IE UNIVERSIDAD

TESIS DOCTORAL/
DOCTORAL DISSERTATION

Influencia de los Insumos de Marketing Visual en la Percepción y el Comportamiento del Consumidor

Influence of Visual Marketing Inputs on Consumer Perception and Behavior

Sumit Malik

SEGOVIA, 2022

IE UNIVERSIDAD

TESIS DOCTORAL/
DOCTORAL DISSERTATION

Influencia de los Insumos de Marketing Visual en la Percepción y el Comportamiento del Consumidor

Influence of Visual Marketing Inputs on Consumer Perception and Behavior

Sumit Malik

Doctoral Thesis Co-Advisors:
Professor Eda Sayin
Professor Matthias Seifert

Abstract

Aristotle, in his treatise Metaphysics, described the visual sense as the one “yielding most knowledge and excelling in differentiation” (Jonas, 1954). Indeed, a substantial body of research in consumer psychology has studied visual information processing and perception. This dissertation studies the effect of visual stimuli location on downstream consumer outcomes – with the focus of chapter 1 on spacing (i.e., proximal vs. distant food depictions), chapter 2 on movement (i.e., slow vs. fast hand interaction with products), and chapter 3 on positioning (i.e., presentation format of left-digit pricing in food visuals). These three chapters demonstrate that visual stimuli can subconsciously influence sensory perceptions and consumer behavior. For example, Chapter 1 examines the role of mental simulation (i.e., the perceptual re-enactment of prior eating experiences) and perceived tastiness in driving the effect of proximal food depictions on consumer responses. Chapter 2 delves into the influence of observed hand movement speed on product gender perceptions and purchase preferences. Finally, Chapter 3 explores how the presentation of left-digit pricing increases food waste behaviors. To examine these effects, the thesis chapters combine prior research on visual information processing with other literature streams (e.g., food consumption, satiation, social identity theory, behavioral pricing, food waste, etc.). Noteworthily, each chapter has distinct prosocial and practical implications – aimed at engaging with different stakeholders including members of the academia, consumers, marketers, and public policymakers.

Resumen

Aristóteles, en su tratado Metafísica, describe el sentido de la vista como el que *"reporta mayor conocimiento y destaca más en la diferenciación"* (Jonas, 1954). Ciertamente, existe un cuerpo considerable de investigación en psicología del consumidor que ha estudiado el procesamiento y la percepción de la información visual. La presente tesis estudia el efecto de la ubicación de los estímulos en los consumidores finales, centrándose el capítulo 1 en el espaciado (es decir, las representaciones de alimentos próximas frente a las distantes), el capítulo 2 en el movimiento (es decir, la interacción lenta frente a la rápida de las manos con los productos) y el capítulo 3 en el posicionamiento (es decir, el formato de presentación de los precios de los dígitos de la izquierda en las imágenes de alimentos). Estos tres capítulos demuestran que los estímulos visuales pueden influir inconscientemente en las percepciones sensoriales y en el comportamiento del consumidor. Por ejemplo, el capítulo 1 examina el papel de la simulación mental (es decir, la recreación perceptiva de experiencias alimentarias anteriores) y el sabor percibido a la hora de impulsar el efecto de las representaciones próximas de alimentos en las respuestas de los consumidores. El capítulo 2 profundiza en la influencia de la velocidad del movimiento de la mano observada en las percepciones del género del producto y las preferencias de compra. Por último, el capítulo 3 explora cómo la presentación de los precios del dígito izquierdo incrementa los comportamientos de desperdicio de alimentos. Para examinar estos efectos, los capítulos de la tesis combinan la investigación previa sobre el procesamiento de la información visual con otras corrientes bibliográficas (por ejemplo, el consumo de alimentos, la saturación, la

teoría de la identidad social, la fijación de precios conductuales, el desperdicio de alimentos, etc.). Cabe destacar que cada capítulo tiene distintas implicaciones prosociales y prácticas, orientadas a las distintas partes interesadas, como miembros del mundo académico, consumidores, responsables de marketing y responsables de políticas públicas.

Acknowledgment

As I write this note, I am filled with a deep sense of gratitude - for my wonderful institution, amazing supervisor, inspiring mentors, a loving family, and encouraging friends. Thank you so very much for being part of my doctoral journey.

This journey of a thousand miles began at IE Business School, an institution that believed in me and my dream. I wish to especially thank Professor Eda Sayin for mentoring my path with patience and for guiding each step of this dissertation. Your guidance is my treasure for life. In addition, I would like to express my sincere gratitude to Professor Kriti Jain for always encouraging and giving me hope. A huge thanks is also due to Professor Ana Valenzuela, Professor Dilney Gonçalves, Professor Matthias Siefert, and Professor Zachary Estes, for their invaluable feedback and time to shape this dissertation. Just as importantly, I acknowledge the unwavering support of Professor Peeter Verlegh and Professor Stefano Puntoni, whose mentorship has inspired me over the last ten years.

I am very thankful to Professor Laura Maguire and Professor Julio de Castro for their wholehearted support and Maria Muriel De Alba for never shying to provide help. The Doctoral Programs Department has been just like an academic home from the first day of the Ph.D. journey.

This dissertation owes a lot to my family – the devout blessings of my parents, the loving support of my wife Kanika and daughter Kyra (my light!), and the distant healing from my sister Preeti. Thank you, Papa and Mummy, for brainstorming on my ideas, listening to my practice presentations, and giving me unique ideas over morning tea to design experiments. Kanika and Kyra, each word on this thesis express my gratitude for

the sacrifices you made for me to pursue the Ph.D. dream. Our long-distance relationship, though very painful, was also an inspiration to continue this path with perseverance.

In the end, my Ph.D. journey would not have been possible without the fierce support of my friends, Antoaneta, Manisha, Prana, Rajdeep, Sandeep, Siyao, Sreyaa, and Susan (in alphabetic order). You all got a smile back even on the most trying days. Thank you, dear friends, for being there!

List of Contents

List of Figures

List of Tables

Introduction

The human sensory modalities of touch, smell, sound, taste, and vision are like our gateways to knowledge. In *De Amina* (or *On the Soul*), the principal theory of Aristotle (384-322 B.C.E.), the famed Greek philosopher noted that "*knowledge must have as its object both universals and particulars. Knowing the former does not guarantee the latter, for which the experience of the senses is indispensable*" (Korsmeyer, 2002). Indeed, the five sensory modalities have a profound effect on our perception, judgment, and behavior. The domain of sensory marketing examines how different marketing stimuli sub-consciously engage with our sensory modalities in forming abstract concepts and, subsequently, shaping evaluations (Krishna, 2012). This dissertation aims to extend the sensory marketing literature by examining the effect of different visual marketing cues on consumer responses.

The visual modality has been shown to dominate other senses in influencing consumer judgments and behavior (Krishna, 2006). There is evidence to suggest that visual inputs are processed faster (Herz & Engen, 1996) and, thus, are likely to be perceived before other sensory inputs. Hence, a large body of research has studied the effect of visual inputs and cross-modal interactions. Prior literature on visual marketing cues has examined the influence of visual biases and illusions (Raghubir & Krishna, 1999; Chandon & Ordabayeva, 2009; Aydinoğlu & Krishna, 2012; Cornil, Ordabayeva, Kaiser, Weber, & Chandon, 2014), product layout and position-based beliefs (Valenzuela & Raghubir, 2009; 2015), pictorials, aesthetics, and visual-art (Hagtvedt & Patrick, 2008; Deng & Kahn, 2009), product display and orientation (Elder & Krishna, 2012; Chae & Hoegg, 2013; Romero & Biswas, 2016), and ambient visual cues (e.g., brightness; Xu &

Labroo, 2014). In addition, there is growing evidence on the interactive effect of sensory cues – for example, between visual and haptic/ touch (Morales & Fitzsimons, 2007; Hadi & Valenzuela, 2014; Streicher & Estes, 2016; Kwon & Adaval, 2018), olfactory (Krishna, Morrin & Sayin, 2014; Lin, Cross, Laczniak & Childers, 2018), taste (Hoegg & Alba, 2007; McFerran, Dahl, Fitzsimons, & Morales, 2010), and auditory senses (Unnava, Agarwal, & Hagtvedt, 1996). Notwithstanding the vast literature, there are several unexplored facets of visual perception – driven, in part, by the growing use of visual assets in the online environment and the different ways in which the visual and verbal cues interact to shape consumer behavior (Sample, Hagtvedt, & Brasel, 2020).

Accordingly, this thesis contributes to the sensory marketing literature by examining three novel topics, which investigate the effects of visual stimuli's location (defined as *the positioning, orientation, spacing, and movement of an object in relation to other objects within an area*; Sample et al., 2020). For instance, Chapter 1 examines the visual perception of '*spacing*' by studying the effect of distance of indulgent (vs. non-indulgent) foods depicted within advertisement/ signage pictures on consumer responses. This chapter explores the influence of spatial proximity (vs. distance) of food depiction, in an advertisement picture, on mental simulation, perception of taste, and, subsequently, consumer responses. Then, Chapter 2 explores the visual perception of '*movement*' by examining how the speed of observed and described hand interaction with products in advertisements affects downstream consumption outcomes. The chapter investigates the effect of observing slow (vs. fast) hand movement with a featured product on product gender perception and preferences. Finally, in Chapter 3, which is in the preliminary stage of conceptualization, we examine the effect of the presentation mode of pricing

information (i.e., left-digit pricing with and without a reference price) on food waste. One possible direction of this chapter is to explore the influence of '*positioning*' (i.e., left vs. right position) of the food visual and verbal (i.e., pricing) elements on price-quality inferences and, finally, food waste. Taken together, these chapters aim to provide novel insights related to visual stimuli location and sensory perception, both of which shape consumer behavior (Kubovy & Pomerantz, 2017). The next section briefly summarizes the three chapters of this thesis.

Chapter Summaries

Drawing upon the literature on visual information processing, food consumption, and satiation, **chapter 1** examines the effect of **spatial distance of food depiction** on consumer responses. Our research shows that up-and-close depiction of indulgent (than non-indulgent) food within advertisements can evoke higher expected enjoyment and purchase intentions. We attribute the effect to the consumer spontaneously reenacting their prior eating experience (i.e., mental simulation) and perception of tastiness for the proximally depicted product. This chapter shows that proximal depictions influence consumer responses for indulgent (more than non-indulgent) foods. This is because non-indulgent foods, even when proximally depicted, do not make the tastiness of the featured product accessible to the consumer. In addition, the chapter compares the effect of proximal (vs. distant) depictions for a single (e.g., billboard advertisement) and multiple food pictures (e.g., menu display in fast-food restaurants). We show that multiple-proximal (vs. multiple-distant) depiction of similar indulgent food can increase satiation – because the tastiness perception becomes accessible and declines over repeated exposures. This

chapter utilizes different stimuli, contexts, and measures to test our predictions across four experimental studies.

Chapter 2 of this thesis investigates the effect of **observing or reading descriptions on the speed of hand interaction with a featured product** (e.g., slow/ fast hand washing, rubbing of shaving foam, wiping over a window frame, etc.) on consumer responses. Our research suggests that consumers innately associate speedy (versus slow) motoric movements with a more masculine (than feminine) behavior. For example, many advertisements depict a female character performing a gentle, soft, and slow hand movement (e.g., applying L'Oréal face cream or mascara, spreading Nutella on a pancake, etc.) and a male character performing a rather fast or forceful hand movement (e.g., twisting the handle of Harley Davidson bike, spraying the AXE body deodorizer, etc.). The recurrent exposure to such sensorimotor experiences (i.e., repeatedly observing hand movements in advertisements, dance-forms, films, etc.) lead consumers to develop an implicit association (held across genders) and, consequently, evoke mental schemas that relate the speed of movement with either femininity or masculinity.

These stereotypical associations, in turn, influence consumer perception and behavior. Our work shows that associations about the speed of hand movements have an informative value – such that the product touched with a slow (vs. fast) hand movement itself may be perceived as more feminine (than masculine). Drawing upon the social identity theory, we posit that female (vs. male) consumers evoke higher evaluations for a product that is depicted with a gentle (vs. speedy) hand movement – driven by higher perceived femininity (vs. masculinity) of the product. The chapter examines the proposed

effects across five studies (including an Implicit Association Test; IAT) in different country and product contexts.

Finally, **chapter 3** of the thesis examines the effect of **left-digit price promotion strategy in advertisement/ menu visuals** on food waste. This research examines the effect of left-digit pricing, with or without a reference or comparison price, on the consumer's perception of product quality and subsequently on food waste. We suggest that left-digit pricing without an accompanying reference price (tag of $2.99 instead of $3.00) can increase food waste, because the tag of $2.99 (vs. $3.00) would be perceived to possess a low-price meaning and, thus, offer reduced quality. The low 'price-quality' inference for the left-digit priced product is likely to lead to higher food waste. However, we posit that left-digit price, when accompanied with a reference price (tag of $4.00, now $2.99), would increase the quality inference, and reduce food waste. This is because the consumers utilize the reference price tag ($4.00) to form their price-quality inference. Our research suggests that retailers can improve the quality perception and reduce food waste when they utilize the left-digit pricing with an accompanying reference price. This chapter reports an initial study that supports our main hypothesis and proposes new research directions.

Taken together, the three chapters of this thesis demonstrate the effect of different visual stimuli on consumer perception and responses. In these chapters, we experimentally manipulate the distance of depiction within an advertisement picture (chapter 1), the speed of hand interaction with a product in an advertising video and product descriptions (chapter 2), and the interaction of visual and verbal elements in the processing of food pictures (chapter 3). The chapters demonstrate the effect of visual

stimuli on other sensory perceptions. For example, in chapter 1, we demonstrate that proximal (vs. distant) depiction of indulgent (vs. non-indulgent) foods increase the perceived tastiness and, subsequently, consumer response. The paper shows that the effect of spatial proximity on perceived tastiness is specific to indulgent (not non-indulgent) foods and is more likely when the consumer is exposed to single (than multiple) depictions. This research demonstrates the effect of a visual stimulus on mental simulation, taste perception, and, subsequently, behavioral intentions and satiation. In chapter 2, we demonstrate the effect of another visual marketing stimulus on haptic perception – showing that female (more than male) consumers elicit improved product preferences upon observing a slow (vs. fast) hand interaction with an advertised product. In the final chapter, we test the effect of left-digit pricing information (tag of $2.99 vs. $3.00; placed left vs. the right of visual-area and with/ without reference prices), within food visuals, on price-quality perceptions and food waste. Therefore, a common thread through this thesis is an examination of the spontaneous effect of different visual marketing cues.

The thesis chapters holistically examine the effect of indulgent (vs. non-indulgent) food visuals – on, both, consumption (Chapter 1) and, as follow-up work, on waste-related outcomes (Chapter 3). Furthermore, as noted earlier, the three chapters examine different aspects of the location of the visual stimuli (i.e., spacing, movement, and positioning; Sample et al., 2020). It might be worth exploring the fourth facet of visual location (i.e., orientation or angle of perception) and the interaction of location effects with other marketing-relevant components (i.e., illuminance, shape, surface, color, and materiality; Sample et al., 2020).

Finally, these chapters have aimed to not only provide new theoretical insights but also derive marketing-based solutions to practical issues. For example, the findings of chapter 1 signal the need for policymakers to carefully evaluate the distance of food depiction within advertisement pictures/ signages. This subject is of crucial importance owing to the rising prevalence of overweight individuals globally and has implications for consumer well-being (related to Sustainable Development Goal 3.4.1, United Nations, 2017). In chapter 2, we suggest that marketers can alter the attribute perception (e.g., elicit different product gender perceptions) and consumer preferences by simply showing or describing different speeds (slow vs. fast) of hand interaction with a featured product. We believe that the findings of this chapter are relevant for online marketing of products that possess textural properties (e.g., clothing), require an active touch, or information-seeking using one's hands (e.g., grooming, clothing, etc.), and target specific genders. Likewise, in chapter 3, we explore the effect of the format of presenting left-digit pricing on food waste. Our research contributes insights on the adverse consequences of a commonly used marketing action (i.e., left-digit pricing) at the point of purchase. This input is important as policymakers are aiming to halve the per-capita food waste at the consumption stage by 2030 (related to Sustainable Development Goal 12.3, United Nations, 2017).

The findings of this thesis endeavor to provide novel evidence on the effect of different visual marketing cues on consumer responses. It is hoped that the dissertation chapters not only trigger further research on related topics but also offer meaningful inputs to different stakeholders (e.g., consumers, marketers, retailers, and policymakers).

Introducción

Las modalidades sensoriales humanas del tacto, el olfato, el sonido, el gusto y la visión son como nuestras puertas al conocimiento. En *De Amina* (o *Sobre el alma*), la principal teoría de Aristóteles (384-322 a.C.), el renombrado filósofo griego señaló que *"el conocimiento debe tener como objeto tanto lo universal como lo particular. Conocer lo primero no garantiza lo segundo, para lo cual es indispensable la experiencia de los sentidos"* (Korsmeyer, 2002). De hecho, las cinco modalidades sensoriales tienen un profundo efecto en nuestra percepción, juicio y comportamiento. El ámbito del marketing sensorial examina la forma en que los diversos estímulos de marketing se relacionan inconscientemente con nuestras modalidades sensoriales para formar conceptos abstractos y, posteriormente, dar forma a las evaluaciones (Krishna, 2012). El objetivo de esta tesis es ampliar la bibliografía sobre el marketing sensorial examinando el efecto de diferentes señales visuales de marketing en las respuestas de los consumidores.

Se ha demostrado que la modalidad visual predomina sobre otros sentidos a la hora de influir en los juicios y el comportamiento del consumidor (Krishna, 2006). Hay pruebas que sugieren que los estímulos visuales se procesan más rápidamente (Herz y Engen, 1996) y, por tanto, es probable que se perciban antes que otros estímulos sensoriales. De ahí que un gran número de investigaciones hayan estudiado el efecto de los estímulos visuales y las interacciones intermodales. La literatura anterior sobre las señales visuales de marketing ha examinado la influencia de los sesgos e ilusiones visuales (Raghubir y Krishna, 1999; Chandon y Ordabayeva, 2009; Aydinoğlu y Krishna, 2012; Cornil, Ordabayeva, Kaiser, Weber y Chandon, 2014), la disposición del producto y las creencias basadas en la posición (Valenzuela y Raghubir, 2009; 2015), los

pictóricos, la estética y el arte visual (Hagtvedt y Patrick, 2008; Deng y Kahn, 2009), la exhibición y la orientación del producto (Elder y Krishna, 2012; Chae y Hoegg, 2013; Romero y Biswas, 2016), y las señales visuales ambientales (e. g., brillo; Xu y Labroo, 2014). Además, cada vez hay más pruebas sobre el efecto interactivo de las señales sensoriales, por ejemplo, entre lo visual y lo háptico/táctil (Morales y Fitzsimons, 2007; Hadi y Valenzuela, 2014; Streicher y Estes, 2016; Kwon y Adaval, 2018), olfativo (Krishna, Morrin y Sayin, 2014; Lin, Cross, Laczniak y Childers, 2018), gustativo (Hoegg y Alba, 2007; McFerran, Dahl, Fitzsimons, y Morales, 2010) y auditivo (Unnava, Agarwal, y Haugtvedt, 1996). A pesar de la vasta literatura, existen varias facetas inexploradas de la percepción visual – impulsadas, en parte, por el creciente uso de recursos visuales en el entorno en línea y las diferentes formas en que las señales visuales y verbales interactúan para dar forma al comportamiento del consumidor (Sample, Hagtvedt, y Brasel, 2020).

En consecuencia, esta tesis contribuye a la literatura de marketing sensorial examinando tres temas novedosos, que investigan los efectos de la ubicación de los estímulos visuales (definida como *la posición, la orientación, el espaciado y el movimiento de un objeto en relación con otros objetos dentro de un área*; Sample et al., 2020). Por ejemplo, el capítulo 1 examina la percepción visual del *"espaciado"* estudiando el efecto de la distancia de los alimentos insanos (frente a los saludables) representados en las imágenes de la publicidad/señalización sobre las respuestas de los consumidores. Este capítulo explora la influencia de la proximidad espacial (frente a la distancia) de la representación de los alimentos, en una imagen publicitaria, sobre la simulación mental, la percepción del sabor y, posteriormente, las respuestas de los consumidores. A

continuación, el capítulo 2 explora la percepción visual del *"movimiento"* examinando cómo la velocidad de la interacción observada y descrita de las manos con los productos en los anuncios afecta a los resultados posteriores del consumo. El capítulo investiga el efecto de la observación del movimiento lento (frente al rápido) de la mano con un producto destacado sobre la percepción y las preferencias del género del producto. Por último, en el capítulo 3, que se encuentra en la fase preliminar de conceptualización, se examina el efecto del modo de presentación de la información sobre los precios (es decir, precios con dígitos a la izquierda con y sin precio de referencia) sobre el desperdicio de alimentos. Una posible dirección de este capítulo es explorar la influencia del *"posicionamiento"* (es decir, la posición de la izquierda frente a la de la derecha) de los elementos visuales y verbales de los alimentos (es decir, los precios) en las inferencias de calidad del precio y, finalmente, en el desperdicio de alimentos. En conjunto, estos capítulos pretenden aportar nuevos conocimientos relacionados con la ubicación de los estímulos visuales y la percepción sensorial, que conforman el comportamiento del consumidor (Kubovy y Pomerantz, 2017). La siguiente subsección resume brevemente los tres capítulos de esta tesis.

2. Resúmenes de los capítulos

Basándose en la literatura sobre el procesamiento de la información visual, el consumo de alimentos y la saturación, el **capítulo 1** examina el efecto de la **distancia espacial de la representación de los alimentos** en las respuestas del consumidor. Nuestra investigación muestra que la representación de cerca de alimentos insanos (que no saludables) dentro de los anuncios puede inducir un mayor disfrute esperado e

intenciones de compra. Atribuimos este efecto a la recreación espontánea por parte del consumidor de su experiencia alimentaria previa (es decir, la simulación mental) y a la percepción del sabor del producto representado de forma cercana. Este capítulo muestra que las representaciones cercanas influyen en las respuestas de los consumidores a los alimentos insanos (más que a los saludables). Esto se debe a que los alimentos saludables, incluso cuando se representan de forma cercana, no hacen que el sabor del producto presentado sea accesible para el consumidor. Además, el capítulo compara el efecto de las representaciones cercanas (frente a las distantes) para una sola imagen de alimentos (por ejemplo, el anuncio de una valla publicitaria) y múltiples imágenes de ellos (por ejemplo, la presentación del menú en los restaurantes de comida rápida). Demostramos que la representación múltiple-cercana (frente a la múltiple-distante) de un alimento insano similar puede aumentar la saturación, puesto que la percepción del sabor se vuelve accesible y disminuye con las exposiciones repetidas. Este capítulo utiliza diferentes estímulos, contextos y medidas para probar nuestras predicciones a través de cuatro estudios experimentales.

El **capítulo 2** de esta tesis investiga el efecto de **observar o leer descripciones sobre la velocidad de interacción de las manos con un producto mostrado** (por ejemplo, lavado de manos lento/rápido, frotar la espuma de afeitar, limpiar el cristal de una ventana, etc.) en las respuestas de los consumidores. Nuestra investigación sugiere que los consumidores asocian de forma innata los movimientos motrices rápidos (frente a los lentos) con un comportamiento más masculino (que femenino). Por ejemplo, muchos anuncios muestran a un personaje femenino realizando un movimiento de mano suave y lento (por ejemplo, aplicando la crema facial o la máscara de pestañas de

L'Oréal, extendiendo Nutella en una tortita, etc.) y a un personaje masculino realizando un movimiento de mano más bien rápido o contundente (por ejemplo, girando el manillar de la moto Harley Davidson, rociando el desodorante corporal AXE, etc.). La exposición recurrente a este tipo de experiencias sensomotrices (es decir, observar repetidamente los movimientos de las manos en anuncios, bailes, películas, etc.) lleva a los consumidores a desarrollar una asociación implícita (que se mantiene en todos los géneros) y, en consecuencia, genera esquemas mentales que relacionan la velocidad de movimiento con la feminidad o la masculinidad.

Estas asociaciones estereotipadas, a su vez, influyen en la percepción y el comportamiento de los consumidores. Nuestro trabajo demuestra que las asociaciones sobre la velocidad de los movimientos de las manos tienen un valor informativo, de manera que el producto tocado con un movimiento de manos lento (frente a uno rápido) puede ser percibido como más femenino (que masculino). Basándonos en la teoría de la identidad social, postulamos que las consumidoras (frente a los consumidores) ofrecen evaluaciones más positivas para un producto que se representa con un movimiento de mano suave (frente a uno rápido), impulsadas por una mayor percepción de la feminidad (frente a la masculinidad) del producto. En este capítulo se examinan los efectos propuestos en cinco estudios (incluida una prueba de asociación implícita) en diferentes países y contextos de productos.

Por último, en el **capítulo 3** de la tesis se examina el efecto de **la estrategia de promoción de precios con dígitos a la izquierda en los anuncios/menús** sobre el desperdicio de alimentos. Esta investigación examina el efecto de los precios con dígitos a la izquierda, con o sin un precio de referencia o de comparación, sobre la percepción

que tiene el consumidor de la calidad del producto y, posteriormente, sobre el desperdicio de alimentos. Sugerimos que la fijación de precios con dígitos a la izquierda sin un precio de referencia que la acompañe (etiqueta de 2,99 dólares en lugar de 3,00 dólares) puede aumentar el desperdicio de alimentos, porque la etiqueta de 2,99 dólares (frente a la de 3,00 dólares) se percibiría como un significado de bajo precio y, por tanto, ofrecería una calidad reducida. Es probable que la inferencia de baja "calidad-precio" para el producto con precio de dígito izquierdo conduzca a un mayor desperdicio de alimentos. Sin embargo, planteamos que el precio del dígito izquierdo, cuando va acompañado de un precio de referencia (etiqueta de 4 dólares, ahora 2,99 dólares), aumentaría la inferencia de calidad y reduciría el desperdicio de alimentos. Esto se debe a que los consumidores utilizan la etiqueta del precio de referencia (4,00 dólares) para formar su inferencia de calidad-precio. Nuestra investigación sugiere que los minoristas pueden mejorar la percepción de la calidad y reducir el desperdicio de alimentos cuando utilizan el precio del dígito izquierdo con un precio de referencia contiguo. Este capítulo presenta un estudio inicial que apoya nuestra hipótesis principal y propone nuevas direcciones de investigación.

En conjunto, los tres capítulos de esta tesis demuestran el efecto de diferentes estímulos visuales sobre la percepción y las respuestas del consumidor. En estos capítulos, manipulamos experimentalmente la distancia de la representación dentro de una imagen publicitaria (capítulo 1), la velocidad de la interacción de la mano con un producto en un vídeo publicitario y las descripciones del producto (capítulo 2), y la interacción de los elementos visuales y verbales en el procesamiento de imágenes de alimentos (capítulo 3). Los capítulos demuestran el efecto de los estímulos visuales en

otras percepciones sensoriales. Por ejemplo, en el capítulo 1, se demuestra que la representación cercana (frente a la lejana) de alimentos insanos (frente a los saludables) potencia el sabor percibido y, posteriormente, la respuesta del consumidor. El trabajo demuestra que el efecto de la proximidad espacial sobre el sabor percibido es privativo de los alimentos insanos (no de los saludables) y es más probable cuando el consumidor está expuesto a representaciones únicas (que a múltiples). Esta investigación demuestra el efecto de un estímulo visual sobre la simulación mental, la percepción del sabor y, posteriormente, las intenciones de comportamiento y la saturación. En el capítulo 2, demostramos el efecto de otro estímulo visual de marketing sobre la percepción háptica, mostrando que las consumidoras (más que los consumidores) muestran preferencias de producto más positivas al observar una interacción lenta (frente a una rápida) de la mano con un producto anunciado. En el último capítulo, probamos el efecto de la información de precios con dígitos a la izquierda (etiqueta de 2,99 dólares frente a 3,00 dólares; colocada a la izquierda frente a la derecha del área visual y con/sin precios de referencia), dentro de los visuales de alimentos, sobre las percepciones de la calidad del precio y el desperdicio de alimentos. Así, pues, un hilo conductor de esta tesis es el examen del efecto espontáneo de las diferentes señales visuales de marketing. Los capítulos de la tesis examinan de forma holística el efecto de los elementos visuales de alimentos insanos (frente a los saludables), tanto en el consumo (capítulo 1) como, a modo de trabajo de seguimiento, en los resultados relacionados con el desperdicio (capítulo 3). Además, como se ha señalado anteriormente, los tres capítulos examinan diferentes aspectos de la ubicación de los estímulos visuales (es decir, el espacio, el movimiento y la posición; Sample et al., 2020). Podría merecer la pena explorar la cuarta faceta de la

localización visual (es decir, la orientación o el ángulo de percepción) y la interacción de los efectos de la localización con otros componentes relevantes para el marketing (es decir, la luminosidad, la forma, la superficie, el color y la materialidad; Sample et al., 2020).

Por último, estos capítulos no solo han buscado proporcionar nuevos conocimientos teóricos, sino también derivar soluciones basadas en el marketing para cuestiones prácticas. Por ejemplo, las conclusiones del capítulo 1 señalan la necesidad de que los responsables políticos evalúen cuidadosamente la distancia de la representación de los alimentos dentro de las imágenes y los carteles publicitarios. Este tema es de crucial importancia debido a la creciente prevalencia de individuos con sobrepeso a escala mundial y tiene implicaciones para el bienestar de los consumidores (relacionado con el Objetivo de Desarrollo Sostenible 3.4.1, Naciones Unidas, 2017). En el capítulo 2, sugerimos que los vendedores pueden alterar la percepción de los atributos (por ejemplo, provocar diferentes percepciones del género del producto) y las preferencias de los consumidores simplemente mostrando o describiendo diferentes velocidades (lenta frente a rápida) de interacción de las manos con un producto destacado. Creemos que las conclusiones de este capítulo son relevantes para el marketing online de productos que poseen propiedades texturales (por ejemplo, la ropa), que requieren un tacto activo o la búsqueda de información utilizando las manos (por ejemplo, el aseo, la ropa, etc.) y que se dirigen a géneros específicos. Asimismo, en el capítulo 3, exploramos el efecto del formato de presentación de los precios de los dígitos a la izquierda en el desperdicio de alimentos. Nuestra investigación aporta conocimientos sobre las consecuencias adversas de una acción de marketing comúnmente utilizada (es

decir, la fijación de precios de dígito izquierdo) en el punto de venta. Esta aportación es importante, ya que los responsables políticos pretenden reducir a la mitad el desperdicio de alimentos per cápita en la fase de consumo para 2030 (en relación con el Objetivo de Desarrollo Sostenible 12.3, Naciones Unidas, 2017).

Los resultados de esta tesis pretenden aportar pruebas novedosas sobre el efecto de las diferentes señales visuales de marketing en las respuestas de los consumidores. Se espera que los capítulos de la tesis no solo den lugar a nuevas investigaciones sobre temas relacionados, sino que también ofrezcan aportaciones significativas a las diferentes partes interesadas (por ejemplo, consumidores, responsables de marketing, minoristas y responsables políticos).

Chapter 1

The "Proximal Depiction Effect" of Indulgent (Versus Non-Indulgent) Foods on Consumer Responses

Abstract

Exposure to food pictures has been shown to influence an individual's impulse responses, taste perception, and satiation. We demonstrate that the effect of food pictures would vary depending on the spatial distance of the product within an advertisement. Specifically, the proximal depiction of indulgent (than non-indulgent) foods would result in higher consumer responses. These responses manifest because proximal depictions heighten the consumer's mental simulation (or perceptual re-enactment of the eating experience) and, subsequently, their perceived tastiness for an indulgent food. However, multiple exposures to similar proximal depictions can trigger satiation, that is, a decline in expected enjoyment. Four studies demonstrate these effects, validate the mechanism, and rule-out alternative explanations. This paper highlights the multi-faceted effect of proximal depictions and contributes to the prior research on visual information processing, mental simulation of consumption experiences, and satiation.

The "Proximal Depiction Effect" of Indulgent (Versus Non-Indulgent) Foods on Consumer Responses

1.1. Introduction

Apicius, the famed 1st Century Roman connoisseur, purportedly said: "*We eat first with our eyes*" (Spence, Okajima, Cheok, Petit, & Michel, 2016). This phrase sounds true, now more than ever, as pictures of appetizing food beckon us – through advertising, restaurant menus, product packaging, billboards, and social media. Merely viewing pictures of an indulgent food (e.g., a slice of a cheese-dripping pizza) can elicit taste inferences, trigger consumption intentions, and stimulate the expected enjoyment of the featured food (Raghunathan, Naylor, & Hoyer, 2006; Elder & Krishna, 2012; Krishna, Morrin, & Sayin, 2014; Larson, Redden, & Elder, 2014; Moore & Konrath, 2015). Extending this literature, our research examines a novel pictorial cue (i.e., the spatial distance of food depicted within an advertisement) and identifies the mechanism of mental simulation of eating and perceived tastiness driving the effect of such depictions. We address the question: "*whether, how, and under which conditions do a proximal depiction of food products affect the consumer responses?*"

This paper has implications for food marketing and the phenomena of over-consumption and obesity. It is estimated that, on average, consumers observe over 5,000 advertisements every day – with an increasing proportion featuring food products (Larson et al., 2014). In 2019, McDonald's spent US$ 1.62 billion and Yum Brands (comprising Taco Bell, Pizza Hut, and KFC) another US $1.07 billion on advertising within the United States (Advertising Age Data Center, 2020). These advertisements typically highlight the

sensorial appeal of food products through evocative imagery. Our research examines whether such pictorial cues (in particular, proximity of depiction) influence consumer responses. Furthermore, we explore the situational factors (e.g., multiple exposures to similar proximal depictions) that can have an unintended consequence for advertisers due to increased satiation (i.e., a decline in expected enjoyment for a featured food product). These insights are relevant for not only food advertisers but also policymakers. Advertising stimuli featuring indulgent foods activate impulse responses (Guthrie, Mancino, & Lin, 2015; Moore & Konrath, 2015), thereby contributing to the rise in overweight and obesity-related diseases. In 2016, over 1.9 billion adults were overweight, of which nearly 650 million were obese. It is estimated that the prevalence of overweight individuals globally has risen from 29.1% in 1996 to 33.6% in 2006 to 38.9% in 2016 (WHO, 2017). Our research identifies a specific stimulus type and mechanism that makes consumers (both restrained and unrestrained eaters; Herman & Polivy, 1975) more susceptible to food indulgences. Thus, a better understanding of the effect of such visual food cues is crucial to devise counterstrategies that encourage healthy eating habits, reduce the risk of non-communicable diseases (NCDs), and improve overall well-being (Sustainable Development Goal 3.4.1, United Nations, 2017).

This research makes a few theoretical contributions. We extend the literature on visual information processing, especially the research stream examining the spatial dimensions of location, movement, and spacing between image elements (Adaval, Saluja, & Jiang, 2019). Prior work has studied different visuospatial effects, such as the physical distance between regular and sales price (Coulter & Norberg, 2009), between images of cause and effect (e.g., pictures of ‘acne cream’ and ‘smooth face’; Chae, Li, &

Zhu, 2013), and between observer and verbal description (Jia, Huang, Wyer Jr., Shen, 2017). Contributing to this literature, we identify the effects of incidental exposure to food pictures that vary on spatial distance within the visual. We argue that the "proximal depiction effect" occurs because proximal (than distant) depictions enhance the amount, ease, and vividness of a consumer's mental imagery of eating. Simply put, proximal depictions heighten the perceptual representations of the consumption experience, increase the perceived tastiness, and consequently lead to higher consumer responses. In demonstrating these effects, we contribute to the literature stream on the role of mental simulation and sensory perceptions in processing food visuals (e.g., Elder & Krishna, 2012; Larson, Redden, & Elder, 2014; Shen, Zhang, & Krishna, 2016; Xie, Minton, & Kahle, 2016; Petit, Velasco, & Spence, 2018). Our research also adds to prior work on interventions that influence the consumer's food well-being (Batat & Addis, 2021; Machin, Moscato, & Dadzie, 2021). We show that the effect of proximally depicted pictures is specific to indulgent (than non-indulgent) foods, can increase eating intentions, and, by implication, lead to over-consumption.

Lastly, this paper builds upon recent research on the conditions under which external food stimuli might drive satiation and variety-seeking (e.g., Larson et al., 2014; Suher, Raghunathan, & Hoyer, 2016; Cornil & Chandon, 2016; Sevilla, Lu, & Kahn, 2019). We reveal spatial distance as a potential moderator to the effect of indulgent food pictures on satiation. This research demonstrates that exposure to multiple-proximal depictions of indulgent foods (e.g., several up-and-close pictures featured in online menus and store displays of burgers or pizzas) can increase satiation - driven by reduced perceived tastiness. We next review the relevant literature leading to our hypotheses.

1.2. Conceptual Background

1.2.1. Proximal Depiction is Perceived Tastier

Prior literature suggests that food products and their pictorial representations can affect the perception of taste. Neurophysiological evidence shows that merely viewing pictures of food products activate multiple regions of the brain – especially, the frontal operculum/ insula (enabling perception of food taste), the orbitofrontal cortex (facilitating inferences of the hedonic value of taste), and the visual cortex (processing the food's shape; Simmons, Martin, & Barsalou, 2005). Furthermore, Rolls (2005) suggests that inputs from different sensory modalities have a role in spontaneously shaping the perceived taste of food featured in a picture. Our research proposes that the proximal (vs. distant) depiction of food products would activate multiple sensory modalities, especially, the visual and gustatory (taste) senses. The visual effect of spatial proximity implies that an up-and-close depiction would make the product appear more evocative and detailed (Nisbett & Ross, 1980). Furthermore, spatial proximity induces a reference point shift, i.e., adaptation to a physically closer comparison point, and, thus, stimulates impulse responses (Hoch and Loewenstein, 1991; 2004). Proximal depiction of food would also simultaneously activate more positive taste inferences for a featured product. Stated simply, the perceived tastiness of the depicted food product is likely to improve when a food product is depicted in a proximal and up-and-close manner. This is because taste is a proximal sensory modality i.e., the taste can only be perceived when an actual (or imagined) stimulus is physically proximal (Elder, Schlosser, Poor, & Xu, 2017). As proximal depictions bring a food product closer, without any change in an observer's bodily position, they are likely to make the food, both, visually evocative and tastier.

Therefore, these multiple sensory influences can have a taste-enhancing effect for proximal (than distant) food depictions.

Our research proposes that the effect of proximal depictions on tastiness would vary by the nature of the stimuli, especially, food type (indulgent vs. non-indulgent). Prior research suggests that people hold associations about food cues that influence their taste inferences and consumption choices (e.g., Raghunathan et al., 2006; Suher et al., 2016; Ye, Morrin, & Kampfer, 2020). For instance, pictorial depictions of non-indulgent foods (e.g., pictures of fruit salad) and health portrayals (e.g., cookies with high levels of fiber) are perceived as less filling, thereby making consumers order greater quantities of such foods (Suher et al., 2016). Contrarily, pictorial depictions of indulgent foods are associated with tastiness, which makes consumers associate these foods with words reflecting taste (e.g., delicious) than less tastiness (e.g., bland; Raghunathan et al., 2006). We posit that spatial proximity will strengthen the associated taste inferences for indulgent (vs. non-indulgent) food depictions. This is because spatial proximity adds causal strength to an activated concept (Argo, Dahl, & Morales 2006; Chae, Li, & Zhu, 2013). Thus, proximal food depiction is likely to heighten the activated concept of tastiness for indulgent foods. Contrarily, non-indulgent food products, due to their association of being less tasty, might not evoke similar perceptions of tastiness even when proximally depicted. Therefore, the proximal depiction of indulgent (than non-indulgent) foods is likely to lead to a higher perception of tastiness.

Furthermore, previous research has shown that perceived tastiness affects the expected enjoyment (e.g., Alba and Williams, 2013) and the likelihood of purchasing a food product (Moore, 2014). Therefore, we expect that higher perceived tastiness from

proximal (vs. distant) depiction of indulgent foods would increase the consumer responses - more so, for indulgent (than non-indulgent) foods. Stated formally,

H_1: Proximal (vs. distant) depiction of indulgent (vs. non-indulgent) foods will evoke higher perceived tastiness.

H_2: Proximal (vs. distant) depiction of indulgent (vs. non-indulgent) foods will evoke higher consumer responses mediated by perceived tastiness.

Through H_1 – H_2, we argue that the effect of proximal food depictions will be significantly higher for indulgent (than non-indulgent) foods. Our research examines two consumer responses i.e., purchase intention and expected enjoyment. As over-consumption of indulgent foods is of special practical relevance, for the remaining hypotheses, we focus only on indulgent foods. In the next section, we discuss the full mechanism driving the effect of proximal depictions on mental simulation, perceived tastiness, and consumer responses.

1.2.2. Psychological Mechanism of Mental Simulation

Prior research shows that food pictures can elicit mental imagery or re-enactment of prior eating experiences (Elder & Krishna, 2012; Shen & Sengupta, 2012; Larson et al., 2014). For example, the visual orientation of objects within a food picture, by placing a fork on the dominant/ right-hand side of a cake, can facilitate imagined grasping of the fork and consequently increase the consumer's purchase intention (Elder & Krishna, 2012). Likewise, when considering eating M&Ms or merely seeing a picture of an ice-cream sundae, people may recall their experience of a product's taste, sound, and texture (Barsalou, 1999; Larson et al., 2014). Thus, mere exposure to food pictures can evoke

the mental imagery of a prior consumption experience. Proximal food depictions, being visually evocative and taste-enhancing, are likely to generate more images of the past eating experiences in the consumer's mind. Distant food depictions, on the other hand, are likely to decrease the ease, amount, and vividness of mental imagery of eating. That is, a proximal (more than distant) depiction of an indulgent food would heighten the simulation of reaching out, holding, and eating the featured food. Enhanced mental simulation, in turn, is likely to heighten the taste perceptions. This is because mental simulation would activate the conceptual knowledge related to the indulgent food (Simmons et al., 2005) in the consumer's mind (e.g., how is the food likely to taste?), the tastiness perception, and consequently consumer responses. This leads us to predict the following serial mediation mechanism:

> **H_3**: Effect of proximal (vs. distant) depiction of indulgent foods on consumer responses will be mediated through mental simulation of eating and perceived tastiness.

We next draw upon the satiation literature to develop our conceptualization of multiple proximal depictions of indulgent foods.

1.2.3. Multiple Exposures to Proximal Indulgent Food Depictions

Although the proximal depiction of indulgent foods might evince higher consumer responses upon a single exposure, we suggest that multiple exposures to proximal (vs. distant) depictions may result in satiation. Prior research has defined satiation as a decline in sensory enjoyment for a pleasurable product due to repeated consumption (Redden & Haws, 2012; Larson et al., 2014). The effect of satiation is experienced upon

exposure to external food cues (e.g., labels, food color, shape, etc.) that make the composition and quantity of the product salient (Cornil, 2017). Satiation may be driven by a consumer's awareness and perception of their own bodily (or physiological) cues – in particular, level of hunger. Additionally, lay beliefs, contextual factors, and individual differences may influence the rate of satiation. For example, people may experience slower satiation when the food is portrayed as non-indulgent due to the "healthy = less filling" association (Suher et al., 2016) when attention is hindered by distractions (e.g., watching television while eating; Higgs & Woodward, 2009), and meal consumption is difficult to track (e.g., due to amnesia; Rozin et al., 1998). On the contrary, consumers, who have higher trait self-control, may experience a faster rate of satiation for indulgent foods (Redden et al., 2012). We contribute to this literature by investigating an important, hitherto unexplored pictorial format that can affect the rate of satiation i.e., proximal (vs. distant) depiction of indulgent foods.

Larson and colleagues (2014) found that repeatedly evaluating food pictures that shared a taste-characteristic (e.g., sweet, or salty) led to a drop in the enjoyment for a subsequently presented product. In general, consumers are likely to experience higher satiation for the sensory characteristics of products (e.g., taste). Inman (2001) showed that consumers experienced a substantial decline in pleasantness for the taste attribute (vs. brand or category) of food products consumed. This decline, then, led to more satiation on the tastiness inferences. Our research suggests that multiple exposures to pictures of indulgent food would lead to a higher decline in perceived tastiness and expected enjoyment, depending on the proximity of the product picture. That is, whereas exposure to a single proximal (vs. distant) depiction of indulgent food may increase the

perceived tastiness, multiple proximal (vs. distant) exposures will lead to a greater decline in perceived tastiness.

H_4: Multiple-proximal (vs. multiple-distant) depictions of indulgent food products will lead to higher satiation through lower perceived tastiness.

We next investigate these predictions across four studies. In study 1, we tested whether self-reported perceptions of tastiness are higher for proximally depicted indulgent (vs. non-indulgent) foods. In Study 2A and 2B, we examine the effect on consumer responses through the serial mediation mechanism of mental simulation and perceived tastiness. Finally, in study 3, we investigate the effect of multiple-proximal (vs. multiple-distant) indulgent food depictions on the rate of satiation.

1.3. Study 1: Proximal Depiction of Indulgent (vs. Non-Indulgent) Foods

The initial study validates the effect of proximal depictions on the perceived tastiness for indulgent (vs. non-indulgent) foods (H_1). In addition, the study examines the alternative explanations of whether proximal (vs. distant) depiction leads to an: (a) over-estimation of the portion size and (b) alteration in the participant's bodily position. Prior research shows that indulgent foods could evoke an attitude ambivalence due to the co-existence of desire and health-threat for these products (Cornil, Ordabayeva, Kaiser, Weber, & Chandon, 2014). Such attitude ambivalence can subsequently increase an individual's visual sensitivity to increasing portion sizes. We, therefore, examine whether proximal (vs. distant) depictions lead to an inaccurate portion-size perception. Evidence also suggests that pictures of indulgent products may elicit an approach behavior and, thus, spontaneously increase food craving (Kemps, Tiggemann, Martin, & Elliott, 2013).

Hence, in Study 1, we additionally test whether people are likely to change their bodily position (i.e., approach or lean forward) upon observing a proximal indulgent food picture.

1.3.1. Sample, Design, and Procedure

One hundred and eighty-nine MTurk participants (60.3% female; M_{age} = 49.4) completed this study. We tested the proposed effects using a 2x2x5 mixed design, with the distance of depiction (proximal vs. distant) and product-type (indulgent vs. non-indulgent) as between-subject factors and stimuli (five food pictures) as the within-subjects factor. The stimuli (refer to Appendix A.1.) were chosen based on pre-tests and prior research (e.g., Raghunathan et al., 2006). The food pictures differed only on the spatial distance of depiction. We used photo manipulation software to mimic the actual size of the featured food product – had it been placed proximal (i.e., up-and-close to an observer) or distant (about one foot away from an observer) on a flat surface. In doing so, we preserved the perceived size that forms the basis of perceptual constancy in everyday life (e.g., Amit, Algom, & Trope, 2009). This experiment aimed to test whether proximal depictions of indulgent and non-indulgent foods influence the consumer responses across multiple stimuli. Participants read a scenario of a hypothetical café introducing new food products to its menu. Subsequently, each participant saw five randomly presented food pictures depending on their assigned between-subjects condition. After viewing each picture, participants were asked about their perceived tastiness (2 items; “how do you think the food product tastes?” and “I would describe this food item as: not at all tasty --- very tasty”; Irmak, Vallen, & Robinson, 2011) anchored from 1 (very bad/not at all) to 7 (very good/very much).

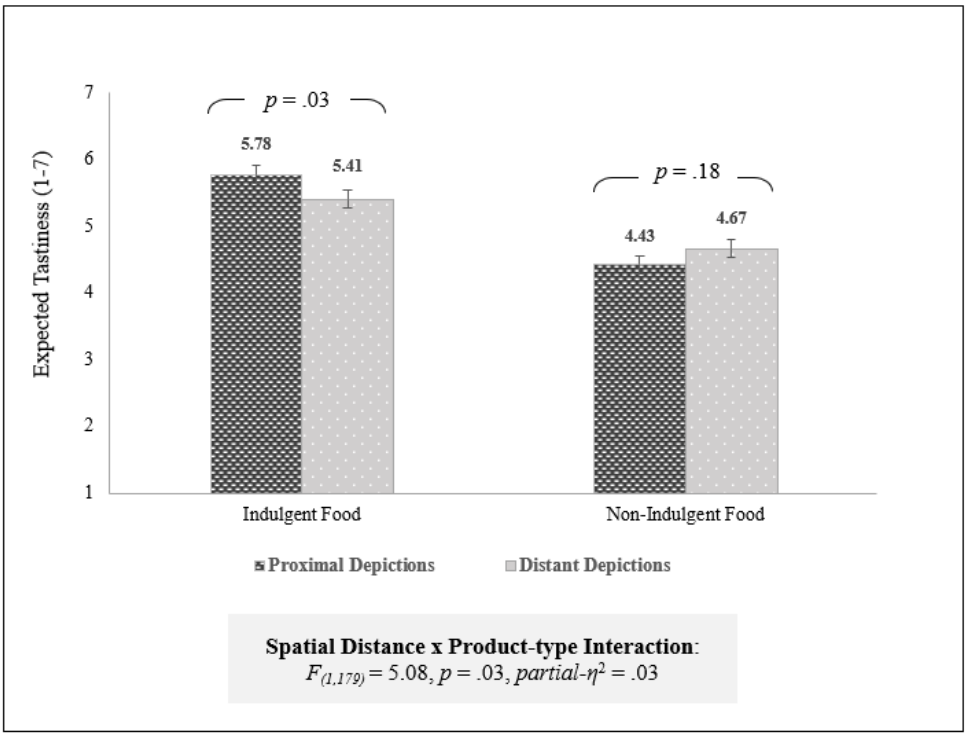
Then, the participants reported perceived portion-size ("how small or big do you think is the portion-size of the burger depicted in this picture?") anchored at 1 (small portion-size) to 7 (big portion-size) and bodily distance ("when seeing this picture, how close or far are you from the computer screen relative to your normal position?") rated from 1 (closer than normal) to 7 (farther than normal; Thomas & Tsai, 2011). Lastly, participants responded to several control variables. First, they responded to the 10-item restrained eating sub-scale of the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986). The items included questions such as "when you have put on weight, do you eat less than you usually do?" and "how often do you try not to eat between meals because you are watching your weight?" anchored from 1 (never) to 5 (very often). We controlled for this individual difference as restrained (vs. unrestrained) eaters hold higher visual sensitivity for indulgent food cues (Cornil et al., 2014). Second, participants reported their hours since the last eating ("how many hours ago did you last eat something?"; Krishna et al, 2014), as a proxy for the hunger level. Third, we asked participants about their dietary restrictions ("do you have any dietary restrictions?"; coded on a binary scale: (0) No, (1) Yes - with options such as diabetic, gluten-free, kosher, lactose intolerance, vegetarian, etc.). Forth, participants shared their time of day by answering "what is the time in your city right now?" We considered the participants' time of day because it may influence food acceptability and behavioral outcomes (Birch, Billman, & Richards, 1984). Lastly, they reported their age and gender.

1.3.2. Results

We conducted a repeated measures ANCOVA with spatial distance of depictions and product-type as the between-subject factors and perceived tastiness of five different stimuli as a within-subjects factor including all covariates. The between-subjects analysis revealed a significant main effect of product-type ($F_{(1,179)} = 58.70$, $p < .01$, *partial-*$\eta^2 = .05$) but not spatial distance ($F_{(1,179)} = .20$, $p = .66$, *partial-*$\eta^2 < .01$). Importantly, a significant spatial distance × product-type interaction emerged ($F_{(1,179)} = 5.08$, $p = .03$, *partial-*$\eta^2 = .03$). Paired comparisons, across the five-tested stimuli, showed that proximal depiction led to an increase in perceived tastiness for indulgent foods ($M_{Indulgent\text{-}proximal} = 5.78$ vs. $M_{Indulgent\text{-}distant} = 5.41$) but not for non-indulgent foods ($M_{Non\text{-}indulgent\text{-}proximal} = 4.43$ vs. $M_{Non\text{-}indulgent\text{-}distant} = 4.67$; figure 1.1). The interaction effect strengthened after excluding the covariates ($F_{(1,185)} = 6.62$, $p = .01$, *partial-*$\eta^2 = .04$; $M_{Indulgent\text{-}proximal} = 5.82$ vs. $M_{Indulgent\text{-}distant} = 5.38$ and $M_{Non\text{-}indulgent\text{-}proximal} = 4.42$ vs. $M_{Non\text{-}indulgent\text{-}distant} = 4.69$). Among the covariates, restrained eating ($p = .02$) and dietary restrictions ($p < .01$) were significant. This was expected as restrained eaters have been shown to evince greater preference and taste perception for high-fat foods (Roefs & Jansen, 2002). However, these covariates did not interact with factors to influence perceived tastiness across stimuli (*p's* > .50).

Follow-up analysis, by product-type, showed that proximal (vs. distant) depiction of indulgent foods ($F_{(1,87)} = 5.00$, $p = .03$, *partial-*$\eta^2 = .05$) led to a significant increase in perceived tastiness across stimuli. However, the effect of proximal depiction was not significant for non-indulgent foods ($F_{(1,86)} = 1.85$, $p = .18$, *partial-*$\eta^2 = .02$). This analysis also suggested stimuli-level differences as the interaction of between-subject factors (i.e., spatial distance x product-type) and within-subjects factor (stimuli pictures) was not

significant ($F_{(1,179)}$ = 0.08, p = .78). We expected the stimulus-level differences in perceived tastiness to be driven by the variation in the vividness of picture depiction, which might vary by spatial distance, product type, and the picture itself. Overall, this analysis suggests that, across multiple stimuli, the average effect of proximal depictions is specific to indulgent (but not non-indulgent) food depictions.



Note: Error bars represent standard errors

Figure 1.1: Effect on Mean Perceived Tastiness

1.3.3. Alternate Explanations

A repeated measures ANCOVA with portion-size perception of stimuli pictures as a within-subject factor revealed a non-significant main effect of spatial distance (p = .91), product-type (p = .34) and their interaction (p = .36) suggesting that participants did not perceive a significant difference in portion-size for the proximal (vs. distant) depiction.

However, a repeated-measures ANCOVA with bodily distance as a within-subjects factor revealed a significant effect of spatial distance ($p < .01$), non-significant effect of product-type ($p = .12$) and non-significant interaction effect ($p = .93$). Paired contrasts found that the proximal depiction led to perceived change in the bodily-position for both indulgent ($I_{Indulgent\text{-}proximal} = 3.71$ vs. $M_{Indulgent\text{-}distant} = 4.22$) and non-indulgent foods ($M_{Non\text{-}indulgent\text{-}proximal} = 3.46$ vs. $M_{Non\text{-}indulgent\text{-}distant} = 4.00$). Prior research alludes to an approach bias towards highly desired (alternately, indulgent) foods (Kemps et al., 2013). Contrarily, our analysis found that the proximal depictions led to a bodily approach across the product types. Considering this result and the potential concern that spatial distance of depiction altered the perceived bodily distance from the stimulus, we controlled for this variable in a follow-up study.

1.3.4. Discussion

In Study 1, we provided evidence on the effect of proximal depictions for indulgent (vs. non-indulgent) food products using self-report measures of perceived tastiness (H_1). Study 2 replicates these findings in an online food ordering context in which participants make choices for someone else. Prior research shows that consumers tend to actively self-regulate/ manage their food decisions - choosing more healthy foods for themselves (than for others; Laran, 2010). Therefore, the next study takes an indirect approach to validate the proximal depiction effect of indulgent (vs. non-indulgent) foods - using a context in which participants decide for someone else and, therefore, do not experience self-presentation concerns (Liu & Baskin, 2021). In addition, study 2 includes two new

control variables [i.e., participants' bodily distance from the screen and body-mass index (BMI)].

1.4. Study 2A: Indulgent vs. Non-Indulgent Depictions – A Moderated Mediation

This study investigates our prediction that the proximity of depiction elicits higher perceived tastiness and consequently consumer responses for indulgent foods (than non-indulgent) foods (H_2). This study demonstrates that the proximal depiction effect is specific to indulgent foods and holds irrespective of whether consumers make food-related decisions for themselves or others. Furthermore, in study 2A, we consider the participants' BMI (calculated from self-reported weight and height) and bodily distance from the screen as additional control variables. We include BMI because it represents one of the most used indicators of obesity and over-consumption (Kernani, McFerran, & Mukhopadhyay, 2016). The inclusion of bodily distance from the screen was based on our finding in study 1. Specifically, we found that participants altered their bodily position in response to proximal (vs. distant) depiction of indulgent food and, thus, the need for including it as a covariate.

1.4.1. Sample, Design, and Procedure

We pre-tested 5 pairs of indulgent (i.e., hamburger) and non-indulgent (salad) foods on visual appeal and perceived portion size. Participants (N = 99 U.S. respondents from Prolific Academic platform; M_{age} = 29.27 years, 52% female) were assigned to two between-subject conditions (food-type: indulgent vs. non-indulgent) and evaluated five randomly presented food images. Upon seeing each picture, the participants responded

to a 3-item visual appeal scale ["I like the way this food picture looks", "the food picture is attractive", and "the food picture is aesthetically appealing" – rated from strongly disagree (1) to strongly agree (7); adapted from Cian, Krishna, & Elder, 2014]. They subsequently responded to the measure of portion-size perception (same as study 1). The ANCOVA analyses identified a burger-salad pair (refer, Appendix A.2.) that did not differ on both visual appeal (M_{burger} = 4.44, M_{salad} = 4.27; p = .72) and perceived portion-size (M_{burger} = 4.91, M_{salad} = 4.73; p = .62).

In the study, participants (N = 204 U.S. respondents recruited from the Prolific Academic platform, 45.10% females, M_{age} = 33.68) were randomly assigned to four conditions in a 2 (spatial distance: proximal vs. distal) x 2 (product-type: indulgent vs. non-indulgent) between-subjects design. The participants were asked to imagine the scenario about Taylor [pre-tested as gender-neutral name; N = 101 U.S. participants from Prolific Academic platform; $t_{(100)}$ = -1.08, p = .29, M = 3.84; rated from 1 = very feminine to 7 = very masculine] surfing online for ordering food at home and coming across an advertisement picture of a new cafeteria chain 'My Café' in the neighborhood. Then, the participants viewed an advertisement picture of a burger or salad - depicted either proximally or distally. These pictures included a caption at the bottom "home delivery available" to make the advertisement stimuli realistic to the home ordering context. Upon viewing the picture, participants shared their purchase intentions on a 2-item scale (α = .93; r = .87; Poor, Duhachek, & Krishnan, 2013) with items including "how likely would Taylor order the burger after seeing this advertisement?" rated from not at all order (1) to definitely order (7) and "how likely would Taylor recommend it to family and friends anchored from not at all recommend (1) to very much recommend (7). Then, the

participants evaluated the tastiness (α = .94; r = .85; Poor et al., 2013) on 3 attributes: flavor, deliciousness, and overall taste (1 = flavorless/ not at all delicious/ bad taste and 7 = flavorful/ very delicious/ good taste), perceived spatial distance ["how spatially close or far do you think the food product is to you?" ranging from very close spatially (1) to very far spatially (7)], and bodily distance from the screen (same measure as study 1).

Subsequently, the participants shared their dietary habits using a 10-item revised restrained scale (Herman et al., 1978). The scale included items such as "how often are you dieting?" rated from never (0) to always (4); "do you eat sensibly in front of others and splurge alone?" rated from never (0) to always (3). We averaged the scale items (α = .77; r = .58). Finally, we included the control variables such as the participant's dietary restrictions, hours since last eating, gender, age, weight (pounds), height (feet and inches), and time of day. The self-reported weight and height were used to calculate each participant's body-mass index (BMI).

1.4.2. Results

The ANCOVA results, adjusted for the covariates, confirmed our manipulation of spatial distance of depiction ($M_{proximal}$ = 2.79, $M_{distant}$ = 4.61, p < .01). Next, we conducted a 2x2 ANCOVA on purchase intention. The results revealed a main effect of proximity ($F_{(1,192)}$ = 20.03, p < .01, *partial-*η^2 = .09) and product-type controlling for the covariates ($F_{(1,192)}$ = 4.78, p = .03, *partial-*η^2 = .02). More importantly, we found a significant interaction effect ($F_{(1,192)}$ = 7.99, p < .01, *partial-*η^2 = .04) on purchase intention. Age was a significant covariate (p < .01) but its 2-way and 3-way interactions with the two IVs (i.e., spatial distance of depiction and product-type) were not significant (p > .13). The planned

contrasts showed that whereas proximal depiction of indulgent food evinced a significantly higher purchase intention ($M_{proximal}$ = 4.56 vs. $M_{distant}$ = 2.99; p < .01), a similar depiction evoked non-significant difference for non-indulgent foods ($M_{proximal}$ = 3.51 vs. $M_{distant}$ = 3.17; p = .24). The interaction effect remained significant ($F_{(1,200)}$ = 8.25; p < .01; *partial-*η^2 = .04) without the model covariates.

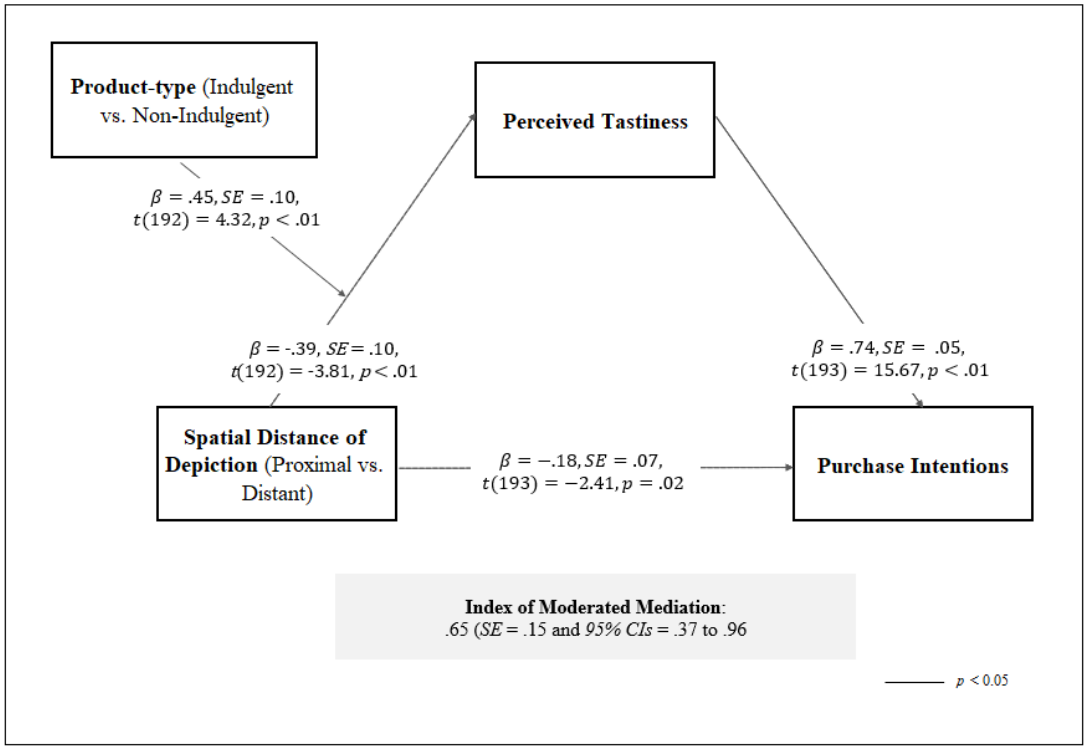
A similar analysis on perceived tastiness, controlling for the covariates, resulted in a significant main effect of proximity ($F_{(1,192)}$ = 14.49, p < .01, *partial-*η^2 = .07) and product-type ($F_{(1,192)}$ = 4.26, p = .04, *partial-*η^2 = .02) and a significant interaction effect ($F_{(1,192)}$ = 18.69, p < .01, *partial-*η^2 = .09). Planned contrasts revealed that participants considered Taylor would perceive higher tastiness for the proximally depicted indulgent food ($M_{proximal}$ = 5.46 vs. $M_{distant}$ = 3.78; p < .01) but not non-indulgent food ($M_{proximal}$ = 4.15 vs. $M_{distant}$ = 4.25; p = 0.69). The effects were similar without covariates – with a significant effect of proximity (p < .01), marginally significant effect of product-type (p = .06), and significant interaction (p < .01).

This analysis replicated our findings of Study 1 on the effect of proximal depictions on perceived tastiness for indulgent (vs. non-indulgent) foods (H_1). These results indicated that the influence of spatial distance of depictions is significantly higher for indulgent (than non-indulgent) food products. We further test this effect through a moderated mediation analysis.

1.4.3. Moderated Mediation Analysis

We next conducted a moderated-mediation analysis (Model 7; Hayes, 2013), with 5,000 bootstrapped samples using spatial distance as the predictor variable (-1 =

proximal, 1 = distal), product-type as moderator (-1 = non-indulgent, 1 = indulgent), perceived tastiness as mediator, and purchase intention as the dependent variable. The results showed that the effect of spatial distance on perceived tastiness was significantly moderated by the product-type (a_3: β = .45, *SE* = .10, $t(192) = 4.32$, $p < .01$) – with significant effect for indulgent food depictions (β = -.84, *SE* = .15, *95% CIs* = -1.13 to -.55) but not for non-indulgent food depictions (β = .05, *SE* = .14, *95% CIs* = -.24 to .34). Furthermore, controlling for spatial distance, the perceived tastiness of the depicted food product significantly influenced the purchase intention (b: β = .74 *SE* = .05, $t(193) = 15.67$, $p < .01$). Lastly, indicating partial mediation, the effect of spatial distance on purchase intention reduced but was still significant (c': β = -.18, *SE* = .07, $t(193) = -2.41$, $p = .02$). The index of moderated mediation was .65 (*SE* = .15; *95% CIs* = .37 to .96; figure 1.2).



Note: Proximal Depiction (-1); Distant Depiction (1)

Figure 1.2: Moderated Mediation through Perceived Tastiness

1.4.4. Discussion

Study 2A provided evidence that exposure to the proximal depiction of an indulgent (vs. non-indulgent) food can affect consumer response through perceived tastiness (H_2). The results of this study enabled us to generalize our findings to different food products and contexts. We repetitively demonstrate that the effect of proximity of depiction is specific to indulgent food, and not for non-indulgent food. Hence, in Study 2B and 3, we focus on indulgent food depictions and decipher the psychological mechanism driving the effect of proximal depictions – through mental simulation and perceived tastiness.

1.5. Study 2B: The Psychological Mechanism – A Serial Mediation

This study investigates the effect of proximal (vs. distant) depiction of indulgent foods on consumer responses and the proposed serial mediation mechanism of mental simulation and perceived tastiness (H_3). We consider two burger stimuli, either depicted proximally or distally, within an online food ordering context (like Study 2A). Specifically, we investigate whether indulgent foods, when proximally depicted, would increase the mental simulation, lead to higher perceived tastiness, and consequently heighten the consumer's purchase intention and expected enjoyment.

1.5.1. Sample, Design, and Procedure

Participants (N = 171 U.S. respondents recruited from the Prolific Academic platform, 50.9% female, M_{age} = 34.78) were randomly assigned to a 2x2 mixed-design experiment with the spatial distance of depiction (proximal vs. distant) as a between-subject factor and indulgent foods (i.e., two burger stimuli; refer Appendix A.3. for stimuli

pictures) as a within-subject factor. Each participant was asked to imagine the scenario of Taylor coming-across online advertisements of My Café and evaluating proximal (or distant; randomly presented) burger stimuli for ordering at home. Upon seeing each advertisement picture, the participants shared the likelihood of Taylor ordering the snack (2-items; *α's* for stimuli > .92, *r*'s > .89), his/ her expected enjoyment (2-items; *α's* for stimuli > .95, *r*'s > .94), and perceived tastiness (3-items; *α's* > .96, *r*'s > .90). We then asked the participants to share their perception of the amount, ease, and vividness with which Taylor would generate images of eating in the mind. Mental simulation was measured using a 12-point scale with three sub-scales: simulation amount [e.g., "as Taylor views this food picture, to what extent would the image of eating come to mind e.g., chewing it, tasting it?" rated from not at all (1) to great extent (7)], simulation ease [e.g., "how difficult or easy would Taylor create the images of eating in mind?" anchored from 1 (extremely difficult) to 7 (extremely easy)], and simulation vividness ["how would Taylor rate the images of eating the food on the following dimensions: not at all clear (1) - extremely clear (7); Larson et al., 2014]. These subscales were averaged to form a composite measure of mental simulation (*α*'s = .97, *r*'s > .76).

Participants then responded to the manipulation checks of spatial distance, bodily distance from the screen, and restrained eating scale (Herman et al., 1978). In addition, we asked participants to report their dietary restrictions, hours since the last eating, time of day, gender, and age using the same measures as Study 1 and 2A.

1.5.2. Results

The results of a repeated measures ANCOVA, adjusted for covariates, confirmed the manipulation of spatial distance of depiction ($M_{proximal}$ = 2.78, $M_{distant}$ = 4.12; $F_{(1, 162)}$ = 37.83, p < .01, *partial-*η^2 = .19). Gender had a marginally significant effect (p = .06) but its interaction with spatial distance was not significant (p = .96), and the effect remained significant without the covariates (p < .01).

We then conducted four separate repeated-measures analyses with purchase intention, expected enjoyment, mental simulation, and perceived tastiness as the dependent variables, spatial distance as the between-subjects factor, and the two burger stimuli assigned within-subjects. The analyses found a significant between-subjects effect on purchase intention ($F_{(1,160)}$ = 39.91, p < .01, η_p^2 = .20). Specifically, the participants perceived that Taylor was more likely to purchase/ order the burger stimuli when they are proximally depicted ($M_{proximal}$ = 4.75, $M_{distant}$ = 3.46). Likewise, the participants expected Taylor to evoke higher enjoyment ($F_{(1,160)}$ = 32.56, p < .01, η_p^2 = .17; p < .01), perceive higher tastiness ($F_{(1,160)}$ = 44.31, p < .01, η_p^2 = .22; p < .01) and mentally simulate the eating experience ($F_{(1,160)}$ = 33.29, p < .01, η_p^2 = .17; p < .01) for proximal (than distant) depiction of burger stimuli. The effect of spatial distance remained significant without the covariates (p's < .01) across the analyses. The findings of the four repeated measures ANCOVAs (indicating the average/ generalized effect and means across both stimuli) on the main variables are presented in figure 1.3.

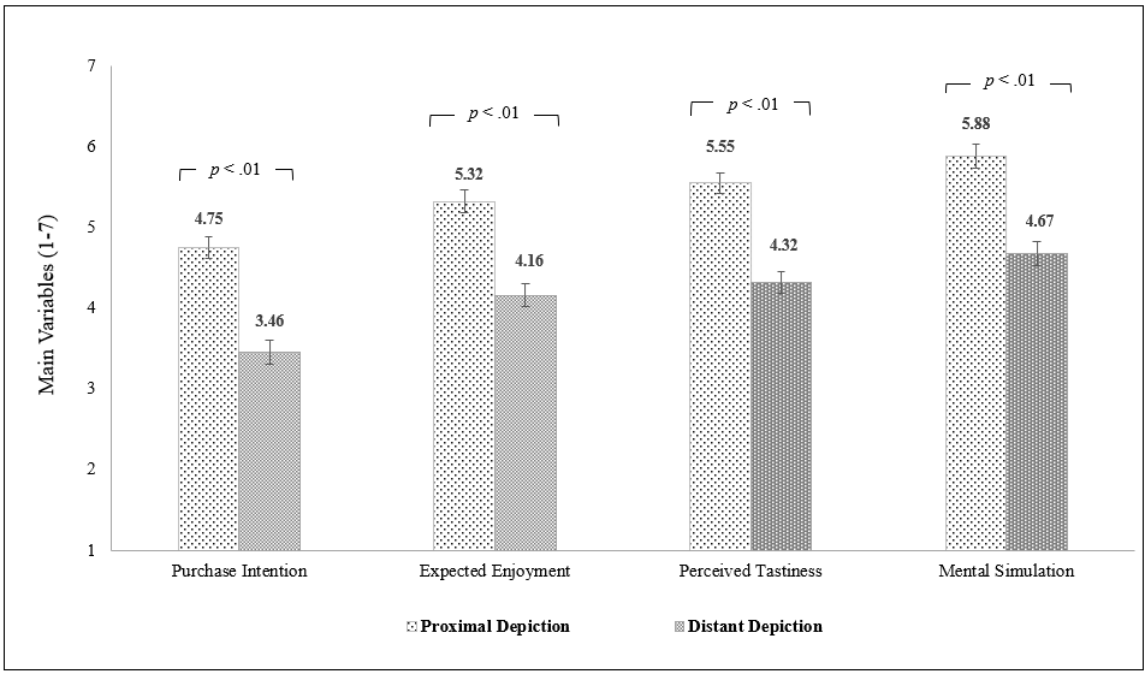


Figure 1.3: Effect on Main Variables

Furthermore, the effect of proximal depiction on purchase intention, expected enjoyment, perceived tastiness, and mental simulation held across both stimuli. Table 1.1 summarizes the results of separate analyses of variance demonstrating the effect for the two indulgent stimuli.

Main Variables	Indulgent Stimulus 1	Indulgent Stimulus 2
Purchase Intention	$M_{proximal}$ = 4.50, $M_{distant}$ = 3.09, p < .01	$M_{proximal}$ = 5.00, $M_{distant}$ = 3.83, p < .01
Expected Enjoyment	$M_{proximal}$ = 5.11, $M_{distant}$ = 3.46, p < .01	$M_{proximal}$ = 5.54, $M_{distant}$ = 4.67, p < .01
Perceived Tastiness	$M_{proximal}$ = 5.35, $M_{distant}$ = 3.76, p < .01	$M_{proximal}$ = 5.77, $M_{distant}$ = 4.87, p < .01
Mental Simulation	$M_{proximal}$ = 5.75, $M_{distant}$ = 4.26, p < .01	$M_{proximal}$ = 6.02, $M_{distant}$ = 5.08, p < .01

Table 1.1: Stimuli-level Differences for the Main Variables

A few points are worth noting in the analysis. First, we found that the proximal (vs. distant) depiction of indulgent foods leads to the mental simulation of the eating experience. Second, the participant's restrained eating (included as a control variable) did not significantly influence the dependent (i.e., purchase intention and expected enjoyment) and mediation variables (i.e., mental simulation and perceived tastiness). These findings imply that the proximal depiction of indulgent foods would lead participants to spontaneously simulate their past eating experiences and influence, both, restrained and unrestrained eaters.

1.5.3. Serial Mediation Analysis

We collapsed the data for the two stimuli as we observed similar effects across dependent and mediation variables (Table 1). Then, we conducted a serial mediation analysis for stimuli (Model 6; Hayes, 2013), with 5,000 bootstrapped samples using spatial distance as predictor variable (-1 = proximal, 1 = distant), mental simulation and perceived tastiness as serial mediators, and purchase intention and expected enjoyment as the dependent variables. The results showed that spatial distance had a significant direct effect on purchase intention [β = -.65, t = -6.37, p < .01, *95% CI* = (-.85, -.45)] and on mental simulation [β = -.61, t = -5.83, p < .01, *95% CI* = (-.81, -.40)]. Furthermore, mental simulation significantly influenced perceived tastiness [β = .60, t = 11.62, p < .01, *95% CI* = (.50, .70)] and tastiness predicted the purchase intentions [β = .71, t = 9.72, p < .01, *95% CI* = (.57, .85)]. The overall model [$F_{(1,159)}$ = 37.25, p < .01] and indirect effect, including the serial mediators, was significant [β = -.26, *SE* = .06, *95% CI* = (-.39, -.19)]. The indirect effect separately through mental simulation [β = -.11, t = .05, *95% CI* = (-.22,

-.02)] and through perceived tastiness [β = -.18, t = .06, *95% CI* = (-.31, -.07)] on purchase intention were also significant. Lastly, as predicted, the indirect effect of spatial distance on purchase intention became non-significant [β = -.09, t = -.07, p = .20, *95% CI* = (-.24, .05); figure 1.4] when the serial mediators were included.

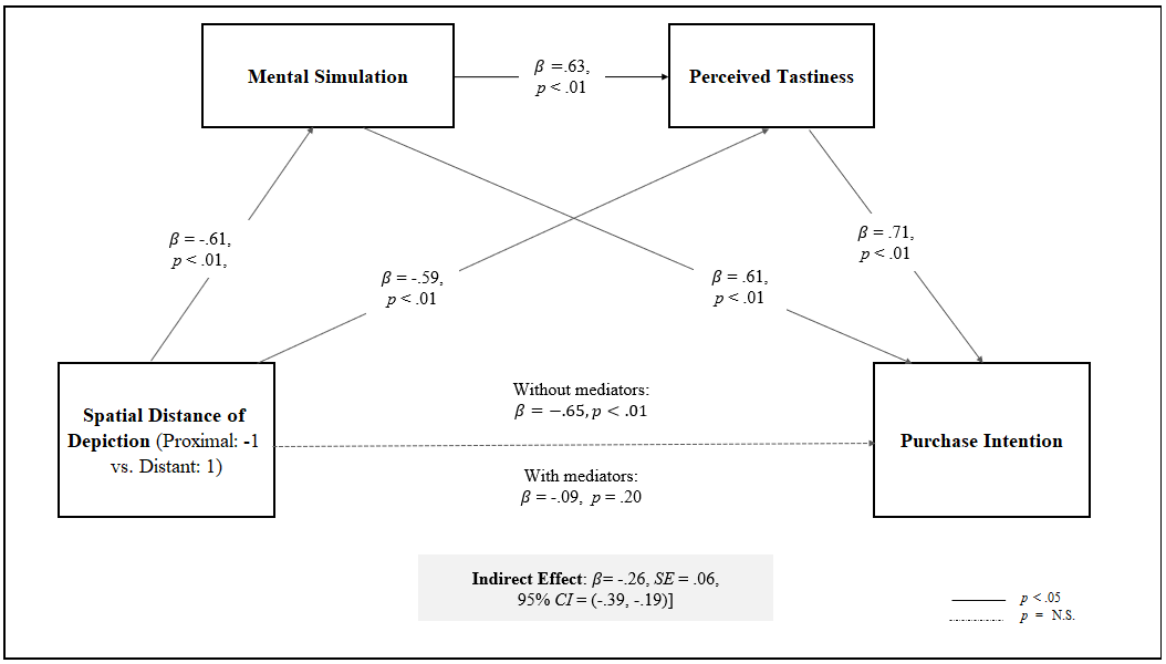


Figure 1.4: Serial Mediation on Purchase Intention

We next conducted a similar serial mediation analysis on expected enjoyment (using Model 6; Hayes, 2013), including all control variables. The findings showed a significant effect of spatial distance on expected enjoyment and [β = -59., t = -5.78, p < .01, *95% CI* = (-.79, -.39)] and mental simulation [β = -61., t = -5.83, p < .01, *95% CI* = (-.81, -.40)]. The effect of mental simulation on perceived tastiness, including spatial distance, was significant [β = .60, t = 11.62, p < .01, *95% CI* = (.49, .70)]. Likewise, perceived tastiness significantly affected the expected enjoyment [β = .92, t = 19.46, p < .01, *95% CI* = (.83,

1.02)]. The model, including the serial mediators and control variables, was significant [$F_{(1,159)}$ = 104.31, p < .01] as was the indirect effect [β = -.34, *SE* = .07, *95% CI* = (-.49, -.20)]. The mediation effects separately through mental simulation [β = -.04, *SE* = .02, *95% CI* = (-.08, -.005)] and perceived tastiness [β = -.16, *SE* = .05, *95% CI* = (-.26, -.06)] were significant. Most importantly, after including both mediators, the effect of spatial distance on expected enjoyment was non-significant [β = .05, t = 1.05, p = .29, *95% CI* = (-.04, .14)]. Figure 1.5 presents the serial mediation effect.

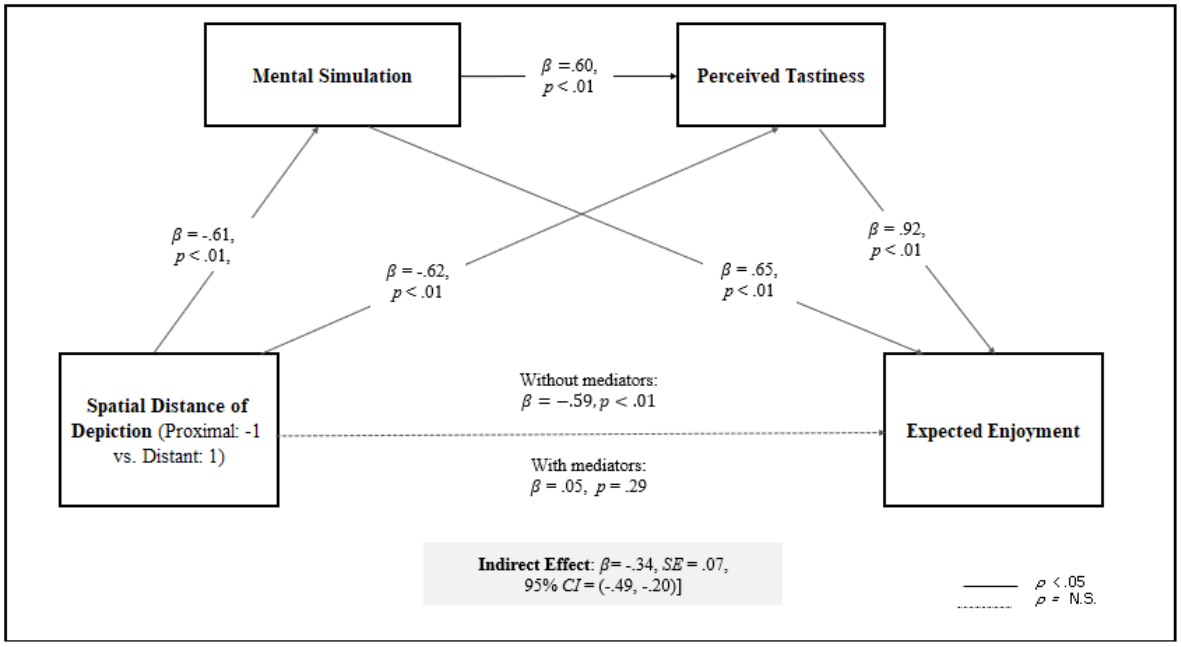


Figure 1.5: Serial Mediation on Expected Enjoyment

1.5.4. Discussion

Study 2B provided evidence on the effect of spatial distance of indulgent food depictions on consumer responses through the serial mediation of mental simulation and perceived tastiness (H_3). It is worth noting that mental simulation and perceived tastiness

were significantly correlated ($r > .74$). There is prior evidence to suggest that both taste perception and mental simulation share the same neural circuitry, which might spontaneously activate upon exposure to food stimuli (Si and Jiang, 2016). Our results also indicate that the proximal (than distant) depiction of indulgent foods concurrently produces simulations of the eating experience and sensory perceptions of tastiness.

In the next study, we consider the mechanism of mental simulation using a more deliberate, conscious, method (i.e., explicitly asking the participants to imagine chewing, swallowing, and consuming the depicted food). Furthermore, we consider the effect of multiple (not just single) depictions of similar indulgent foods on another consumer response i.e., satiation.

1.6. Study 3: Multiple Indulgent Food Depictions and Satiation

This study extends our prior findings to explore whether people might experience a difference in their satiation levels when they are exposed to multiple proximal (vs. distant) depictions of similar indulgent food (e.g., variety of different burgers, sharing a taste attribute/ characteristic, featured on an online menu of McDonald's, Burger King, Carl's Junior, etc.). We examine this effect because advertising and display formats tend to widely differ on the number of exposures that they allow to food pictures. Accordingly, in study 3, we consider the effect of both single and multiple proximal depictions of indulgent foods. In addition, this study examines the multi-faceted effect of proximal depictions using different stimuli and background contexts. Whereas the previous studies depicted the food product on a flat table (either placed proximal or distant), the stimuli in the current

study created a perception of depth without any background details. Lastly, Study 3 considers the influence of mood as an additional control variable.

1.6.1. Sample, Design, and Procedure

MTurk participants (N = 146; 52.05% female, M_{age} = 37.74) were assigned to the spatial distance condition in a between-subjects design. In the opening screen, participants were informed that they would view 20 different food advertisement pictures – each for 3 seconds. The first and last picture (hereinafter, target stimulus) was not timed and kept identical. In between the target stimulus (i.e., pictures shown on 1st and 20th exposure), the participants viewed 18 different products (hereinafter, referred to as "non-target stimuli") – comprising a variety of hamburgers and chicken burgers (refer to Appendix A.4. for stimuli). Before viewing each of the non-target stimuli, across conditions, participants read the instruction: "*imagine picking up the burger, putting it in your mouth, chewing, and swallowing it*". The uniform instruction of mental simulation aimed at consciously (rather than spontaneously; as in study 2B) re-enacting the eating experience. Prior research suggested that simulation of food consumption and, consequently, satiation may be elicited through either an explicit instruction (a cognitive mechanism) or an automatic, affect-driven, process (e.g., Larson et al., 2014). In this study, we manipulate mental simulation through explicit instruction.

Based on prior research, we contended that all participants would evince satiation (especially, after the uniform instruction to simulate) upon exposure to stimuli sharing a taste characteristic (e.g., Larson et al., 2014). However, the rate of satiation (or decline in expected enjoyment over several exposures) and decline in perceived tastiness is likely

to be significantly higher when people observe multiple-proximal (vs. multiple-distant) indulgent food. This is because multiple-proximal depictions when shown with an instruction to simulate eating, may increase the perceived tastiness of the indulgent food and thus, increase the rate of satiation.

To test the hypothesized effects, we measured the key dependent variable (i.e., expected enjoyment) and mediator (perceived tastiness) twice – once at the 1st exposure and then at the 20th exposure. The participants shared their expected enjoyment by responding to "how much would you enjoy eating each bite of this food product?" ranging from 1 (not at all enjoy) to 7 (very much enjoy) and "how much would you like to eat this food product?" rated from 1 (not eat at all) to 7 (eat all of it; Redden et al., 2012; α = .97, r = .95). We used the measures, as Study 2B, for perceived tastiness and the control variables (i.e., age, gender, BMI, hours since the last eating, time of day, dietary restrictions, the individual difference in dietary restraint, and bodily distance from the screen). In addition, we controlled for the participants' mood because spatial distance and product size have been, both, shown to evince emotional responses depending on the stimulus' valence (e.g., De Cesarei & Codispoti, 2006). The mood was measured using a four-item scale "at the moment, I am feeling…good, positive, pleasant, and likable (α = .79; adapted from Allen & Janiszewski, 1989) with ratings from 1 (slightly) to 7 (extremely).

1.6.2. Single Exposure to Proximal (vs. Distant) Indulgent Food Depictions

We conducted two separate ANCOVAs on expected enjoyment and perceived tastiness, elicited upon the first exposure to target stimulus to test whether we replicate our previous results. The analyses revealed that proximal depictions led to a higher

expected enjoyment ($M_{proximal}$ = 4.94 vs. $M_{distant}$ = 4.26; $F_{(1,136)}$ = 5.28, p = .02, *partial-*η^2 = .04), and perceived tastiness ($M_{proximal}$ = 5.27 vs. $M_{distant}$ = 4.51; $F_{(1,136)}$ = 8.50, p < .01, *partial-*η^2 = .06). The analyses remained significant without the covariates as well (all *p's* < .06). Thus, we replicated the results on the effect of a single exposure to proximal (vs. distant) depiction of indulgent foods.

1.6.3. Mediation of Perceived Tastiness upon Single Exposure

We subsequently conducted a mediation analysis using the PROCESS Model 4 (Hayes, 2013) with spatial distance (-1 = proximal and 1 = distant) as the predictor variable, perceived tastiness as mediator, and expected enjoyment as outcome variable. As expected, we found that an increase in spatial distance reduced the expected enjoyment of eating (β = -.33, *SE* = .15, t(136) = -2.24, p = .03). Furthermore, the effect of perceived tastiness on expected enjoyment was significant after controlling for the influence of spatial distance (β = .96, *SE* = .04, t(135) = 22.32, p < .01). Lastly, we found that the effect of spatial distance on expected enjoyment became non-significant after tastiness perception was included in the model (β = .03, *SE* = .08, t(135) = .33, p = .74). The 95% confidence interval for the indirect effect did not include zero (*95% CI* = [-.60, -.12], *SE* = .12*; Sobel Z* = -2.92, p < .01). These findings show that proximal depiction of indulgent foods affect consumer responses through perceived tastiness.

1.6.4. Multiple Exposures to Proximal (vs. Distant) Indulgent Food Depictions

Next, we conducted a repeated-measures ANCOVA with spatial distance as a between-subjects factor and decline in expected enjoyment (i.e., satiation) as a within-

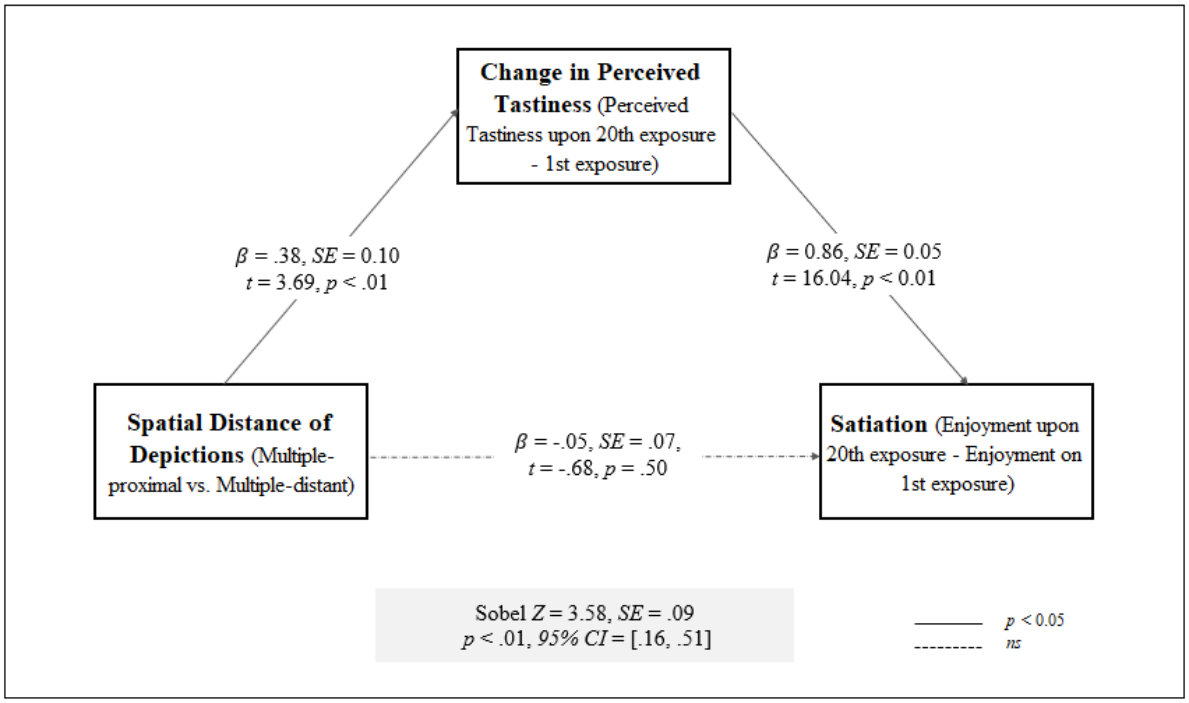
subjects factor with all covariates. This analysis revealed that participants who viewed multiple-proximal depictions experienced a significantly higher satiation ($M_{1st\ exposure}$ = 4.94 vs. $M_{20th\ exposure}$ = 4.01; $M_{20th\ -1st\ exposure}$ = -.93; *SE* = .20) compared to those viewing multiple-distant depictions ($M_{1st\ exposure}$ = 4.26 vs. $M_{20th\ exposure}$ = 3.90; $M_{20th\ -1st\ exposure}$ = -.36; *SE* = .20). The within-subjects effect of multiple-depictions on expected enjoyment was significant ($F_{(1,136)}$ = 6.90, p = .01, *partial-*η^2 = .05). Among the covariates, the effect of time of day and its interaction with expected enjoyment were significant (p < .01). This is consistent with prior research that time-of-day influences food-acceptability and, thus, satiation (Birch et al., 1984).

Finally, the repeated-measures ANCOVA with perceived tastiness as a within-subjects factor also yielded a significant effect ($F_{(1,137)}$ = 16.26, p < .01, *partial-*η^2 = .11). This analysis suggested that multiple-proximal depictions led to a more significant decline in perceived tastiness ($M_{1st\ exposure}$ = 5.27 vs. $M_{20th\ exposure}$ = 4.27; $M_{20th\ -}$ $M_{1st\ exposure}$ = -1.00; *SE* = .19) than distant depictions ($M_{1st\ exposure}$ = 4.51 vs. $M_{20th\ exposure}$ = 4.28; $M_{20th\ -}$ $M_{1st\ exposure}$ = -.23; *SE* = .18).

1.6.5. Mediation of Perceived Tastiness upon Multiple Exposures

This mediation analysis considered spatial distance as the predictor, decline in expected enjoyment ($M_{20th\ exposure} - M_{1st\ exposure}$) as the outcome variable, and decline in perceived tastiness ($M_{20th\ exposure} - M_{1st\ exposure}$) as the mediator. Using Model 4 of PROCESS Macro (Hayes, 2013), we found that: (a) multiple-proximal (coded: -1) depictions led to a higher decline in perceived tastiness than multiple-distant depictions (β = .38, *SE* = .10, t = 3.69, p < .01), (b) decline in perceived tastiness for multiple-proximal

(vs. distant) depictions led to decline in expected enjoyment (β = .86, *SE* = .05, *t* = 16.04, *p* < .01) and (c) effect of multiple-proximal (vs. distant) depictions on expected enjoyment became non-significant after considering the mediation of perceived tastiness (β = -.05, *SE* = .07, *t* = -.68, *p* = .50). Lastly, confirming full mediation, the indirect effect of multiple-proximal (vs. multiple-distant) depictions through perceived tastiness was significant (Sobel *Z* = 3.58, *p* < .01, *SE* = .09; *95% CI*: [0.16, 0.51]; figure 1.6; H_4).



Note: Proximal Depiction (-1); Distant Depiction (1)

Figure 1.6: Mediation Mechanism through Perceived Tastiness on Satiation

1.6.6. Discussion

This study replicated our earlier findings and, additionally, showed that multiple exposures to proximal (more than distant) depictions of indulgent foods led to a significant decline in consumer responses (H_4). However, we observed that satiation significantly

reduced (but not fully attenuated) the effect of proximal depictions of indulgent food products. Specifically, we found that on 20th exposure, the effect of proximity on expected enjoyment fades away. These findings reinforce the need for investigating the multi-faceted effects of proximal food depictions as the insights have relevance for both food advertising and over-consumption and obesity phenomenon.

1.7. General Discussion

In four studies, we demonstrate replicating evidence that the proximal (vs. distal) depiction of indulgent (vs. non-indulgent) food evinces higher consumer responses. Focusing on indulgent food products, we show that the effect of spatial distance on consumer responses is serially mediated by mental simulation and perceived tastiness. These results imply that marketers can subtly manipulate the distance of an indulgent product within an advertisement picture to influence different consumer responses. Our research reveals that the effect is more pronounced for a single exposure to an indulgent food depiction compared to multiple exposures to similar food pictures (e.g., an online menu showing several up-and-close depictions of burger items). For advertising and display formats that lead to multiple exposures to similar food pictures, proximal depictions may lead to a higher rate of satiation.

Taken together, these findings have a direct implication for the advertising business and, more importantly, for food over-consumption and obesity. Karnani et al. (2016) suggest that obesity represents a case of market failure, which could be corrected through multiple mechanisms – among others, government intervention (i.e., stricter regulations) and industry self-regulation (especially, regulating the advertising of indulgent food

products). In this context, our research suggests that food regulators could establish guidelines on the spatial distance of depiction for different food types - with indulgent foods distally depicted and non-indulgent products proximally depicted within an advertisement picture.

From a theoretical standpoint, we contribute to literature on visuospatial information processing by introducing a new pictorial format within the food consumption context. This research is the first, to our knowledge, to identify the conditions (i.e., stimulus type and the number of exposures) under which proximal depictions affect consumer responses. In studying these effects, we extend the prior research on visual processing of images and their effect on food consumption behavior (e.g., Elder & Krishna, 2012; Poor et al., 2013; Krishna & Elder, 2020). Additionally, we reveal that proximal depictions, especially of indulgent foods, are likely to generate more mental imagery of eating, tastiness perception, and finally consumer responses. This research demonstrates the role of, both, spontaneous imagery (e.g., Larson et al., 2014) and instructed simulation (e.g., Morewedge, Huh, & Vosgerau, 2010). The present research also provides evidence to suggest that multiple exposures to proximal (vs. distant) food pictures, which share a taste characteristic, could alter the level of satiation. We find that satiation levels depend not only on the food but also on spatial distance within an advertisement visual. This finding contributes to the limited literature on the influence of food advertising on satiation (Cornil, 2017).

Our work opens several paths for future research. First, an interesting avenue for follow-up research could be to explore the effects of the proximal (vs. distant) depiction of indulgent foods using different situational and consummatory contexts. Prior research

has shown that depicting food products (e.g., popcorn) in a congruent situational context (e.g., movie hall) can trigger holistic (vs. analytic) thinking and, subsequently, increase the craving and purchase intention. Likewise, consummatory pictures of indulgent foods (i.e., images depicting someone eating) have been shown to elicit higher taste perception than those of food alone (Poor et al., 2013). This is because such images might serve as social proof of indulgent consumption thereby reducing an individual's self-control conflict.

Second, it might be worthy to explore the behavioral responses in situations when either cognitive resources are depleted, or mindful attention is enhanced when observing proximal depiction of indulgent foods. Prior work has shown that pictures of indulgent products might automatically bias attention. This bias could be reduced by being more aware of one's experiences (i.e., training to adopt a mindful attention perspective; Papies, Pronk, Keesman, & Barsalou, 2015). Conversely, it has been shown that imposing cognitive load could evince a higher choice for indulgent foods (Shiv & Fedorikhin, 1999). While our research asked all participants to pay close attention to the stimuli, it would be worth examining the hypothesized effects when the attentional resources are either enhanced or limited.

Third, future work could explicate the effect of proximal depictions on sensory expectations other than taste – in particular, mouthfeel (i.e., oral touch of food in one's mouth; Topolinski & Turk-Pereira, 2012). Prior research has examined the effect of active oral touch (e.g., experiencing the hardness of food product) on mastication (i.e., level of chewing), oro-sensory perception (i.e., felt-fattiness), and downstream behavioral outcomes (Biswas, Szocs, Krishna, & Lehmann, 2014). As a touch, along with taste, requires spatial proximity to be perceived (Elder et al., 2017), it might be worth exploring

whether proximal depictions lead to the higher expected mouthfeel, thereby influencing people's calorie estimations and consumption outcomes.

Forth, our research demonstrates that the sensory mechanism of perceived tastiness drives the effect of proximal (vs. distant) depiction of indulgent and non-indulgent foods. Future research might investigate the effect on the behavioral intention by manipulating (1) spatial distance (proximal vs. distant), (2) visual cues affecting the expectations of tastiness (e.g., the color of food), and (3) rate of satiation (e.g., altering the health portrayal). Prior research suggests that people may form inferences on the tastiness of food products (e.g., orange juice) based on visual cues (e.g., light vs. dark color hues; Hoegg & Alba, 2007). Furthermore, merely portraying a food product as healthy (i.e., description of cookies as being high on fiber, proteins, and low on caloric content) may reduce the rate of satiation due to a "healthy = less filling" intuition (Suher et al., 2016). We expect that these processes, when manipulated, might interact with the spatial distance of depiction in affecting behavioral outcomes.

Fifth, our work focused on examining the effect of spatial proximity (vs. distance) of a featured food product within an advertisement and not the influence of an individual's distance from the depiction. It is worth noting that the latter, which alludes to the egocentric psychological distance, might either activate an abstract or concrete construal (Trope & Liberman, 2010). In line with prior research (e.g., Chae et al., 2013), we posit that spatial proximity (vs. distance) of object depiction differs from the egocentric psychological distance (i.e., the distance of an object from me, now, and here) and, thus, might not alter the construal level. Although we control for the bodily distance from the screen in Study 2 and 3, the egocentric psychological distance may interact with the non-

egocentric distance (i.e., the spatial distance of depiction within advertisement pictures) to affect the consumer responses. This could be a future avenue of research.

Lastly, further research could examine the simultaneous influence of verbal messaging and individual-level differences in consumption. Recent research suggests that whereas consumers with high self-control are likely to experience greater happiness when they can rationalize their indulgence (e.g., you deserve it!), those with low self-control feel more satisfied without such reason-based messaging (Petersen, Dretsch, & Loureiro, 2018). That is, consumers, varying on trait self-control, are likely to react differently depending on whether they can articulate a reason to indulge. Extending this work, an intriguing area of work could be to investigate the joint effect of proximal (vs. distant) pictures of indulgent foods, reason-based messaging, and trait individual differences.

We conclude this chapter with an earnest hope that our research empowers consumers to pay more mindful attention to proximal food depictions, sensitizes policymakers on identifying advertising pictures that facilitate over-consumption, and enables practitioners to design their advertisements to not severely undermine their consumers' self-control.

Chapter 2

Hand Movement Speed in Advertising Elicits Gender Stereotypes and Consumer Responses

Abstract

Merely observing the hand movement speed with an advertised product can affect consumer perception. Five studies show that hand movement speed when observed (e.g., watching or even reading the description of slow vs. fast hand interaction with a product) elicits distinct associations in the consumer's mind and affects their responses. We suggest that people implicitly associate speedy movements with a more masculine (than feminine) behavior and use hand movement speed as an input to form evaluations of a touched product. Additionally, we demonstrate that consumers elicit higher product preference when their associations from observed hand movement speed match their own social identity. Thus, female (than male) consumers would prefer an advertised product that is depicted with a gentle (instead of speedy) hand movement – as such observed movement makes, both, the product, and the action-performer be perceived as more feminine. We find support for these effects across different product and advertising contexts. Our findings provide novel evidence on the effect of observed and described hand movements as a signal of gender identity and have significant implications for advertising.

Hand Movement Speed in Advertising Elicits Gender Stereotypes and Consumer Responses

2.1. Introduction

Hand movements serve as one of our "*windows to the world*" – they help activate either innate or learned associations, facilitate the representation of an object's property in the memory, and influence our thought confidence (Lederman & Klatzky, 1987; Barsalou, 1999, 2008; Peck & Childers, 2008). In everyday life, we not only perform but also observe hand movements – for example, watching a delicate *floreo* (or "to flower") handwork in flamenco dance, gentle brushing of teeth in a toothpaste advertisement, or frantic movement of steering wheels in "*The Fast and The Furious*" action thriller. Through repeated observation of different hand movements, people might develop associations about the speed of a motoric act and the characteristics of an individual performing the movement. In the consumption context, consumers may utilize these associations to form judgments about a touched product. The question then is: "*how do observed hand movements, when varied on speed, influence the consumer responses?*"

This research has direct relevance for marketers as hand interaction with products is often depicted in advertisements (e.g., observing a protagonist applying L'Oreal face cream, washing hands with Palmolive liquid hand wash, or using a Philips vacuum cleaner). From a practical standpoint, it is critical to study whether the consumer perception varies when an advertised product is shown with a fast (instead of slow) hand movement. The findings from this paper provide insights to marketers utilizing any non-touch or remote mediums (e.g., print, and outdoor advertisements, email texts, social

media posts, display ads, etc.). In these non-touch contexts, consumers perceive the product attributes through descriptions and the product's visual representation rather than through physical touch. Our research suggests that advertisers and online marketers could simply alter the speed of the observed or described sensorimotor experience with a featured product to vary the consumer responses. Thus, advertising videos and textual descriptions portraying a slow (vs. fast) sensorimotor interaction with a product can influence consumer perceptions and behaviors across product categories. Our research also implies that marketers of strongly gendered products (e.g., perfumes, shoes, glasses; Van Tilburg, Lieven, Herrmann, & Townsend, 2015) should avoid pairing slow (vs. fast) motoric movements with a masculine (vs. feminine) product in their advertisements and online content. This is because an incongruent speed-gender identity pairing can reduce the impact of their targeted marketing efforts.

Prior research has shown that sensorimotor experiences (including hand movements) can affect attitudes by activating heuristics (e.g., Labroo & Nielsen, 2010), visual fluency (Streicher & Estes, 2016), positive affect, and engagement (Chung, Kramer, & Wong, 2018), emotional attachment (Hadi & Valenzuela, 2014), and feeling-based dispositions (Kwon & Adaval, 2017). This research stream, although rich in empirical evidence, has studied the effect of self-experienced hand movements and different touch interfaces. Furthermore, extant literature has examined the effect of direction (and not speed) of hand movements. Our paper addresses this conceptual void by showing that observed hand movements, when varied on speed, can affect consumer responses. We posit that observing a slow (vs. fast) hand movement can activate distinct gender-identity associations in the consumers' minds. These are learned associations

based on customers' recurrent experiences (Kwon & Adaval, 2017) and observations of others' hand movements. For example, in advertisements, consumers might observe a female protagonist performing a gentle hand interaction with a product and a male character doing a relatively speedier hand action. We propose that repeated exposure to such sensorimotor experiences can lead consumers to develop implicit associations of slow (vs. fast) hand movements with a more feminine (vs. masculine) identity. These learned associations might also shape product evaluations. We show that a match between the observed hand movement speed and the consumer's gender identity heightens product preferences. Specifically, female (vs. male) consumers evince higher preference upon observing a slow (vs. fast) hand interaction with a product - as such movement would activate feminine (vs. masculine) associations.

This research makes important theoretical contributions. First, we explore the novel effect of *speed* of *observed* hand movements on consumer perceptions and product preferences. Prior literature has focused on haptic perception through one's own hands (e.g., Peck & Johnson, 2011), and no empirical research, to our knowledge, has explored the effect of speed of bodily movements on consumer responses. Second, our research shows that people draw inferences about social identity not only through possessions (Berger & Heath, 2007) but also observed hand movements, thereby bridging the literature on social-identity maintenance and bodily movements. We notably demonstrate that hand movement speed may be used as a signal of gender identity. Lastly, we demonstrate how learned associations between speedy movement with *masculinity* and *femininity* (held across genders) affect product perception and advertising responses. These findings contribute to the literature on gender-consumption perceptions (e.g., Van

Tilburg et al., 2015; Pinna, 2020; Borau, Elgaaied-Gambier, & Barbarossa, 2021), social identity theory (Kleine, Kleine, & Kernan, 1993), and sensory marketing (e.g., Krishna, Elder & Caldara, 2010). We next present the literature review that leads to our hypotheses.

2.2. Conceptual Background

2.2.1. Effect of Hand Movements on Behavior

Prior research suggests that bodily states, movements, and sensations spontaneously activate past experiences and influence attitudes (Barsalou, 1999, 2008). Prior work has delved with personal and vividly simulated experiences and manipulated the direction of the motoric action (e.g., Cacioppo et al. 1993; Hadi & Valenzuela, 2014; Streicher & Estes, 2016; Kwon & Adaval, 2017). For example, Kwon and Adaval (2017) showed that the motoric act of moving one's hand against the flow (e.g., stroking a fur from right-to-left) increased the preference for normatively less preferred products. In one experiment, the authors contrasted personally experienced (vs. observed) hand movement and found null effects for the latter. Kwon and Adaval (2017) noted that observed hand movements differ from personal or vividly simulated experiences as they are less visceral and involve a shift in visual perspective. Specifically, observed experiences are likely to be driven by the activation of semantic concepts.

Extending this literature, our research shows that observed hand movements, when varied on speed, affect consumer evaluations. We posit that this effect is driven by activation of associations between *speedy movement* and *masculine (than feminine) behavior* and leads to certain inferences, which serve as an input to form perceptions of

a featured product. Next, we elaborate on why consumers form these associations upon observing a hand movement varying on speed.

2.2.2. Associations with the Speed of Movement

Extant research shows that people develop gender associations through social learning (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007). These associations get engrained as people are repetitively exposed to the behaviors representing different gender roles (e.g., what it is to be feminine or masculine?) through books, films, advertisements, and press coverage (Holt & Thompson, 2004). For example, traditional dance forms such as Kathakali (17th-century Indian art-form) and Flamenco (18th-century Spanish dance) portray femininity through subtle hand gestures and masculinity with vigorous movements (Ganapathi, 2011; Cabrera et al., 2006). Likewise, representations in films and theatres have occasionally shown men to engage in vigorous hand movements and women to depict graceful and softer actions (Azmi, Rashid, Rehman, & Basirah, 2016). In the advertising context, commercials of personal care and cleaning products often depict women engaging in slow hand movements – to convey the product's nurturance, gentleness, and care (i.e., stereotypical feminine characteristics; Rudman, Greenwald, & McGhee, 2001). Contrarily, advertisements depicting male protagonists frequently portray fast hand movements – to reflect forcefulness, power, and dominance (i.e., stereotypical masculine attributes). Thus, as consumers more frequently observe a male (vs. female) protagonist performing vigorous sensorimotor actions, they may relate *speedy movements* with *masculinity*. Relatedly, we expect people to associate *gentle or slow movements* with a more *feminine* identity. These associations may manifest in the

form of mental schemas of femininity (vs. masculinity) upon observing a slow (vs. fast) hand movement.

H_1: Observing a slow (vs. fast) hand movement will elicit feminine (vs. masculine) associations in the consumer's mind.

2.2.3. Speed of Observed Hand Movement as a Perceptual Input

The associations elicited from the speed of observed hand movement can help form attribute judgments of a touched product. Prior research suggests that consumers may form judgments based on their touch-related inferences. For example, Krishna and Morrin (2008) examined the influence of a flimsy (vs. firm) quality of a cup, a non-diagnostic haptic cue, on the evaluation of mineral water. They found that consumers, especially those with a low autotelic need for touch (NFT), tend to misattribute the quality of the cup to form judgments of the mineral water it contained. Another research showed that the tactile aspects of a surface (e.g., soft carpet vs. a hard vinyl-tile floor) can alter the consumer's sensation of comfort and thus evaluations of a target product (e.g., vase; Meyers-Levy, Zhu, & Jiang, 2010). Yet another study found that packaging texture (soft vs. hard) of snacks (e.g., potato chips) can influence the product's quality perception – with chips in difficult to open packaging perceived as tastier, and fresher (McDaniel & Baker, 1977).

Moreover, prior research has shown that sensorimotor experiences can activate associations and feelings and, subsequently, lead people to ascribe the activated concept to a target stimulus. For example, enacting certain hand gestures (e.g., upward extension of the thumb) while reading a story alters the liking for a target character (Chandler &

Schwarz, 2009). Tom and colleagues (1991) further demonstrate that head nodding up-and-down (vs. shaking side-to-side) while evaluating a target pen generates positive thoughts (e.g., agreement) and preference for the product. We infer from these studies that consumers utilize their associations from sensorimotor experiences as perceptual input to form product evaluations. Specifically, we expect that observing slow (vs. fast) hand movement would evoke feminine (vs. masculine) associations (H_1), which would be reflected in the perception of product attributes.

H_2: Observing a slow (vs. fast) hand movement will affect the perceived femininity (vs. masculinity) of a touched product.

2.2.4. Effect on Consumption Outcomes

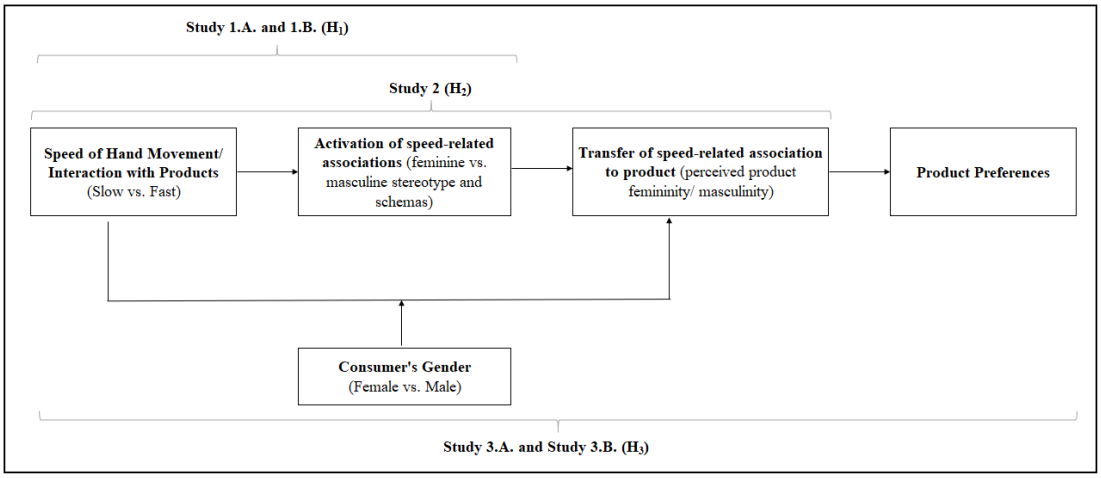
Consumers may utilize speed-related associations to signal identity and form product preferences. Building on the social identity theory, we propose that female (vs. male) consumers would evince a higher evaluation upon observing or reading a description of a slow (vs. fast) hand interaction with a product – as, in this case, the product is perceived more feminine (than masculine). The social identity theory suggests that individuals partly derive their self-concept from group membership and are motivated to signal their affiliation to a group (Kleine, Kleine, & Kernan, 1993), through their possessions and consumption behaviors (Berger & Heath, 2007). For example, Brough et al. (2016) demonstrate that consumers hold a green-feminine association, which explains the lower likelihood of males (than females) embracing eco-friendly products. Likewise, Gal and Wilkie (2010) show that consumers prefer product choices that are gender-congruent based on cues such as colors, shapes, and forms. Accordingly, we

expect females to evoke a more positive preference for products shown with a slow hand movement. Contrarily, male consumers would evince more positive responses for products depicted with a fast hand movement.

H_3: Perceived product gender will mediate the effect of slow (vs. fast) observed hand movement on product preferences.

We test these hypotheses across five experimental studies. In studies 1A and 1B, we examine whether people implicitly hold distinct speed-related associations and elicit mental schemas upon observing a slow (vs. fast) hand movement (H_1) across different countries. In study 2, we explore whether these associations with observed hand movement speed are used to shape the perception of product attributes (H_2) – in the context of a masculine product. Study 3A and 3B replicate the findings of Study 2 for a gender-neutral hand movement and show that a slow (vs. fast) hand interaction with a product can alter the perceived product gender (H_2) and product preferences (H_3). Across these studies, we use a mix of video and scenario-based stimuli. In the video-based stimuli, we paired the gender perception of different hand movements (i.e., feminine and masculine) with the hand portraying the movement (i.e., female and male). Such pairing was likely to conform with the participant's expectations and facilitate information processing (Krishna et al., 2010). Additionally, this pairing allowed us to show that participants elicit a more feminine (vs. masculine) schema upon observing different hand movement speeds – even for motoric actions that have a prior gender-role association in the consumer's mind. For gender-neutral hand movement, we used a scenario-based manipulation to demonstrate that the schematic associations are driven by the hand

movement speed – and not confounded by the gender of the person performing the action. The conceptual framework for the proposed effects is summarized in figure 2.1.



2.3. Study 1A: Associations with Speed of Movement

This study used the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) to explore the ease with which people pair characteristics of femininity and masculinity with attributes related to the speed of movement. We expected that people would take a lower response time in categorizing speedy movement with a more masculine (than feminine) behavior.

2.3.1. Sample, Design, and Procedure

Participants were recruited from the U.S. (N = 160 MTurk workers; M_{age} = 36.73; 45.28% female), Spain (N = 76 students; M_{age} = 23.29; 38.67% female), and India (N = 124 students; M_{age} = 22.43; 37.90% female) to complete the IAT procedure through IATGen platform (Carpenter et al., 2019). The IAT required participants to sort words between two binary pairs: (1) masculinity/femininity attributes; (2) words implying

fast/slow movement (refer Appendix B.1. for stimuli words). The attributes of femininity (vs. masculinity) were selected from prior research (Hoffman & Borders, 2001). The participants were then asked about their explicit belief on the association between the speed of movement and feminine/masculine attributes via two randomly presented questions: "*to what extent do you believe that slow hand movements (or hand actions) are associated with femininity?*" and "*to what extent do you believe that fast hand movements (or hand actions) are associated with masculinity*?" anchored on 1 (not at all) to 7 (to great extent). Finally, the participants reported their age and gender.

2.3.2. Results

The findings revealed a positive significant association for fast (vs. slow) movement with masculinity relative to femininity across the three samples (all $D_{score's}$ > .59.; refer, Table 2.1 for the findings). The speed-related association holds across the genders - implying that both men and women implicitly relate slow movements with feminine and fast movements with masculine identity (H_1).

Parameters	**United States**	**Spain**	**India**
D-Score Mean	.67	.60	.59
D-Score SD	.41	.27	.35
t-test	20.71	19.22	18.93
p-value	< .01	< .01	< .01
Degrees of Freedom	159	74	123
95% CI	(.61, .73)	(.53, .66)	(.53, .65)
Cohen's *d*	1.64	2.21	1.70
Reliability	.89	.75	.80
Difference by participant gender	D_{male} = .70 vs. D_{female} = .63; p = .23	D_{male} = .62 vs. D_{female} = .57; p = .43	D_{male} = .62 vs. D_{female} = .52; p = .09

Table 2.1: Results of IAT Studies

Furthermore, across samples, we found that the associations with the speed of movement reflect a more implicit than explicit attitude. Thus, participants did not explicitly allude to "fast movement = masculine" (*p's* > .22) and "slow movement = feminine" association (*p's* > .10).

The results of study 1A suggested that both men and women associate speedy movements with a more masculine (than feminine) behavior. Interestingly, the implicit association does not translate to explicitly acknowledged attitude – that is, people revise their responses when overtly asked.

2.4. Study 1B: Schemas Triggered by Speed of Observed Hand Movements

This study examined whether observing a slow (vs. fast) motoric action manifests in the feminine (vs. masculine) mental schemas. We tested the effect across three feminine hand movement contexts (i.e., ironing, vacuuming, and spray-cleaning; selected through a pre-test[1]), in which a female hand was observed performing either a slow (or fast) hand movement (refer to Appendix B.2. for snapshots). We proposed that observing a slow (vs. fast) hand movement would activate a more feminine (than masculine) schema due to associations with the speed of motoric act – even when such hand movements have a distinct feminine gender association.

2.4.1. Sample, Design, and Procedure

Mturk participants (N = 259; 41.70% female; M_{age} = 35.58) were randomly assigned to a 2x3 mixed-design experiment, with speed (slow vs. fast) as the between-subject and

[1] We conducted a pre-test of 25 hand movements (N = 72) to test their gender-role associations (1 = very feminine, 4 = neither feminine nor masculine, and 7 = very masculine). The results of one-sample t-test found that ironing (M = 3.37, SD = 1.19; p <.01), vacuuming (M = 3.52 , SD = 1.19; p < .01) and scrubbing and cleaning (M = 3.33, SD = 1.10; p < .01) are perceived as feminine actions.

hand movement contexts as the within-subject factor. Each participant evaluated three videos (12 secs.) depicting either a slow (1x) or fast (4x) hand movement and shared their associations for the action performer "*how much do you think the person ironing/ vacuuming/ spray-cleaning has the following personal traits?*" on a scale ranging from 1 (not at all) to 7 (very much). They provided ratings on 6 randomly ordered traits – feminine (i.e., gentle, nurturing, and caring) and masculine (i.e., dominant, aggressive, and forceful). These traits are shown in prior research (Hoffman & Borders, 2001; Holt & Thompson, 2004; Brough et al., 2016) to highly correlate with feminine (vs. masculine) identity. We included traits that did not explicitly refer to gender identities (Bem, 1981) as such overt reference could trigger self-presentation considerations (Rudman, Greenwald, & McGhee, 2001) and, potentially, make participants revise their responses (Study 1A).

As a manipulation check, we measured the participant's perception of speed by asking "*how would you rate the speed depicted in the video?*" anchored by 1 (very slow) and 7 (very fast). Additionally, the participants rated the stimuli on characteristics of video quality such as light intensity ("*how would you rate the intensity of light in this video?*"), picture sharpness ("*how sharp is the picture quality of this video?*"), and smoothness of motion ("*how smooth is the motion of the video?*") rated from 1 (not at all) to 7 (very much). We included video quality as a control variable as it can affect the trustworthiness of an advertisement (Hautz, Füller, Hutter, & Thürridl, 2014). Finally, the participants reported their age and gender, both of which were included as control variables.

2.4.2. Manipulation Checks

Consistent with our experimental manipulation, participants perceived the stimuli to vary on speed for the hand movements i.e., ironing (M_{slow} = 4.28, M_{fast} = 5.20, $F_{(1,254)}$ = 45.42, p < .01, η_p^2 = .15), vacuuming (M_{slow} = 4.14, M_{fast} = 5.32, $F_{(1,254)}$ = 67.76, p < .01, η_p^2 = .21), and spray-cleaning (M_{slow} = 3.39, M_{fast} = 5.38, $F_{(1,254)}$ = 135.30, p < .01, η_p^2 = .35). The participants perceived the slow (vs. fast) conditions to be similar on light intensity (p's > .40) and picture sharpness (p's > .45) but not motion smoothness (p's < .01). Therefore, in the following studies, we included video-quality as an additional covariate and reported all results with and without the control variables.

2.4.3. Results: Main Study

To investigate our prediction that observing a slow (vs. fast) hand movement would elicit distinct schematic associations, we developed a femininity-index (α's > .87) and masculinity index (α's > .90) by averaging the ratings on the feminine and masculine traits (Brough et al., 2016). Additional factor analysis supported our argument that the tested traits captured the schematic associations of femininity and masculinity.

We conducted a repeated-measures ANCOVA with speed (slow vs. fast) as the between-subjects factor, observed hand movement context (ironing, vacuuming, and spray-cleaning) as within-subjects factor, and feminine schematic associations as the continuous measured factor. The analysis on femininity-index found a significant between-subject effect of speed ($F_{(1, 252)}$ = 15.48, p < .01, η_p^2 = .06) - with slow (vs. fast) hand movement triggering a more feminine schema (M_{slow} = 4.91 vs. M_{fast} = 4.35). This effect indicated the average (or generalized) influence of hand movement speed across

the tested contexts. Additionally, the analysis revealed a significant speed x observed hand movement context within-subjects effect ($F_{(1, 252)}$ = 7.07, p < .01, η_p^2 = .03), which suggested that participants evoked a higher feminine schema upon observing a slow (vs. fast) hand movement in each context. Specifically, we found that a slow hand movement activated a higher feminine schema for the ironing (M_{slow} = 4.94, M_{fast} = 4.67; p = .06), vacuuming (M_{slow} = 4.84, M_{fast} = 4.03; p < .01), and spray-cleaning actions (M_{slow} = 4.96, M_{fast} = 4.32; p < .01). Gender was not a significant between-subjects covariate (p = .56), implying that similar schematic associations were evoked by both female and male participants. Video-quality had a significant between-subjects effect for two contexts (*p's* < .05) but its interaction with observed speed was not significant (p > .60). The effect of speed of observed hand movement remained significant without the control variables (p < .01).

We conducted another repeated-measures ANCOVA to test the relationship between hand movement speed and masculine schema and found a significant between-subjects effect of speed (M_{slow} = 3.30 vs. M_{fast} = 4.06; $F_{(1, 252)}$ = 18.87, p < .01, η_p^2 = .07) and a significant effect of speed and hand movement contexts interaction ($F_{(1, 252)}$ = 12.77, p < .01, η_p^2 = .05). Specifically, observing fast speed elicited a higher masculine association for each hand movement i.e., ironing (M_{slow} = 3.25, M_{fast} = 3.62; p = .01), vacuuming (M_{slow} = 3.45, M_{fast} = 4.46; p < .01) and spray-cleaning (M_{slow} = 3.20, M_{fast} = 4.09; p < .01). Gender was not a significant covariate (p = .11). Though characteristics of video-quality for one of the three hand movement contexts (i.e., cleaning) was significant (p < .01), this factor did not interact with speed (p = .42) and the model remained significant without the control variables (p < .01).

Together, the findings of studies 1A (IAT) and 1B (mental schemas) provide evidence that people associate speedy movements with more masculine behavior and slow movements with more feminine behavior (H_1). These studies also suggest that consumers across genders exhibit a similar pattern of speed-related associations.

2.5. Study 2: Using Speed of Observed Hand Movement to form Product Perceptions

This study examined whether the schematic associations, elicited upon observing a slow (vs. fast) hand movement, affect the consumers' product inferences (H_2). Our research proposes that speed-related associations from an observed sensorimotor experience may be used to form inferences of a product, thereby shaping the preferences of consumers.

2.5.1. Sample, Design, and Procedure

Mturk participants (N = 254, 50.0% female, M_{age} = 36.58) were assigned to one of the two between-subject conditions (i.e., slow vs. fast-hand movement). The scenario read that Stripes Corporation, a manufacturer of personal care and grooming products, was launching a range of male shaving foam products in the U.S. The participants were informed that they would watch a promotional video of Stripes Shaving Foam. The stimulus video (15 seconds) depicted a male protagonist applying shaving foam (refer to Appendix B.3. for stimuli snapshot) either at slow or fast speed. Immediately after watching this video, participants were asked to choose the shaving foam they believed the protagonist was using (i.e., "Ultra-sensitive" or "Bold;" pre-tested and chosen among

five options as “low masculinity” and “high masculinity” products respectively; refer Appendix B.3.).

Thereafter, participants rated the attributes they ascribed to the individual applying the shaving foam i.e., randomly presented masculine (α = .87) and feminine traits (α = .90), their perception of hand movement speed (manipulation check), and video-quality attributes (α = .69). We used the same measures as study 1B to gauge the schematic associations and video quality. In addition, we tested whether the speed of observed hand movement altered the participants’ self-reported task involvement and attention. To measure this construct, we asked participants “*how involved were you in completing this questionnaire task?*” rated from 1 (not at all involved) to 7 (very involved) and “*how attentive were you to the task?*” anchored from 1 (paid a little attention) to 7 (paid a lot of attention; α = .81; Hung & Labroo, 2011). Finally, participants reported their age, gender, and handedness (“*which of your two hands do you most often use for holding objects?*;” binary choice measure of left-hand and right-hand). Handedness was included as an additional control variable because observing a hand action oriented towards the participant’s dominant hand may trigger mental simulation and make the experience more fluent (e.g., Elder & Krishna, 2011).

2.5.2. Manipulation Checks

An ANCOVA showed that participants perceived the stimulus depicting a slow (vs. fast) hand movement (i.e., action of applying the shaving foam) to be slower (M_{slow} = 3.52, M_{fast} = 4.74; $F_{(1,248)}$ = 54.80, p < .01, η_p^2 = .18). Age and gender were significant covariates but did not interact with the predictor variable (i.e., speed of observed hand movement; p

> .15). Additionally, the speed conditions did not vary on characteristics of video-quality (p = .97), task involvement (p = .64) and handedness (p = .26).

2.5.3. Main Study: Results

We conducted a logistic regression to test whether slow (vs. fast) hand movement influenced the participants' choice about which shaving foam (low vs. high masculine) they thought the protagonist used. The main effect of speed was significant (Wald χ^2 = 3.75, p = .05; H_2) with no significant covariates (p > .35). Gender did not have a significant effect (p = .86). This analysis showed that participants' choices matched with the associations evoked by the speed of observed hand movement. Specifically, participants expected the protagonist to be using the more masculine product (i.e., Stripes Shaving Form Bold) upon observing a fast (vs. slow) hand movement (P_{slow} = 48.80% vs. P_{fast} = 60.60%; χ^2 = 3.58, p = .059; figure 2.2).

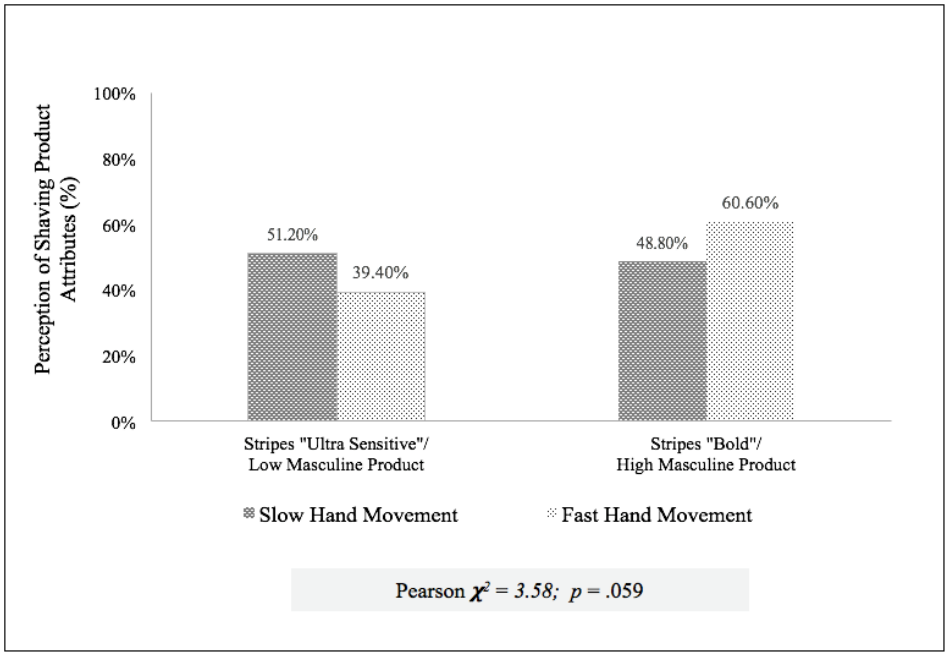


Figure 2.2: Effect of Hand Movement Speed on Product Perception

Next, we conducted a MANCOVA on the schematic associations [femininity and masculinity indices] for the male protagonist. The analysis showed that slow (vs. fast) observed speed activated a significant feminine schematic association (M_{slow} = 4.53, M_{fast} = 3.79; $F_{(1,248)}$ = 15.85, p < .01, η_p^2 = .06) but did not alter the masculine associations (M_{slow} = 3.59, M_{fast} = 3.54; $F_{(1,248)}$ = .07, p = .79, η_p^2 < .01) for the individual applying the shaving foam. Gender and video quality had a significant effect (p < .01) but did not interact with speed to influence the schematic associations. Our findings suggest that the speed conditions did not vary on the masculine schema but significantly differed on the feminine schematic associations. This may be because face-shaving is a distinctly masculine activity and, thus, there might have been a ceiling effect on the masculine schematic associations across the speed conditions. Second, this analysis shows that slow (vs. fast) speed activated similar schematic associations for the protagonist across genders. Finally, consistent with the notion of gender androgyny (Bem, 1981) and our findings, we infer that a combination of feminine and masculine schematic associations (and not stand-alone gender schemas) might affect the consumer inferences. We examine this proposition through mediation analysis.

We ran a mediation analysis using PROCESS Macro Model 4 (Hayes, 2012) with observed speed (coded slow: -1 and fast: 1) as the predictor, schematic associations (feminine and masculine indices) as parallel mediators, product-choice (low vs. high masculinity foam) as a binary-outcome variable and gender, age, handedness, and video quality as the covariates. The mediation analysis found that fast speed led to a decline in feminine associations (β = -.37, SE = .09, p < .01) but did not alter the masculine associations (β = -.03, SE =.09, p = .79). Furthermore, the schematic associations

significantly influenced the choice of shaving foam (feminine: β = -.53, *SE* = .11, $p < .01$ and masculine: β = .30, *SE* = .10, $p < .01$). The direct path from slow (vs. fast) hand movement to product-choice became non-significant after including the mediators (β = .10, *SE* = .14, p = .47). The relative indirect effect of speed on product choice was significant only through the feminine schematic associations (indirect effect = .20, *95% CI*: [.08, .35]) and not the masculine associations (indirect effect = -.01, *95% CI*: [-.08, .05]).

This mediation analysis alludes to the co-occurrence of schematic associations, which may serve as an input to form evaluations of a product (H_2). Specifically, we found that slow (vs. fast) shaving movement heightened the feminine schematic associations and, thus, led to the choice of a low masculine product. On the contrary, a fast-shaving hand movement led participants to select the more masculine product. These findings imply that consumers use their inferences from the observed hand movement speed to form perceptions of an advertised product. Next, we test the robustness of the effect and its consumption implications (H_3) for a gender-neutral hand movement and a scenario-based (instead of video) manipulation. These changes enable us to address the potential concern that the portrayed hand had a confounding effect on the product perceptions.

2.6. Study 3A: Speed of Gender-Neutral Hand Movement on Action Performer and Product Inferences

This study provides evidence on the effect of speed of observed hand movement on inferences about the action performer and the advertised product (H_2) – in the context

of a gender-neutral sensorimotor experience (i.e., handwashing; pre-tested among 25 daily hand movements).

2.6.1. Sample, Design, and Procedure

Participants (N = 200, 43.0% female, M_{age} = 34.91), recruited from the Prolific Academic platform, were randomly assigned to either slow or fast hand movement between-subject conditions. The participants read a vividly described advertisement, in which they imagined watching the commercial of Stripes liquid hand soap. The scenario detailed the sensorimotor actions of a protagonist slowly (briskly) picking up the hand soap, steadily (quickly) squeezing its nozzle, gradually (speedily) rubbing the foam on both sides of the hands, and washing the hands in a slow-paced (fast-paced) way. The words reflecting the speed of movement were the same as tested in the IAT (Study 1A). Upon reading this description, the participants were asked to choose the liquid hand soap they believed the protagonist was used in the advertisement (i.e., “Delicate” or “Bold”; tested as feminine and masculine products respectively; refer to Appendix B.4. for stimuli). We used a scenario-based manipulation to avoid priming the participants on the gender of the action-performer and hand movement. Furthermore, the product façade was of green color to prevent any gender-based associations (Semin & Palma, 2014). Then, the participants were asked to rate the attributes that they believe best described the protagonist in the advertisement. We used the same attributes as earlier studies to measure the feminine (α = .94) and masculine (α = .93) traits and, in addition, tested three gender-neutral attributes (i.e., curious, adaptable, and truthful; α = .78; Hoffman & Borders, 2001) for the action performer. The participants shared their task involvement α

= .80), age, gender, and handedness using the measures used in Study 2. Lastly, as a manipulation check, the participants rated how feminine or masculine they found the two liquid hand soaps on a scale from 1 (very feminine) to 7 (very masculine).

2.6.2. Manipulation Checks

The results of a one-sample *t*-test found that participants perceived the Stripes Delicate hand soap to be a feminine product [$M_{Delicate}$ = 2.91; $t_{(199)}$ = -11.15, p < .01, 95% *CI* = (-1.28, -.89)] and Stripes Bold soap a masculine product [M_{Bold} = 5.28; $t_{(199)}$ = 16.21, p < .01, 95% *CI* = (1.31, 1.44)]. Furthermore, the between-subjects manipulation of speed of observed hand movement was successful (M_{slow} = 2.06, M_{fast} = 6.19; $F_{(1,194)}$ = 774.12, p < .01, η_p^2 = .80) with no significant covariates.

2.6.3. Main Study: Results

A binary logistics regression revealed a significant main effect of hand movement speed on perception of a feminine (vs. masculine) product [Wald χ^2 = 72.28, p < .01, 95% CI = (3.58, 7.70)]. None of the covariates were significant (p's > 0.5) – indicating that the effect did not vary by the participant gender, age, and handedness. The analyses confirmed that participants perceived the protagonist as using the masculine hand soap (i.e., Stripes Bold Liquid Hand Soap) when the scenario described a fast (vs. slow) hand movement (P_{slow} = 16.20% vs. P_{fast} = 83.80%; p < .01).

We then conducted a MANCOVA on the schematic associations (feminine, masculine, and gender-neutral) for the protagonist. The results showed that the advertisement describing the slow hand movement triggered a significant feminine

schema (M_{slow} = 5.25, M_{fast} = 2.90; $F_{(1,194)}$ = 165.22, p < .01, η_p^2 = .46), and fast hand movement a significant masculine schema (M_{slow} = 1.97, M_{fast} = 5.11; $F_{(1,194)}$ = 347.66, p < .01, η_p^2 = .64) but did not vary on the gender-neutral attributes (M_{slow} = 3.71, M_{fast} = 3.48; $F_{(1,194)}$ = 1.62, p = .21, η_p^2 < .01). None of the covariates were significant (p's > .20).

Finally, we ran a mediation analysis using Model 4 of PROCESS Macro (Hayes, 2012) with hand movement speed (slow vs. fast) as the predictor, schema-based associations (feminine, masculine, and gender-neutral) as parallel mediators, product-type (feminine: Stripes Delicate vs. masculine: Stripes Bold) as the dichotomous outcome and including all covariates. The analyses found that fast hand movement speed led a significant decline in feminine schematic associations (β = -2.36, SE = .19, p < .01), increase in masculine schematic associations (β = 3.13, SE = .19, p < .01) and no alteration on gender-neutral associations (β = -.23, SE = .19, p = .22). Furthermore, only the feminine (β = -.93, SE = .25, p < .01) and masculine (β = .54, SE = .18, p < .01) associations affected the choice of liquid hand soap. The gender-neutral associations did not influence the product-choice (p = .14). After including these parallel mediators, the direct path of hand movement speed to feminine (vs. masculine) soap choice became non-significant (β = .59, SE = .60, p = .32). The relative indirect effect of hand movement speed on product-choice was significant for feminine associations (effect = -.43, *95% CI*: [-.83, -.17]) and masculine associations (effect = .35, *95% CI*: [.08, .65]) but not for gender-neutral associations (effect = .001, *95% CI*: [-.003, .03]).

The mediation analyses provide evidence on the effect of schematic associations (both, feminine and masculine) from the speed of hand movement on the perception of a gender-neutral product (H_2).

2.7. Study 3B: Hand Movement Speed, Product Gender, and Preferences

This study shows that slow (vs. fast) hand interaction with a product shapes the perceived product gender and, subsequently, product preferences. We test this proposition using the Directed Describing procedure (Warren & Campbell, 2021), in which the participants develop a persona based on their perceptions of gender identity. Subsequently, they share opinions on the product preference of the persona. This indirect technique is useful in our context – as participants do not acknowledge their stereotypical association between speed of movement (slow vs. fast) and gender-role perceptions (femininity vs. masculinity; Study 1A). We propose that participants who develop the persona of a feminine female (vs. masculine male) would have a significantly higher preference for a product that is advertised with a slow (vs. fast) hand movement (H_3). The effect is driven by the perceived product gender – as slow hand interaction with a product would be perceived more feminine (than masculine; H_2).

2.7.1. Sample, Design, and Procedure

Participants (N = 213, 45.5% female, M_{age} = 34.89) were recruited from the Prolific Academic platform. They were randomly assigned to 2(hand movement speed: slow vs. fast) x 2(gender-identity: feminine female vs. masculine male) between-subject conditions. Depending upon the assigned condition, participants were asked to choose the name of a masculine male (or feminine female). The chosen name (e.g., Emma/ Brandon) was piped into the following questions: “identify three personal attributes or characteristics that best describe Emma/ Brandon” and “which activity does Emma/ Brandon most enjoy.” Then, all participants were asked to imagine that the masculine

male (vs. feminine female) is watching a prime-time TV advertisement of Stripes Liquid Hand Soap (with accompanying product picture without gender-based branding; refer to Appendix B.4.). They read the description of a hand soap commercial depicting either a slow or fast hand movement (like Study 3A). Subsequently, the participants completed two measures of the perceived product preference for the persona: “how likely would Emma/ Brandon buy/ try the Stripes Liquid Hand Soap?” 1 = definitely wouldn’t buy/try it, 7 = definitely would buy/try it; adapted from Brough et. al., 2016). The participants were next asked about their perceived gender for the liquid hand soap (1 = very feminine soap and 7 = very masculine soap). This scale was reverse coded for the feminine condition so that a higher score reflected a higher perception of product femininity. Then, as an additional manipulation check, the participants indicated their perception of the person performing the hand movement - between the dichotomous choice of female (coded: 1) and male (coded: -1). Finally, the participants responded to the manipulation check on speed and reported their gender, age, and handedness using the measures of earlier studies.

2.7.2. Manipulation Checks

The ANCOVA, adjusted for covariates, confirmed our manipulation of hand movement speed (M_{slow} = 2.35, M_{fast} = 5.95; $F_{(1,195)}$ = 363.58, p < .01, η_p^2 = .65). None of the covariates were significant. We then conducted a binary logistic regression for the participants assigned to slow and hand movement conditions. The model found a significant main effect on perceived gender of hand performing the motoric action [Wald χ^2 = 25.19, p < .01, 95% CI = (.34, ,62)]. Specifically, participants perceived the hand

movement to be that of a male upon reading an advertisement describing a fast product interaction (P_{slow} = 25.2% vs. P_{fast} = 74.8%) and female for the description of a slow interaction (P_{slow} = 64.3% vs. P_{fast} = 35.7%). The analyses provided support to our conceptualization (H_1).

2.7.3. Main Study: Results

The analysis of co-variance on product preference for the assigned persona (feminine female vs. masculine male) found a non-significant main effect of hand movement speed ($F_{(1,206)} < .01$, $p = .98$) and gender-identity ($F_{(1,206)} = .14$, $p = .71$) but a significant interaction effect ($F_{(1,206)} = 12.41$, $p < .01$, $\eta_p^2 = .06$). Participant gender was a significant covariate but its two-way (p's > .13) and three-way interactions ($p = .44$) with the predictors were not significant. The interaction effect remained significant without the control variables ($p < .01$). Pairwise comparisons showed that participants perceived the masculine male (vs. feminine female) persona to prefer the liquid hand soap described with the fast hand movement ($M_{feminine\ female\text{-}slow} = 4.21$, $M_{feminine\ female\text{-}fast} = 3.49$, $p = .02$; $M_{masculine\ male\text{-}slow} = 3.65$, $M_{masculine\ male\text{-}fast} = 4.38$, $p < .01$).

We then conducted another ANCOVA on perceived product gender. This analysis found a non-significant main effect of hand movement speed ($F_{(1,206)} < .01$, $p = .96$) but a significant main effect of gender-identity ($F_{(1,206)} = 12.13$, $p < .01$) and their interaction ($F_{(1,206)} = 29.90$, $p < .01$). None of the covariates were significant (p's > .35) and the interaction effect remained significant without the covariates ($p < .01$). As hypothesized, the participants perceived the liquid hand soap described with the slow hand movement to be more feminine ($M_{slow} = 4.10$, $M_{fast} = 3.06$, $p < .01$) and with a fast hand movement

to be more masculine (M_{slow} = 3.78, M_{fast} = 4.79, p < .01). The analyses provided evidence that hand movement speed can alter the perceived product gender (H_2) and, consequently, product preferences (H_3).

Finally, we conducted a moderated mediation analysis (PROCESS Macro, Model 8, Hayes, 2012) on product preference with 95% confidence interval and 5,000 bootstrapped samples. The model had perceived product gender as mediator, the target gender (masculine male: -1 vs. feminine female: 1) as moderator, and all control variables. The analyses found a significant interaction effect of speed and gender identity on perceived product gender (β = -.52, SE = .10, $t_{(6,213)}$ = -5.47, p < .01). After controlling for the main effect of hand movement speed, gender identity, and their interaction, the mediator (i.e., perceived product gender) significantly influences the product preference (β = .64, SE = .06, $t_{(7,213)}$ = 10.87, p < .01). Most importantly, after including the mediator of product-gender, the interaction effect of hand movement speed and gender identity was non-significant (β = -.02, SE = .09, $t_{(7,205)}$ = -.25, p = .80). The index of moderated mediation excluded zero (β: -.34, 95% CIs = -.50 to -.21; SE = .07; figure 2.3), thereby confirming that the proposed mediation of perceived product gender on product preferences is moderated by gender-identity.

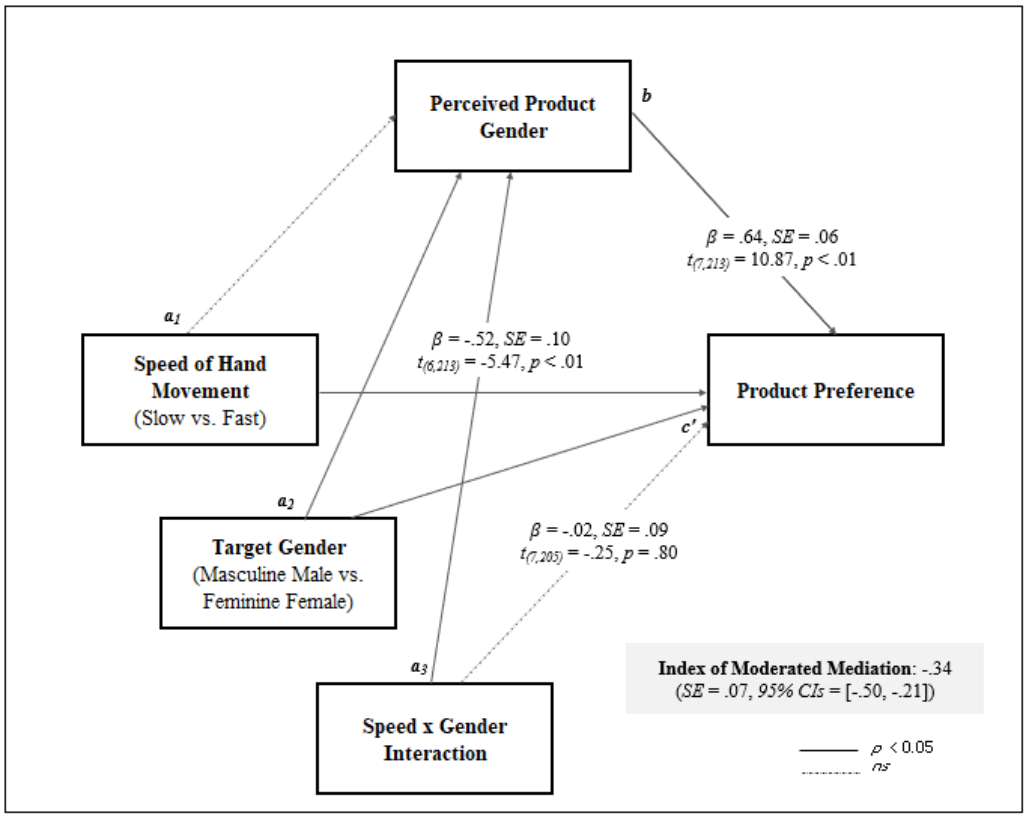


Figure 2.3: Moderated Mediation of Perceived Product Gender on Preferences

The findings of this study provide robust evidence that hand movement speed can affect product preferences – such that a masculine male (versus feminine female) would prefer products depicted with a speedy hand movement.

2.8. General Discussion

In five studies, this research provides replicating evidence on the effect of observed or vividly described hand movement speed on consumer responses. We demonstrate that consumers, across different product and country contexts, are likely to elicit a stereotypical feminine (vs. masculine) association for slow (vs. fast) hand movement. Further, this association influences their perceptions of the action-performer, the

perceived gender of a touched product, and consumer preferences. These findings have direct implications for product management, advertising, and online marketing, especially for products targeting different genders. Our results imply that marketing a masculine product (e.g., shaving foam) with a slow hand movement might prove counterproductive as the product is perceived as less masculine. Contrarily, advertisers should avoid pairing a feminine product with fast hand movement. Marketers may improve the product preferences when they match the hand movement speed with the product's gender in their social media posts, video content, and email newsletters. Our findings also provide online or catalog retailers with a novel method to alter the product perception and preference for an observed or described (i.e., not physically touched) product.

From a theoretical standpoint, prior literature has studied the effect of self-experienced hand movements that varied on the direction of the motoric act (e.g., Cacioppo et al., 1993; Kwon & Adaval, 2017). Furthermore, extant research has explored the influence of specific hand movements and gestures (e.g., isometric arm flexion/ extension, approach/ avoidance, etc.) on purchase intention, product evaluations, and choice. Our research provides novel evidence for the effect of *observed sensorimotor experiences* that differ on the *speed* of the hand movement. These dimensions, to our knowledge, have not been examined in the prior literature. In addition, we provide evidence that the speed of motoric actions may signal gender identity. These findings add to the growing literature on the learned associations with different genders and their effect on product evaluations (e.g., Brough et al., 2016), social identity theory, and sensory marketing.

Nevertheless, this research has a few limitations that may open intriguing avenues for future work. First, prior literature on the effects of gestures and dynamic sensorimotor experiences may be extended to investigate the influence of speed of movement. For the sake of parsimony, our research focused on the effect of speed of a hand movement over a product and did not explore the interactive influence of *speed* and *direction*. Future research could study whether other movements (e.g., isometric arm flexion vs. extension), when varied on speed, evince an approach-avoidance motivation and preference for products (Cacioppo et al., 1993). Therefore, our research proposes "speed of motion" as a potential moderator to the effect of hand movements and opens new avenues of work on observed haptic experiences.

Second, our work may be extended to examine the effect of a match between the speed of observed hand movement with other sensory inputs on product evaluation. Prior research suggests that multi-sensory semantic congruence (e.g., fit between a feminine perfume and smooth texture of paper) evokes higher pleasantness, likeability, and texture perceptions (Krishna et al., 2010). It might be worth exploring the effect of a match between slow (vs. fast) hand movement and a touched product's haptic properties (e.g., smooth vs. rough texture) on product evaluations. Furthermore, Semin and Palma (2014) suggest that female (vs. male) consumers evince higher preferences for lighter (vs. darker) consumables. It is plausible to explore how the match between the inferences from an observed hand movement on a product and the product's color (light vs. dark) influences consumer preferences. Similarly, a match between the inferences resulting from observed hand movement speed in an advertisement with a product's aesthetic dimensions of the form (i.e., proportion, shape, and lines) could influence consumers'

purchase intention. It has been shown that slimness, rounded shape, and curvy lines are associated with the perceived femininity of a product (Van Tilburg et al. 2015). Our research opens opportunities to explore the influence of a fit between the speed of an observed motoric movement and product attributes such as texture, color, and form on consumer perception.

Third, follow-up research could differentiate between slow and fast motoric speed i.e., determine the threshold beyond which hand (and bodily) interaction with products is visually perceived to differ on speed. While we conducted manipulation checks for the video-based stimuli, an objective assessment of motoric speed could be a useful input for advertisers.

Forth, the combined influence of observed hand movement speed and individual-level differences on Need for Touch (NFT) could be examined. Prior research suggests that, in the online context, high-NFT individuals evince lower attitude-confidence, which can be offset through situational nonhaptic factors (e.g., mood, price promotions, and expertise; Peck & Childers, 2003; Yazdanparast & Spears, 2013). Therefore, further research could examine whether slow hand movement speed enables high-NFT individuals to gain attitude confidence. Lastly, our research identified that people hold learned associations about the speed of movements. We delved into the consumption implications of such associations upon observing the different speeds of hand movements. Future research could examine in-depth the reasons and social effects of this perturbing stereotypical association.

We conclude this chapter with a belief that our study will trigger the interest of consumer psychologists to further explore the influence of speed of actions on consumer

perceptions and provide tangible insights to marketers of material and gender-specific products.

Chapter 3

Food for Thought: How Left-Digit Pricing Justifies Food Waste?

Abstract

Retailers often use left-digit pricing (e.g., a tag of $2.99 instead of $3.00) to drive consumption preferences. Our research shows that left-digit pricing can have adverse consequences for food waste – especially when it is not accompanied by a reference price (e.g., a tag of $4.00, now $2.99). We suggest that the presence of a reference price increases the perceived quality of the featured product. That is, the consumers utilize the higher tag of the reference price (i.e., $4.00) as a perceptual cue to form their 'price-quality' inferences. Contrarily, without a reference price (i.e., $2.99), consumers would be uncertain about the product's quality and, thus, are more likely to justify wasting food. The results of a pilot study support our main hypothesis. This research provides novel insights by bridging the behavioral pricing and food-waste literature. Furthermore, our work has substantive implications as it identifies a pricing format that can reduce food waste at the point of purchase. We also identify a few future directions for this research.

Food for Thought: How Left-Digit Pricing Justifies Food Waste?

3.1. Introduction

Mahatma Gandhi once said: "*there are people in the world so hungry, that God cannot appear to them except in the form of bread*" (Rosa, 2017). It is estimated that between 720 and 811 million people faced malnourishment in 2020 (FAO, IFAD, UNICEF, WFP, and WHO, 2021). Yet, nearly 931 million tons or 17% of the food produced globally was wasted at the consumption stage – with 74 kgs. of food wasted per capita (United Nations Environment Program, 2021). To address this challenge, the United Nations has targeted to halve the per-capita global food waste by 2030 (Sustainable Development Goal 12.3; United Nations, 2017). Furthermore, researchers have examined different contextual (e.g., expiration date labels, bonus deals, household routines, etc.), product-related (e.g., attitude to aesthetically unappealing foods), and individual factors (e.g., food-waste-aversion) that influence consumer-related food waste (Porpino, Parente, & Wansink 2015; Stancu, Haugaard, & Lahteenmaki, 2016; Grewal, Hmurovic, Lamberton, & Reczek, 2019; Van Lin, Aydinli, Bertini, Herpen, & Von Schuckmann, 2020; Raghunathan, & Chandrasekaran, 2021).

Extending this literature, we investigate the effect of visuals depicting left-digit pricing (i.e., price format that decreases the left-most digit by one and ends a few cents below the rounded price - $2.99 instead of $3.00; Thomas & Morwitz, 2005; refer figure 3.1 for real-world examples). Specifically, we study: "*how does left-digit pricing in advertising and product visuals affect consumer food waste behavior?*"

Our research not only has implications for the phenomena of food waste but also adds to the limited literature examining the role of in-store stimuli and promotional pricing on food waste behavior (Van Doorn, 2016). Recent work has studied the role of anticipated food waste when purchasing bonus packs (Petit, Lunardo, and Rickard, 2020), multi-pack promotions (e.g., buy-one-get-one 50% off; BOGO50; Le Borgne, Sirieix, and Costa, 2018), and promotion of perishable products on actual household food waste (Van Lin et al., 2020). Our research draws upon the behavioral pricing literature to examine the effect of left-digit pricing on consumer food waste responses. Existing research suggests that such pricing format (i.e., a tag of $2.99 instead of $3.00) influences the consumer's discount perceptions, willingness to purchase, price-magnitude judgments, and sales volume (Thomas & Morwitz, 2005; Lacetera, Pope, & Sydnor 2012; Bhattacharya, Holden, & Jacobsen, 2012; Sokolova, Seenivasan, & Thomas, 2020).

Figure 3.1: Left-digit Pricing in Food Advertisement and Product Visuals

We propose that left-digit pricing would increase the amount of food waste. As price is considered a signal of product quality (Park, Lalwani, & Silvera, 2020), consumers would infer the quality of the featured product to be lower when left-digit pricing is used.

The lower perceived quality is expected to, in turn, increase the food waste – implying that a price tag of $2.99 would lead to higher food waste than the tag of $3.00. In effect, a left-digit price of $2.99 would provide a justification to consumers for food waste. However, we posit that retailers can improve the perceived quality and reduce the food waste – in case the left-digit price is accompanied by a reference price (e.g., a tag of $4.00, now $2.99). Such price format explicitly provides the consumers with a higher reference point (i.e., $4.00) to develop improved 'price-quality' inferences and, thus, elicits lower food waste. In essence, the presentation format of left-digit pricing can have a significant impact on the level of food waste.

This research makes a few theoretical and substantive contributions. First, our work contributes to the limited, yet growing literature on the mechanisms leading to food waste from the consumer behavior perspective (Van Doorn, 2016; Porpino, 2016; Stancu et al., 2016; Wilson, Rickard, Saputo, & Ho, 2017; Raghunathan & Chandrasekaran, 2020; Petit, Lunardo, & Rickard, 2020). We specifically examine a factor that might lead to higher food waste at the point of purchase. Prior work has focused on food-related decisions made within households with limited emphasis on the effect of in-store promotions on food waste (Beretta, Stoessel, Baier, & Hellweg, 2013; Van Doorn, 2016). Second, this research bridges the literature on food waste and behavioral pricing – by developing insights on the conditions under which left-digit pricing lowers the 'price-quality' inference and, subsequently, increases the consumer's tendency to waste food. Extant behavioral pricing literature has examined the psychological effect of numerical cues on different product judgments (e.g., Thomas & Morwitz, 2005; Sokolova et al., 2020; Park et al., 2020) but not on the consumer's anticipated and actual food waste.

Finally, our work provides empirical evidence on the detrimental effect of left-digit pricing on food waste. This finding has managerial implications as store/ restaurant managers often utilize left-digit pricing to drive demand. Our research shows that retailers could reduce food waste by providing consumers with a reference price (accompanying the same left-digit price) to anchor their 'price-quality' judgments. This finding offers insight to not only retailers but also policymakers on a pricing format that can reduce food waste at the consumption stage. In essence, our research offers a marketing-based solution that enables the retailers to continue using left-digit pricing and, simultaneously, contribute to reducing food waste.

We next provide an overview of the literature connecting left-digit pricing and food waste to develop our initial hypotheses. Then, in a pilot study, we test our main prediction on the effect of left-digit pricing on food waste. We finally discuss the proposed direction of this research.

3.2. Conceptual Background

3.2.1. Price Promotions and Food Waste

Consumers tend to make several decisions at the point of purchase – many of which are not planned before they enter a store (Inman & Winer, 1998). Evidence suggests that consumers leave scope for "in-store slack" (i.e., keeping an unplanned mental budget) to take advantage of the price promotions that they might encounter at the point of purchase (Stilley, Inman, & Wakefield, 2010). The in-store slack and price promotions might, in turn, contribute to food waste. For instance, multi-buy promotions (e.g., 3x2 sales) have been shown to induce consumers into unplanned purchase

quantities and, thus, higher food waste (Halloran et al., 2014). In addition, consumers are likely to stockpile products that offer bonus packaging (e.g., 50% higher quantity at the same price) and, thus, are more susceptible to food waste (Petit et al., 2020). These studies suggest that promotions encountered at the point of purchase (e.g., in-store discounts) can increase food waste.

Our research posits that the effect of price promotions on food waste would differ for different types of promotions – depending on the price-quality inference they generate. We develop these predictions based on the literature on behavioral pricing and numeric cognition. Previous research in this literature suggests that consumers tend to use the left-most digit to form inferences on price magnitude (Thomas & Morwitz, 2005). In an experiment, the authors studied the target price of two pen brands – with half participants evaluating the price that ended in digit-nine (i.e., $2.99, and $3.59) and the other half assessing the price terminating with digit-zero ($3.00 and $3.60). Participants were asked to assess the price magnitude of each pen. The authors found that price ending in digit-nine was perceived significantly lower only when the left-most digit changed (i.e., $2.99 instead of $3.00) and not when the left-most digit remained constant (i.e., $3.59 instead of $3.60). The tendency of consumers to judge or anchor product prices based on the left-most digit is termed as the '*left-digit bias*'. In a recent study, Sokolova et al. (2020) showed that left-digit pricing, without an accompanying reference price (tag of $2.99), makes people process the pricing through conceptual representations. Such pricing format relies on the retrieval of general price knowledge for the category and is less accurate. In contrast, evaluating the left-digit pricing along with a reference price (tag of

$4.00, now $2.99) relies on precise perceptual representation or digit-by-digit evaluation of price.

Extending this literature, we propose that left-digit pricing, without an accompanying reference price, would lead to higher food waste. This is because such pricing provides a signal of low quality for the featured product. Evidence suggests that prices with a low left-most digit (especially, tags ending with .99) possess a low-price meaning – such that every time consumers encounter a .99-ending price, they develop the perception of a discount (Schindler, 2006). As price is a salient attribute to predict quality (Lalwani & Forcum, 2016; Park et al., 2020), consumers are also likely to attach lower quality to products ending with left-digit price (tag of $2.99). In other words, consumers might waste less food when the product is priced at $3.00 (instead of $2.99). On the contrary, when the left-digit pricing is accompanied by a reference price (e.g., a tag of $4.00, now $2.99), the consumers would develop a higher price-quality inference. This is because they utilize the reference price for comparison (i.e., higher left-most digit and rounded/ not .99-ending) to infer the quality of the featured product. The consumer is, therefore, likely to evoke lower food waste for the left-digit pricing that is accompanied with a reference price – driven by improved price-quality perceptions. Thus, we propose that:

H_1: Food waste is higher when the left-digit pricing is not accompanied (vs. accompanied) with a reference price.

H_2: Left-digit pricing without a reference price will evoke lower price-quality inferences.

We next test our hypothesis (H_1) on the effect of left-digit pricing on food waste.

3.3. Pilot Study: Left-Digit Pricing and Food Waste

3.3.1. Sample, Design, and Procedure

Four hundred and four U.K.-based participants (M_{age} = 35.36; 38.72% female) were recruited from the Prolific Academic platform. One participant failed the number-based attention check and, thus, we were left with 403 participants. These participants were randomly assigned to one of four conditions in 2 (reference price: absent vs. present) x 2 (left-most digit: low vs. high) between-subjects experimental design. Participants were asked to imagine that they were in London on a business trip and decide to visit the nearby Pizza Point restaurant. The scenario asked the participants to imagine observing a menu board featuring the restaurant's five-cheese pizza, which they decide to order for themselves. Then, the participants saw the randomly assigned food visual depending on their between-subjects condition: (1) reference price absent, low-left digit, condition: £9.99; (2) reference price absent, high-left digit, condition: £10.00; (3) reference price present, low-left digit, condition: £11.00, now £9.99; and (4) reference price present, high-left digit, condition: £11.01, now £10.00. The featured food (i.e., five-cheese pizza) and its visual characteristics remained unchanged across the four conditions (refer, Appendix C for the stimuli).

Upon viewing the food visually, participants were asked to visualize how it would be when they were finished eating the five-cheese pizza at the restaurant. Specifically, they were asked to indicate the amount of pizza that they would likely leave on their plate – with anchor 1 (leave all the pizza) to 7 (not leave any of the pizza). To make the measure vivid, each Likert-scale point was shown with the picture of an incrementally reducing five-cheese pizza left on the plate. This measure served as our main dependent variable.

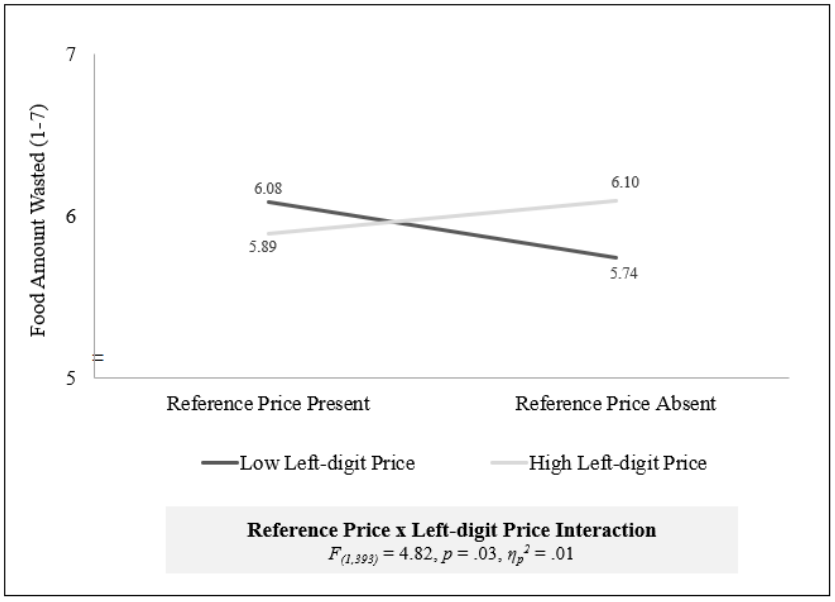
The participants, then, responded to 6-item Food Aversion Scale (Raghunathan & Chandrasekaran, 2020) with the scale ranging from 1 (strongly disagree) to 7 (strongly agree). The measure included scale-items such as “In general, I hate to waste food”, “It makes me guilty to waste food when I think of all the poor people who don't get enough to eat”, and “I am okay with letting food on my plate go waste - if I feel that I have eaten enough” (reverse-coded). These items were averaged (α = .77) to measure the participant’s food waste aversion. We included this measure because the individual attitude to food-aversion was expected to be correlated with our key dependent variable. Next, the participants responded to 10-item Revised Restraint Scale (Herman & Polivy, 1978) that gauged the individual differences on restrained eating. The scale includes items to measure an individual’s concern with dieting (e.g., “How often are you dieting?”), perceptions of guilt after eating (e.g., “Do you have feelings of guilt after overeating?”) and thought to the food consumed (e.g., “Do you give too much time and thought to food?”. We controlled for this variable because restrained eaters have been shown to exhibit greater sensitivity to visual cues of indulgent foods (Cornil, Ordabayeva, Kaiser, Weber, & Chandon, 2014).

In addition, the participants shared the number of hours since the last eating (“how many hours ago did you last eat something?”) as a proxy for the hunger level. We also asked the participants about their dietary restrictions (“do you have any dietary restrictions?”; coded on a binary scale: (0) No, (1) Yes - with options such as diabetic, gluten-free, halal, kosher, lactose intolerance, peanut allergy, vegan, and vegetarian) and their time-of-day (“what is the time in your city right now?”). The participants’ time-of-day was included as a control variable as it can influence the food acceptability (Birch, Billman,

& Richards, 1984) and, thus, the level of food waste. Finally, the participants reported their age and gender.

3.3.2. Results

The findings of two-way ANCOVA found a non-significant main effect of reference price (absent vs. present; $p = .60$) and left-digit price (low vs. high; $p = .53$) but a significant reference price x left-digit pricing interaction ($F_{(1,393)} = 4.82$, $p = .03$, *partial-*$\eta^2 = .01$; figure 3.2). Pair-wise comparison showed that left-digit pricing without an accompanying reference price (£9.99 vs. £10.00) led to significantly higher food waste ($p = .03$) when the left-digit was low ($M_{low\ left\text{-}most\ digit} = 5.74$) than high ($M_{high\ left\text{-}most\ digit} = 6.10$). However, there was no significant difference on food waste for left-digit pricing with accompanying reference price (£11.00, now £9.99 vs. £11.01, now £10.00; $M_{low\ left\text{-}most\ digit} = 6.08$ vs. $M_{high\ left\text{-}most\ digit} = 5.89$, $p = .24$).



Note: Scale anchors (1: leave all the pizza and 7: not leave any of the pizza)

Figure 3.2: Left-digit Pricing and Food Waste

Among the covariates, the individual difference in food-waste-aversion (p = .01) and gender (p < .01) were significant. Furthermore, dietary restrictions and differences in restrained eating (both p = .06) were found to be marginally significant. However, the 2-way (p's > .54) and 3-way interactions (p's > .17) of these covariates with the predictor variables did not reach significance. The interaction effect was marginally significant ($F_{(1, 399)}$ = 3.63, p = .06, *partial-*η^2 = .01) without any covariates. The results of this pilot study provided initial evidence that left-digit pricing without an accompanying reference price leads to higher food waste (H_1).

3.4. Discussion and Next Steps

In this research, we explore the effect of price labels (i.e., with or without reference price) and the mechanism through which left-digit pricing leads to higher food waste. Our pilot study shows that pictures (e.g., a menu featuring a pizza) with left-digit pricing can increase food waste when retailers use left-digit pricing without an explicit reference price (tag of £9.99 vs. £10.00). In contrast, the use of a reference price (using a tag of £11.00, now £9.99 rather than a tag of £9.99) can lower the adverse consequence by reducing food waste. We posit that this effect manifests because left-digit pricing without a reference price does not enable the consumers to form high 'price-quality' inferences for the featured product. These findings draw upon and extend the food-waste and behavioral pricing literature. Furthermore, the paper offers insight on a price promotion format that can reduce food waste at the consumption/ point-of-purchase stage. Our findings, therefore, have substantive implications as a major portion of food waste occurs within households, restaurants, and foodservice environments.

This research could be extended to study the effect of left-digit pricing for different food types (i.e., indulgent vs. non-indulgent). Prior research suggests that consumption of indulgences (e.g., cookies), although tempting, are harder to justify as they generate feelings of guilt (Kivetz & Simonson, 2002a, b; Choi et al., 2012). Left-digit pricing, due to its association with a promotional discount (Schindler, 2006), justifies indulgent purchases and consumption (referred to as the 'left-digit price justification effect'; Choi et al., 2012). Accordingly, we expect that consumers would purchase more of the indulgent foods (e.g., cookies priced at $2.99) than required and waste more in their households as well. Without left-digit pricing (e.g., a tag of $3.00), consumers have a lower justification for purchasing beyond their needs and consequently waste less food. Contrarily, non-indulgent foods (e.g., salads), due to their intrinsic health benefit, are easier to self-justify (Kivetz & Simonson, 2002a, b; Choi et al., 2012). Thus, left-digit pricing for non-indulgent foods is not likely to lead consumers to purchase more than they require. We expect no significant difference of left-digit pricing (i.e., a tag of $2.99 vs. $3.00) on non-indulgent food waste.

The inclusion of a reference price would attenuate the effect of left-digit pricing on food waste. Consistent with our pilot study, the presence of a higher reference price for an indulgent food would reduce its wastage – as it alleviates the consumer's discount perception and provides a perceptual cue of the product's quality. We do not expect a significant effect on non-indulgent food waste – as such foods are easier to self-justify and do not require the consumers to construct reasons (both, with or without reference price). In essence, our research would show that the effect of left-digit pricing on food waste is specific to indulgent (than non-indulgent) products.

Relatedly, we expect that food waste, especially for indulgent foods, would vary with the individual differences in trait self-control. Consider a consumer with high self-control. Such consumers are likely to perceive more happiness when they have a reason (than not have a reason) to indulge as it makes their indulgence “feel right” (Peterson, Dretsch, & Loureiro, 2017). Likewise, we expect that high self-control consumers would waste more of the indulgent foods when such products feature left-digit pricing (versus no left-digit pricing). This is because left-digit pricing for indulgent foods would provide a reason to high self-control consumers to purchase more than required. Having purchased more indulgent foods than needed, the high self-control consumers are also likely to waste more – due to the low price-quality inference (i.e., a reason to waste). On the other hand, low self-control consumers would be tempted to, both, purchase and consume more of the indulgent foods when featured with left-digit pricing. Therefore, we expect differences in the level of indulgent food waste for consumers with high (but not for low) trait self-control. Furthermore, the level of self-control would not make a significant difference for non-indulgent foods that are depicted with left-digit pricing – as these purchases are considered necessary and are easier to justify. Therefore, the subtle difference due to left-digit pricing would not affect the purchase and waste of non-indulgent foods across low and high self-control consumers.

In addition, we propose to test a boundary condition to the effect of left-digit pricing on food waste when the product uses multi-digit pricing (e.g., caviar having a tag of $1999 vs. $2111). Recent research shows that consumers might perceive a higher discount for multi-digit prices with 1-ending than 9-ending (Dogerlioglu-Demir, Akpinar, Gurhan-Canli, & Koças, 2022). This is because consumers perceive a higher discount for prices

including a chunk of 1-digit (than 9-digit) endings. Accordingly, we would test whether indulgent foods, having a high left-digit price with a chunk of 1-digit endings (e.g., $2111), generate more discount perception and, consequently, cause more waste when compared to the products with low left-digit price with a chunk of 9-digit endings (e.g., $1999).

Finally, prior research suggests that individuals mentally organize magnitude (including numbers) from left to right in increasing order of importance (Calabria & Rossetti, 2005). It might be worth exploring the different lateral placements/ positioning of the food product picture and left-digit pricing. Specifically, we intend to examine whether the effects of left-digit pricing (without reference price) on food waste are alleviated in case the price information is displayed on the left-hand side of the featured product. In summary, this chapter demonstrates that the effect of left-digit pricing on food waste is stronger without reference prices. These findings have practical and theoretical implications for a better understanding of the mechanisms driving food waste at the consumption stage.

Conclusions

Visual marketing stimuli surround us and can subconsciously influence our perceptions and behavior. The overarching aim of this thesis has been to explore whether, how, and under which conditions do commonly used visual stimuli influence consumer responses. The three chapters examine the effect of product visuals, video advertisements, and visual-verbal information on consumer perception and behavior. To better understand the complex nature of consumer decision-making, this thesis utilizes a combination of implicit and explicit elicitation techniques. Furthermore, each chapter not only explores the effect of a novel visual stimulus but also studies a phenomenon having substantive implications.

Chapter 1 investigates how the proximal depiction of indulgent (but not non-indulgent) foods facilitates mental simulation of prior eating experience, heightens the perceived tastiness, and consequently increases the consumer responses. Across four studies, this research provides converging evidence on the "*proximal depiction effect*" and shows that the effect alleviates for multiple exposures to similar proximal food pictures – due to sensory satiation. These findings contribute to the literature on visuospatial processing, mental simulation, and satiation, as well as identify a pictorial cue that makes consumers more susceptible to food indulgences. The chapter also proposes a few extensions for research – in particular, studying proximal depictions in different consummatory contexts, examining the combined effect of proximal food visuals and verbal elements, and the effect upon altering attentional resources.

Chapter 2 explores the effect of observing hand movement speed with products (e.g., slow versus speedy handwashing in a Palmolive advertisement) on consumer

responses. Five studies, including a multi-country Implicit Association Test, demonstrate that merely observing slow (versus fast) speed of hand movement can elicit associations of feminine (versus masculine) behavior and subsequently shape product preferences. The findings show that hand movement speed serves as a perceptual cue in forming evaluations about a touched product. That is, consumers are likely to perceive slow hand movements as more feminine and a gentle hand interaction with a product (e.g., slow handwashing) as representing feminine behavior. Consequently, female (more than male) consumers would prefer products shown or described with a slow hand movement – as the speed of movement fits their own social identity. This chapter demonstrates converging evidence for the hypothesized effects using different products (e.g., vacuuming, shaving foam, hand wash, etc.), hand movements (feminine, masculine, and gender-neutral), marketing formats (e.g., video content and advertisement descriptions), and country contexts (i.e., U.S., Spain, and India). From a theoretical standpoint, this chapter contributes to the literature on gender-consumption preferences, social identity theory, and sensory marketing. Follow-up research could explore the interactive effect of speed and direction of motoric movements, semantic congruence effects (e.g., fit of the product color and movement speed), and individual differences on the Need for Touch (NFT).

Finally, Chapter 3 provides evidence on the effect of left-digit pricing (e.g., a price tag of $2.99 instead of $3.00) on food waste behavior. This chapter shows that left-digit pricing, a commonly-used pricing tactic, can increase food waste – driven by lower price-quality inferences of consumers. However, the presence of a higher reference price (i.e., a tag of $4.00, now $2.99) alleviates the low price-quality inference and reduces waste.

As a follow-up, Chapter 3 proposes to examine the effect of left-digit pricing for different food types (indulgent vs. non-indulgent), the boundary condition of multi-digit pricing, and lateral positioning of the pricing information.

In essence, these chapters explore different dimensions of visuospatial perception (i.e., spacing, movement, and positioning) and their effect on consumer responses (both consumption and disposal). Furthermore, this thesis addresses topics having a direct societal relevance. For example, Chapter 1 has implications for the overweight and obesity phenomena that are related to the growing incidence of Non-Communicable Diseases (NCDs), which in turn reduces consumer well-being (SDG 3.4.1, United Nations, 2017). Chapter 2 identifies a gender stereotype (i.e., slow movement is feminine) and highlights the need for marketers to be cognizant of gender-related biases in the marketplace. Finally, Chapter 3 identifies a pricing format that influences food waste at the consumption stage (addressing SDG 12.3, United Nations, 2017).

Taken together, it is hoped that this thesis stimulates further discussion and research on different visual inputs, their perception, and their influence on marketing and societally relevant outcomes.

Conclusiones

Los estímulos visuales del marketing nos rodean y pueden influir inconscientemente en nuestras percepciones y comportamientos. El objetivo general de esta tesis ha sido explorar si los estímulos visuales utilizados habitualmente influyen en las respuestas de los consumidores, cómo y en qué condiciones. Los tres capítulos examinan el efecto de los elementos visuales de los productos, los anuncios de vídeo y la información visual-verbal en la percepción y el comportamiento del consumidor. Para comprender mejor la compleja naturaleza de la toma de decisiones del consumidor, esta tesis utiliza una combinación de técnicas de elicitación implícitas y explícitas. Además, cada capítulo no solo explora el efecto de un estímulo visual novedoso, sino que también estudia un fenómeno con implicaciones sustantivas.

El capítulo 1 investiga cómo la representación próxima de alimentos indulgentes (pero no indulgentes) facilita la simulación mental de la experiencia alimentaria previa, aumenta el sabor percibido y, en consecuencia, incrementa las respuestas del consumidor. A través de cuatro estudios, esta investigación proporciona pruebas convergentes sobre el *"efecto de la representación proximal"* y muestra que el efecto se atenúa en caso de exposiciones múltiples a imágenes de alimentos cercanos similares, debido a la saturación sensorial. Estos hallazgos contribuyen a la literatura sobre el procesamiento visoespacial, la simulación mental y la saturación, además de identificar una señal pictórica que hace a los consumidores más susceptibles a los caprichos alimentarios. El capítulo también propone algunas ampliaciones para la investigación – en particular, el estudio de las representaciones proximales en diferentes contextos de consumo, el examen del efecto combinado de los elementos visuales proximales de la

comida y los elementos verbales, y el efecto sobre la alteración de los recursos atencionales.

El capítulo 2 explora el efecto de la observación de la velocidad del movimiento de las manos con los productos (por ejemplo, el lavado de manos lento frente al rápido en un anuncio de Palmolive) sobre las respuestas de los consumidores. Cinco estudios, que incluyen una Prueba de Asociación Implícita en varios países, demuestran que la mera observación de la velocidad lenta (frente a la rápida) del movimiento de las manos puede provocar asociaciones de comportamiento femenino (frente a masculino) y, por tanto, determinar las preferencias de producto. Los resultados demuestran que la velocidad del movimiento de la mano sirve como señal perceptiva en la formación de evaluaciones sobre un producto tocado. Es decir, es probable que los consumidores perciban los movimientos lentos de las manos como más femeninos y que una interacción suave de las manos con un producto (por ejemplo, el lavado lento de las manos) represente un comportamiento femenino. En consecuencia, las consumidoras (más que los consumidores) preferirían productos mostrados o descritos con un movimiento lento de la mano, ya que la velocidad del movimiento encaja con su propia identidad social. Este capítulo demuestra la existencia de pruebas convergentes de los efectos hipotetizados utilizando diferentes productos (por ejemplo, aspiradora, espuma de afeitar, lavado de manos, etc.), movimientos de manos (femeninos, masculinos y de género neutro), formatos de marketing (por ejemplo, contenido de vídeos y descripciones de anuncios) y contextos de países (por ejemplo, Estados Unidos, España e India). Desde un punto de vista teórico, este capítulo contribuye a la literatura sobre las preferencias de consumo de género, la teoría de la identidad social y el marketing sensorial. La investigación de

seguimiento podría explorar el efecto interactivo de la velocidad y la dirección de los movimientos motrices, los efectos de congruencia semántica (por ejemplo, el ajuste del color del producto y la velocidad del movimiento) y las diferencias individuales en la Necesidad de Tacto (NFT, por sus siglas en inglés).

Por último, el capítulo 3 proporciona pruebas sobre el efecto de la fijación de precios con dígitos a la izquierda (por ejemplo, una etiqueta de precio de 2,99 dólares en lugar de 3 dólares) en el comportamiento de desperdicio de alimentos. Este capítulo muestra que la fijación de precios con un dígito a la izquierda, una táctica de fijación de precios comúnmente utilizada, puede aumentar el desperdicio de alimentos, impulsado por las inferencias de calidad de precio más bajas de los consumidores. Sin embargo, la presencia de un precio de referencia más alto (es decir, una etiqueta de 4,00 dólares, ahora 2,99 dólares) atenúa la inferencia de baja calidad del precio y reduce el desperdicio. Como continuación, el capítulo 3 propone examinar el efecto de la fijación de precios con dígitos a la izquierda para diferentes tipos de alimentos (insanos frente a saludables), la condición límite de la fijación de precios con varios dígitos y el posicionamiento lateral de la información de precios.

En esencia, estos capítulos exploran diferentes dimensiones de la percepción visoespacial (es decir, el espacio, el movimiento y la posición) y su efecto en las respuestas de los consumidores (tanto el consumo como la eliminación). Además, esta tesis aborda temas que tienen una relevancia social directa. Por ejemplo, el capítulo 1 tiene implicaciones para los fenómenos de sobrepeso y obesidad relacionados con la creciente incidencia de las enfermedades no transmisibles (ENT), lo que a su vez reduce el bienestar del consumidor (ODS 3.4.1, Naciones Unidas, 2017). El capítulo 2 identifica

un estereotipo de género (es decir, que el movimiento lento es femenino) y destaca la necesidad de que los profesionales del marketing sean conscientes de los prejuicios relacionados con el género en el mercado. Por último, el capítulo 3 identifica un formato de precios que influye en el desperdicio de alimentos en la etapa de consumo (abordando el ODS 12.3, Naciones Unidas, 2017).

En conjunto, se espera que esta tesis fomente un mayor debate e investigación sobre los diferentes estímulos visuales, su percepción y su influencia en el marketing y los resultados socialmente relevantes.

Bibliography

Adaval, R., Saluja, G., & Jiang, Y. (2019). Seeing and thinking in pictures: A review of visual information processing. *Consumer Psychology Review*, 2(1), 50-69.

Advertising Age Data Center (AdAge, 2020). *Leading National Advertisers 2020 Fact Pack*. Weblink: https://s3-prod.adage.com/s3fs-public/2020-07/lnafp_aa_20200713_locked.pdf

Alba, J. W., & Williams, E. F. (2013). Pleasure principles: A Review of Research on Hedonic Consumption. *Journal of Consumer Psychology*, 23(1), 2-18.

Allen, C. T., & Janiszewski, C. A. (1989). Assessing the role of contingency awareness in attitudinal conditioning with implications for advertising research. *Journal of Marketing Research*, 26(1), 30-43.

Amit, E., Algom, D., & Trope, Y. (2009). Distance-dependent processing of pictures and words. *Journal of Experimental Psychology: General*, 138(3), 400.

Argo, J. J., Dahl, D. W., & Morales, A. C. (2006). Consumer contamination: How consumers react to products touched by others. *Journal of Marketing*, 70(2), 81-94.

Azmi, N. J., Ab Rashid, R., Rahman, M. A., & Safawati Basirah, Z. (2016). Gender and Speech in a Disney Princess Movie. *International Journal of Applied Linguistics and English Literature*, 5(6), 235-239.

Barsalou, L. W. (1999). Perceptual Symbol Systems. *Behavioral and Brain Sciences*, 22(4), 577-660.

Barsalou, L. W. (2008). Grounded Cognition. *Annual Review of Psychology*, 59, 617-645.

Batat, W., & Addis, M. (2021). Designing food experiences for well-being: a framework advancing design thinking research from a customer experience perspective. *European Journal of Marketing*.

Becker, D. V., Kenrick, D. T., Neuberg, S. L., Blackwell, K. C., & Smith, D. M. (2007). The confounded nature of angry men and happy women. *Journal of Personality and Social Psychology*, 92(2), 179.

Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review*, 88(4), 354.

Beretta, C., Stoessel, F., Baier, U., & Hellweg, S. (2013). Quantifying food losses and the potential for reduction in Switzerland. *Waste Management*, 33(3), 764-773.

Berger, J., & Heath, C. (2007). Where consumers diverge from others: Identity signaling and product domains. *Journal of Consumer Research*, 34(2), 121-134.

Bhattacharya, U., Holden, C. W., & Jacobsen, S. (2012). Penny wise, dollar foolish: Buy–sell imbalances on and around round numbers. *Management Science*, 58(2), 413-431.

Birch, L. L., Billman, J., & Richards, S. S. (1984). Time of day influences food acceptability. *Appetite*, 5(2), 109-116.

Biswas, D., Lund, K., & Szocs, C. (2019). Sounds like a healthy retail atmospheric strategy: effects of ambient music and background noise on food sales. *Journal of the Academy of Marketing Science*, 47(1), 37-55.

Borau, S., Elgaaied-Gambier, L., & Barbarossa, C. (2021). The green mate appeal: Men's pro-environmental consumption is an honest signal of commitment to their partner. *Psychology & Marketing*, 38(2), 266-285.

Brough, A. R., Wilkie, J. E., Ma, J., Isaac, M. S., & Gal, D. (2016). Is eco-friendly unmanly? The green-feminine stereotype and its effect on sustainable consumption. *Journal of Consumer Research*, 43(4), 567-582.

Cabrera, J. J., Díaz-Báñez, J. M., Escobar-Borrego, F. J., Gómez, E., Gomez Martin, F., & Mora, J. (2008). *Comparative Melodic Analysis of A Cappella Flamenco Cante*s.

Cacioppo, J. T., Priester, J. R., & Berntson, G. G. (1993). Rudimentary determinants of attitudes: II. Arm flexion and extension have differential effects on attitudes. *Journal of Personality and Social Psychology*, 65(1), 5-17.

Calabria, M., & Rossetti, Y. (2005). Interference between number processing and line bisection: a methodology. *Neuropsychologia*, 43(5), 779-783.

Carpenter, T. P., Pogacar, R., Pullig, C., Kouril, M., Aguilar, S., LaBouff, J., & Chakroff, A. (2019). Survey-software implicit association tests: A methodological and empirical analysis. *Behavior Research Methods*, 51(5), 2194-2208.

Chae, B., Li, X., & Zhu, R. (2013). Judging product effectiveness from perceived spatial proximity. *Journal of Consumer Research*, 40(2), 317-335.

Chandler, J., & Schwarz, N. (2009). How extending your middle finger affects your perception of others: Learned movements influence concept accessibility. *Journal of Experimental Social Psychology*, 45(1), 123-128.

Choi, J., Li, Y. J., Rangan, P., Chatterjee, P., & Singh, S. N. (2014). The odd-ending price justification effect: the influence of price-endings on hedonic and utilitarian consumption. *Journal of the Academy of Marketing Science*, 42(5), 545-557.

Chung, S., Kramer, T., & Wong, E. M. (2018). Do touch interface users feel more engaged? The impact of input device type on online shoppers' engagement, affect, and purchase decisions. *Psychology & Marketing*, 35(11), 795-806.

Cian, L., Krishna, A., & Elder, R. S. (2014). This logo moves me: Dynamic imagery from static images. *Journal of Marketing Research*, 51(2), 184-197.

Cornil, Y. (2017). Mind over stomach: A review of the cognitive drivers of food satiation. *Journal of the Association for Consumer Research*, 2(4), 419-429.

Cornil, Y., & Chandon, P. (2016). Pleasure as a substitute for size: How multisensory imagery can make people happier with smaller food portions. *Journal of Marketing Research*, 53(5), 847-864.

Cornil, Y., Ordabayeva, N., Kaiser, U., Weber, B., & Chandon, P. (2014). The acuity of vice: Attitude ambivalence improves visual sensitivity to increasing portion sizes. *Journal of Consumer Psychology*, 24(2), 177-187.

Coulter, K. S., & Norberg, P. A. (2009). The effects of physical distance between regular and sale prices on numerical difference perceptions. *Journal of Consumer Psychology*, 19(2), 144-157.

De Cesarei, A., & Codispoti, M. (2006). When does size not matter? Effects of stimulus size on affective modulation. *Psychophysiology*, 43(2), 207-215.

Dogerlioglu-Demir, K., Akpinar, E., Gurhan-Canli, Z., & Koçaş, C. (2022). Are 1-endings the new 9-endings? An alternative for generating price discount perceptions. *Journal of Retailing and Consumer Services*, 66, 102912.

Elder, R. S., & Krishna, A. (2012). The “visual depiction effect” in advertising: Facilitating embodied mental simulation through product orientation. *Journal of Consumer Research*, 38(6), 988-1003.

Elder, R. S., Schlosser, A. E., Poor, M., & Xu, L. (2017). So Close I Can Almost Sense It: The Interplay between Sensory Imagery and Psychological Distance. *Journal of Consumer Research*. 44(4), 877–894.

FAO, IFAD, UNICEF, WFP and WHO (2019). The State of Food Security and Nutrition in the World 2019. *Safeguarding against economic slowdowns and downturns*. Rome, FAO. License: CC BY-NC-SA 3.0 IGO.

FAO, IFAD, UNICEF, WFP and WHO (2021). The State of Food Security and Nutrition in the World 2021. *Transforming food systems for food security, improved nutrition, and affordable healthy diets for all*. Rome, FAO. https://doi.org/10.4060/cb4474en

Gal, D., & Wilkie, J. (2010). Real men don’t eat quiche: Regulation of gender-expressive choices by men. *Social Psychological and Personality Science*, 1(4), 291-301.

Ganapathi, A. (2011). Socio-Cultural Dynamics of Indian Classical Dance. Retrieved from *The Pennsylvania State University CiteSeerX Archives* at http://citeseerx.ist.psu.edu/viewdoc/summary.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of Personality and Social Psychology*, 74(6), 1464-1480.

Grewal, L., Hmurovic, J., Lamberton, C., & Reczek, R. W. (2019). The self-perception connection: Why consumers devalue unattractive produce. *Journal of Marketing*, 83(1), 89-107.

Guthrie, J., Mancino, L., & Lin, C. T. J. (2015). Nudging consumers toward better food choices: Policy approaches to changing food consumption behaviors. *Psychology & Marketing*, 32(5), 501-511.

Hadi, R., & Valenzuela, A. (2014). A meaningful embrace: Contingent effects of embodied cues of affection. *Journal of Consumer Psychology*, 24(4), 520-532.

Halloran, A., Clement, J., Kornum, N., Bucatariu, C., & Magid, J. (2014). Addressing food waste reduction in Denmark. *Food Policy*, 49, 294-301.

Hautz, J., Füller, J., Hutter, K., & Thürridl, C. (2014). Let users generate your video ads? The impact of the video source and quality on consumers' perceptions and intended behaviors. *Journal of Interactive Marketing*, 28(1), 1-15.

Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from http://www.afhayes.com/public/process2012.pdf.

Herman, C. P., & Polivy, J. (1975). Anxiety, restraint, and eating behavior. *Journal of Abnormal Psychology*, 84(6), 666.

Herman, C. P., Janet, P., Patricia, P., Joyce, T., & Donna, M. (1978). Distractibility in dieters and non-dieters: An alternative view of" externality.". *Journal of Personality and Social Psychology*, 36(5), 536.

Higgs, S., & Woodward, M. (2009). Television watching during lunch increases the afternoon snack intake of young women. *Appetite*, 52(1), 39-43.

Hoch, S. J., & Loewenstein, G. F. (1991). Time-inconsistent preferences and consumer self-control. *Journal of Consumer Research*, 17(4), 492-507.

Hoegg, J., & Alba, J. W. (2007). Taste perception: More than meets the tongue. *Journal of Consumer Research*, 33(4), 490-498.

Hoffman, R. M., & Borders, L. D (2001). Twenty-five years after the Bern Sex-Role Inventory: A reassessment and new issues regarding classification variability. *Measurement and Evaluation in Counseling and Development*, 34, 39-55.

Holt, D. B., & Thompson, C. J. (2004). Man-of-action heroes: The pursuit of heroic masculinity in everyday consumption. *Journal of Consumer Research*, 31(2), 425-440.

Inman, J. J. (2001). The role of sensory-specific satiety in attribute-level variety seeking. *Journal of Consumer Research*, 28(1), 105-120.

Inman, J. J., & Winer, R. S. (1998). Where the rubber meets the road: A model of in-store consumer decision making.

Irmak, C., Vallen, B., & Robinson, S. R. (2011). The impact of the product name on dieters' and nondieters' food evaluations and consumption. *Journal of Consumer Research*, 38(2), 390-405.

Jia, Y., Huang, Y., Wyer Jr, R. S., & Shen, H. (2017). Physical proximity increases persuasive effectiveness through visual imagery. *Journal of Consumer Psychology*, 27(4), 435-447.

Jonas, H. (1954). The nobility of sight. *Philosophy and Phenomenological Research*, 14(4), 507-519.

Karnani, A., McFerran, B., & Mukhopadhyay, A. (2016). The obesity crisis as market failure: An analysis of systemic causes and corrective mechanisms. *Journal of the Association for Consumer Research*, 1(3), 445-470.

Kemps, E., Tiggemann, M., Martin, R., & Elliott, M. (2013). Implicit approach-avoidance associations for craved food cues. *Journal of Experimental Psychology: Applied*, 19(1), 30.

Kivetz, R., & Simonson, I. (2002a). Earning the right to indulge: Effort as a determinant of customer preferences toward frequency program rewards. *Journal of Marketing Research*, 39(2), 155-170.

Kivetz, R., & Simonson, I. (2002b). Self-control for the righteous: Toward a theory of precommitment to indulgence. *Journal of Consumer Research*, 29(2), 199-217.

Kleine III, R. E., Kleine, S. S., & Kernan, J. B. (1993). Mundane consumption and the self: A social identity perspective. *Journal of Consumer Psychology*, 2(3), 209-235.

Krishna, A., & Elder, R. S. (2021). A review of the cognitive and sensory cues impacting taste perceptions and consumption. *Consumer Psychology Review*, 4(1), 121-134.

Krishna, A., & Morrin, M. (2008). Does touch affect taste? The perceptual transfer of product container haptic cues. *Journal of Consumer Research*, 34(6), 807-818.

Krishna, A., Elder, R. S., & Caldara, C. (2010). Feminine to smell but masculine to touch? Multisensory congruence and its effect on the aesthetic experience. *Journal of Consumer Psychology*, 20(4), 410-418.

Krishna, A., Morrin, M., & Sayin, E. (2014). Smellizing cookies and salivating: A focus on olfactory imagery. *Journal of Consumer Research*, 41(1), 18-34.

Kwon, M., & Adaval, R. (2017). Going against the flow: the effects of dynamic sensorimotor experiences on consumer choice. *Journal of Consumer Research*, 44(6), 1358-1378.

Labroo, A. A., & Nielsen, J. (2010). Half the thrill is in the chase: Twisted inferences from embodied cognitions and brand evaluation. *Journal of Consumer Research*, 37(1), 143–157.

Lacetera, N., Pope, D. G., & Sydnor, J. R. (2012). Heuristic thinking and limited attention in the car market. *American Economic Review*, 102(5), 2206-36.

Lalwani, A. K., & Forcum, L. (2016). Does a dollar get you a dollar's worth of merchandise? The impact of power distance belief on price-quality judgments. *Journal of Consumer Research*, 43(2), 317-333.

Laran, J. (2010). Goal management in sequential choices: Consumer choices for others are more indulgent than personal choices. *Journal of Consumer Research*, 37(2), 304-314.

Larson, J. S., Redden, J. P., & Elder, R. S. (2014). Satiation from sensory simulation: Evaluating foods decreases enjoyment of similar foods. *Journal of Consumer Psychology*, 24(2), 188-194.

Le Borgne, G., Sirieix, L., & Costa, S. (2018). Perceived probability of food waste: Influence on consumer attitudes towards and choice of sales promotions. *Journal of Retailing and Consumer Services*, 42, 11-21.

Lederman, S. J., & Klatzky, R. L. (1987). Hand movements: A window into haptic object recognition. *Cognitive Psychology*, 19(3), 342-368.

Liu, P. J., & Baskin, E. (2021). The Quality Versus Quantity Trade-Off: Why and When Choices for Self Versus Others Differ. *Personality and Social Psychology Bulletin*, 47(5), 728-740.

Machin, J. E., Moscato, E., & Dadzie, C. (2021). Visualizing food: photography as a design thinking tool to generate innovative food experiences that improve food well-being. *European Journal of Marketing*, 55(9), 2515–2537.

McDaniel, C., & Baker, R. C. (1977). Convenience food packaging and the perception of product quality. *Journal of Marketing*, 41(4), 57.

Meyers Levy, J., Zhu, R., & Jiang, L. (2010). Context effects from bodily sensations: Examining bodily sensations induced by flooring and the moderating role of product viewing distance. *Journal of Consumer Research*, 37(1), 1-14.

Moore, D. J. (2014). Is anticipation delicious? Visceral factors as mediators of the effect of olfactory cues on purchase intentions. *Journal of Business Research*, 67(9), 2045-2051.

Moore, D. J., & Konrath, S. (2015). “I can almost taste it:” Why people with strong positive emotions experience higher levels of food craving, salivation, and eating intentions. *Journal of Consumer Psychology*, 25(1), 42-59.

Morewedge, C. K., Huh, Y. E., & Vosgerau, J. (2010). Thought for food: Imagined consumption reduces actual consumption. *Science*, 330(6010), 1530-1533.

Nisbett, R., & Ross, L. (1980). *Human Inference: Strategies and Shortcomings of social judgment*. Englewood Cliffs, NJ: Prentice-Hall.

Papies, E. K., Pronk, T. M., Keesman, M., & Barsalou, L. W. (2015). The benefits of simply observing: Mindful attention modulates the link between motivation and behavior. *Journal of Personality and Social Psychology*, 108(1), 148.

Park, H., Lalwani, A. K., & Silvera, D. H. (2020). The impact of resource scarcity on price-quality judgments. *Journal of Consumer Research*, 46(6), 1110-1124.

Peck, J., & Childers, T. L. (2003). To have and to hold: The influence of haptic information on product judgments. *Journal of Marketing*, 67(2), 35-48.

Peck, J., & Childers, T. L. (2008). Sensory factors and consumer behavior. *Handbook of Consumer Psychology*, 193-219.

Peck, J., & Johnson, J. W. (2011). Autotelic need for touch, haptics, and persuasion: The role of involvement. *Psychology & Marketing*, 28(3), 222-239.

Petersen, F. E., Dretsch, H. J., & Loureiro, Y. K. (2018). Who needs a reason to indulge? Happiness following reason-based indulgent consumption. *International Journal of Research in Marketing*, 35(1), 170-184.

Petit, O., Lunardo, R., & Rickard, B. (2020). Small is beautiful: The role of anticipated food waste in consumers' avoidance of large packages. *Journal of Business Research*, 113, 326-336.

Petit, O., Velasco, C., & Spence, C. (2018). Are large portions always bad? Using the Delboeuf illusion on food packaging to nudge consumer behavior. *Marketing Letters*, 29(4), 435-449.

Pinna, M. (2020). Do gender identities of femininity and masculinity affect the intention to buy ethical products?. *Psychology & Marketing*, 37(3), 384-397.

Polivy, J., Herman, C. P., & Warsh, S. (1978). Internal and external components of emotionality in restrained and unrestrained eaters. *Journal of Abnormal Psychology*, 87(5), 497.

Poor, M., Duhachek, A., & Krishnan, H. S. (2013). How images of other consumers influence subsequent taste perceptions. *Journal of Marketing*, 77(6), 124-139.

Porpino, G. (2016). Household food waste behavior: Avenues for future research. *Journal of the Association for Consumer Research*, 1(1), 41-51.

Porpino, G., Parente, J., & Wansink, B. (2015). Food waste paradox: antecedents of food disposal in low-income households. *International Journal of Consumer Studies*, 39(6), 619-629.

Raghunathan, R., & Chandrasekaran, D. (2021). The Association Between the Attitude of Food-Waste-Aversion and BMI: An Exploration in India and the United States. *Journal of Consumer Psychology*, 31(1), 81-90.

Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The unhealthy= tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, 70(4), 170-184.

Redden, J. P., & Haws, K. L. (2012). Healthy satiation: The role of decreasing desire in effective self-control. *Journal of Consumer Research*, 39(5), 1100-1114.

Roefs, A., & Jansen, A. (2002). Implicit and explicit attitudes toward high-fat foods in obesity. *Journal of Abnormal Psychology*, 111(3), 517.

Rolls, E. T. (2005). Taste, olfactory, and food texture processing in the brain, and the control of food intake. *Physiology & Behavior*, 85(1), 45-56.

Rosa, W. (2017). Goal 2. End Hunger, Achieve Food Security and Improved Nutrition, and Promote Sustainable Agriculture. *A New Era in Global Health: Nursing and the United Nations 2030 Agenda for Sustainable Development*, 257.

Rozin, P., Dow, S., Moscovitch, M., & Rajaram, S. (1998). What causes humans to begin and end a meal? A role for memory for what has been eaten, as evidenced by a study of multiple meals eating in amnesic patients. *Psychological Science*, 9(5), 392-396.

Rudman, L. A., Greenwald, A. G., & McGhee, D. E. (2001). Implicit self-concept and evaluative implicit gender stereotypes: Self and ingroup share desirable traits. *Personality and Social Psychology Bulletin*, 27(9), 1164-1178.

Schindler, R. M. (2006). The 99-price ending as a signal of a low-price appeal. *Journal of Retailing*, 82(1), 71-77.

Semin, G. R., & Palma, T. A. (2014). Why the bride wears white: grounding gender with brightness. *Journal of Consumer Psychology*, 24(2), 217-225.

Sevilla, J., Lu, J., & Kahn, B. E. (2019). Variety seeking, satiation, and maximizing enjoyment over time. *Journal of Consumer Psychology*, 29(1), 89-103.

Shen, H., & Sengupta, J. (2012). If you can't grab it, it won't grab you: The effect of restricting the dominant hand on target evaluations. *Journal of Experimental Social Psychology*, 48(2), 525-529.

Shen, H., Zhang, M., & Krishna, A. (2016). Computer interfaces and the “direct-touch” effect: Can iPads increase the choice of hedonic food?. *Journal of Marketing Research*, 53(5), 745-758.

Shiv, B., & Fedorikhin, A. (1999). Heart and mind in conflict: The interplay of effect and cognition in consumer decision making. *Journal of Consumer Research*, 26(3), 278-292.

Si, K., & Jiang, Y. (2017). Bidirectional contrast effects between taste perception and simulation: A simulation-induced adaptation mechanism. *Journal of Consumer Psychology*, 27(1), 49-58.

Simmons, L. C., & Schindler, R. M. (2003). Cultural superstitions and the price endings used in Chinese advertising. *Journal of International Marketing*, 11(2), 101-111.

Simmons, W. K., Martin, A., & Barsalou, L. W. (2005). Pictures of appetizing foods activate gustatory cortices for taste and reward. *Cerebral Cortex*, 15(10), 1602-1608.

Sokolova, T., Seenivasan, S., & Thomas, M. (2020). The Left-*Digit* Bias: When and Why Are Consumers Penny Wise and Pound Foolish?. *Journal of Marketing Research*, 57(4), 771-788.

Spence, C., Okajima, K., Cheok, A. D., Petit, O., & Michel, C. (2016). Eating with our eyes: From visual hunger to digital satiation. *Brain and Cognition*, 110, 53-63.

Stancu, V., Haugaard, P., & Lähteenmäki, L. (2016). Determinants of consumer food waste behaviour: Two routes to food waste. *Appetite*, 96, 7-17.

Stilley, K. M., Inman, J. J., & Wakefield, K. L. (2010). Planning to make unplanned purchases? The role of in-store slack in budget deviation. *Journal of Consumer Research*, 37(2), 264-278.

Streicher, M. C., & Estes, Z. (2016). Multisensory interaction in product choice: grasping a product affects choice of other seen products. *Journal of Consumer Psychology*, 26(4), 558-565.

Suher, J., Raghunathan, R., & Hoyer, W. D. (2016). Eating healthy or feeling empty? How the “healthy= less filling” intuition influences satiety. *Journal of the Association for Consumer Research*, 1(1), 26-40.

Thomas, M., & Morwitz, V. (2005). Penny wise and pound foolish: the left-digit effect in price cognition. *Journal of Consumer Research*, 32(1), 54-64.

Thomas, M., & Tsai, C. I. (2011). Psychological distance and subjective experience: How distancing reduces the feeling of difficulty. *Journal of Consumer Research*, 39(2), 324-340.

Tom, G., Pettersen, P., Lau, T., Burton, T., & Cook, J. (1991). The role of overt head movement in the formation of affect. *Basic & Applied Social Psychology*, 12(3), 281-289.

Topolinski, S., & Pereira, P. T. (2012). Mapping the tip of the tongue—deprivation, sensory sensitization, and oral haptics. *Perception*, 41(1), 71-92.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, 117(2), 440.

Tu, L. L., & Pullig, C. (2018). Penny wise and pound foolish? How thinking style affects price cognition. *Marketing Letters*, 29(2), 261-273.

United Nations (2017). *Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development*. Weblink:

https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202021%20refinement_Eng.pdf

United Nations Environment Programme (2021). Food Waste Index Report 2021. Nairobi.

Van Doorn, J. (2016). Commentary: Why do we waste so much food? A research agenda. *Journal of the Association for Consumer Research*, 1(1), 53-56.

Van Lin, A., Aydinli, A., Bertini, M., van Herpen, E., & Von Schuckmann, J. (2020). Does Cash Really Mean Trash? An Empirical Investigation into the Effect of Retailer Price Promotions on Household Food Waste. *An Empirical Investigation Into the Effect of Retailer Price Promotions on Household Food Waste* (July 16, 2020).

Van Strien, T., Frijters, J. E., Bergers, G. P., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders*, 5(2), 295-315.

Van Tilburg, M., Lieven, T., Herrmann, A., & Townsend, C. (2015). Beyond “pink it and shrink it” perceived product gender, aesthetics, and product evaluation. *Psychology & Marketing*, 32(4), 422-437.

Warren, N. B., & Campbell, T. H. (2021). The Sleep-Deprived Masculinity Stereotype. *Journal of the Association for Consumer Research*, 6(2), 236-249.

Wilson, N. L., Rickard, B. J., Saputo, R., & Ho, S. T. (2017). Food waste: The role of date labels, package size, and product category. *Food Quality and Preference*, 55, 35-44.

World Health Organization (WHO; 2017). *Obesity and Overweight*. Weblink: http://www.who.int/mediacentre/factsheets/fs311/en/

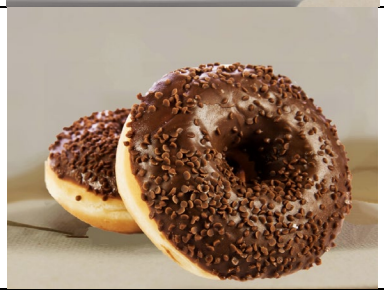
Xie, H., Minton, E. A., & Kahle, L. R. (2016). Cake or fruit? Influencing healthy food choice through the interaction of automatic and instructed mental simulation. *Marketing Letters*, 27(4), 627-644.

Yazdanparast, A., & Spears, N. (2013). Can consumers forgo the need to touch products? An investigation of nonhaptic situational factors in an online context. *Psychology & Marketing*, 30(1), 46-61.

Ye, N., Morrin, M., & Kampfer, K. (2020). From glossy to greasy: The impact of learned associations on perceptions of food healthfulness. *Journal of Consumer Psychology*, 30(1), 96-124.

Appendix A.1.

Study 1: Experimental Stimuli

Proximal Food Depictions	Distant Food Depictions
	
	
	
	
	

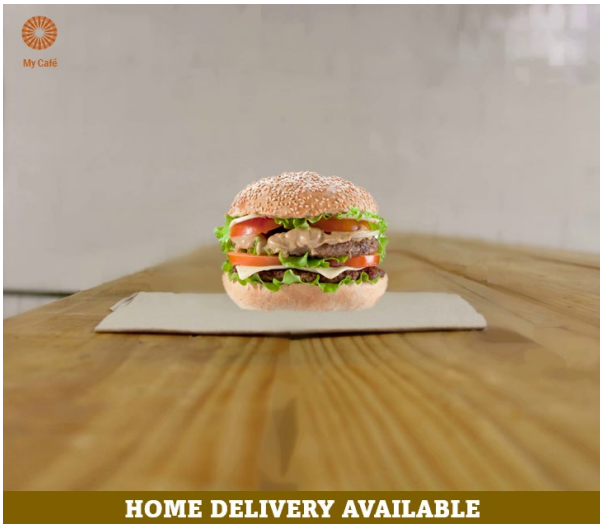
Study 1: Experimental Stimuli (Contd.)

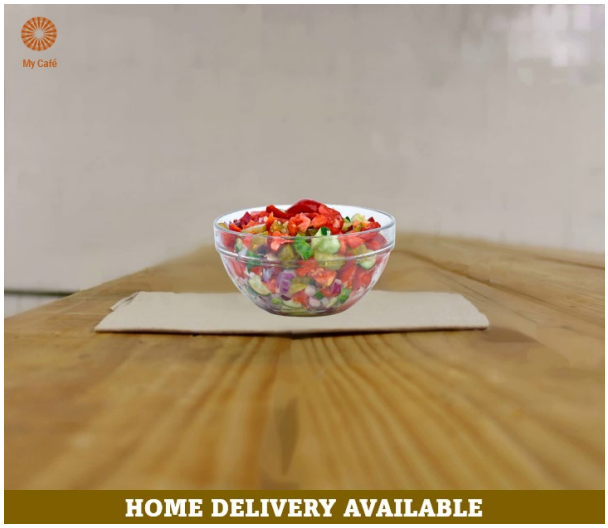
Proximal Food Depictions	Distant Food Depictions
	
	
	
	
	

Note: Images have been re-scaled to fit the page dimension

Appendix A.2.

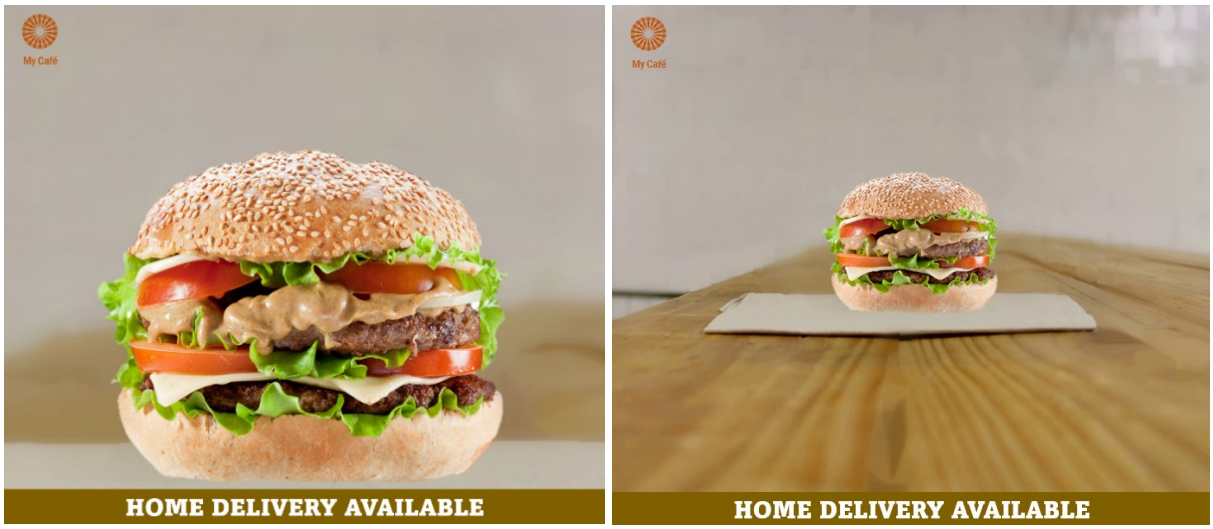
Study 2A: Experimental Stimuli

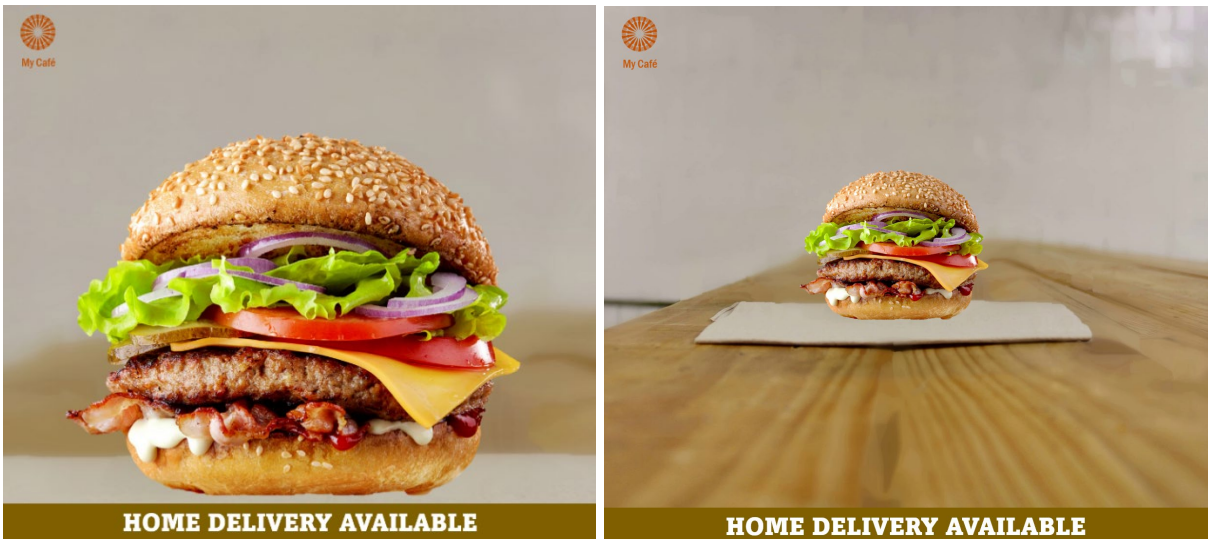




Appendix A.3.

Study 2B: Experimental Stimuli





Appendix A.4.

Study 3: Experimental Stimuli

***Proximal Depiction: Target Stimulus** ***Distant Depiction: Target Stimulus**

***Note**: The target stimulus was displayed on the first and twentieth instance with 18 different burgers displayed in-between.

Appendix B.1.

Stimuli and Schematic Design of Implicit Association Test (IAT) Blocks

Category	Items
Fast Movement	Accelerated, brisk, fast-paced, hurried, rapid, rushed, speedy, and turbo-charged
Slow Movement	Conscious, easy-going, gradual, measured, slow-paced, steady, unhurried, and unrushed
Masculinity	Aggressive, assertive, dominant, forceful, macho, masculine, and risk-taking
Femininity	Caring, feminine, gentle, nurturing, sensitive, soft-spoken, and tender

Block	Number of Trials	Function	Items for Left-Key Response (E)	Items for Right-Key Response (I)
IAT #1 – Compatible First [categories counter-balanced]				
1	20	Practice (only targets)	Masculinity	Femininity
2	20	Practice (only categories)	Fast/ Speedy Movement	Slow Movement
3	20	Practice (compatible pairing)	Masculinity + Fast Movement	Femininity + Slow Movement
4	40	Critical (compatible pairing)	Masculinity + Fast Movement	Femininity + Slow Movement
5	20	Practice (only targets)	Femininity	Masculinity
6	20	Practice (incompatible pairing)	Femininity + Fast Movement	Masculinity + Fast Movement
7	40	Critical (incompatible pairing)	Femininity + Fast Movement	Masculinity + Fast Movement
IAT #2 – Incompatible First [categories counter-balanced]				
1	20	Practice (only targets)	Masculinity	Femininity
2	20	Practice (only categories)	Slow Movement	Fast/ Speedy Movement
3	20	Practice (incompatible pairing)	Masculinity + Slow Movement	Femininity + Fast/ Speedy Movement
4	40	Critical (incompatible pairing)	Masculinity + Slow Movement	Femininity + Fast/ Speedy Movement
5	20	Practice (only targets)	Femininity	Masculinity
6	20	Practice (compatible pairing)	Femininity + Slow Movement	Masculinity + Fast/ Speedy Movement
7	40	Critical (compatible pairing)	Femininity + Slow Movement	Masculinity + Fast/ Speedy Movement
IAT #3 – Compatible First [targets counter-balanced]				
1	20	Practice (only targets)	Femininity	Masculinity
2	20	Practice (only categories)	Slow Movement	Fast/ Speedy Movement
3	20	Practice (compatible pairing)	Femininity + Slow Movement	Masculinity + Fast/ Speedy Movement

4	40	Critical (compatible pairing)	Femininity + Slow Movement	Masculinity + Fast/ Speedy Movement
5	20	Practice (only targets)	Masculinity	Femininity
6	20	Practice (incompatible pairing)	Masculinity + Slow Movement	Femininity + Fast/ Speedy Movement
7	40	Critical (incompatible pairing)	Masculinity + Slow Movement	Femininity + Fast/ Speedy Movement
IAT #4 – Incompatible First [targets counter-balanced]				
1	20	Practice (only targets)	Femininity	Masculinity
2	20	Practice (only categories)	Fast/ Speedy Movement	Slow Movement
3	20	Practice (incompatible pairing)	Femininity + Fast Movement	Masculinity + Slow Movement
4	40	Critical (incompatible pairing)	Femininity + Fast Movement	Masculinity + Slow Movement
5	20	Practice (only targets)	Masculinity	Femininity
6	20	Practice (compatible pairing)	Masculinity + Fast Movement	Femininity + Slow Movement
7	40	Critical (compatible pairing)	Masculinity + Fast Movement	Femininity + Slow Movement

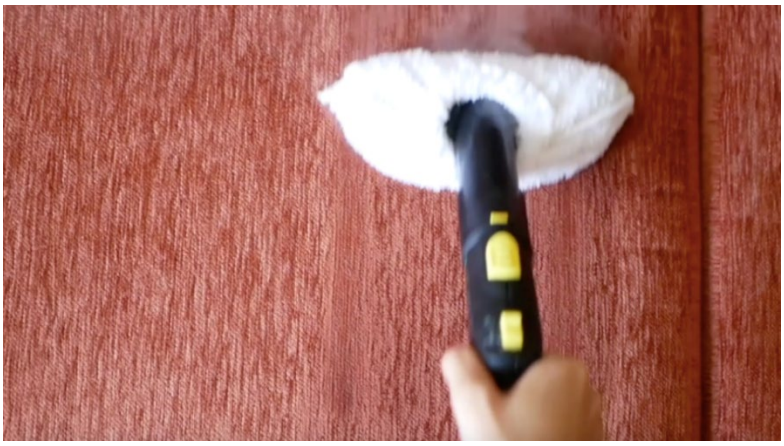
Note: The above-mentioned IAT permutations were randomly presented to the participants to avoid order effects.

Appendix B.2.

Study 1B: Experimental Video Stimuli Snapshots

1. Spray-cleaning Context

2. Vacuuming Context



3. Ironing Context

Appendix B.3.

Study 2: Experimental Stimulus
Snapshots of Stripes Shaving Foam

Study 2: Experimental Stimulus
Shaving Hand Movement

Appendix B.4.

Study 3A: Experimental Stimulus
Snapshot of Stripes Liquid Hand Soap (Feminine and Masculine)

Study 3B: Experimental Stimulus
Snapshot of Stripes Liquid Hand Soap (Without Gender-based Branding)

Appendix C

Pilot Study: Experimental Stimuli and Dependent Measure

A. Picture Stimulus

B. Dependent Measure

Next, visualize how it would be when you are finished eating the five-cheese pizza at Pizza Point.

Indicate the amount of pizza that you would likely leave on your plate?

1: Leave all the pizza

7: Not leave any of the pizza