 2017).

For this study, MTurkers were randomly assigned to one of the two experimental conditions. They were requested to evaluate the ad and provide their overall rating for it (0 = poor, 10 = excellent), followed by an assessment of product attractiveness (1 = unattractive, 7 = attractive), product stimulation (1 = boring, 7 = stimulating) and product contrast (1 = poor, 7 = excellent) (adapted from Desmet 2002; Hagtvedt and Patrick 2008; Meyers-Levy and Zhu 2010).

Product attractiveness, stimulation and contrast perceptions were averaged to form the product’s visual appraisal index (α = .72). At the end of the survey, participants were asked about their interest in the product category shown in the ad, followed by self-reports of gender and age. Sixty MTurkers (63% Males, $M_{age} = 33$ years) participated in this study.
**Results**

A single-factor ANCOVA with product’s shadow as the manipulated factor and interest in product category as a significant covariate ($p < .05$) on the overall ad ratings revealed a significant main effect of the product shadow ($M_{\text{shadow}} = 6.34$ vs. $M_{\text{no-shadow}} = 5.10$; $F (1, 57) = 4.86, p < .05$). This supports H1. Analysis of variance based assumption testing was conducted for all the current dissertation studies (See Levene’s tests and Lack of fit tests in Appendix H for details).

A similar ANCOVA on the product’s visual appraisal index also exhibited a significant main effect of the presence (versus absence) of the product’s cast shadow ($F (1, 57) = 5.56, p < .05$). The product’s visual appraisal in terms of its attractiveness, stimulation and contrast was rated higher in the presence of shadow ($M_{\text{shadow}} = 4.41$), compared to its absence ($M_{\text{no-shadow}} = 3.72$; $M_{\text{difference}} = .62, p < .05$). This supports H2.

Finally, mediation testing (using PROCESS Model 4) revealed product’s visual appraisal index as a significant mediator to the ad ratings, based on the shadow manipulation ($\beta = .58$, [.1404, 1.2986], 5000 bootstraps, 95% CI, Hayes 2013). There was a significant, indirect effect of product shadow’s presence (vs. absence) on the overall ad ratings through product’s visual appraisal. Hence, H3 was also supported. Product shadow improved the overall ad evaluations by enhancing the product’s visual appeal.

**Discussion**

The results of study 1A support hypotheses 1, 2 and 3 and gather preliminary evidence for the proposed effects of the presence (versus absence) of a product’s cast shadow on ad evaluations due to an enhancement in the product’s visual appraisal. In the next study, an attempt was made to replicate the effects from study 1A using a different product category.
Study 1B: Replication using a different product category

The purpose of study 1B was to replicate all the findings from study 1A and establish stronger evidence towards hypotheses 1, 2 and 3. This study employed a different product category (ballpoint pen) to retest the proposed effects and solicited student-subjects for participation in exchange for extra course credit (Bhattacherjee 2012).

Compared to music speaker employed in study 1A, ballpoint pen is a popular product category and also more compatible with the student demographic. Another reason for choosing this product was to ensure that the proposed effects are replicated for a low-design stimuli (Pieters, Wedel and Batra 2010). In comparison to music speaker stimuli used before, the stimuli used in this study is minimalistic in its design, i.e. lower in visual design complexity (See Appendix B).

Design, Participants, Procedure

Study 1B again had a single-factor, between-subjects design (presence vs. absence of product’s shadow). Students were randomly assigned to one of the two conditions. In a paper and pencil based format, each condition consisted of a printed ad of a ballpoint pen presented under a relatively less known American pen brand, Yafa ($M_{\text{familiarity}} = 2.16$ on a 6 point scale), a black and white product image, and a short verbal copy adopted from a real online ad of a ballpoint pen (See Appendix B).

Participants evaluated the ad in each condition using three, 7-point scale measures (poor/excellent, dislike very much/like very much, extremely negative/extremely positive; $\alpha = .89$) (MacKenzie, Lutz and Belch 1986; Mitchell and Olsen 1981), followed by their assessment of the product’s visual appearance (visual attractiveness, visual pleasure, visual aesthetics, and visual design; $\alpha = .95$) (adapted from Berlyne 1970; Hagtvedt and Patrick 2008; Townsend and Shu
Principal Component Analysis (PCA) with Varimax rotation conducted on all the items for ad evaluations (35.65% variance explained) and product’s visual appraisal (50.29% variance explained) is presented below (See Table 1.; Bartlett’s test of Sphericity, \( p < .01 \), and KMO measure of sampling adequacy = .85) (Hair Jr, et al. 2009).

Table 1. PCA on ad evaluation and product appraisal measures in study 1B

<table>
<thead>
<tr>
<th>Measure</th>
<th>Answer</th>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad evaluation</td>
<td>Poor/Excellent</td>
<td>ADPOOREXC</td>
<td>0.376</td>
<td>0.836</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Dislike very much/Like very much</td>
<td>ADDISLIK</td>
<td>0.317</td>
<td>0.863</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Extremely negative/Extremely Positive</td>
<td>ADNEGPOS</td>
<td>0.046</td>
<td>0.917</td>
</tr>
<tr>
<td>Product’s visual attractiveness</td>
<td>Very bad/Very good</td>
<td>VISATTR</td>
<td>0.937</td>
<td>0.145</td>
</tr>
<tr>
<td>Product’s visual pleasure</td>
<td>Very bad/Very good</td>
<td>VISPLEAS</td>
<td>0.887</td>
<td>0.274</td>
</tr>
<tr>
<td>Product’s visual aesthetics</td>
<td>Very bad/Very good</td>
<td>VISAESTH</td>
<td>0.914</td>
<td>0.255</td>
</tr>
<tr>
<td>Product’s visual design</td>
<td>Very bad/Very good</td>
<td>VISDES</td>
<td>0.881</td>
<td>0.223</td>
</tr>
</tbody>
</table>

*Boldface = factor loading > .6; non-forced PCA with Varimax rotation

Finally, subjects reported their interest in the product category and some general demographics. Sixty-eight undergraduate students (54% Males, \( M_{age} = 21 \) years) participated in this study in exchange for extra course credit.

**Results**

An ANCOVA (with interest in product category as the covariate) on the overall ad ratings revealed expected differences in the shadow and no-shadow conditions (\( M_{shadow} = 4.61 \) vs. \( M_{no-shadow} = 4.20 \); \( F(1, 65) = 3.68, p = .06 \)). A same ANCOVA on the product’s visual appraisal index revealed a significant main effect of the product’s shadow (\( M_{shadow} = 4.33 \) vs. \( M_{no-shadow} = 3.40 \); \( F(1, 65) = 8.18, p < .05 \)). Finally, a PROCESS Model 4 (with interest in the product category as
covariate) confirmed the product’s visual appraisal index as a significant mediator to the overall ad ratings, based on the presence (vs. absence) of the product’s shadow in the ad frame ($\beta = .32$, [.1019, .6314], 5000 bootstraps, 95% CI) (Hayes 2013).

**Discussion**

Study 1B replicated the findings from study 1A in supporting hypotheses 1, 2 and 3. The effects were consistent across two product categories (music speaker and ballpoint pen), different product designs, as well as varied respondent demographics (MTurkers and students). However, the findings from the above studies can be critiqued based on the presence of other ad elements in the ad frame, such as the product claims.

While product claims were added mainly to simulate ad realism, an isolated effect of the product’s cast shadow on ad assessments should be replicated, given the conceptualization in chapter three. Therefore, a short third study (Study 1C) was conducted with a reductionist approach towards the ad design (i.e. with only the brand name and product’s image, but no product claims).

**Study 1C: Isolated effects of a product shadow on ad evaluations**

The main objective of this study was to evidence and replicate the main effect of the presence (vs. absence) of a product’s cast shadow on the overall ad evaluations, isolated from other ad elements such as the product claims.

**Design, Participants, Procedure**

Study 1C had a one-factor, between-subjects design such that the only difference between the two conditions was the presence versus absence of the product’s shadow from the ad frame.
An ink pen was used as a product category, and apart from the brand name used before (Yafa), there were no other ad elements in the ad frame (See Appendix B).

MTurkers were solicited for this online study with an incentive of $.35. Similar to other studies, each participant was randomly assigned to either a shadow or a no-shadow condition. Upon ad exposure, they provided their feedback using 7-point scale measures (poor/excellent, strongly dislike/ strongly like, extremely negative/ extremely positive, not engaging at all/ very engaging, not interesting at all/ very interesting, not involving at all/ very involving; $\alpha = .96$) (Edell and Burke 1987; Holbrook and Batra 1987; Janiszewski 1990a; MacKenzie, Lutz and Belch 1986).

Finally they reported their brand name familiarity ($M_{\text{familiarity}} = 2.9$ on a 7-point scale), interest in product category, gender and age. Fifty-eight MTurkers participated in this study (52% Males, $M_{\text{age}} = 38$ years).

**Results**

A one-way ANCOVA (interest in product category as a significant covariate, $p < .01$) revealed a significant main effect of the product’s shadow on ad evaluations ($F(1, 55) = 5.41, p < .05$). The ad evaluations were significantly higher when the product’s shadow was present in the ad frame, compared to its absence ($M_{\text{shadow}} = 4.67$ vs. $M_{\text{no-shadow}} = 4.00$; $M_{\text{difference}} = .72, p < .05$). Thus, H1 was supported again.

**Discussion**

The main effect of product shadow on ad evaluations was replicated with a third stimuli (Ink pen) in study 1C, and without any product claims in the ad’s background. Overall, combined evidence from studies 1A, 1B, and 1C support hypotheses 1, 2 and 3.
Study 2: Moderation by centrality of visual product aesthetics

The main objective of this study was to test hypothesis 4. As discussed before, CVPA (Centrality of Visual Product Aesthetics) is defined as the level of importance visual aesthetics hold for a consumer in a product domain, and has three dimensions: value, acumen, and response (Bloch, Brunel and Arnold 2003). Although not formally hypothesized for in H4, the three dimensions of CVPA may interact individually and independently with the presence (vs. absence) of product shadow to influence the overall ad evaluations. Therefore, a pretest was conducted to explore these interactions, as discussed below.

Pretest

Before running a full study with all the CVPA items, a pretest was conducted to a) test the stimuli before running a full study with all CVPA items, and b) explore the preliminary effects of individual CVPA aspects (value, acumen, and response) on the relationship between product shadow and ad evaluations.

This study employed a single-factor, between-subjects design with the presence versus absence of the product’s shadow in the ad frame as the manipulated factor. Fifty-nine respondents (56% Males, Mage = 37 years) from Amazon’s Mechanical Turk participated in this study for a nominal compensation ($ .25). The stimuli consisted of a ballpoint pen guised under the name of a British brand of stationary products (Berol), along with some generic claims (See Appendix C).

Participants were randomly shown an ad either presenting the product with its shadow or without it. They were requested to assess the ad and provide their evaluations on three, 7-point scale measures (poor/excellent, strongly dislike/strongly like, not engaging at all/very engaging; α = .89) (Janiszewski 1990b; MacKenzie, Lutz and Belch 1986).
After ad assessments, participants reported individual differences on three single CVPA items (Value - “I enjoy seeing visual displays that have superior designs.”, Acumen - “I have a pretty good idea of what makes a visual display look better for a product”, and Response - “When I see a product display that has a really great design, I feel a strong urge to buy it.”; 1 = strongly disagree, 7 = strongly agree), followed by basic demographic information (Bloch, Brunel and Arnold 2003). The mean value for brand familiarity was 2.7 on a 7-point scale (1 = very low, 7 = very high).

Consistent with the findings from previous studies, there was a main effect of the product’s shadow on the overall ad evaluations following a single-factor ANCOVA with interest in product category as the covariate ($M_{\text{shadow}} = 4.71$ vs. $M_{\text{no-shadow}} = 4.10$; $F (1, 56) = 6.14, p < .05$). The overall ad evaluations were significantly higher when the product shadow was present in the ad frame ($M_{\text{difference}} = .77, p < .05$).

Since each CVPA item used in this pretest was derived from the three CVPA dimensions of value, acumen, and response, respectively; an ANCOVA with product shadow, CVPA value item, CVPA acumen item and CVPA response item, along with two-way interactions between product shadow and each of these CVPA items on the overall ad evaluations was conducted.

The interaction between product shadow and CVPA value item was significant and negative ($\beta = -1.03, p < .01$). The interaction between shadow and CVPA acumen was significant and positive ($\beta = .86, p < .05$). Lastly, the interaction between product shadow and CVPA response item was not statistically significant ($p > .05$).

Findings from this pretest replicate the main effect of product shadow on ad evaluations (again supporting H1). In addition, they provide interesting preliminary insights towards the moderating effect of individual CVPA aspects on the relationship between product shadow and ad
evaluations. While H4 predicted a general positive effect of an individual’s CVPA, the effect of CVPA acumen was positive but the effect of CVPA value was negative.

Consumers who reported enjoying seeing visual displays with superior designs more reported lower ad evaluations when the product’s shadow was present (vs. absent). On the other hand, consumers with reportedly higher visual acumen (“I have a pretty good idea of what makes a visual display look better for a product”) exhibited more positive ad evaluations in the shadow’s presence (versus absence). The latter provides evidence in support of H4.

It is possible that individuals who derive pleasure from superior visual displays do not like a product’s shadow in the ad frame and consider them distracting. However, those with higher visual acumen appreciate the role of product shadows in making the product’s visual portrayal better. There was no effect of the CVPA response item possibly due to a single item used in this pretest. In the main study 2, in addition to the product’s cast shadow manipulation, the full 11-item CVPA scale was administered to fully capture all these dimensions and retest for the interactions between product shadow and each of these CVPA dimensions (Bloch, Brunel and Arnold 2003).

**Design, Participants, Procedure**

Study 2 also had the product’s shadow (presence vs. absence) as the manipulated, between-subjects factor. The individual CVPA was measured for each participant at the end of the survey. In this study, the same pretested product image for the ballpoint pen was used. However, the brand name was changed and the product claims were directly taken from a real online ad for such a pen to enhance ad believability (also used in study 1B, see Appendix C).

Seventy MTurkers (54% Males; \(M_{age} = 36 \) years) participated in this study for compensation ($0.15). MTurkers located in the U.S. and those who had not participated in one of
the earlier studies were requested to participate in this study. Upon meeting the screening criteria, a participant was randomly presented with the product ad for a ballpoint pen either with or without its cast shadow in the ad frame.

With the ad exposure, they provided their ad assessments on three, 7-point scales (very bad/very good, dislike very much/like very much, extremely negative/extremely positive; \( \alpha = .94 \)) (MacKenzie, Lutz and Belch 1986), followed by their evaluation of product’s contrast, depth and symmetry (1= very bad, 9 = very good; \( \alpha = .90 \)) (Arnheim 1965; Berlyne 1970) (for PCA on ad valuation and product appraisal items, see Table 2.).

**Table 2.** PCA on ad evaluation and product appraisal measures in study 2

<table>
<thead>
<tr>
<th>Measure</th>
<th>Answer</th>
<th>Items</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad evaluation</td>
<td>Very bad/Very good</td>
<td>ADBADGOOD</td>
<td>0.880</td>
<td>0.359</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Dislike very much/Like very much</td>
<td>ADDISLIK</td>
<td>0.902</td>
<td>0.302</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Extremely negative/Extremely positive</td>
<td>ADNEGPOS</td>
<td>0.829</td>
<td>0.405</td>
</tr>
<tr>
<td>Product contrast</td>
<td>Very bad/Very good</td>
<td>PCON</td>
<td>0.241</td>
<td><strong>0.870</strong></td>
</tr>
<tr>
<td>Product depth</td>
<td>Very bad/Very good</td>
<td>PRDEPTH</td>
<td>0.414</td>
<td><strong>0.844</strong></td>
</tr>
<tr>
<td>Product symmetry</td>
<td>Very bad/Very good</td>
<td>PRSYMM</td>
<td>0.442</td>
<td><strong>0.798</strong></td>
</tr>
</tbody>
</table>

*Boldface = factor loading > .6; forced PCA with Varimax rotation

Finally, before reporting their gender and age, participants filled out an 11-item CVPA scale, with the first four items (CVPA 1-4) measuring the value for visual product aesthetics (e.g. “I enjoy seeing displays of products that have superior designs.”; 1 = strongly disagree, 7 = strongly agree), the next four items (CVPA 5-8) measuring their acumen for visual product aesthetics (e.g. “Being able to see subtle differences in product designs is one skill that I have developed overtime.”), and the last three items (CVPA 9-11) capturing an individual’s response to visual product aesthetics (e.g. “When I see a product that has a really great design, I feel a strong
A Principal Component Analysis (PCA) on the 11 items for the CVPA scale with as the extraction method and Varimax rotation was conducted (Hair Jr, et al. 2009). Three approximate components were revealed in the rotated matrix such that for the first four items: value ($\alpha = .87$; 20.89% variance explained), for the next four items (28.01% variance explained): acumen ($\alpha = .89$), and for the last three items (30.70% variance explained): response ($\alpha = .93$) (See Table 3.).

**Table 3. PCA on CVPA items in study 2**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Answer</th>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owning products that have superior designs makes me feel good about myself.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA1</td>
<td>0.596</td>
<td>0.165</td>
<td>0.566</td>
</tr>
<tr>
<td>I enjoy seeing displays of products that have superior designs.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA2</td>
<td><strong>0.673</strong></td>
<td>0.123</td>
<td>0.590</td>
</tr>
<tr>
<td>A product's design is a source of pleasure for me.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA3</td>
<td>0.163</td>
<td>0.314</td>
<td><strong>0.826</strong></td>
</tr>
<tr>
<td>Beautiful product designs make our world a better place to live in.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA4</td>
<td>0.199</td>
<td>0.299</td>
<td><strong>0.814</strong></td>
</tr>
<tr>
<td>Being able to see subtle differences in product designs is one skill that I have developed overtime.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA5</td>
<td>0.256</td>
<td><strong>0.846</strong></td>
<td>0.167</td>
</tr>
<tr>
<td>I see things in a product's design that others tend to pass over.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA6</td>
<td>0.091</td>
<td><strong>0.854</strong></td>
<td>0.231</td>
</tr>
<tr>
<td>I have the ability to imagine how a product will fit in with designs of other things I already own.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA7</td>
<td>0.224</td>
<td><strong>0.777</strong></td>
<td>0.201</td>
</tr>
<tr>
<td>I have a pretty good idea of what makes one product look better than its competitors.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA8</td>
<td>0.345</td>
<td><strong>0.747</strong></td>
<td>0.283</td>
</tr>
<tr>
<td>Sometimes the way a product looks seems to reach out and grab me.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA9</td>
<td><strong>0.867</strong></td>
<td>0.149</td>
<td>0.186</td>
</tr>
<tr>
<td>If a product's design really &quot;speaks&quot; to me, I feel that I must buy it.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA10</td>
<td><strong>0.872</strong></td>
<td>0.317</td>
<td>0.147</td>
</tr>
<tr>
<td>When I see a product that has a really great design, I feel a strong urge to buy it.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CVPA11</td>
<td><strong>0.865</strong></td>
<td>0.351</td>
<td>0.163</td>
</tr>
</tbody>
</table>

*Boldface = factor loading > .6; non-forced PCA with Varimax rotation*
The KMO measure for sampling adequacy for the CVPA items was .85 and the Bartlett’s test of Sphericity was less than .05. Thus, the proportion of variance as explained by the underlying factors was high and the variables were associated suitably for factor analysis to reveal useful dimensions (Tabachnick and Fidell 2007). After conducting the factor analysis, respective index scores were calculated for the value, acumen and response dimensions of CVPA.

Results

An overall ANCOVA (with interest in product category as the consistent covariate) with the presence (versus absence) of product shadow, value, acumen, response, and two-way interactions between shadow and value, shadow and acumen, and shadow and response as predictors to overall ad evaluations was significant \(F(8, 61) = 5.66, p < .01\).

The only significant interaction term however was that of product shadow with the response dimension of the CVPA scale \(F(1, 61) = 11.72, p < .01\). In comparison to the no-shadow condition, ad evaluations were significantly higher in the shadow condition for those individuals with a greater tendency to respond towards visual product aesthetics \(\beta = .89, p < .01\). The interactions of product shadow with value and acumen dimensions of CVPA, respectively, were not significant \(p > 0.10\).

A similar ANCOVA model with all the relevant interaction terms was run using the product’s visual appraisal index as the outcome variable \(F(8, 61) = 4.21, p < .01\). Again, the product’s visual appraisal in terms of contrast, depth, and symmetry was evaluated better in the presence of the product’s shadow by those who reported having a higher tendency to respond to visual product aesthetics \(F(1, 61) = 2.89, p = .09; \beta = .55, p = .09\).
A PROCESS Model 8 with the overall ad evaluation as the outcome variable, product’s visual appraisal as the mediator, individual response tendencies to visual product aesthetics as the moderator (along with interest in product category as a covariate) confirmed that for those with higher response tendencies towards visual aesthetics ($M = 5.98$), ad evaluations was significantly higher in the presence (versus absence) of shadow as mediated by their enhanced visual product appraisal in the shadow’s presence ($\beta = .36, [0.0492, .7695], 5000$ bootstraps, 90% CI).

**Posttest**

A simple direct replication of this study with 60 undergraduate students (40% Males, $M_{age} = 22$ years) in an online format revealed similar effects with the product shadow and individual response tendencies as the only significant interaction term ($F (1, 51) = 4.96, p < .05; \beta = .95, p < .05$) (Ad evaluations as an average of 6 items: very bad/very good, dislike very much/like very much, extremely negative/extremely positive, not engaging at all/very engaging, not persuasive at all/very persuasive, not interesting at all, very interesting; $\alpha = .92$) (Janiszewski 1990b; MacKenzie, Lutz and Belch 1986; Miniard, et al. 1991). Overall, these findings support H4.

**Discussion and limitations**

Findings from study 2 support H4 in that a specific dimension of the CVPA scale, i.e. an individual’s response tendencies towards aesthetics, positively moderate the effect of product shadow on ad evaluations. There was also evidence for moderated mediation, where the effect of product shadow on the overall ad evaluation was significantly mediated by improvement in the product’s visual appearance, for those with higher self-reported aesthetic response tendencies.
It is interesting to note that while the pretest revealed interactions between product shadow and CVPA value and acumen aspects, the main study 2 and its simple replication with a different demographic showed significant interactions only with the CVPA response dimension, even though the same product image was used in all these studies. There may be a couple of reasons for this. First, as per the factor analysis reported in table 3, the CVPA value items (i.e. CVPA 1-4, see Table 3) did not seem to load well together, thus undermining the strength of that particular dimension (Bloch, Brunel and Arnold 2003). Second, the interactions exhibited in the current studies with the individual CVPA dimensions may be restricted by the stimuli aspects such as its design and color.

Third, CVPA as an individual factor varies considerably across the consumer population for e.g. across genders. In fact, a further probing of the findings from main study 2 based on gender revealed such differences. For males, two specific interactions were significant (product shadow by CVPA acumen: \( F (1, 29) = 5.25, p < .05, \eta^2 = .60 \); product shadow by CVPA response: \( F (1, 29) = 12.09, p < .01, \eta^2 = .92 \)). For men, as their reported acumen increased, ad evaluations in the shadow compared to the no-shadow condition decreased (\( \beta = -.62, p < .05 \)). On the other hand, as their CVPA response tendencies increased, the ad ratings in the shadow condition compared to the no-shadow condition increased (\( \beta = .87, p < .01 \)).

For females, as the CVPA value increased, ad evaluations in the shadow (versus no-shadow) conditions declined (\( F (1, 23) = 4.04, p = .06, \eta^2 = .49; \beta = -1.42, p = .06 \)). The power for some of these effects was low due to the smaller cell sizes, when probing for gender effects. In addition to CVPA captured through self-reported measures that weaken their veracity, such varied findings across genders makes it difficult to generalize these effects. Nevertheless, these are interesting insights towards varied gender appraisals of the ads with and without product shadow.
Fourth, while some consumers may value product aesthetics more, they may lack the acumen to decipher these valuations. Others may respond strongly to product visual aesthetics but may not value them overtly. The latter is heightened in the case of peripheral visual elements like product shadows (please refer back to the section ‘The implicit nature of shadows’ in chapter two). An individual’s background or professional training may also impact his/her visual tendencies e.g. if someone is an artist or a graphic designer. There is a lot of scope for further exploration in these respects but for the current purposes, there seems reasonable evidence for H4.

The effect with the strongest power in study 2 (as well as replicated in posttest) was that of product shadow and CVPA response, and can be generalized to consumer population in that those with higher response tendencies towards product aesthetics positively evaluate ads where product shadows are present in the ad frames. Additionally, given the items used to measure this CVPA response dimension (such as urge to buy), it makes a befitting construct for marketers to target consumers as a starting point when manipulating product shadows in ad frames (Bloch, Brunel and Arnold 2003).

**Study 3A: Moderation by the visual processing mode**

The aim of this study was to test hypotheses 5 and 6 which propose that ad evaluations and ad communication efficacy are higher when consumers engage in a gestalt-based visual processing and a product shadow is present in the ad frame. On the other hand, ad evaluations and effectiveness are proposed to be lower in the product shadow’s presence (versus absence), when consumers engage in component-based visual processing since the shadow acts as optical noise in the ad frame.
Pretest

Before the main study, a pretest with only the product images (i.e. without any claims) was conducted (See Appendix D). The aim of this pretest was to evidence a general positive effect of the presence (vs. absence) of the product’s shadow prior to any claim manipulations. Therefore, it followed a single-factor, between-subjects design with the presence (vs. absence) of the product’s shadow as the manipulated factor. A black and white image of music speaker (also used in study 1A) was randomly presented with or without its cast shadow using a British brand name (KEF) of music speakers (See Appendix D, Mean brand familiarity = 2.15).

Sixty-two MTurkers (52% males, \(M_{\text{age}} = 35\) years) participated in this pretest online (compensation = $.35). The mean ad evaluations (1 = poor, strongly dislike, extremely negative/7 = excellent, strongly like, extremely positive; \(\alpha = .93\)) for the stimuli were higher in the presence of product’s shadow in the ad frame compared to its absence (\(M_{\text{shadow}} = 3.51\) vs. \(M_{\text{no-shadow}} = 2.85\); \(M_{\text{difference}} = .70, p = .08\)) (See Table 4.).

Similarly, the mean ad efficacy ratings (“The ad employs all the ad elements effectively to present the product”, “The ad presents the product convincingly”, “All the ad elements flow well with one another”; 1 = strongly disagree and 7 = strongly agree; \(\alpha = .93\)) were higher in the shadow’s presence (\(M_{\text{shadow}} = 3.20\) vs. \(M_{\text{no-shadow}} = 2.51\); \(M_{\text{difference}} = .72, p = .08\) (Kamins, et al. 1989) (See Table 4.).

Table 4. Means and SDs for pretest to study 3A

<table>
<thead>
<tr>
<th>Pretest (Images only)</th>
<th>Ad evaluations</th>
<th>Ad efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Condition</strong></td>
<td><strong>N</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>Shadow</td>
<td>30</td>
<td>3.51</td>
</tr>
<tr>
<td>No-shadow</td>
<td>32</td>
<td>2.85</td>
</tr>
<tr>
<td>All</td>
<td>62</td>
<td></td>
</tr>
</tbody>
</table>
A Principal Component Analysis (PCA) on all the items for ad evaluations and ad efficacy evidenced fair discriminant validity amongst the two constructs (Forced, 2-factor with Varimax rotation) (Hair Jr, et al. 2009). The PCA revealed a significant value for the Bartlett’s test of Sphericity ($p < .01$) and the value for KMO measure of sampling adequacy was .90. Each of these two constructs loaded separately onto two components with Eigen values greater than 1, explaining 44.21% and 43.89%, respectively. Thus, there was support for ad evaluations and ad efficacy as distinct constructs (See Table 5.).

Table 5. PCA on ad evaluation and ad efficacy items in the pretest to study 3A

<table>
<thead>
<tr>
<th>Measure</th>
<th>Answer</th>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad evaluation</td>
<td>Poor/Excellent</td>
<td>ADPOOREXC</td>
<td>0.784</td>
<td>0.525</td>
</tr>
<tr>
<td></td>
<td>Strongly dislike/Strongly like</td>
<td>ADDISLIK</td>
<td>0.856</td>
<td>0.405</td>
</tr>
<tr>
<td></td>
<td>Extremely negative/Extremely positive</td>
<td>ADNEGPOS</td>
<td>0.845</td>
<td>0.365</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Strongly disagree/Strongly agree</td>
<td>ELEEFF</td>
<td>0.525</td>
<td><strong>0.770</strong></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree/Strongly agree</td>
<td>PRCONV</td>
<td>0.440</td>
<td><strong>0.844</strong></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree/Strongly agree</td>
<td>FLOWEL</td>
<td>0.349</td>
<td><strong>0.870</strong></td>
</tr>
</tbody>
</table>

*Boldface = factor loading > .6; forced PCA with Varimax rotation*

Overall, the findings from this pretest again show that the presence of product’s shadow improved the overall ad evaluations (See Table 4.). More specifically, for study 3A, it helped pretest the stimuli prior to any claim manipulations.

**Design, Participants, Procedure**

Study 3A followed a 2 (product’s cast shadow: present vs. absent) X 2 (ad copy: gestalt-focused vs. component-focused) between-subjects design. In this study, gestalt versus component...
processing was manipulated through the ad copy. In the *gestalt* condition, the ad’s claims emphasized the product’s holistic aspects such as its form, while in the component condition, the claims pointed towards the product’s visual details (See Appendix D for details).

For the main study 3A, in addition to the manipulation of product’s shadow similar to the pretest just discussed, the ad’s copy was also manipulated between-subjects. In the *gestalt* condition, the ad claims highlighted the product’s contours and form (See Appendix D). In the *component* condition, the ad claims focused on the product’s texture and specific features such as the speaker’s metal heads.

Thus, in a 2 X 2 between-subjects format, participants were randomly presented with one of the four possible conditions: gestalt copy with product shadow, gestalt copy without product shadow, component copy with product shadow and component copy without product shadow (See Appendix D). One hundred and forty MTurkers participated in this study (51% males, $M_{\text{age}} = 38$ years, Compensation = $.35$). Please note that the overall sample size for this study is almost double that of the previous studies because of its 2 X 2 factorial design (compared to single-factor designs of previous studies). Following small to medium effect sizes for the current research, an estimated 30-35 responses per cell were planned for all the studies (Cohen 1992).

Upon ad exposure, they were requested to provide their evaluations of the ad on 7-point scale items such as poor-excellent, not engaging at all-very engaging, and not involving at all-very involving ($\alpha = .93$) (MacKenzie and Lutz 1989; MacKenzie, Lutz and Belch 1986). Then, respondents reported their assessments of ad effectiveness using cognitive style statements, where $1 = $ strongly disagree and $7 = $ strongly agree (“*All the ad elements flow well with one another*”, “*The ad conveys information in a way that is easy to process*”, “*The ad presents the product convincingly*”; $\alpha = .82$) (Kamins, et al. 1989).
Table 6. PCA on ad evaluation and ad efficacy items in study 3A

<table>
<thead>
<tr>
<th>Measure</th>
<th>Answer</th>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad evaluation</td>
<td>Poor/ Excellent</td>
<td>ADPOOREXC</td>
<td><strong>0.839</strong></td>
<td>0.296</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Not engaging at all/ Very engaging</td>
<td>ADENGAG</td>
<td><strong>0.910</strong></td>
<td>0.240</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Not involving at all/ Very involving</td>
<td>ADINVOLV</td>
<td><strong>0.910</strong></td>
<td>0.285</td>
</tr>
<tr>
<td>All the ad elements flow well with one another.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>FLOWEL</td>
<td>0.500</td>
<td><strong>0.672</strong></td>
</tr>
<tr>
<td>The ad conveys information in a way that is easy to process.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>EASYPRO</td>
<td>0.155</td>
<td><strong>0.919</strong></td>
</tr>
<tr>
<td>The ad presents the product convincingly.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>PRCONV</td>
<td>0.647</td>
<td>0.608</td>
</tr>
</tbody>
</table>

*Boldface = factor loading > .6; forced PCA with Varimax rotation*

Factor analysis (PCA) on all these items revealed two separate constructs with items for ad evaluations (50.89% variance explained) loading separately from the items on ad efficacy (31.53% variance explained) (KMO Measure = .87, Bartlett’s test of Sphericity - $p < .01$, Forced, 2-factor with Varimax rotation) (Hair Jr, et al. 2009) (See Table 6.). Respondents finished the survey by answering some demographics, their brand name familiarity (Mean brand familiarity = 2.52) and their interest in the product category of music speakers in general ($M_{product-category~interest} = 4.28$).

Results

A 2 (product’s cast shadow: present vs. absent) X 2 (ad copy: gestalt-focused vs. component-focused) ANCOVA, with the interest in product category as the consistent covariate on the overall ad evaluations revealed a significant interaction between the two factors ($F (1, 135) = 5.23, p < .05$). In the gestalt condition, mean ad evaluations were significantly higher when the product’s shadow was present in the ad frame ($M_{shadow} = 4.02$ vs. $M_{no-shadow} = 3.31; M_{difference} = .80, p = .03$) (See Table 7.). In contrast, the mean ad ratings were lower in the shadow’s presence versus
absence in the component condition \(M_{\text{shadow}} = 3.56\) vs. \(M_{\text{no-shadow}} = 4.26; M_{\text{difference}} = .40, p = .29\).

However, this difference was not statistically significant. These findings support H5a, but not H5b.

**Table 7.** Means and SDs for study 3A

<table>
<thead>
<tr>
<th>Main Study 3a</th>
<th>Condition</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestalt copy</td>
<td>Shadow</td>
<td>35</td>
<td>4.02</td>
<td>(1.68)</td>
<td>4.45</td>
<td>(1.40)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>34</td>
<td>3.31</td>
<td>(1.61)</td>
<td>3.78</td>
<td>(1.57)</td>
</tr>
<tr>
<td>Component copy</td>
<td>Shadow</td>
<td>36</td>
<td>3.56</td>
<td>(1.54)</td>
<td>4.06</td>
<td>(1.39)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>35</td>
<td>4.26</td>
<td>(1.67)</td>
<td>4.36</td>
<td>(1.21)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.** Results for study 3A
Similarly, an ANCOVA on ad efficacy revealed an interaction between product shadow and ad copy ($F(1, 135) = 3.12, p = .08$). Again, ad efficacy ratings were higher in the shadow’s presence in the *gestalt* condition ($M_{\text{shadow}} = 4.45$ vs. $M_{\text{no-shadow}} = 3.78$; $M_{\text{difference}} = .74$, $p = .02$), but no-different in the *component* condition ($M_{\text{shadow}} = 4.06$ vs. $M_{\text{no-shadow}} = 4.36$; $p = .85$). These findings support H6a, but not H6b (See Table 7. and Figure 4.).

**Discussion**

Upon directly comparing *gestalt* versus *component* conditions in the absence of product’s shadow, a significant difference was found between them. The ad evaluations were higher in the *component*-focused copy compared to those in the *gestalt*-focused copy ($M_{\text{component}} = 4.26$ vs. $M_{\text{gestalt}} = 3.31$; $M_{\text{difference}} = 1.03$, $p < .01$) (See Table 7.). Similarly, ad efficacy ratings were higher in the absence of product’s shadow for the *component* condition versus the *gestalt* condition ($M_{\text{component}} = 4.36$ vs. $M_{\text{gestalt}} = 3.78$; $M_{\text{difference}} = .65$, $p = .04$).

These findings show that without the product’s shadow in the ad frame, *component* condition fared better than the *gestalt* condition. Upon adding a product shadow to the frame, while the ad evaluations for the *gestalt* condition improved statistically, the mean difference in the ad ratings for the *component* condition attenuated, i.e. became non-significant ($M_{\text{component}} = 4.02$ vs. $M_{\text{gestalt}} = 3.56$; $p = .67$).

Similarly, the difference between the ad efficacy ratings for the *component* and *gestalt* conditions became non-significant upon adding shadow to the frame ($M_{\text{component}} = 4.45$ vs. $M_{\text{gestalt}} = 4.06$; $p = .65$). Therefore, there is some support for H5b and H6b through attenuation of the effects in the *component* condition (instead of significantly lower ad evaluations and efficacy ratings as proposed by these hypotheses).
Posttest

Given that product shadows are processed peripherally and in combination with the presented claims, it becomes difficult to isolate the effects of each ad element separately (i.e. the product, its cast shadow, the claims or a combination of these). Therefore, a posttest was conducted with an ad copy containing combined claims on gestalt and component aspects of the product and a single-factor between-subjects design (Product’s cast shadow: present vs. absent).

One half of the ad copy was gestalt-focused while the other half was component-focused (See Appendix D). In this posttest, the effects uncovered in the above study 3A should not occur (or go away), due to the neutralization of positive effects of shadow with the gestalt portion of the copy and negative effects shadow with the component portion of the copy.

Fifty-nine MTurkers (56% males, $M_{\text{age}} = 37$ years) participated in this study for the same amount of compensation as study 3A ($\$ .35$). They were randomly exposed to one of the two conditions, i.e. with or without the product’s shadow in the ad frame using the same measures for capturing ad evaluations and ad efficacy as in study 3A. There were no differences between the shadow and no-shadow conditions for the ad ratings or the ad efficacy ratings ($p > .10$) (See Table 8.). As expected, the effects found in study 3A were not seen in this posttest.

<table>
<thead>
<tr>
<th>Table 8. Means and SDs for posttest to study 3A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Posttest (Combined copies)</strong></td>
</tr>
<tr>
<td><strong>Condition</strong></td>
</tr>
<tr>
<td>Shadow</td>
</tr>
<tr>
<td>No-shadow</td>
</tr>
<tr>
<td>All</td>
</tr>
</tbody>
</table>
Note that without any claims, the pretest to study 3A revealed that the presence of the product’s shadow has a positive impact on both ad evaluations and efficacy perceptions. Upon combining the claim types, there were no such differences. The effects revealed in study 3A can thus only be attributed to the specific combinations of ad copies and the presence or absence of product shadow (as hypothesized in H5 and H6).

**Study 3B: Product shadow & ad efficacy in the case of a real brand**

In contrast to claim manipulations in study 3A, a priming task was used to engage respondents in either a *gestalt* or a *component* visual processing mode in study 3B (Förster 2009). Additionally, while the product in study 3A was presented under a fictitious brand name, a real brand (Honda) was used in study 3B for better generalizability of the effects of cast shadows on ad assessments under these specific visual processing modes, i.e. *gestalt* versus *component*.

**Design, Participants, Procedure**

In study 3B, a *gestalt* versus *component* based visual priming task was employed before seeking ad assessments. Experimental psychology suggests that in a global or *gestalt* processing mode, respondents search for similarities in unrelated stimuli, but look for differences in the stimuli under a local or *component* processing mode (Förster, Liberman and Kuschel 2008; Förster 2009). Following this literature stream, a writing task was designed and pretested for study 3B in order to visually prime respondents towards either a global (gestalt) or a local (component) visual processing mode, before seeking their ad assessments.
Pretest 1

For the pretest on the priming task, two black and white square images were created such that each of these images was composed of smaller elements (one made up of 16 smaller circles and the other made up of 4 triangles) (see Appendix E). Global versus local processing can be induced by requesting participants to locate a target figure in a compositional image by either focusing on its overall shape or on its individual elements in reaction time tasks (Förster, Liberman and Kuschel 2008; Förster 2009).

Thus, these images were manually created following prior research on visual processing, including Navon Tasks and Gestalt Completion Tests (Ekstrom, et al. 1976; Förster, Liberman and Kuschel 2008; Navon 1997). The pretest was conducted online via MTurk and adapted to a writing task with two square images following research on similarities generation under global processing and dissimilarities generation under local processing (Förster 2009).

Participants were shown the two compositional, black and white square images and randomly requested to either find similarities among the two images for global (gestalt) priming or to draw out differences between them for local (component) priming (See Appendix E). Therefore, in a single-factor, between-subjects (gestalt vs. component) design, participants were requested to write out the similarities or differences among these two images in a few lines. Time spent on this writing task was recorded by the background software. This was followed by a 7-point measure on task difficulty (1 = very difficult, 7 = very easy).

Finally, respondents were asked to provide their response to three cognitive style statements (1 = strongly disagree and 7 = strongly agree) to capture the induced visual processing mode ("While assessing the objects, I paid more attention to objects as a whole than to their individual elements.", “While evaluating the objects, I paid more attention to the entire context..."
than the details.” and “While evaluating the objects, I focused more on the elements within the objects than their overall shapes.” – Reverse-coded; α = .64) (Monga and John 2010).

Sixty-one MTurkers (54% males, \(M_{age} = 35\) years) participated in this pretest for compensation ($0.30). There were no significant differences among the gestalt versus component conditions with respect to the total time spent on the writing task or the task difficulty perceptions \((p > .10)\). The average task difficulty was rated at 5.28 and the average word count was 35. Thus the task was considered somewhat easy and no different in terms of the entailing effort from the respondents, across the two conditions.

An index score was created for the three items on visual processing and tested for differences across conditions. The mean score on this visual processing measure in the gestalt condition (where respondents were asked to draw similarities among the images) was higher than the mean score in the component condition (where respondents looked for differences) \((M_{gestalt} = 4.18\) vs. \(M_{component} = 3.57\); \(M_{difference} = .60, p = .07\)) (See Table 9.). Thus, the pretest was successful.

**Pretest 2**

As mentioned before, a real brand was used as the ad stimuli in study 3B and therefore, in another short pretest the ad stimuli was tested for the main effect of product’s shadow before executing the full 2 (Product’s shadow) X 2 (Visual prime) design. A black and white image of a Honda car (with or without shadow, see Appendix E) was randomly presented to 60 MTurk participants (52% males, \(M_{age} = 33\) years, Compensation = $0.25) requesting for their assessments on ad efficacy (“All the ad elements flow well with one another”, “The ad executes all the elements effectively”, “The ad employs the product’s image effectively”; \(α = .87\)). The mean ad efficacy
ratings were significantly higher when the car was depicted with its shadow, than without it ($M_{\text{shadow}} = 5.00$ vs. $M_{\text{no-shadow}} = 4.23$; $M_{\text{difference}} = .78, p < .05$) (See Table 9.).

Table 9. Means and SDs for pretests to study 3B

<table>
<thead>
<tr>
<th>Pretest 1 (Gestalt versus component manipulation)</th>
<th>Visual focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>N</td>
</tr>
<tr>
<td>Gestalt task - finding similarities</td>
<td>32</td>
</tr>
<tr>
<td>Component task - finding differences</td>
<td>29</td>
</tr>
<tr>
<td>All</td>
<td>61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pretest 2 (Stimuli - Honda)</th>
<th>Ad efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>N</td>
</tr>
<tr>
<td>Shadow</td>
<td>31</td>
</tr>
<tr>
<td>No-shadow</td>
<td>29</td>
</tr>
<tr>
<td>All</td>
<td>60</td>
</tr>
</tbody>
</table>

After pretesting both the manipulation and the stimuli, a full 2 (Product’s shadow: present vs. absent) X 2 (Visual prime: gestalt vs. component) between-subjects design was executed online on MTurk. Please note that for each MTurk study, workers who had participated in the pretests were screened out to maintain data integrity. This study consisted of three separate tasks: a) visual priming, b) visual prime reinforcement, and c) ad efficacy assessments. Participants were told that these tasks are unrelated. Given the length of this study which included three parts, only ad efficacy perceptions were captured for re-testing H6.

In the first task, visual priming was done through the writing task pretested before. In the second task, a visual prime reinforcement was used to strengthen the manipulation (as the pretested difference between gestalt and component primes was weak, significant at an alpha of .10). For the visual prime reinforcement task following the *gestalt* prime (i.e. similarities generation task),
respondents were told to look at three, black and white U.S. state-maps one by one (see Appendix E) and pick a response from the choice set that best represents a state’s overall shape (Friedman et al. 2003). In contrast, respondents under the *component* prime (i.e. differences generation task) were requested to look at the same state-maps one by one and pick a response that showed a specifically marked location on each map (with a *) (Förster, Liberman and Kuschel 2008; Friedman, et al. 2003).

In the final task, respondents were shown the Honda ad (pretested before) and requested for their assessments on ad efficacy measures (“The ad does a good job in presenting the product”, “The ad employs the product’s image effectively”, “The ad conveys information in a way that is easy to process”; 1 = strongly disagree and 7 = strongly agree; α = .84). A total of 142 MTurk workers participated in this study for compensation ($ .45). Fifteen people failed the attention check and hence excluded, leaving a final sample size of 127 (46% males, M_age = 41 years).

*Results*

Given a familiar brand used in this study, liking for the brand (Mean liking = 5.2 on a 7-point scale) was a significant covariate in the 2 (Product’s shadow: present vs. absent) X 2 (Visual prime: gestalt vs. component) ANCOVA on ad efficacy. There was a significant interaction between product shadow and visual prime (F (1, 122) = 5.30, p < .05). Under the gestalt prime, ad effectiveness ratings were significantly higher when the product’s shadow was present in the ad frame compared to its absence (M_shadow = 5.07 vs. M_no-shadow = 4.60; M_difference = .64, p < .05) (See Table 10.). This finding reconfirms H6a. Under the component prime, ad efficacy was lower in the shadow’s presence but not statistically different than the no-shadow condition (M_shadow = 4.95 vs. M_no-shadow = 5.10; p = .26). Again, H6b could not be supported (See Figure 5.).
Table 10. Means and SDs for main study 3B

<table>
<thead>
<tr>
<th>Main Study 3b</th>
<th>Condition</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestalt prime</td>
<td>Shadow</td>
<td>33</td>
<td>5.07</td>
<td>(1.19)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>31</td>
<td>4.60</td>
<td>(1.59)</td>
</tr>
<tr>
<td>Component prime</td>
<td>Shadow</td>
<td>31</td>
<td>4.95</td>
<td>(1.26)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>32</td>
<td>5.10</td>
<td>(1.27)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>127</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5. Results for study 3B

Discussion

A similar post-hoc analysis as in study 3A revealed that in the absence of product shadow, ad efficacy ratings were significantly higher under the component versus the gestalt prime ($M_{component} = 5.10$ vs. $M_{gestalt} = 4.60$; $M_{difference} = .78, p < .05$). This finding replicates from study 3A and provides indirect support to H6b as in the absence of shadow respondents under the component prime provided higher ad effectiveness ratings compared to those under the gestalt prime.

Also note that the lack of significance for the component conditions could arise due to the lack of color in the ad stimuli. While this was done to avoid color as a confounding factor in the
current research, prior research shows that black and white versus color visuals are associated with abstract and concrete gestalts, respectively (Lee, et al. 2014). Since all black and white images were used in the current research, perhaps the concrete or component-focused gestalts could not reveal the proposed effects on accounts of lack of color. This is because color enhances an object’s vividness and further facilitates detailed processing (Lee, et al. 2014). Future research can help uncover the effects of product shadow with color, under gestalt vs. component processing modes.

**Study 4A: Moderation by luxury versus non-luxury positioning**

The main objective of this study 4A was to investigate the impact of luxury versus non-luxury positioning on the relationship between the product’s cast shadow and the overall ad evaluations. It tests the final hypothesis 7.

**Design, Participants, Procedure**

Study 4A had a 2 (product’s cast shadow: present vs. absent) X 2 (ad’s positioning: luxury vs. non-luxury) between-subjects design. The product’s cast shadow was manipulated as in earlier studies and the ad’s positioning was manipulated through the copy (See Appendix F). A contemporary optical mouse was showcased with or without its cast shadow in the ad frame and a foreign brand name (Wipro – an Indian IT Services corporation). Under luxury positioning, Wipro electronics was highlighted as a sophisticated brand offering stylish products compared to the non-luxury conditions, where it was offered as a practical brand offering reliable products (See Appendix F) (Hagtvedt and Patrick 2008, 2009; Han, Nunes and Drèze 2010; Hung, et al. 2011).
MTurkers were randomly presented with one of the four conditions in an online survey and requested for their overall ad assessments (poor/excellent, extremely negative/extremely positive, not engaging at all/very engaging; \( \alpha = .93 \)). These were followed by measures on luxury perceptions of the showcased product for manipulation check (“The ad depicts the product as high end”, “The ad presents the product as upscale”, “The ad showcases the product as classy”, “The ad highlights the product’s luxury appeal”; 1 = strongly disagree and 7 = strongly agree; \( \alpha = .95 \)) (adapted from Hagtvedt and Patrick 2008, 2009; Hung, et al. 2011).

### Table 11. PCA on ad evaluation and product luxury items in study 4A

<table>
<thead>
<tr>
<th>Measure</th>
<th>Answer</th>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad evaluation</td>
<td>Poor/Excellent</td>
<td>ADPOOREXC</td>
<td>0.345</td>
<td><strong>0.888</strong></td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Extremely negative/Extremely positive</td>
<td>ADNEGPOS</td>
<td>0.363</td>
<td><strong>0.857</strong></td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Not engaging at all/Very engaging</td>
<td>ADENGAG</td>
<td>0.280</td>
<td><strong>0.903</strong></td>
</tr>
<tr>
<td>The ad depicts the product as high end.</td>
<td>Strongly disagree/Strongly agree</td>
<td>HIEND</td>
<td><strong>0.872</strong></td>
<td>0.273</td>
</tr>
<tr>
<td>The ad presents the product as upscale.</td>
<td>Strongly disagree/Strongly agree</td>
<td>UPSCALE</td>
<td><strong>0.913</strong></td>
<td>0.290</td>
</tr>
<tr>
<td>The ad showcases the product as classy.</td>
<td>Strongly disagree/Strongly agree</td>
<td>CLASSY</td>
<td><strong>0.865</strong></td>
<td>0.372</td>
</tr>
<tr>
<td>The ad highlights the product’s luxury appeal.</td>
<td>Strongly disagree/Strongly agree</td>
<td>LUXAPP</td>
<td><strong>0.832</strong></td>
<td>0.390</td>
</tr>
</tbody>
</table>

*Boldface = factor loading > .6; non-forced PCA with Varimax rotation*

Finally, participants reported their familiarity with the brand name, interest in electronics as a product category, and some general demographics before finishing the survey. A non-forced PCA with Varimax rotation on the items for ad evaluation (39.82% variance explained) and ad positioning (48.08% variance explained) revealed two separate components (KMO Measure = .88, Bartlett’s test of Sphericity, \( p < .01 \)) (Hair Jr, et al. 2009) (See Table 11.).
A total of 122 MTurkers participated in this study for compensation ($0.35). Two participants failed the manipulation check and were removed from the final dataset (N = 120, 54% males, $M_{\text{age}} = 36$ years). The mean brand name familiarity was low (2.80 on a 7-point scale) and the average interest in electronics as a product category was 4.92 ($1$ = very low and $7$ = very high).

*Manipulation check*

In line with the intended manipulation, luxury perceptions of the showcased product were significantly higher in the luxury versus the non-luxury conditions ($M_{\text{luxury}} = 5.09$ vs. $M_{\text{non-luxury}} = 4.00$; $F (1, 115) = 13.63, p < .001$). A 2 X 2 ANCOVA (Interest in electronics as a significant covariate) on ad positioning index only revealed the former reported main effect. There was neither a main effect of the product’s shadow nor an interaction effect based on shadow’s presence vs. absence and the ad’s positioning type on this index ($p > .05$) (See Table 12., Figure 6.).

### Table 12. Means and SDs for study 4A

<table>
<thead>
<tr>
<th>Study 4a</th>
<th>Condition</th>
<th>N</th>
<th>Ad evaluations</th>
<th>Ad positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Luxury positioning</td>
<td>Shadow</td>
<td>30</td>
<td>4.91</td>
<td>(1.19)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>30</td>
<td>4.01</td>
<td>(1.68)</td>
</tr>
<tr>
<td>Non-luxury positioning</td>
<td>Shadow</td>
<td>29</td>
<td>3.90</td>
<td>(1.47)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>31</td>
<td>4.27</td>
<td>(1.94)</td>
</tr>
<tr>
<td>All</td>
<td></td>
<td>120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Results*

A 2 (product’s shadow) X 2 (ad positioning) ANCOVA (interest in product category as the covariate) revealed an interaction effect ($F (1, 115) = 3.43, p = .07$). The mean ad evaluations in the non-luxury condition were no different across shadow and no-shadow conditions ($p > .05$). So,
a main effect of the product’s shadow could not be seen. However, the mean ad ratings under the luxury conditions were higher when the product’s shadow was present in the ad frame, compared to its absence ($M_{\text{shadow}} = 4.91$ vs. $M_{\text{no-shadow}} = 4.01$; $M_{\text{difference}} = .67, p = .09$) (See Table 12.).

![Graph](image1)

**Figure 6.** Results for study 4A

Additionally, the mean ad assessments in the shadow’s presence were higher for the luxury ad positioning compared to the non-luxury ad positioning ($M_{\text{luxury}} = 4.91$ vs. $M_{\text{non-luxury}} = 3.90$; $M_{\text{difference}} = .79, p = .05$) (See Table 12.). Given that the presence of product’s shadow benefits the ad assessments in the luxury positioned ads, there was some support for H7 (See Figure 6.).
**Study 4B: Replication for moderation by luxury versus non-luxury positioning**

While study 4A was run online with Amazon workers and an optical mouse as the product category, study 4B was run using a paper and pencil format with undergraduate students and a ballpoint pen as the product category.

*Design, Participants, Procedure*

In study 4B, undergraduate students from a basic marketing section were solicited for participation in exchange for extra course credit. This study also had a 2 (product’s cast shadow: present vs. absent) X 2 (ad’s positioning: luxury vs. non-luxury) between-subjects design. Students voluntarily signed up for one of the four time slots (each presenting one of the four ad types: luxury shadow, luxury no-shadow, non-luxury shadow and non-luxury no-shadow), where they were randomly assigned to evaluate a black and white print ad of a ballpoint pen from a relatively less known U.S. pen brand, Yafa (See Appendix G).

In the luxury conditions, the ad’s copy presented the pen as having a premium lacquer body and a polished steel nib for elegant writing. On the other hand, in the non-luxury condition, the pen was positioned for everyday use, durable, and refillable, i.e. with generic attributes of a ballpoint pen (See Appendix G).

A total of 97 students participated in this study (43% males, $M_{age} = 21$ years). After debriefing the students with the study’s instructions, the print ad was shown to all the students in a particular condition on the projector screen to enhance the internal validity through the study design (Bhattacherjee 2012). They were asked to provide their assessments of that ad on a paper survey (poor/excellent, strongly dislike/strongly like, not sophisticated at all/very sophisticated; $\alpha = .81$).
Following these measures, they reported their perceptions of luxury for the advertised product ("The ad depicts the product as high end", "The ad presents the product as upscale", "The ad highlights the product’s stylishness", "The ad showcases the product as classy", "The ad highlights the product’s luxury appeal"); 1 = strongly disagree and 7 = strongly agree; $\alpha = .95$), and if the ad showcased the product prominently, vividly, and tastefully (averaged to form the product’s aesthetic appraisal index; 1 = strongly disagree and 7 = strongly agree; $\alpha = .76$). The print ad was kept on the projector screen until participants’ finished assessing the ad. Finally, they reported some basic demographics, their brand name familiarity ($M = 1.42$), and interest in pens ($M = 3.56$) on 7-point scales before leaving the study session.

Table 13. PCA on ad evaluation, product luxury and product visual appraisal items in study 4B

<table>
<thead>
<tr>
<th>Measure</th>
<th>Answer</th>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad evaluation</td>
<td>Poor/ Excellent</td>
<td>ADPOOREXC</td>
<td>0.292</td>
<td>0.802</td>
<td>0.238</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Strongly dislike/ Strongly like</td>
<td>ADDISLIK</td>
<td>0.168</td>
<td>0.855</td>
<td>0.263</td>
</tr>
<tr>
<td>Ad evaluation</td>
<td>Not sophisticated at all/ Very sophisticated</td>
<td>ADSOPHIS</td>
<td>0.435</td>
<td>0.694</td>
<td>0.036</td>
</tr>
<tr>
<td>The ad depicts the product as high end.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>HIEND</td>
<td>0.827</td>
<td>0.210</td>
<td>0.315</td>
</tr>
<tr>
<td>The ad presents the product as upscale.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>UPSCALE</td>
<td>0.910</td>
<td>0.249</td>
<td>0.148</td>
</tr>
<tr>
<td>The ad highlights the product’s stylishness.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>PRSTYL</td>
<td>0.773</td>
<td>0.269</td>
<td>0.349</td>
</tr>
<tr>
<td>The ad showcases the product as classy.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>CLASSY</td>
<td>0.817</td>
<td>0.284</td>
<td>0.192</td>
</tr>
<tr>
<td>The ad highlights the product’s luxury appeal.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>LUXAPP</td>
<td>0.879</td>
<td>0.248</td>
<td>0.209</td>
</tr>
<tr>
<td>The ad presents the product prominently.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>PROMIN</td>
<td>0.277</td>
<td>0.277</td>
<td>0.770</td>
</tr>
<tr>
<td>The ad showcases the product vividly.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>VIVDLY</td>
<td>0.245</td>
<td>0.126</td>
<td>0.868</td>
</tr>
<tr>
<td>The ad showcases the product tastefully.</td>
<td>Strongly disagree/ Strongly agree</td>
<td>TASTFULY</td>
<td>0.192</td>
<td>0.488</td>
<td>0.479</td>
</tr>
</tbody>
</table>

*Boldface = factor loading > .6; forced PCA with Varimax rotation*
A PCA with Varimax rotation (forced, 3 factor) produced three separate components with items for each loading well under the constructs of overall ad evaluation (22.80% variance explained), ad positioning (36.61% variance explained, manipulation check) and product’s aesthetic appraisal (18.42% variance explained), respectively (KMO Measure = .88, Bartlett’s test of Sphericity - $p < .01$) (Hair Jr, et al. 2009) (See Table 13.).

**Manipulation check**

A 2 X 2 ANCOVA (interest in pens as a significant covariate) on the ad positioning index revealed only a main effect of the positioning type ($M_{\text{luxury}} = 4.67$ vs. $M_{\text{non-luxury}} = 2.83$; $F(1, 92) = 38.67$, $p < .001$). Hence, the perceptions were significantly more luxury in the luxury ad positioning condition versus the non-luxury condition ($M_{\text{difference}} = 1.89$, $p < .001$) (See Figure 7.).

![Figure 7. Manipulation check in study 4B](image)

**Results**

Similar 2 (product’s shadow) X 2 (ad’s positioning) ANCOVAs on the overall ad evaluations as well the product’s aesthetic appraisal index were conducted. There was a main effect
of ad positioning ($M_{\text{luxury}} = 3.52$ vs. $M_{\text{non-luxury}} = 2.82$; $F(1, 92) = 10.31, p < .05$) as well as an interaction effect of shadow and ad positioning ($F(1, 92) = 2.92, p = .09$) on the overall ad evaluations. The ad evaluations in the non-luxury condition were not different across the shadow and no-shadow conditions ($p > .05$, See Table 14.). The mean ad ratings for the ad with product’s shadow were only directionally higher than those without it in the luxury positioning condition ($M_{\text{shadow}} = 3.82$ vs. $M_{\text{no-shadow}} = 3.33; p = .13$).

The only significant contrast was between the shadow conditions for the luxury versus non-luxury positioning ($M_{\text{luxury}} = 3.82$ vs. $M_{\text{non-luxury}} = 2.65; M_{\text{difference}} = 1.19, p < .01$) (See Table 14.). This effect provides some support to H7, where product shadow positively enhances the ad evaluations of a luxury positioned product, compared to the same product presented as non-luxury (See Figure 8.).

**Table 14.** Means and SDs for study 4B

<table>
<thead>
<tr>
<th>Main Study 4b</th>
<th>Condition</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ad evaluations</td>
<td></td>
<td></td>
<td></td>
<td>Ad positioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luxury positioning</td>
<td>Shadow</td>
<td>19</td>
<td>3.82</td>
<td>(1.21)</td>
<td>4.89</td>
<td>(1.41)</td>
<td>4.30</td>
<td>(1.30)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>30</td>
<td>3.33</td>
<td>(1.36)</td>
<td>4.53</td>
<td>(1.58)</td>
<td>3.70</td>
<td>(1.32)</td>
</tr>
<tr>
<td>Non-luxury positioning</td>
<td>Shadow</td>
<td>23</td>
<td>2.65</td>
<td>(1.12)</td>
<td>2.82</td>
<td>(1.47)</td>
<td>3.07</td>
<td>(1.62)</td>
</tr>
<tr>
<td></td>
<td>No-shadow</td>
<td>25</td>
<td>2.97</td>
<td>(0.99)</td>
<td>2.85</td>
<td>(1.40)</td>
<td>3.44</td>
<td>(1.19)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A 2 X 2 ANCOVA on the product’s aesthetic appraisal was also significant ($F(4, 92) = 3.27, p < .05$). The product’s visual appraisal was higher in the luxury condition compared to the non-luxury condition ($M_{\text{luxury}} = 3.93$ vs. $M_{\text{non-luxury}} = 3.26; M_{\text{difference}} = .76, p < .01$). There was an
interaction effect on this outcome measure as well ($F(1, 92) = 3.21, p = .08$). In the shadow’s presence, the product’s aesthetic appraisal was significantly higher in the luxury versus the non-luxury condition ($M_{\text{shadow-luxury}} = 4.30$ vs. $M_{\text{shadow-non-luxury}} = 3.07$; $M_{\text{difference}} = 1.26$, $p < .01$) (See Figure 8.).

**Figure 8.** Results for study 4B

Finally, a moderated mediation was conducted to see if the effect of product’s shadow on ad evaluations is mediated by the product’s aesthetic appraisal while being moderated by the ad’s positioning (PROCESS 8, Hayes 2013). There was evidence for conditional indirect effect from product’s aesthetic appraisal index as a significant mediator to the ad ratings, based on the
shadow’s presence only ($\beta = .62, [.721, 1.1654], 1000 bootstraps, 90\% CI$). These findings converge with that of study 1.

Discussion and limitations

For both studies 4A and 4B, the main effects of the product’s cast shadow could not be replicated, possibly due to the nature of product categories and the black and white color of the stimuli. Combined with generic claims in the non-luxury conditions, the impact of shadow could have weakened. In study 4A, the image of the optical mouse was perhaps more stylish to begin with. This may have led to lower evaluations when combined with the non-luxury claims.

In study 4B, each experimental cell was run one at a time (30 students solicited in each) with an attempt to execute strict experimental controls. Students who showed up on time were debriefed in a closed room as a batch. Due to such implementation, cell sizes could not be exactly balanced. Additionally, luxury perceptions around a ballpoint pen may be inherently weak and possibly not manipulated strongly, despite the verbal claims employed. The average values for both luxury and non-luxury ad positioning, under manipulation checks for study 4B were indeed lower than that in study 4A (Compare figures 6 and 7).
A complete summary table of all the hypotheses tested in this chapter, respective studies and findings is presented below (See Table 15.):

**Table 15. Summary table for hypotheses, studies and findings**

<table>
<thead>
<tr>
<th>HYPOTHESES</th>
<th>STUDIES</th>
<th>FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1</strong> The overall ad evaluations will be higher, when a product is presented with its cast shadow in the ad frame than without it.</td>
<td>STUDY 1A, 1B</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H2</strong> The product’s visual appraisal will be higher in the presence of the product’s cast shadow in comparison to its absence from the ad frame.</td>
<td>STUDY 1A and 1B</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H3</strong> The impact of the product’s cast shadow on the overall ad evaluations will be mediated by the product’s visual appraisal in the shadow’s presence (versus absence).</td>
<td>STUDY 1A and 1B</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H4</strong> The effect of a product’s cast shadow on the overall ad evaluations is moderated by an individual’s Centrality of Visual Product Aesthetics (CVPA), such that the effect is stronger for an individual with a higher CVPA.</td>
<td>STUDY 2</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H5a</strong> The effect of a product’s cast shadow on the overall ad evaluation is moderated by the visual processing style, such that the effect is positive for gestalt-based processing.</td>
<td>STUDY 3A</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H5b</strong> The effect of a product’s cast shadow on the overall ad evaluation is moderated by the visual processing style, such that the effect is negative for component-based processing.</td>
<td>STUDY 3A</td>
<td>Not supported</td>
</tr>
<tr>
<td><strong>H6a</strong> The effect of a product’s cast shadow on the overall ad communication efficacy is moderated by the visual processing style, such that the effect is positive for gestalt-based processing.</td>
<td>STUDY 3A and 3B</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H6b</strong> The effect of a product’s cast shadow on the overall ad communication efficacy is moderated by the visual processing style, such that the effect is negative for component-based processing.</td>
<td>STUDY 3A and 3B</td>
<td>Not supported</td>
</tr>
<tr>
<td><strong>H7</strong> The effect of the presence (versus absence) of a product’s cast shadow on ad evaluation will be moderated by the product’s ad positioning, such that the effect will be stronger for a luxury (or prestige) positioned product compared to non-luxury positioned product.</td>
<td>STUDY 4A and 4B</td>
<td>Supported</td>
</tr>
</tbody>
</table>
CHAPTER FIVE:  
GENERAL DISCUSSION

AIDA model suggests that consumer engagement in advertising follows four broad steps: 1) Awareness (attention), 2) Interest, 3) Desire, and, 4) Action (Barry and Howard 1990; Strong 1925). This paradigm follows a sequential hierarchy, such that consumers (as audiences) are persuaded through a series of cognitive, affective, and conative stages, in response to advertising messages (Barry and Howard 1990; Vakratsas and Ambler 1999). Visual imagery plays an integral role in this framework and has a direct impact on consumer attitudes (Edell and Staelin 1983; Mitchell 1986; Rossiter and Percy 1980).

In addition to the impactful role of pictorial ad content (which has been strongly highlighted in the past advertising literature - Hornik 1980; Messaris 1997; Rossiter and Percy 1980), stylistic manipulations of images have also been shown to impact consumer perceptions (Chae and Hoegg 2013; Janiszewski 1990b; Peracchio and Meyers-Levy 2005). While many stylistic manipulations have been explored in the past, product shadows in how they impact consumer ad perceptions have not been considered.

This dissertation investigated the presence versus absence of a product’s cast shadow as another stylistic manipulation in how it impacts the advertising communication process both in terms of ad evaluations (or ad attitudes) and ad communication efficacy perceptions. Ad attitudes are significant mediators to product attitudes, purchase intentions, and brand beliefs (MacKenzie, Lutz and Belch 1986; Miniard, et al. 1991; Mitchell 1986). Therefore, as a first attempt, it examined how product shadows as stylistic elements impact ad evaluations.
Stylistic iconicity in advertising has three uses: a) highlighting shapes and color, b) subliminal persuasion, and c) appealing through the overall compositional style of the picture (Messaris 1997). Cast shadows are low spatial frequency elements, visually decoded under abstract construals. They tend to enhance a product’s form or gestalt. They are processed subliminally in most cases. And, they enhance the overall composition by acting as stylistic tools that add drama, contrast and depth. Therefore, according to the criteria mentioned in Messaris (1997), a product’s cast shadow suffices all these uses as a stylistic icon in advertising.

As per the current data findings, ad evaluations were significantly better in the presence (vs. absence) of a product’s ‘cast’ shadow in the ad frame. This was replicated across multiple product categories (such as music speakers, pens, optical mouse, and car), and varied consumer demographics (MTurkers and students). As the underlying mechanism, current data shows that in the presence of the cast shadow, a product’s visual appraisal is enhanced, which in turn improves the overall ad evaluations.

This dissertation also identified some individual aesthetic level differences (CVPA response tendencies) that impact the relationship between product shadows and ad evaluations. Individuals with higher response tendencies towards visual product aesthetics evaluated the ads incorporating product shadows better than the ads without any such stylistic elements.

Findings from study 3 revealed that ad evaluations and efficacy perceptions enhance further in the presence (vs. absence) of product shadow, when the visual processing entails gestalt-based processing. There was directional evidence for decline in ad perceptions in the presence vs. absence of product shadow, under component-focused visual processing scenarios. Lastly, study 4 provided some evidence towards luxury ad positioning benefitting more when a product shadow is present in the ad frame (compared to its absence).
As discussed in chapter one, qualitative responses from professional marketers suggest the importance of incorporating or avoiding product shadows in ad frames, depending upon the context. They mentioned using shadows to enhance product realism and highlighted their use in luxury scenarios. The current research empirically conforms to some of these intuitions in that product shadows enhance a product’s overall visual appeal, including aspects such as product’s depth, contrast, aesthetics, and attractiveness (study 1; Schindler 1986). There was also evidence that product shadows tend to benefit luxury positioned ads more (study 4).

The same marketing professionals mentioned avoiding product shadows if they make the image look crowded or if they are too dark and poorly rendered in the ad frame. In other words, they seem to be pointing towards scenarios where product shadows could act as visual distractions or noise elements. For the component based scenarios in study 3, while the statistical evidence was weak, there was a directional decline in the mean ad ratings. In addition, compared to the no-shadow conditions, where ad perceptions were generally higher for component conditions, adding product shadow to the frame seemed to attenuate that effect.

While these marketing professionals did not follow any formal guidelines and shared their general experience with product shadows, findings from the current dissertation provide tangible evidence towards how product shadows influence ad perceptions, i.e. through the product’s visual appraisal in the ad frame. This dissertation also delineates contexts, which marketers can now systematically use with or without product shadows to influence consumer ad evaluations.

**Current research limitations**

While the current findings have many potential contributions (discussed in the following sections), there were some limitations which are discussed herewith. Although there was a reliable
replication of the main effect of a product’s cast shadow on overall ad evaluations, the interactions
of an individual CVPA dimensions with the product shadow manipulation were not as consistent.
An attempt was made to probe for gender effects, however, the overall findings for study 2 are
limited by the use of a same product image, lack of color in the stimuli, and a general variability
in consumer individual aesthetic tendencies (See Discussion and limitations section under study
2). For studies 1, 3 and 4, at least two different product categories were used to evidence the
robustness of findings. Therefore, study 2 can be complemented by further exploration of CVPA
effects using different product types and soliciting different consumer demographics, such as art
or design experts compared to traditional consumer population.

Study 3 suffers from limitations regarding lack of significance for the component-focused
scenarios. An attempt was made to decipher the underlying causes, such as the use of black and
white stimuli, and attenuation of effects when compared to control conditions, providing indirect
support to the proposed hypotheses. However, H5b and H6b could not be completely validated
through any of the current studies. Perhaps future research can investigate a third factor (i.e. color)
to assess changes in the overall ad evaluations combined with the manipulations of product shadow
and visual processing style.

Main effects of product shadow could not be seen in study 4, possibly due to the choice of
product categories and interaction of the ad’s copy with the product’s image (Rossiter and Percy
1980). Isolating the effects of product shadow becomes very difficult when the overall ad
assessment is based on a holistic appraisal that includes all the ad elements presented to the
observing consumer.

Other limitations of the current studies arise from the use of experimental design approach
for all the dissertation studies. While care was taken to ensure strict controls with student subjects
and also in implementing screening criteria for MTurkers, the findings are limited in external validity to the extent that is the general nature of experimental designs (Bhattacherjee 2012). MTurk has been criticized for idiosyncrasies in regards to its representativeness and self-selection issues (Goodman and Paolacci 2017). However, as mentioned before, strict screening criteria was used in all the current studies, including checks for participant prohibition from taking part in the studies using the same stimuli to maintain the overall data integrity (Goodman and Paolacci 2017).

**Theoretical contributions**

This dissertation brings together findings on object shadows from art and visual-cognition literature streams in forwarding the role of product shadow as an influencer to ad attitudes. Prior advertising research looks at many stylistic manipulations including camera angles and image location placements (Chae and Hoegg 2013; Meyers-Levy and Peracchio 1992). This research not only contributes to the list of such stylistic manipulations by adding product shadows to it, but also builds upon established advertising communication frameworks (AIDA and HPM) in understanding their role in the message communication process (Barry and Howard 1990; Finn 1988; Peracchio and Meyers-Levy 2005).

Meyers-Levy and Peracchio (1992) show that consumers ascribe positive (versus negative) characteristics to objects viewed from below versus a top camera angle. Although one can see product shadows in their stimuli, they did not consider the effects of product shadow particularly (Meyers-Levy and Peracchio 1992). Similarly, product shadows are seen in the ad backgrounds of other advertising research (see stimuli from Schnurr and Stokburger-Sauer 2016). The current findings can impact such prior works which incorporate product shadows inadvertently.
Even though visual cognition research suggests that shadows are processed peripherally and subliminally, the current findings show that ad evaluations indeed differ by a mere presence versus absence of the product’s cast shadow in the frame. Peripheral processing has been shown to influence consumer perceptions in advertising (Petty and Cacioppo 1984). By evidencing a tangible impact of product shadows, this dissertation contributes to this specific stream on the effects of peripheral (or non-focally-attended) material in advertising (Janiszewski 1990a; Lee, at al. 2014; Moore 1982; Tellis and Ambler 2007).

It extends the relatively narrow marketing literature stream on product aesthetics in purporting the role of product shadows as enhancers of the product’s visual form (Sharma 2016). Following Gestalt psychology principles, it uncovers the mediating role of the product’s visual appraisal in the shadow’s presence. It contributes to the product aesthetics literature by adding product shadows to the list of antecedents that drive aesthetic appraisals in the consumer domain (Holbrook and Huber 1979; Lavie and Tractinsky 2003; Leder, et al. 2004).

This dissertation extends Construal Level Theory (CLT) and more specifically its aspects of abstract versus concrete visual representations in understanding the nature and uses of a product’s cast shadow in ad frames (Trope and Liberman 2010). As per CLT, product shadows are assimilated through the visual-motor senses under a gestalt perspective, and further inextricably linked to mental abstractions of the stimuli (Trope and Liberman 2010). Building the link from Gestalt psychology to visual and mental representations of forms under CLT, this research attempts to comprehend this complex process of shadow abstraction in suggesting it as a compatible stylistic element under gestalt-based visual processing.

It leverages information-communication paradigms and Signal Detection Theory (SDT) in delineating the effects of product shadow in gestalt versus component-based communication
frames (Shannon 1949). It converges the findings around object shadows not only as signal enhancers in gestalt contexts, but also as signal attenuators in component contexts, with a targeted high \textit{Signal/Noise} ratio on the advertising communication channel (Shannon 1949).

**Managerial contributions**

To corroborate the findings of the current research to real world advertising, three independent coders were requested to assess the print forms of six popular consumer magazines for the month of September 2016 (See Table 16.). Each of them were requested to code all the product/brand ads they encounter in these magazines for a) the number of ads containing shadows (both cast shadows and attached shadows), b) the shadow bearer (product, other ad elements) and c) a subjective estimate of the shadow sizes (small, medium or big). The average inter-rater agreement was acceptable (See Table 16 for individual Cronbach alphas across the three raters).

**Table 16. Content analysis**

<table>
<thead>
<tr>
<th>Magazine (September 2016 issue)</th>
<th>Average total of ads analyzed</th>
<th>Average number of ads with cast shadows</th>
<th>Average number of ads with product as the shadow bearer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better Homes and Gardens</td>
<td>39</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td>People</td>
<td>34</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>Women’s Day</td>
<td>39</td>
<td>29</td>
<td>22</td>
</tr>
<tr>
<td>US Weekly</td>
<td>19</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Good Housekeeping</td>
<td>44</td>
<td>33</td>
<td>20</td>
</tr>
<tr>
<td>Time</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cronbach’s Alpha, ( \alpha )</td>
<td>.88</td>
<td>.81</td>
<td>.82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Magazine (September 2016 issue)</th>
<th>Average number of ads with small shadows</th>
<th>Average number of ads with medium shadows</th>
<th>Average number of ads with big shadows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better Homes and Gardens</td>
<td>19</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>People</td>
<td>14</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Women’s Day</td>
<td>22</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>US Weekly</td>
<td>10</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Good Housekeeping</td>
<td>23</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Time</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cronbach’s Alpha, ( \alpha )</td>
<td>.75</td>
<td>.75</td>
<td>.78</td>
</tr>
</tbody>
</table>
From an average of 90 ads analyzed per magazine, an average of 64 ads incorporated at least one cast shadow in the ad frame. In that subset, cast shadows were actually assigned to the product in an average of 40 ads. This makes almost half the number of total ads analyzed per magazine. While most of these shadows were considered small by the coders (an average of 45 per magazine), there were still an average of 17 ads per magazine categorized with medium sized shadows. Overall, these numbers evidence a high use of product shadows in contemporary print advertising (See Table 16.).

Given the ubiquitous use of shadows as shown above and through the qualitative responses from marketers (in chapter one), it seems relevant to understand the nature of product shadows in how they impact consumer ad perceptions. Stylistic image manipulations (such as product shadows) comprise production elements and only affect the way in which the product is displayed, i.e. not the core product image or a product’s design (Peracchio and Meyers-Levy 2005; Yang, Zhang and Peracchio 2010). Hence, these can be employed as strategic tools towards ad effectiveness (Barry and Howard 1990). An understanding of product shadows as stylistic elements can help managers design effective ad frames, without forgoing established Consumer Based Brand Equity, CBBE, i.e. built through familiar visual elements in the past (Keller 1993).

Visual advertising space is competitive and expensive. Research on negative space mentions that creative directors use white space as a design element to achieve visual balance (Olsen et al. 2012). White space has also been used to convey prestige perceptions around products (Ambler and Hollier 2004). However, advertising costs incurred through such designs may be difficult for managers to justify.

The current research shows that perhaps adding a shadow can help achieve similar objectives, including improvement in product’s visual aesthetics and its luxury perceptions. Art
and brand managers can use product shadows to elevate the luxury appeals through their ad messages, as suggested by findings from study 4.

Managers need to particularly pay attention to the incorporation or omission of product shadows based on the context suitability. Findings from study 3 formally suggest that product shadows can be used to enhance ad evaluations under gestalt scenarios, but maybe avoided in component-focused product contexts. Gestalt scenarios can be defined by product attributes (such as its shape) or by an individual’s processing goals (e.g. a consumer browsing for a particular product shape). In each of these cases, a product shadow is desirable to have in the ad frame.

In general, adding product shadows may help enhance a product’s visual appeal (study 1). However, care must be taken while adding product shadows to ad frames where they may prove distracting or take away from the core ad message to be communicated. For instance, if consumers are hoping to discern the detailed features of a handbag pattern, the handbag’s shadow in the visual frame may act as a distraction and lower their overall ad evaluations. Managers can directly use these insights to create optimal visual displays for their products not only online but also in stores. An effective use of product shadows around the advertised product would lower a consumer’s search costs through ease of visual assessment (Moorthy, Ratchford and Talukdar 1997).

The current findings demonstrate enhanced ad evaluations as well as efficacy perceptions with an appropriate use of product shadows in ad frames. As mentioned before, ad evaluations or ad attitudes are significant predictors to consumer actions such as purchase behaviors (Gardner 1985; Homer 1990; Mitchell and Olson 2000; Shimp 1981).

Therefore, managers can benefit by following a more systematic approach to using product shadows as stylistic elements by designing a contextually appropriate ad message. While adding a product shadow may still be cheaper than adding large amounts of white space, if they are not
needed, ad costs would be automatically lowered by removing them from the frame altogether.

Lastly, findings from study 2 suggest that managers could create specific consumer segments based on consumer aesthetic response tendencies, and use specific promotion strategies to target them. With the extent of customization options available online, it is possible to lure aesthetically responsive consumers with promotions styled with product shadows.

**Future scope**

Some of future research based on the current work stems from the current study limitations mentioned before (e.g. colored vs. black and white images) (Gorn, Chattopadhyay and Dahl 1997; Lee, et al. 2014). The current work only explored cast shadows. Future explorations may look at attached shadows, looming shadows (hovering below the product), shadow strength (light or dark), and shadow sizes (small or big) in how they impact ad assessments (Casati 2004). There are many instances of contemporary advertising where marketers have used unrealistic shadows. Below are some quirky Lego print ads incorporating unrealistic shadows worthy of exploration in how they impact consumer perceptions (See Figure 9.).

![Figure 9. Print ads from lego incorporating unrealistic shadows](image)
Marketers’ responses to the qualitative survey in chapter one revealed that an ad’s overall visual complexity is a deciding factor when working with product shadows. Therefore, changes in ad complexity through increase in the number of ad elements can be explored to see how product shadows interact with the number of ad elements in influencing overall ad perceptions (Pieters, Wedel and Batra 2010). Product shadows may improve ad perceptions in minimalistic ad scenarios but hurt them when the overall ad complexity is high (Elliott and Speck 1998; Messaris 1997). It may also be interesting to see how the type of ad elements (verbal or visual) interacts with product shadows in affecting ad evaluations (Mitchell 1986; Percy and Rossiter 1992).

In the current research, there were implications of different consumer visual priming modes (gestalt vs. component) on the relationship between product shadow and ad assessments (Study 3b). While the scenarios in study 3B parallel incidental priming leading to spillover effects onto the ad evaluation contexts, it may be worth investigating how consumer goals affect this relationship. Specific consumer goals can have a stronger impact on the outcomes of interest in comparison to incidental primes (Lee, Keller and Sternthal 2010; Pieters and Wedel 2007). Given the current results, stronger effects for presence (vs. absence) of product shadow in combination with gestalt (vs. component) product goals on ad evaluations may be anticipated (Jia, Shiv and Rao 2014). Overall, there are many avenues to future research given the current findings.
REFERENCES


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Homer, P. M. (1990), "The mediating role of attitude toward the ad: Some additional evidence," *Journal of Marketing Research, 27*(1), 78-86.


Street, R. F. (1931), "A Gestalt completion test," Teachers College Contributions to Education.


Appendix A: Qualitative survey responses

Respondent 1 - (Female, 40 years, Current title: Marketing Director, 11 years of experience)

Q10. In your experience, how often have you had to think about including or excluding a product's shadow from an ad frame?

- Never
- Very few times
- Sometimes
- Most of the time
- Always

Q3. In a few words, please tell us about your past experiences with the use of product shadows in ad frames. Do you have some mental or formal guidelines around using or avoiding product shadows in ad frames?

We do not have any guidelines. Sometimes the product image looks sparse without it so we use the shadow to fill up the frame. Sometimes the shadow makes the image look too crowded so we remove it.

Q6. In your experience, which of the following factors have played a significant role in determining if you should or should not include product shadows in the ad frame? You may select more than one.

- Presence of the actual product's image in the ad
- Colored versus black & white ad images
- Verbal versus visual ad emphasis
- Brand considerations such as its luxury appeal
- Type of product - aesthetic or functional
- Target market characteristics - gender, age etc.
- Advertising expenses including the cost of negative space
- Type of ad platform - print or online
- Ad's visual complexity - number of images & their layout
Appendix A (continued)*

Respondent 2 - (Female, 46 years, Current title: Art Director, 20 years of experience)

Q10. In your experience, how often have you had to think about including or excluding a product's shadow from an ad frame?

Never  Very few times  Sometimes  Most of the time  Always

Q3. In a few words, please tell us about your past experiences with the use of product shadows in ad frames. Do you have some mental or formal guidelines around using or avoiding product shadows in ad frames?

Without a shadow, a product can look fake and out of context. If you are looking for realism, include a shadow. Sometimes a shadow is not needed if that is the type of graphic style you are going for: flat.

Q6. In your experience, which of the following factors have played a significant role in determining if you should or should not include product shadows in the ad frame? You may select more than one.

- Presence of the actual product's image in the ad
- Colored versus black & white ad images
- Verbal versus visual ad emphasis
- Brand considerations such as its luxury appeal
- Type of product - aesthetic or functional
- Target market characteristics - gender, age etc.
- Advertising expenses including the cost of negative space
- Type of ad platform - print or online
- Ad's visual complexity - number of images & their layout

Q11. Given your response to the previous question, please give us some specific examples of the times you either included or excluded product shadows from ad frames for the considerations you selected above. If we missed any relevant considerations, please educate us as it would help us with our research.

Designing watch advertising, the soft, grey shadow would help keep the watch from floating in white space. When working on fashion ads we choose strong, harsh shadows to imply flash, digital photos from a cell phone. It seemed more impulsive and lifestyle. The type of shadow is always a consideration and is part of the thought process when choosing a photographer.
Appendix B: Stimuli used in study 1A, 1B and 1C

**Covi Music Speaker**
Bursting with amazing audio, Covi delivers the sound your tunes deserve—all in a compact, portable, grab-and-go size.

Efficient yet petite, Covi is the perfect size to slip into a backpack or bag, on your way out the door.

**Covi Music Speaker**
Bursting with amazing audio, Covi delivers the sound your tunes deserve—all in a compact, portable, grab-and-go size.

Efficient yet petite, Covi is the perfect size to slip into a backpack or bag, on your way out the door.

**Yafa Ballpoint Pen**
Yafa pen features a secure, soft-feel grip.
Refillable, Medium-Point, 1.0 mm.
Making sure strokes, this pen is perfect for writing.

**Yafa Ballpoint Pen**
Yafa pen features a secure, soft-feel grip.
Refillable, Medium-Point, 1.0 mm.
Making sure strokes, this pen is perfect for writing.

**Yafa Ink Pens**

**Yafa Ink Pens**
Appendix C: Stimuli used in study 2 pretest and main study

Berol Ballpoint Pen

Refillable and reliable for everyday use.
Durable medium-point for bold, precise writing.
Small enough to take with you wherever you go.

Berol Ballpoint Pen

Refillable and reliable for everyday use.
Durable medium-point for bold, precise writing.
Small enough to take with you wherever you go.

Yafa Ballpoint Pen

Yafa pen features a secure, soft-feel grip.
Refillable, Medium-Point, 1.0 mm.
Making sure strokes, this pen is perfect for writing.

Yafa Ballpoint Pen

Yafa pen features a secure, soft-feel grip.
Refillable, Medium-Point, 1.0 mm.
Making sure strokes, this pen is perfect for writing.
Appendix D: Stimuli used in study 3a pretest, main study and posttest

KEF Music Speaker
Symmetrical contours with a balanced form for that lasting performance.

KEF Music Speaker
Symmetrical contours with a balanced form for that lasting performance.

KEF Music Speaker
Grooved silicone body with polished metal-heads for that nuanced performance.

KEF Music Speaker
Grooved silicone body with polished metal-heads for that nuanced performance.

KEF Music Speaker
Symmetrical contours with a grooved silicone body for that great performance.

KEF Music Speaker
Symmetrical contours with a grooved silicone body for that great performance.
Appendix E: Stimuli used in study 3B priming stimuli (gestalt condition vs. component condition)

TASK 1

INSTRUCTIONS

Please take a few minutes to describe the general features of the objects shown below.

In your own words, describe their overall shapes and draw out any similarities that you see among them.

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

TASK 1

INSTRUCTIONS

Please take a few minutes to describe the specific features of the objects shown below.

In your own words, describe their compositions and draw out any differences that you see among them.

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.
Appendix E (continued)*: Prime reinforcement sample stimuli (gestalt vs. component condition)

TASK 2

This is a separate task.

For each state-map that follows, please pick a response that best represents the general shape or outline of that particular state.

We request you to do this task as accurately as possible.

TASK 2

This is a separate task.

For each state-map that follows, please pick a response that shows a specifically marked location (●) within that particular state.

We request you to do this task as accurately as possible.
Appendix E (continued)*: Main study stimuli

The Power of Dreams

The Power of Dreams
Appendix F: Stimuli used in study 4A

Wipro Electronics
Wipro offers a sophisticated range of stylish products that inspire a refined way of living.

Wipro Electronics
Wipro offers a sophisticated range of stylish products that inspire a refined way of living.

Wipro Electronics
Wipro offers a wide range of reliable products that facilitate a practical way of living.

Wipro Electronics
Wipro offers a wide range of reliable products that facilitate a practical way of living.
Appendix G: Stimuli used in study 4B

Yafa Ballpoint Pen

Beautiful finish for elegant writing. Premium lacquer body with a polished steel nib. Adds a touch of exotic to everything you write.

Yafa Ballpoint Pen

Beautiful finish for elegant writing. Premium lacquer body with a polished steel nib. Adds a touch of exotic to everything you write.

Yafa Ballpoint Pen

Refillable and reliable for everyday use. Durable medium-point for bold, precise writing. Small enough to take with you wherever you go.

Yafa Ballpoint Pen

Refillable and reliable for everyday use. Durable medium-point for bold, precise writing. Small enough to take with you wherever you go.
Appendix H: Analysis of variance assumption testing

<table>
<thead>
<tr>
<th>STUDY</th>
<th>Outcome Variable</th>
<th>Levene's F Value</th>
<th>Levene's P-Value</th>
<th>Lack of fit test F Value</th>
<th>Fit P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDY 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest to study 1A Ad evaluation</td>
<td>$F(1, 70) = 0.756$</td>
<td>0.388</td>
<td>$F(14, 54) = 0.792$</td>
<td>0.673</td>
<td></td>
</tr>
<tr>
<td>Study 1A</td>
<td>Ad rating</td>
<td>$F(1, 58) = 0.056$</td>
<td>0.813</td>
<td>$F(11, 46) = 2.817$</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>Product's visual appraisal</td>
<td>$F(1, 58) = 4.488$</td>
<td>0.038</td>
<td>$F(11, 46) = 0.466$</td>
<td>0.915</td>
</tr>
<tr>
<td>Study 1B</td>
<td>Ad evaluation</td>
<td>$F(1, 66) = 3.081$</td>
<td>0.084</td>
<td>$F(11, 54) = 0.812$</td>
<td>0.628</td>
</tr>
<tr>
<td></td>
<td>Product's visual appraisal</td>
<td>$F(1, 66) = 0.013$</td>
<td>0.910</td>
<td>$F(11, 54) = 1.463$</td>
<td>0.173</td>
</tr>
<tr>
<td>Study 1C</td>
<td>Ad evaluation</td>
<td>$F(1, 56) = 1.647$</td>
<td>0.205</td>
<td>$F(10, 45) = 0.833$</td>
<td>0.600</td>
</tr>
<tr>
<td>STUDY 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest to study 2 Ad evaluation</td>
<td>$F(1, 57) = 2.085$</td>
<td>0.153</td>
<td>$F(45, 5) = 0.447$</td>
<td>0.933</td>
<td></td>
</tr>
<tr>
<td>Study 2</td>
<td>Ad evaluation</td>
<td>$F(1, 68) = 0.623$</td>
<td>0.433</td>
<td>$F(60, 1) = 2.361$</td>
<td>0.482</td>
</tr>
<tr>
<td></td>
<td>Product's visual appraisal</td>
<td>$F(1, 68) = 3.651$</td>
<td>0.060</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Posttest to study 2 Ad evaluation</td>
<td>$F(1, 58) = 0.459$</td>
<td>0.501</td>
<td>$F(49, 2) = 21.130$</td>
<td>0.046</td>
<td></td>
</tr>
<tr>
<td>STUDY 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest to study 3A Ad evaluation</td>
<td>$F(1, 60) = 2.017$</td>
<td>0.161</td>
<td>$F(10, 49) = 1.468$</td>
<td>0.180</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ad efficacy</td>
<td>$F(1, 60) = 1.203$</td>
<td>0.277</td>
<td>$F(10, 49) = 2.346$</td>
<td>0.024</td>
</tr>
<tr>
<td>Study 3A</td>
<td>Ad evaluation</td>
<td>$F(3, 136) = 0.592$</td>
<td>0.621</td>
<td>$F(22, 113) = 1.086$</td>
<td>0.372</td>
</tr>
<tr>
<td></td>
<td>Ad efficacy</td>
<td>$F(3, 136) = 1.267$</td>
<td>0.288</td>
<td>$F(22, 113) = 0.858$</td>
<td>0.648</td>
</tr>
<tr>
<td>Posttest to study 3A No significant effects were proposed for this study.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest to study 3B Visual processing score</td>
<td>$F(1, 59) = 0.406$</td>
<td>0.526</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Pretest 2 to study 3B Ad efficacy</td>
<td>$F(1, 58) = 8.215$</td>
<td>0.006</td>
<td>$F(7, 50) = 1.945$</td>
<td>0.082</td>
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<tr>
<td>Study 3B</td>
<td>Ad efficacy</td>
<td>$F(3, 123) = 2.942$</td>
<td>0.036</td>
<td>$F(19, 103) = 0.713$</td>
<td>0.798</td>
</tr>
<tr>
<td>STUDY 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study 4A</td>
<td>Ad positioning</td>
<td>$F(3, 116) = 3.115$</td>
<td>0.029</td>
<td>$F(21, 94) = 0.926$</td>
<td>0.560</td>
</tr>
<tr>
<td></td>
<td>Ad evaluation</td>
<td>$F(3, 116) = 3.052$</td>
<td>0.031</td>
<td>$F(21, 94) = 0.703$</td>
<td>0.821</td>
</tr>
<tr>
<td>Study 4B</td>
<td>Ad positioning</td>
<td>$F(3, 93) = 0.112$</td>
<td>0.953</td>
<td>$F(22, 70) = 0.944$</td>
<td>0.541</td>
</tr>
<tr>
<td></td>
<td>Ad evaluation</td>
<td>$F(3, 93) = 1.151$</td>
<td>0.333</td>
<td>$F(22, 70) = 0.672$</td>
<td>0.851</td>
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<tr>
<td></td>
<td>Product's visual appraisal</td>
<td>$F(3, 93) = 0.981$</td>
<td>0.405</td>
<td>$F(22, 70) = 1.016$</td>
<td>0.456</td>
</tr>
</tbody>
</table>

*P-value italicized when the assumption was not met at an α = .05

Notes:

1. Levene's null hypothesis: sample variances are equal across groups. If $p < .05$, reject the null, i.e., sample variances are not equal, else, if fail to reject the null, the model is fine.
2. Lack of fit test: tests for model fit. If $p < .05$, reject the null, i.e., there is no lack of linear fit else, when fail to reject the null, the model fit is fine.
3. Levene's test is preferred for testing homogeneity of variances in ANOVAs over Bartlett's test, when the data is non-normal. So, here normality violations can still be acceptable (Mendenhall and Sincich 2003).
4. ANOVA is robust with respect to unequal variances for balanced designs, which is true for all the current study designs (Mendenhall and Sincich 2003). Therefore, some homogeneity violations are also acceptable.
Appendix I: IRB approval letter

9/28/2016

Narum Sharma, M.B.A.
Marketing
4202 E. Fowler Avenue, BSN 3403
Tampa, FL 33620

RE: Exempt Certification
IRB#: Pro00027872
Title: Implications of Presenting Product Shadows in Ad Frames

Dear Ms. Sharma:

On 9/26/2016, the Institutional Review Board (IRB) determined that your research meets criteria for exemption from the federal regulations as outlined by 45CFR46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects’ responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects’ financial standing, employability, or reputation.

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF HRPP policies and procedures.

Please note, as per USF HRPP Policy, once the Exempt determination is made, the application is closed in ARC. Any proposed or anticipated changes to the study design that was previously declared exempt from IRB review must be submitted to the IRB as a new study prior to initiation of the change. However, administrative changes, including changes in research personnel, do not warrant an amendment or new application.

Given the determination of exemption, this application is being closed in ARC. This does not limit your ability to conduct your research project.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

[Signature]

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board