

Multi-modal food story immersion:

A persuasion mechanism and theory of
photographic depiction of food products in
advertising and marketing

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Inside front cover

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Declaration

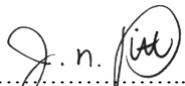
The work embodied in this thesis has not been submitted for a higher degree to any other university or institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Undertaking this thesis has involved human intervention, for which I received approvals from the Macquarie University Ethics Committee. The approval reference numbers are: 5201100651, 5201100944 and 5201300473.

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Date:



.....
Joseph Nitipon Pitt
17 February 2015

Dedications

This thesis is dedicated to my devoted parents,
all passionate teachers, researchers,
food stylists and photographers.



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The completion of this thesis would have not been possible without guidance, learning opportunities and support from a number of intelligent, creatively talented and kind people.

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Thesis abstract

Photographic depictions of food products are critical creative elements for food advertising and marketing practice (e.g., photographic food ads and packages) to induce consumer purchase intention. Research streams on the effect of photographic depiction types on consumer responses in the advertising and marketing contexts have emerged since the early 1990s.

Such research has provided useful insights. However, the significant effect of photographic depictions on multi-modal and precise consumer mental imageries, their follow-on effects on purchase intention and connections to other existing advertising communications theory are still not well established.

This thesis puts forward a new proposition, called the multi-modal food story immersion (MFSI) theory of persuasion, where consumers engage in several aspects of self-referencing when they look at food images. This is a complex form of mental imagery that goes beyond visual imagery investigated in previous research. This thesis investigates this phenomenon and presents the results in three papers as follows:

- 1) reviews the literature on photographic depiction of food over the past 20 years and conducts grounded research with food stylists and photographers revealing new insights for the development of the MFSI construct;
- 2) validates the existence of the MFSI construct empirically; and
- 3) uses path analysis to examine the effects of MFSI in a traditional advertising persuasion model and the effects of individual difference on that model.

This thesis significantly contributes to the advertising and marketing literature by introducing a new and empirically verified immersion construct (i.e. MFSI) that is grounded in consumer voice. It opens up new avenues of research by suggesting a new persuasion path when consumers look at food images.

Epigraph



Commensal kə'mens(ə)l, Origin - Late 19th century, from Medieval Latin:

Commensalis, from *com-* 'sharing' and *mensa* 'a table'

Oxford Dictionary of English (2010),
Oxford: Oxford University Press, p. 349.



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CHAPTER 1

Introduction

Food, simply as a subject matter, has a power to evoke memories. In fact, it can even put some individuals into a state of immersion. This subjective state occurs when they get transported to a place and time, sense food flavors and textures and picture themselves sharing the food experience with others in mind. For some people, such a state may sound a little unreal—but—its existence is undeniable. Consider the following story Lisa Farrell, an English office worker and a food blogger writes (emphasis added):

“Vietnamese tofu and tomato sauce. You know that kind of meal that *makes your mouth water just thinking about it*? Yeah, that. Think *crispy tofu*, coated in a *sauce of velvety fresh tomatoes* flecked with *garlic* and *spring onion*, and finished with a *spicy burst* of white *pepper*. Simple, cheap and oh so *tasty*, it has the added bonus of *transporting me* to the other side of the planet, *far away from the cold, dark nights of England and into the hot, golden days of Vietnam* (Farrell, 2015a)... [Thinking of a bite] *I’m in a café*, wafting away *steam* rising from the mound of rice that’s been placed in front of me...The waiter slams a Saigon beer on the bamboo coaster... minutes later came another *steaming bowl* [tofu and tomato sauce] put next to *our* rice along with *two sets* of chopsticks... My fingers fumble with chopsticks and I grit my teeth, fighting the urge to snap them and use my fingers instead... (Farrell, 2015b)”

If just thinking about food can evoke such a mental state, can an exposure to food photographs too have such an effect—particularly in advertising and marketing contexts? If so, how can this state be conceptualized, operationalized and measured? What type of photographic depictions can facilitate such an immersive mental experience? Does this mental mechanism have a positive relationship with advertising or marketing outcomes such as food product purchase intention? More importantly, does this mental mechanism significantly explain the effect of photographic depiction types on such an outcome? If so, will its significance still hold when other predictors of such an outcome are in the model? Do unhealthy foods make consumers immerse more than healthy ones? Who immerses more? Why? Most importantly, how can this mechanism be integrated with existing research and connected to other existing advertising and marketing communications theory? These are the quests of this thesis.

An overarching theory of this thesis is grounded cognition (Barsalou, 2008). The theory posits that human cognition is grounded in multiple ways including mental simulation. Mental simulation is the enactment of multiple modalities associated with an experience. Recall Lisa Farrell's story about her immersion into the world of food story visually, in-the-mouth sensorially and socially. The experiences she has encountered in Vietnam: the scenes; happenings; flavors and textures of Vietnamese tofu and tomato sauce with steamed rice; eating; and sharing a table, enable her brain to capture these experiences across the modalities. The brain then integrates them with a multi-modal representation stored in the memory. When she thinks about the food such multi-modal states are reactivated to simulate how the brain represents experiences associated with the food.

The theory of grounded cognition provides support to a mental phenomenon this thesis has discovered, proposed, developed and investigated. That is multi-modal food story immersion (MFSI). MFSI refers to a psychological state when consumers experience visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) while viewing photographic food ads (i.e. a total immersion as a function of VI, ISI and SI). The thesis propositions are: 1) exposure to food products depicted with consumption sharing scenes in ads increases MFSI; 2) as MFSI increases, purchase intention also increases; 3) MFSI is a significant persuasion mechanism; 4) women immerse more than men partly because they place greater importance on social food experience making them immerse more socially into ads when the ads depict food products with consumption sharing scenes.

This thesis aims to advance a persuasion theory of photographic depiction of food product in advertising and marketing by drawing together different theoretical strands from various disciplines. This is not a summarization or a replication but a novel integration. Integration is—to thoroughly understand what previous research in this area has examined, to amalgamate existing fragmented evidence, to offer a novel theoretical view from a simplified higher-order perspective, to qualitatively validate new theory with consumers, to empirically test and replicate it, and lastly to connect it with existing theory in advertising. This new theoretical perspective resolves a number of issues which results in immediate and long-term knowledge contributions on three levels: novel concept advanced from integrated theoretical and practical grounds, measurement theory qualitatively and empirically validated, and structural theory verified. The exposition of this scholarship is divided into 3 key papers (Chapters 2, 3 and 4) following this chapter before conclusion (Chapter 5). Figure 1 shows an overview of the 3 papers.

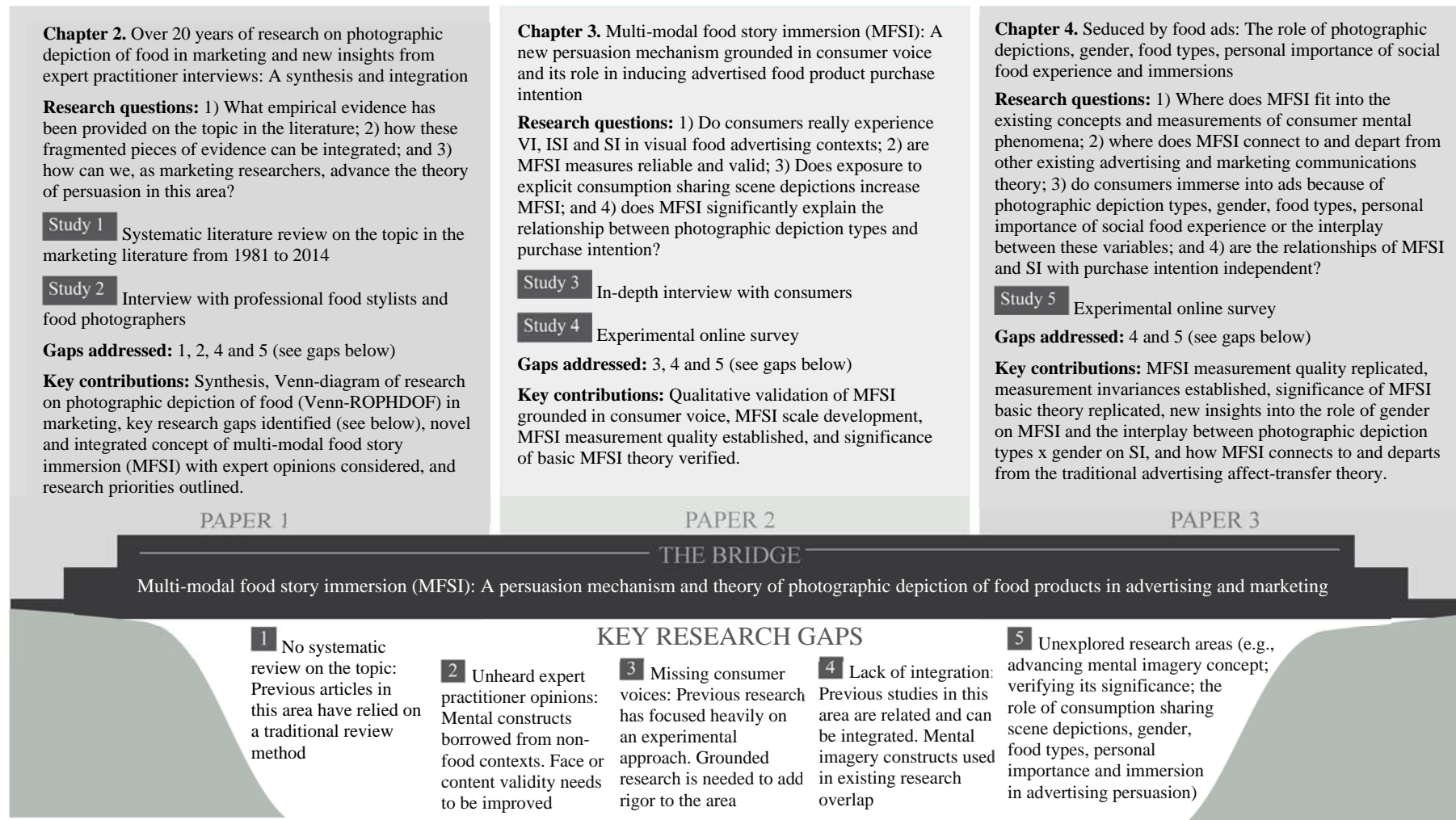


Figure 1
An overview of the 3 key papers in this thesis

In summary, this chapter has introduced: the focal point of this thesis about multi-modal food story immersion (MFSI) phenomenon and its components (i.e. visual immersion, VI; in-the-mouth sensory immersion, ISI; and social immersion, SI), key research questions of this thesis, overarching theoretical framework of this thesis (i.e. grounded cognition), thesis proposition about the role of MFSI, antecedents (i.e. consumption sharing scene depictions, food types, gender, personal importance of social food experience) and outcome (i.e. purchase intention) of MFSI, overall thesis aim and research problems around integration issues, and overall picture of critical scholarship work divided into 3 papers consisting of 5 studies.

Chapter 2 (Paper 1) presents a comprehensive review of the literature based on a systematic review study of previous research on the topic from 1981 to 2014 (Study 1). This paper also provides a critical synthesis of previous studies with a Venn-diagram of research on photographic depiction of food (Venn-ROPHDOF) in marketing and identifies key research gaps (see Figure 1 for an overview). In addition, the paper highlights the discovery, conceptual development and theoretical perspective of multi-modal food story immersion (MFSI) and its components based on an interview with expert practitioners (Study 2). Research priorities are also developed accordingly, which leads to further work in the subsequent papers.

Chapter 3 (Paper 2) provides a further critical synthesis of existing concepts and measures related to multi-modal food story immersion (MFSI) in non-visual food and visual food marketing and non-marketing contexts. The paper also elaborates more on grounded cognition theory and its current status in the advertising and marketing literature. In addition, this paper shows that MFSI exists and that it is grounded in consumer voice based on in-depth interviews with consumers (Study 3). Next, it provides empirical evidence from an experiment using online survey methodology (Study 4) followed by path analysis to establish the following: reliability and validity of MFSI measures, the positive effect of explicit consumption sharing scene depiction → MFSI, the positive relationship of MFSI → purchase intention, and the significance of MFSI as a persuasion mechanism (i.e. exposure to explicit consumption sharing scene depictions → MFSI → purchase intention).

Chapter 4 (Paper 3) provides existing neuroimaging evidence supporting the idea that human cognition is grounded by visual-perception-led mental simulation. The paper also provides an additional literature review on gender differences in advertising and marketing.

This paper builds a more complex model: by investigating the role of food-only and food with consumption sharing scene depictions, gender, food types, personal importance of social food experience and immersions; and by connecting multi-modal food story immersion (MFSI) to the traditional advertising-affect transfer theory (i.e. ad attitude → brand attitude → purchase intention). It also provides additional empirical evidence from another experimental online survey (Study 5) followed by path and multigroup analyses to establish the following: reliability and validity of MFSI measurement, measurement invariances, the significance of MFSI as a persuasion mechanism, and new insights into the effect of gender → MFSI and the interplay between photographic depiction types x gender → SI and the chain of relationships from gender → personal importance of social food experience → SI. More importantly, the paper illustrates the significance of MFSI as a persuasion mechanism above and beyond that provided by the traditional advertising theory.

Chapter 5 (Conclusion) provides a summary of all findings from the 5 studies presented in the 3 key papers (Chapters 2, 3 and 4) including key theoretical and practical implications and future research needed. In concluding, this thesis contributes to the visual food advertising and marketing literature by: 1) providing a systematic review of previous research on the topic from 1981 to 2014; 2) bringing in unheard expert practitioner opinions and consumer voice to the literature; 3) integrating theoretical perspectives from previous studies, grounded cognition theory and expert opinions to provide an alternative way of looking at the consumer mental phenomenon (i.e. MFSI); 4) advancing the measurement model from a higher-order perspective; and 5) providing a new theory and empirical evidence demonstrating MFSI as a significant mechanism to induce purchase intention, thereby opening up new research avenues.

Thesis appendix A provides detailed theoretical and technical explanations on all of the immersion constructs. Readers who are not familiar with the concepts of: latent constructs, lower-order vs. higher-order latent constructs, reflective vs. formative constructs, different criteria used to evaluate the reliability and validity of reflective vs. formative constructs, latent variable score estimation process based on a structural equation modelling algorithm, and benefits of modelling constructs from a higher-order perspective, should find this supplementary information helpful.

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CHAPTER 2

Over 20 years of research on photographic depiction of food in marketing and new insights from expert practitioner interviews:

A synthesis and integration

Abstract. Research on photographic depiction of food in marketing has developed for over two decades. Findings and insights on the topic have accumulated and have not yet been delineated or integrated. This article addresses this research issue by conducting a systematic review and providing a synthesis. It also provides a Venn diagram of research on photographic depiction of food (Venn-ROPHDOF) in marketing showing how previous studies intersect. The authors¹ point out four key research gaps in this area: unheard expert practitioner opinions, missing consumer voice, lack of integration, and unexplored research areas particularly in terms of conceptual contributions. A follow-on interview study with food stylists and photographers reveals new insights. The experts want viewers to experience visual, in-the-mouth sensory and social immersions (VI, ISI and SI), not just visual imageries about themselves eating the foods. VI, ISI and SI constructs can form a higher-order construct, called multi-modal food story immersion (MFSI). This conceptual integration has direct implications on persuasion theory building in visual food advertising and marketing. To advance research in this area, the priorities are: investigating if VI, ISI and SI are grounded in consumer voice and developing measures; empirically demonstrating the measurement quality for VI, ISI, SI and MFSI; verifying relationships of MFSI with advertising or marketing antecedents and outcomes; and connecting MFSI to other existing persuasion theory.

Key words. Photographic depiction, Food, Marketing, Systematic review, Practitioner interview, Multi-modal food story immersion (MFSI)

¹ Joseph N. Pitt, PhD candidate is the first author of this article. Associate Professor Lawrence Ang, Principal thesis supervisor is the second author of the article who reviews and provides constructive comments on previous versions of this article.

Introduction

“Like revision, integration involves seeing something in a new way, and like summarization, it involves a holistic perspective. However, true integration does more than lay out what has been found... Integration draws connections between previously differentiated phenomena, finding a novel, simplified, and higher-order perspective on how these entities are related. Integration involves synthesis—that is, the creation of a whole from diverse parts...

Papers that contribute through integration accommodate extant knowledge. Thus, they account for well-accepted findings... Good papers also contribute by noting the parsimony achieved through the integrated perspective... (MacInnis, 2011, p. 146) [...but] The precipitous decline of conceptual articles suggests that the [marketing] field may be missing important ideas (2011, p. 151). ...”

MacInnis, Deborah J. (2011). “A framework for conceptual contributions in marketing,” *Journal of Marketing*, 75 (4), 136-54

Food styling and photography is a crucial creative execution for marketing food products (e.g., Custer, 2010; Gutman, 2012; Kennedy, 2011; Lunney, 2013). Research on the effect of such photographic depictions on consumers has emerged since the 1990s (e.g., Debevec & Romeo, 1992; Homer & Gauntt, 1992). Over 20 years, findings and insights have accumulated. Recent articles and book chapters related to the topic (Elder & Krishna, 2012; Jiang & Lei, 2014; Krishna & Schwarz, 2014; Poor, Duhachek, & Krishnan, 2013; Raghubir, 2010; Rozin & Holmes, 2010) have provided some literature reviews. However, these reviews usually rely on a traditional method. This means inclusion and exclusion criteria of the reviews are not explicitly provided (Petticrew, 2001). Such an approach to review, therefore, results in an incomplete picture of all relevant theoretical perspectives and empirical evidence. Some questions still remain unanswered: What empirical evidence has been provided on the topic in the literature; how these fragmented pieces of evidence can be integrated; and how can we, as marketing researchers, advance the persuasion theory of photographic depiction of food in advertising and marketing?

Advertising and marketing researchers know that consumers can infer meanings from pictures (Messaris, 1997; Mick, 1986; Scott, 1994). Previous research has shown that visual elements can have a significant effect on many outcomes including: visual attention (e.g., Pieters, Rosbergen, & Wedel, 1999; Pieters & Wedel, 2004); evoked visual imageries (e.g., MacInnis & Price, 1987; Rossiter, 1982); evoked emotions (e.g., Olney, Holbrook, & Batra, 1991); ad, brand and purchase intention evaluations (e.g., Mitchell, 1986; Mitchell & Olson, 1981; Rossiter & Percy, 1980; Shimp, 1981). Recent research has also shown that altering visual elements can influence these outcomes. For instance, camera angles used to photograph a bicycle have a significant effect on brand evaluation when viewers have low motivation to process ad information (Meyers-Levy & Peracchio, 1992). Orientations of a

watch depicted in an ad have a significant effect on brand evaluation when ad copy matches with the depiction among viewers who have a high tendency to process information extensively (Peracchio & Meyers-Levy, 2005). The effect of visual complexity in ads on visual attention, ad and brand evaluation can vary depending on whether such complexity is feature or design related (Pieters, Wedel, & Batra, 2010). However, how much we know about the role of photographic depiction of food product on consumer responses is unclear because no one has systematically synthesized and integrated existing evidence.

Advertising and marketing scholars and practitioners are very interested in this research because of the following reasons. First, a synthesis and integration amalgamates extant knowledge and generates new insights for long term theory building and testing (MacInnis, 2011; Stewart & Zinkhan, 2006; Yadav, 2010). Articles that provide a synthesis and integration are urgently needed now because such contributions have dramatically declined in marketing journals in the past 30 years (Yadav, 2010). Second, as the marketing discipline advances, sub-disciplines such as visual food advertising and marketing emerge (e.g., a food marketing program at Saint Joseph's University, a gastronomy program focusing on food media and communication at Boston University and the University of Gastronomic Sciences where its entire academic programs are devoted to food including visual food marketing and media communications). This article advances research in this specific area and at the same time attracts attention from wider scholarship communities due to its multidisciplinary nature (i.e. visual, food, advertising, marketing, and consumer psychology). Third, practitioners overwhelmingly use food images for advertising and marketing purposes. For example, Kraft Foods has added over 6,000 recipe photos on their Pinterest (Fleischer, 2012). Understanding how photographic depiction of food product has influenced consumers helps practitioners make informed decisions on creative visual depiction strategies—particularly from a holistic view through synthesization and integration.

Systematic literature review

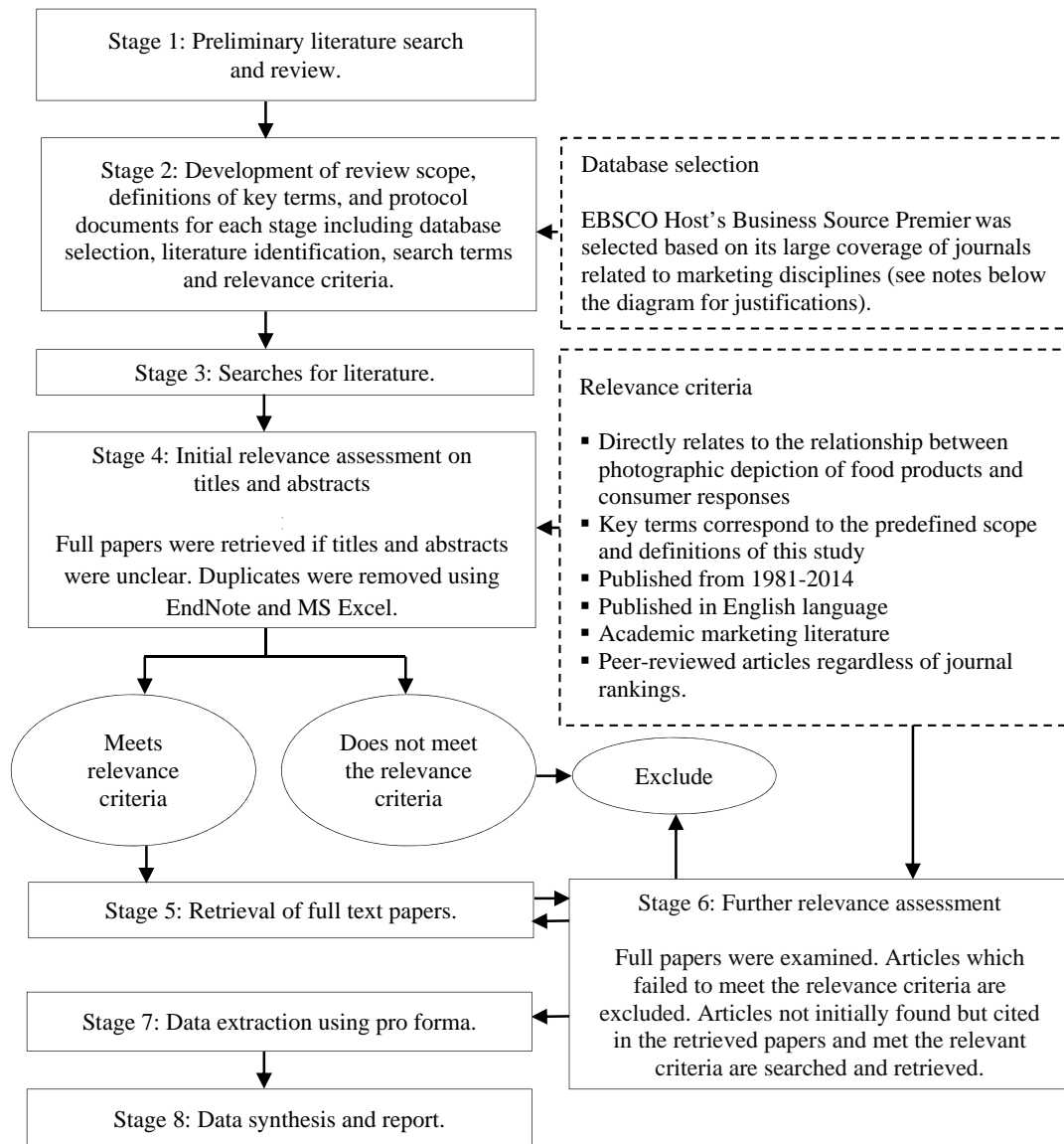
The systematic review study aims to contribute to the marketing literature by providing a review of all relevant studies without any bias towards particular theoretical perspectives. This review method was originally used in the medical science literature but has recently been adapted to the marketing literature (e.g., see Harker, Harker, & Burns, 2007; Stead, Mcdermott, & Hastings, 2007). Our systematic review study, adapted from Khan et al. (2001), involves 8 stages as shown in Figure 1.

Review methods and stages

Stage 1. We conducted a preliminary literature search and review on most recent studies directly related to the research topic (Elder & Krishna, 2012; Jiang & Lei, 2014; Poor et al., 2013) and on relevant but broader topics of sensory marketing, visual perception and persuasion, photography and food psychology (Bate, 2009; Elder & Krishna, 2010; Krishna, 2012; McQuarrie, 2008; Raghubir, 2010; Rozin & Hormes, 2010). The preliminary literature review found that these articles relied on a traditional review method. Inclusion and exclusion criteria were not explicitly given. Most likely, these articles did not aim to provide a critical synthesis or integration. Rather, the articles aimed to give examples of previous studies that provide findings relevant to their specific theory building and hypothesis testing. For instance, Poor et al.'s (2013) article examines the effect of depicted unhealthy foods eaten by another consumer on taste evaluation and other outcomes (including purchase intention) via a reduced negative emotion mechanism. The review provided in Poor et al.'s (2013) article is oriented towards the existing literature in justification of indulgence, social influence and reduced associative negative emotions of unhealthy food consumption. This paper does not argue that the traditional review method is wrong or less valuable than a systematic review method. Both methods serve different research aims. Instead, this paper argues that the systematic review method provides a more complete summary related to the research topic for further integration with explicit inclusion and exclusion criteria.

Stage 2. We developed a review scope, definitions of key terms, and protocol documents for each stage including database selection and literature identification, search terms and relevance criteria.

In this article, by “*photographic depiction*,” we specifically refer to the type of photographic images produced by a camera. These can be still (e.g., print ads, packages) or moving images (e.g., TV ads). The term, “*food*” refers to food products that are meals, snacks and non-alcoholic beverages. The term, “*product*” here refers to all product forms regardless whether they are packaged goods or restaurant meals including packaged groceries or ingredient products such as butter and sauce. The term “*marketing*,” defined



Note:

Web of Science's Social Science Index, Taylor & Francis' Economics, Finance, Business & Industry (formerly known as Informaworld), ProQuest's ABI/INFORM Complete and WARC were also considered. EBSCO Host's Business Source Premier was selected because it includes over 80 marketing journals listed in the 2013 Australian Business Deans Council (ABDC) Journal List.²

The stage of rating each paper by its quality of methodology suggested by Khan et al. (2001) as a further inclusion and exclusion criterion is intentionally left out. This is because our systematic review focuses on peer-reviewed articles published in the academic literature. The quality of methodology of published articles has already been assessed during the peer-reviewed process.

Figure 1
Systematic review study and stages of the review

² This includes, for instance, European Journal of Marketing; Journal of Consumer Research; Journal of Marketing; Journal of Marketing Research; Journal of the Academy of Marketing Science; Marketing Science; International Journal of Consumer Studies; Journal of Consumer Psychology; Journal of Advertising; Journal of Advertising Research; International Journal of Advertising; Journal of Business Research; Journal of International Marketing; Journal of Marketing Management; Marketing Theory; Journal of Marketing Communications; Journal of Marketing Theory and Practice; Advances in Consumer Research; Journal of Consumer Marketing; Journal of Consumer Behaviour; and Journal of Food Products Marketing. For more information, see: www.abdc.edu.au and www.ebscohost.com/academic/business-source-premier.

from a general consumer perspective, is any form of marketing communications practice such as packaging and advertising regardless whether they are in the paid, earned or owned media. This research restricts, the term “*consumer*” to adults aged over 18 years or above. In terms of “*consumer responses*,” this research does not place a limitation on definition. Hence, this can be any consumer responses such as attention, cognition, affect or judgements (e.g., perceptual or attitudinal evaluations of visual stimuli, products or behavioral intention) and behavior (e.g., purchase and consumption).

Figure 2 juxtaposes two different genres of photographic depiction of food products. This study is not interested in figurative or deviated images (e.g., Lurpak’s butter ad on the left, produced by Adam & Eve DDB, London). Rather, this study is interested in the type of food photographs that visually describe intrinsic product benefits and tell consumption stories like the Morrisons’ spread ad on the right. The Morrisons’ spread ad depicts the butter oozing over the golden charred crumpets sitting on a stack of plates with coffee cups in a homey wooden tray to tell stories about the product and consumption experience. This research is only interested in previous studies that examine the relationships between the non-figurative food photographs on consumer responses.



Figure 2
Lurpak’s butter ad (left) and Morrisons’ spread ad (right)

Stage 3. We conducted searches for the literature through a selected database (see Figure 1 for database choices, decision and justifications) using key words, parentheses, compound Boolean search terms and truncation (i.e. asterisk symbol) operators.³ Of all searches, 5,114 potentially relevant titles within the marketing literature were found. All results were exported to EndNote, a bibliography and reference management software package.

Stage 4. After removing 825 duplicate articles, we assessed titles and abstracts of all 4,289 studies against the relevance criteria (see Figure 1). If the titles and abstracts did not provide sufficient information for this initial assessment, full papers were retrieved for further assessment. Included studies had to focus on the visual depiction of food product as a key independent variable. Studies about the images of different food types were not included (e.g., Chernev & Gal, 2010; Raghunathan, Naylor, & Hoyer, 2006) because such investigations focused more on food types rather than visual depictions. Research on actual foods (e.g., Garber, Hyatt, & Starr, 2000; Wansink, 1996) was not included because exposure to actual foods was considered as immediate opportunity for physical product consumption. Studies that involved food pictures but focused more on source characteristics (e.g., Batra & Homer, 2004) were not included because such studies were more related to the research areas of celebrity endorsement and brand personality associations. Including these studies would present a difficulty for generalising and integrating findings.

Stage 5. After elimination, full papers for 66 initially qualified studies were retrieved for further assessment.

Stage 6. We examined all of the 66 initially qualified studies. However, only 11 of these studies met the criteria for inclusion. One additional study (Payne & Wansink, 2010) did not perfectly meet the criteria because the study used actual foods. However, it investigated how food products plated differently could impact on different consumer responses. The study had direct implications on photographic depiction of food. Thus, it was included in the review study. We also used this stage to ensure the rigor and inclusiveness of our review methods by cross-checking all the references cited in the articles. This was to detect articles not found in our search results but which might be relevant. In this process, another full

³ This stage included seven searches with the following search terms: 1) visual depict* OR visual image* OR visual portrayal OR visual cue OR pictorial OR picture OR photo*) AND (food OR snack OR meal OR beverage OR product); 2 product pictures; 3) visual commercial; 4) visual advertis* OR product visual OR product image* OR visual ad OR pictorial advertis* OR pictorial ad OR product depict*; 5) food toppings; 6) product unit image; 7) taste perception OR taste evaluation OR good taste OR perceived taste OR perceived palatability

paper by Homer and Gauntt (1992) published outside the marketing literature cited in Underwood, Klein and Burke (2001) was additionally retrieved and included. As a result, a total of 13 articles were included for the next stage of the review.

Stage 7. We reviewed each of the 13 papers. Key ideas from these papers were then extracted using a pro forma (as shown in Table 1).

Stage 8. We have chosen a qualitative narrative synthesis instead of performing meta-analysis for reporting. This is because the heterogeneity of all reviewed studies was strong. The typologies of visual depictions, food types, and consumer responses investigated and research context varied. A qualitative synthesis, therefore, was more appropriate. All stages of the review were conducted by the first author and each stage of the review including the data extraction was double checked by the second author.

Findings of the systematic review study

The organizing framework

In this article, we metaphorically viewed our role as an architect. MacInnis (2011) likens the task of integration to that of an architect. An architect creates a new building from a set of pipes, cement, steel, wiring, and windows. This means it is important to understand all variables and constructs observed in previous studies and simplify them through an organizing framework before integration can take place.

We used Venn's (1880) set concept to organize the systematic review study findings. We observed all manifest variables investigated by previous studies. On average, each study investigated six variables ($SD = 2.22$, Range = 4–12 variables). There were 53 variables in total. These manifest variables were then designated into 4 main sets: vision; cognition; affect; and behavior, individual or situational differences. Variables or constructs that could be products of cognition and affect components (e.g. perceptual and attitudinal evaluations) were designated under the overlapped cognition and affect subset. We organized variables and constructs into these sets because desired advertising and marketing responses always fall into these sets. Table 2 shows all 53 manifest variables in the designated sets.

Table 1

A summary of past research on photographic depiction of food in marketing from 1981 to 2014

1. Author (Year)	2. Journal	3. Key theory	4. Method	5. Food types	6. Variables	7. Key findings
Debevec and Romeo (1992)	Journal of Consumer Psychology	Visual imagery processing and self-referencing (Paivio, 1969)	Experiment	Soft drink	Food product depicted alone vs. having typical consumers holding the products in print ads, magnitude of self-referencing, ad attitude, brand attitude, purchase intention	As the magnitude of self-referencing increases, ad attitude, brand attitude and purchase intention also increase. Self-referencing mediates the effect of depiction types on ad attitude, brand attitude and purchase intention.
Homer and Gauntt (1992)	Journal of Mental Imagery	Visual imagery processing (Lutz & Lutz, 1978; MacInnis & Price, 1987; Paivio, 1969)	Experiment	Chocolate bar, orange juice	High vs. low eliciting imagery food pictures on packages, visual imagery processing vs. non-visual imagery processing mode, brand recall, product class recall, total recall (i.e. brand recall plus product class recall), brand attitude, package attitude, purchase intention	High-eliciting imagery pictures increase the magnitude of visual imagery. There is an interaction effect between picture types and visual imagery processing modes on brand attitude and purchase intention. Exposure to high-eliciting imagery pictures in a visual imagery processing mode results in higher positive brand attitude and purchase intention. This interaction effect is only marginally significant for package attitude.
Lautman and Hsieh (1993)	Journal of Advertising Research	NA Practitioner-focused	Observation	Frozen entrée, frozen diner	Varied creative depiction tactics of food products in TV ads, on-message recall, perceived appealing features of the ads, positive thoughts/feelings of ads	The number of times foods depicted, the number of different food edits, and the number of times ingredients shown in ads are highly correlated with on-message recall, positive thoughts and feelings and perceived appealing features of the ads.
Underwood, Klein and Burke (2001)	Journal of Product and Brand Management	Visual imagery processing (Lutz & Lutz, 1978; MacInnis & Price, 1987; Paivio, 1969)	Experiment	Candy, bacon, margarine	Presence vs. absence of food products visually depicted on packages in a virtual reality simulation, high vs. low experiential benefits of food types represented on packages, visual attention to the product, choice, brand familiarity (i.e. national vs. private brands)	Presence of product visually depicted on packages increase visual attention to the brand. However, this visual depiction effect was only significant for low familiarity brands among the food types that offered high levels of experiential benefits (i.e. candy).

Table 1 (continued)

A summary of past research on photographic depiction of food in marketing from 1981 to 2014

1. Author (Year)	2. Journal	3. Key theory	4. Method	5. Food types	6. Variables	7. Key findings
Underwood and Klein (2002)	Journal of Marketing Theory and Practice	Visual imagery processing (Lutz & Lutz, 1978; MacInnis & Price, 1987; Paivio, 1969)	Experiment	Candy, bacon, margarine	Presence vs. absence of food products visually depicted on packages, high vs. low experiential benefits of food types, brand beliefs, package attitude, brand attitude, personal importance of experiential benefits, brand familiarity (i.e. national vs. private brands)	Presence of product depicted on packages heightens package attitude and taste belief regardless of brand familiarity. The depiction types do not significantly influence brand healthiness belief. Brand attitude is enhanced only among consumers who place greater importance on sensory than health benefits when exposed to packages with pictures.
Shimp and Stuart (2004)	Journal of Advertising	Emotional processing (Holbrook & Batra, 1987)	Experiment	Roast beef sandwich, chicken sandwich	Presence vs. absence of raw meat depictions as an ingredient of finished food products in TV ads, disgust felt, brand attitude, purchase intention, hunger level, sensitivity to disgust	Felt disgust partially mediate the effect of presence vs. absence of raw meat depictions on brand attitude and purchase intention.
Peracchio & Meyers-Levy (2005)	Journal of Consumer Research	Involvement (Petty, Cacioppo, & Schumann, 1983)	Experiment	Cereal	Upward vs. downward looking camera angles, strength vs. nature concept priming, low vs. high involvement, brand attitude, brand recall	Both camera angles have a positive effect on brand attitude but this effect is conditional when consumers process ad extensively (i.e. high involvement) and when the camera angle matches with its concept.
Deng and Kahn (2009)	Journal of Marketing Research	Visual perception processing (Amheim, 1974)	Field study and experiment	Wafer, cookie, cracker	Varied locations of food products depicted on packages, healthy vs. unhealthy food types, perceived product heaviness, package attitude, eyedness, healthy vs. indulgence consumption goals, high vs. low store shelf contrasts	Products depicted at varied locations on packages influence perceived product heaviness but moderated by whether consumers are left-eyed or right-eyed. Perceived product heaviness influences package attitude but moderated by whether: it is positive or negative for the products to be perceived as heavy or light, consumers have a healthy vs. indulgence goal, and there was a high contrast on store shelf.
Madzharov and Block (2010)	Journal of Consumer Psychology	Anchoring judgement (Kahneman, Slovic, & Tversky, 1982)	Experiment	Cookie, cracker, pretzel	Less vs. more food product units depicted on packages, perceived product quantity, consumption amount, visual processing ability (i.e. high vs. low)	Packages depicting more product units (e.g., 9 pieces vs. 1 piece of cracker) increase perceived product quantity and consumption amount. These effects are moderated by visual processing abilities even correct verbal information is also depicted.

Table 1(continued)

A summary of past research on photographic depiction of food in marketing from 1981 to 2014

1. Author (Year)	2. Journal	3. Key theory	4. Method	5. Food types	6. Variables	7. Key findings
Payne and Wansink (2010)	Advances in Consumer Research	Confirmation bias (Wason, 1960)	Experiment	Salad, sandwich, brownie	Food products presented more vs. less attractively (e.g., on a glass plate vs. on a paper napkin) in a restaurant setting, attractiveness of presentation before eating, taste evaluation after eating, willingness to pay	Products presented more attractively (e.g., on a glass plate) increase perceived attractiveness of presentation, willingness to pay and taste evaluation after eating more than when products presented on a napkin or a paper plate (only for sandwich and brownie – not salad).
Elder and Krishna (2012)	Journal of Consumer Research	Grounded cognition (Barsalou, 2008)	Experiment	Yogurt, hamburger, cake, soup	Left vs. right orientations of food products depicted in pictures and print ads, magnitude of mental simulation, purchase intention, handedness, blocking vs. unblocking mental simulation (i.e. forcing consumers to hold something in their dominant hands), food type liking (i.e. disliked vs. liked food types)	Orientations of products depicted in pictures and print ads matched with viewers' handedness increase the magnitude of mental simulation, thereby heightening purchase intention. The mental simulation effect was moderated by whether consumer mental imagery is blocked. The purchase intention effect is moderated by food type liking.
Poor, Duhachek and Krishnan (2013)	Journal of Marketing	Justification of indulgence (Okada, 2005) and social proof (Cialdini, 2001)	Experiment	Natural almond, potato chip, apple, chocolate bar, chocolate chip cookie	Food product depicted alone vs. having another typical consumer eating the products in pictures and print ads, healthy vs. unhealthy food types, pleasure felt, guilt felt, taste evaluation before and after eating, purchase intention, desire for consuming more, word of mouth intention, healthy vs. indulgence goals, hunger level	Depicting a typical consumer eating unhealthy products reduces the level of guilt associated with the subsequent indulgent consumption experience and, in effect, increased subsequent taste evaluation. This depiction also leads to desire for consuming more, purchase intention and word of mouth intention.
Jiang and Lei (2014)	Journal of Consumer Psychology	Heuristic processing (Chaiken & Eagly, 1989) and averaging bias (Chernev & Gal, 2010)	Experiment	Salad, cake, ice-cream, pastry	Healthy vs. unhealthy augmented food product toppings on healthy vs. unhealthy based food products, calorie evaluation, consumption amount; healthy vs. indulgence goals, food type liking, hunger level	Unhealthy products with healthy topping make consumers underestimate the calorie content and increase consumption amount. This depiction effect is moderated by consumption goals.

Table 2

A summary of variables investigated in research on photographic depiction of food in marketing from 1981 to 2014 by variable sets

Variable sets and subsets	Manifest variables			
Vision				
▪ Photographic depiction types varied by product cues	1) Presence vs. absence of food products visually depicted on packages 2) Presence vs. absence of raw meat depictions as an ingredient of finished food products in TV ads 3) More vs. less units of food products depicted on packages 4) Healthy vs. unhealthy augmented food product toppings on healthy vs. unhealthy based food products			
▪ Photographic depiction types varied by non-product cues	5) Food products depicted alone vs. having a typical consumer eating the products in pictures and print ads 6) Food products depicted alone vs. having typical consumers holding the products in print ads 7) High vs. low-eliciting imagery food pictures on packages 8) Food products presented more vs. less attractively (e.g. on a glass plate vs. on a paper napkin) in a restaurant setting 9) Left vs. right orientations of food products depicted in pictures and print ads 10) Varied locations of food products depicted on packages 11) Varied creative depiction tactics of food products in TV ads 12) Food depicted with upward vs. downward looking camera angles in a print ad			
▪ Visual attention	13) Attention to the product			
Cognition				
▪ Cognitive mental imagery	14) Magnitude of self-referencing	15) Magnitude of mental simulation	16) Magnitude/mode of visual imagery processing	
▪ Cognitive performance	17) On-message recall	18) Product class recall	19) Brand recall	
Affect	20) Pleasure felt	21) Disgust felt	22) Guilt felt	
Cognition and affect				
▪ Perceptual or attitudinal evaluation of visual stimulus	23) Package attitude 26) Positive thoughts/feelings of ads	24) Ad attitude 27) Attractiveness of presentation	25) Perceived appealing features of ads	
▪ Perceptual or attitudinal evaluation of food product	28) Food type liking 31) Perceived product quantity 34) Taste evaluation before eating	29) Calorie evaluation 32) Brand attitude 35) Taste evaluation after eating	30) Perceived product heaviness 33) Brand beliefs	
▪ Perceptual or attitudinal evaluation of behavioural intention	36) Purchase intention	37) Willingness to pay	38) Word of mouth intention	
Behavior, individual or situational differences				
▪ Behavior	39) Choice (i.e. purchase)	40) Consumption amount		
▪ Individual difference	41) Eyedness 44) Sensitivity to disgust	42) Handedness 45) Hunger level	43) Visual processing ability 46) Personal importance of experiential benefits	
▪ Situational difference	47) National vs. private brands types 51) High vs. low involvement	48) Healthy vs. indulgence goals 52) High vs. low store shelf contrasts	49) Matched vs. mismatched ad copy	50) Food 53) Blocking vs. unblocking mental simulation

The synthesis

We synthesized the findings according to the organizing framework. First, we summarized evidence on the effects of depiction types on different outcomes including moderating factors. After that, we turned to a synthesis of key mechanisms that explain the relationship between the depiction types and outcomes.

Depiction types → visual attention. There is promising evidence that the presence of food product depiction on packages may increase visual attention to the product for low familiarity brands and food types that offer high levels of experiential benefits. Underwood, Klein and Burke (2001) conducted an experimental study asking consumers to take six consecutive grocery shopping trips in a virtual reality simulation and buy at least one unit of each of the three products (bacon, candy bar and margarine). They manipulated brand familiarity by using private label brand (low) and national brand (high). They manipulated experiential benefits by using the three product categories. The packages were manipulated to either depict the food product on the package or not. The results showed that the effect of depiction types on visual attention (i.e. touching and looking at products closely) was significant only for bacon and candy bars (because of their higher experiential benefits compared to margarine) and private label brands (because of low familiarity with these brands).

Depiction types → perceptual or attitudinal evaluations of visual marketing stimuli. There is also convincing evidence that simply altering the ways food products are visually depicted or presented can have a significant effect on perceptual or attitudinal evaluations of visual marketing stimuli. The depiction effect can vary depending on other factors such as individual differences. For instance, Madzharov and Block (2010) manipulated the number of product units depicted on packages (e.g., 15 pieces vs. 3 piece of pretzels) in a series of experimental studies. They consistently found that packages depicted with more units increased perceived product quantity contained in the packages. Such an effect was marginally significant only among consumers who have high preferences for processing visual information. Payne and Wansink (2010) conducted a series of experimental studies to investigate visual depiction effects. They manipulated the attractiveness of food presentation (i.e. plating food products on a paper napkin vs. on a glass plate). Their studies found that consumers reported that food products plated on a glass plate were more attractive. Underwood and Klein (2002) compared the effects of presence vs. absence of food products depicted on packages. Their study results showed that consumers liked the

packages with pictures much more than those with no pictures regardless of whether consumers were familiar or not with the brands.

Depiction types → perceptual or attitudinal evaluations of products. There is also strong evidence on the effect of depiction types on perceptual or attitudinal evaluations of products. This depiction effect varies depending on individual or situational differences. For instance, recall Payne and Wansink's (2010) studies on the attractiveness of food presentations. They, interestingly, demonstrated that changing the way a food product was plated (e.g., presenting a brownie on a glass plate instead of plating it on a paper napkin) enhanced taste evaluation after eating and significantly increased willingness to pay more for the brownie. Homer and Gauntt (1992) manipulated how a chocolate bar and an orange juice were depicted on packages in two ways. In one condition, the products were depicted with low-eliciting images (i.e. cocoa beans and a midsection view of a chocolate bar/sun-ripened orange with a glass of orange juice). In the other condition, the products were depicted with high-eliciting images (i.e. a sea of melted chocolate along with a floating chunk of chocolate/orange juice flowing endlessly from an oversized orange on a sunny morning). Their studies found that consumers rated the brand more favourably and wanted to buy the products more when they were exposed to the packages with high-eliciting images. This effect was stronger on consumers who were directly instructed to imagine anticipated consumption experiences. Poor, Duhachek and Krishnan (2013) compared the effects of food products depicted alone vs. depicted with another typical consumer eating them (i.e. consummatory images) in a series of experimental studies. They consistently found that exposure to consummatory images enhanced consumer taste evaluation, desire to consume more food, purchase intention, and word of mouth intention. This depiction effect was only significant for unhealthy foods (e.g., chocolate chip cookies). Consumers believed that the chocolate chip cookies taste better when exposed to consummatory images only when they were primed with healthy consumption goals.

Depiction types → behavior. There is also some evidence showing that the way food products are visually depicted or presented has a significant effect even on actual consumption behavior. This effect can vary depending on individual or situational differences. For instance, recall Madzharov and Block's (2010) studies on the effect of food product units depicted on packages. Their studies consistently found that exposure to packages depicting more product units made consumers eat more food in the packages. This depiction effect was stronger among consumers who prefer to process visual

information even when correct verbal information was also depicted. Jiang and Lei (2014) examined the effect of depicting healthy vs. unhealthy food toppings on healthy vs. unhealthy based foods. Their studies showed that when seeing unhealthy foods (e.g. chocolate pastry) combined with healthy toppings (e.g., a piece of strawberry) led to consumers eating more.

Key mechanism: Cognition – evoked mental imageries. It is evident that depiction types have a significant effect on the magnitude of mental imageries: the extent to which consumers imagine themselves eating the depicted food products. This concept has been variously referred to as “self-referencing” (Debevec & Romeo, 1992), “visual imagery” (Homer & Gauntt, 1992; Underwood & Klein, 2002; Underwood et al., 2001) and “mental simulation” (Elder & Krishna, 2012). The magnitude of mental imageries can significantly explain the relationship between the depiction types and advertising or marketing outcomes. For instance, Elder and Krishna (2012) manipulated the ways yoghurt and soup, cake and hamburger are respectively depicted with a spoon, fork or in the hand by flipping the images horizontally. The manipulation created two depiction conditions: in one condition the cutlery or the hand was on the left and in the other condition it was on the right. They consistently demonstrated that exposure to the depiction types matching with one’s handedness increased visual imageries about eating the foods and purchase intention. This effect was mitigated when consumers were asked to hold something in their hands. The more consumers reported higher amount of imagery, the more their purchase intention was heightened. More importantly, they empirically showed that the amount of visual imagery mediated the effect of depiction types on purchase intention. They posited that this was because consumer cognition was grounded in the way consumers interact with world.

Key mechanism: Affect – reduced negative emotions. Some studies have shown that another way to influence taste perception and food product purchase intention is to reduce negative emotions through photographic depictions. For instance, recall Poor, Duhachek and Krishnan’s (2013) studies on depicting unhealthy foods alone vs. with a typical consumer eating the foods. They empirically demonstrated that exposure to such a depiction type reduced negative emotions associated with eating the food and increased taste evaluation and purchase intention. More importantly, emotional positivity (i.e. positive emotions divided by negative emotions) mediated the effect of depiction types on taste evaluation. They posited that the typical consumer depicted in ads acted as an external justification for indulgence consumption. Shimp and Stuart (2004) manipulated TV ads of chicken and roast beef sandwiches by depicting raw meat as an ingredient in one condition and with it

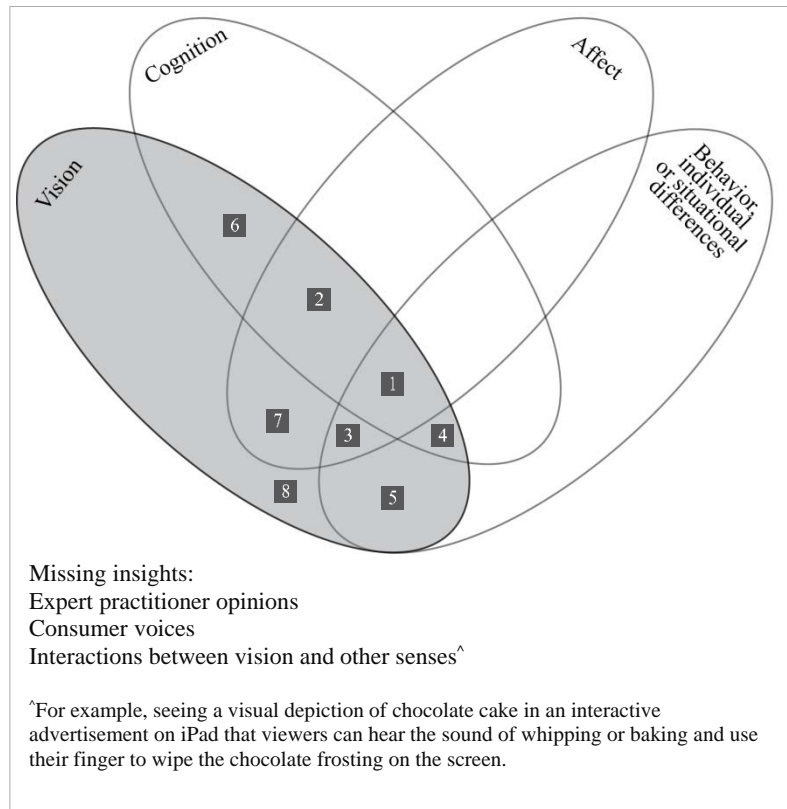
removed in the other condition. Their experimental studies showed that exposure to the raw meat condition resulted in reduced purchase intention. This was partly because such a depiction increased disgust. Hence, the ads without raw meat depiction made the viewers experience less disgust feelings and thereby enhanced purchase intention.

Key mechanism: Evaluations of heuristic cues. Another way to explain the effect of depiction types on advertising and marketing outcomes is that consumers simply rely on evaluations of heuristic cues. For instance, recall Payne and Wansink's (2010) manipulations of a brownie plated on a paper napkin vs. on a glass plate. The platings served as heuristic cues of product quality (i.e. it looks attractive, it should be good) that subsequently biased consumer taste evaluation. Likewise, recall Jiang and Lei's (2014) manipulations of healthy and unhealthy food toppings and food bases. They posited that calorie estimation was biased by healthy food toppings, thereby making consumers eat more.

In summary, the ways food products depicted in advertising and marketing can influence consumer visual attention, perceptual or attitudinal evaluations of visual stimuli and products or even actual consumption behavior. The depiction effect can vary depending on individual or situational differences. Persuasion mechanisms can vary depending on depiction types and individual or situational differences.

Integration of literature

To show how all past studies are interrelated, we have developed a Venn diagram of research on photographic depiction of food (Venn-ROPHDOF) in marketing (see Figure 3). Venn diagrams are useful for conceptualizing past research in order to relate and integrate existing knowledge together (MacInnis, 2011). Built from our organizing framework, the Venn-ROPHDOF diagram shows 8 areas of research in this stream. The diagram highlights the ellipse labelled "vision" as shaded because visual depiction of food is the focal point of research. Areas outside the vision ellipse are not numbered because they will not be related to the visual elements and accordingly deemed irrelevant. The more areas intersect, the more complex is the study (i.e. involved multiple sets of variables and constructs). Our Venn-ROPHDOF diagram connects past studies together and at the same time clearly illustrates empty regions indicating possible avenues for future research.



1 Vision, perceptual and attitudinal evaluations and behavior, individual or situational differences:

Homer and Gauntt (1992)
Underwood, Klein and Burke (2001)
Underwood and Klein (2002)
Peracchio & Meyers-Levy (2005)
Deng and Kahn (2009)
Madzharov & Block (2010)
Jiang and Lei (2014)

and cognition:

Elder and Krishna (2012)

and affect:

Poor, Duhachek and Krishnan (2013)

2 Vision, perceptual and attitudinal evaluations:

Lautman and Hsieh (1993)
Payne and Wansink (2010)

and cognition:

Debevec and Romeo (1992)

and affect:

Shimp and Stuart (2004)

3 Vision, affect and behavior, individual or situational differences

4 Vision, cognition and behavior, individual or situational differences

5 Vision and behavior, individual or situational differences

6 Vision and cognition

7 Vision and affect

8 Vision and visual attention

Figure 3

Venn diagram of research on photographic depiction of food (Venn-ROPHDOF) in marketing from 1981 to 2014

Note: This Venn-ROPHDOF diagram is mapped/demarcated according to the sets of variables investigated in previous research (as shown in Table 2). This Venn-ROPHDOF diagram together with the summary of past research shown in Table 1 and the sets of variables investigated in previous research shown in Table 2 are used to subsequently identify key research gaps.

While Table 1 provides a summary of findings, Table 2 clusters all variables into sets. The Venn diagram of research on photographic depiction of food (Venn-ROPHDOF) in Figure 3 then visually shows how each variable set intersect and where past research can be demarcated according to the variables studied. The Venn-ROPHDOF diagram helps identify research gaps because it visually shows: what insights are missing (i.e. not part of the eclipses), whether an integration of theoretical views can be made, and which research areas are under-investigated. Hence, we used the review summary provided in Table 1, the organizing set framework in Table 2 and the Venn-ROPHDOF diagram in Figure 3 to identify key research gaps as follows.

Research gap a: Unheard expert practitioner opinions. Visual depiction of food in marketing is actually related to food product styling and photography in practice. Food stylists and food photographers are directly involved in food image production such as food product advertisements, food product packages, cookbooks and food magazines (Custer, 2010). However, previous studies have never attempted to gain insight from the expert practitioners on the research topic. Gaining expert practitioner opinions is important for academic research in two respects. First, expert practitioner opinions can help improve the face or content validity of existing measures (Hair, Black, Babin, Anderson, & Tatham, 2010; Rossiter, 2011). Are we measuring what the experts want to measure? Conducting an interview with expert practitioners can improve the measurement theory and reassure us that conceptualizations of constructs and variables are practically relevant. Second, expert practitioners' opinions help reduce the academic-practitioner divide (Lilien, 2011; Rossiter & Percy, 2013). Do we, as academic advertising and marketing researchers, investigate all communication outcomes intended by practitioners? The answer to this qualitative question will serve as a point of reference for a comparison against the variables and constructs summarized in Table 2.

Research gap b: Missing consumer voices. All past studies relied heavily on the experimental study approach (see column 4 in Table 1). None of the previous studies has ever attempted to gain insights from consumers. Conducting a qualitative interview with consumers investigating what they really say when seeing varied food product depictions can add rigor to research in this area. Such a qualitative approach helps identify new ways of understanding consumers better. A lack of qualitative consumer research approach found here seems to resonate with academic advertising and marketing research issues. For example, Nuttall, Shankar, Beverland and Hopper (2011) reviewed 2,023 articles published

in the Journal of Advertising Research over 50 years. Their study found that only 40 papers were classified as qualitative contribution (i.e. only 2%).

Research gap c: Lack of integration. The synthesis and the Venn-ROPHDOF diagram in Figure 3 show that previous studies can be integrated. This is because each study shares the same aim—investigating the effect of depiction types on consumer responses. Integration can be made at the conceptual and measurement level and at the structural theory level.

At the conceptual and measurement level, it is evident that mental imagery is a key persuasion mechanism. However, mental imagery has been conceptualized and operationalized differently in the past as “self-referencing,” (Debevec & Romeo, 1992) “visual imagery,” (Homer & Gauntt, 1992; Underwood & Klein, 2002; Underwood et al., 2001) and “mental simulation” (Elder & Krishna, 2012). This article proposed that to be more specific to food, the construct can be referred to as “general food product consumption visions,” a mental state when consumers have visual images of themselves eating the depicted food in their minds.

There has also been some inconsistencies in conceptualizing emotions evoked by food photographs. In some circumstances, exposure to food photographs can evoke positive emotions and negative emotions (Poor et al., 2013). Some individuals may experience high pleasure and high guilt at the same time (e.g., viewing a rich chocolate cake depicted in an ad). This phenomenon is known as “ambivalence” (Thompson, Zanna, & Griffin, 1995, p. 361). If such circumstances apply, respondents should not be forced to choose between negative and positive emotions (i.e. using bipolar scales) but rate negative and positive emotions separately (i.e. using unipolar scales). Thompson, Zanna and Griffin (1995) provide guidelines on how ambivalence should be measured and computed. Poor et al. (2013) measured positive and negative emotions separately. However, their operationalization (“positive emotions divided by negative emotions,” p. 134) is more related to emotional positivity (Gallan, Jarvis, Brown, & Bitner, 2013) rather than the ambivalence construct proposed by Thompson, Zanna and Griffin (1995).

At the structural theory level, Elder & Krishna’s (2012) article brought in a new theoretical perspective to the advertising and marketing literature. They referred to the grounded cognition theory (Barsalou, 2008). The theory asserts that consumer mental activities are grounded in multiple ways, similar to how consumers interact with the world. Exposure to

food photographs depicted in ads could evoke visual images of eating the foods in the consumer's mind without being directly instructed to imagine so. This means advertising and marketing researchers could explore more of the grounded nature of cognitive activities. This theoretical perspective can be useful as an overarching framework. Results from other previous studies also provide support for this theoretical perspective. For instance, exposure to unhealthy food photographs could evoke positive emotions (e.g., happy) and negative emotions (e.g., guilt) in Poor et. al.'s (2013) studies. Viewing sandwich ads with a shot of raw meat evoked disgust feelings (Shimp & Stuart, 2004). This means consumer emotions related to food consumption are likely to be grounded too (Krishna, 2012). Investigating these mechanisms together will provide an integrative view of photographic persuasion of food product.

Research gap d: Unexplored less complex research areas that potentially could provide significant contribution to the literature. The Venn-ROPHDOF diagram in Figure 3 shows that previous studies are oriented toward investigating complex relationships. Nine out of 13 previous studies fall into area 1 of the diagram. This is the most complex research area that investigates the relationships between vision, cognition, affect, perceptual and attitudinal evaluations and behavior, individual or situational differences. Elder and Krishna's (2012) and Poor et. al.'s (2013) articles are examples of previous studies that fall into this area. The other 4 articles fall into area 2 of the diagram. This research area is also quite complex. It investigates the relationships between vision, cognition, affect and perceptual and attitudinal evaluations. Debevec and Romeo's (1992) and Payne and Wansink's (2010) writings are examples of research in this area. We discuss research opportunities available in the other areas next.

In area 3 of the Venn-ROPHDOF diagram, we see it fits studies that examine the relationships between vision, affect and behavior individual or situational differences. There are research opportunities to investigate who are more likely to experience emotional ambivalence and have more positive or negative emotional responses when seeing food pictures in marketing and in what situations. For example, Wansink, Cheney and Chan (2003) observed that women report a feeling of guilt more than men after eating ice cream, cookies and chocolate. Wansink, Cheney and Chan's (2003) findings suggest an interesting research question: is interaction between depiction types and food types (e.g., unhealthy food depicted with another consumer eating it) in Poor et al.'s (2013) studies stronger for women than men? In area 4 of the diagram, there are limited insights into the role of vision, evoked mental imageries and gender. Opportunities to provide conceptual contributions to

individual differences related to food, cognition, affect and vision are also still available. These research areas are situated in areas 5, 6, 7 and 8 respectively. For instance, in area 5, advertising and marketing researchers can explore other types of individual differences. For example, it has been estimated that in the U.S.A. alone 44 million of adults are foodie consumers (Sloan, 2013). Who is a foodie? How can it be measured? Do they react to food photographs differently compared to non-foodies? Answers to these questions will provide great conceptual and theoretical contribution to research in this stream. In area 6, it is evident that existing studies focus on the visual and self-only imageries (see Table 2). Hence, there are research opportunities to broaden understanding of mental imageries evoked by food photographs further. In area 7, previous studies have investigated a small number of emotions (see Table 2). There are research opportunities to develop a typology of emotions specifically evoked by visual depictions of food products (see Batra & Holbrook, 1990 for example). In area 8, previous studies have provided only some basic typologies of visual depictions (see Table 2). Therefore, there are opportunities to extend these further. The typologies can be classified and mapped according to their similar or different outcomes. There are also research opportunities to conduct eye tracking studies such as those investigated in the broader advertising and marketing research stream (e.g., Pieters et al., 1999; Pieters & Wedel, 2004). Some studies outside the marketing literature have investigated the relationships between visual attention and food images using eye-tracking methodology (e.g., Hoover, Ceballos, Komogortsev, & Graham, 2010; Velazquez & Pasch, 2014). However, these studies focus on food types rather than depiction types. Raghurir (2010) has provided an excellent framework on developing visual typologies that could be explored where it can be applied to photographic depictions of food products.

Discussion

In summary, this article argues that previous studies on photographic depiction of food in marketing have not provided a more complete review of the literature on the topic. This study, therefore, conducts a systematic review study from 1981 to 2014. This article does not only provide a summary of the review. It also provides a synthesis. Altering the way food products depicted slightly can influence consumers in many ways including perceptual and attitudinal evaluations of products or even actual consumption behavior. The depiction effect can vary depending on individual or situational differences. Key mechanisms underlying photographic depiction of food product persuasion are mental imageries, reduced negative emotions, and evaluations of heuristic cues. More importantly, this article also provides an integrative view of previous research fragmentally studied into

a Venn diagram of research on photographic depiction of food in marketing. Additionally, this article points out four key research gaps: unheard expert practitioner opinions, missing consumer voices, lack of integration, and other research areas that could be explored.

We have cross-referenced articles found in this research against those cited in other recent studies on the topic (Elder & Krishna, 2012; Jiang & Lei, 2014; Poor et al., 2013) and other recent reviews on broader but relevant topics (Krishna, 2012; Krishna & Schwarz, 2014; Raghubir, 2010). Many of the articles reviewed in this study have not been included before (published year taken into consideration). For example, none of the articles published prior to 2012 reviewed in this study were included in Elder and Krishna's (2012) article about the visual depiction effect on food product purchase intention via evoked mental imageries. Eight articles published prior to 2013 reviewed in this study were not included in Poor et al.'s (2013) article about the effect of visual depiction on taste perception and purchase intention. Hence, this article is the first that offers a more complete and integrative view of previous studies on the topic.

The systematic review study has contributed to the advertising and marketing literature by providing a bird's eye view of past studies and identifying research gaps. However, it has not specified research priorities. In addition, contribution to conceptual integration could be more concrete. Hence, we next conduct a follow-up interview study with expert practitioners to address these issues and bridge the academic-practitioner gap for this research stream.

Expert practitioner interview study

This expert practitioner interview study has two aims. First, it aims to serve as a point to cross-reference whether there are gaps in construct conceptualisation and measurement theory. Expert opinions can help improve the face or content validity of constructs. Previous studies in this area have never attempted to gain insights from food stylists and photographers before. For example, measures of evoked mental imageries have been borrowed from prior research in non-food advertising and marketing contexts. Previous studies have heavily relied on reporting Cronbach's alphas to determine the quality of measurement (e.g., Elder & Krishna, 2012; Homer & Gauntt, 1992). Hair, Black, Babin and Anderson strongly assert that "when using borrowed scales, researchers should still check for face or content validity...face or content validity is the most important validity test" (2010, p. 688). The objective of establishing face or content validity is to ensure that

the measurements extend past just empirical tests to also include theoretical and practical considerations.

Second, this expert practitioner interview study aims to reduce the academic-practitioner divide (Lilien, 2011; Rossiter & Percy, 2013). It serves as a point of reference to check whether there are any outcomes expert practitioners intend to have on consumers but have never been considered before in academic research. Ethics approval was given to conduct the study by the university in line with the Australian Code for the Responsible Conduct of Research (NHMRC, ARC, & Universities Australia, 2007).

Research methods of expert practitioner interview study

Data quality control prior to data collection

We adapted Podsakoff, MacKenzie, Lee, & Podsakoff's (2003) guidelines on procedural remedies to ensure research data quality. Prior to the interview study, we identified seven key variables that potentially might influence the trustworthiness of interview study findings: 1) obtaining insights only from food stylists or photographers, 2) years of experience, 3) areas of experience, 4) participants' work origin, 5) product forms and sectors they worked for, 6) nonresponse, and 7) disclosure of identity. Hence, we developed the following criteria and research methods to remedy these. To this end, we included both food stylists and photographers. We required that participants at least have four years of experience in order to gain reliable expert insights.⁴ We also varied the participant's years of experience, their work origins and product classes and sectors they had worked in. We used a telephone interview to reduce nonresponse bias due to their different working schedules. Telephone interviews also helped increase anonymity and reach such geographically dispersed expert participants.

We used targeted, chain-referral and theoretical sampling methods. We firstly recruited participants at the 2011 International Conference on Food Styling and Photography (www.bu.edu/foodandwine/photography). We then asked for referrals with specified participants' characteristics needed to ensure data quality. The sampling process then ceased at saturation, as indicated by information repetitiveness (Sandelowski, 2008). The

⁴ The American Photographic Artists (APA), a non not-for-profit association for professional photographers, defines emerging photographers as those who have less than three years of experiences as a full-time professional photographer (see: www.apanational.org). To be eligible to become an accredited member of the Australian Institute of Professional Photography, artists must have at least two years of experiences as a full-time professional photographer (see: www.aipp.com.au).

sample size of 24 in our study was consistent with previous studies that meet theoretical saturation (Creswell, 2007).

Table 3 shows key participants' characteristics. A larger number of participants came from North America and Australia because food styling and photography as an industry, is well established in the U.S.A. (Custer, 2010). Australia has also been well regarded in the industry since the 1990s (Custer, 2010; Tolra, 2003). Examples of brands across different sectors the recruited participants had worked for include: Nestle, Maggi, Knorr, Kraft Foods, McCain, Heinz, Sumeru, Birds Eye, Hellmann's, McDonalds, KFC, Weight Watchers, Lipton, Quaker Oats, Tesco, Hilton, Gourmet Traveller, Donna Hay, Bon Appetite and The Food Network.

Table 3

A summary of expert practitioner participants' characteristics

Demographic variable	Level	Frequency
Gender	Male	7
	Female	17
Role	Food stylist	16
	Food photographer	8
Years of experience	4 – 10 years	8
	11 – 20 years	9
	21 or more years	7
Areas of experience	Advertising	23
	Packaging	16
	Other marketing areas (i.e. point of purchase, web)	15
	Editorial (i.e. film, magazine, cookbook)	17
Work origin	North America	13
	Europe	2
	Australia	6
	Others (i.e. South America, Asia)	3

Interview procedures

Participants were initially invited via email and an interview schedule was arranged after participants agreed to participate on a voluntary basis. At the beginning of the interviews, all participants were told that the aim of the interview was for them to share their experience on food styling and photography; that there were no right or wrong answers; and that their anonymity was to be maintained in publications of results. All participants were asked the same questions: *what primarily do you want the viewers to react when exposed to food photographs? Anything else would you like to add?* We intended not to anchor the question to a particular context such as a particular product form, a particular use in marketing or a particular outcome (e.g., mental imagery, emotion) because we wanted to avoid biased results from such prompts.

Analysis of expert practitioner interview study

The interview data were digitally recorded, transcribed and exported to the QSR International NVivo software program for analysis. Participants spoke about 80 words on average ($SD = 61$, range = 12-264). We used Braun and Clarke's (2006) thematic analysis, which has been widely adopted in marketing research (e.g., Crowther & Donlan, 2011; Handelman, Cunningham, & Bourassa, 2010; Ponnamp & Dawra, 2013; Quinn & Dibb, 2010; Valos, Polonsky, Geursen, & Zutshi, 2010). Thematic analysis was similar to the process of grounded theory (Corbin & Strauss, 2008) analysis. While grounded theory analysis aims to build a causal theory grounded in the qualitative data, thematic analysis aims to discover themes or insights from specific research questions (Braun & Clarke, 2006) such as classifying advertising, marketing or communication outcomes expert practitioners wish to have on consumers in this study.

The analysis involved five stages: 1) immersing in the data to obtain a familiarity of information by reading and re-reading every paragraph, 2) generating initial codes of manifest themes via QSR International NVivo software program using Code-In-Vivo functions (similar to open coding in grounded theory), 3) grouping the manifest themes that were related (similar to axial coding in grounded theory), 4) reviewing and grouping manifest themes into higher-order perspectives (similar to selective coding in grounded theory), and 5) providing definitions and creating a thematic map.

Interviews and data coding were conducted by the first author. All themes were given equal attention. Hence, we did not quantify the results because quantifying the results such as counts of words, themes and sources might mislead the interpretation on the level of importance among themes. We did not employ a second data coder for inter-rater reliability calculation. This is because the inter-rater reliability score is only relevant if researchers would like to quantify their data when conducting a content analysis or when coding participants' free thought listing data for a further quantitative analysis. Braun and Clarke (2012) emphasize that inter-rater reliability scores can only show that two researchers are trained to code data in the same way. The inter-rater reliability scores cannot be interpreted that the coding is accurate. We used a narrative synthesis to tell a story about our findings. The interview data was carefully reviewed and coded, taking approximately 3 months to complete. This effort is consistent with the amount of time taken in other qualitative studies (e.g., Britten, 1995; Flint & Woodruff, 2001; Pidgeon, Turner, & Blockley, 1991; Urquhart,

2001) with the aim and scope of our research taken into account. All interview and data analytical procedures were double checked by the second author and disagreements were resolved through discussion based on the existing marketing literature.

Findings of expert practitioner interview study

We organized all themes into four main sets similarly to the organizing framework developed in the systematic review study: vision, cognition, affect, and behavior. Perceptual or attitudinal evaluations of visual stimuli or products were included as a combined cognition and affect set. We used the same framework to cross-reference and identify new insights. We reported unsurprising findings first before revealing surprising new insights regarding more precise types of mental imageries expert practitioners wished to evoke. A thematic map is shown in Figure 3. All italic emphases are added by the authors to highlight the themes.

Unsurprising findings

Visual attention. The food stylists and photographers reported that they wanted to attract and sustain visual attention from the viewers. For example, they said: “I would like them to *look at it* more than once or just *a glance*,” and “I would like people to *look at* the picture and not turn to the next page but stay on the picture.”

General food product consumption visions. When exposed to food photographs, the practitioners wanted the viewers to imagine themselves eating the depicted foods. For example, they reported:

“I would say to *eat with the eyes*, if you ask me. It is to entice the consumers or the viewers to not to be able to resist it [...]

It (the visual depiction) should make the person want to eat what they are *looking* at [...]

To communicate the product and recipe to the viewer that the client wants to sell and through that is to make food *looks good enough to eat* [...]

Emotions. Expert practitioners wanted to evoke positive emotional responses among viewers of food photographs. For instance, they said: “You want them to *feel good* when they look at the images... I mean making them *feel sort of happy*,” and “I want to *woo* them.”

Perceptual or attitudinal evaluations of food photograph properties. The food stylists and photographers wanted viewers to evaluate food photographs positively. For instance, they said: “I want them to *think* that they are *beautiful images*,” “I just want to make a *beautiful image*. Obviously I want to make food look good but my overall my primary objective is to create a *good looking image*.”

Perceptual or attitudinal evaluations of food products. The food image making experts wanted to make consumers evaluate the depicted or advertised products positively. For instance, they stated: “I want people to think that this is *the most amazing edible thing they can have*,” and “I want them to look at the photo think – *Oh god! That looks delicious*.”

Perceptual or attitudinal evaluations of behavioral intentions. The expert participants wished to increase behavioral intentions. For example, they said: “I want them to *get motivated to cook* the product,” “I want them *to want to buy* the product”

Purchase. The food image makers wanted to influence the viewers’ behaviors such as purchasing the products (e.g., food brands, recipes). For instance, they stated: “The bottom line is to *sell* the product,” “We want you to *buy it...*,” and “It is inducing them to *purchase* the product.”

Consumption. The expert practitioners wanted the viewers to cook and eat the foods. For instance, they stated: “I want to them to *make* it (i.e. cook the recipe or use the products to cook something), and “I want them to buy it and *eat* it.”

Figure 4 shows these themes unshaded. This is because academic researchers have already known and measured these constructs. Compare the unshaded themes in Figure 3 against Table 2 in the systematic review study section. It becomes clear that we, as academic researchers, have done well in taking the majority of outcomes practically related into consideration. General food product consumption visions, as a mental imagery mechanism, may sounds rather subjective. The expert practitioners’ voices confirmed the validity of this construct. It is the experts’ intention to make viewers eat with the mind’s eyes. However, the expert practitioner interview study also provided surprising new insights into more precise mental imageries they wished to have on viewers. We next reported these dimensions of mental imageries missing in the visual food advertising and marketing literature.

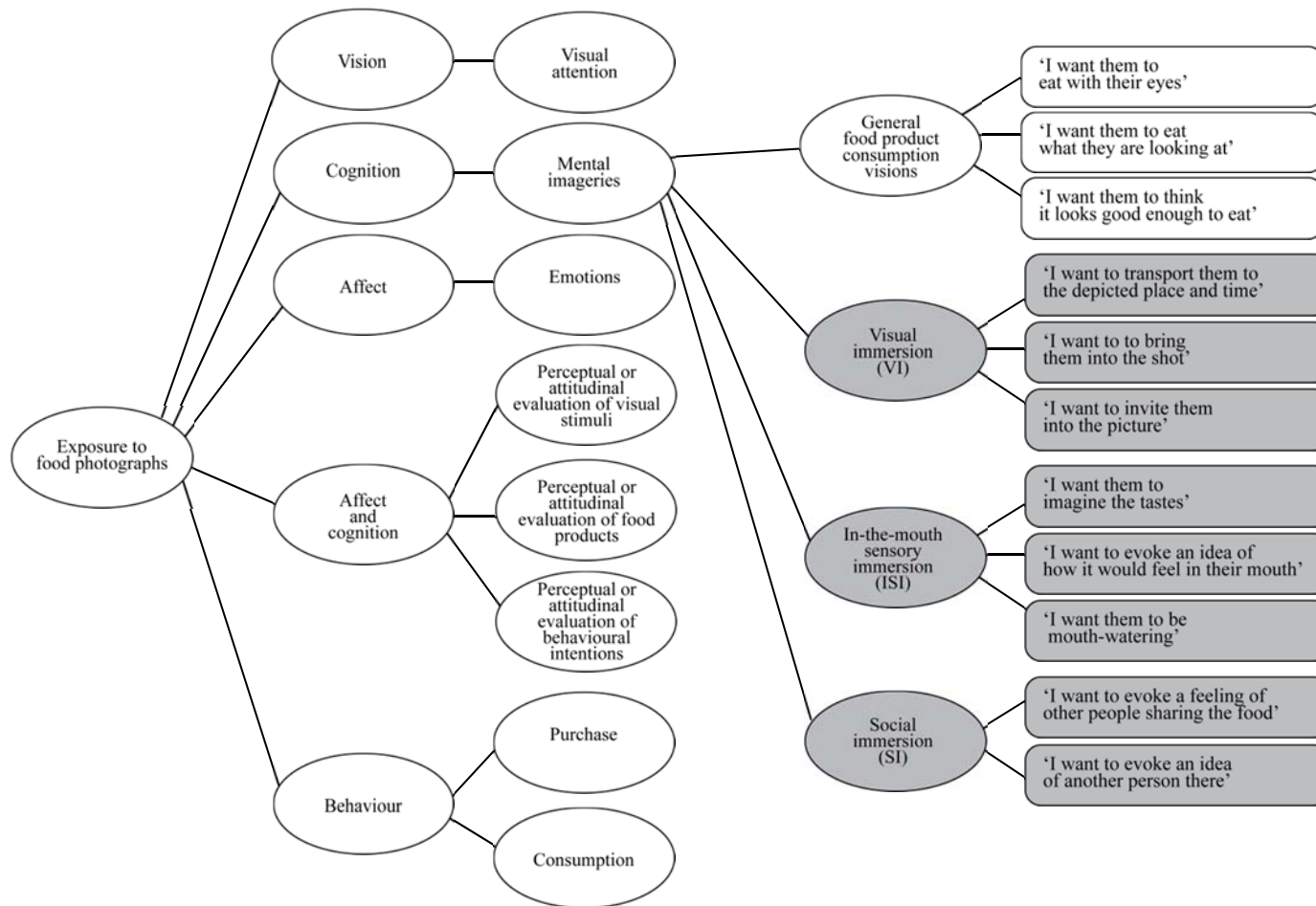


Figure 4

Thematic map showing shaded new insights into more precise types of mental imageries expert practitioners wished to evoke and examples of verbatim extracts

Surprising findings: New insights

The expert food image makers also wished to evoke three specific mental imageries stimulated by photographic depiction of food in consumer mind's eyes: visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI). These dimensions have never been addressed before by previous studies in this area.

Visual immersion (VI). In some circumstances, the food stylists and photographers also wanted the viewers to step into the world of food story telling by inducing viewers to immerse themselves into food photographs. This paper defined this phenomenon as a subjective mental experience when viewers feel as if they are part of the depicted visual stories. For instance, they said:

“The objective of some food photographs can be just visual and art but for all commercial food photographs the objective is to make someone hungry. It is there to pull the emotion and *bring them into the shot* and make them want to buy the product.”

“The communication can be *telling* some kind of *stories* or maybe trying to *transport* the viewer to a *different time and place* by appealing to a different sense.”

In-the-mouth sensory immersion (ISI). In addition, the expert practitioners also wanted the viewers to savour the food pictures by imagining the tastes and feeling the food in their mouth. This article defined this phenomenon as a subjective mental state when viewers imagine or sense the flavors and textures of the depicted food product in their mouth. Note that the sense of flavors is a combination of smell (i.e. retronasal olfaction) and taste (Small & Green, 2012). Hence, this dimension also captures the sense of smell. For example, two food stylists described this phenomenon and how food photographs could evoke this mental phenomenon very well:

“When you experience food in the real world, you get to experience aroma, the smell of it, the texture, the colour, how the *mouth feels*. There are all these visual cues about the food. You can evoke ideas about *texture*, *crispiness* or *smoothness* by *moisture content*. All food items have a visual element and if you can evoke those ideas *visually* it helps the viewer understand what the *taste* is [...]”

“The challenge of food photography is that we are appealing to a single sense that is the eyes. So as a stylist, our job is to try to *communicate wonderful flavors, and wonderful aromas*, and that can be challenging.”

Social immersion (SI). In circumstances when food marketers wanted to tell a story beyond their product the expert practitioners wanted the viewers to mentally interact with social cues visually depicted or hinted as well. This article defined this phenomenon as a psychological state when viewers imagine sharing the food with other people in their mind. For example, two photographers pointed out that:

“Perhaps, I want to depict a person that is *present but not visible* in the picture.”

“We may have *models* involved and they may have kids around the table helping to convey that idea about *sharing this food* [...]. This kind of idea is conveyed through the photo, the props and the story acted by the models.”

Discussion

The expert practitioners’ voices regarding visual immersion (VI), in-the-mouth sensory (ISI) and social immersion (SI) shout at us as academic researchers that it is needed to rethink the existing conceptualization and measures. Compare VI, ISI and SI with the existing construct of general food product consumption visions. It is clear that VI, ISI and SI are more precise. Altogether VI, ISI and SI entail multiple modalities while the existing construct focuses more on visual and self-only imageries. Such new insights suggest that perhaps we can alternatively view the mental imagery phenomenon from a higher-order perspective as immersion. This means in some circumstances exposure to food photographs may make consumers immerse into the world of food story through multiple modalities. We next provided a couple of examples of existing photographic depictions of food products in advertising and marketing to illustrate possible depiction effects on immersions.

Figure 5 shows a photographic depiction of Lurpak’s Slow Churned Butter used in a recent ad campaign by Wieden + Kennedy, London. The photograph depicts a background that looks like a dining table, which indicates that the story is happening in a kitchen. The soft light reflecting on the dining table indicates that it is happening during a morning. This depiction may invite the viewers to immerse visually and in-the-mouth sensorially. Consider the following ad headline (not in the example): “Today we will sit instead of rushing. Taste, instead of wolfing. Slow down. Eat to enjoy. Yes, this is the life.” The ad agency states that “The depiction departs from the brand’s previous bold advertising imagery allowing the captured point in time to shine through” (“This is life,” 2013). The ad headline and the agency’s remarks provide support to the idea of immersions.



Figure 5
Lurpak's Slow Churned Butter image used in an ad campaign



Figure 6
Linda McCartney's Country Pie image used in an ad campaign and on a package

Figure 6 shows a photographic depiction of Linda McCartney's Country Pie used in a recent ad campaign and on its package. Not only does this photograph depict a scene but also a consumption sharing scene. This depiction may make viewers immerse visually, in-the-mouth sensorially and socially. We discuss how advertising and marketing researchers can conceptualize and operationalize this immersion concept next.

To advance the visual persuasion theory of photographic food ads further, this paper proposes that visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) can be viewed as lower-order reflective latent constructs. We postulate that, conceptually, VI, ISI and SI are not the same (assuming they are not highly correlated). Accordingly, VI, ISI and SI can be viewed to form a higher-order perspective as multi-modal food story immersion (MFSI) making it a higher-order formative latent construct. This means MFSI is a function of VI, ISI and SI combined as a total immersion, a mental state when consumers immerse into photographic depiction of food across multiple modalities. One possible measurement and structural equation model of VI, ISI, SI and MFSI is illustrated in Figure 7.

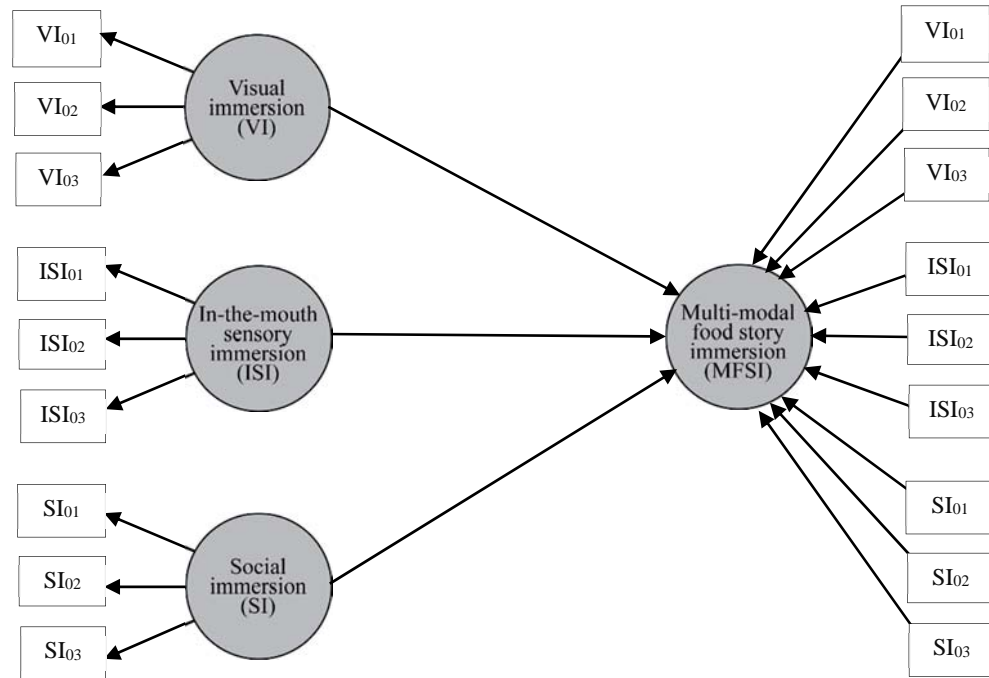


Figure 7
Multi-modal food story immersion (MFSI) as a higher-order reflective-formative construct

In Figure 7, visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) are lower-order reflective constructs because it is expected that covariation among the observed indicators (i.e. VI_{01} , VI_{02} , VI_{03} , ..., SI_{03}) is caused by, and subsequently reflects variation in the underlying latent factors. VI, ISI and SI (conceptually) determine the indicators (e.g., VI_{01} : “I feel invited into the picture,” VI_{02} : “I am transported into the depicted scene,” and VI_{03} : “I feel as if the food is physically here” for VI). It is important to note here that this paper does not aim to develop a scale. These indicators are examples to aid our discussion about reflective measurement. Now, consider dropping one indicator from VI. Doing so is not supposed to influence the meaning of VI because the remaining indicators are supposed to adequately represent the concept of VI (Bollen & Lennox, 1991). These reflective relationships are illustrated by the arrows pointing from VI, ISI and SI to the indicators. In sharp contrast, multi-modal food story immersion (MFSI) is a higher-order formative construct. Dropping VI, ISI or SI from the model can change the meaning of MFSI because VI, ISI and SI define MFSI. These formative relationships are illustrated by the arrows pointing from VI, ISI and SI to MFSI. As the lower-order constructs are reflective (i.e. VI, ISI and SI) and the higher-order construct is formative (i.e. MFSI), the model presented in Figure 7 is known as a “reflective-formative hierarchical component model” (Hair, Hult, Ringle, & Sarstedt, 2014, p. 233), “higher-order molar construct” (Chin, 2010, p. 665; Chin & Gopal, 1995), or “reflective first-order formative second-order” multidimensional composite construct (Diamantopoulos, Riefler, & Roth, 2008, p. 1207; Jarvis, Mackenzie, & Podsakoff, 2003, p. 205) in the structural equation modelling context.

This paper proposes that researchers should view immersions from a higher-order perspective (i.e. as multi-modal food story immersion or MFSI) for the following reasons. MFSI makes more theoretical and practical sense. Imagine using visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) without conceptualizing them as MFSI to predict purchase intention. Doing so assumes that VI, ISI and SI are independent. Also, it fails to acknowledge that some consumers may immerse into photographic food ads across multiple modalities. Hence, MFSI as a total immersion is conceptually and operationally stronger. Accordingly, we postulate that MFSI should predict purchase intention better than VI, ISI and SI alone. Also, conceptualizing immersions from a higher-order perspective makes it more parsimonious for subsequent theory buildings because it reduces the number of constructs in further modelling.

Summary and general discussion

In summary, this article is the first to provide a systematic review study for research on photographic depiction of food in the marketing literature from 1981 to 2014. Changing the way food products are depicted can influence consumers in several ways including their brand evaluations and purchase intention or even consumption amount. The depiction effect can vary depending on individual or situational differences. Evoked mental imageries, reduced negative emotions and evaluations of heuristic cues are key mechanisms in photographic persuasion of food products. This article also develops Venn diagram of research on photographic depiction of food (Venn-ROPHDOF) in marketing. The Venn-ROPHDOF diagram shows where previous studies are situated. Moreover, this article points out four key research gaps: unheard expert practitioner opinions, missing consumer voices, lack of integration, and other research areas that could be explored.

This article is also the first to provide expert practitioner voices on the topic through an interview study with food stylists and photographers. The interview study results show new insights into more precise mental imageries the expert food image makers wish to have on consumers. These are: visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI). This idea of immersion can be conceptualized from a higher-order perspective as a multi-modal food story immersion (MFSI) or a total immersion. MFSI is a weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm).⁵ This means the more consumers: feel as if they are part of the visual depiction or transport themselves into the world of photographic food story, sense or imagine flavors and textures of the depicted food in their mouth and imagine sharing the depicted food with others in their mind, the more they immerse.

Recall MacInnis' (2011) remarks about integration being more than just a summary of previous studies but a synthesis that draws connections from previous studies, finds a novel, simplifies or provides a higher-order perspective. It is clear that this article has achieved a level of integration. This article significantly contributes to the visual food advertising and marketing literature by providing: a review, a summary of variables and constructs, a synthesis, an integrative view of previous studies via a Venn-ROPHDOF diagram, and MFSI as an integration of mental imagery constructs evoked by food photographs. Although the main contribution of this article is conceptual, it has some important

⁵ Readers who are not familiar with the latent variable score estimation process based on a structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.

theoretical and practical implications. We next discuss these implications before developing research priorities in this area.

Theoretical implications

Previous studies have borrowed constructs from earlier research in non-visual food advertising and marketing contexts to measure mental imageries evoked by photographic depiction of food. These borrowed constructs and measures are, for example, “self-referencing” (Paivio, 1969; Shavitt & Brock, 1986) and “visual imagery” (Bone & Ellen, 1992; MacInnis & Price, 1987). Previous studies have conceptualized the mental phenomenon as a one-dimensional construct. This article refers to this measure as “general food product consumption visions,” to be more specific to food. It measures the amount of visual images of eating the depicted food products evoked in the consumer’s mind. As such, the measure reflects only one dimension of the phenomenon, visual imageries about themselves eating the foods.

On the other hand, MFSI conceptualizes the mental phenomenon in three specific modalities: VI, ISI and SI. The concepts of VI, ISI and SI come from practitioner opinions. This means VI, ISI and SI have face or content validity. From a theoretical perspective, MFSI is a conceptually stronger construct because it is a weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm).⁶ As VI, ISI and SI increase, MFSI also increases. Experienced mental imagery researchers know that the evocation of imagery can involve concrete representations of multiple modalities (MacInnis & Price, 1987; Rossiter, 1982; Yuille & Catchpole, 1977). Food photographs can tell stories about flavors, consumption scenes and people sharing. Hence, MFSI is a more precise and specific concept of mental imageries through multiple modalities evoked by a photographic depiction of food. Precision and specification enhance construct validity (Hair et al., 2010). MFSI can be easily constructed using the partial least squares structural equation modelling (PLS-SEM) approach (as shown in Figure 7, see Becker, Klein, & Wetzels, 2012 for an empirical example).

The concept of immersion, in fact, exists in the literature. For instance, in the interactive advertising literature, consumers immerse into 3D gaming virtual environments (Grigorovici & Constantin, 2004). In the non-food advertising literature, consumers transport themselves into ads (Escalas, 2004). In the media psychology literature, readers

⁶ Readers who are not familiar with the latent variable score estimation process based on a structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.

immerse themselves into written novels (Green & Brock, 2000). However, this does not mean that MFSI is not new. The concept of MFSI is novel in two respects. First, it is novel within the visual food advertising and marketing literature because previous studies in this area have never viewed the consumer mental phenomenon from an immersion perspective before. Second, MFSI is conceptually unique compared to other existing immersion phenomena. This is because MFSI is specific to food and has the in-the-mouth sensory immersion (ISI) and social immersion (SI) as additional defining components.

From a structural theory integration perspective, our review shows that photographic persuasion of food products may occur through different routes involving evoked mental imageries (i.e. MFSI), emotions and a heuristic evaluation. Ideally, these constructs should be investigated at once. This is to acknowledge that consumers may use different strategies to process visual food advertising and marketing information. Previous studies in this area have never investigated all these mechanisms together. This implication is more related to a long term integration goal because such studies can be quite complex.

Practical implications

This article provides some practical implications in the respect that it provides a summary of past studies and empirical evidence on photographic persuasion of food product. Practitioners can use Table 1 and Table 2 as references to understand the effects of different photographic depiction types in varied contexts. For example, practitioners should now realize from Payne and Wansink's (2010) article that changing a plating style of a brownie can influence consumer taste evaluation. Such findings have implications for food styling and photography for advertising and marketing. What Payne and Wansink have manipulated may be known from a practitioner perspective as prop styling. The prop stylist's job is to find non-food objects (e.g., plates, cutlery) to ensure that a food product depiction has an intended look and feel. Practitioners may have already realized the important role of prop styling. However, empirical evidence synthesized here make the practitioners understand that such visual element can make a significant difference, statistically. The expert practitioner interview study results also reassure practitioners that academic researchers and practitioners are on the same page. Existing research in the academic literature addresses intended effects the practitioners want to have on consumers well.

Future research

This research focuses more on making a conceptual contribution to the literature. Thus, it is beyond the scope of this paper to empirically demonstrate the validity and reliability of VI, ISI, SI and MFSI. Although this research has achieved a level of integration, there is still a lot to be done. We propose research priorities as follows.

First, future research should conduct a qualitative interview study with consumers to validate whether the VI, ISI and SI phenomena really exist. Consumer voices can be used to develop indicators for the VI, ISI and SI scales. Further, validity and reliability of the constructs can be empirically demonstrated by conducting a confirmatory factor analysis. Then, future research can investigate the effect of photographic depiction types that facilitate MFSI and the effect of MFSI on advertising or marketing outcomes. Future research should also verify whether MFSI is a significant intervening mechanism. Once the quality of the measurement model and basic verification of structural theory have been achieved, future research can then incorporate other factors into the model (e.g. food types, gender). After that, it will also be useful if future research can show how MFSI connects to other existing advertising or marketing communications theory. Next, future research should consider investigating MFSI, emotional and heuristic evaluation mechanisms together. Then, future research can investigate other unexplored areas discussed earlier such as developing a visual typologies and eye tracking research. These research priorities are oriented towards the goal of integrated marketing.

To conclude, Porter and Cu (2014) perfectly sum up how trustworthy our interview findings are and how our developed research priorities deserve attention. Todd Porter and Diane Cu are professional photographers and filmmakers (who did not participate in our interview study) based in the U.S.A. Their work has been published for many clients in different sectors such as Nestle, Whole Foods Market, Food and Wine Magazine and Los Angeles Times. They uphold:

“Food photography— isn’t—just about taking a *delicious image* but it’s a way to tell a *story about tastes* [...] to tell a story through food photography, you want the image to feel more authentic, to feel it lived in – as if the viewer is part of that story, *as if they are there* [...] It’s connecting with people – the way that you *connect* with people through food, *sharing* a dinner table. It is the same through food photography [...]”

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CHAPTER 3

Multi-modal food story immersion (MFSI):

A new persuasion mechanism grounded in consumer voice and its role in inducing purchase intention

Abstract. This paper introduces a new multi-modal food story immersion (MFSI) construct and its basic theory. The authors¹ propose that when consumers are exposed to photographic food ads, they experience: visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI). Results from a consumer interview study show that these phenomena exist and suggest convincing relationships with photographic depiction types and purchase intention. Foods depicted with more explicit consumption sharing scenes make consumers immerse more (because such a depiction puts the consumption in a context of places and made the food experience appear more sociable) and thereby induces their purchase intention. A follow-on experimental study empirically verifies that VI, ISI and SI are distinctive from each other. All these phenomena can be conceptualized and operationalized from a high-order perspective as multi-modal food story immersion (MFSI), a weighted sum of VI, ISI and SI. Photographic depiction types do not directly influence purchase intention. Instead, they influence purchase intention via MFSI. Foods depicted with more explicit consumption sharing scenes lead to higher MFSI and as MFSI increases purchase intention also increases. The MFSI theory, grounded in consumer voice and empirically tested, provides new avenues for future research in the visual food advertising and marketing literature. It also helps marketing managers understand how to photographically tell food stories to facilitate immersions and subsequently entice their consumers.

Key words. Multi-modal food story immersion (MFSI), Photographic depiction of food products, Visual immersion (VI), In-the-mouth sensory immersion (ISI), Social immersion (SI), Purchase intention, Advertising, Marketing

¹ Joseph N. Pitt, PhD candidate is the first author of this article. Associate Professor Lawrence Ang, Principal thesis supervisor is the second author of the article who reviews and provides constructive comments on previous versions of this article.

Introduction

Photographic depictions of food products in marketing contexts such as advertising can tell stories about tastes, moments in time, with whom and where the products are being consumed. In fact, storytelling is very common in food marketing practices—particularly among food retail, food product and restaurant chain sectors (Bacon, 2013). Hence, it is not surprising that expert food image makers such as food stylists and food photographers (e.g., Porter & Cu, 2014; Tsang, 2011) sometimes do not only want to evoke 1) *visual images* of eating the foods in the mind's eyes of consumers. They also want the viewers to 2) *feel as if the viewers are part of the pictures*, to 3) *savour* and to 4) *share* the foods depicted with others in mind when exposed to their images. Unfortunately, previous research in this area only provides insight into the first phenomenon that has been referred to as visual imagery (Underwood, Klein, & Burke, 2001), self-referencing (Debevec & Romeo, 1992) and mental simulation (Elder & Krishna, 2012). This research, therefore, asks: do consumers really experience the latter three phenomena in visual food advertising contexts, are these three specific phenomena discriminable, how can these phenomena be conceptualized and operationalized, and more importantly can such subjective perceptual-cognitive experiences empirically explain the relationship between photographic food ad exposure and purchase intention?

This article makes four propositions in this paper. First, when consumers are exposed to photographic depictions of food products in print ads they immerse into the world of food story through multiple modalities: *visual immersion*, *in-the-mouth sensory immersion* and *social immersion* (hereafter VI, ISI and SI respectively). VI, ISI and SI refer to the three consumer responses the food image making experts aim to elicit. Second, we suggest that VI, ISI and SI are different. Third, we propose that VI, ISI and SI can be conceptualized from a higher-order perspective as *multi-modal food story immersion* (hereafter MFSI). Fourth, exposure to food products depicted with more explicit consumption sharing scenes leads to higher MFSI. This is because such a depiction puts the consumption in a context of places and made the food experience appear more sociable. The more MFSI one experiences, the more one's purchase intention is induced. More importantly, photographic depiction types have an indirect-only effect on purchase intention via MFSI.

Theoretical development

Grounded cognition theory – an overarching framework

This research is built from grounded cognitive theory (Barsalou, 2008). The theory of grounded cognition posits that our cognition is grounded in several ways such as mental simulations, situated action and bodily states. This means our cognition can be influenced by a stimulus, a situation we are in and bodily positions. This research focuses on mental simulation. Barsalou explains how this form of cognition is generated and re-enacted:

“As an experience occurs (e.g., easing into a chair), the brain captures states across the modalities and integrates them with a multimodal representation stored in memory (e.g., how a chair looks and feels, the action of sitting, introspections of comfort and relaxation).

Later, when knowledge is needed to represent a category ‘such as seeing a picture of a chair,’ multimodal representations captured during experiences with its instances are reactivated to simulate how the brain represented perception, action and introspection associated with it” (2008, p. 618).

For consumption experience, eating always occurs in the context of places. We eat at home or at someone’s place, in a café or restaurant, at a park or winery. Additionally, eating is a social activity. This eating-with-other phenomenon is sociologically known as “commensality” (Sobal, 2000). Sobal and Nelson’s (2003) cross-sectional mail survey with almost 700 individuals in one U.S.A. region shows that most people do not eat alone. Considering a specific meal time, 58% eat breakfast alone. However, 55% and 80% have lunch and dinner with other people respectively. Holm’s (2001) telephone survey study with almost 5,000 individuals in Denmark, Finland, Sweden and Norway also provides a consistent evidence that people indeed eat most meals with families, work colleagues or friends.

From an applied perspective, the grounded cognition theoretical view has one important implication for visual food advertising and marketing communications. That is, exposure to photographic food ads may evoke perceptual and cognitive responses in multiple modalities. When consumers see food ads depicted in consumption sharing scenes they may feel as if they are there, sense the flavors and textures of the foods, and imagine eating with others. They, perceptually and mentally, participate in the telling of the food story encoded in photographic ads—just like a re-enactment of the real world consumption experiences. Such implication raises an important conceptual question for advertising researchers: is it necessary to rethink the way we have conceptualized and operationalized mental phenomena evoked by photographic food ads?

For years, advertising and marketing researchers have been interested in: facilitating consumers to imagine using products, and measurements of individual differences in, and magnitude of mental imageries. This paper reviews the last aspect, particularly in visual food advertising and marketing communications contexts. Table 1 provides a summary of the review (for broader contexts see Babin & Burns, 1998; Bone & Ellen, 1992; MacInnis & Price, 1987; Miller, Hadjimarcou, & Miciak, 2000).

This paper commends the efforts advertising and marketing scholars have put into conceptualizing and measuring the magnitude of evoked mental imageries. However, this article makes three arguments about the limitations of existing concepts and measures. First, existing concepts and measures focus heavily on visual and self-only imageries (see columns 3, 4 and 5 in Table 1). This issue might stem from the influence of earlier work in visual and self-referencing research (see column 6 in Table 1). It is also obvious that the theory of grounded cognition has not much been integrated into this research area. Krishna and colleagues (e.g., Elder & Krishna, 2012; Krishna & Schwarz, 2014) are pioneers in the integrative work. However, their recent study (i.e. Elder & Krishna, 2012, see Table 1) in this area has still primarily focused on visual and self-only imageries (see columns 3, 4 and 5 in Table 1). Second, the measurement evaluations have heavily focused on Nunanny's (1978) and Churchill's (1979) approaches, which can be seen from the influence of using exploratory factor analysis and Cronbach's alphas for evaluating construct reliability (see column 7). One limitation of such approaches is the lack of face validity or content validity of a construct (Rossiter, 2011) grounded in consumer voice including that of expert opinions. Third, there have been limited attempts to view the construct from a higher-order perspective. For instance, if exposure to photographic food ads make consumers feel as if they are there, sense the flavors and textures of the depicted food, and imagine themselves sharing the depicted with others, this can in fact be conceptualized as total immersion. A weighted sum (based on a partial least squares equation modelling algorithm)² of visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) is conceptualized as multi-modal food story immersion (MFSI), a higher-order perspective of theoretically related mental phenomena.

² Readers who are not familiar with the latent variable score estimation process based on a structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.

Table 1

Existing mental imagery constructs in the advertising and marketing literature

1. Authors	2. Stimulus	3. Construct	4. Scaling information	5. Aspects	6. Influenced work	7. Measurement quality
Debevec and Romeo (1992)	Visual food print ad: soft drink	Self-referencing	Number of indicators and scale points, scale format and anchoring not reported. Example: <ul style="list-style-type: none"> ▪ “How personally relevant the ad was?” ▪ “Was the product personally useful and beneficial?” ▪ “I could picture myself trying the product” (p. 91) 	1. Personal relevance of ad 2. Personal useful and beneficial of product 3. Visual imageries about trying the product	Visual imagery processing and self-referencing (Paivio, 1969)	Only Cronbach’s alphas (above .70) reported. Factor loadings, composite reliability and average variance extract values not reported.
Homer and Gauntt (1992)	Visual food product packages: chocolate bar and orange juice	Imagery/ non-imagery processing mode used as a binary factor	1 indicator as a manipulation check. Measured on a 9-point scale. Scale format and anchoring not reported: <ul style="list-style-type: none"> ▪ “I imagined my reaction to the packages,” (p. 136) 	1. Visual imageries about reactions	Visual imagery processing (Lutz & Lutz, 1978; MacInnis & Price, 1987; Paivio, 1969)	NA
Underwood, Klein and Burke (2001)	Visual food product packages: candy, bacon and margarine	Imagery/ non-imagery processing mode	NA – not reported as a measure but assumed to be the mode of processing for visual packages (p. 60)	NA	Visual imagery processing (Lutz & Lutz, 1978; MacInnis & Price, 1987; Paivio, 1969)	NA
Elder and Krishna (2012)	Food images and food ads: yoghurt, hamburger, cake and soup	Embodied mental simulations	3 indicators. Measured on 9-point unipolar scales, anchored by 1 = not at all/few or no images and 9 = to a great extent/lots of images adapted from Bone and Ellen (1992): <ul style="list-style-type: none"> ▪ “As you viewed the ad, to what extent images of eating the product came to mind?” ▪ “While viewing the ad, I experienced...” ▪ “I could imagine eating the product” (p. 992) 	1. Visual imageries about eating the product	Grounded cognition (Barsalou, 2008); Visual imagery (Bone & Ellen, 1992)	Only Cronbach’s alphas (above .70) reported. Factor loadings, composite reliability and average variance extract values not reported.

Table 1 (continued)

Existing mental imagery constructs in the advertising and marketing literature

1. Authors	2. Stimulus	3. Construct	4. Scaling information	5. Aspects	6. Influenced work	7. Measurement quality
Bone and Ellen (1992)	Radio food ads: popcorn	Visual imagery processing	<p>6 indicators measured vividness. Measured on 5-point staple scales:</p> <ul style="list-style-type: none"> ▪ “Clear, vivid, intense, lifelike, sharp, and defined” <p>6 indicators measured quantity and ease of imageries. Measured on 9-point scales, anchored by 1 = to a very small extent/few or no images/strongly disagree/extremely difficult and 9 = to a great extent/lots of images/strongly agree/extremely easy. Example:</p> <ul style="list-style-type: none"> ▪ “As you listened to the ad, to what extent did any images came to mind?” ▪ “All sorts of pictures, sounds, tastes and/or smells came to my mind while listening to the ad” ▪ “How difficult or easy were the images to create?” ▪ “I had no difficulty imagining the scene in my head” (p. 97) 	<p>1. Quantity and ease of visual imageries</p> <p>2. Vividness of evoked imageries</p>	Visual imagery (Lutz & Lutz, 1978; MacInnis & Price, 1987)	<p>Cronbach’s alphas (above .70) reported.</p> <p>Exploratory factor analysis with factor loadings reported.</p> <p>Composite reliability and average variance extract values not reported.</p> <p>Discriminant validity reported using correlation matrices alone.</p>
Babin and Burn (1998)	Visual print ads: car; camera and tea	Visual imagery processing	<p>8 indicators measured vividness. 3 indicators measured quantity of images. 3 measured elaboration of images. All measured on 7-point scales, anchored by strongly disagree and strongly agree. Scale format not reported. Example:</p> <ul style="list-style-type: none"> ▪ The imagery that occurred was: “Clear, detailed, weak[^], fuzzy[^], vague[^], vivid, sharp, well-defined. [^]Scores were reversed for these items. ▪ “I imagined a number of things” ▪ “I imagined what it would be like to use the product advertised.” (p. 270) 	<p>1. Vividness of evoked imageries</p> <p>2. Quantity of visual imageries</p> <p>3. Elaboration of visual imageries</p>	Visual imagery (Gregory, Cialdini, & Carpenter, 1982; Lutz & Lutz, 1978; MacInnis & Price, 1987; Paivio, 1969)	<p>Factor loadings (.58 to .84), composite reliability values (above .58) and variance extract values (above .50) reported.</p> <p>Discriminant validity reported using phi correlation value < 1, ΔX^2 differences and variance extracted > the square of the correlation between constructs.</p>

Table 1 (continued)

Existing mental imagery constructs in the advertising and marketing literature

1. Authors	2. Stimulus	3. Construct	4. Scaling information	5. Aspects	6. Influenced work	7. Measurement quality
Phillips (1996)	Visual print ad: holiday	Visual consumption visions	<p>4 indicators. Measured on bipolar scales. Number of scale points not reported. Example:</p> <ul style="list-style-type: none"> ▪ “How much did the ad bring to mind concrete images or mental pictures?” endpoints anchored by very much-not at all ▪ “When thinking about the trip to the destination, how vivid or detailed was the image that came to mind?” endpoints anchored by very vivid-not at all vivid ▪ “While reading the ad, to what extent were you able to transport yourself into the ad?” endpoints anchored by very much-not at all (p. 72) 	1. Visual imageries of anticipated consumptions	Visual imagery and mental simulations (Anderson, 1983; Gregory et al., 1982; Lutz & Lutz, 1978; Paivio, 1969)	Only Cronbach’s alphas (above .70) reported. Factor loadings, composite reliability and average variance extract values not reported.
Miller, Hadjimarcou and Miciak (2000)	Radio, visual print and TV ads: varied product categories	Mental imagery processing	<p>2 indicators measured taste/smell imageries. 3 indicators measured quantity of visual imageries. All measured on 7-point bipolar scale, anchored by -3 = strongly disagree and +3 = strongly disagree. Example:</p> <ul style="list-style-type: none"> ▪ “While I watched the commercial, I imagined tastes” ▪ “While I watched the commercial, I imagined scents” ▪ “While I watched the commercial, many images came to my mind” <p>5 indicators measured vividness of evoked visual imageries. Measured on 7-point semantic differential scales:</p> <ul style="list-style-type: none"> ▪ “The images that came to mind while I watched the commercial were: Vivid-Vague, Clear-Unclear, Sharp-Dull, Intense-Weak, Fuzzy-Well-defined” (p. 6) 	<p>1. Taste/smell 2. Quantity 3. Vividness</p> <p>The authors also measured valence (i.e. likeable/not likeable) of imageries evoked by ad. However, this research views such aspect as conceptually similar to ad attitude.</p>	Visual and mental imagery (Lutz & Lutz, 1978; MacInnis & Price, 1987; Paivio, 1971)	<p>Factor loadings (.59 to .88), Cronbach’s alphas (.67 to .89) across three ad media types.</p> <p>Discriminant validity reported using only factor loadings.</p> <p>Measurement invariance across three ad media types not reported.</p>

Table 1 (continued)

Existing mental imagery constructs in the advertising and marketing literature

1. Authors	2. Stimulus	3. Construct	4. Scaling information	5. Aspects	6. Influenced work	7. Measurement quality
Escalas, Moore and Britton (2004)	TV ads: varied product categories	Being hooked	8 indicators. Measured on 7-point scales. Scale format not reported. Example: <ul style="list-style-type: none"> ▪ “This ad really intrigued me” ▪ “I could not relate to this commercial ▪ “This commercial reminded me of experiences or feelings I've had in my own life” ▪ “I felt as though I was right there in the commercial experiencing the same thing” ▪ “I would like to have an experience like the one shown in the commercial” (p. 110) 	1. Involvement – including sustained attention to, interest in, visual immersion into, and personal relevance of ads	Experiential involvement (Wild, Kuiken, & Schopflocher, 1995) and narrative transportation (Green & Brock, 2000)	Only Cronbach’s alpha (above .70) reported. Factor loadings, composite reliability and average variance extract values not reported.

Note: Other conceptually related constructs beyond the advertising and marketing literature and totally not related to food are: “Absorption,” (Tellegen & Atkinson, 1974), “Flow” (Csikszentmihalyi, 1975; Csikszentmihalyi & LeFevre, 1989), “Telepresence or Presence,” (Minsky, 1980) and “Transportation” (Green & Brock, 2000).

Absorption is a personal tendency construct measuring the extent to which one is likely to become immersed in movies, acting, nature, music and fantasy in general (Tellegen & Atkinson, 1974, p. 270).

Flow is an optimal experience occurring when individuals are encountered by a highly challenging task that requires a high level of personal skills (Csikszentmihalyi & LeFevre, 1989, p. 816).

Telepresence or presence is a mental phenomenon when individuals feel immersed into virtual reality such as virtual online store and 3-D interactive ads/advergates and TV programs. Telepresence or presence measures the levels of one’s senses of leaving the real world and being part of the virtual reality and TV programs (e.g. Kim & Biocca, 1997; Klein, 2003, p. 43; Li, Daugherty, & Biocca, 2002, p. 44).

Transportation is a mental phenomenon when individuals feel transported to the world of written fictions and movies. Transportation is a uni-dimensional construct, which measures the levels of one’s cognitive and affective involvement and visual imagery about the written fictions and movies (Green & Brock, 2000, p. 704).

Raising these conceptual issues is necessary because it is an essential part of advancing our knowledge in this area through integration (MacInnis, 2011). Krishna and Schwarz (2014) described well why advertising, marketing and consumer researchers need to rethink consumer cognition as grounded in their consumption experiences and raise conceptual issues in the existing literature:

“[Traditional information processing paradigm] assumed that people acquire information through their senses and that this information is translated into common code that is *independent* of the modality in which the information was initially acquired (Krishna & Schwarz, 2014, p. 160) [...]

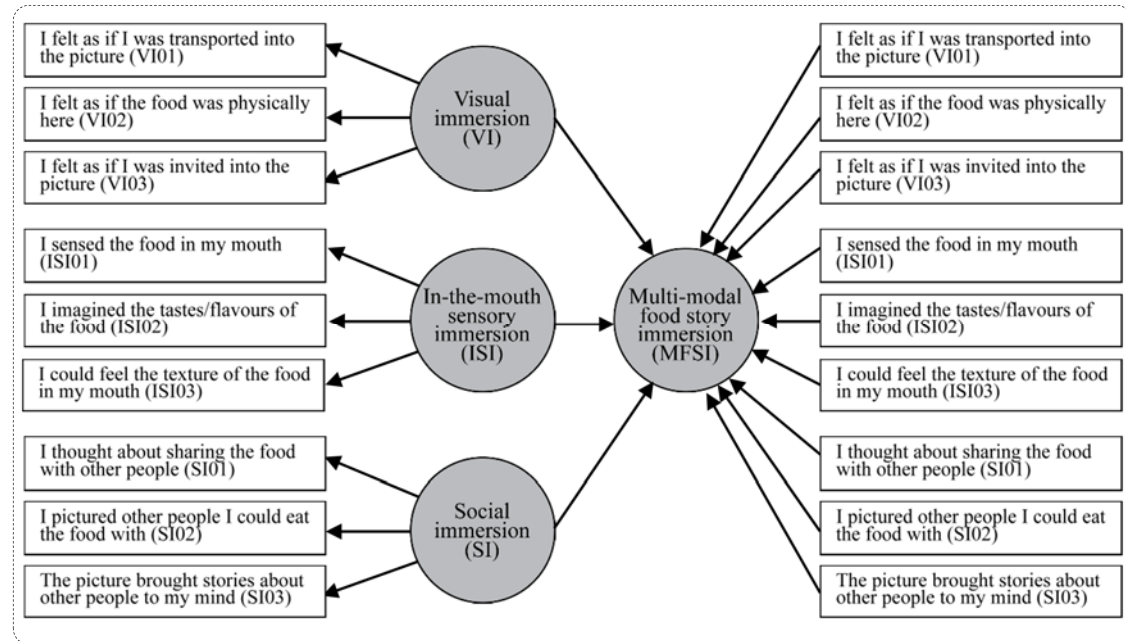
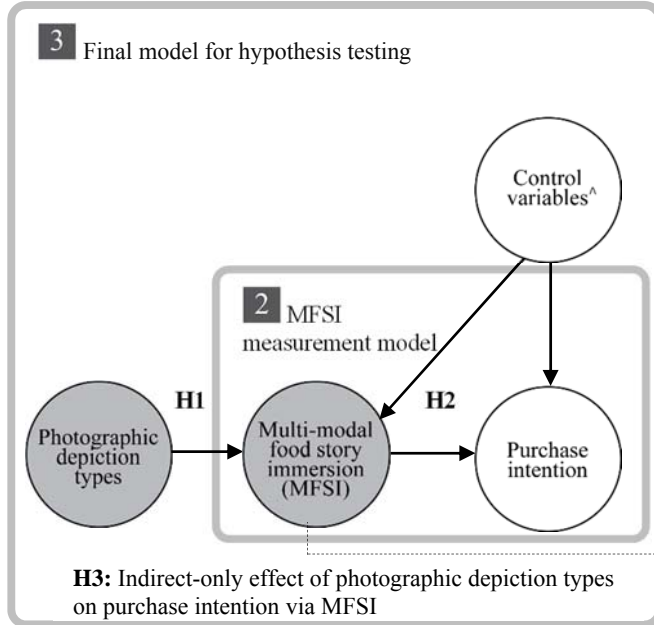
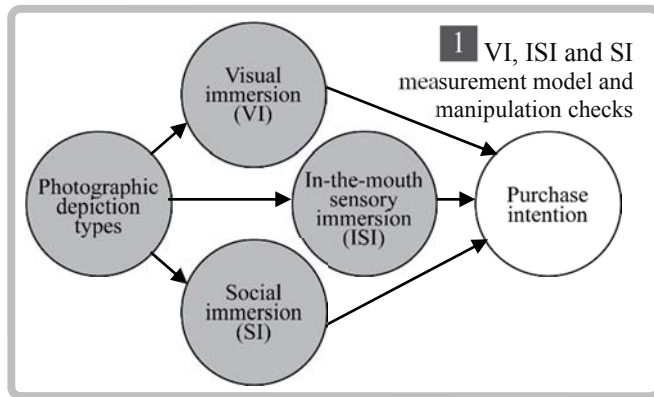
[researchers] need to reconsider human cognition as grounded in the sensory experience resulting from goal-directed interaction with the world...*one cannot discover new lands without consenting to lose sight of the shore for a while* (Gide, 1925/1973) ... [unfortunately] *little attempt has been made to address larger conceptual issues* (Krishna & Schwarz, 2014, p. 165) [...]

Multi-modal food story immersion (MFSI) measurement, basic theory and hypotheses

This paper puts forward the MFSI measurement and basic theory, shown in Figure 1. Three steps of modeling are illustrated in Figure 1. First, the model (see box 1 in Figure 1) posits that particular types of photographic depictions facilitate more visual immersion (VI), in-the-mouth sensory immersion (ISI), and social immersion (SI). This article defines VI as a subjective mental experience when viewers feel as if they are part of a photographic depiction of food product. On the other hand, ISI is a psychological state when viewers savour or sense the flavors and textures of a depicted food product. SI is a subjective mental experience when viewers imagine sharing depicted foods with others in their minds.

Photographic depiction types → immersions

Previous research has shown that consumers utilize available cues (e.g. photographs and verbal copies in ads) as extrinsic cues to create impressions about products (Cox, 1962; Olson, 1978). Foods depicted with explicit consumption sharing scenes, therefore, tells where the consumptions occur and makes the depicted food experience appear more sociable, leading to higher VI and SI. From a narrative (story) theoretical perspective, such depiction strengthens the food story by telling viewers where the consumption takes place and with whom (Barbatsis, 2005). This type of depiction is oriented towards hedonic consumption goals beyond sensory gratifications. When consumers are exposed



^Control variables: 1) Product form familiarity and 2) liking, 3) food type familiarity and 4) liking, and 5) hunger

Note: All nine indicators of immersion constructs were developed from the findings of the following consumer interview study.

Figure 1

Introduction to multi-modal food story immersion (MFSI) measurement, basic theory and hypotheses:

- 1** Evaluation of the VI, ISI and SI lower-order reflective constructs. This model is also used partly for manipulation checks. Verbal indicators are developed from consumer interview study
- 2** Evaluation of the MFSI higher-order reflective-formative construct
- 3** Final model for hypothesis testing.

to this type of story structure, they are accordingly moving towards the goals (Escalas et al., 2004) by re-enacting associated actions (i.e. immersing themselves into the ads). This narrative framework is consistent with the grounded cognition theory in the respect that mental simulation is a re-enactment of goal-directed interaction with the world (Barsalou, 2008; Krishna & Schwarz, 2014). Depicting food products in consumption sharing scenes comes with a trade-off on the clarity of food products. This is because adding such scenes force photographers to move further away from the products. Hence, this type of depiction may make the products less clear, thereby decreasing ISI. However, when considering immersions from a higher-order perspective, this type of depiction still makes consumers immerse more.

Immersion → purchase intention

Previous research has also shown that the more consumers imagine themselves using the product, the higher is their purchase intention. For instance, results from Elder and Krishna's (2012) experimental studies have shown that exposure to pictures and ads of yoghurt, soup, cake and hamburger depicted with a spoon or fork or in a hand matching viewers' handedness increase visual imageries of eating the foods. As consumers experience more of such imageries, they want to buy the products more (as long as the products are on average not disliked). Their studies provide convincing evidence that as VI, ISI and SI increase purchase intention should also increase. Phillips' (1996) experimental study has also shown consistent results. She has demonstrated that the effect of visual detail of a holiday ad (i.e. a photographic depiction of a bright, sunny and white-sand beach scene with turquoise water vs. no picture) on purchase intention is mediated by the extent to which consumers immerse into the ad.

As consumers' mental activities are multimodal in nature, conceptualizing VI, ISI and SI separately does not make theoretical sense. For instance, suppose during an exposure to photographic food ad, one has the following intensity of mental experiences: weak VI, strong ISI and medium SI. A weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm)³ represents the consumer's total immersive experience. If researchers model VI, ISI and SI separately, an underlying assumption is that consumer mental activities are independent. Hence, forming VI, ISI and SI as multi-modal food story immersion (MFSI) is more in line with the grounded cognition theory. This article defines

³ Readers who are not familiar with the latent variable score estimation process based on a structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.

MFSI as a mental state when consumers immerse themselves into the world of a food story visually, in-the-mouth sensorially and socially when exposed to a photographic depiction of food product. Figure 1 (see box 2) illustrates the measurement model of MFSI. Verbal indicators shown in Figure 1 are developed from a consumer interview study (to be discussed later in this paper). This measurement modeling is variously known as a “reflective-formative hierarchical component model” (Hair, Hult, Ringle, & Sarstedt, 2014, p. 233), “higher-order molar construct” (Chin, 2010, p. 665; Chin & Gopal, 1995), or “reflective first-order formative second-order” (Diamantopoulos, Riefler, & Roth, 2008, p. 1207; Jarvis, Mackenzie, & Podsakoff, 2003, p. 205). Although the higher-order molar construct measurement modeling has only been introduced rather recently, it has already been applied to other constructs in the marketing and management literature (e.g., see Baumgarth & Kolomoichenko, 2012; Jayamaha, Grigg, & Mann, 2011; Johnson, Bruner, & Kumar, 2006; Ruiz, Gremler, Washburn, & Carrión, 2008; Vlachos, Theotokis, Pramataris, & Vrechopoulos, 2010; Yi & Gong, 2008).

Finally, we make the following hypotheses as shown in the final model (see box 3 in Figure 1). Note that the MFSI measurement model (see box 2 in Figure 1) needs to be performed before testing hypotheses. Recall that MFSI is a higher-order reflective-formative construct. Hence, MFSI variance is already 100% explained by VI, ISI and SI (i.e. because it is defined by these lower-order constructs). If other antecedents of MFSI are added in simultaneously, the coefficients are always approximately zero and non-significant leading to misleading interpretations (Hair, Hult, et al., 2014). In this step (see box 2 in Figure 1), the purpose is to obtain MFSI latent variable scores or the weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm)⁴ in addition to evaluating MFSI measurement quality. We hypothesize that:

- H1:** Photographic depiction types → MFSI: Photographic depiction types have a significant effect on MFSI. Exposure to foods depicted with more explicit consumption sharing scenes leads to higher MFSI than those depicted less explicitly. This is because more explicit consumption sharing scenes show where the consumption occurs and makes the depicted food experience appear more sociable.
- H2:** MFSI → Purchase intention: MFSI has a significant positive relationship with purchase intention. As consumers immerse into photographic ads visually, in-the-mouth sensorially and socially more into photographic ads, they want to buy the products more.

⁴ Readers who are not familiar with the latent variable score estimation process based on a structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.

- H3:** Photographic depiction types → MFSI → Purchase intention:
Photographic depiction types do not have a significant effect on purchase intention. Photographic depiction types have an indirect-only effect on purchase intention via MFSI.

Other causes of purchase intention

Product form familiarity and liking, food type familiarity and liking and hunger are variables that could also explain the variance of immersions and purchase intention. Product form familiarity is a level of acquaintance one feels towards a group of food products that is marketed in a particular sector (e.g., frozen pie, chilled pie in a deli aisle, made-to-order gourmet pie). Product form liking is defined here as the level of like and dislike that one has with a particular product form. Food type familiarity is defined here as a level of acquaintance one feels towards a classification of foods by preparation method and ingredients (e.g., pie, steak and salad). Food type liking is defined as the level of positive and negative fondness that one has with a classification of foods by preparation method and ingredients. Hunger is defined here as the level of psychological experience one feels leading to a desire for food consumption. These variables have been known to influence consumer responses and evaluations (Choo, Chung, & Pysarchik, 2004; Lautman & Hsieh, 1993; Olsen, 2002; Poor, Duhachek, & Krishnan, 2013).

A pluralistic approach – field study first before experimental study

To address existing conceptual measurement issues regarding face validity or content validity, we informally explored if the concept of immersion was grounded in the voice of experts. The following food photographers' comments have provided some initial validation of MFSI conceptualization and operationalization. All emphases are added by the authors:

“Food photography—*isn't*—just about the finished product. [...] Use the visual sense to stimulate the viewer's other senses. [Can you] *feel the warm summer sun? Taste* the charcoal-kissed veggies?” (Nienhuis, 2011)

“[...] You want the image to feel more authentic, to feel it lived in – as if the viewer is part of that story, *as if they are there* [...] It's connecting with people – the way that you connect with people through food, *sharing a dinner table*. It is the same through food photography [...]” (Porter & Cu, 2014)

“For me, food photography—*isn't*—just about dish after dish [...] there should be a story [...] I want people to see where ingredients

come from, the vendors who sell them, the chef and the chef's hands. Each of those layers adds to the story and hopefully helps to *mentally transport the viewer to that place*" (David Hagerman's remarks from an interview conducted by Tsang, 2011).

Next, we conduct a consumer interview study to validate our MFSI theory further before conducting an experimental study. Such a pluralistic approach is important for visual advertising studies to add rigor to visual advertising persuasion research (McQuarrie & Mick, 1992).

In-depth consumer interview study

This study aims to validate our multi-modal food story immersion theory qualitatively. We want to demonstrate that our theory is grounded in the real voice of consumers. Also importantly, this interview study will enable us to qualitatively establish the face or content validity (Hair, Black, Babin, Anderson, & Tatham, 2010; Rossiter, 2011) for our multi-modal food story immersion measurement (MFSI) model.

Research methods of consumer interview study

Interview sampling and participant characteristics

We firstly recruited participants by sending an email invitation to the Australian Food Bloggers Community (www.foodbloggersaustralia.com.au). We specifically targeted food bloggers initially because they should have some interest in food. We then asked these food bloggers for referrals with specified participant characteristics needed in order to widen the profile of participants. The sampling process then ceased at saturation, as indicated by information repetitiveness (Sandelowski, 2008). The sample size of 21 in our study was consistent with previous studies that meet theoretical saturation (Creswell, 2007). Ethics approval was also given to conduct the study by the university in line with the Australian Code for the Responsible Conduct of Research (2007).

Table 2 shows key participants' characteristics. Participants' average age is 42 (SD = 11.87, range = 20-69). This figure is similar to the average age of grocery shoppers (Bakewell, 2011; Goodman, 2008). We obtained a wide sample in respect of participants' level of hunger by varying interview session times. During the interviews, participants were also asked general profile questions to confirm that we successfully widened the profile of participants. Among all participants, 43 per cent had consumed a main meal less than two

hours prior to the survey. Participants were also asked to indicate how many times they watched food TV programs, and how many times they read food magazines during the week prior to the interview as a proxy for participants' interest in food. Both questions were anchored by "0 none," "1 once," "2 twice," and "3 three times or more." These scores were combined and split at the median to provide a sense of participants' interest in food (Median = 2, SD = 1.85, range = 0–5). Among the twelve participants who scored highest on their interest in food, six were food bloggers, not surprisingly. We also included three vegetarians and participants from varied places of birth.

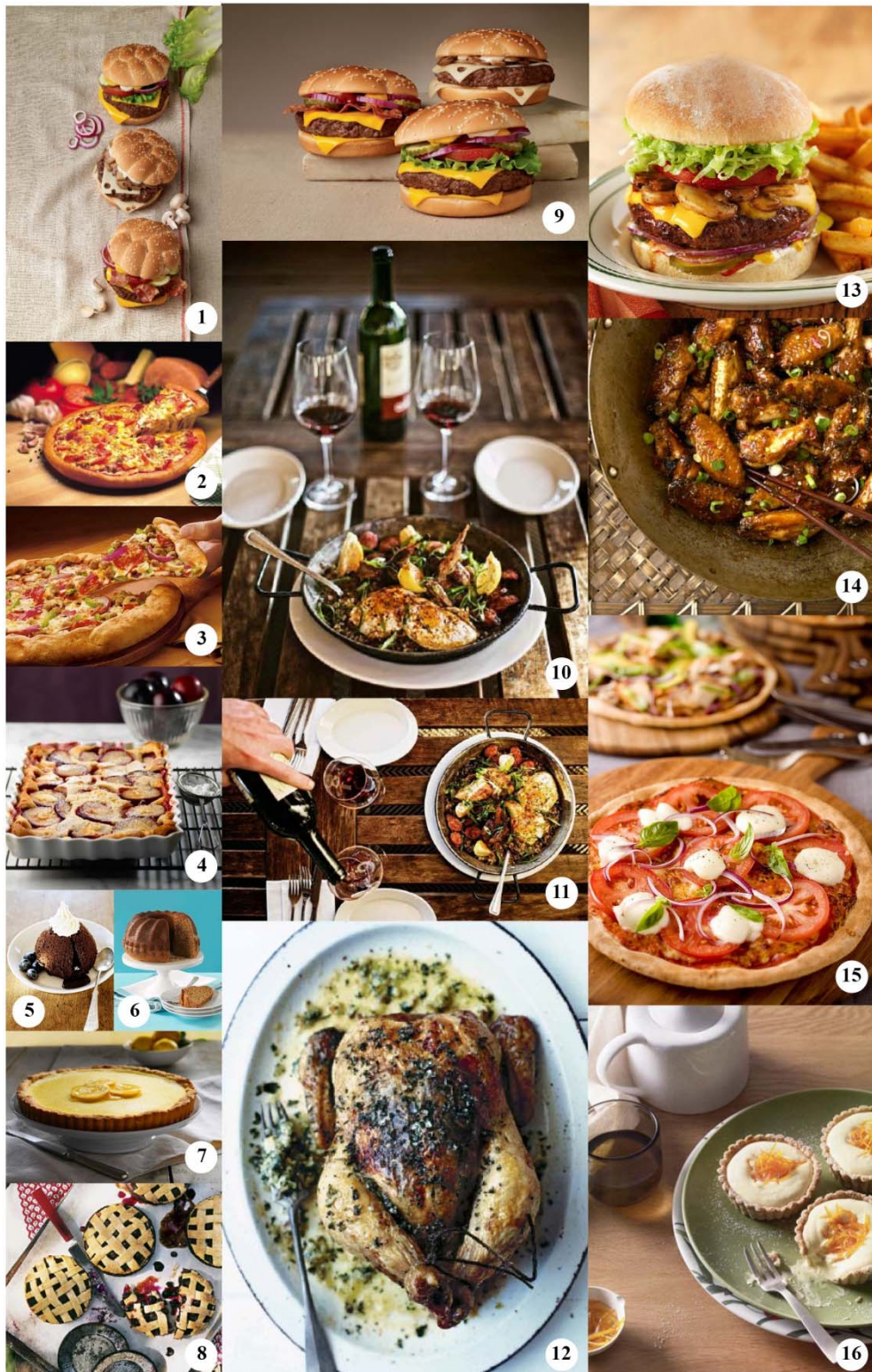
Table 2

A summary of consumer participants' characteristics

Characteristics	Level	Frequency
Gender	Male	8
	Female	13
Age range	21 – 30	3
	31 – 40	4
	41 – 50	9
	51 and over	5
Hours since last main meal	Less than 2 hours	9
	2 hours and over	12
Interest in food	Low	9
	High	12
Place of birth	Australia and New Zealand	10
	Europe	7
	North America	2
	Asia	2

Photo elicitation

This study used a photo-elicitation in-depth interviewing technique. We purposefully selected 21 food pictures from websites of food advertisers, stylists and photographers (see Figure 2). We chose the images based on the following criteria. First, we wanted to have image samples to represent those that were used in marketing and editorial contexts such as food images used for ad campaigns, branded websites and mainstream recipe magazines. Second, we wanted the image samples to represent food types and product forms familiar to general consumers. We selected images based on varied healthy cues. Consumers usually use healthy cues such as fruits and vegetables depicted to evaluate to what extent the products are healthy rather than judging solely based on healthy-unhealthy food types (e.g., see Jiang & Lei, 2014). Third, we wanted to vary stylistic aspects such as camera angles, scenes and social cues within the same food type. This purposive image selection technique was used to gather useful insight if any on consumer reactions. We removed branding information such as logos from all images in order not to let it affect participants' responses.



Images 1*, 2^, 3^, 9*, 13 and 15 pictures were used for marketing purposes and the others pictures were used for editorial purposes. All photographs here are resized from the original versions for a layout purpose. Images reproduced with permission from the advertisers and/or artists.

^Pizza Hut, Yum! Brands, Inc.

*Images reproduced with permission from McDonald's Corporation.

Figure 2

Selected examples of food photographs used in the consumer interview study

Interview procedures

At the beginning of the interview, all participants were told that the aim of the interview was to see how they react to food pictures and that their viewing goal was to evaluate how enticing the pictures were in terms of making them want to buy and eat the foods. On average, participants viewed eight images during each interview session. Participants were asked to discuss what came to mind, how the pictures made them feel, what they liked/disliked about the pictures, and overall how successfully the pictures enticed them to eat. We then used Durgee's (1985) laddering and symbolic analysis probes such as "what made you say that?," "why was that important?," "what if that was not depicted or was depicted differently,?" and "anything else you would like to add?" to gain further insight. On average, each interview took 50 minutes ($SD = 12.5$, range 17–71 minutes). One interview concluded very quickly because the participant was a vegetarian and found many pictures containing meat disturbing, as expected.

Analysis of consumer interview study

The interview data were digitally recorded, transcribed and exported to the QSR International NVivo software program (Version: 10) for analysis. Participants spoke about 2,578 words on average ($SD = 776$, range = 1,025–4,085 words). We analyzed the data using grounded theory (Corbin & Strauss, 2008). The analysis involved three stages: 1) open coding stage by generating initial codes using Code-In-Vivo functions without conceptualising the data, 2) axial coding stage by grouping the initial codes into themes, and 3) selective coding stage by selectively coding the themes of interest and their relationships. Some researchers may refer to this method as "grounded theory lite" analysis (Braun & Clarke, 2006, p. 81). While full or classical grounded theory involves multiple theoretical samplings to build and test a theory entirely based on a qualitative approach, we instead will test our theory later using a quantitative approach.

Interviews and data coding were conducted by the first author. We did not employ a second data coder for inter-rater reliability calculation because the inter-rater reliability score is only relevant if researchers would like to quantify their data (Braun & Clarke, 2012). Such a procedure is important when conducting a content analysis or when coding participants' free thought listing data for a further quantitative analysis. We instead used a narrative synthesis to illustrate that our theory is "explicitly grounded" in the voice of consumers (McLeod, 2011, p. 151). All emphases in the following participants' verbatim remarks

were added to highlight phenomena and/or their potential relationships with other variables. The interview data transcription took 126 hours (approximately 6 hours per script). The data analysis procedures took 105 hours (approximately 5 hours per script). This effort is consistent with the amount of time taken by other qualitative scholars (e.g. Britten, 1995; Flint & Woodruff, 2001; Pidgeon, Turner, & Blockley, 1991; Urquhart, 2001) with the aim of our research taken into account. All interview and data analytical procedures were double checked by the second author and a consensus was reached through discussion based on the existing marketing literature.

Findings and discussion of consumer interview study

The multi-modal food story immersion phenomenon exists

Visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) phenomena existed and did not seem to occur only for a particular food type, marketing or editorial image style. The following remarks are examples of participants' comments highlighting the existence of the phenomena:

"I feel like I am being there in the sun and there are lots of pizza and having some beers or some wine" (Female, 34 years old, born in Scotland, response to Image 15)

"It gives me the feeling that I am in that restaurant and I am comfortable with it" (Male, 47 years old, born in Australia, response to Image 13)

"I can already taste the onion and the tomatoes and the cucumber and the saltiness of the cheese by just looking at it" (Female, 34 years old, born in Philippines, response to Image 1)

"I get the taste of garlic, rosemary, lemony and barbeque sort of taste. It probably has got a bit of pepper and salt in it" (Female, 69 years old, born in Australia, response to Image 10)

"The taste should be nice. It is going to taste really sweet and chocolaty" (Male, 23 years old, born in Spain, response to Image 5)

"I feel like I am having lunch with a bunch of friends at a nice café maybe by the water" (Male, 21 years old, born in Australia, response to Image 15)

"It makes me feel like I am sharing the meal with someone and the wine is poured by that person" (Female, 34 years old, born in Philippines, response to Image 11)

One may argue that these phenomena might occur because of repeat exposures or repeat simulations. To address this issue, we additionally performed a case analysis by looking into participants' responses to the first image presented to them. The following participants'

verbatim remarks showed that they used immersion strategies to process the stimulus in the first exposures. For example, shortly after seeing the first picture, one participant immediately said: “It is not *here* or *there* really” (Female, 46 years old, born in New Zealand, response to Image 1). Interestingly, while the former participant did not seem to immerse another participant did, he said: “I feel nostalgic actually [...] It kind of brings me back the memories of *eating at that place* and the kind of *taste* associates with it [...] I was thinking about the *sauciness* of it. I was also thinking about the *saltiness* of that bacon” (Male, 23 years old, born in Germany, response to Image 1). Hence, immersions did not seem to require a repeat exposure.

Explicit depiction of consumption scenes → VI

Visual immersion seemed to occur in line with our assumption. More explicit consumption sharing scenes facilitated visual immersion. The following participants’ voices illustrated this:

“I think the *background adds more of a context that* I feel like I am *being there* in the sun” (Female, 34 years old, born in Scotland, response to Image 15)

“It is at *someone’s house on a balcony* maybe. I have got a friend who has a table like that on the balcony” (Female, 34 years old, born in Philippines, response to Image 10)

Sometimes, viewers feel immersed because it feels like the experience coming to them. For example, one participant said: “I didn’t imagine myself in the photo. *It is more about the photo coming to me.*” This finding is consistent with the experience evoked by visual and interactive media such as television and virtual reality. Consumers can feel like the experience in the media coming to them (Bracken, 2005; Grigorovici & Constantin, 2004; Lombard, Reich, Grabe, Bracken, & Ditton, 2000) ‘*rather than them being transported there*’ (Lee, 2004, p. 43). Hence, VI measurement should not focus on the transportation aspect (i.e. being there) alone. This is a useful insight because it differs from the transported phenomenon (Green & Brock, 2000) in the written fiction literature where readers are transported into text-based stories.

Close up depiction of food product → ISI

It was important for pictures to clearly depict the food products and ingredients because when consumers could see the product clearly they could name the ingredients easily. This enhanced in-the-mouth sensory immersion. The following participants' comments highlighted the relationship between such a photographic depiction type and ISI:

"It is crunchy and tasty *because of all different ingredient combinations*. It is crunchy because of the *cucumber, the lettuce and the onions*. I get a stronger intensity of flavors in my mind looking at this picture compared to the previous one *because of it being featured more predominantly*" (Female, 52 years old, born in Australia, response to Image 9 compared to Image 1)

"Is it chicken? *I am not sure what it is*. It is about the experience and not so much about the food." (Female, 34 years old, born in the U.S.A., response to Image 10)

Explicit depiction of consumption sharing scenes → SI

Depicted servings, plates, cutlery sets and human hands added richness to the vicarious social consumption experience. This type of depiction could facilitate social immersion even if the pictures did not literally depict other people. Consider the following participants' remarks that revealed the relationship between such a photographic depiction type and SI:

"The two plates and the two glasses of wine made me think of *two people*...if you put your hand covering one of the wine glasses and the plates, it wouldn't make me think the food is less appetizing *but as an experience it is more enticing* to have it with two people. It means you have got *someone eating with you so you are not by yourself*" (Female, 69 years old, born in Australia, response to Image 10)

"I like it that *someone is pouring the wine*. It *makes me feel like I am sharing the meal with someone* and the wine is poured by that person. *I feel like I am a guest*" (Female, 34 years old, born in Philippines, response to Image 11)

"I would like to see human elements in food pictures. I think these elements are really good. I love seeing people's hands on the cutlery or holding something. *It is not just about food but you get the sense of somebody enjoying it with you. I love seeing people in food photographs.*" (Male, 23 years old, born in Germany, response to Image 2)

Increased immersions → increased purchase intention

The more viewers felt immersed visually, in-the-mouth sensorially and socially, the more their purchase intentions were heightened. Compare the following remarks from different participants. The first three seemed to immerse but the last did not:

“...*I would eat that*. I like it that someone is pouring the wine...*It makes me feel like I am sharing the meal with someone*...I can see the dark colour on the edges so it would be *crispy on the outside of potato wedges*... *I can see the utensils now that I can use*...This picture enticed me to eat extremely well.” (Female, 34 years old, born in Philippines, response to Image 11)

“This picture *makes me feel like I am in a situation where I have company*. It tells me that they are made for three people because of the three different combinations...I expect that *I would be sharing with some friends*... To me, it looks like a table setting *like a Sunday afternoon setting and I expect there would be a bottle of wine just out of the photo*. Overall, *it enticed me to eat it*.” (Male, 34 years old, born in Australia, response to Image 1)

“It’s ready to be served for two people... *you have got someone eating with you*... *I get the taste of garlic, rosemary, lemony and barbeque sort of taste*. It probably has got a bit of pepper and salt in it...*yeah it does make me want to eat it*. It looks like it has a lot of flavors in it.” (Female, 69 years old, born in Australia, response to Image 10)

“This picture is *not enticing* because there is *so much going on* when you are trying to choose to eat just one. It doesn’t show me how much it is appealing. It is *overwhelming and crowded*. *It doesn’t entice me to eat it*” (Female, 41 years old, born in Philippines, response to Image 1)

Product form familiarity and liking, food type familiarity and liking and hunger → immersions and purchase intention

As expected, product form familiarity and liking, food type familiarity and liking and hunger might influence immersions and purchase intention. These should be controlled in the follow-on experimental study. Consider the following comments from participants about the possible effect of these variables:

“The front burger looks *more gourmet*. It doesn’t look like [Brand name of a fast food restaurant chain]. I eat burgers *once or twice a month or less*. I buy it from a *local fish and chips shop*” (Male, 21 years old, born in Australia, response to Image 9)

“It probably tastes very nice [...but] I don’t eat food like that. Are they *take-away or homemade*?” (Female, 69 years old, born in Australia, response to Image 1)

“I am *not familiar* with this kind of pizza. It is a pizza *I haven’t had before*. It is the least enticing photo” (Female, 34 years old, born in Philippines, response to Image 15)

“I can see *salami* in it. No, it doesn’t look appealing to me. *I just dismissed it*. It has got *meat* in it. *I just don’t want to look at it*” (Female, 48 years old, born in England, response to Image 2)

“I am *not hungry* now [...] I look at it and think: ‘Not now’. *I am closing my mind* if you like” (Male, 44 years old, born in Canada, response to Image 1)

The interview study results qualitatively validate our multi-modal food story immersion (MFSI) theory. We have demonstrated that our theory is explicitly grounded in the real voice of consumers. In addition, the interview study results also confirm that components of MFSI (i.e. VI, ISI and SI) can be measured using consumer reports. Verbal indicators developed from the consumer interview study are shown in Figure 1. The trustworthiness of this interview study’s findings, measurement model and hypotheses will be empirically tested in the next study.

Experimental online survey

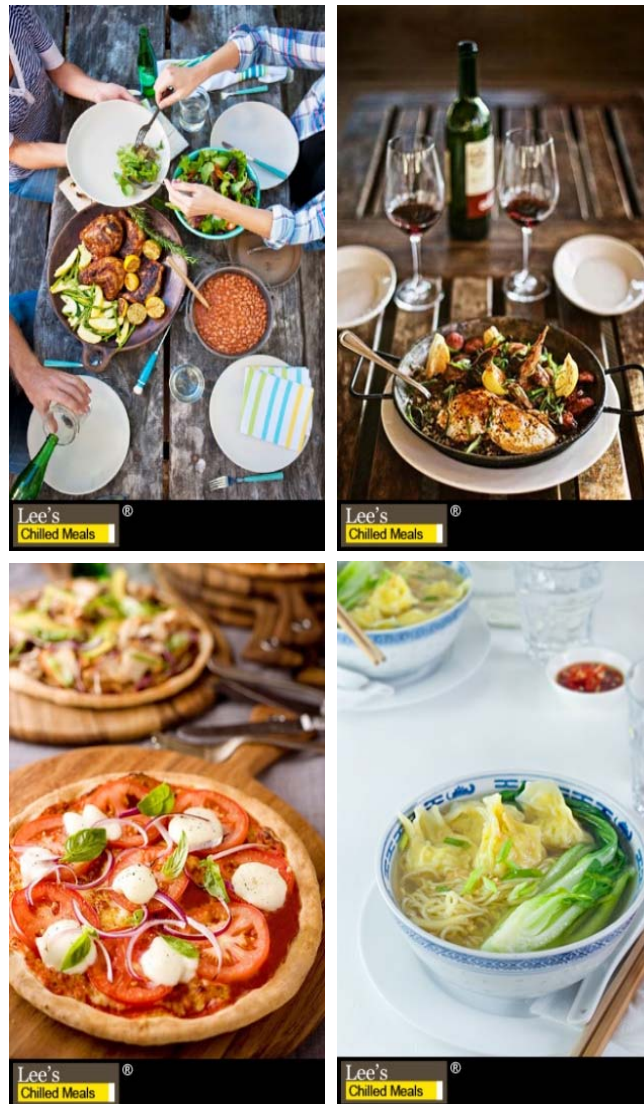
This study has two aims. First, it aims to establish the reliability and validity of the multi-modal food story immersion (MFSI) measurement model. Second, it aims to test our theory and hypotheses in a visual food marketing context such as advertising using a quantitative approach.

Research methods of experimental online survey

Overview

This study employed a simple one-factor between-subject design (print ads) with two levels of more (less) explicit consumption sharing scenes. Each ad depicted different food types as shown in Figure 3. These include: 1) grilled chicken with baked beans and leaf salad, 2) pan roasted chicken, 3) pizzas and 4) wonton noodle soups. The first two images were grouped as “more explicit consumption sharing scenes” while the last two were grouped as “less explicit consumption sharing scenes.” We theoretically selected these images based on an assumption that the first two images explicitly show the consumption scenes and make the depicted food experience appear more sociable. This depiction type should lead to higher VI and SI. On the other hand, the last two images would make the food products look clearer and made viewers name the ingredients more easily than the first two images. Accordingly, the last two pictures should result in higher ISI. However, considering

immersions as a total immersion, the first two images should lead to higher MFSI. We did not expect there would be a significant difference in ad liking between the two depiction types. Each ad was randomised across the participants to avoid biases on the effect of food type.



Note: The original picture size was 320 x 503 pixels but reduced here for a layout purpose. Images reproduced here with permission from the advertisers and/or artists.

Figure 3
Visual stimuli used in the experimental study

Data quality control prior to data collection

We controlled for common method biases throughout the research process using the procedural remedies suggested by Podsakoff, MacKenzie, Lee & Podsakoff (2003). We counterbalanced the question order where it would not disrupt the logical flow of the survey. For example, the order of multi-modal food story immersion (MFSI) subscales and all indicators were randomized. We improved our scale items by establishing the face or content validity of the construct using verbatim comments gained from the consumer interview study. Both radio button and slider scale formats were used in a randomized fashion. Rotated scale options were also employed and randomized. Every scale point was both numerically and verbally anchored. This helps reduce common method biases because scales anchored only at the endpoints lead to response biases among some respondents who tend to exhibit an extreme response style (Dolnicar & Grün, 2007). We also limited our scale points to five. Previous research has shown that high scale points tend to display higher base level instability (Dolnicar & Grün, 2012). We did not use any post-hoc statistical remedies to control for common method bias such as the frequently used unmeasured latent marker construct to partial out the common method bias (e.g., Liang, Saraf, Hu, & Xue, 2007; Podsakoff et al., 2003; Richardson, Simmering, & Sturman, 2009). This is because recent evidence (Chin, Thatche, & Wright, 2012) from Monte Carlo simulations suggests that it cannot detect nor control for common method bias. Since considerable efforts were employed to reduce common method bias throughout the research process, such post-hoc statistical remedies are redundant (Podsakoff et al., 2003, p. 897).

Procedure

Initially, 436 undergraduate participants (47% males, 53% females) recruited from a major public university in Australia voluntarily participated in an online experimental study and survey using Qualtrics. The participants' ages ranged between 18 and 29 years. Ethics approval was also given to conduct the study by the university in line with the Australian Code for the Responsible Conduct of Research (NHMRC, ARC, & Universities Australia, 2007).

Participants were told that the study sought to understand their response to an ad, general food knowledge and consumption behavior. Before the exposure to an ad, they evaluated their hunger. They were told that an ad for a new ready-meal brand (chilled meal, not

frozen) would be shown to them. The brand name (Lee's Chilled Meals) was fictitious in order to control for the effect of existing brand attitude and familiarity (Underwood & Klein, 2002; Underwood et al., 2001). We selected a ready meal product form and specified that it was a chilled meal not frozen because of the growth of this product form (Simons, 2013). Also, we selected this product form to avoid the floor effect for choosing frozen meal product form (Lautman & Hsieh, 1993). We told the participants that their goal was to see if the product was desirable to eat. This standardization was to control the effect of viewing goals (Pieters & Wedel, 2007; Rayner, Miller, & Rotello, 2008). They were asked to view the ad as they would normally do when reading a magazine and for as long as they wished at their own pace. The participants evaluated their purchase intention before responding to the multi-modal food story immersion (MFSI) scale. After that, participants indicated their product form (i.e. ready meal products) familiarity and liking, food type (e.g., grilled chicken) familiarity and liking and answered manipulation check questions before providing general personal information (see questionnaire in Appendix B).

Data quality control after data collection and participants

There were no missing data and consistent outliers.⁵ We established three exclusion criteria prior to data analysis: 1) mobile devices,⁶ 2) delayed responses,⁷ and 3) flat-lining responses.⁸ First, participants who used mobile devices (i.e. mobile phones, iPad, and tablets) were excluded. This criterion was set to control the viewing conditions for both the ads and the survey questions. Second, only participants who completed the survey within 30 minutes were included. This criterion was established to control for the data quality and avoid responses from participants who might not complete the survey within one single session. Third, only participants who had a weighted average standard deviation of all scale item response value above 0.5 were included. This last criterion was to screen out participants whose responses exhibited low variability across rating scale items (i.e. flat-lining responses) because including these responses could bias results (Menictas, Wang, & Fine, 2011).

⁵ Measured by absolute z-scores ≥ 2.0

⁶ Measured by browser meta-info operating system (n = 26)

⁷ Measured by time submitted the survey minus time started the survey. Participants who spent time longer than the amount spent by 90% of participants (approx. 30 minutes) were defined as extreme delayed responses (n = 99)

⁸ Measured by the sum of standard deviations of all variables in each scale format and rotation weighted by the number of questions participants received each scale format and rotation < 0.5 . If the standard deviation values are less than 0.5 (i.e. very closer to zero), this means participants tend to give the same answer throughout (n = 24)

We then performed Levene's test loading age and gender on the factor list, latent variable scores of visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) and purchase intention on the dependent variable list. We followed Field's (2013) guidelines for comparing Levene's test scores and median values to investigate the homogeneity of variance. Levene's test shows that the variances of VI, ISI, SI and purchase intention were equal across ages, $F(8, 344) = 1.214, .885, 1.423, 1.483$ respectively, all p -values $> .050$) after trimming four cases aged 27 or over. The variances were also equal across gender, $F(1, 351) = 1.631, .670, .366, .010$ respectively, all p -values $> .050$). After elimination, 353 participants were included for further analyses. Table 3 shows the number of participants by photographic depiction types, food types and gender (see descriptive statistics of each variable in Table A in Appendix A).

Table 3

Number of participants by photographic depiction types, food types and gender

More explicit consumption sharing scenes			Less explicit consumption sharing scenes		
<i>Grilled chicken with baked beans and leaf salad</i>			<i>Pizzas</i>		
Gender	Male	39	Gender	Male	37
	Female	42		Female	55
	Total	81		Total	92
<i>Pan roasted chicken</i>			<i>Wonton noodle soups</i>		
Gender	Male	39	Gender	Male	50
	Female	55		Female	36
	Total	94		Total	86
Total	Male	78	Total	Male	87
	Female	97		Female	91
Total		175	Total		178

Measures

Hunger was measured using a 5-point unipolar scale, prompted with "How hungry are you feeling right now?" and anchored by: "Not at all hungry (0)," "Slightly hungry (1)," "Moderately hungry (2)," "Very hungry (3)," and "Extremely hungry (4)."

Purchase intention was measured using a single indicator being a shortened version of Juster's (1966) purchase intention probability scale. Participants were prompted by the question: "What are the chances that you will buy Lee's chilled meal brand when it becomes available?" It was measured on a 5-point unipolar scale with the following anchors: "No chance to slight possibility (0-20%)," "Some to fair possibility (21-40%)," "Fairly good to good possibility (41-60%)," "Probable to very probable (61-80%)," and "Almost sure to certain (81-100%)."

Multi-modal food story immersion (MFSI) consisted of three sub-scales: visual immersion (VI), in-the-mouth sensory immersion (ISI), and social immersion (SI). VI, ISI and SI had three indicators each (see Table A in Appendix A). Participants were first asked whether they experienced each indicator of VI, ISI and SI (“While viewing the ad, did you experience the following?”) on a binary scale anchored by “Yes” and “No.” Only participants who answered “Yes,” were then asked to indicate the magnitude of their experience (“How intensely did you experience the following?”) on 4-point unipolar scales anchored by “Weakly (1),” “Moderately (2),” “Strongly (3),” and “Extremely strongly (4).”

Control variables were measured as follows:

- *Product form familiarity* was measured using a 5-point unipolar scale. Participants were prompted by the question: “How familiar are you with the following food in general: Ready meal products?” The anchors were: “Not at all familiar (0),” “Not very familiar (1),” “Somewhat familiar (2),” “Very familiar (3),” and “Extremely familiar (4).”
- *Product form liking* was measured using a 5-point bipolar scale. Participants were prompted by the question: “How much do you like or dislike the following food in general: Ready meal products?” The anchors were: “Dislike very much (-2),” “Dislike (-1),” “Neither like nor dislike (0),” “Like (1),” and “Like very much (2).”
- *Food type familiarity and liking* were measured similarly to *Product form familiarity and liking*. Names of food types were displayed to participants according to the image they were exposed to. For example, grilled chickens, baked beans and leaf salads were displayed to participants exposed to the grilled chicken, baked beans and leaf salad. These scores were combined and averaged to form indices.

Manipulation checks were measured in four aspects using single-item scales. Participants rated on 5-point bipolar scales:

- *Sociableness of consumption sharing scenes* measured the extent to which the depiction made the food experience appear unsociable or sociable, anchored by: “Very unsociable (-2),” “Unsociable (-1),” “Neither sociable nor unsociable (0),” “Sociable (1),” and “Very sociable (2).”

- *Clarity of food product depiction* measured the extent to which the food product shown in the picture was clear or unclear, anchored by: “Very unclear (-2),” “Unclear (-1),” “Neither clear nor unclear (0),” “Clear (1),” and “Very clear (2);”
- *Easiness for naming ingredients* measured the extent to which the picture made it easy or difficult for viewers to name the ingredients, anchored by: “Very difficult (-2),” “Difficult (-1),” “Neither easy nor difficult (0),” “Easy (1),” and “Very easy (2);” and
- *Ad attitude* measured the extent to which viewers liked or disliked the ad overall, anchored by: “Disliked very much (-2),” “Disliked (-1),” “Neither liked nor disliked (0),” “Liked (1),” and “Liked very much (2).

All 0-4 measures were converted to 1-5 for consistency.⁹

Analyses for experimental online survey

The main statistical analysis reported in this article relied on partial least squares structural equation modeling (PLS-SEM) approach, a variance-based structural equation modeling (VB-SEM). We chose this approach for the following reasons. First, we conducted the Kolmogorov-Smirnov test with Lilliefors correction and found that the data were not normally distributed across all variables (see Table A in Appendix A). Second, our theory relied on a hierarchical component modeling using a repeated indicator approach for MFSI. PLS-SEM suited this research more than the covariance-based structural equation modeling approach (CB-SEM) because PLS-SEM is a non-parametric approach. PLS-SEM does not assume normal data distribution. In addition, PLS-SEM is capable of modeling MFSI as a higher-order reflective-formative latent construct (Hair, Hult, et al., 2014; Hair, Ringle, & Sarstedt, 2011, 2013; Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014; Hair, Sarstedt, Ringle, & Mena, 2012; Sarstedt, Ringle, & Hair, 2014).

All PLS-SEM analyses used the SmartPLS computer software (Version: 3.1.6). The analyses employed the following setting: a path weighting scheme, a maximum iterations of 300, and a bias-corrected and accelerated (BCa) bootstrapping algorithm (parallel processing mode) of 5000 subsamples for two-tailed significance tests at 95% confidence interval (CI).

⁹ Detailed scaling construction of immersion constructs and frequency distributions showing the nature of immersions in photographic food advertising are provided in Thesis appendix A.

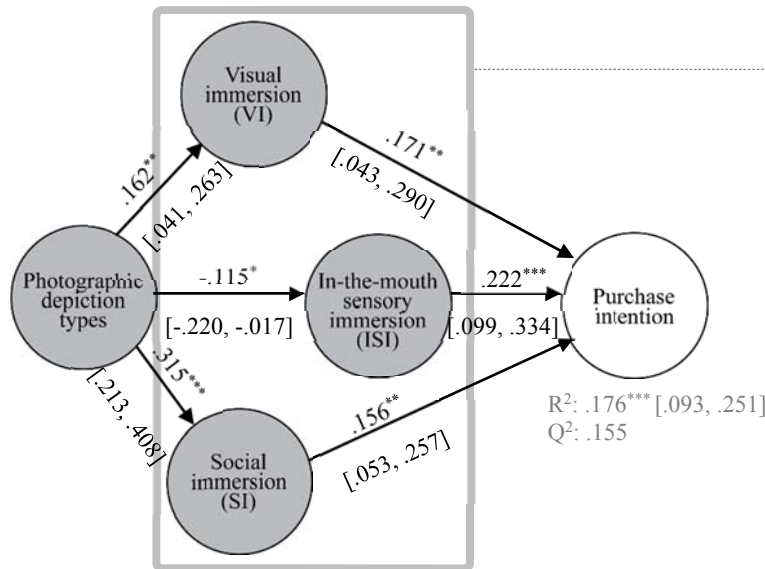
We also provide additional analyses with a covariance-based square structural equation modeling (CB-SEM) approach (where appropriate) using the AMOS computer software (Version: 22.0). We also provide analyses with first-generation techniques (i.e. non-structural equation modeling such as independent samples t-test, ANOVA) using the SPSS computer software (Version: 22.0) in footnotes. Readers who might not be familiar with PLS-SEM, should find these complementary analyses useful. Results are consistent for the main method employed in this article.

Results of experimental online study

Reliability and validity of VI, ISI and SI as lower-order reflective constructs

First, we evaluated the measurement model of VI, ISI and SI as lower-order reflective constructs (see box 1 in Figure 1).¹⁰ The results (see Figure 4. Detailed results are also provided in Tables B, C and D in Appendix A) showed that indicators of VI, ISI and SI exhibited factor loadings (λ) ranging from .771 to .892. This means each and every indicator of VI, ISI and SI is reliable (Hair et al., 2012; Hulland, 1999). VI, ISI and SI all had significant positive relationships with purchase intention ($\beta = .171, p < .010$; $\beta = .222, p < .001$; and $\beta = .156, p < .010$ respectively). VI, ISI and SI altogether explained almost 18%, a significant amount, of variance in purchase intention ($p < .001$). This means VI, ISI and SI achieve nomological validity (Hair et al., 2010). All average variance extracted (AVE) values of VI, ISI and SI were higher than .500 (see Tables B and C in Appendix A). This means VI, ISI and SI achieve convergent validity (Bagozzi & Yi, 1988). All composite reliability (CR) values of VI, ISI and SI were well above .700 (see Tables B and C in Appendix A). This means VI, ISI and SI achieve internal consistency reliability (Bagozzi & Yi, 1988; Hair et al., 2012). Indicators of VI, ISI and SI (see Table B in Appendix A) were also loaded highest within their construct (Chin, 1998; Grégoire & Fisher, 2006). The square root of AVE value (see Table D in Appendix A) of each construct was larger than its correlation value with other constructs (Fornell & Larcker, 1981). The heterotrait-monotrait ratio of correlations (i.e. HTMT, Henseler, Ringle, & Sarstedt, 2015) between VI, ISI and SI were below .70 (see Table D in Appendix A). These mean VI, ISI and SI were related but empirically distinct.

¹⁰ Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.



R^2 = Coefficient of determination; Q^2 = Predictive relevance using blindfolding procedure based on an omission distance of 6. The further the R^2 and Q^2 values are away from 0 the higher significance and relevance of predictors.

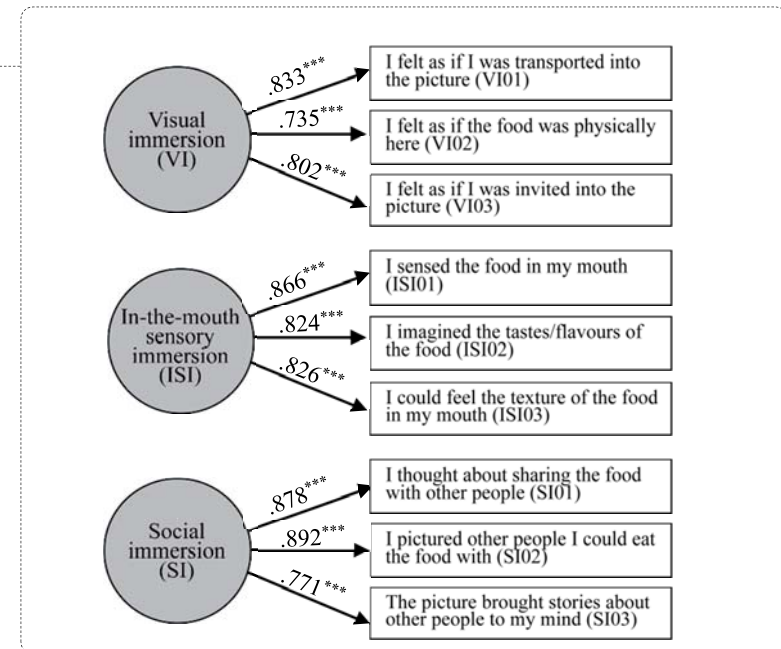
Bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence intervals are reported in squared brackets.

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Stop criterion change: 7

To give a clear picture on the sole influences of VI, ISI and SI on purchase intention, we also performed separate simple regressions. The results showed that VI, ISI and SI alone explained 10%, 12% and 8% of variance in purchase intention respectively ($\gamma = .333$, $\gamma = .341$, $\gamma = .288$ in the same order, all p -values $< .001$).

See also Tables B, C and D in Appendix A for more detailed results.



Note: Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.

Figure 4
VI, ISI and SI (lower-order reflective constructs) measurement model

Reliability and validity of MFSI as a higher-order reflective-formative construct

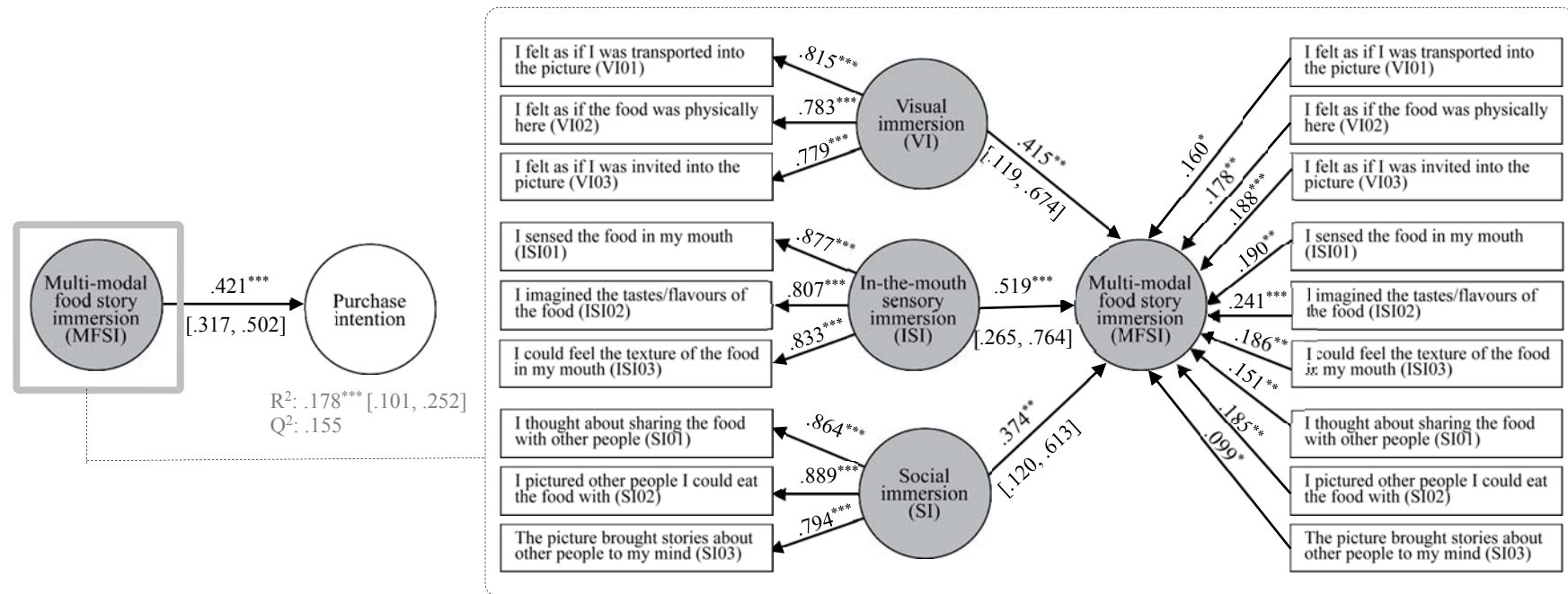
Next, we evaluated the reliability and validity of MFSI.¹¹ MFSI was modelled as a higher-order reflective-formative latent construct (Chin & Gopal, 1995; Diamantopoulos et al., 2008; Hair, Hult, et al., 2014; Jarvis et al., 2003). We used a “repeated indicator, mode b” approach (Becker, Klein, & Wetzels, 2012, p. 376) to model MFSI as a predictor of purchase intention (see Figure 5). We chose this approach because a recent Monte Carlo simulation study (Becker et al., 2012) showed that this approach performed best in terms of having low bias, high precision of parameter estimates and reliability of higher-order latent scores.

The results (see Figure 5) showed that the regression weights of all indicators of VI, ISI and SI on MFSI were significant, all p -values $< .050$. This means each indicator of VI, ISI and SI contributes significantly to MFSI. MFSI had a significant positive relationship with purchase intention ($\gamma = .421, p < .001$). MFSI explained almost 18%, a significant amount, of variance in purchase intention ($p < .001$). This means nomological validity is established for MFSI. The variance inflation factor (VIF) values of VI, ISI and SI were below 5 (see Table E in Appendix A). This means there are no issues with multicollinearity for VI, ISI and SI to form MFSI. Hence, MFSI (as a formative construct) is reliable and valid (Diamantopoulos & Winklhofer, 2001; Hair et al., 2012; Jarvis et al., 2003).

Manipulation checks. We evaluated whether our theoretical grouping of photographic depiction types performed successfully. Pizza and wonton noodle soup were grouped and coded as 0 to represent less explicit consumption sharing scene depiction types. Grilled chicken with baked beans and leaf salad and pan roasted chicken were grouped and coded as 1 to represent more explicit consumption sharing scene depiction types. The 0-1 dummy-coded type of photographic depictions was loaded as an independent variable and VI was loaded as a dependent variable. As expected, the results (see Figure 4) showed that photographic food ads depicted with more explicit consumption sharing scenes made consumers immerse more visually ($\gamma = .162, p < .010$).¹²

¹¹ Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.

¹² Independent sample t-tests using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. On average, participants immersed more visually when exposed to the grilled chicken, baked beans and leaf salad and pan roasted chicken ads ($M = .150$) than when exposed to pizza and wonton soup ads ($M = -.147$). This difference was also significant, $t(351) = 2.825, p < .010, [.119, .478]$.



R^2 = Coefficient of determination; Q^2 = Predictive relevance using blindfolding procedure based on an omission distance of 6. The further the R^2 and Q^2 values are away from 0 the higher significance and relevance of predictors.

Bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence intervals are reported in squared brackets.

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Stop criterion change: 67

See also Table E in Appendix A for more detailed results.

Note: Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.

Figure 5
MFSI (higher-order reflective-formative construct) measurement model

Next, we loaded photographic depiction types as an independent variable and clarity of food product depiction and easiness of naming ingredients as dependent variables. Also as expected, consumers reported the food product depiction of the grilled chicken with baked beans and leaf salad and pan roasted chicken ads were less clear than the pizza and wonton soup ads ($\gamma = -.372, p < .001$). Likewise, participants reported that they found it more difficult to name the product ingredients in the grilled chicken with baked beans and leaf salad ($\gamma = -.329, p < .001$). Accordingly, as shown in Figure 4, consumers immersed less in-the-mouth sensorially in the grilled chicken with baked beans and leaf salad and pan roasted chicken ads ($\gamma = -.115, p < .050$).¹³

Then, we loaded the 0-1 dummy-coded type of photographic depictions as an independent variable and sociableness of depicted food experience as a dependent variable. As expected, participants reported that the grilled chicken with baked beans and leaf salad and pan roasted chicken ads conveyed more sociable food experiences than the pizza and wonton noodle soup ads ($\gamma = .332, p < .001$). Accordingly, as shown in Figure 4, consumers immersed more socially into these two ads more than the pizza and wonton soup ads ($\gamma = .156, p < .010$).¹⁴

Additionally, we tested if the grilled chicken with baked beans and leaf salad and pan roasted chicken ads were more liked by consumers. We did not expect that ad attitude would differ between the photographic depiction types. The 0-1 dummy-coded type of photographic depictions was loaded as an independent variable and ad attitude as a dependent variable. We also controlled for hunger, product form familiarity and liking and food type familiarity and liking on ad attitude. Consumers liked the grilled chicken with baked beans and leaf salad and pan roasted chicken ads about the same as the pizza and wonton noodle soup ads ($\gamma = .094, p > .050$) after controlling for hunger ($\gamma = -.032, p >$

¹³ Independent sample t-tests using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. On average, participants reported that the foods in the grilled chicken, baked beans and leaf salad and pan roasted chicken ads were less clear ($M = .348$) relative to the pizza and wonton soup ads ($M = 1.230$). This difference was also significant, $t(347.470) = -7.502, p < .001, [-1.109, -.657]$. Likewise, participants reported that they found it easier to name the ingredients of products in the pizza and wonton soup ads ($M = 1.016$) than in the grilled chicken, baked beans and leaf salad ads ($M = .337$). This difference was also significant, $t(337.745) = -6.515, p < .001, [-.903, -.465]$. As expected, participants immersed less in-the-mouth sensorially into the grilled chicken, baked beans and leaf salad ads ($M = -.118$) than the pizza and wonton soup ads ($M = .116$). This difference was significant $t(351) = 2.212, p < .050, [-.440, -.001]$.

¹⁴ Independent sample t-tests using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. On average, participants reported that the grilled chicken, baked beans and leaf salad and pan roasted chicken ads conveyed more sociable food experiences ($M = 1.114$) than the pizza and wonton soup ads ($M = .539$). This difference was also significant, $t(349.646) = -2.213, p < .001, [.403, .739]$. Accordingly, participants immersed socially more into the grilled chicken, baked beans and leaf salad and pan roasted chicken ads ($M = .314$) than the pizza and wonton soup ads ($M = -.309$). This difference was significant, $t(341.890) = 6.146, p < .001, [.418, .821]$.

.050), product form familiarity ($\gamma = -.056, p > .050$), product form liking ($\gamma = .022, p > .050$), food type familiarity ($\gamma = .045, p > .050$) and food type liking ($\gamma = .216, p < .010$).¹⁵

In summary, our manipulations were successful. We theoretically selected the grilled chicken with baked beans and leaf salad and pan roasted chicken images because they depicted explicit scenes (i.e. a park and a rustic dining room). As a result, consumers immersed visually more into these ads relative to the pizza and wonton soup ads that did not explicitly depict consumption scenes. Photographing foods more close up (i.e. like the pizza and wonton soup ads) made the food products look clearer and enabled consumers to name ingredients easily. Accordingly, consumers immersed in-the-mouth sensorially more into the pizza and wonton soup ads. Consumers reported that the grilled chicken with baked beans and leaf salad and pan roasted chicken images conveyed more sociable food experiences. Hence, it was not surprising to see they immersed socially more into these two photographic ads. There was a non-significant difference on ad attitude between the grilled chicken with baked beans and leaf salad and pan roasted chicken ads vs. the pizza and wonton noodle soup ads. We next proceed to hypothesis testing.

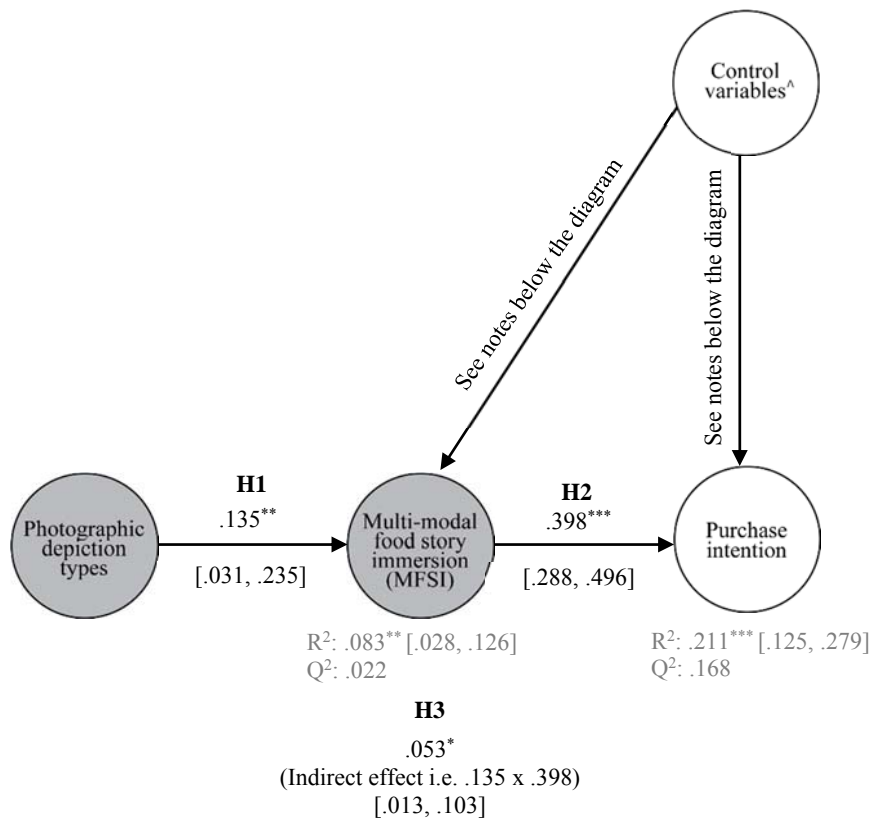
Test of hypotheses

We built the model illustrated in Figure 1 (see box 3) to test our hypotheses. The 0-1 dummy-coded type of photographic depictions was loaded as a dependent variable, MFSI (latent variable scores estimated by a partial least squares structural equation modelling algorithm)¹⁶ as an intervening variable and purchase intention as a dependent variable. We also controlled for hunger, product form familiarity and liking and food type familiarity and liking on both MFSI and purchase intention. Figure 6 illustrates the results in a diagram.

Photographic depiction types \rightarrow *MFSI*: *H1*. Results in Figure 6 support our theory. In accordance with H1, exposure to ads depicted with more explicit consumption sharing scenes (i.e. grilled chicken with baked beans and leaf salad and pan roasted chicken ads) increased MFSI relative to exposure to ads depicted with less explicit consumption sharing

¹⁵ ANCOVA (using Type III sum of squares as the sample sizes were not perfectly equal) using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. The effect of photographic depiction types on ad attitude was not significant, $F(1, 346) = 3.233, p > .050$ after controlling for hunger, $F(1, 346) = .365, p > .050$; product form familiarity, $F(1, 346) = .810, p > .050$; product form liking, $F(1, 346) = .131, p > .050$; food type familiarity, $F(1, 346) = .485, p > .050$; and food type liking, $F(1, 346) = 12.27, p < .010$.

¹⁶ Readers who are not familiar with the latent variable score estimation process based on the structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.



Direct effect of photographic depiction types → purchase intention, $\gamma = .049$, $p > .050$. Hence, photographic depiction types have an indirect-only effect (Zhao, Lynch, & Chen, 2010) on purchase intention via MFSI.

R^2 = Coefficient of determination; Q^2 = Predictive relevance using blindfolding procedure based on an omission distance of 6. The further the R^2 and Q^2 values are away from 0 the higher significance and relevance of predictors.

Bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence intervals are reported in squared brackets.

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Stop criterion change: 1

Notes:

Hunger → MFSI ($\gamma = .025$, $p > .050$, [.000, .087]), Product form familiarity → MFSI ($\gamma = .006$, $p > .050$, [.000, .015]), Product form liking → MFSI ($\gamma = .155$, $p < .010$, [.038, .272]), Food type familiarity → MFSI ($\gamma = .018$, $p > .050$, [.000, .064], and Food type liking → MFSI ($\gamma = .177$, $p < .010$, [.064, .289])

Hunger → purchase intention ($\gamma = .087$, $p > .050$, [.006, .183]), Product form familiarity → purchase intention ($\gamma = .150$, $p < .050$, [.025, .276]), Product form liking → purchase intention ($\gamma = .007$, $p > .050$, [.000, .017]), Food type familiarity → purchase intention ($\gamma = -.028$, $p > .050$, [-.097, -.000], and Food type liking → purchase intention ($\gamma = .038$, $p > .050$, [.001, .127])

Figure 6

Multi-modal food story immersion (MFSI), a persuasion mechanism, basic theory and hypothesis testing

scenes (i.e. pizza and wonton soup ads). The effect of photographic depiction types on MFSI was significant: Photographic depiction types \rightarrow MFSI ($\gamma = .135, p < .050$) even when hunger, product form familiarity and liking and food type familiarity and liking were included in the model. This means consumers immerse into the grilled chicken with baked beans and leaf salad and pan roasted chicken ads beyond hunger, product form familiarity and liking and food type familiarity and liking.¹⁷

Unrelated to our hypotheses, the results also revealed that when product form liking increases MFSI also increases: Product form liking \rightarrow MFSI ($\gamma = .155, p < .010$). This means the more consumers like ready meal products, the more they immerse into photographic food ads. Additionally, as food type liking increases, MFSI also increases: Food type liking \rightarrow MFSI ($\gamma = .177, p < .010$). This means the more consumers like the foods depicted in ads, the more they immerse into the ads.

MFSI \rightarrow purchase intention: H2. In line with H2, the results (see Figure 6) showed that as MFSI increased, purchase intention also increased: MFSI \rightarrow purchase intention ($\beta = .398, p < .001$) even when hunger, product form familiarity and liking and food type familiarity and liking were included as predictors of purchase intention. This means when consumers immerse into photographic ads visually, in-the-mouth sensorially and socially more into the ads, their purchase intention is also heightened. This subjective mental experience can explain a significant amount of variance in purchase intention that the other predictors cannot.

Additionally, beyond our hypotheses, the results showed that product form familiarity had a significant positive relationship with purchase intention: Product form familiarity \rightarrow purchase intention ($\gamma = .150, p < .050$). This means as consumers are more familiar with ready meal foods, their purchase intention likelihood also becomes higher.

Photographic depiction type \rightarrow MFSI \rightarrow purchase intention: H3. Lastly, Figure 6 illustrates that photographic depiction types have an indirect-only effect (Zhao et al., 2010) on purchase intention. As hypothesized in H3, photographic depiction types did not directly

¹⁷ ANCOVA (using Type III sum of squares as the sample sizes were not perfectly equal) using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. There was a significant main effect of photographic depiction types on MFSI, $F(1, 346) = 6.706, p < .050$ after controlling for hunger, $F(1, 346) = .230, p > .050$; product form familiarity, $F(1, 346) = .010, p > .050$; product form liking, $F(1, 346) = 6.743, p < .050$; food type familiarity, $F(1, 346) = .078, p > .050$; and food type liking, $F(1, 346) = 8.371, p < .010$. Follow-on means comparison showed that participants immersed more into the grilled chicken, baked bean and leaf salad and pan roasted chicken ($M = .121$) than the pizza and wonton soup ads ($M = -.119$). This difference was significant, $t(351) = 2.267, p < .050, [.038, .429]$.

influence purchase intention: Photographic depiction types \rightarrow purchase intention ($\gamma = .049$, $p > .050$). However, photographic depiction types had a significant effect on MFSI and MFSI had a significant relationship with purchase intention as exemplified earlier. Hence, photographic depiction type indirectly influenced purchase intention via MFSI as a mechanism. This indirect relationship was significant: Photographic depiction type \rightarrow MFSI \rightarrow purchase intention (effect size = .053, $p < .050$).

Summary and general discussion

In summary, this article introduces the multi-modal food story immersion (MFSI) construct and theory. MFSI is a higher-order construct. It is a mental state when consumers immerse themselves into the world of food story through multiple modalities during photographic food ad exposure. This mental state is in line with what food photographers want to have on viewers. The consumer interview in Study 1 demonstrates that the immersion phenomena really exist and are grounded in consumer voice. In Study 2, we empirically provide evidence that VI, ISI and SI (as lower-order reflective constructs) and MFSI (as higher-order reflective-formative construct) measures are reliable and valid. More importantly, VI, ISI and SI are not the same.

In both studies, we show that ads depicting food products with explicit consumption sharing scenes make consumers immerse more into ads (supporting H1). This is because ads that depict explicit consumption scenes give a sense of places making consumers immerse more visually. Depicting food products close up makes consumers immerse more in-the-mouth sensorially because they can see the products clearly and find it easier to name ingredients. This is because adding consumption scenes forces photographers to move further away from the products. More explicit consumption sharing scenes convey more sociable food experiences making consumers immerse more socially. Overall, foods depicted with more explicit consumption sharing scenes make consumers immerse more. Subsequently, as they immerse more, their purchase intention is also heightened (supporting H2). In Study 2, we additionally demonstrate that photographic depiction types do not directly influence purchase intention per se. Photographic depiction types indirectly influence purchase intention via MFSI as a mechanism (supporting H3). It is—*what consumers do mentally*—that indirectly induces their appetitive behavioral intention such as food product purchase intention. Results from this research provide several theoretical and practical contributions. These are discussed next.

Implications for theoretical development

This article contributes to the visual food advertising and marketing literature in the following respects. First, previous research on photographic depictions of food products has heavily conceptualized consumer mental phenomena evoked by food images on visual and self-only imageries for over 20 years. This paper raises the point that consumer mental activities are multimodal from a grounded cognition theoretical perspective. That is exposure to photographic food ads can evoke visual, in-the-mouth sensory and social immersions, just like how consumers interact with the world. This research, therefore, shows how to integrate grounded cognition theory into the visual food advertising and marketing communications literature. This paper offers advertising and marketing researchers an alternative way of looking at consumer mental phenomena evoked by photographic food ads from a higher-order perspective (i.e. MFSI). MFSI is not a reinvention but an integration of theoretical perspectives of visual imagery and self-referencing in previous research and grounded cognition together.

Second, previous research has identified various visual execution strategies that influence consumers to have more (less) visual images of eating the products in their minds when exposed to photographic depiction of food in marketing. These visual execution strategies are: presence (absence) of food pictures on packages (Underwood et al., 2001), depiction of food product alone (consumed by others) in print ads (Debevec & Romeo, 1992), high-eliciting imagery food pictures such as melted chocolate flowing from a ladle with floating chocolate chunks (low-eliciting imagery such as a midsection view of chocolate bar with cocoa beans) on packages (Homer & Gauntt, 1992), and product orientation such as a cake with a fork on the left or right matching (mismatching) with viewers' handedness (Elder & Krishna, 2012). We extend research on these visual properties by showing that consumers immerse more when photographic ads depict food products with more explicit consumption sharing scenes. This is a significant contribution because across cultures food is consumed socially and this social nature of food in photographic depiction of food has never been investigated.

Implications for advertising and marketing practices

This research provides three key implications for marketing practices. First, advertising agency practitioners (e.g., creative directors, art directors, account executives) and marketing managers benefit from our studies by understanding that consumer immerse into

photographic food ads beyond in-the-mouth sensory aspect. This is a very important practical contribution because it is more conventional for practitioners to focus on the appetite appeal in visual food advertising and marketing (Attea, 2008). The industry knows that photographic depictions of soft drink with water droplets (i.e. cold and refreshing look) or pizzas with a cheese-pull slice (i.e. cheesy and hot look) are ways to create the appetite appeal (Campbell, 2013; Custer, 2010; Dujardin, 2011). Although this in-the-mouth sensory aspect is important, our studies remind the practitioners that consumers also immerse visually and socially into photographic food ads.

Second, our studies provide implications on food styling and photography for advertising and marketing. This article shows that it is important to depict food products clearly and ensure that the photographic depiction makes it easy for the consumers to name the ingredients. This is to facilitate in-the-mouth sensory immersion. In addition, it is important to select a background to set a consumption scene (e.g., dining room, outdoor) so that it helps enhance visual immersion. Moreover, it is important to incorporate eating-with-other cues into food ads (e.g., paid models, hand models, number of servings or cutlery sets). If marketing managers want the viewers to have a multi-modal food story immersion experience while viewing the photographic depiction of their food product, then it is important to involve food stylists and food photographers to discuss and plan for these visual cues.

Third, this article provides a means to help marketing and brand managers evaluate and select the most immersive food image for advertising and marketing campaigns. This research puts forward multi-modal food story immersion (MFSI) scale as a predictor of food product purchase intention. It is evident that the phenomena exist among consumers when processing photographic food ads. Hence, the MFSI scale can help the advertising agency practitioners and marketing managers evaluate and choose the most immersive image to entice the consumers—if the campaign objective is to induce their purchase intention.

Future research

This paper gives a high priority to the validation and establishment of a reliable and valid measurement and the establishment of a solid theoretical foundation for multi-modal food story immersion (MFSI). Hence, there are some challenges that stemmed from our prioritization. Our prioritization limited our ability to investigate the relationship between

MFSI and other variables such as ad attitude, brand beliefs, brand attitude, consumption behaviors and individual differences. Nevertheless these are important variables that could be investigated to provide more fruitful findings; we believe that a good theory should start from a reliable and valid measurement model. This is because findings that are useful and trustworthy come from a good measurement model that reflects consumer voice with expert practitioner opinions considered.

First, this research does not directly manipulate the photographic depictions of food products. Instead, this research selects images and groups them based on theoretical grounds. Future research could manipulate the photographic depictions directly to operationalize the concept of consumption sharing scenes more tightly. For instance, researchers could compare the effect of food only depiction with food in consumption sharing scene depiction on immersions (controlling for the depiction of the main food product). We postulate that the results should be consistent with the experimental study in this research.

Second, this research does not directly classify food types into categories because this research places more focus on classifying photographic depiction types. Hence, future research could classify food types into categories such as healthy and unhealthy food types to extend this research. Poor et al. (2013) studies show that unhealthy food types depicted with another consumer eating it help reduce negative emotions associated with eating the unhealthy foods, thereby increasing taste evaluations. Future research could also investigate the interaction effects between food types and depiction types on immersions.

Third, this research shows that the more individuals like the product form (i.e. ready meal products) and the advertised foods the more they immerse into photographic food ads. Previous research has shown that gender differences exist in ad information processing (e.g., Meyers-Levy, 1989; Meyers-Levy & Maheswaran, 1991; Meyers-Levy & Sternthal, 1991). In addition, when consumers place greater importance on an issue the more likely they would elaborate more on marketing communication materials that address such an issue (Boninger, Krosnick, Berent, & Fabrigar, 1995). For example, absence or presence of food product depiction on packages has a stronger effect on taste perception for those who place greater importance on taste benefits (Underwood & Klein, 2002). Future research could investigate the effects of individual differences such as gender and personal importance on social food experience on immersions.

Fourth, this research shows that VI, ISI and SI are reliable and valid. This research also shows that the measures are reliable for each food ad (see Table C in Appendix A). However, this research did not show whether there is a significant difference between each food type or sub-populations (i.e. male and female) in the measurement model. If there is no significant difference, it means the scales consistently measure the same underlying constructs across gender and food types. This is known as “measurement invariance” (Hair, Hult, et al., 2014, p. 249). This is another reason why this research does not investigate the moderating effect of gender differences on specific paths. Measurement invariance should be established first before comparing whether specific path coefficient is significantly different between groups. Future research could address this issue.

Last, this research shows MFSI as a significant new mechanism and theory to influence purchase intention. However, it does not show how MFSI connects to existing advertising communications theory. Future research could incorporate MFSI into an existing advertising communications theory for further integration. To conclude, we provide the following consumer’s verbatim comment that highlights the importance of our research. The consumer’s voice also shouts at us, as advertising and marketing researchers, to pay more attention to this research area. This research area needs to be advanced because the body of this scholarship is still sparse compared to the overwhelming use of food photographs in marketing (Gutman, 2012; Lunney, 2013; Poor et al., 2013) and in mainstream food media (O’Neill, 2003; Ovide & Steel, 2008). Besides, it is obvious that consumers first eat with their eyes:

“I imagine a whole lot of tastes in my mouth that don’t go together [...] I see the dried tomatoes or is that a pepperoni and mushroom or is that a meat ball? I don’t know what it is [...] I would like to see some wine and a glass of wine there. I have seen it and I have made up my mind about it that I am not going to like it” (Male, 53 years old, born in Australia, response to Image 3 in Figure 2).

Appendix A: Detailed results

Table A
Descriptive statistics for each variable

Variable	No. of item	Mean	Std. Deviation	Kurtosis	Kolmogorov-Smirnov ^a
Photographic depiction types (Dummy coded as 0 for less explicit consumption sharing scenes and as 1 for more explicit consumption scenes)	1				
Multi-modal food story immersion (MFSI) ¹⁸	9				
Visual immersion (VI)	3				
I felt as if I was transported into the picture (VI01)		1.82	1.30	-.096	.417***
I felt as if the food was physically here (VI02)		1.89	1.30	-.568	.399***
I felt as if I was invited into the picture (VI03)		2.52	1.41	-1.44	.265***
In-the-mouth sensory immersion (ISI)	3				
I sensed the food in my mouth (ISI01)		2.06	1.36	-.973	.362***
I imagined the tastes/flavours of the food (ISI02)		2.89	1.33	-1.22	.197***
I could feel the texture of the food in my mouth (ISI03)		2.01	1.38	-.771	.370***
Social immersion (SI)	3				
I thought about sharing the food with other people (SI01)		2.34	1.48	-1.36	.322***
I pictured other people I could eat the food with (SI02)		2.22	1.45	-1.19	.336***
The picture brought stories about other people to my mind (SI03)		1.82	1.27	-.142	.412***
Purchase intention	1	2.27	2.00	-.468	.221***
Manipulation checks					
Sociableness of consumption sharing scenes	1	.824	.864	.654	.289***
Clarity of food product depiction	1	.793	1.18	-.399	.255***
Easiness for naming ingredients	1	.679	1.03	-.009	.296***
Ad attitude	1	.484	.856	.244	.251***
Control variables					
Hunger	1	2.16	1.12	-.209	.207***
Product form familiarity	1	3.08	1.16	-.747	.174***
Product form liking	1	.028	1.19	-.896	.167***
Food type familiarity index	1	2.72	1.11	-.211	.176***
Food type liking index	1	1.01	1.01	.997	.215***

^aLilliefors significance correction

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ ($df = 353$)

¹⁸ Detailed scaling construction of immersion constructs and frequency distributions showing the nature of immersions in photographic food advertising are provided in Thesis appendix A.

Table B

Reflective measurement model evaluation: Indicator reliability, internal consistency reliability, convergent validity and discriminant validity criteria

Latent construct and indicator	λ			AVE	CR	α^{\wedge}
	Visual immersion (VI)	In-the-mouth sensory immersion (ISI)	Social immersion (SI)			
Visual immersion (VI)				.626	.833	.703
I felt as if I was transported into the picture (VI01)	.833***	.263	.341			
I felt as if the food was physically here (VI02)	.735***	.415	.217			
I felt as if I was invited into the picture (VI03)	.802***	.362	.356			
In-the-mouth sensory immersion (ISI)				.704	.877	.790
I sensed the food in my mouth (ISI01)	.369	.866***	.230			
I imagined the tastes/flavours of the food (ISI02)	.368	.824***	.252			
I could feel the texture of the food in my mouth (ISI03)	.340	.826***	.218			
Social immersion (SI)				.720	.885	.807
I thought about sharing the food with other people (SI01)	.319	.240	.878***			
I pictured other people I could eat the food with (SI02)	.360	.279	.892***			
The picture brought stories about other people to my mind (SI03)	.329	.182	.771***			

λ = Factor loading (indicator reliability and discriminant validity), AVE = Average variance extracted (convergent validity), CR = Composite reliability (internal consistency reliability), α^{\wedge} = Cronbach's alpha

α^{\wedge} Cronbach's alpha values should not be used to evaluate the internal consistency reliability because Cronbach's alpha values are affected by the number of indicators—when the number of indicators increase, the higher the value of Cronbach's alpha is (Cortina, 1993). Internal consistency reliability should be evaluated using the CR values (Bagozzi & Yi, 1988; Hair et al., 2012).

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

The results (see above) showed that indicators of VI, ISI and SI exhibited factor loadings (λ) ranging from .771 to .892. This means each and every indicator of VI, ISI and SI is reliable (Hair et al., 2012; Hulland, 1999). All average variance extracted (AVE) values of VI, ISI and SI were higher than .50. This means VI, ISI and SI achieve the convergent validity (Bagozzi & Yi, 1988). All composite reliability (CR) values of VI, ISI and SI were well above .70. This means VI, ISI and SI achieve the internal consistency reliability (Bagozzi & Yi, 1988; Hair et al., 2012).¹⁹ See Table C for the reflective measurement model evaluation for each food type.

¹⁹ We also ran a Confirmatory Factor Analysis (CFA) model using a covariance-based structural equation (CB-SEM) modeling approach using the AMOS computer software version 22.0. The indicators of VI, ISI and SI exhibited factor loadings from .636 to .852, all p -values $< .001$. The model fit indices indicated a reasonably good fit for the measurement model with an χ^2 of 62.97 ($df = 24$, $p = 0.000$), a comparative fit index (CFI) of 0.96, a Tucker–Lewis index (TLI) of 0.94, a root mean square error of approximation (RMSEA) of 0.06.

Table C

Reflective measurement model evaluation: Indicator reliability, internal consistency reliability and convergent validity by food types

Latent construct and indicator	Grilled chicken (picnic)				Pan roasted chicken				Pizza				Wonton noodle soup			
	λ	AVE	CR	α^{\wedge}	λ	AVE	CR	α^{\wedge}	λ	AVE	CR	α^{\wedge}	λ	AVE	CR	α^{\wedge}
Visual immersion (VI)																
I felt as if I was transported into the picture (VI01)	.918				.695				.819				.735			
I felt as if the food was physically here (VI02)	.758	.684	.866	.765	.783	.539	.778	.579	.810	.646	.845	.726	.816	.645	.845	.739
I felt as if I was invited into the picture (VI03)	.796				.722				.781				.853			
In-the-mouth sensory immersion (ISI)																
I sensed the food in my mouth (ISI01)	.724				.878				.904				.843			
I imagined the tastes/flavours of the food (ISI02)	.905	.629	.834	.753	.824	.692	.871	.781	.770	.720	.885	.805	.880	.731	.891	.804
I could feel the texture of the food in my mouth (ISI03)	.738				.791				.865				.841			
Social immersion (SI)																
I thought about sharing the food with other people (SI01)	.918				.866				.680				.827			
I pictured other people I could eat the food with (SI02)	.851	.708	.878	.806	.883	.681	.864	.769	.927	.648	.844	.769	.927			
The picture brought stories abt. other people to my mind (SI03)	.746				.716				.788				.771	.713	.881	.804

λ = Factor loading (indicator reliability and discriminant validity) – all factor loadings were significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$); AVE = Average variance extracted (convergent validity); CR = Composite reliability (internal consistency reliability); α^{\wedge} = Cronbach's alpha

α^{\wedge} Cronbach's alpha values should not be used to evaluate the internal consistency reliability because Cronbach's alpha values are affected by the number of indicators—when the number of indicators increase, the higher the value of Cronbach's alpha is (Cortina, 1993). Internal consistency reliability should be evaluated using the CR values (Bagozzi & Yi, 1988; Hair et al., 2012).

The results (see above) showed that indicators of VI, ISI and SI exhibited factor loadings (λ) mostly above .700 across food types. This means each and every indicator of VI, ISI and SI is reliable (Hair et al., 2012; Hulland, 1999). All average variance extracted (AVE) values of VI, ISI and SI were higher than .500 across four food types. This means VI, ISI and SI achieve the convergent validity (Bagozzi & Yi, 1988). All composite reliability (CR) values of VI, ISI and SI were well above .70 across food types. This means VI, ISI and SI achieve the internal consistency reliability (Bagozzi & Yi, 1988; Hair et al., 2012).

Table D

Reflective measurement model evaluation: Additional discriminant validity criteria

Construct/Discriminant validity criteria	Fornell & Larcker's (1981) $\sqrt{AVE} > r$			Henseler, Ringle & Sarstedt's (2015) HTMT [^]		
	Visual immersion (VI)	In-the-mouth sensory immersion (ISI)	Social immersion (SI)	Visual immersion (VI)	In-the-mouth sensory immersion (ISI)	Social immersion (SI)
Visual immersion (VI)	(.792)					
In-the-mouth sensory immersion (ISI)	.442	(.838)		.585		
Social immersion (SI)	.386	.282	(.848)	.342	.513	

AVE = Average variance extracted; r = Correlation; HTMT = Heterotrait-monotrait ratio of correlations; \sqrt{AVE} values are shown in parentheses but r and HTMT values are shown without parentheses.

[^]Henseler, Ringle & Sarstedt (2015) argue that Fornell & Larcker's (1981) criterion works well only when factor loadings are not partially correlated with high sample sizes. Henseler, Ringle & Sarstedt's (2015) criterion suggests that if the average heterotrait-heteromethod divided by the geometric mean of the average monotrait-heteromethod correlation of a latent construct and the average monotrait-heteromethod correlation of another latent construct is less than .700 then the discriminant validity is established.

The results in Table B also showed that indicators of VI, ISI and SI were also loaded highest within their construct (Chin, 1998; Grégoire & Fisher, 2006). In this table (see Table D above), the square root of AVE value of each construct was larger than its correlation value with other constructs (Fornell & Larcker, 1981). The heterotrait-monotrait ratio of correlations (i.e. HTMT, Henseler et al., 2015) between VI, ISI and SI were below .700. These mean VI, ISI and SI were related but empirically distinct.²⁰

²⁰ Another Confirmatory Factor Analysis (CFA) model was also run using the AMOS computer software version 22.0 allowing VI, ISI and SI to be perfectly correlated ($\chi^2 = 436.79$, $df = 27$). The different between the two CB-SEM CFA models was highly significant with the chi-square change ($\Delta\chi^2(3) = 373.81$, $p < .001$). This means the three-factor model fits the data better than the one factor model or VI, ISI and SI should not be modelled as one global reflective factor. Note that MFSI in this study was not modelled as a global reflective factor. MFSI was modelled as a higher-order construct formed by VI, ISI and SI as separate components defining MFSI.

Table E
Formative measurement model evaluation

Construct/indicator	Multi modal food story immersion (MFSI) [^]	
	VIF	Weights
Visual immersion (VI)	1.367	.415**
I felt as if I was transported into the picture (VI01)	1.589	.160*
I felt as if the food was physically here (VI02)	1.560	.178**
I felt as if I was invited into the picture (VI03)	1.470	.188***
In-the-mouth sensory immersion (ISI)	1.259	.519***
I sensed the food in my mouth (ISI01)	2.057	.190**
I imagined the tastes/flavours of the food (ISI02)	1.614	.241***
I could feel the texture of the food in my mouth (ISI03)	1.862	.186**
Social immersion (SI)	1.196	.374**
I thought about sharing the food with other people (SI01)	1.992	.151**
I pictured other people I could eat the food with (SI02)	2.125	.185**
The picture brought stories about other people to my mind (SI03)	1.586	.099*

VIF = Variance inflation factor. VIF values below 5 indicate that there are no issues with multicollinearity to form a formative latent construct. Significant regression weights indicate whether the indicators and lower-order reflective latent construct contribute greatly to the higher-order reflective-formative latent construct (Hair et al., 2012).

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

[^]MFSI was modelled as a higher-order reflective-formative latent construct (Chin & Gopal, 1995; Diamantopoulos et al., 2008; Hair, Hult, et al., 2014; Jarvis et al., 2003). We used a “repeated indicator, mode b” approach (Becker et al., 2012, p. 376) to model MFSI as a predictor of purchase intention. This means we modelled VI, ISI and SI as lower-order latent constructs (with indicators being reflective). Then, we used VI, ISI and SI to form MFSI. All indicators of VI, ISI and SI were also simultaneously modelled as formative indicators of MFSI. This means MFSI is a weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm).²¹ MFSI was used to predict purchase intention (see box 2 in Figure 1, p. 60). We chose this approach because a recent Monte Carlo simulation study (Becker et al., 2012) has shown that this approach has performed best in terms of having low bias, high precision of parameter estimates and reliability of higher-order latent scores.

The results (see above) showed that the variance inflation factor (VIF) values of VI, ISI and SI were below 5. This means there are no issues with multicollinearity for VI, ISI and SI to form MFSI. The regression weights of all indicators of VI, ISI and SI on MFSI were significant, all p -values $< .050$. This means each indicator of VI, ISI and SI contributes significantly to MFSI (Hair et al., 2012).

²¹ Readers who are not familiar with the latent variable score estimation process based on a structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.

Appendix B: Experimental online questionnaire

Note: The questionnaire below contains all the measures used in this study. However, only one scale format and one food ad are displayed below, to be concise. Please refer to “Data quality control prior to data collection,” page 76 in the body of this article for information on how scale formats, scale rotations and randomization are managed. Please refer to “Figure 3,” page 75 in the body of this article for all photographic ads used in this research.

[Information statement]

Information statement

You are invited to participate in an online study. This study seeks to understand your response to an advertisement and general food knowledge and consumption behaviour.

About the researchers

The study is being conducted by Joseph Pitt (joe.pitt@mq.edu.au) and is being conducted to meet the requirements of the Doctor of Philosophy degree in marketing under the supervision of Associate Professor Lawrence Ang (lawrence.ang@mq.edu.au or 02 9850 9135) and Associate Professor Hume Winzar (hume.winzar@mq.edu.au or 02 9850 6468) of the Department of Marketing and Management.

About this survey and privacy

This survey takes approximately 20 - 25 minutes to complete. Your participation is anonymous and entirely voluntary. Information on whether you choose to respond or not respond to this survey will be kept confidential. Only Joe has access to information on who responds. This information will NOT be made available to any teachers of the units being surveyed (if you are a Macquarie University student).

Only Joseph Pitt, Associate Professor Lawrence Ang and Associate Professor Hume Winzar will have access to the raw data. A summary of the results of the analysis can be made available to you on request by contacting Joe.

Ethics clearance

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

You may be contacted again for a follow-up study, which is also anonymous and entirely voluntary.

You can choose to print this Information Statement by clicking the "Print" button below.

Print

By clicking the "Agree" button below, you are confirming that you have read and understand the information above and agree to participate in this research. Then, click the "Next >>" button below to start the survey.

iPad, tablet and mobile phone users:

Participants are asked to use a desktop or laptop computer only to complete this survey.

This is part of quality assurance. If right now you are accessing this survey on an iPad, tablet or mobile phone, please complete this survey when you have access to a desktop or laptop computer.

☒ Agree

[Hunger]

How hungry are you feeling right now?

Indicate your answer by clicking a button. If your answer is "Not at all", then just click the "0" button.

Not at all
hungry
0



Slightly
hungry
1



Moderately
hungry
2



Very
hungry
3



Extremely
hungry
4



[Instructions]

Next, we will show you an advertisement for...

- A new ready meal brand (chilled, not frozen)

Your viewing goal is to...

- See if the product is desirable to eat or not

View it...

- As you would normally do when reading a magazine
- As long as you wish at your own pace

[Ad exposure]



[Free thought listing]

What thoughts, feelings or imageries came to mind while viewing the ad?

[Purchase intention]

What are the chances that you will buy Lee's Chilled Meals Brand when it becomes available?

Indicate your answer by clicking a button. If your answer is "No chance to slight possibility", then just click the "0 - 20%" button.

No chance to
slight possibility

0 - 20%



Some to
fair possibility

21 - 40%



Fairly good to
good possibility

41 - 60%



Probable to
very probable

61 - 80%



Almost sure to
certain

81 - 100%



[Ad attitude]

How much do you like or dislike the ad?

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Dislike
very much
-2



Dislike
-1



Neither like
nor dislike
0



Like
1



Like
very much
2



[Multi-modal food story immersion, MFSI]



[Visual immersion, VI]

While viewing the ad, did you experience the following?

	Yes	No
I felt as if I was transported into the picture	<input type="radio"/>	<input type="radio"/>
I felt as if the food was physically here	<input type="radio"/>	<input type="radio"/>
I felt as if I was invited into the picture	<input type="radio"/>	<input type="radio"/>

How intensely did you experience the following?

	Weakly 1	Moderately 2	Strongly 3	Extremely strongly 4
» I felt as if I was transported into the picture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I felt as if the food was physically here	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I felt as if I was invited into the picture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[In-the-mouth sensory immersion, ISI]

While viewing the ad, did you experience the following?

	Yes	No
I sensed the food in my mouth	<input type="radio"/>	<input type="radio"/>
I imagined the tastes/flavours of the food	<input type="radio"/>	<input type="radio"/>
I could feel the texture of the food in my mouth	<input type="radio"/>	<input type="radio"/>

How intensely did you experience the following?

	Weakly 1	Moderately 2	Strongly 3	Extremely strongly 4
» I sensed the food in my mouth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I imagined the tastes/flavours of the food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I could feel the texture of the food in my mouth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Social immersion, SI]

While viewing the ad, did you experience the following?

	Yes	No
I thought about sharing the food with other people	<input type="radio"/>	<input type="radio"/>
I pictured other people I could eat the food with	<input type="radio"/>	<input type="radio"/>
The picture brought stories about other people to my mind	<input type="radio"/>	<input type="radio"/>

How intensely did you experience the following?

	Weakly 1	Moderately 2	Strongly 3	Extremely strongly 4
» I thought about sharing the food with other people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I pictured other people I could eat the food with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» The picture brought stories about other people to my mind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



[Clarity of the main food product depiction]

The food product shown in the picture is

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very
unclear

-2



Unclear

-1



Neither clear
nor unclear

0



Clear

1



Very
clear

2



[Easiness of naming ingredients]

The picture makes it for me to name the ingredients.

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very
difficult

-2



Difficult

-1



Neither easy
nor difficult

0



Easy

1



Very
easy

2



[Sociableness of depicted food experience]

The picture seems to convey a food experience that is.....

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very unsociable	Unsociable	Neither social nor unsociable	Sociable	Very sociable
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

.....

[Product form and food type familiarity]

How familiar are you with the following food in general?

Indicate your answer by clicking a button. If your answer is "Not at all", then just click the "0" button.

	Not at all familiar	Not very familiar	Somewhat familiar	Very familiar	Extremely familiar
	0	1	2	3	4
<input type="checkbox"/> Wonton noodle soups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Pizzas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Grilled chickens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Leaf salads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Baked beans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Red wines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ready meal products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

.....

[Product form and food type liking]

How much do you like or dislike the following food in general?

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

	Dislike very much	Dislike	Neither like nor dislike	Like	Like very much
	-2	-1	0	1	2
<input type="checkbox"/> Wonton noodle soups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Pizzas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Grilled chickens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Leaf salads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Baked beans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Red wines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ready meal products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

.....

[Gender]

What is your gender?

- ☐ Male
- ☐ Female

[Age]

What year were you born in?

Please select below... ▼

[Debrief and submission]

The specific aim of this study is to:

- Investigate the impact of visual cues in food pictures/ads on mental processing

Would you like to make further comments about this survey?

If so, please comment below. Otherwise, thank you very much for your participation. We appreciate your help.

Please click "Next>" to submit your response.

This question will record the recipient's browser information. It will not be displayed to the user.

Browser Type
Browser Version
Operating System
Screen Resolution
Flash Version
Java Support
User Agent

End of Survey

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CHAPTER 4

Seduced by food ads:

The role of photographic depictions, gender, food types, personal importance of social food experience and immersions

Abstract. This paper argues that other significant routes to food product purchase intention related to immersions exist above and beyond the traditional advertising affect-transfer theory. The authors¹ integrates existing theoretical concepts of visual imagery and self-referencing from previous research and proposes multi-modal food story immersion (MFSI) as a new persuasion mechanism and theory. MFSI is a mental state when consumers experience visual immersion (VI), in-the-mouth sensory immersion (SI) and social immersion (SI) when exposed to photographic food ads. Operationally, MFSI is a weighted sum of VI, ISI and SI. Experimental study results show that exposure to ads depicting food in consumption sharing scenes (food in CSS) increases MFSI more than ads depicting it alone (food only). Women experience higher MFSI than men. Higher MFSI results in higher purchase intention. When considering only SI, the effect of photographic depiction types varies by gender. Women immerse socially more into ads than men only in the food in CSS condition. This is because women place greater importance on social food experience. As one places greater importance on social food experience, one immerses socially more into ads. As SI increases, purchase intention also increases. This article shows how MFSI connects to and departs from the traditional advertising theory. The MFSI theory provides new avenues for further research to the visual food advertising and marketing literature.

Key words. Photographic depictions, Gender, Food types, Personal importance of social food experience, Multi-modal food story immersion (MFSI), Visual immersion (VI), In-the-mouth sensory immersion (ISI), Social immersion (SI), Purchase intention, Advertising, Marketing

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Introduction

Without doubt, consumers of the mainstream food media (e.g., television cooking shows, food films and food blogs) are immersed into a world of food story evoked by photographic depictions. Consider comments Eva, Jane and Alexandria left on a photo food blog below. The blog post visually told stories about a food experience at a café. All emphases are added by the authors to highlight different types of immersions:

Eva: “[...] I am *transported* to a place of delicious food and coffee...now I'm craving [...]

Jane: “[...] I *can almost smell and taste* the coffee and food!”

Alexandria: “I get *a sense of community* and *togetherness* in these photographs [...]” (Brimble, 2012).

This paper refers to Eva's, Jane's and Alexandria's responses as: visual immersion, in-the-mouth sensory immersion, and social immersion respectively (hereafter VI, ISI and SI in the same order). This article views all of these subjective consumer mental phenomena from a higher-order perspective as multi-modal food story immersion (hereafter MFSI). This perspective is consistent with grounded cognition theory (Barsalou, 2008) positing that consumer mental activities are multimodal, grounded in several ways including a re-enactment of real-world experience like Eva's, Jane's and Alexandria's mental states.

Shifting to advertising contexts, as a consumer immerses more into photographic food ads, one would expect that their purchase intention would be heightened. If this is true, then it raises several questions for advertising researchers. First, where does MFSI fit in the existing concepts and measurements of consumer mental phenomena in the literature? For more than 20 years of research on photographic depiction of food in marketing, consumer mental phenomena have been conceptualized as visual imagery (Homer & Gauntt, 1992; Underwood, Klein, & Burke, 2001), self-referencing (Debevec & Romeo, 1992) and mental simulations (Elder & Krishna, 2012). These concepts measure the extent to which consumers report having visual images of themselves eating the product depicted in marketing and advertising (e.g., print ads and packages). Such operationalization reflects the heavy focus on visual and self-only imageries. This research issue might stem from the influence of earlier conceptualizations of and research in, visual imagery (Lutz & Lutz, 1978; MacInnis & Price, 1987; Rossiter, 1982), self-referencing (Gregory, Cialdini, & Carpenter, 1982; Shavitt & Brock, 1986) and mental simulation (Taylor, Pham, Rivkin, & Armor, 1998). Some scholars have attempted to capture taste and smell imageries (Miller,

Hadjimarcou, & Miciak, 2000) as an extension of earlier measurements developed by Ellen and Bone (1992; 1991) and Babin and Burns (1998). However, this paper challenges the existing conceptualizations. This article argues that the existing concepts do not fully capture the consumer mental phenomena evoked by photographic depiction of food. MFSI is proposed as a new construct—an integration of relevant theoretical concepts for visual food advertising and marketing communications from a higher-order perspective, not a duplication.

Second, how can MFSI connect to and depart from an existing advertising communication theory? It is without doubt that ad liking or disliking judgement (hereafter ad attitude) and good or bad product evaluation (hereafter brand attitude) are popular constructs in the advertising literature (Kim, Hayes, Avant, & Reid, 2014; Spears & Singh, 2004). The more consumers like the ad, the better they rate the brand. As brand attitude increases, purchase intention also increases. This indirect influence of ad exposure on purchase intention is known as an affect-transfer (Mitchell & Olson, 1981; Shimp, 1981), which has been well embraced (e.g., Haley & Baldinger, 1991; Mehta & Purvis, 1997; Morris, Woo, Geason, & Kim, 2002) particularly for copy testing. However, it is obvious that this traditional theory does not take the subjective mental experiences like Eva's, Jane's, and Alexandria's into account. This paper proposes that MFSI is a missing piece of information that can explain the relationship between exposure to photographic food ads and purchase intention—above and beyond the traditional advertising theory.

Other questions are: do consumers immerse into ads because of photographic depiction types, gender or food types or the interplay between these factors, and finally is the relationship of immersions with purchase intention independent?

Previous research in this stream has investigated various types of visual depiction of food such as presence vs. absence of food product depiction on packages (Underwood & Klein, 2002; Underwood et al., 2001), presence vs. absence of raw meat depiction in sandwich restaurant TV ads (Shimp & Stuart, 2004), location of food product depiction on packages (Deng & Kahn, 2009), varied number of food product unit depiction on packages (Madzharov & Block, 2010), food products presented on a paper napkin vs. on a glass plate (Payne & Wansink, 2010), left vs. right orientation of food products depicted in print ads (Elder & Krishna, 2012), and food product depicted alone vs. depicted with another consumer eating it (Poor, Duhachek, & Krishnan, 2013). However, none has investigated

the different effects between ads that photographically depict food only and food in consumption sharing scenes (hereafter food in CSS) on immersions. This is surprising because eating is a social activity (Korsmeyer, 2002). Young, Mizzau, Mai, Sirisegaram and Wilson (2009) observe almost 500 individuals at different meal times and locations for a week. Their studies find that only 8% of the observed individuals eat alone. Regardless of cultures, food is consumed socially. As such, the social nature of food deserves more scholarly attention (Krishna & Elder, 2010).

In a broader stream, gender differences have attracted much attention from advertising and marketing scholars. Previous research has shown that gender differences exist in the level of processing, recall ability and message evaluation (e.g., Brunel & Nelson, 2000, 2003; Darley & Smith, 1995; Meyers-Levy, 1989; Meyers-Levy & Maheswaran, 1991; Meyers-Levy & Sternthal, 1991); ad, brand and purchase intention evaluations (e.g. Brunel & Nelson, 2000, 2003; Putrevu, 2004) and loyalty (e.g., Melnyk, van Osselaer, & Bijmolt, 2009; Ndubisi, 2006). However, research on differences between women and men in their immersions into photographic food ads, is non-existent.

Previous research has also shown the effects of healthy and unhealthy food types on consumer responses. For instance, less healthy food types are believed to be better in taste and more enjoyable to eat (Raghunathan, Naylor, & Hoyer, 2006). Viewing unhealthy food depicted with another consumer eating it in ads leads to higher net positive thoughts or a higher emotional positivity about eating the foods. Higher emotional positivity leads to better taste perception and purchase intention (Poor et al., 2013). Depicting unhealthy food with healthy toppings (e.g., rich creamy ice cream topped with fresh fruits) make consumers underestimate the calorie content and increase consumption (Jiang & Lei, 2014). However, research on the effect of healthy and unhealthy food types on immersions into photographic ads have never been conducted.

This article is of interest to advertising and marketing scholars and practitioners for several reasons. First, photographic depiction of food is an integral part of food advertising and marketing practice (Attea, 2008; Custer, 2010; Gutman, 2012; Lunney, 2013). Second, it is forecasted that globally women now control \$20-\$30 trillion in annual consumer spending (Silverstein & Sayre, 2009). In many countries, women are decision makers for foods and groceries (Nielsen, 2011; Silverstein & Sayre, 2009). However, there is still a perception that advertisers and marketers do not understand women sufficiently (Rooney,

2009). Last, there is convincing evidence that mental imageries can influence consumer purchase intention (Dahl & Hoeffler, 2004; Debevec & Romeo, 1992; Elder & Krishna, 2012; Escalas, 2004, 2007; Homer & Gauntt, 1992; Petrova & Cialdini, 2005; Phillips, 1996; Underwood et al., 2001). Purchase intention is a desired marketing outcome, especially for new products.

Theoretical development

Grounded cognition theory

Grounded cognition theory posits that mental activities are grounded in many ways including mental simulations, situated actions, and, sometimes, bodily states (Barsalou, 2008). Mental simulation is the focus of this research. Only this aspect will be elaborated further (for a review of other aspects see Barsalou, 2008; Barsalou, 2009, 2010; in marketing see Krishna & Schwarz, 2014). The theory of grounded cognition in the account of mental simulation holds that our initial experiences (e.g., consumption) are stored in semantic memory across multiple modalities. For instance, as we initially meet with friends at a café for coffee and lunch, the brain captures perceptual and mental states and integrates them with a multimodal representation (e.g., how the café looks, how being in the café feels like, what the food looks, tastes and feels like in the mouth, whom we share the food with, how sharing a meal with friends feels like). Later, when one views a photograph telling food stories at a café, these modal representations are simulated or re-enacted—similar to Eva's, Jane's and Alexandria's responses.

Recent neuroscience research corroborates the theory of grounded cognition. For instance, viewing a video of a scene creates a perceptual illusion of being there leading to activation of the parahippocampal area. This brain area is responsible for giving contextual meaning of where an event occurs (Bouchard et al., 2010). Seeing food photographs (e.g., hamburger, chocolate chip cookies, and spaghetti) triggers the visual cortex, right insula/operculum and left orbitofrontal cortex. These brain areas are responsible for knowledge of food shapes, taste and flavour inferences and reward values of tastes respectively (Simmons, Martin, & Barsalou, 2005). Imagining oneself preparing dinner to share the meal with someone activates the anterior paracingulate cortex. This brain region represents mental states involving social interactions (Walter et al., 2004). Seeing faces of other people remotely competing in a computer game also triggers the same brain region responsible for interpersonal interactions (Rilling, Sanfey, Aronson, Nystrom, & Cohen, 2004).

Convincing evidence from neuroimaging studies gives strong support to the argument that a photographic depiction of food is not simply a physical object (i.e. photograph). It is not just a representation either (i.e. food). It can trigger a collection of experiences (i.e. scene, flavors, and social interactions) embedded in a photograph that can be relived or imagined. Exposure to food photographs makes Eva feel as if she is there; makes Jane feel as if she could really smell and taste the coffee and food; and probably makes Alexandria feel as if she is not there alone but sharing the food experience with others. This theoretical view raises an important question to advertising researchers as to whether existing concepts and measurements in the research stream of visual food advertising are adequate. Eva's, Jane's and Alexandria's explicit remarks also indicate that such subjective mental states can be measured using consumer verbatim reports.

Traditional concepts and measures of visual ad-evoked mental imagery

Existing concepts and measures in the research areas of visual food advertising and marketing do not capture the consumer mental phenomena evoked by photographic food ads adequately and precisely. This is because existing constructs have focused heavily on the visual and self-only imageries. Below are examples of indicators used by previous research. All emphases are added by the authors to highlight key aspects of existing constructs:

"I could *picture myself* trying the product" (Debevec & Romeo, 1992, p. 91)

"How much did the advertisement bring to mind concrete *images* or mental *pictures*?" (Phillips, 1996, p. 72)

"I *imagined* what it would be like to use the product advertised." (Babin & Burns, 1998, p. 270)

"To what extent *images* of eating the product came to mind," and "To what extent could you *imagine yourself* eating the product," (Elder & Krishna, 2012, p. 997)

These indicators reflect concepts that have previously been referred to as: visual imagery (Babin & Burns, 1998; Ellen & Bone, 1991; MacInnis & Price, 1987; Miller et al., 2000; Rossiter & Percy, 1980; Underwood et al., 2001), self-referencing (Debevec & Romeo, 1992; Escalas, 2007; Gregory et al., 1982; Meyers-Levy & Peracchio, 1996; Shavitt & Brock, 1986), consumption visions (Phillips, 1996; Phillips, Olson, & Baumgartner, 1995), mental simulations (Elder & Krishna, 2012; Escalas, 2004; Taylor et al., 1998).

It is evident that existing concepts and measurements in the visual food advertising research stream completely neglect mental phenomena like Eva's feeling transported into the picture and Alexandria's possible social interaction imagery. The transportation phenomenon, which originated in the psychology and telepresence literature (Green & Brock, 2000; Minsky, 1980), has recently started to attract the attention of some marketing scholars (e.g. Debbabi, Daassi, & Baile, 2010; Escalas, 2004, 2007; Hopkins, Raymond, & Mitra, 2004). However, it has never been integrated into the visual food advertising and marketing literature.

Some scholars have attempted to add taste imageries (i.e. "I imagined tastes" in Miller et al., 2000, p. 6) as an extension of earlier measurements developed by Ellen and Bone (1992; 1991) and Babin and Burns (1998). However, this in-the-mouth sensory dimension still has not been fully integrated even in the very recent research in this area (e.g., Elder & Krishna, 2012). Recall Jane's remark about sensing the smell and tasting the coffee and food. Her mental state suggests this mental phenomenon exists. One possible reason why this dimension is left out is because it is questionable whether the indicators "I imagined tastes" and "I imagined myself eating the food" are discriminable. This is because as one imagines oneself eating the food, one concurrently senses the tastes and flavors. Likewise, as one senses the tastes and flavors of the food, one is imagining eating it.

Some researchers place an importance on measuring individual differences in imagery. There have been many other scales developed for measuring individual differences in one's ability or tendency to think in picture such as the Betts Questionnaire Upon Mental Imagery (Betts, 1909), Imaginal Process Inventory (Singer & Antrobus, 1970), Visualizer-Verbalizer Questionnaire (Richardson, 1977) and Visualizing/Verbalizing Index (Holbrook, Chestnut, Oliva, & Greenleaf, 1984). These scales measure individual differences in one's ability or tendency to think in pictures. This article supports Bone and Ellen (1992)'s argument that such measurements are not appropriate for evaluating the magnitude of mental states evoked by a specific communication (i.e. ads). In addition, the magnitude of mental states evoked by ads predicts advertising outcomes better than individual differences constructs (Rossiter, 1982; Slee, 1978). This is possibly because the ad-evoked imagery construct is more specific. When these two constructs are both included in the model, imagery as an individual differences construct can become insignificant for predicting advertising outcomes (Slee, 1978) because the variance may have already been explained by the ad-evoked imagery construct.

Multi-modal food story immersion (MFSI) as a new higher-order perspective

This paper conceptualizes Eva's, Jane's and Alexandria's mental experiences as multi-modal food story immersion (MFSI). This conceptualization is a departure from the traditional perspective, literally viewing the phenomenon as imagery. This article defines MFSI as a mental state when consumers immerse themselves into the world of food story visually, in-the-mouth sensorially and socially. Operationally, MFSI is a weighted sum of VI, ISI and SI based on a structural equation modelling algorithm (see Table A in Appendix A for indicators).² VI is a subjective mental experience when consumers experience an illusion or feel as if they are part of photographic depiction of food product. ISI is a subjective mental experience when consumers sense the flavors and textures of food products photographically depicted. SI is a psychological state when consumers imagine themselves sharing depicted food products with others in their minds. VI, ISI and SI are related but discriminable. VI, ISI and SI measures the intensity viewers experience the mental states (i.e. ranging from not at all to extremely). Hence, MFSI is not a reinvention. MFSI is an integration of related theoretical concepts bridging the conceptualization and measurement gaps of existing research in this area. MFSI is developed particularly for visual food advertising and marketing, consistent with grounded cognition theory.

Next, we discuss a traditional advertising theory. This well-established theory serves as an anchor to describe how MFSI connects to and at the same time departs from the traditional advertising theory.

MFSI, a connection to and departure from a traditional advertising theory

Affect-transfer theory (Mitchell & Olson, 1981; Shimp, 1981) posits that the effect of ad exposure on purchase intention can be explained by a transfer from ad attitude to brand attitude. It is derived from a classical conditioning attitude theory (Staats & Staats, 1967). This means that after ad exposure, as consumers like the ad more, they rate the advertised brand better. The more favourable brand attitude is the higher purchase intention. This significant role of ad attitude and brand attitude has made them become popular constructs in the advertising literature (Spears & Singh, 2004). For example, the Advertising Research Foundation (ARF)'s Copy Research Validity Project (Haley & Baldinger, 1991) has

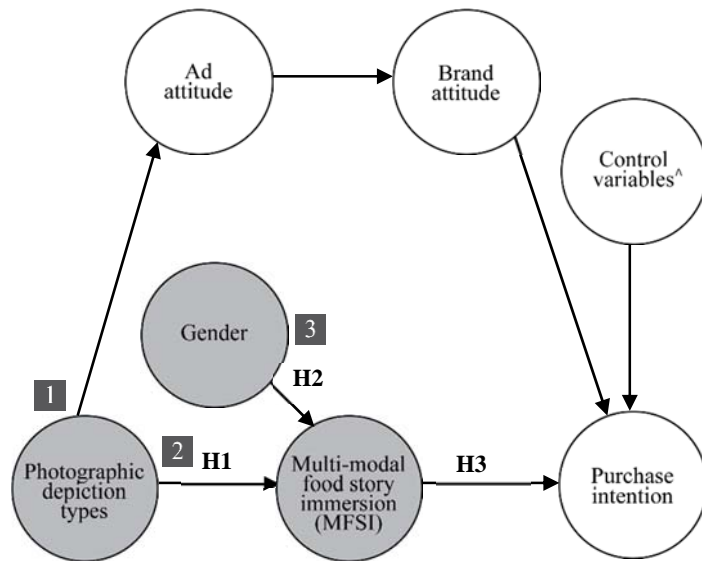
² Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.

endorsed ad attitude as the best predictor of campaign success in copy testing (see also Bergkvist & Rossiter, 2008 beyond copy testing contexts). Ad attitude and brand attitude have been pivotal for 30 years of advertising research (Kim et al., 2014).

MFSI connects to the traditional advertising communications theory because they share the same antecedent (i.e. photographic depiction types) and outcome (i.e. purchase intention). However, MFSI divorces the affect-transfer theory in two respects. First, consumers do not only process advertising information attitudinally. By measuring the extent to which viewers like or dislike photographic food ads, the traditional theory assumes that consumers only view ads as physical objects. This paper challenges this traditional assumption and proposes that consumers also look at photographic food ads as consumption experiences or stories to be immersed into. Second, the traditional theory also assumes that brand attitude is the primary basis for the formation of purchase intention. This article challenges this assumption and proposes that the magnitude of immersions into photographic food ads across multiple modalities is also a significant predictor of purchase intention. In short, this paper argues that there are other significant routes to purchase intention above and beyond the affect-transfer theory involving MFSI as a mechanism.

This article presents two models for hypothesis testing. In Figure 1, immersion is conceptualized from a higher-order perspective (i.e. MFSI is a weighted sum of VI, ISI and SI, hereafter MFSI model).³ Figure 2 considers just SI, only one component of MFSI (hereafter SI model). In the SI model, immersion is conceptualized from a lower-order perspective. Both are modeled in parallel with the traditional affect-transfer (Mitchell & Olson, 1981; Shimp, 1981) path to purchase intention (i.e. path 1). However, we do not make any hypotheses related to the traditional affect-transfer path because the focal point of this article is on MFSI. The traditional affect-transfer path primarily serves as a visual anchor to help reader understand how MFSI connects to and departs from the traditional advertising theory. MFSI is a new concept. Hence, anchoring it with a well-known theory helps readers gradually integrate new insights to what they already know.

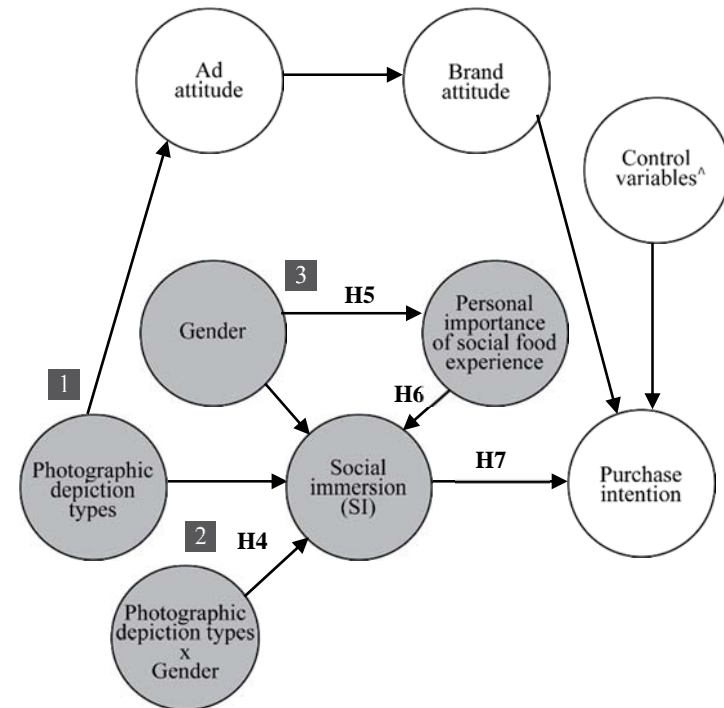
³ Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.



^Control variables: 1) Brand belief – palatability, 2) Brand belief – healthiness, 3) Emotional positivity, 4) Social proof - popularity, 5) Background/source attractiveness and 6) Hunger

Figure 1

Proposed statistical diagram highlighting 3 routes to purchase intention through: **1** the traditional advertising affect-transfer, **2** an indirect effect of photographic depiction types on purchase intention via MFSI, and **3** an indirect effect of gender on purchase intention via MFSI



^Control variables: 1) Brand belief – palatability, 2) Brand belief – healthiness, 3) Emotional positivity, 4) Social proof - popularity, 5) Background/source attractiveness, 6) Hunger, 7) Visual immersion (VI), and 8) In-the-mouth sensory immersion (ISI)

Figure 2

Proposed statistical diagram highlighting 3 routes to purchase intention through: **1** the traditional advertising affect-transfer, **2** an indirect effect of two-way interaction between photographic depiction types x gender on purchase intention via SI, and **3** an indirect effect of gender on purchase intention via personal importance of social food experience and SI

Hypothesis development for the MFSI Model

Photographic depiction types → MFSI

Recall that this paper investigates two depiction types of photographic food ads: food only and food in consumption sharing scenes (i.e. food in CSS). The MFSI model (see Figure 1) posits that food in CSS ads makes viewer immerse more. This assertion is derived from an integration of cue utilization (Cox, 1962, Olson, 1978), story transportation (Green & Brock, 2000) and grounded cognition (Barsalou, 2008) theoretical perspectives. Photographic food ads provide extrinsic and intrinsic cues about the food and benefits of consumption experience. Extrinsically, food ads tell viewers what the food type, the brand name and product attributes are. Intrinsically, photographic food ads also serve as a basis for viewers to develop impressions of whether the depicted food experience is inviting and sociable (i.e. experiential benefits). Photographic depictions also serve as a food story framing. When food products are photographically framed in consumption sharing scenes, food in CSS ads enhances the quality of food story (i.e. the story is more inviting and sociable). Story quality influences one's immersion into it (Green & Brock, 2000).

From a grounded cognition theoretical perspective, foods in CSS ads also act as a stronger mental simulator making viewers immerse into photographic ads across modalities. We assert that immersion occurs even without being instructed to do so—just like how Eva's, Jane's and Alexandria's reactions exemplified earlier. Elder and Krishna (2012) empirically demonstrate through their multiple experimental studies that visual imageries about eating food products can be evoked by an exposure to food product depiction in ads without asking consumers to imagine so. For instance, exposure to a bowl of yoghurt depicted in an ad makes viewers imagine eating the food more without a verbal prompt when it is depicted with a spoon on the side matching with viewers' handedness.

Consumption is driven by experiential benefits (Holbrook & Hirschman, 1982). In fact, our initial reactions to food and consumption are almost always hedonic (Hansen & Mossberg, 2013; Prescott, 2012). Foods in CSS ads should make the depicted consumption experiences appear more inviting and make the depicted food experiences appear more sociable. Hence, we hypothesize that:

- H1:** Photographic depiction types have a significant effect on MFSI. Exposure to food in CSS ads leads to increased MFSI relative to food only ads—regardless of whether the viewers are male or female and/or whether the foods are healthy or unhealthy.

Gender → MFSI

Past research has shown that nonverbal stimuli evoke more associative and imagery-laced interpretations among women than men (Wood, 1966). Women also assimilate all available cues related to self and others and elaborate more from stimulus than men (Carsky & Zuckerman, 1991; Meyers-Levy & Maheswaran, 1991; see also Wolin, 2003). A recent study by Elder and Krishna (2012) has shown that gender has no significant effect on visual imagery. However, recall that MFSI is conceptually different from the traditional visual imagery. Also, MFSI is a total immersion across multiple modalities. Hence, we expect a significant difference between men and women on MFSI and make the following hypothesis:

- H2:** Gender has a significant effect on MFSI. Women on average immerse more into photographic food ads than men regardless of photographic depiction types and food types.

MFSI → Purchase intention

As consumers immerse more into photographic food ads, their purchase intention should be heightened. The most important piece of evidence for this research is a recent study by Elder and Krishna (2012). They have demonstrated that the more consumers imagined themselves eating a depicted hamburger, yoghurt, cake and soup the more their purchase intention is increased (if on average the foods are not disliked). Research in other areas also points to the significance of immersion in influencing purchase intention. For instance, Bone and Ellen's (1992) study has found that as participants visualized themselves eating popcorn when listening to a related radio ad (after being instructed to imagine so), their purchase intention is increased. Similarly, the more consumers imagined themselves going on a holiday at a particular destination depicted in a printed ad, the higher is the purchase intention to visit the destination (Phillips, 1996). Gregory et al.'s study (1982) has shown that as homeowners imagine themselves utilizing a cable TV service more, their likelihood of service subscription is greater. Finally, the more one imagines oneself starting a new job or donating blood, the more likely one would engage in such activities (Anderson, 1983).

We further assert that the relationship between MFSI and purchase intention is not moderated by photographic depiction types, gender and food types. Imagine if one sees a food only ad and one already immerses oneself into it—feeling as if the food is physically present right in front of oneself or imagining the flavors in their mouth and thinking about

sharing it with others. There are no theoretical reasons to say that the same intensity of immersion evoked by food in CSS ad should predict purchase intention better. The analogy also holds for gender and food types. This is the power of immersion and grounded cognition. Hence, we hypothesize that:

H3: MFSI has a significant positive relationship with purchase intention. As consumers immerse more into photographic food ads, their purchase intention is also heightened. This relationship does not significantly vary by photographic depiction types, gender or food types.

In summary, H1, H2 and H3 predict that there are other indirect routes to purchase intention via MFSI, as shown in Figure 1. The MFSI model posits that the photographic depiction types do not directly influence purchase intention per se. The photographic depiction types instead have an indirect-only effect (Zhao, Lynch, & Chen, 2010) on purchase intention via MFSI (see path 2 in Figure 1). This is another indirect route to purchase intention in addition to the affect-transfer path, evoked by photographic depiction types. The other indirect route is evoked by gender differences (see path 3 in Figure 1). Women are more likely to immerse more into photographic food ads than men. Subsequently, an increase in immersion results in an increase in purchase intention.

To shed a little more light, we next focus on social immersion for testing further hypotheses in the SI model. The aims of the SI model are to more closely investigate how social immersion works and to partly explain why women immerse more.

Hypothesis development for the SI Model

Photographic depiction types \times gender \rightarrow SI

When focusing only on social immersion (SI), the SI Model (see Figure 2) asserts that the effect of photographic depiction types on SI varies by gender. Women are more socially oriented (Eagly, 1987; Eagly & Wood, 1991) and are more skilled at decoding nonverbal cues (Briton & Hall, 1995). Women also process nonverbal stimuli by using more associative and imagery-laced interpretations (Wood, 1966). Hence, when the photographic depiction matches with women's social motives, the food in CSS ads are expected to have a more pronounced effect for women on social immersion. This logic leads to the following hypothesis:

- H4:** The effect of photographic depiction types on SI is dependent on gender. Exposure to food in CSS ads makes women significantly immerse socially more than men on average. However, this difference is not significant for food only ads.

Gender \rightarrow Personal importance of social food experience

Previous research has found that women, unlike men, place greater importance on social bonds and social interactions (Cross & Madson, 1997). This is probably because they are more intrinsically motivated than men (Holbrook, 1986). Eating is a social activity (Korsmeyer, 2002; Krishna & Elder, 2010). Intrinsically, eating can offer social interaction rewards in addition to sensory gratifications. Women are the primary grocery buyers (e.g. see Cooke, 2013 for the U.S.A.; Dugan, 2014 for the U.K.; Hennessy, 2014 also for the U.S.A.; Walsh, 2014 for Australia). Globally, this also holds true—and more importantly women are more likely than men to cook for others at home according to the world's women trends and statistics latest report published by the United Nations (2010). Hence, one would expect women to place greater importance on social food experience. Accordingly, we hypothesize:

- H5:** There is a significant difference between women and men on the extent to which they personally place an importance on social food experience. When buying food products, on average women consider the ability to enjoy foods with others as more important than men.

Personal importance of social food experience → SI

Individuals who care deeply about something are more likely to report thinking about it on a regular basis (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993). When a topic of an ad is relevant to what viewers find personally important, they generate more thoughts about the ad and product (Celsi & Olson, 1988). Hence, individuals who place more importance on social food experience should immerse socially more into photographic food ads. Further, we posit that this relationship is not moderated by photographic depiction types, gender and food types. Imagine the following scenario. Liz is a woman. It is expected that women generally place greater importance on social food experience than men (i.e. H5). However, if Liz and John both place equal importance on social food experience then there are no theoretical reasons to expect that the same amount of personal importance would predict social immersion differently. This analogy also applies for depiction types and food types. Accordingly, we predict that:

- H6:** Personal importance of social food experience has a significant positive relationship with SI. As individuals consider an ability to enjoy foods with others when buying food products more important, they immerse socially more into photographic food ads. This relationship does not significantly vary by photographic depiction types, gender or food types.

SI → purchase intention

Consistent with the logic for the predicted MFSI → purchase intention relationship (i.e. H3), we hypothesize that:

- H7:** SI has a significant positive relationship with purchase intention. The more consumers immerse socially into photographic food ads, the more their purchase intention is heightened. This relationship does not significantly vary by photographic depiction types, gender or food types.

In summary, H4, H5, H6 and H7 predict that when considering just SI, there is an interplay of photographic depiction types and gender on social immersion. Women are expected to immerse more socially than men only for the food in CSS condition (i.e. H4). This is because women place greater importance on social food experience than men on average (i.e. H5). As one places more importance on social food experience, one immerses more socially into ads (i.e. H6). As social immersion increases, purchase intention also increases (i.e. H7).

Other causes → purchase intention

In the MFSI model, we controlled for six other causes that could also explain the variance of purchase intention. These are potential confounds. First, we controlled for the effect of brand belief – palatability. Second, we controlled for the effect of brand belief – healthiness. As individuals believe that the food products are more pleasant to the palate and healthier, their purchase intention can be significantly heightened (e.g., Batra & Homer, 2004). Third, we controlled for the effect of ‘emotional positivity’ (Gallan, Jarvis, Brown, & Bitner, 2013, p. 345) on purchase intention. Exposure to different food types can evoke both positive (e.g., happy) and negative (e.g., guilt) emotions. The ratio of positive to negative emotions (i.e. emotional positivity) can significantly influence food product purchase intention (e.g., Poor et al., 2013). Note that in Poor et al.’s (2013) article, they term this construct (operationalized as above) as “conflict” (2013, p. 125, see their operationalization on p. 134). However, we argue that such operationalization suits the term, “positivity” better than “conflict.” This is because the concept of conflict or ambivalence should be operationalized differently (see Thompson & Zanna, 1995; Thompson, Zanna, & Griffin, 1995). Fourth, we controlled for social proof (Cialdini, 2007). In this study, social proof is operationalized as popularity because the food in CSS ads may visually suggest that the products are popular (i.e. being consumed by many others). Such impression evoked by ads can increase purchase intention (e.g. Griskevicius et al., 2009). Fifth, we controlled for the effect of background/source attractiveness because it can influence purchase intention (Till & Busler, 2000). Last, we controlled for the effect of hunger that can also heighten purchase intention (e.g. Jiang & Lei, 2014; Poor et al., 2013). In the case of testing hypotheses for the SI Model (see Figure 2), we additionally controlled for the effect of VI and ISI (i.e. the other two components of MFSI).

Experimental online survey

Research methods

Overview

We employed a 2 x 2 x 2 between-subject experimental study design, with two levels for each factor. The three factors were: 1) photographic depiction types (food only vs. food in CSS ads); 2) gender (male vs. female participants); 3) food types (healthy vs. unhealthy). Visual stimuli used in the experimental study are shown in Figure 3.



Note: The original picture sizes were 342 x 373 pixels for sundried tomato bread and 450 x 320 pixels for all other foods. However, the sizes were reduced here for a layout purpose. Images reproduced here with permission from the advertisers and/or artists.

Figure 3
Visual stimuli used in the experimental study

We used four foods in this study which were grouped as unhealthy and healthy food types. Sundried tomato bread and Greek salad were categorized as healthy foods. Carrot cake and hamburger were categorized as unhealthy foods. Names of food types were also labelled in all ads. We expected that sundried tomato bread and Greek salad combined would be perceived as healthier than the other two foods. We did not expect that the two food types would differ significantly on palatability. We mostly used royalty free images by digitally adding the main food products on top of consumption sharing scenes except for sundried tomato bread. The sundried tomato bread images came from a real campaign of Bakers Delight, an Australian retail bakery brand. All ads had the same fictitious brand name/logo (Kathy's Gourmet) and slogan (Freshness is our recipe) to control for the effect of existing brand attitude and familiarity (Underwood & Klein, 2002; Underwood et al., 2001).

Data quality control prior to data collection

We ensured the quality of data by controlling for common method biases prior to data collection following the suggested procedural remedies recommended by Podsakoff, MacKenzie, Lee & Podsakoff's (2003). Question order was counterbalanced where it would not disrupt the logical flow of the survey. For example, the order of multi-modal food story immersion (MFSI) subscales, the orders of positive and negative emotions, specific beliefs, social proof - popularity, background/source attractiveness and manipulation check measures were randomized. Furthermore, both radio button and slider scale formats were used in a randomized fashion. Rotated scale options (i.e. ascending and descending order) were also employed and randomized. Every scale point was both numerically and verbally anchored. This helped reduce common method biases because scales anchored only at the endpoints lead to response biases among some respondents who exhibit extreme response style (Dolnicar & Grün, 2007). We also limited our scale points to five because high scale points tend to display higher base level instability (Dolnicar & Grün, 2012).

Some researchers may control for common method bias using post-hoc statistical remedies such as the frequently used Unmeasured Latent Marker Construct (ULMC) to partial out the common method bias (e.g., Liang, Saraf, Hu, & Xue, 2007; Podsakoff et al., 2003; Richardson, Simmering, & Sturman, 2009). However, we did not use the post-hoc approach because recent Monte Carlo simulation evidence (Chin, Thatche, & Wright, 2012) suggests that it cannot detect nor control for common method bias. As we have made considerable procedural effort to reduce common method bias throughout the research process, such post-hoc statistical remedies are unnecessary (Podsakoff et al., 2003, p. 897).

Procedure

This study recruited 1,423 participants from a major public university in Australia to participate in an online experimental study and survey using Qualtrics. Participants received a chance to win one of ten movie vouchers (worth approx. \$13 each). Ethics approval was also given to conduct the study by the university in line with the Australian Code for the Responsible Conduct of Research (NHMRC, ARC, & Universities Australia, 2007).

Before ad exposure, participants were told that the study sought to understand their response to an ad, general food knowledge and consumption behavior. Next, participants rated their hunger. They were told that the ad was for a new ready meal product (not frozen) to be sold at selected retail stores. We selected a non-frozen product form to avoid the floor effect, which may result from beliefs associated with the frozen product form that is less fresh and less palatable (Bonner & Nelson, 1985; Lautman & Hsieh, 1993). We also controlled for the effect of viewing goals (Pieters & Wedel, 2007; Rayner, Miller, & Rotello, 2008) by telling participants that their viewing goal was to evaluate if the product was desirable to eat. We also advised participants to view the ad as they would normally do when reading a magazine and for as long as they wished at their own pace.

We randomized all photographic depiction types and food types across participants. After ad exposure, the participants were prompted to list their thoughts, feelings or imageries that came to mind before rating their purchase intention, brand attitude, ad attitude and multi-modal food story immersion (MFSI). Then participants rated their positive and negative emotions (i.e. happy and guilt) that would result from an anticipated consumption. Participants also answered their specific beliefs about intrinsic product attributes (i.e. palatability and healthiness), social proof - popularity, background/source attractiveness, other manipulation checks and other individual difference questions (see Appendix B for the full questionnaire).

Measures

Hunger was measured using a 5-point unipolar scale, prompted with “How hungry are you feeling right now?” and anchored by: “Not at all hungry (0),” “Slightly hungry (1),” “Moderately hungry (2),” “Very hungry (3),” and “Extremely hungry (4).”

Purchase intention was measured using a single indicator being a shortened version of Juster’s (1966) purchase intention probability scale. Participants were prompted by the question: “What are the chances that you will buy Kathy’s Gourmet Brand (of carrot cake/sundried tomato bread) when it becomes available?” It was measured on a 5-point unipolar scale with the following anchors: “No chance to slight possibility (0-20%),” “Some to fair possibility (21-40%),” “Fairly good to good possibility (41-60%),” “Probable to very probable (61-80%),” and “Almost sure to certain (81-100%).”

Ad attitude was measured using a single indicator adapted from Bergkvist and Rossiter’s study (2009). Participants were prompted with the question: How much do you like or dislike the ad? It was measured on a 5-point bipolar scale anchored by “Dislike very much (-2),” “Dislike (-1),” “Neither like nor dislike (0),” “Like (1),” and “Like very much (2).”

Brand attitude was measured using a single indicator adapted from Bergkvist and Rossiter (2009). Participants were prompted by the question: “How good or bad do you think Kathy’s Gourmet Brand (of sundried tomato bread/Greek salad/carrot cake/hamburger) is?” It was measured on a 5-point bipolar scale with the following anchors: “Very bad (-2),” “Bad (-1),” “Neither good nor bad (0),” “Good (1),” and “Very good (2).”

Multi-modal food story immersion (MFSI) consisted of three sub-scales: visual immersion (VI), in-the-mouth sensory immersion (ISI), and social immersion (SI). VI, ISI and SI had three indicators each (see Table A in Appendix A). Participants were first asked whether they experienced each indicator of VI, ISI and SI (“While viewing the ad, did you experience the following?”) on a binary scale anchored by “Yes” and “No.” Only participants who answered “Yes,” were then asked to indicate a magnitude of their experience (“How intensely did you experience the following?”) on 4-point unipolar scales anchored by “Weakly (1),” “Moderately (2),” “Strongly (3),” and “Extremely strongly (4).”

Emotional positivity was measured using two indicators: one positive emotion (i.e. happy) and one negative emotion (i.e. guilt). For positive emotion, participants were prompted with the question: “How happy would you feel if you were to eat this food?” It was

measured on a 5-point unipolar scale, anchored by: “Not at all happy (0),” “Slightly happy (1),” “Moderately happy (2),” “Very happy (3),” and “Extremely happy (4).”

For negative emotion, participants were prompted with the question: “How guilty would you feel if you were to eat this food?” It was measured on a 5-point unipolar scale, anchored by: “Not at all guilty (0),” “Slightly guilty (1),” “Moderately guilty (2),” “Very guilty (3),” and “Extremely guilty (4).” To operationalize emotional positivity, we converted the scores to 1 to 5 and divided the score of positive emotion by that of the negative emotion.

Brand belief – palatability and *brand belief - healthiness* were measured using a single indicator each on 5-point bipolar scales. Both measures were prompted by the question: “After viewing the ad, I believe Kathy’s Gourmet Brand (of sundried tomato bread/Greek salad/carrot cake/hamburger) is....” For the brand belief - palatability, the anchors were: “Very unpalatable (-2),” “Unpalatable (-1),” “Neither palatable nor unpalatable (0),” “Palatable (1),” “Very palatable (2).”

For the brand belief - healthiness, the anchors were altered as follows: “Very unhealthy (-2),” “Unhealthy (-1),” “Neither healthy nor unhealthy (0),” “Healthy (1),” “Very healthy (2).”

Social proof - popularity was measured using a single indicator. Participants were prompted with the question: “After viewing the ad, how popular or unpopular do you think the (sundried tomato bread/Greek salad/carrot cake/hamburger) is?” It was measured on a 5-point bipolar scale with the following anchors: “Very unpopular (-2),” “Unpopular (-1),” “Neither popular nor unpopular (0),” “Popular (1),” and “Very popular (2).”

Background/source attractiveness was measured using a single indicator. Recall that we manipulated two photographic depiction types: the food only and food in CSS ads. The food only ads depicted the food against an empty background while the food in CSS ads depicted other consumers sharing the foods. Hence, we could not measure the physical attractiveness of the sources directly across both depiction types. Participants were therefore asked: “Ignoring the food, text and logo, how attractive or unattractive is the background of this picture?” It was measured on a 5-point bipolar scale anchored by: “Very unattractive (-2),” “Unattractive (-1),” “Neither attractive nor unattractive (0),” “Attractive (1),” and “Very attractive (2).”

Manipulation of photographic depiction types was checked using three measures on 5-point bipolar scales: 1) invitingness of consumption scene depiction, 2) clarity of the main food product depiction, and 3) sociableness of food experience depiction. For the invitingness of consumption scene depiction, participants were questioned: “Ignoring the food, text and logo, how inviting or uninviting is the background of this picture?” This was anchored by: “Very uninviting (-2),” “Uninviting (-1),” “Neither inviting nor uninviting (0),” “Inviting (1),” and “Very inviting (2).”

For the clarity of the main food product depiction, participants were prompted with the following statement: “The main food picture shown in the foreground is...” This was anchored by: “Very unclear (-2),” “Unclear (-1),” “Neither clear nor unclear (0),” “Clear (1),” and “Very clear (2).”

For the sociableness of food experience depiction, participants were prompted with the following statement: “The picture seems to convey a food experience that is...” This was anchored by: “Very unsociable (-2),” “Unsociable (-1),” “Neither sociable nor unsociable (0),” “Sociable (1),” and “Very sociable (2).”

Personal importance of social food experience was measured using a single indicator. Participants were prompted with the question: “When buying food products, how important is the ability to enjoy the foods with others to you?” It was measured on a 5-point unipolar scale with the following anchors: “Not at all important (0),” “Not very important (1),” “Fairly important (2),” “Very important (3),” and “Extremely important (4).”

All 0-to-4 scales were converted to 1-to-5 scales for analyses.⁴

⁴ Detailed scaling construction of immersion constructs and frequency distributions showing the nature of immersions in photographic food advertising are provided in Thesis appendix A.

Data quality control after data collection and participants

We excluded 247 participants from analyses based on the following pre-defined exclusion criteria: 1) mobile device,⁵ 2) extreme outlying,⁶ 3) extreme flat-lining,⁷ 4) extreme speeding and delayed responses,⁸ 5) participants who could recognize the Baker's Delight brand from the sundried tomato bread images used in the experimental study.⁹

We excluded participants who used mobile devices in order to standardize the presentation of the visual stimuli and survey questions. We excluded outliers because they could bias parameter estimates such as the mean and the sum of squared errors (Field, 2013). We excluded participants who exhibited rather extreme flat-lining response style because such responses could bias results (Menictas, Wang, & Fine, 2011). In addition, we excluded participants who displayed extreme speeding and delayed response because of concerns about online data quality (Greszki, Meyer, & Schoen, 2014; Gutierrez, Wells, Rao, & Kurzynski, 2011; Phillips, 2014). This was also to screen out participants who might not complete the survey within one single session. We excluded participants who could recognize the Baker's Delight brand from the visual images used in the experimental study to avoid the effect of pre-existing brand attitude and brand familiarity (Underwood et al., 2001).

After elimination, 1,176 participants were included for data analyses. Participants' ages ranged from 18 to 28. Table 1 displays the number of participants by photographic depiction types, food types and gender.

⁵ Measured by browser meta-info operating system (n = 98)

⁶ Measured by absolute z-scores ≥ 2.0 (n = 1)

⁷ Measured by the sum of standard deviations of all variables in each scale format and rotation weighted by the number of questions participants received each scale format and rotation < 0.5 . If the standard deviation values are less than 0.5 (i.e. very closer to zero), this means participants tend to give the same answer throughout (n = 23)

⁸ Measured by time submitted the survey minus time started the survey. Participants who spent time 50% less than the norm or median (MD = 13.69 minutes) were defined as extreme speeding responses (n = 55) Participants who spent time longer than the amount spent by 95% of participants (approx. 42 minutes) were defined as extreme delayed responses (n = 74)

⁹ Measured by the brand name mentioned in the open-ended question immediately provided after ad exposure (n = 11)

Table 1

Number of participants by photographic depiction types, food types and gender

Food types			Photographic depiction types		Total
			Food only	Food in CSS	
Unhealthy foods	Gender	Male	141	162	303
		Female	156	148	304
	Total		297	310	607
Healthy foods	Gender	Male	141	143	284
		Female	147	138	285
	Total		288	281	569
Total	Gender	Male	282	305	587
		Female	303	286	589
	Total		585	591	1176

Analyses

We chose the partial least squares structural equation modeling (PLS-SEM) approach, a variance-based structural equation modeling (VB-SEM), for the following reasons. First, we examined the normality of all variables by performing Kolmogorov-Smirnov test with Lilliefors correction. The Kolmogorov-Smirnov test results were significant for all variables indicating non-normally distributed data (see Table A in Appendix A). Second, MFSI was a higher-order reflective-formative latent construct. Therefore, PLS-SEM suited our research better than the covariance-based structural equation modeling approach (CB-SEM). PLS-SEM is a non-parametric approach that does not assume a normal distribution. It is also capable of modeling higher-order reflective-formative latent construct (Hair, Hult, Ringle, & Sarstedt, 2014; Hair, Ringle, & Sarstedt, 2011, 2013; Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014; Hair, Sarstedt, Ringle, & Mena, 2012; Sarstedt, Ringle, & Hair, 2014).

All PLS-SEM analyses used the SmartPLS computer software (Version: 3.1.6). The analyses employed the following setting: a path weighting scheme, a maximum iterations of 300, and a bias-corrected and accelerated (BCa) bootstrapping algorithm (parallel processing mode) of 5000 subsamples for two-tailed significance tests at 95% confidence interval (CI).

We also provide additional analyses with a covariance-based square structural equation modeling (CB-SEM) approach (where appropriate) using the AMOS computer software (Version: 22.0). In addition, we provide analyses with a first-generation technique (i.e. non-structural equation modeling such as ANOVA) using the SPSS computer software (Version: 22.0). These complementary analyses are included in footnotes. Readers who

might not be familiar with PLS-SEM, should find these complementary analyses useful. Results are consistent for the main method employed in this article.

Results and discussion

Reliability and validity of measurement. VI, ISI, SI and MFSI measurements met the reliability and validity of measurement criteria in the PLS-SEM and marketing literature (Bagozzi & Yi, 1988; Chin, 1998; Chin & Gopal, 1995; Diamantopoulos, Riefler, & Roth, 2008; Grégoire & Fisher, 2006; Hair et al., 2012; Henseler, Ringle, & Sarstedt, 2015; Hulland, 1999; Jarvis, Mackenzie, & Podsakoff, 2003). Detailed results are not discussed here but are provided in Tables B, C and D in Appendix A.¹⁰ We next investigate and report measurement invariance to demonstrate the consistency of the VI, ISI and SI measurement across multiple groups of subsamples.

Measurement invariance of VI, ISI and SI. We investigated if the measurement of VI, ISI and SI was invariant across three groups: 1) male vs. female participants, 2) food only vs. food in CSS depictions, 3) healthy vs. unhealthy food types. Measurement invariance is a requirement for a comparison of parameter estimates between multiple groups (Hair, Hult, et al., 2014; Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). This comparison procedure is known as “multigroup analysis, MGA” (Hair, Hult, et al., 2014, p. 247; Sarstedt, Henseler, & Ringle, 2011, p. 198) in PLS-SEM. This research involves MGAs. Hence, we conduct measurement invariance tests. Measurement invariance analysis results are reported below.

We used a modified Welch-Satterthwait test (for equations, see Sarstedt et al., 2011, pp. 200-201) to determine whether the average variance extracted values (AVEs) values and composite reliability values (CRs) of VI, ISI and SI were significantly different between groups. Tables 2, 3 and 4 show the measurement invariance analysis results. The results indicated that the AVEs and CRs did not significantly differ between the groups (all p -values > .050). This means the indicators of VI, ISI and SI measure the same underlying constructs across photographic depiction types, gender and food types. Hence, the measurement invariance is established.

¹⁰ Note that this study used *different* samples and photographic ads compared to the experimental and questionnaire study reported in the previous chapter. The reliability and validity of VI, ISI and SI measurement was again established and *replicated* in this study. Hence, there is consistent and convincing evidence that supports the reliability and validity of VI, ISI, SI and MFSI measurement.

Table 2

Measurement invariance evaluation: Reflective measurement model comparison between photographic depiction types

Latent construct	Quality criterion	Depiction types	Original sample mean	Standard error	diff	<i>t</i> -value [^]	<i>p</i> -value [^]
Visual immersion (VI)	AVE	Food only	.598	.023	.006	.204	.838
		Food in CSS	.604	.020			
	CR	Food only	.817	.014	.004	.199	.842
		Food in CSS	.821	.011			
In-the-mouth sensory immersion (ISI)	AVE	Food only	.689	.018	.026	1.00	.315
		Food in CSS	.662	.019			
	CR	Food only	.869	.010	.014	.999	.318
		Food in CSS	.855	.011			
Social immersion (SI)	AVE	Food only	.651	.023	.003	.086	.931
		Food in CSS	.648	.019			
	CR	Food only	.848	.014	.003	.149	.882
		Food in CSS	.845	.013			

AVE = Average variance extracted; CR = Composite reliability

[^]Measurement invariance determines whether the constructs are interpreted similarly between groups (Rigdon, Ringle, & Sarstedt, 2010). In PLS-SEM, the measurement invariance evaluation uses a modified Welch-Satterthwait test. The test assesses whether the AVE and CR values of latent constructs are significantly different between groups (for equations, see Sarstedt et al., 2011, pp. 200-201). Measurement invariance is established when the differences are not statistically different (see also Ringle, Sarstedt, & Zimmermann, 2011).

Table 3

Measurement invariance evaluation: Reflective measurement model comparison between gender

Latent construct	Quality criterion	Gender	Original sample mean	Standard error	diff	<i>t</i> -value [^]	<i>p</i> -value [^]
Visual immersion (VI)	AVE	Male	.596	.023	.001	.025	.980
		Female	.597	.021			
	CR	Male	.816	.015	.000	.003	.998
		Female	.816	.013			
In-the-mouth sensory immersion (ISI)	AVE	Male	.672	.019	.007	.269	.788
		Female	.679	.018			
	CR	Male	.860	.011	.004	.255	.799
		Female	.864	.010			
Social immersion (SI)	AVE	Male	.650	.022	.022	.783	.434
		Female	.672	.019			
	CR	Male	.847	.013	.012	.754	.451
		Female	.859	.010			

AVE = Average variance extracted; CR = Composite reliability

[^]Measurement invariance determines whether the constructs are interpreted similarly between groups (Rigdon et al., 2010). In PLS-SEM, the measurement invariance evaluation uses a modified Welch-Satterthwait test. The test assesses whether the AVE and CR values of latent constructs are significantly different between groups (for equations, see Sarstedt et al., 2011, pp. 200-201). Measurement invariance is established when the differences are not statistically different (see also Ringle et al., 2011).

Table 4

Measurement invariance evaluation: Reflective measurement model comparison between food types

Latent construct	Quality criterion	Food types	Original sample mean	Standard error	diff	<i>t</i> -value [^]	<i>p</i> -value [^]
Visual immersion (VI)	AVE	Healthy foods	.596	.022	.003	.104	.917
		Unhealthy foods	.599	.022			
	CR	Healthy foods	.815	.014	.001	.076	.940
		Unhealthy foods	.817	.014			
In-the-mouth sensory immersion (ISI)	AVE	Healthy foods	.679	.018	.006	.212	.832
		Unhealthy foods	.674	.019			
	CR	Healthy foods	.864	.010	.003	.198	.843
		Unhealthy foods	.861	.010			
Social immersion (SI)	AVE	Healthy foods	.644	.021	.041	1.45	.145
		Unhealthy foods	.684	.019			
	CR	Healthy foods	.842	.013	.024	1.45	.146
		Unhealthy foods	.866	.010			

AVE = Average variance extracted; CR = Composite reliability

[^]Measurement invariance determines whether the constructs are interpreted similarly between groups (Rigdon et al., 2010). In PLS-SEM, the measurement invariance evaluation uses a modified Welch-Satterthwait test. The test assesses whether the AVE and CR values of latent constructs are significantly different between groups (for equations, see Sarstedt et al., 2011, pp. 200-201). Measurement invariance is established when the differences are not statistically different (see also Ringle et al., 2011).

Manipulation checks: Photographic depiction types. We evaluated whether our photographic manipulations were successful. We expected that food in CSS ads would be more inviting and convey more sociable food experiences than food only ads. However, we did not expect the two depiction types to significantly differ in terms of the clarity of main food product depictions. The food only ads were coded as 0 and the food in CSS ads were coded as 1. The 0-1 dummy coded type of photographic depictions was used as an independent variable and the manipulation check measures were used as dependent variables. As expected, participants reported that the food in CSS ads were significantly more inviting ($\gamma = .621, p < .001$) and conveyed more sociable food experiences ($\gamma = .594, p < .001$). The two depiction types, as expected, did not significantly differ in terms of the clarity of the main food product depictions ($\gamma = .004, p > .050$).¹¹

Manipulation checks: Food types. Next, we checked whether the food type manipulations were successful. We expected that participants would believe that sundried tomato bread and salad would be healthier than hamburger and carrot cake overall. Hamburger and salad were grouped and coded as 0 (i.e. unhealthy foods). Sundried tomato bread and salad were grouped and coded as 1 (i.e. healthy foods). The 0-1 dummy coded type of foods was used as an independent variable and brand belief - healthiness was used as a dependent variable. We also controlled for the effect of depiction types, emotional positivity and social proof - popularity. As expected, sundried tomato bread and salad were rated as healthier than hamburger and carrot cake ($\gamma = .259, p < .001$) even when depiction types, emotional positivity and social proof - popularity were controlled for ($\gamma = .034, p > .050$; $\gamma = .284, p < .001$; and $\gamma = .133, p < .001$ respectively).¹²

Also, we checked the effect of food types on product belief – palatability. The results showed that sundried tomato bread and salad were not rated as significantly more palatable than hamburger and carrot cake ($\gamma = -.001, p > .050$) when depiction types, emotional

¹¹ Independent sample t-tests using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. On average, participants reported that food in CSS ads were more inviting ($M_{\text{food in CSS}} = .760$) than food only ads ($M_{\text{food only}} = -.840$). This difference was significant $t(1120.756) = 27.083, p < .001, [1.482, 1.711]$. Participants also reported that food in CSS ads conveyed more sociable food experiences ($M_{\text{food in CSS}} = 1.26$) than food only ads ($M_{\text{food only}} = -.030$). This difference was significant $t(1045.155) = 25.250, p < .001, [1.188, 1.385]$. Participants reported that food in CSS ads depicted the main foods a little more clearly ($M_{\text{food in CSS}} = 1.130$) than food only ads ($M_{\text{food only}} = 1.120$). However, this difference was not significant, $t(1174) = .137, p > .050, [-.094, .105]$.

¹² ANCOVA using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. There was a significant effect of food types on product belief – healthiness, $F(1, 1171) = 96.094, p < .001$, partial $\eta^2 = .076$ after controlling for depiction types, $F(1, 1171) = 1.693, p > .050, [-.038, .180]$; emotional positivity, $F(1, 1171) = 105.298, p < .001, [.179, .272]$; and social proof - popularity, $F(1, 1171) = 23.463, p < .001, [.085, .213]$. Participants believed that sundried tomato bread and salad were healthier ($M_{\text{healthy foods}} = .495$) than hamburger and carrot cake ($M_{\text{unhealthy foods}} = -.038$), $t(1171) = -9.803, p < .001, [-.641, -.428]$.

positivity and social proof - popularity were controlled for ($\gamma = -.020, p > .050$; $\gamma = .272, p < .001$; and $\gamma = .386, p < .001$ respectively).¹³

Additionally, we also checked whether background/source attractiveness for the food in CSS ads between the food types was significantly different. This was to demonstrate that background/source attractiveness did not significantly differ between the food types even though each depicted different-looking people. The 0-1 dummy coded type of foods was used an independent variable and background/source attractiveness was used as a dependent variable. As expected, the results indicated that the background/source attractiveness between the healthy and unhealthy food types was not significantly different ($\gamma = -.068, p > .050$).¹⁴

Lastly, we tested our assumption that the manipulated photographic depiction types did not have a significant effect on purchase intention. Food only ads were coded as 0 and food in CSS ads were coded as 1. The 0-1 dummy coded type of photographic depictions was used an independent variable and purchase intention was used as a dependent variable. As expected, the photographic depiction types did not significantly have an effect on purchase intention ($\gamma = .009, p > .050$).¹⁵ This means photographic depiction types do not directly influence purchase intention.

In summary, the manipulations were successful. The manipulation checks showed that food in CSS depictions were more inviting and conveyed a food experience that was more sociable than food only depictions. Sundried tomato bread and salad (i.e. healthy foods) were indeed believed to be healthier than hamburger and carrot cake (i.e. unhealthy foods). The palatability of the two food types did not significantly differ. The background/source attractiveness for the food in CSS ads of the two food types did not significantly differ. Exposure to food only ads or food in CSS ads did not directly influence purchase intention.

¹³ ANCOVA using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. There was an insignificant effect of food types on product belief – palatability, $F(1, 1171) = .003, p > .050$, partial $\eta^2 = .000$ after controlling for depiction types, $F(1, 1171) = .653, p > .050, [-.125, .052]$; emotional positivity, $F(1, 1171) = 105.298, p < .001, [-.156, .230]$; and social proof - popularity, $F(1, 1171) = 23.463, p < .001, [.335, .452]$. Participants believed that sundried tomato bread and salad were not significantly more palatable ($M_{\text{healthy foods}} = .641$) than hamburger and carrot cake ($M_{\text{unhealthy foods}} = .638$), $t(1171) = .054, p > .050, [-.086, .095]$.

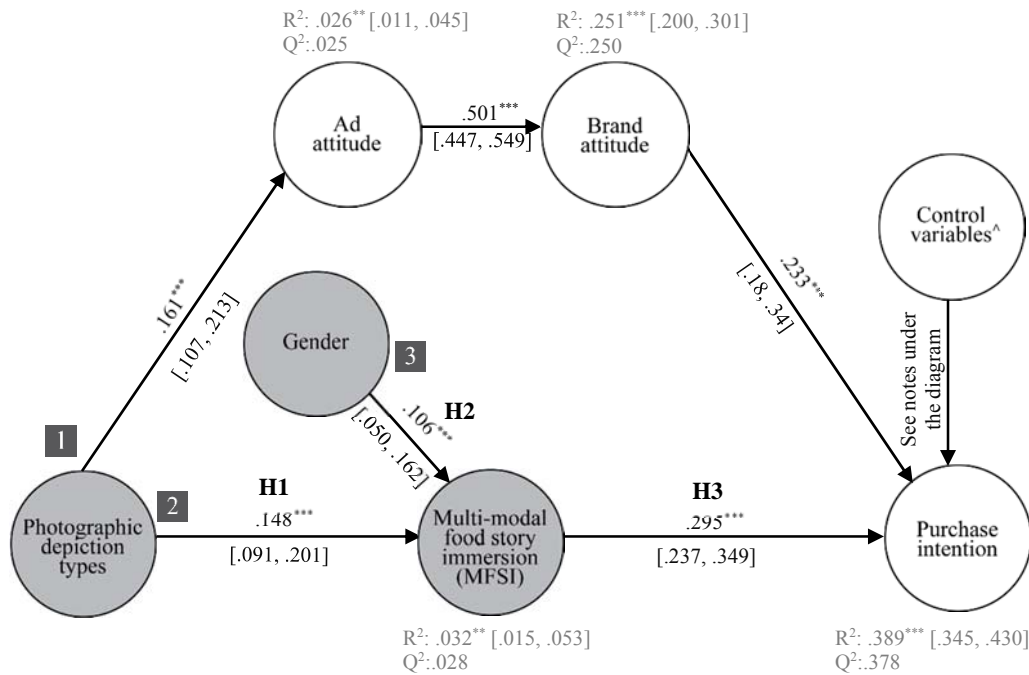
¹⁴ Independent sample t-tests using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. The results indicated that the background/sources attractiveness between the healthy and unhealthy food types was not significantly different for the food in CSS ads, $t(589) = -1.655, p > .050, [-.289, .020]$.

¹⁵ Independent sample t-tests using SPSS, bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence interval, also provided consistent results. On average, participants reported roughly equal purchase intention for both photographic depiction types ($M_{\text{food in CSS}} = 2.32$ and $M_{\text{food only}} = 2.30$), $t(1174) = .318, p > .050$.

Test of hypotheses: H1, H2 and H3

Next, we built the model as illustrated in Figure 1 to test H1, H2 and H3. We also examined the interaction effects of photographic depiction types, gender and food types in conjunction with testing H1 and H2 (for an illustration of all interaction terms, see Figure A in Appendix A). This was to investigate whether the effect of photographic depiction types (predictor) was dependent on gender (primary moderator) and food types (secondary moderator). We added food types, two-way interaction terms (i.e. photographic depiction types x gender, photographic depiction types x food types, and gender x food types) and a three-way interaction term (i.e. photographic depiction types x food types x gender) in the model. This three-way interaction test is known as “moderated moderation” (Hayes, 2013, p. 307). This means the moderation of an independent variable’s effect on a dependent variable by a primary moderator varies by a secondary moderator. Male participants were coded as 0 and female participants were coded as 1. Photographic depiction types and food types were also coded as 0 and 1 as described earlier.

As expected, the results showed that the three-way interaction between photographic depiction types x gender x food types \rightarrow MFSI was not significant ($\gamma = -.007, p > .050$). We then discarded the non-significant three-way interaction term and tested the two-way interaction effects. The results showed that all two-way interactions (i.e. photographic depiction types x gender, photographic depiction types x food types, and gender x food types) \rightarrow MFSI were not significant either ($\gamma = .085, p > .050$; $\gamma = -.041, p > .050$; and $\gamma = -.012, p > .050$ respectively). Similarly, we removed the non-significant two-way interaction terms and tested the simple effects of photographic depiction types, gender and food types on MSFI. In line with H1, the results showed that there was a significant simple effect of photographic depiction types \rightarrow MFSI ($\gamma = .148, p < .001$). In accordance with H2, there was also a significant simple effect of gender \rightarrow MFSI ($\gamma = .106, p < .001$). The simple effect of food types \rightarrow MFSI was not significant ($\gamma = .007, p > .050$) and removed from the model. Figure 4 illustrates the results in a path diagram.



R² = Coefficient of determination; Q² = Predictive relevance using blindfolding procedure based on an omission distance of 5. The further the R² and Q² values are away from 0 the higher significance and relevance of predictors.

Bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence intervals are reported in squared brackets.

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Stop criterion change: 1

Notes:

[^]Brand belief – palatability ($\gamma = .086$, $p < .010$, [.021, .146]), Brand belief – healthiness ($\gamma = -.004$, $p > .050$, [-.010, -.000]), Social proof - popularity ($\gamma = .105$, $p < .001$, [.053, .160]), Emotional positivity ($\gamma = .151$, $p < .001$, [.098, .203]), Background/source attractiveness ($\gamma = -.028$, $p > .050$, [-.075, -.000]), and Hunger ($\gamma = .102$, $p < .001$, [.052, .150])

Indirect effect sizes of the three routes are: **1** = .019 (i.e. .161 x .501 x .233), **2** = .044 (i.e. .148 x .295) and **3** = .031 (i.e. .106 x .295).

To give a clear picture on the sole influence of MFSI on purchase intention, we also performed a simple regression by removing other causes of purchase intention. The results showed that MFSI alone explained 23% of variance in purchase intention ($\gamma = .481$, $p < .001$).

Figure 4

Results on a path diagram highlighting 3 routes to purchase intention through: **1** the traditional advertising affect-transfer, **2** indirect effect of photographic depiction types on purchase intention via MFSI, and **3** indirect effect of gender on purchase intention via MFSI

Follow-up simple mean comparisons showed that food in CSS ads led to higher MFSI ($M_{\text{food in CSS}} = .143$) than food only ads ($M_{\text{food only}} = -.145$; $t(1161.301) = 5.006$, $p < .001$). Female participants also had higher MFSI score ($M_{\text{Female}} = .100$) than their male counterparts ($M_{\text{food only}} = -.101$; $t(1174) = 3.480$, $p < .010$).¹⁶

The path diagram in Figure 4 provides three key conclusions from the results.

First, the path diagram clearly illustrates that there were three routes to purchase intention (without considering the control variables and intercept):

- The first path was through the traditional affect-transfer route, Photographic depiction types → ad attitude → brand attitude → purchase intention. Recall that photographic depiction types was coded as 0 (i.e. food only ads) and 1 (i.e. food in CSS ads). Hence, the diagram indicates that food in CSS ads led to more favourable ad attitude and subsequently heightened brand attitude and purchase intention accordingly.
- The second path was Photographic depiction types → MFSI → purchase intention. The diagram indicates that food in CSS ads made participants immerse more into the ads regardless of food type and gender. Such immersion subsequently induced their purchase intention.
- The third path was Gender → MFSI → purchase intention. Recall that male participants were coded as 0 and female participants were coded as 1. Hence, the diagram suggests that women immersed more into photographic food ads than men regardless of photographic depiction type and food type. Such immersion led to increased purchase intention.

Second, the two paths related to MFSI highlight a significant theoretical contribution to the visual food advertising and marketing literature above and beyond the traditional affect-

¹⁶ We also conducted three-way ANOVA (using Type III sum of squares as the sample sizes were not perfectly equal) and found consistent results. We loaded MFSI as a dependent variable and photographic depiction types, gender and food types as three factors. The three-way interaction between photographic depiction types x gender x food types did not have a significant effect on MFSI ($F(1, 1168) = .000$, $p > .050$). All two-way interactions were not significant either (Photographic depiction types x gender, $F(1, 1168) = 2.999$, $p > .050$; Photographic depiction types x food types, $F(1, 1168)$, $p > .050$; and gender x food types, $F(1, 1168) = .055$, $p > .050$).

However, there were significant main effects of photographic depiction types and gender on MFSI, $F(1, 1168) = 26.249$, $p < .001$; and $F(1, 1168) = 13.555$, $p < .001$ respectively – see means comparison results above. The main effect of food types on MFSI was not significant, $F(1, 1168) = .051$, $p > .050$.

transfer theory. There are indeed other significant routes to purchase intention involving MFSI as a mechanism.

Third, the relationship of MFSI → purchase intention also highlights another significant contribution of this research. In accordance with H3, MFSI significantly predicts purchase intention ($\beta = .295, p < .001$). Recall that we modeled MFSI in parallel with the traditional affect-transfer theory and control for other predictors of purchase intention (i.e. brand belief – palatability, brand belief – healthiness, emotional positivity, social proof - popularity, background/source attractiveness, and hunger). Hence, this relationship of MFSI → purchase intention highlights the contribution of MFSI as a highly significant predictor of purchase intention.

Unrelated to our hypotheses, the path coefficients shown in the diagram were used to calculate the indirect effect sizes between the three routes (i.e. a multiplication of relevant path coefficients). The indirect effect sizes of the three routes are: 1) Photographic depiction types → ad attitude → brand attitude → purchase intention = .019, Photographic depiction types → MFSI → purchase intention = .044. This indicates that the effect of photographic depiction types on purchase intention via MFSI is twice larger than the traditional affect-transfer route.

Although the diagram highlights the significant relationship of MFSI → purchase intention, it does not provide insights as to whether the parameter estimates significantly differ between photographic depiction types, gender and food types. It does not provide insights as to whether the relationship of MFSI → purchase intention was moderated by other factors. Therefore, we next conducted further moderation tests.

Multigroup analyses (MGAs). We removed photographic depiction types and gender from the model and ran three MGAs to compare the parameter estimates of the remaining paths. The three planned multigroup comparisons were: 1) food only vs. food in CSS depictions, 2) male vs. female participants, and 3) unhealthy vs. healthy foods. If the confidence interval for the parameter estimate for a specific path of one group does not overlap with the corresponding confidence interval of the other group, then there is a significant difference between the two groups at significance level α . This approach is called a “confidence set approach” (Sarstedt et al., 2011, p. 203). We chose the confidence set approach, a non-parametric approach, to interpret the MGA results instead of a parametric approach because

the data of this research was not normally distributed and the sample sizes between groups were not perfectly equal. We selectively reported the paths related with MFSI to be concise. BCa 95% CI ranges were reported in squared brackets below. Detailed results are provided in Tables E, F and G in Appendix A.

Food only vs. food in CSS groups MGA. The results (see Table E in Appendix A) showed that the relationship of MFSI → purchase intention was a little stronger on food in CSS ads than on food only ads. The relationship of MFSI → purchase intention was highly significant for both food in CSS and food only ads ($\gamma = .323, p < .001, [.241, .394]$; and $\gamma = .271, p < .001, [.196, .339]$ respectively). However, the confidence interval for the parameter estimate of the food in CSS ads overlapped with the corresponding confidence interval of the food in CSS ads (i.e. BCa 95% CI .241 and .394 of food in CSS ads overlapped with BCa 95% CI .196 and .339 of food only ads). Hence, the relationship of MFSI → purchase intention was not moderated by photographic depiction types. This means the more participants immerse visually, in-the-mouth sensorially and socially into ads, the more their purchase intention is heightened regardless of photographic depiction types.

Male vs. female groups MGA. The results (see Table F in Appendix A) revealed that the relationship of MFSI → purchase intention was a little stronger on women than on men. The relationship of MFSI → purchase intention was highly significant for both female and male participants ($\gamma = .296, p < .001, [.215, .372]$; and $\gamma = .265, p < .001, [.172, .342]$ respectively). However, the confidence interval for the parameter estimate of the female group overlapped with the corresponding confidence interval for the male group. Hence, the relationship of MFSI → purchase intention was not moderated by gender.

Unhealthy vs. healthy food groups MGA. The results (see Table G in Appendix A) showed the relationship of MFSI → purchase intention was, interestingly, a little stronger on unhealthy foods than healthy foods. The relationship of MFSI → purchase intention was highly significant on both unhealthy and healthy food types ($\gamma = .298, p < .001, [.214, .367]$; $\gamma = .284, p < .001, [.186, .363]$ respectively). However, the confidence interval for the parameter estimate of the unhealthy food group overlapped with the corresponding confidence interval of the healthy food group. Hence, the relationship of MFSI → purchase intention was not moderated by food types.

Non-categorical variable moderation test. Finally, we investigated whether the relationship of MFSI → purchase intention was moderated by other non-categorical variables. We used MFSI as a main predictor variable and other causes of purchase intention as moderating variables. The interaction terms were calculated using MFSI latent variable scores (i.e. "two-stage approach" Hair, Hult, et al., 2014, p. 263) with a mean-centred calculation setting. We chose this two-stage approach instead of other approaches because our main interest was on the significance of moderating effects. This decision was in line with Henseler and Chen's (2010) recommendations based on their Monte Carlo simulation study. Results of their study suggested that the two-stage approach provided a high level of statistical power. The results (see Table H in Appendix A) showed that brand attitude, brand belief – palatability, brand belief – healthiness, emotional positivity, social proof - popularity, background/source attractiveness and hunger did not significantly moderate the relationship of MFSI → purchase intention, all p -values > .050. The moderation test results highlighted a very significant contribution of MFSI—the independence of MFSI for predicting purchase intention.

Although the MFSI model revealed new insights into the effect of gender on MFSI, it did not specify the effect of gender on a specific component of MFSI. To shed a little more light on the role of gender, we next focus on social immersion (i.e. the SI model). This was in order to demonstrate how social immersion works and to partly explain why women immerse more.

Test of hypotheses: H4, H5, H6 and H7

We built the model as illustrated in Figure 2 to test H4, H5, H6 and H7. In this model, we were interested in social immersion (SI). We treated VI and ISI as additional control variables on purchase intention. VI, ISI and SI were reflectively modeled using three indicators (see Table 1 in Appendix A for indicators).

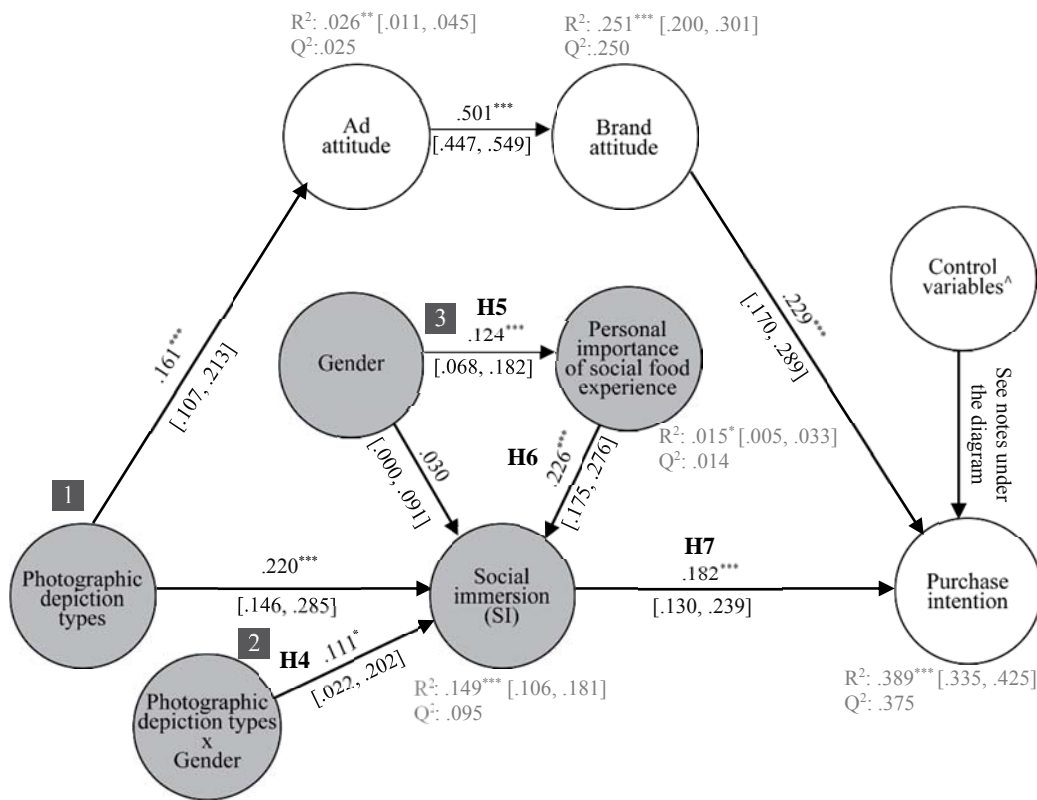
We first investigated the three-way interaction between photographic depiction types x gender x food types on SI prior in testing H4. The procedure was the same as the previous moderated moderation test. The results showed that the three-way interaction between photographic depiction types x food types x gender → SI was not significant ($\gamma = .002, p > .050$). We then removed the three-way interaction term and tested a number of two-way interactions including H4. In accordance with H4, there was a significant two-way interaction effect between photographic depiction types x gender → SI ($\gamma = .111, p < .050$).

The remaining two-way interactions (i.e. photographic depiction types x food types and gender x food types) were not significant ($\gamma = .077, p > .050$; $\gamma = -.001, p > .050$ respectively). Then, we removed the non-significant two-way interaction terms and tested the simple effect of food types. The results revealed that the simple effect of food types \rightarrow SI was not significant ($\gamma = -.043, p > .050$) and removed from the model.¹⁷ Figure 5 displays the results in a path diagram.

¹⁷ We conducted three-way ANOVA (using Type III sum of squares as the sample sizes were not perfectly equal) and found consistent results. We loaded SI as a dependent variable. Photographic depiction types, gender and food types were loaded as three independent factors. The results showed that the three-way interaction between photographic depiction types x gender x food types was not significant ($F(1, 1168) = .009, p > .050$). There was a significant two-way interaction between photographic depiction types x gender ($F(1, 1168) = 4.783, p < .050$).

However, the other two-way interactions: photographic depiction types x food types, $F(1, 1168) = .758, p > .050$; and gender x food types, $F(1, 1168) = .377, p > .050$ were not significant.

The main effects of photographic depiction types and gender were significant, $F(1, 1168) = 101.858, p < .001$, $F(1, 1168) = 19.211, p < .001$ respectively. However, the main effect of food types was not significant, $F(1, 1168) = .051, p > .050$.



R² = Coefficient of determination; Q² = Predictive relevance using blindfolding procedure based on an omission distance of 5. The further the R² and Q² values are away from 0 the higher significance and relevance of predictors.

Bias-corrected and accelerated bootstrap of 5000 subsamples at 95% confidence intervals are reported in squared brackets.

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Stop criterion change: 4

Notes:

[^]Brand belief – palatability ($\gamma = .088$, $p < .010$, [.024, .148]), Brand belief – healthiness ($\gamma = -.005$, $p > .050$, [-.016, -.000]), Social proof - popularity ($\gamma = .101$, $p < .001$, [.053, .155]), Emotional positivity ($\gamma = .154$, $p < .001$, [.097, .204]), Background/source attractiveness ($\gamma = -.045$, $p > .050$, [-.084, -.002]), Hunger ($\gamma = .103$, $p < .001$, [.052, .151]), Visual immersion (VI, $\gamma = .077$, $p < .050$, [.020, .137]), and In-the-mouth sensory immersion (ISI, $\gamma = .125$, $p < .001$, [.073, .181]).

Indirect effect sizes of the three routes are: **1** = .018 (i.e. .161 x .501 x .229), **2** = .020 (i.e. .111 x .182) and **3** = .005 (i.e. .124 x .226 x .182).

To give a clear picture on the sole influences of VI, ISI and SI on purchase intention, we also performed separate simple regressions. The results showed that VI, ISI and SI alone explained 12%, 13% and 14% of variance in purchase intention respectively ($\gamma = .353$, $\gamma = .369$, $\gamma = .374$ in the same order, all p -values $< .001$).

Figure 5

Path diagram highlighting 3 routes to purchase intention through: **1** the traditional advertising affect-transfer, **2** indirect effect of two-way interaction between photographic depiction types x gender on purchase intention via SI, and **3** indirect effect of gender on purchase intention via personal importance of social food experience and SI

Follow-up simple mean comparisons showed that women immersed socially more into food in CSS ads ($M_{\text{Female}} = .464$) than men ($M_{\text{Male}} = .099$; $t(589) = 4.309$, $p < .001$). However, there was no significant difference between gender on food only ads ($M_{\text{Female}} = -.219$; $M_{\text{Male}} = -.343$; $t(583) = 1.717$, $p > .050$). Figure 6 illustrates the two-way interaction plot of SI as a function of photographic depiction types x gender. This means women immerse socially more into ads than men only in the food in CSS condition.

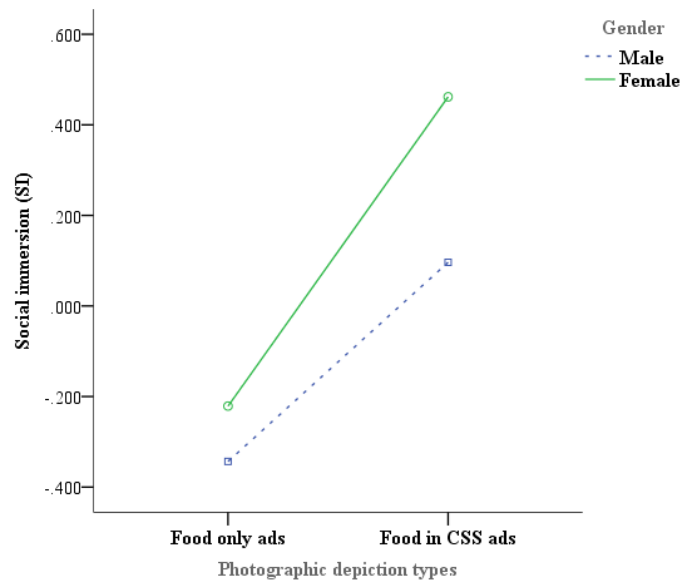


Figure 6

Interaction plot showing social immersion (SI) as a function of photographic depiction types x gender

Second, all the paths involving SI provide deeper insights than the MFSI model. These paths do not only highlight the significant role of gender on social immersion but also the significant role of social immersion in predicting purchase intention for the visual food advertising and marketing literature.

Unrelated to our hypotheses, the path coefficients shown in the diagram were used to calculate the indirect effect sizes between the three routes (i.e. a multiplication of relevant path coefficients). The indirect effect sizes of the three routes are: 1) Photographic depiction types → ad attitude → brand attitude → purchase intention = .018, Photographic

depiction types \times gender \rightarrow SI \rightarrow purchase intention = .020 and Gender \rightarrow Personal importance of social food experience \rightarrow SI \rightarrow purchase intention = .005).

Multigroup analyses (MGAs). To check whether the effect of H6 and H7 hold true universally, we conducted further moderation tests. The procedures were identical to the previous MGAs and non-categorical moderation tests. We removed photographic depiction types, gender and their two-way interaction term to run three MGAs comparing the parameter estimates of the remaining paths. We only reported the paths related to SI below to be concise. Full results are provided in Tables I, J and K in Appendix A.

Food only vs. food in CSS groups MGA. The results (see Table I in Appendix A) showed that the relationship of personal importance of social food experience \rightarrow SI was highly significant for both food in CSS ($\gamma = .267, p < .001, [.185, .339]$) and food only ads ($\gamma = .199, p < .001, [.127, .269]$). The confidence intervals of the two groups overlapped. Hence, the relationship of personal importance of social food experience \rightarrow SI was not moderated by photographic depiction types. The relationship of SI \rightarrow purchase intention was also highly significant for both food in CSS ($\beta = .188, p < .001, [.103, .278]$) and food only ads ($\beta = .207, p < .001, [.135, .272]$). The confidence intervals of the two groups overlapped. Therefore, the relationship of SI \rightarrow purchase intention was not moderated by photographic depiction types.

Male vs. female groups MGA. The results (see Table J in Appendix A) revealed that the relationship of personal importance of social food experience \rightarrow SI was highly significant for both men ($\gamma = .249, p < .001, [.181, .323]$) and women ($\gamma = .206, p < .001, [.124, .275]$). However, the confidence interval for the parameter estimate of the male group overlapped with the corresponding confidence interval of the female group. Hence, the relationship of personal importance of social food experience \rightarrow SI was not moderated by gender. The relationship of SI \rightarrow purchase intention was significant and a little stronger on women ($\beta = .181, p < .001, [.105, .260]$). This effect was also significant on men ($\beta = .165, p < .001, [.074, .246]$). The confidence intervals of the two groups overlapped. Therefore, the relationship of SI \rightarrow purchase intention was not moderated by gender.

Unhealthy vs. healthy food groups MGA. The results (see Table K in Appendix A) showed that the relationship of personal importance of social food experience \rightarrow SI was highly significant for both healthy foods ($\gamma = .246, p < .001, [.167, .320]$) and unhealthy foods (γ

= .204, $p < .001$, [.135, .275]). The confidence intervals of the two groups overlapped. Hence, the relationship of personal importance of social food experience \rightarrow SI was not dependent on food types. The relationship of SI \rightarrow purchase intention was significant for both food types but a little stronger on healthy foods ($\beta = .173$, $p < .001$, [.084, .262]) than unhealthy foods ($\beta = .167$, $p < .001$, [.091, .249]). The confidence intervals of the two groups overlapped. Therefore, the relationship of SI \rightarrow purchase intention was not moderated by food types.

Non-categorical variable moderation test. Lastly, we investigated whether the relationship of SI \rightarrow purchase intention was moderated by other non-categorical variables. The PLS-SEM setting was similar to the previous non-categorical variable moderation test. The results (see Table L in Appendix A) showed that the relationship of SI \rightarrow purchase intention was not moderated by brand attitude, brand belief – palatability, brand belief – healthiness, emotional positivity, social proof - popularity, background/source attractiveness, hunger, VI or ISI, all p -values $> .050$. All these additional moderation tests supported the conclusions for H6 and H7. These results also highlighted the independence of SI as a predictor of purchase intention. Full results are provided in Table L in Appendix A.

In summary, this article shows significant paths to food product purchase intention through a traditional affect-transfer route and other routes involving immersions into food ads. Specifically, consumers like ads that depict food products in consumption sharing scenes (i.e. food in CSS ads) more than ads that solitarily depict food products. An increase in the overall ad evaluation transfers to an increase in the overall brand evaluation, thereby leading to an increase in purchase intention. This is the traditional affect-transfer path (i.e. Photographic depiction types \rightarrow ad attitude \rightarrow brand attitude \rightarrow purchase intention). When considering MFSI as a total immersion (i.e. MFSI as a weighted sum of VI, ISI and SI based on a structural equation modelling algorithm),¹⁸ exposure to food in CSS ads leads to increased MFSI relative to food only ads in accordance with H1. In line with H2, women immerse more into photographic ads than men. As MFSI increases, purchase intention also increases in support of H3. These two paths (i.e. Photographic depiction types \rightarrow MFSI \rightarrow purchase intention, and Gender \rightarrow MFSI \rightarrow purchase intention) show depiction types and gender can indirectly influence purchase intention via MFSI.

¹⁸ Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.

When considering just SI, the effect of photographic depiction types on SI varies by gender. Exposure to food in CSS ads makes women immerse more socially into ads than men but this gender difference is not significant for food only ads in accordance with H4. In line with H5, women indeed consider the ability to enjoy foods with others as more important than men. As one places greater importance on social food experience, one immerses more socially into ads in support of H6. Also as hypothesized in H7, as social immersion increases, purchase intention also increases. The photographic depiction types x gender → SI → purchase intention path provides deeper insights into the interplay of ad designs and gender differences in influencing social immersion. The gender → personal importance of social food experience → SI → purchase intention path explains why women immerse more socially than men for the food in CSS ads. The non-significant moderation effects of gender and photographic depiction types on the relationship of personal importance of social food experience → SI indicate a more independent role of personal importance in predicting SI. This means as one places greater importance on social food experience, one immerses more socially regardless of whether they are exposed to food only ads or food in CSS ads or whether they are male or female. Although women place a higher importance on social food experience than men, for a particular level of personal importance of social food experience, the predicted amount of social immersion is not significantly different between men and women. Similarly, photographic depiction types do not moderate the relationship between personal importance of social food experience and social immersion either.

General discussion

Theoretical implications

This article contributes to the visual food advertising and marketing literature in the following respects. First, this study verifies MFSI as a very significant predictor of purchase intention and illustrates significant indirect routes to purchase intention via MFSI above and beyond that of the traditional affect-transfer theory. Photographic food ads are not simply physical objects. Consumers do not simply evaluate whether they liked or disliked the ad overall. Consumers immerse into the photographic food ads, very much like how they interact with the world. This is consistent with the theoretical perspective of grounded cognition (Barsalou, 2008).

Second, this study provides new perspectives on conceptualizing and measuring consumer mental phenomena evoked by photographic food ads. The concept of consumer mental imageries has been integrated under the umbrella of grounded cognition theory in the consumer psychology literature (Krishna & Schwarz, 2014). The fundamental view of grounded cognition is that consumer mental activities are multimodal. Despite this acknowledgement, previous research on photographic depiction of food has conceptualized and measured consumer mental imageries very broadly focusing only on visual and the self-only imageries (e.g., Debevec & Romeo, 1992; Elder & Krishna, 2012; Homer & Gauntt, 1992). Some scholars have attempted to explore taste and smell imageries (Miller et al., 2000) as an extension of earlier measurements developed by Ellen and Bone (Bone & Ellen, 1992; 1991) and Babin and Burns (1998). However, these existing measures neglect the subjective experiences when consumers feel transported into photographic food ads (i.e. VI) and when the ads evoke imageries about themselves sharing the foods with others (i.e. SI). Hence, MFSI fills in the gaps of conceptualisation and measurement issues for the visual food advertising and marketing literature. More importantly, this study shows that such subjective experiences can be explicitly measured using consumer verbatim reports. Empirical evidence provided in this article shows that the measurement is reliable and valid. VI, ISI and SI are related but empirically differentiable. The measurement is also invariant across photographic depiction types, gender and food types.

This study also makes a methodological contribution by showing some advantages and disadvantages of modeling a higher-order latent construct (i.e. MFSI) and lower-order latent constructs (i.e. VI, ISI and SI). MFSI is a weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm).¹⁹ Hence, MFSI is, conceptually, stronger than VI, ISI and SI considered individually. Modeling MFSI as a higher-order construct also makes theory building less complex (i.e. more degrees of freedom). However, a higher-order construct is more abstract. On the other hand, lower-order latent constructs provide deeper and more specific insights. For instance, this study shows that when considering immersions from a higher-order perspective (i.e. MFSI), photographic depiction types and gender independently influence immersions. This means considering visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) altogether, food in CSS ads make viewers immerse more and women also immerse more into ads than men.

¹⁹ Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.

When considering just SI, this study shows that photographic depiction types and gender depend on each other in influencing SI. Women immerse more socially than men only in the food in CSS ad condition. These findings provide more specific insights into the interplay of photographic depiction types and gender on social immersion.

We propose that decisions about whether to model MFSI as a higher-order construct or to use lower-order constructs should be made based on research objectives. If a research objective is to predict purchase intention, then we suggest modeling MFSI as a higher-order construct. This is because MFSI, obviously, explains more variance than its single parts (see notes under Figures 4 and 5, p. 144 and p. 150). If a research objective is to explain why consumers immerse across multiple modalities, then we also suggest modeling MFSI as a higher-order construct. However, if a research objective is to investigate antecedents or outcomes of specific immersion types, then using VI, ISI or SI as lower-constructs fits the research objective best.

This study also suggests that a perspective change in conceptualizing consumer mental imageries can shed more light on the role of gender in visual food advertising and marketing. In a previous study conducted by Elder and Krishna (2012), the consumer mental responses were conceptualized as the extent to which consumers have visual images of themselves eating the depicted foods in ads. Their studies found no effect of gender on the magnitude of such visual imageries. In contrast, this study suggests that women may be more easily influenced by photographic food ads, particularly when ads depict food products in consumption sharing scenes. Hence, this study urges scholars to view consumption imageries as immersions to better understand gender differences.

Practical implications

This study provides the following key implications for food advertising and marketing practitioners. First, advertising and marketing managers should recognize MFSI as a consumer mental phenomenon. They should also regard MFSI as an independent significant predictor of purchase intention. This means advertising and marketing managers should realize that some consumers immerse into photographic food ads across multiple modalities, not just the obvious in-the-mouth sensory dimension. The more consumers immerse into photographic food ads visually, in-the-mouth sensorially and socially, the more they want to buy the food products. This understanding leads to the next practical implication.

Second, advertising and marketing managers can utilize the developed MFSI measurement scale for pretesting photographic food ads. MFSI is particularly useful when an advertising campaign aims to induce consumer purchase intention by photographically telling food stories. The MFSI scale has only 9 indicators. Hence, it is practical and easy to use. The scale will enable the managers to objectively choose the most immersive photographic food image for advertising use. Images with higher MFSI scores will result in higher purchase intention.

Third, advertising and marketing managers can benefit by developing a broader understanding on photographic depiction types that facilitate MFSI. This article shows that food products depicted in consumption sharing scenes can significantly heighten MFSI. This is a departure from current practice where the emphasis is on creating an appetite appeal or evoking in-the-mouth sensory imageries (Attea, 2008; Custer, 2010). For instance, it is more likely that food products are depicted alone in magazine advertising (Poor et al., 2013). Food product depiction can still be the focal point of the ad even when consumption sharing scenes are added (e.g., see the sundried tomato bread ad in Figure 3, p. 129). This article does not suggest that practitioners always need to depict food products in consumption sharing scenes. The key point is that practitioners should not underestimate the significant and positive effect of visual and social immersions when all components are considered as a total immersion. This study provides empirical evidence showing that depicting food products in consumption sharing scenes, as an alternative to food only depiction, can induce purchase intention via MFSI.

Last, findings from this study provide implications for segmentation and positioning strategies. This study shows that women immerse more into photographic food ads than men. Partly, this is because women place greater importance on social food experience than men making women immerse more socially into the ads than men when the ads depict food products with consumption sharing scenes. If the target audience is women and the marketing campaign objective is to induce purchase intention, then practitioners should consider depicting their food product in consumption sharing scenes instead of depicting or photographing the food alone. This is because such depiction is in line with women's social intrinsic goal of consumption.

Future research

Although this research provides several contributions to the visual advertising and marketing literature and implications for practice, there are some limitations. First, this research models MFSI only in parallel with the traditional advertising affect-transfer model. In doing so, we aim to simply illustrate additional significant paths to purchase intention related to MFSI. MFSI is a new construct. Hence, anchoring MFSI with a well-known path to purchase intention should help readers gradually integrate these new insights to what they already know. Future research should investigate the relationships of MFSI with ad attitude and brand attitude.

Second, the focal point of this research is on MFSI and SI. Hence, this research focuses on investigating the three-way and two-way interactions and simple effects of photographic depiction types, food types and gender on MFSI and SI. Future research should investigate the effect of these variables on ad attitude, brand attitude and purchase intention to provide further insights. It is also beyond the scope of this paper to investigate such effects on VI and ISI individually. Future research can extend the current research by examining VI and ISI as outcomes of photographic depiction types, food types and gender.

Third, this research only investigates purchase intention as an outcome of MFSI. Future research could explore the relationship of MFSI with actual behaviors. The significant relationship of MFSI with purchase intention illustrated in this study poses further interesting research questions. Will an increase in the overall immersion into photographic food ads among consumers increase the chance for them to actually buy the depicted products? If consumers overall immerse more into photographic food ads, will that make them eat more food after exposure—particularly among women? The significant antecedents and outcomes of MFSI illustrated in this study coupled with the higher prevalence of obesity (i.e. overweight and obese at $\text{BMI} \geq 25\text{kg/m}^2$) in women across almost 200 countries (Ng et al., 2014) justifies why future research in this area is needed.

Last, this research controls the effect of pre-existing brand attitude by using a fictitious brand. This implies that MFSI is legitimate only when the brand is new to consumers. Future research could investigate the effect of pre-existing brand attitudes by using real brands in the market. Studies comparing results between new brands and existing brands will also extend the MFSI theory and provide further implications for advertising and marketing practitioners.

In conclusion, it is without doubt that consumers are immersed into food stories depicted in mainstream media such as TV cooking shows and films centred on food. Consider the following remarks made about some cooking programs and a food-related film by a broadcasting network, a TV program host and film reviewer. All emphases are added by the authors to highlight the different facets of immersions:

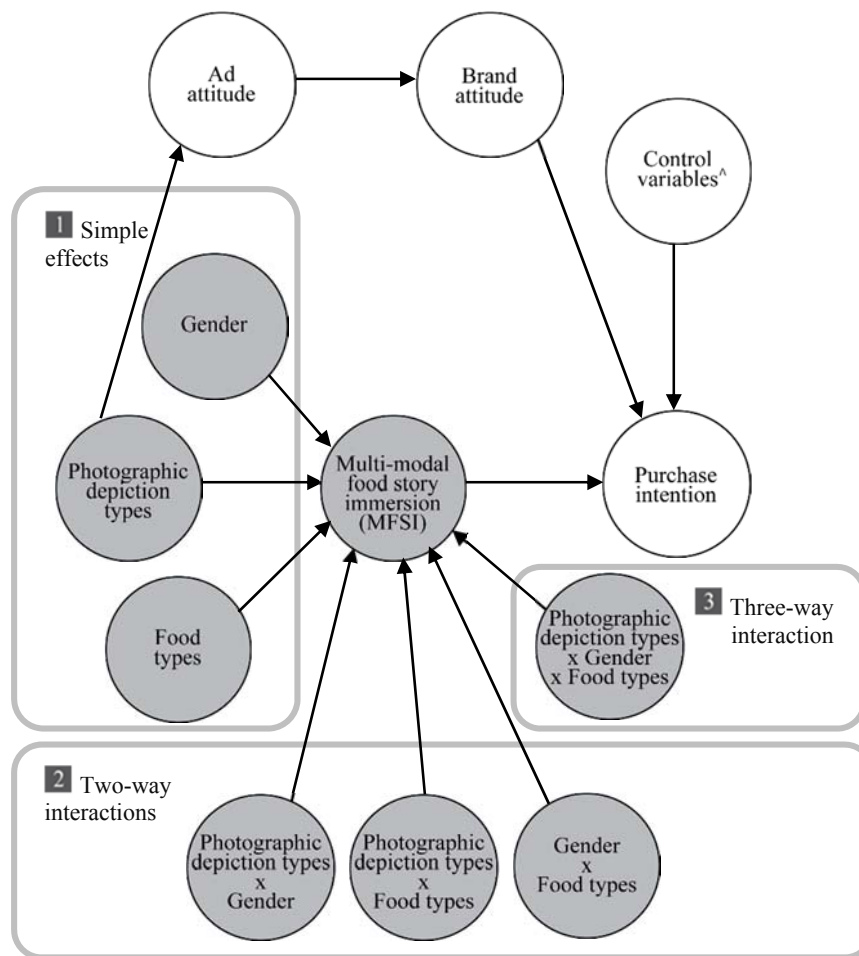
“Immerse yourself in the delicious feasts Nigella cooks for herself, her friends and her family.” ("Nigella kitchen," 2014)

“[...] Our program is to immerse viewers in a world of pure culinary delights [...] Yes Chef takes viewers inside some of the most famous restaurant kitchens, with some of most known chefs and locations ‘in Australia’ and overseas. [...]” (Rizzo, 2012)

“[...] While watching ‘The Hundred Footed Journey,’ the audience craves not only for the food on-screen, but is also transported to the ‘cinematographic’ world ‘through depicted scenes’ [...]” (Thompson, 2014)

The concept of multi-modal food story immersion (MFSI) has now been brought into the visual food advertising and marketing literature. This article shows how the consumer mental phenomenon can be explicitly measured. More importantly, MFSI is a product of an integration of relevant theoretical perspectives from previous research but goes beyond visual and self-only imageries. This article clearly illustrates significant indirect routes to purchase intention via MFSI above and beyond that of the traditional affect-transfer theory. In this regards, this article demonstrates how the grounded cognition literature can be integrated into the visual food advertising and marketing literature. Such new and significant insights from this research warrant further examination to better understand this complex consumer mental phenomenon.

Appendix A: Detailed results



[^]Control variables: 1) Brand belief – palatability, 2) Brand belief – healthiness, 3) Emotional positivity, 4) Social proof - popularity, 5) Background/source attractiveness and 6) Hunger

Figure A

Expanded model exemplifying 7 terms for three-way interaction (moderated moderation) test: **1** simple effect terms, **2** two-way interaction terms, and **3** three-way interaction term

Table A

Descriptive statistics for each variable

Variable	No. of item	Mean	Std. Deviation	Kurtosis	Kolmogorov-Smirnov [^]
Photographic depiction types (Dummy coded as 1 for food in CSS and 0 food only)	1				
Food types (Dummy coded as 1 for healthy foods and 0 for unhealthy foods)	1				
Gender (Dummy coded as 1 for females and 0 for males)	1				
Multi-modal food story immersion (MFSI) ²⁰	9				
Visual immersion (VI)	3				
I felt as if I was transported into the picture (VI01)		1.529	1.064	1.610	0.469***
I felt as if the food was physically here (VI02)		1.959	1.288	-0.831	0.376***
I felt as if I was invited into the picture (VI03)		1.982	1.261	-0.937	0.367***
In-the-mouth sensory immersion (ISI)	3				
I sensed the food in my mouth (ISI01)		1.942	1.305	-0.632	0.382***
I imagined the tastes/flavours of the food (ISI02)		2.821	1.306	-1.193	0.209***
I could feel the texture of the food in my mouth (ISI03)		2.058	1.341	-0.951	0.357***
Social immersion (SI)	3				
I thought about sharing the food with other people (SI01)		2.076	1.375	-0.985	0.366***
I pictured other people I could eat the food with (SI02)		1.973	1.344	-0.764	0.388***
The picture brought stories about other people to my mind (SI03)		1.733	1.225	0.328	0.430***
Purchase intention	1	2.313	1.112	-0.655	0.217***
Ad attitude	1	0.287	0.872	0.025	0.215***
Brand attitude	1	0.483	0.820	0.531	0.249***
Brand belief – palatability	1	0.639	0.906	0.615	0.294***
Brand belief – healthiness	1	0.220	1.021	-0.648	0.209***
Emotional positivity	2				
Happy		2.870	1.123	-0.759	0.173***
Guilt		1.949	1.203	-0.257	0.320***
Social proof - popularity	1	0.362	0.888	-0.181	0.238***
Background/source attractiveness	1	-0.145	1.287	-1.242	0.210***
Hunger	1	2.324	1.202	-0.668	0.193***

[^]Lilliefors significance correction*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ ($df = 1176$)²⁰ Detailed scaling construction of immersion constructs and frequency distributions showing the nature of immersions in photographic food advertising are provided in Thesis appendix A.

Table B

Reflective measurement model evaluation: Indicator reliability, internal consistency reliability, convergent validity and discriminant validity criteria

Latent construct and indicator	λ			AVE	CR	α^{\wedge}
	Visual immersion (VI)	In-the-mouth sensory immersion (ISI)	Social immersion (SI)			
Visual immersion (VI)				.598	.817	.664
I felt as if I was transported into the picture (VI01)	.795***	.283	.373			
I felt as if the food was physically here (VI02)	.750***	.423	.234			
I felt as if I was invited into the picture (VI03)	.775***	.295	.388			
In-the-mouth sensory immersion (ISI)				.676	.862	.764
I sensed the food in my mouth (ISI01)	.400	.854***	.245			
I imagined the tastes/flavours of the food (ISI02)	.313	.828***	.246			
I could feel the texture of the food in my mouth (ISI03)	.372	.784***	.191			
Social immersion (SI)				.665	.855	.748
I thought about sharing the food with other people (SI01)	.355	.222	.833***			
I pictured other people I could eat the food with (SI02)	.355	.253	.884***			
The picture brought stories about other people to my mind (SI03)	.340	.209	.720***			

λ = Factor loading (indicator reliability and discriminant validity), AVE = Average variance extracted (convergent validity), CR = Composite reliability (internal consistency reliability), α^{\wedge} = Cronbach's alpha

α^{\wedge} Cronbach's alpha values should not be used to evaluate the internal consistency reliability because Cronbach's alpha values are affected by the number of indicators—when the number of indicators increase, the higher the value of Cronbach's alpha is (Cortina, 1993). Internal consistency reliability should be evaluated using the CR values (Bagozzi & Yi, 1988; Hair et al., 2012).

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

The results (see above) showed that indicators of VI, ISI and SI exhibited factor loadings (λ) ranging from .72 to .85. This means each and every indicator of VI, ISI and SI is reliable (Hair et al., 2012; Hulland, 1999). All average variance extracted (AVE) values of VI, ISI and SI were higher than .50. This means VI, ISI and SI achieve the convergent validity (Bagozzi & Yi, 1988). All composite reliability (CR) values of VI, ISI and SI were well above .70. This means VI, ISI and SI achieve the internal consistency reliability (Bagozzi & Yi, 1988; Hair et al., 2012).²¹

²¹ Note that this study used *different* samples and photographic ads compared to the experimental and questionnaire study reported in the previous chapter. The reliability and validity of VI, ISI and SI measurement was again established and results were *replicated* in this study. Hence, there is consistent and convincing evidence that supports the reliability and validity of VI, ISI and SI measurement.

We also ran a Confirmatory Factor Analysis (CFA) using a covariance-based structural equation (CB-SEM) modeling approach via AMOS. The indicators of VI, ISI and SI exhibited factor loadings from .560 to .824, all p -values $< .001$. The model fit indices indicated a reasonably good fit for the measurement model with a χ^2 of 149.337 ($df = 24$, $p < .001$), a comparative fit index (CFI) of .957, a Tucker–Lewis index (TLI) of .936, a root mean square error of approximation (RMSEA) of .067.

Table C

Reflective measurement model evaluation: Additional discriminant validity criteria

Construct/Discriminant validity criteria	Fornell & Larcker's (1981) $\sqrt{AVE} > r$			Henseler, Ringle & Sarstedt's (2015) HTMT [^]		
	Visual immersion (VI)	In-the-mouth sensory immersion (ISI)	Social immersion (SI)	Visual immersion (VI)	In-the-mouth sensory immersion (ISI)	Social immersion (SI)
Visual immersion (VI)	(.773)					
In-the-mouth sensory immersion (ISI)	.435	(.822)		.611		
Social immersion (SI)	.427	.280	(.815)	.613	.364	

AVE = Average variance extracted; r = Correlation; HTMT = Heterotrait-monotrait ratio of correlations; \sqrt{AVE} values are shown in parentheses but r and HTMT values are shown without parentheses.

[^]Henseler, Ringle & Sarstedt (2015) argue that Fornell & Larcker's (1981) criterion works well only when factor loadings are not partly correlated with high sample sizes. Henseler, Ringle & Sarstedt's (2015) criterion suggests that if the average heterotrait-heteromethod divided by the geometric mean of the average monotrait-heteromethod correlation of a latent construct and the average monotrait-heteromethod correlation of another latent construct is less than 0.70 then the discriminant validity is established.

The results in Table B also show that indicators of VI, ISI and SI were also loaded highest within their construct (Chin, 1998; Grégoire & Fisher, 2006). In Table C, the square root of AVE value of each construct was larger than its correlation value with other constructs (Fornell & Larcker, 1981). The heterotrait-monotrait ratio of correlations (HTMT, Henseler et al., 2015) between VI, ISI and SI were below .70. These mean VI, ISI and SI were related but empirically distinct.²²

²² Note that this study used *different* samples and photographic ads compared to the experimental and questionnaire study reported in the previous chapter. The discriminant validity of VI, ISI and SI measurement was again established and results were *replicated* in this study. Hence, there is consistent and convincing evidence that VI, ISI and SI are related but empirically distinct.

Another Confirmatory Factor Analysis (CFA) model was also run forcing VI, ISI and SI to be perfectly correlated ($\chi^2 = 306.335$, $df = 27$). The difference between this CFA model and the other CFA model allowing VI, ISI and SI to correlate freely was highly significant with the chi-square change ($\Delta \chi^2(3) = 156.998$, $p < .001$). This means the three-factor model fits the data better than the one factor model or VI, ISI and SI should not be modeled as one global reflective factor. Note that MFSI in this study was not modeled as a global reflective factor. MFSI was modeled as a higher-order construct formed by VI, ISI and SI as separate components defining MFSI.

Table D
Formative measurement model evaluation

Construct/indicator	Multi modal food story immersion (MFSI) [^]	
	VIF	Weights
Visual immersion (VI)	1.37	.306***
I felt as if I was transported into the picture (VI01)	1.47	.126***
I felt as if the food was physically here (VI02)	1.33	.146***
I felt as if I was invited into the picture (VI03)	1.44	.132***
In-the-mouth sensory immersion (ISI)	1.24	.487***
I sensed the food in my mouth (ISI01)	1.72	.209***
I imagined the tastes/flavours of the food (ISI02)	1.50	.235***
I could feel the texture of the food in my mouth (ISI03)	1.56	.141***
Social immersion (SI)	1.23	.513***
I thought about sharing the food with other people (SI01)	1.71	.206***
I pictured other people I could eat the food with (SI02)	1.84	.254***
The picture brought stories about other people to my mind (SI03)	1.50	.161***

VIF = Variance inflation factor. VIF values below 5 indicate that there are no issues with multicollinearity to form a formative latent construct. Significant regression weights indicate whether the indicators and lower-order reflective latent construct contribute greatly to the higher-order reflective-formative latent construct (Hair et al., 2012).

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

[^]MFSI was modeled as a higher-order reflective-formative latent construct (Chin & Gopal, 1995; Diamantopoulos et al., 2008; Hair, Hult, et al., 2014; Jarvis et al., 2003). We used a “repeated indicator, mode b” approach (Becker, Klein, & Wetzels, 2012, p. 376) to model MFSI as a predictor of purchase intention. This means we modeled VI, ISI and SI as lower-order latent constructs (with indicators being reflective). Then, we used VI, ISI and SI to form MFSI. All indicators of VI, ISI and SI were also simultaneously modeled as formative indicators of MFSI. This means MFSI is a weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm).²³ MFSI was used to predict purchase intention. We chose this approach because a recent Monte Carlo simulation study (Becker et al., 2012) showed that this approach performed best in terms of having low bias, high precision of parameter estimates and reliability of higher-order latent scores.

The results (see above) showed that the variance inflation factor (VIF) values of VI, ISI and SI were below 5. This means there are no issues with multicollinearity for VI, ISI and SI to form MFSI. The regression weights of all indicators of VI, ISI and SI on MFSI were significant, all p -values $< .001$. This means each indicator of VI, ISI and SI contributes significantly to MFSI (Hair et al., 2012).²⁴

²³ Readers who are not familiar with the latent variable score estimation process based on a structural equation modelling approach, can find detailed explanation of the process in Thesis appendix A.

²⁴ Note that this study used *different* samples and photographic ads compared to the experimental and questionnaire study reported in the previous chapter. The reliability and validity of MFSI measurement was again established and results were *replicated* in this study. Hence, there is consistent and convincing evidence that support the reliability and validity of MFSI measurement.

Table E

PLS-MGA results comparing between photographic depiction types: MFSI as a higher-order reflective-formative latent construct

Route/path	<i>Food only</i> Coeff. [BCa CI]	<i>Food in CSS</i> Coeff. [BCa CI]	diff	<i>t</i> -value (parametric)	Confidence set [^] (non-parametric)
<i>Affect-transfer route</i>					
Ad attitude → brand attitude	.489***[.414, .555]	.509***[.434, .574]	.020	.398	Not significant
Brand attitude → purchase intention	.224***[.146, .303]	.224***[.133, .319]	.001	.010	Not significant
<i>MFSI route</i>					
MFSI → Purchase intention	.271***[.196, .339]	.323***[.241, .394]	.053	.974	Not significant
<i>Control variables</i>					
Brand belief – palatability → purchase intention	.113**[.028, .196]	.057[.003, .143]	.056	.966	Not significant
Brand belief – healthiness → purchase intention	.007[.000, .023]	-.016[-.053, -.000]	.023	.731	Not significant
Emotional positivity → purchase intention	.162***[.083, .234]	.154***[.081, .229]	.008	.152	Not significant
Social proof - popularity → purchase intention	.114**[.044, .186]	.083*[.011, .166]	.031	.578	Not significant
Background/source attractiveness → purchase intention	.055[.004, .119]	-.010[-.036, -.000]	.065	1.70	Significant
Hunger → purchase intention	.070*[.009, .134]	.125***[.058, .194]	.055	1.15	Not significant

Partial least square multiple group analysis (PLS-MGA) is a procedure that assesses whether the coefficient values of a path relationship are significantly different between categorical groups (for a review of PLS-MGA approaches, see Sarstedt et al., 2011). Sarstedt et al. (2011) argued that the confidence set approach (a non-parametric approach) should be used for interpreting the PLS-MGA results when the data is not normally distributed instead of significant t-test (parametric approach). The confidence set approach is more conservative than the parametric approach. If the parameter estimate for a specific path of one group does not overlap with the corresponding confidence intervals of the other group, then there is a significant difference between groups at the α significance level.

For instance, consider the relationship of MFSI → purchase intention. The results (see above) showed that the confidence interval for the two groups overlapped (i.e. BCa 95% CI .196 and .339 of food only ads overlapped with BCa 95% CI .241 and .394 of food in CSS ads). Hence, the relationship of MFSI → purchase intention was not moderated by photographic depiction types. This means the more participants immerse visually, in-the-mouth sensorially and socially into ads, the more their purchase intention is heightened regardless of photographic depiction types.

[^]Based on the 95% bias-corrected and accelerated confidence intervals (95% BCa CI)

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Table F

PLS-MGA results comparing between gender: MFSI as a higher-order reflective-formative latent construct

Route/path	Male Coeff. [BCa CI]	Female Coeff. [BCa CI]	diff	t-value (parametric)	Confidence set [^] (non-parametric)
<i>Affect-transfer route</i>					
Ad attitude → brand attitude	.530***[.461, .593]	.468***[.393, .537]	.062	1.22	Not significant
Brand attitude → purchase intention	.275***[.191, .360]	.192***[.111, .281]	.083	1.366	Not significant
<i>MFSI route</i>					
MFSI → Purchase intention	.265***[.172, .342]	.296***[.215, .372]	.032	.542	Not significant
<i>Control variables</i>					
Brand belief – palatability → purchase intention	.071[.004, .166]	.114**[.028, .195]	.043	.715	Not significant
Brand belief – healthiness → purchase intention	-.018[-.061, -.000]	.001[.000, .000]	.019	.583	Not significant
Emotional positivity → purchase intention	.134**[.056, .213]	.197**[.116, .268]	.063	1.13	Not significant
Social proof - popularity → purchase intention	.079*[.008, .158]	.120**[.047, .198]	.041	.744	Not significant
Background/source attractiveness → purchase intention	-.025[-.084, -.001]	-.057[-.128, -.004]	.032	.760	Not significant
Hunger → purchase intention	.111**[.042, .179]	.117**[.048, .184]	.006	1.13	Not significant

Partial least square multiplegroup analysis (PLS-MGA) is a procedure that assesses whether the coefficient values of a path relationship are significantly different between categorical groups (for a review of PLS-MGA approaches, see Sarstedt et al., 2011). Sarstedt et al. (2011) argued that the confidence set approach (a non-parametric approach) should be used for interpreting the PLS-MGA results when the data is not normally distributed instead of significant t-test (parametric approach). The confidence set approach is more conservative than the parametric approach. If the parameter estimate for a specific path of one group does not overlap with the corresponding confidence intervals of the other group, then there is a significant difference between groups at the α significance level.

For instance, consider the relationship of MFSI → purchase intention. The results (see above) showed that the confidence interval for the two groups overlapped (i.e. BCa 95% CI .172 and .342 of male group overlapped with BCa 95% CI .215 and .372 of female group). Hence, the relationship of MFSI → purchase intention was not moderated by gender. This means the more participants immerse visually, in-the-mouth sensorially and socially into ads, the more their purchase intention is heightened regardless of gender.

[^]Based on the 95% bias-corrected and accelerated confidence intervals (95% BCa CI)

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Table G

PLS-MGA results comparing between food types: MFSI as a higher-order reflective-formative latent construct

Route/path	<i>Healthy foods</i> Coeff. [BCa CI]	<i>Unhealthy foods</i> Coeff. [BCa CI]	diff	<i>t</i> -value (parametric)	Confidence set [^] (non-parametric)
<i>Affect-transfer route</i>					
Ad attitude → brand attitude	.500***[.432, .568]	.500***[.427, .565]	.000	.006	Not significant
Brand attitude → purchase intention	.199***[.118, .287]	.255***[.173, .332]	.056	.928	Not significant
<i>MFSI route</i>					
MFSI → Purchase intention	.284***[.186, .363]	.298***[.214, .367]	.014	.243	Not significant
<i>Control variables</i>					
Brand belief – palatability → purchase intention	.065[.004, .152]	.118[.030, .206]	.053	.890	Not significant
Brand belief – healthiness → purchase intention	-.005[-.014, -.000]	.035**[.002, .095]	.040	1.18	Significant
Emotional positivity → purchase intention	.194***[.111, .280]	.157***[.090, .223]	.037	.674	Not significant
Social proof - popularity → purchase intention	.114**[.037, .192]	.080*[.011, .154]	.033	.617	Not significant
Background/source attractiveness → purchase intention	-.063[-.137, -.006]	-.037[-.104, -.002]	.025	.573	Not significant
Hunger → purchase intention	.092**[.028, .160]	.102**[.034, .166]	.010	.217	Not significant

Partial least square multiple group analysis (PLS-MGA) is a procedure that assesses whether the coefficient values of a path relationship are significantly different between categorical groups (for a review of PLS-MGA approaches, see Sarstedt et al., 2011). Sarstedt et al. (2011) argued that the confidence set approach (a non-parametric approach) should be used for interpreting the PLS-MGA results when the data is not normally distributed instead of significant t-test (parametric approach). The confidence set approach is more conservative than the parametric approach. If the parameter estimate for a specific path of one group does not overlap with the corresponding confidence intervals of the other group, then there is a significant difference between groups at the α significance level.

For instance, consider the relationship of MFSI → purchase intention. The results (see above) showed that the confidence interval for the two groups overlapped (i.e. BCa 95% CI .186 and .363 of healthy foods overlapped with BCa 95% CI .214 and .367 of unhealthy foods). Hence, the relationship of MFSI → purchase intention was not moderated by food types. This means the more participants immerse visually, in-the-mouth sensorially and socially into ads, the more their purchase intention is heightened regardless of food types.

[^]Based on the 95% bias-corrected and accelerated confidence intervals (95% BCa CI)

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Table H

PLS non-categorical variable moderation analysis results: MFSI as a higher-order reflective-formative latent construct

Interaction terms	Coeff. [BCa CI]^	t-value	Significance
MFSI x brand attitude → purchase intention	.026 [.001, .070]	1.39	Not significant
MFSI x brand belief – palatability → purchase intention	.037 [.002, .086]	1.66	Not significant
MFSI x brand belief – healthiness → purchase intention	-.001 [-.001, -.000]	.020	Not significant
MFSI x emotional positivity → purchase intention	-.007 [-.024, -.000]	.445	Not significant
MFSI x social proof - popularity → purchase intention	-.003 [-.010, -.000]	.223	Not significant
MFSI x background/source attractiveness → purchase intention	.004 [.000, .012]	.290	Not significant
MFSI x hunger → purchase intention	.016 [.000, .053]	.965	Not significant

^An example interpretation of the positive and negative interaction term coefficient values would be as follows. Recall that the relationship of MFSI → purchase intention in Figure 4 was .295. When brand attitude is increased by one standard deviation, the relationship of MFSI → purchase intention would increase by the size of the interaction (i.e. $.295 + .026 = .321$). This means when brand attitude is rated more positively, the relationship of MFSI → purchase intention is estimated to be a little stronger. However, the interaction effect was not significant. Hence, brand attitude did not significantly moderate the relationship of MFSI → Purchase intention. When brand belief – healthiness is increased by one standard deviation, the relationship of MFSI → purchase intention would weaken (i.e. $.295 - .001 = .294$). This means when brand belief – healthiness is rated more favourably, the relationship of MFSI → purchase intention is estimated to reduce a very little. The interpretation also applies in the opposite direction. When brand belief – healthiness is *decreased* by one standard deviation, the relationship of MFSI → purchase intention is estimated to be a very little stronger (i.e. $.295 + .001 = .296$). However, the interaction effect was not significant. Hence, brand belief – healthiness did not significantly moderate the relationship of MFSI → Purchase intention. This is consistent with the PLS-MGA results shown in Table G. The relationship of MFSI → purchase intention was a little stronger for unhealthy foods.

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Table I

PLS-MGA results comparing between photographic depiction types: SI as a lower-order reflective latent construct, a key defining component of MFSI

Route/path	<i>Food only</i> Coeff. [BCa CI]	<i>Food in CSS</i> Coeff. [BCa CI]	diff	<i>t</i> -value (parametric)	Confidence set [^] (non-parametric)
<i>Affect-transfer route</i>					
Ad attitude → brand attitude	.489***[.412, .555]	.509***[.439, .576]	.020	.398	Not significant
Brand attitude → purchase intention	.228***[.149, .312]	.224***[.138, .316]	.005	.073	Not significant
<i>SI route</i>					
Personal importance of social food experience → SI	.199***[.127, .269]	.267***[.185, .339]	.067	1.25	Not significant
SI → Purchase intention	.207***[.135, .272]	.188***[.103, .278]	.019	.332	Not significant
<i>Control variables</i>					
Brand belief – palatability → purchase intention	.120**[.036, .208]	.057[.002, .144]	.064	1.09	Not significant
Brand belief – healthiness → purchase intention	.007[.000, .019]	-.015[-.050, .000]	.021	.661	Not significant
Emotional positivity → purchase intention	.172***[.088, .251]	.155***[.082, .234]	.017	.312	Not significant
Social proof - popularity → purchase intention	.110**[.038, .182]	.084*[.008, .161]	.026	.485	Not significant
Background/source attractiveness → purchase intention	.054[.002, .122]	-.010[-.035, .000]	.064	1.60	Significant
Hunger → purchase intention	.071*[.010, .137]	.125***[.058, .197]	.054	1.12	Not significant
VI → purchase intention	.062[.004, .139]	.098**[.010, .183]	.036	.635	Not significant
ISI → purchase intention	.081*[.011, .155]	.127**[.044, .198]	.046	.849	Not significant

Partial least square multigroup analysis (PLS-MGA) is a procedure that assesses whether the coefficient values of a path relationship are significantly different between categorical groups (for a review of PLS-MGA approaches, see Sarstedt et al., 2011). Sarstedt et al. (2011) argued that the confidence set approach (a non-parametric approach) should be used for interpreting the PLS-MGA results when the data is not normally distributed instead of significant t-test (parametric approach). The confidence set approach is more conservative than the parametric approach. If the parameter estimate for a specific path of one group does not overlap with the corresponding confidence intervals of the other group, then there is a significant difference between groups at the α significance level.

For instance, consider the relationship of SI → purchase intention. The results (see above) showed that the confidence interval for the two groups overlapped (i.e. BCa 95% CI .135 and .272 of food only ads overlapped with BCa 95% CI .103 and .278 of food in CSS ads). Hence, the relationship of SI → purchase intention was not moderated by photographic depiction types. This means the more participants socially into ads, the more their purchase intention is heightened regardless of photographic depiction types.

[^]Based on the 95% bias-corrected and accelerated confidence intervals (95% BCa CI)

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Table J

PLS-MGA results comparing between gender: SI as a lower-order reflective latent construct, a key defining component of MFSI

Route/path	<i>Male</i> Coeff. [BCa CI]	<i>Female</i> Coeff. [BCa CI]	diff	<i>t</i> -value (parametric)	Confidence set [^] (non-parametric)
<i>Affect-transfer route</i>					
Ad attitude → brand attitude	.530***[.461, .598]	.468***[.387, .532]	.062	1.23	Not significant
Brand attitude → purchase intention	.269***[.183, .359]	.192***[.107, .274]	.076	1.24	Not significant
<i>SI route</i>					
Personal importance of social food experience → SI	.249***[.181, .323]	.206***[.124, .275]	.043	.829	Not significant
SI → purchase intention	.165***[.074, .246]	.181***[.105, .260]	.016	.262	Not significant
<i>Control variables</i>					
Brand belief – palatability → purchase intention	.068[.004, .164]	.105*[.024, .184]	.037	.620	Not significant
Brand belief – healthiness → purchase intention	-.014[-.048, .000]	.004[.000, .0120]	.018	.561	Not significant
Emotional positivity → purchase intention	.133**[.053, .214]	.190***[.112, .266]	.058	1.01	Not significant
Social proof - popularity → purchase intention	.083*[.012, .164]	.121**[.052, .195]	.038	.717	Not significant
Background/source attractiveness → purchase intention	-.015[-.051, -.000]	-.050[-.125, -.004]	.035	.876	Not significant
Hunger → purchase intention	.111**[.042, .178]	.111***[.045, .184]	.000	.002	Not significant
VI → purchase intention	.056[.002, .147]	.091*[.016, .170]	.035	.615	Not significant
ISI → purchase intention	.124**[.046, .203]	.117**[.045, .192]	.007	.130	Not significant

Partial least square multigroup analysis (PLS-MGA) is a procedure that assesses whether the coefficient values of a path relationship are significantly different between categorical groups (for a review of PLS-MGA approaches, see Sarstedt et al., 2011). Sarstedt et al. (2011) argued that the confidence set approach (a non-parametric approach) should be used for interpreting the PLS-MGA results when the data is not normally distributed instead of significant t-test (parametric approach). The confidence set approach is more conservative than the parametric approach. If the parameter estimate for a specific path of one group does not overlap with the corresponding confidence intervals of the other group, then there is a significant difference between groups at the α significance level.

For instance, consider the relationship of SI → purchase intention. The results (see above) showed that the confidence interval for the two groups overlapped (i.e. BCa 95% CI .074 and .246 of male group overlapped with BCa 95% CI .105 and .260 of female group). Hence, the relationship of SI → purchase intention was not moderated by gender. This means the more participants socially into ads, the more their purchase intention is heightened regardless of gender.

[^]Based on the 95% bias-corrected and accelerated confidence intervals (95% BCa CI)

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Table K

PLS-MGA results comparing between food types: SI as a lower-order reflective latent construct, a key defining component of MFSI

Route/path	<i>Healthy foods</i> Coeff. [BCa CI]	<i>Unhealthy foods</i> Coeff. [BCa CI]	diff	t-value (parametric)	Confidence set [^] (non-parametric)
<i>Affect-transfer route</i>					
Ad attitude → brand attitude	.500***[.426, .564]	.500***[.426, .563]	.000	.006	Not significant
Brand attitude → purchase intention	.197***[.119, .277]	.252***[.167, .345]	.056	.908	Not significant
<i>SI route</i>					
Personal importance of social food experience → SI	.246***[.167, .320]	.204***[.135, .275]	.042	.817	Not significant
SI → purchase intention	.173***[.084, .262]	.167***[.091, .249]	.006	.102	Not significant
<i>Control variables</i>					
Brand belief – palatability → purchase intention	.058[.003, .137]	.112*[.020, .206]	.054	.894	Not significant
Brand belief – healthiness → purchase intention	.002[.000, .005]	.038[.001, .099]	.035	.969	Not significant
Emotional positivity → purchase intention	.184***[.099, .265]	.156***[.083, .218]	.027	.502	Not significant
Social proof - popularity → purchase intention	.119**[.045, .199]	.080*[.010, .154]	.039	.728	Not significant
Background/source attractiveness → purchase intention	-.048[-.119, -.003]	-.031[-.097, -.001]	.017	.398	Not significant
Hunger → purchase intention	.091**[.020, .161]	.098***[.030, .163]	.008	.156	Not significant
VI → purchase intention	.053[.003, .135]	.121**[.043, .205]	.068	1.21	Not significant
ISI → purchase intention	.149***[.076, .220]	.098**[.027, .173]	.039	.728	Not significant

Partial least square multiple group analysis (PLS-MGA) is a procedure that assesses whether the coefficient values of a path relationship are significantly different between categorical groups (for a review of PLS-MGA approaches, see Sarstedt et al., 2011). Sarstedt et al. (2011) argued that the confidence set approach (a non-parametric approach) should be used for interpreting the PLS-MGA results when the data is not normally distributed instead of significant t-test (parametric approach). The confidence set approach is more conservative than the parametric approach. If the parameter estimate for a specific path of one group does not overlap with the corresponding confidence intervals of the other group, then there is a significant difference between groups at the α significance level.

For instance, consider the relationship of SI → purchase intention. The results (see above) showed that the confidence interval for the two groups overlapped (i.e. BCa 95% CI .084 and .262 of healthy foods overlapped with BCa 95% CI .091 and .249 of unhealthy foods). Hence, the relationship of SI → purchase intention was not moderated by food types. This means the more participants socially into ads, the more their purchase intention is heightened regardless of food types.

[^]Based on the 95% bias-corrected and accelerated confidence intervals (95% BCa CI)

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Table L

PLS continuous moderation analysis results: SI as a lower-order reflective latent construct, a key defining component of MFSI

Interaction terms	Coeff. [BCa CI]^	t-value	Significance
SI x brand attitude → purchase intention	-.005 [-.017, -.000]	.307	Not significant
SI x brand belief – palatability → purchase intention	-.006 [-.019, -.000]	.374	Not significant
SI x brand belief – healthiness → purchase intention	-.007 [-.025, -.000]	.459	Not significant
SI x emotional positivity → purchase intention	-.003 [-.006, -.000]	.195	Not significant
SI x social proof - popularity → purchase intention	.001 [.000, .000]	.040	Not significant
SI x background/source attractiveness → purchase intention	-.018 [-.059, -.000]	.997	Not significant
SI x hunger → purchase intention	.027 [.002, .077]	1.36	Not significant
SI x VI → purchase intention	-.001 [-.002, -.000]	.085	Not significant
SI x ISI → purchase intention	-.012 [-.042, -.000]	.777	Not significant

^An example interpretation of the positive and negative interaction term coefficient values would be as follows. Recall that the relationship of SI → purchase intention in Figure 5 was .182. Hence, when hunger is increased by one standard deviation, the relationship of SI → purchase intention would increase by the size of the interaction (i.e. $.182 + .027 = .209$). This means when hunger is increased, the relationship of SI → purchase intention is estimated to be a little stronger. However, the interaction effect was not significant. Hence, hunger did not significantly moderate the relationship of SI → Purchase intention. When brand attitude is increased by one standard deviation, the relationship of SI → purchase intention would *decrease* by the size of the interaction (i.e. $.182 - .005 = .177$). This means when brand attitude is rated more favourably, the relationship of SI → purchase intention is estimated to be a little weaker. The interpretation also applies in the opposite direction. When participants rate the product less favourably (i.e. brand attitude is decreased by one standard deviation), the relationship of SI → purchase intention is estimated to be a little stronger (i.e. $.182 + .005 = .187$). This means when the product is less favourably evaluated, social immersion helps induce purchase intention a little. However, the interaction effect was not significant. Hence, brand attitude did not significantly moderate the relationship of SI → Purchase intention.

*Significant, $p < .050$, $t = 1.96$, **significant, $p < .010$, $t = 2.56$, ***significant $p < .001$, $t = 3.29$ (2-tailed, $df = 4999$)

Appendix B: Experimental online questionnaire

Note: The questionnaire below contains all the measures used in this study. However, only one scale format and one manipulation are displayed below, to be concise. Please refer to “Data quality control prior to data collection,” page 132 in the body of this article for information on how scale formats, scale rotations and randomization are managed. Please refer to “Figure 3,” page 131 in the body of this article for all the manipulations of photographic depiction and food types.

[Information statement]

iPad, tablet and mobile phone users:

Participants are asked to please use a desktop or laptop computer only to complete this survey. This is part of quality assurance. If right now you are accessing this survey on an iPad, tablet or mobile phone, please complete this survey when you have access to a desktop or laptop computer.

Information statement

You are invited to participate in an online study. This study seeks to understand your response to an advertisement and general food knowledge and consumption behaviour.

About the researchers

The study is being conducted by Joseph Pitt (joe.pitt@mq.edu.au) and is being conducted to meet the requirements of the Doctor of Philosophy degree in marketing under the supervision of Associate Professor Lawrence Ang (lawrence.ang@mq.edu.au or 02 9850 9135) and Associate Professor Hume Winzar (hume.winzar@mq.edu.au or 02 9850 6468) of the Department of Marketing and Management.

About this survey and privacy

This survey takes approximately 20 - 25 minutes to complete. Your participation is anonymous and entirely voluntary. Information on whether you choose to respond or not respond to this survey will be kept confidential. Only Joe has access to information on who responds. This information will NOT be made available to any teachers of the units being surveyed (if you are a Macquarie University student).

Only Joseph Pitt, Associate Professor Lawrence Ang and Associate Professor Hume Winzar will have access to the raw data. A summary of the results of the analysis can be made available to you on request by contacting Joe.

Ethics clearance

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

You can choose to print this Information Statement by clicking the "Print" button below.

By clicking the "Agree" button below, you are confirming that you have read and understand the information above and agree to participate in this research. Then, click the "Next >>" button below to start the survey.

☒ Agree

[Hunger]

How hungry are you feeling right now?

Indicate your answer by clicking a button. If your answer is "Not at all", then just click the "0" button.

Not at all
hungry
0



Slightly
hungry
1



Moderately
hungry
2



Very
hungry
3



Extremely
hungry
4



[Instructions]

Next, we will show you an advertisement for...

- A new fresh ready-made food product (not frozen) to be sold in selected retail stores

Your viewing goal is to...

- See if the product is desirable to eat or not

View it...

- As you would normally do when reading a magazine
- As long as you wish at your own pace

[Ad exposure]



[Free thought listing]

What thoughts, feelings or imageries came to mind while viewing the ad?

[Purchase intention]

What are the chances that you will buy Kathy's Gourmet Brand of beef burger when it becomes available?

Indicate your answer by clicking a button. If your answer is "No chance to slight possibility", then just click the "0 - 20%" button.

No chance to
slight possibility

0 - 20%



Some to
fair possibility

21- 40%



Fairly good to
good possibility

41 - 60%



Probable to
very probable

61 - 80%



Almost sure to
certain

81 - 100%



[Brand attitude]

How good or bad do you think Kathy's Gourmet Brand of beef burger is?

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very bad	Bad	Neither good nor bad	Good	Very good
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Ad attitude]

How much do you like or dislike the ad?

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Dislike very much	Dislike	Neither like nor dislike	Like	Like very much
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Multi-modal food story immersion, MFSI]



[Visual immersion, VI]

While viewing the ad, did you experience the following?

	Yes	No
I felt as if I was transported into the picture	<input type="radio"/>	<input type="radio"/>
I felt as if the food was physically here	<input type="radio"/>	<input type="radio"/>
I felt as if I was invited into the picture	<input type="radio"/>	<input type="radio"/>

How intensely did you experience the following?

	Weakly 1	Moderately 2	Strongly 3	Extremely strongly 4
» I felt as if I was transported into the picture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I felt as if the food was physically here	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I felt as if I was invited into the picture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[In-the-mouth sensory immersion, ISI]

While viewing the ad, did you experience the following?

	Yes	No
I sensed the food in my mouth	<input type="radio"/>	<input type="radio"/>
I imagined the tastes/flavours of the food	<input type="radio"/>	<input type="radio"/>
I could feel the texture of the food in my mouth	<input type="radio"/>	<input type="radio"/>

How intensely did you experience the following?

	Weakly 1	Moderately 2	Strongly 3	Extremely strongly 4
» I sensed the food in my mouth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I imagined the tastes/flavours of the food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I could feel the texture of the food in my mouth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Social immersion, SI]

While viewing the ad, did you experience the following?

	Yes	No
I thought about sharing the food with other people	<input type="radio"/>	<input type="radio"/>
I pictured other people I could eat the food with	<input type="radio"/>	<input type="radio"/>
The picture brought stories about other people to my mind	<input type="radio"/>	<input type="radio"/>

How intensely did you experience the following?

	Weakly 1	Moderately 2	Strongly 3	Extremely strongly 4
» I thought about sharing the food with other people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» I pictured other people I could eat the food with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
» The picture brought stories about other people to my mind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Emotional positivity: Positive emotion]

How happy would you feel if you were to eat the food?

Indicate your answer by clicking a button. If your answer is "Not at all", then just click the "0" button.

Not at all happy	Slightly happy	Moderately happy	Very happy	Extremely happy
0	1	2	3	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

.....

[Emotional positivity: Negative emotion]

How guilty would you feel if you were to eat the food?

Indicate your answer by clicking a button. If your answer is "Not at all", then just click the "0" button.

Not at all guilty	Slightly guilty	Moderately guilty	Very guilty	Extremely guilty
0	1	2	3	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

.....



[Brand belief – healthiness]

After viewing the ad, I believe Kathy's Gourmet beef burger is....

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very unhealthy	Unhealthy	Neither healthy nor unhealthy	Healthy	Very healthy
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

.....

[Brand belief – palatability]

After viewing the ad, I believe Kathy's Gourmet beef burger is....

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very unpalatable	Unpalatable	Neither palatable nor unpalatable	Palatable	Very palatable
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Social proof - popularity]

After viewing the ad, how popular or unpopular do you think the beef burger is?

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very unpopular	Unpopular	Neither popular nor unpopular	Popular	Very popular
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Background/source attractiveness]

Ignoring the food, text and logo, how attractive or unattractive is the background of this picture?

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very unattractive	Unattractive	Neither attractive nor unattractive	Attractive	Very attractive
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Invitingness of consumption scene]

Ignoring the food, text and logo, how inviting or uninviting is the background of this picture?

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very uninviting	Uninviting	Neither inviting nor uninviting	Inviting	Very inviting
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Clarity of the main food product depiction]

The main food picture shown in the foreground is.....

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very unclear	Unclear	Neither clear nor unclear	Clear	Very clear
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Sociableness of depicted food experience]

The picture seems to convey a food experience that is.....

Indicate your answer by clicking a button. If your answer is "Neither", then just click the "0" button.

Very unsociable	Unsociable	Neither social nor unsociable	Sociable	Very sociable
-2	-1	0	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Personal importance of social food experience]

How important are each of the following when you buy food products?

Indicate your answer by clicking a button. If your answer is "Not at all", then just click the "0" button.

	Not at all important	Not very important	Fairly important	Very important	Extremely important
	0	1	2	3	4
Ability to enjoy the food with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Gender]

What is your gender?

- ☐ Male
- ☐ Female
-

[Age]

What year were you born in?

Please select below... ▼

[Debrief and submission]

The specific aim of this study is to:

- Investigate the impact of visual cues in food pictures/ads on mental processing

Would you like to make further comments about this survey?

If so, please comment below. Otherwise, thank you very much for your participation. We appreciate your help.

Please click "Next>>" to submit your response.

This question will record the recipient's browser information. It will not be displayed to the user.

Browser Type
Browser Version
Operating System
Screen Resolution
Flash Version
Java Support
User Agent

End of Survey

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CHAPTER 5

Conclusion

Photographic depiction of food product is a critical creative element for food advertising and marketing (e.g., photographic food ads). Without doubt, purchase intention is one of many desired outcomes advertising and marketing managers want from consumers after ad exposure, particularly for new products or new market segments. Understanding how photographic depiction of food product influences purchase intention is therefore in the core interest of both academic scholars and practitioners. This research is of interest to academia because as the marketing field advances, specialized fields such as visual food advertising and marketing emerge. Despite the niche, this research is of interest to scholars in different areas including visual, advertising, marketing, communications, consumer psychology, food and gender differences. This research is of interest to practitioners because knowledge about photographic depiction of food product and its persuasion helps managers make better informed decisions on visual depiction and segmentation strategies.

Over the past 20 years, the advertising and marketing literature has provided some knowledge and evidence on the role of photographic depiction of food product in influencing consumer responses. However, no one has ever attempted to provide a systematic review on the topic and advance this research area by integrating different theoretical constructs. Integration is important to advancing marketing knowledge for the following reasons. First, integration connects existing fragmented evidence and overlapped theoretical perspectives together. Second, integration identifies important gaps leading to a development of research priorities. Third, integration generates a novel way of conceptualizing constructs that combines relevant theoretical perspectives together in a simplified or higher-order perspective. Integration is challenging because it involves a critical conceptual contribution, not just numerical analyses. Sadly, conceptual contributions to the marketing literature have declined (Yadav, 2010). Conceptual advancement accompanied by empirical evidence is therefore highly valued (MacInnis, 2011). This thesis hopes to contribute in this regard.

In Chapter 2 (Paper 1), a systematic literature review (Study 1) shows that the concepts of mental imagery evoked by photographic food ads overlap and could be integrated. The existing constructs focus heavily on measuring the extent to which consumers have visual images of themselves eating the depicted food in mind. A follow-on interview study with expert food stylists and photographers (Study 2) shows that the practitioners want to evoke more specific mental states in viewers. They want viewers to immerse visually, in-the-mouth sensorially and socially into photographic food ads. Accordingly, we propose a new construct called multi-modal food story immersion (MFSI). MFSI integrates previous theoretical perspectives about self-referencing (Debevec & Romeo, 1992; Paivio, 1969; Shavitt & Brock, 1986), visual imagery (Homer & Gauntt, 1992; MacInnis & Price, 1987; Rossiter & Percy, 1980) mental simulation (Elder & Krishna, 2012; Taylor, Pham, Rivkin, & Armor, 1998) and consumption visions (Phillips, 1996) together.

In Chapter 3 (Paper 2), an in-depth consumer interview study (Study 3) shows that the MFSI phenomenon exists. Results from a follow-on experimental online survey (Study 4) shows that the MFSI measurement is reliable and valid. More importantly, the results give support to our thesis: exposure to food products depicted in explicit consumption sharing scenes leads to → increased MFSI; as MFSI increases → purchase intention also increases; and photographic depiction types have a significant indirect-only effect (Zhao, Lynch, & Chen, 2010) on purchase intention via MFSI (i.e. Photographic depiction types → MFSI → purchase intention).

In Chapter 4 (Paper 3), another experimental online survey (Study 5) provides additional support for our MFSI measurement quality and our thesis replicating the results of Study 4. In addition, results from Study 5 also reveal that women immerse more to photographic food ads than men, partly because they place greater importance on social food experience making them immerse more socially into ads when the ads portray products with consumption sharing scenes.

This thesis contributes to the visual food advertising and marketing literature in the following respects:

Conceptually, this thesis urges advertising and marketing researchers to rethink the existing mental imagery mechanism. Instead of literally looking at the phenomenon as imagery, scholars can view the phenomenon as immersion. It is evident that exposure to

photographic food ads can make consumers immerse visually, in-the mouth sensorially and socially into ads. Therefore, the measures should reflect the multi-modal and immersive nature of the phenomenon. This is a significant conceptual contribution because previous research in this area has never conceptualized the phenomenon that truly reflects how consumers react to photographic food ads.

Methodologically, this thesis shows that immersions into photographic food ads can be easily measured using consumer verbatim reports. It is evident from the interviews that consumers can explicitly talk about their visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) experiences. Additionally, this thesis shows how VI, ISI and SI can be operationalized from a higher-order perspective as multi-modal food story immersion (MFSI). MFSI is a weighted sum of VI, ISI and SI (based on a structural equation modelling algorithm)—a higher-order reflective-formative latent construct¹ (Chin & Gopal, 1995; Diamantopoulos, Riefler, & Roth, 2008; Hair, Hult, Ringle, & Sarstedt, 2014; Jarvis, Mackenzie, Podsakoff, Mick, & Bearden, 2003). By conceptualizing the phenomenon this way, it makes MFSI conceptually and operationally stronger. The strength of MFSI → purchase intention is evident from moderation analyses showing that the path is really independent. This is a significant methodological contribution because previous research in this area has never considered the phenomenon from a bird's eye view. Hence, this thesis advances the measurement model for this research area.

Theoretically, this thesis clearly shows that MFSI is a significant persuasion mechanism of photographic depiction of food product. Exposure to food product depicted with consumption sharing scenes does not influence purchase intention per se. It is what consumers do mentally that acts as a mechanism, thereby subsequently inducing their purchase intention. Our MFSI theory also sheds more light into the role of gender differences in photographic persuasion of food products. The results suggest that women are more easily influenced. This is partly because women place greater importance on social food experience than men making women more receptive to food products depicted with consumption scenes. Additionally, this thesis also illustrates that MFSI connects to and yet departs from the traditional advertising-affect transfer theory (Mitchell & Olson, 1981; Shimp, 1981). The paths related to MFSI remain significant even if it is modeled in

¹ Readers who are not familiar with the concepts of: latent constructs; lower-order vs. higher-order latent constructs; reflective vs. formative constructs; different criteria used to evaluate the reliability and validity of reflective vs. formative constructs; latent variable score estimation process based on partial least squares structural equation modelling algorithm; and benefits of modelling constructs from a higher-order perspective, can find detailed explanation in Thesis appendix A.

parallel with the traditional affect-transfer path (i.e. Photographic depiction types → ad attitude → brand attitude → purchase intention). The results suggest that purchase intention can be induced through several routes at once. This is a significant contribution because previous research in this area has never conceptualized nor analysed these paths simultaneously using structural equation modeling approach.

This thesis also provides several implications for advertising and marketing practice. Advertising and marketing practitioners need to realize the multi-modal nature of consumer mental experiences. Food photographs are not simply a physical depiction of food. Consumers do not simply evaluate whether the pictures overall look beautiful or whether the depicted food products look delicious or not. Consumers immerse into photographs visually, in-the-mouth sensorially and socially. The concept of immersion through multiple modalities is derived from interviews with expert practitioners (i.e., Study 2 in Paper 1, Chapter 2). However, some practitioners (even highly experienced ones) may not realize the simultaneity of the multi-modal immersions. The juxtaposition of practitioner and consumer responses to a food photograph in Figure 1 is an exemplification of such unrealisation.



“I don’t see the reason of them being there like *the blurred pizza, knife and fork and stacks of wooden boards*. I find that the top part is really *distracting*.” (Photographer, 30 years of experience)

“It looks *editorial rather than advertising*. I think in advertising it wouldn’t have *all the stuff in the background*. It will be just one pizza there in front. (Food stylist, 35 years of experience)

“I *feel like we are at the table* and *we are there* to eat. There is a bit of this pizza and a *bit of that* (other pizza). It is *what I see in real life*. I *feel like I am in a real situation* [...] I *imagine this is a longish table* with a lot of things and a *number of people* sitting around... *sharing*.” (Male consumer, 47 years old)

“There is *nothing I don’t like about this picture* [...] I think the background adds more of a context that I *feel like I am being there in the sun* and there are lots of pizza and having some beers or some wine [...] If you take the background away, it would just feel like it is just me [...]” (Female consumer, 34 years old)

Figure 1

Contrasting reactions to a food photograph between expert practitioners and consumers

Also, advertising and marketing practitioners need to understand the role of multi-modal food story immersion (MFSI) in persuading consumers to want to buy a food product. Adding consumption sharing scenes makes consumers overall immerse more into photographic food ads, thereby inducing their purchase intention. This thesis provides convincing evidence for this theory from our consumer interview study and two experimental online studies. Practitioners tend to focus heavily on the food product and evoking just in-the-mouth sensory experiences (Attea, 2008; Custer, 2010). Poor, Duhachek and Krishnan's (2013) content analysis study results show that food only depictions appear more in magazine food ads. This thesis reminds advertising and marketing practitioners not to underestimate visual and social immersions. Commensality or eating with others at the same table reflects human consumption experience. Thus, it is not surprising to see consumers immerse into photographic food ads just like how they interact with the world. The MFSI measure is a means to help practitioners choose the most compelling food photograph. The key is to have a clear idea what response is intended. If the desired outcome is purchase intention then multi-modal food story immersion is a significant persuasion route. However, this has to be clearly communicated to food stylists and photographers. Consider the following remarks made by some food image making experts about advertising agency practitioners and food product company practitioners (i.e. clients). From these remarks, one can see how this thesis has made a significant practical contribution:

"A lot of my clients [...] have marketing degree or communications degree but they have no backgrounds in visual communication. The art director cares about these visual messages that the photographs convey but the clients may not necessarily care so much about such details. They are happy with the pizza that has all the ingredients in the background as a standard and if we would like to suggest something new then they want us to do both which we don't necessarily have time to do it both ways." (Food stylist, 15 years of experience)

"I think some clients do not understand the process of food photography and communicating what they want [...] For example, I had clients who came in [to a photo shoot] and only cared about the amount of sesame seeds on the [hamburger] bun or whether the left side or the right side were equally balanced. These are what they think they should be concerned about. I think there should be a better education between clients and creatives that we can both be working together for common and better results." (Food photographer, 30 years of experience).

This thesis provides several contributions to the visual food advertising and marketing literature. However, some key limitations exist. This research focuses on purchase intention as an outcome of MFSI. Future research could extend this research by investigating the

relationship of MFSI with ad attitude, brand attitude and actual behaviors (e.g., actual purchase and consumption amount). Such studies will provide more fruitful insights into this interesting consumer mental phenomenon. This research only explains that women immerse socially more into ads than men because women place greater importance on social food experience. However, this research does not explain why women immerse more than men in other modalities. Future research should investigate if there is a significant effect of gender on visual and in-the-mouth sensory immersions and if so why. This research also uses only a fictitious brand. Therefore, its implications are legitimate only for new brands. This research only focuses on print photographs. Future research could extend this thesis in other formats (e.g., TV ads, interactive ads, packages). Despite the limitations, this thesis has achieved its goal of integrating theoretical strands and as a result has opened up new avenues of research in this area.

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Thesis appendix A

Immersion constructs:

Theoretical and technical explanations

This appendix provides theoretical and technical explanations on: the lower-order reflective latent immersion constructs, which are visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI); and the higher-order formative latent immersion construct, which is multi-modal food story immersion (MFSI). First, this appendix gives definitions of the constructs and scaling information. Second, this appendix describes the nature of immersions in photographic food advertising. Third, this appendix shows the measurement and structural relationships between these constructs from a partial least squares structural equation modelling (PLS-SEM) perspective. Fourth, this appendix illustrates the latent variable score estimation process based on PLS-SEM algorithm automated in the SmartPLS-SEM computer software. Fifth, this appendix describes the different reliability and validity criteria used to evaluate these immersion constructs and explains why reflective constructs require different criteria for evaluating the reliability and validity from formative constructs. Last, this appendix provides justifications why it is theoretically and empirically better to view the consumer phenomenon from a higher-order perspective (i.e. as MFSI).

Construct definitions and scaling information of immersion constructs

This thesis posits that when consumers are exposed to food images, they experience three sub-phenomena. First, they experience *visual immersion (VI)*. VI is defined as a subjective mental experience when viewers feel as if they are part of the depicted visual stories. Second, they experience *in-the-mouth sensory immersion (ISI)*. ISI is defined as a subjective mental state when viewers imagine or sense the flavors and textures of the depicted food product in their mouth. Third, they experience *social immersion (SI)*. SI is defined as a psychological state when consumers imagine sharing the food experience with other people in their mind.

Visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) are each measured using three different indicators, as shown in Table 1 below.

Table 1
Indicators of immersion constructs

Construct/indicator	Example of scaling and input data			
Visual immersion (VI)	Binary	Magnitude	Merged	Converted
I felt as if I was transported into the picture (VI01)	0	-	0	1
I felt as if the food was physically here (VI02)	1	2	2	3
I felt as if I was invited into the picture (VI03)	1	3	3	4
In-the-mouth sensory immersion (ISI)				
I sensed the food in my mouth (ISI01)	1	4	4	5
I imagined the tastes/flavours of the food (ISI02)	1	4	4	5
I could feel the texture of the food in my mouth (ISI03)	0	-	0	1
Social immersion (SI)				
I thought about sharing the food with other people (SI01)	1	3	3	4
I pictured other people I could eat the food with (SI02)	1	3	3	4
The picture brought stories about other people to my mind (SI03)	1	1	1	2

Visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) are first measured on binary scales. Consumers are first asked to indicate whether they experience each of the nine immersion indicators (i.e. “While viewing the ad, did you experience the following?” anchored by “Yes” and “No.”). Consumers, who report that they experience any of the nine immersion indicators, are further asked to rate the magnitude of such experiences (i.e. “How intensely did you experience the following?”)

on 4-point unipolar scales anchored by “Weakly (1),” “Moderately (2),” “Strongly (3),” and “Extremely strongly (4).” The binary and magnitude scales are multiplied to merge the scales. Indicators with zero scores are also included (i.e. indicating that consumers did “Not at all” have such immersion experiences). The merged 0-4 scale is then converted to a 1-5 scale to make it consistent with the other 0-4 scales in this thesis (i.e. happy and guilt, which has to be converted before computing emotional positivity scores). An example of the scaling construction is also illustrated in Table 1.

This thesis also proposes that visual immersion (VI), in-the-mouth immersion (ISI) and social immersion (SI) can be viewed from a higher-order perspective as multi-modal food story immersion (MFSI). MFSI is defined as a *total immersion*, a psychological state when consumers become engrossed in the world of food stories visually, in-the-mouth sensorially and socially. This definition suggests that some consumers do not view food images purely as physical objects (i.e. photographs) or representations (i.e. food products). They view food images as experiences or stories that allow them to immerse across multiple modalities.

The nature of immersions in photographic food advertising

Multi-modal food story immersion (MFSI), as a consumer mental phenomenon, in photographic food advertising exists. However, its intensity on average is rather weak to moderate. This is not surprising because in the context of still image advertising a very strong or extreme immersive experience is less likely to occur.

Based on the first quantitative experimental online survey described in Chapter 3 (see pages 74-78 for research design and method), the scores of the indicators were combined and averaged by the number of indicators to investigate the frequency distributions of visual immersion (VI), in-the-mouth sensory immersion (ISI), social immersion (SI), and multi-modal food story immersion (MFSI). Table 2 shows the descriptive statistics of VI, ISI, SI and MFSI.

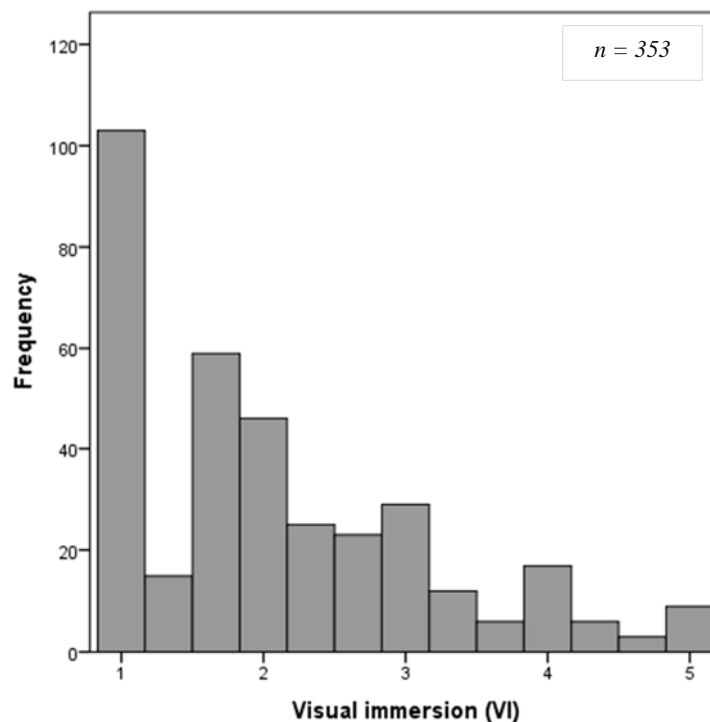
Table 2

Descriptive statistics of averaged immersion constructs

Construct	Mean	Std. error of mean	Std. Deviation	Range
Visual immersion (VI)	2.082	.056	1.061	1-5
In-the-mouth sensory immersion (ISI)	2.326	.060	1.144	1-5
Social immersion (SI)	2.132	.063	1.194	1-5
Multi-modal sensory immersion (MFSI)	2.180	.045	.860	1-5

n = 353

Figures 1 to 4 show the histograms or frequency distributions of VI, ISI, SI and MFSI. The histograms provide evidence showing that multi-modal food story immersion (MFSI) exists in photographic food advertising. Only 6 per cent of the participants reported that they did not at all experience MFSI (see the frequency of the value 1 in Figure 4). The means of VI, ISI, SI and MFSI in Table 2 are a little low because they take those who do not at all experience any immersions into account. Considering only those who experience MFSI to some extent (i.e. excluding the value of 1), then the means range between 2 and 3. This indicates the intensity of VI, ISI, and SI and accordingly MFSI on average is weak to moderate, as expected in this research context (see also the results of qualitative interview study with consumers discussed in Chapter 3, pages 66-74).

**Figure 1**

Frequency distribution of visual immersion (VI)

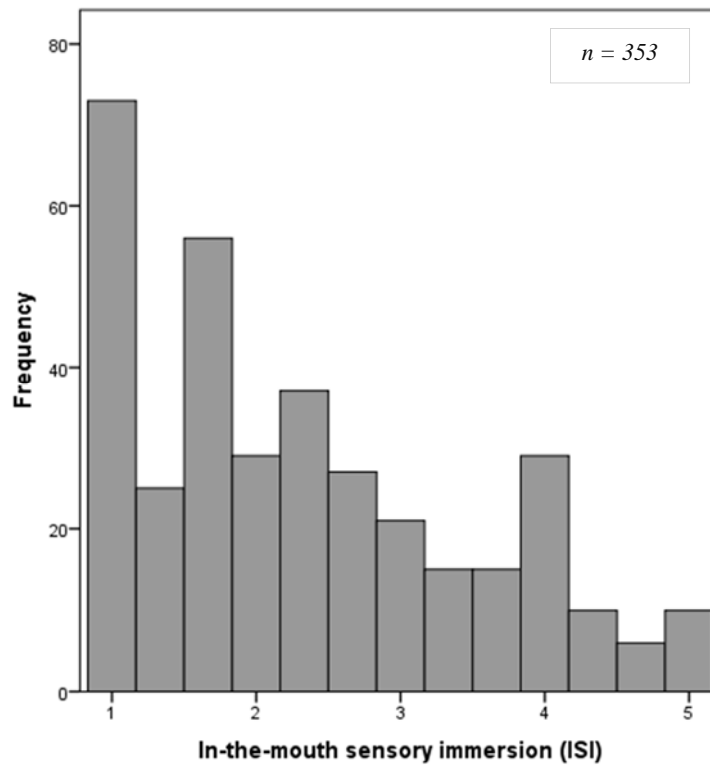


Figure 2
Frequency distribution of in-the-mouth sensory immersion (ISI)

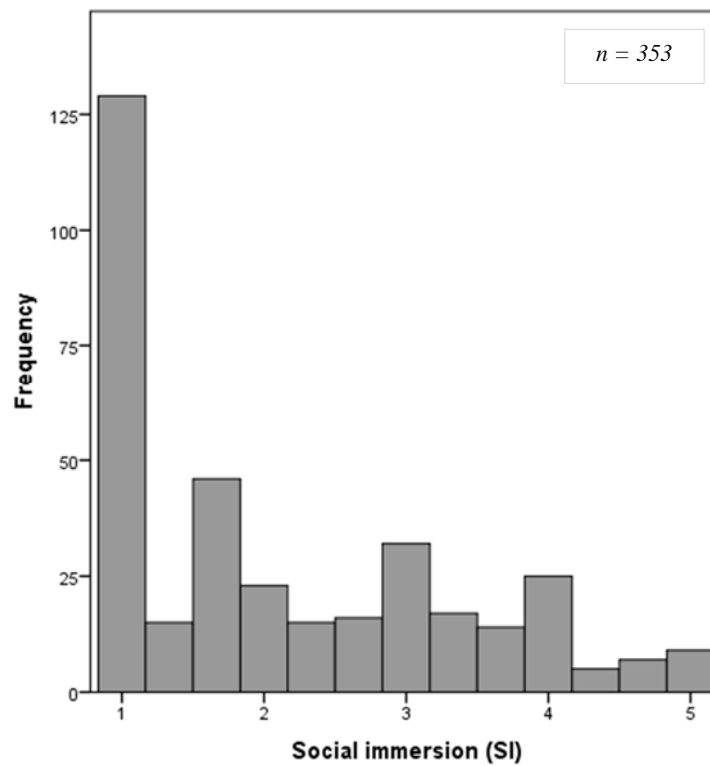


Figure 3
Frequency distribution of social immersion (SI)

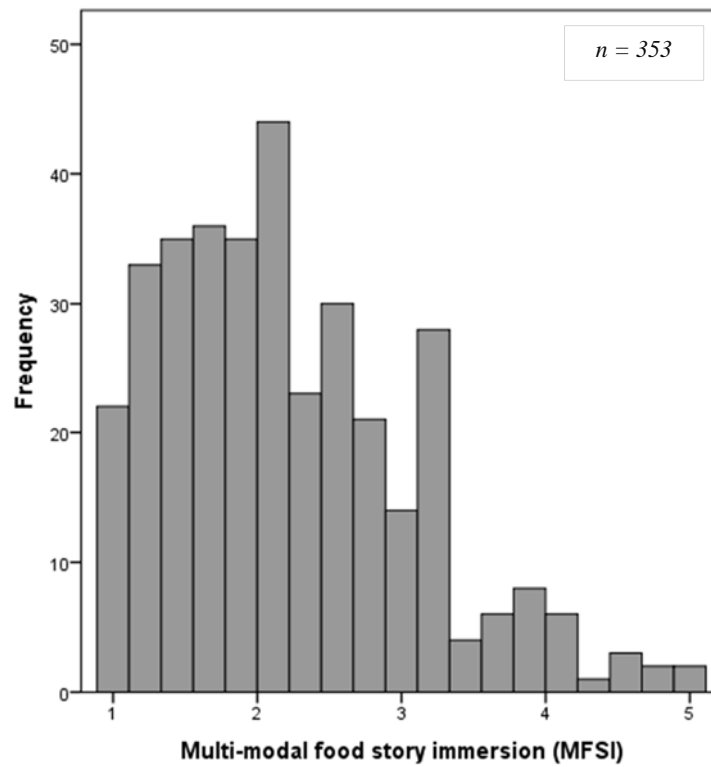


Figure 4
Frequency distribution of multi-modal food story immersion (MFSI)

Also, descriptive statistics derived from the second quantitative experimental online survey discussed in Chapter 4 (see pages 130-133 for research design and method) show the consistent nature of visual immersion (VI), in-the-mouth immersion (ISI), social immersion (SI) and multi-modal food story immersion (MFSI). Table 3 shows the descriptive statistics of VI, ISI, SI and MFSI. Figures 5 to 8 show the frequency distributions of the immersion constructs.

Table 3
Descriptive statistics of averaged immersion constructs

Construct	Mean	Std. error of mean	Std. Deviation	Range
Visual immersion (VI)	1.823	.027	.929	1-5
In-the-mouth sensory immersion (ISI)	2.273	.031	1.086	1-5
Social immersion (SI)	1.927	.031	1.073	1-5
Multi-modal sensory immersion (MFSI)	2.008	.022	.787	1-5

n = 1176

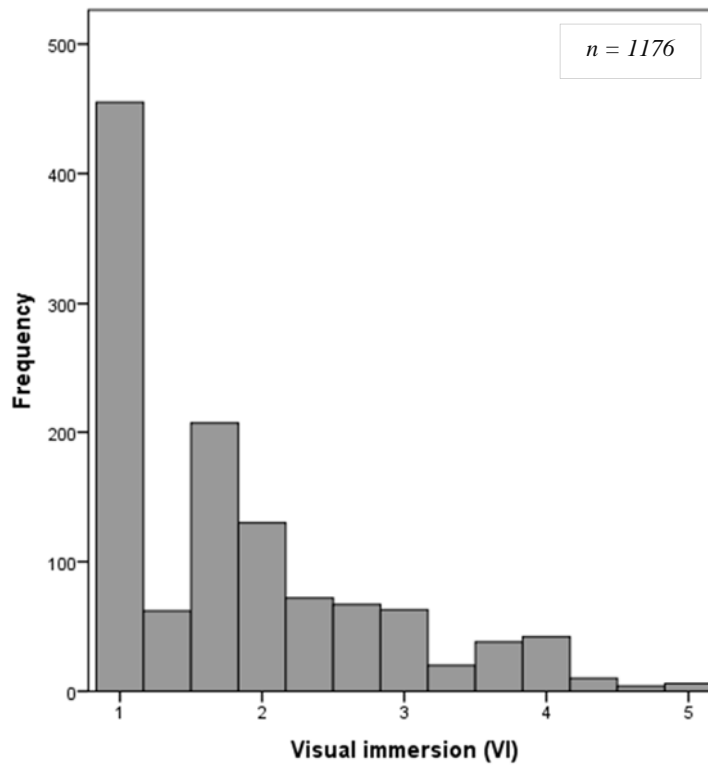


Figure 5
Frequency distribution of visual immersion (VI)

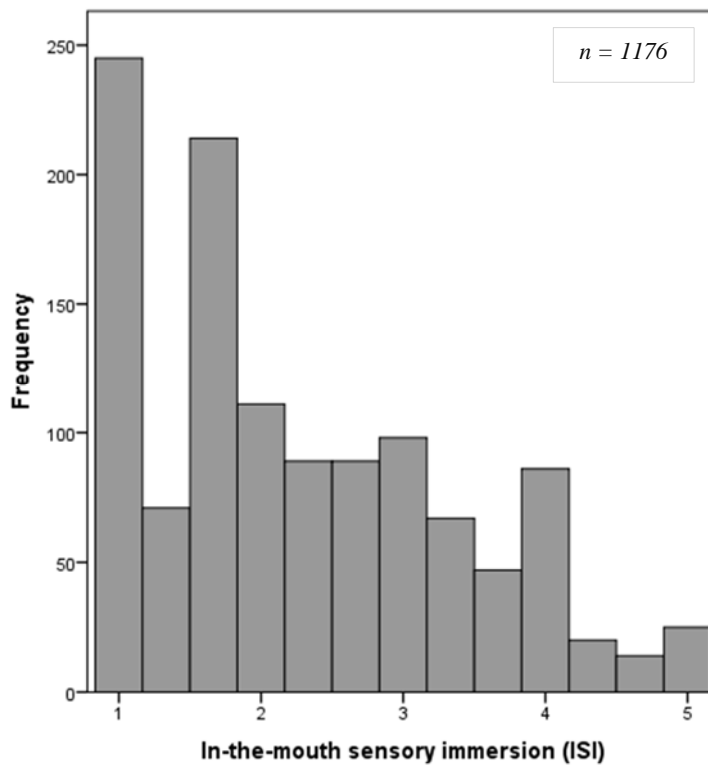


Figure 6
Frequency distribution of in-the-mouth sensory immersion (ISI)

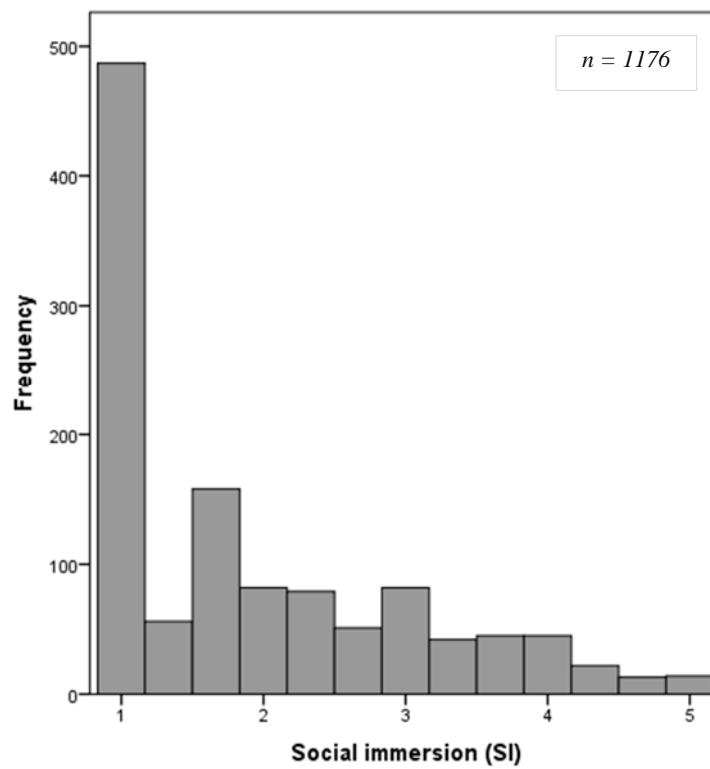


Figure 7
Frequency distribution of social immersion (SI)

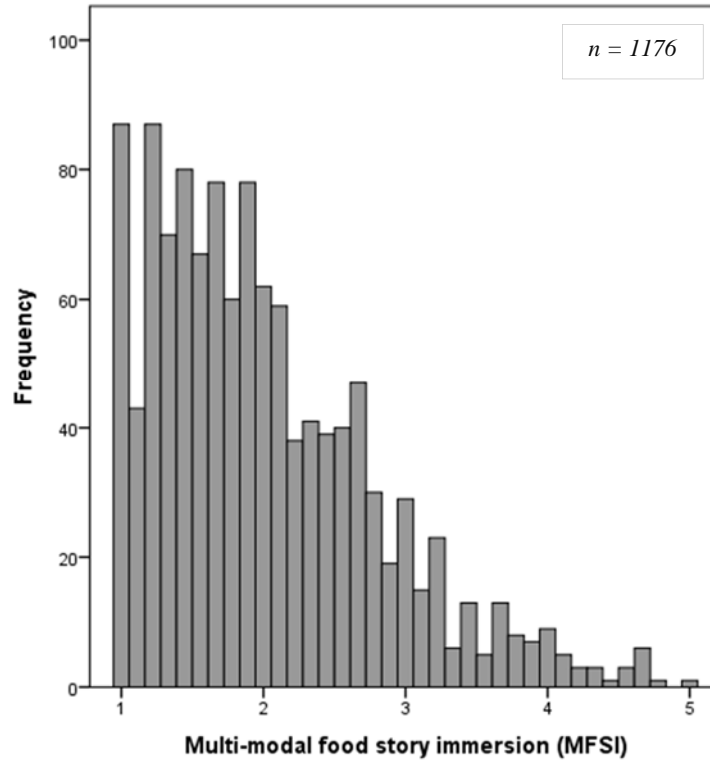
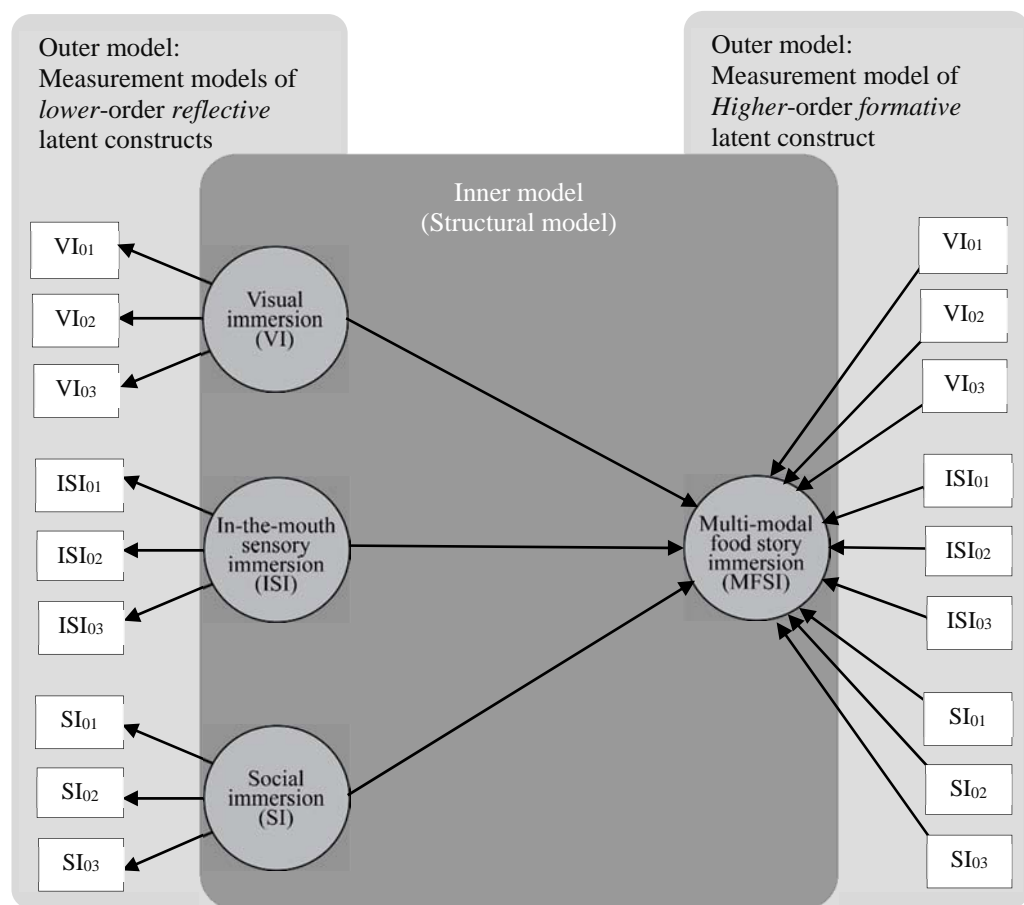


Figure 8
Frequency distribution of multi-modal food story immersion (MFSI)

Measurement and structural relationships of immersion constructs

This thesis uses a structural equation modelling approach to explain the relationships between visual immersion (VI), in-the-mouth sensory immersion (ISI), social immersion (SI) and multi-modal food story immersion (MFSI), as shown in Figure 9. From a partial least squares structural equation modelling perspective, Figure 9 particularly shows the *outer* models of VI, ISI, SI and MFSI (i.e. how VI, ISI, SI and MFSI are measured, see lighter shaded boxes). It also shows the *inner* model (i.e. how MFSI is formed, see darker shaded box). The terms “*outer*” and “*inner*” in PLS-SEM means measurement and structural models respectively.



Note: This thesis uses a “repeated indicator, mode b” approach (Becker, Klein, & Wetzels, 2012, p. 376) to model MFSI as a predictor of purchase intention (not illustrated above for a parsimonious reason).

Figure 9
Measurement and structural relationships of immersion constructs

Consider visual immersion (VI), in-the-mouth sensory immersion (ISI), social immersion (SI) first. Figure 9 shows that VI, ISI and SI are *lower-order* latent constructs and also that they are *reflective* constructs (i.e. arrows from VI, ISI and SI constructs pointing to their

observed indicators). The measurement models of VI, ISI and SI can be referred to as “principal *factor* (reflective)” models, which are very commonly used latent variable measurement models in the marketing literature (Jarvis, Mackenzie, & Podsakoff, 2003, pp. 200-201). This means covariation among the observed indicators is caused by, and subsequently reflects variation in the underlying latent factor. VI, ISI and SI (conceptually) influence the indicators, accounting for their inter-correlations. The three indicators underlying VI, ISI or SI are interchangeable because they are supposed to be highly correlated. Consider dropping one indicator each from VI, ISI and SI from Table 1. Doing so does not influence the meaning of the constructs because they are adequately represented by the remaining indicators (Bollen & Lennox, 1991).

Now consider multi-modal food story immersion (MFSI). Figure 9 shows that MFSI is a *higher-order* latent construct and it is also a *formative* construct (i.e. arrows from indicators and from visual immersion (VI), in-the-mouth sensory immersion (ISI), social immersion (SI) lower-order constructs pointing to MFSI). The measurement model of MFSI is *not* a global factor (i.e. reflective) but a “*composite* (formative)” model (Jarvis et al., 2003, pp. 201-202). As MFSI is formed by VI, ISI and SI (lower-order reflective constructs), it is specifically referred to as a “reflective-formative hierarchical component model” (Hair, Hult, Ringle, & Sarstedt, 2014, p. 233), “higher-order molar construct” (Chin, 2010, p. 665; Chin & Gopal, 1995), or “reflective first-order formative second-order” multidimensional composite construct (Diamantopoulos, Riefler, & Roth, 2008, p. 1207; Jarvis et al., 2003, p. 205) in the structural equation modelling context. This simply means MFSI is a composite higher-order latent variable defined as a function of VI, ISI and SI or lower-order reflective constructs. Consider dropping VI, ISI or SI from the model. Doing so influences the meaning of MFSI because VI, ISI and SI *determine* the conceptual and empirical definition of MFSI as a total immersion. VI, ISI and SI do not need to be perfectly correlated. However, altogether they form the concept of immersions across modalities.

Latent variable score estimation process based on PLS-SEM algorithm

In this thesis, multi-modal food story immersion (MFSI) is *not* simply a sum of all indicators (i.e. VI: (1+3+4) + ISI: (5+5+1) + SI: (4+4+2) = 29/45 from the example provided in Table 1). MFSI is also *not* a sum of VI, ISI and SI averaged by the number of indicators in each dimension (i.e. VI: [(1+3+4)/3] + ISI: [(5+5+1)/3] + SI: [(4+4+2)/3] = 9.67/15). And MFSI is *not* a sum of VI, ISI and SI weighted by the number of indicators experienced in each dimension (i.e. VI: [(1+3+4)*2/3] + ISI: [(5+5+1)*2/3] + SI:

$[(4+4+2)*3/3] = 22.67/45$) either. Doing so would assume that each indicator has equal “absolute contribution” (i.e. factor loadings) to its corresponding lower-order latent construct (i.e. VI, ISI or SI). Such approach also assumes that VI, ISI and SI each has equal “relative contribution” (i.e. regression weights) to MFSI.

Instead, VI, ISI, SI and MFSI latent scores in this thesis *are* the result of partial least squares structural equation modelling (PLS-SEM). MFSI—is—a weighted sum of VI, ISI and SI based on PLS-SEM algorithm, taking factor loadings and regression weights of all measurement and structural paths (i.e. the entire nomological network, as shown in Figure 9) into account.¹

PLS-SEM algorithm

The basic partial least squares algorithm was originally developed by Wold (1975), known then as non-linear iterative partial least squares (NIPALS). Wold’s (1975) work was later extended by Lohmöller (1989). The algorithm follows a two-stage approach (Henseler, Ringle, & Sarstedt, 2012):

Stage 1 is a process of *iterative estimation* of the latent variable scores, consisting of four steps:

- 1.1) outer approximation of the latent variable scores (by initially giving outer weights as 1),
- 1.2) estimation of the inner weights,
- 1.3) inner approximation of the latent variable scores, and
- 1.4) estimation of the outer weights. These steps loop until the differences between the previous outer weight and the newly estimated outer weight are extremely small (i.e. until convergence). The terms “outer” and “inner” refer to the measurement and structural models illustrated in Figure 9.

Stage 2 is a process of *final estimation* of factor loadings (i.e. outer loadings for reflective latent constructs) and regression weights (i.e. outer weights for

¹ For ease of explanation, note that in Tables 2 and 3 and Figures 1 to 8 (pages 206-210) we had to use multi-modal food story immersion (MFSI) as a simple sum of visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) averaged by the number of indicators in each dimension to discuss the nature of immersions earlier. That was because once the scores are standardized by the partial least squares structural equation modelling (PLS-SEM) algorithm, it becomes difficult to interpret the standardized unit of measurement.

formative latent constructs) and path coefficients through (simple and multiple) ordinary least squares (OLS) regressions.

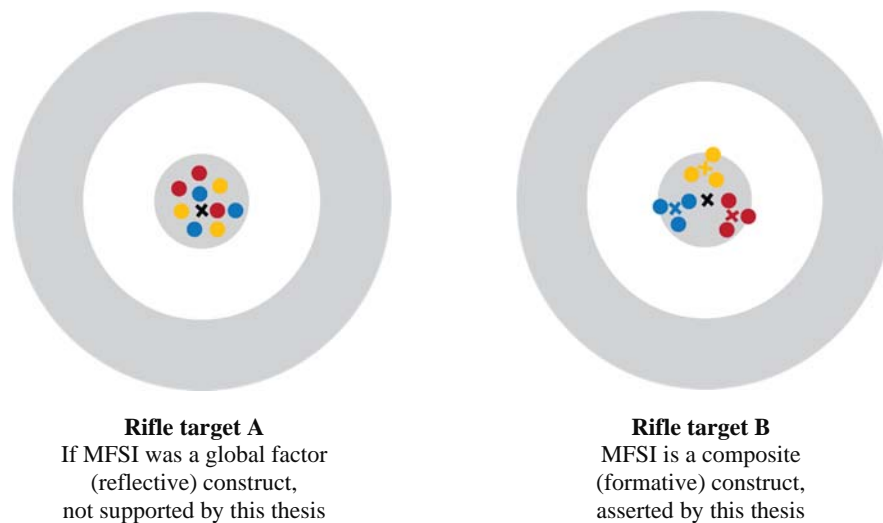
In the multi-modal food story immersion (MFSI) context, the algorithm starts from normalizing the input data (i.e. the original input data minus the means and divided by standard deviations, making the means equal to zero). Then, the algorithm estimates the latent variable scores of VI, ISI, SI and MFSI (see the lighter shaded boxes in Figure 9) by assigning initial weights (i.e. Stage 1.1, the sum of weights multiplied by the normalized input data). Then the estimated VI, ISI, SI and MFSI latent variable scores are standardized before estimating the inner weights (i.e. Stage 1.2, e.g., the covariance of VI \rightarrow MFSI, see the darker shaded box in Figure 1). Next, the algorithm approximates the latent variable scores of VI, ISI and SI, using the estimated inner weights (i.e. Stage 1.3, the estimated latent variable scores multiplied by the estimated inner weights). After that, the algorithm uses the approximated normalized latent variable scores to estimate the outer weights (i.e. Stage 1.4, e.g., the covariance of VI \rightarrow its normalized indicator input data). These estimated outer weights then replace the initial weights (i.e. in Stage 1.1) and so on. These four steps loop until convergence. Finally in Stage 2, factor loadings of VI, ISI and SI, regression weights of all observed indicators on MFSI, and path coefficients between constructs are computed. In short, MFSI latent variable scores are the weighted sum of VI, ISI and SI simultaneously calculated based on the partial least squares structural equation modelling (PLS-SEM) algorithm. MFSI latent variable scores are standardized with mean equal to zero. This approach gives a better estimation of latent variable scores because it takes the entire nomological network (as shown in Figure 9) into account (Becker et al., 2012).

Reliability and validity criteria for reflective vs. formative constructs

It is important to understand that the reliability and validity criteria used to evaluate the measurement quality of VI, ISI and SI vs. MFSI should be different. This is because VI, ISI and SI are reflective constructs. In contrast, MFSI is a formative construct. Figure 10 gives a rifle target analogy illustrating the difference between MFSI as a global (reflective) factor model (see Rifle target A) and MFSI as a higher-order reflective-formative model (see Rifle target B). Suppose 9 rounds are fired by a rifle onto a target. The yellow, blue and red circles represent visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) respectively. The number of the circles represent the number of indicators used to measure the constructs. The black cross represents the average value of

all indicators. The average values of VI, ISI and SI are indicated by the yellow, blue and red crosses in a respective order.

The rifle target A (see Figure 10) indicates that there is little variance between the circles (i.e. they are closely clustered). Specifically, the rifle target A indicates that all nine indicators of visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) are almost perfectly correlated. This means dropping some items from the 9 indicators would not change the meaning of MFSI because the remaining indicators still adequately reflect the concept of MFSI. In this case, the *reliability* criteria of the MFSI measurement model should be determined based on Cronbach's alphas (a traditional approach), composite reliability and factor loadings. The *validity* of such reflective measurement model should be evaluated by convergent validity using average variance extracted (AVE). All indicators would be interchangeable because of expected high internal consistency of the indicators. This thesis *does not* support the view of MFSI being a global reflective factor.



Note: ● Yellow, ● blue and ● red circles represent visual immersion (VI), in-the-mouth sensory immersion (ISI), social immersion (SI) respectively. The number of the circles represent the number of indicators used to measure the constructs. The ✕ black cross represents the average value of all indicators. The average values of VI, ISI and SI are indicated by the ✕ yellow, ✕ blue and ✕ red crosses in a respective order.

Figure 10

A rifle target analogy showing the difference between the reliability and validity of a global reflective measure (left) vs. higher-order reflective-formative measure (right)

The rifle target B (see Figure 10) indicates that there is little variance *within* the yellow, blue and red circles (i.e. the circles are clustered closely within their representative colours). In sharp contrast, when considering all circles together, there is a larger variance *between* the three colours. Specific to this thesis, the rifle target B indicates that the three indicators of visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) have high internal consistency (i.e. high internal consistency because they are clustered closely within their representative constructs). This means VI, ISI and SI are reflective constructs. The quality of measurement should be evaluated according to the reflective measure evaluation explained above. However, at the higher-order level MFSI is a formative construct, formed by reflective lower-order constructs (i.e. VI, ISI and SI). This thesis *does* support this view of MFSI being a higher-order formative construct.

Now consider the rifle target B in Figure 10 again. It is obvious that applying the same reliability and validity criteria for the reflective measurement model to MFSI is nonsensical. This is because of the large variance between the clusters of the yellow, blue and red circles (i.e. they are not exactly the same construct). Therefore, reliability in the sense of internal consistency is not appropriate to evaluate MFSI. Accordingly, it is more appropriate to evaluate formative constructs by content or face validity (i.e. theoretical and practical senses) and nomological validity or expected relationships with other theoretical constructs (Diamantopoulos et al., 2008; Hair, Sarstedt, Ringle, & Mena, 2012; Jarvis et al., 2003; Rossiter, 2011).

It is also important to empirically demonstrate that visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI) are discriminable (i.e. discriminant validity indicated by cross-loadings; Fornell & Larcker's (1981) comparison of the square root of the average variance extracted values with correlations between constructs, $\sqrt{AVE} > r$; and Henseler, Ringle & Sarstedt's (2015) heterotrait-monotrait ratio of correlations, HTMT). It is important to demonstrate that VI, ISI and SI are not highly correlated because if they are highly correlated it can create multicollinearity issues. Variance inflation factor (VIF) values are used to investigate whether VI, ISI and SI have strong linear relationships. VIF values below 5 indicate that there are no multicollinearity issues (Hair et al., 2012). It is important for formative measures to eliminate the multicollinearity issues because MFSI (as a formative construct) is defined by the path coefficients of $VI \rightarrow MFSI$, $ISI \rightarrow MFSI$ and $SI \rightarrow MFSI$ (as shown in Figure 9). The significance of these path coefficients is another criterion for evaluating MFSI as a formative construct.

A confirmatory factor analysis (CFA) of the first quantitative experimental online survey data described in Chapter 3 shows that visual immersion (VI), in-the-mouth sensory immersion (ISI) and social immersion (SI)—as lower-order reflective latent constructs—are reliable and valid (see pages 81-82 and pages 95-96 for the results). Multi-modal food story immersion (MFSI) —as a higher-order formative construct—is also reliable and valid (see pages 83-84 and pages 97-98 for the results). Forcing VI, ISI and SI to be perfectly correlated (i.e. making VI, ISI and SI to become one global reflective factor construct) significantly reduces the chi-square (X^2) value compared to when they are allowed to correlate freely (see notes on pages 95 and 97). This means if MFSI was modelled as a global reflective factor construct, it would be misspecified. The reliability and validity of VI, ISI, SI and MFSI—are also replicated—in the second quantitative experimental online survey described in Chapter 4 (see pages 139-142 and pages 164-166). Qualitatively, the concepts of VI, ISI, SI and MFSI are also grounded in the voices of food image making experts (see the results of qualitative interview study with food image making experts in Chapter 2, pages 34-36) and consumers (see the results of qualitative interview study with consumers in Chapter 3, pages 70-74).

Why conceptualizing and operationalizing multi-modal food story immersion (MFSI) at a higher-order level?

Multi-modal food story immersion (MFSI) is conceptualized and operationalized as a higher-order formative construct for the following reasons. First, the concept of MFSI as a total immersion makes more sense theoretically and practically. Imagine modelling VI, ISI and SI without having MFSI as a higher-order formative construct to predict purchase intention. Doing so assumes that the paths to purchase intention from VI, ISI and SI are independent. Such an assumption is inappropriate because it fails to acknowledge the fact that some consumers experience more than one dimension of immersions. MFSI as a total immersion is also conceptually stronger because it is a function of VI, ISI and SI combined. Second, MFSI subsequently is empirically a better predictor of purchase intention. For instance, compare the path coefficients between VI → purchase intention, ISI → purchase intention, SI → purchase intention of the first quantitative experimental online survey (see Chapter 3, page 82) and MFSI → purchase intention (see Chapter 3, pages 84 and 87). One can see that MFSI (obviously) explains more amount of variance in purchase intention. These results—are also replicated—in the second quantitative experimental online survey (see Chapter 4, pages 146 and 152). Third, using MFSI latent variable scores makes further theory building easier because it reduces the number of constructs in subsequent models.

Although the higher-order latent constructs may be still less common, they are considerably well established in the partial least squares structural equation modelling (PLS-SEM) context. Ringle, Sarstedt and Straub (2012) reviewed all empirical studies using PLS-SEM published in *MIS Quarterly* from 1992 to 2011. They reported that 109 structural equation model estimations deployed the PLS-SEM technique. Of this figure, 23 per cent of the models (i.e. 25 models) included higher-order latent constructs. Of these 25 models, 52 per cent (i.e. 13 models) had reflective-formative constructs. Hence, out of all types of higher-order latent constructs, the higher-order reflective-formative constructs are actually the most common. In the marketing and management literature, existing higher-order reflective-formative measurement models for example include: Brand equity model of the people brands in the art sector, defined by several lower-order constructs such as brand image, brand awareness and attachment (Baumgarth & Kolomoichenko, 2012); Business excellence index model, constituted by several factors such as leadership, strategic planning, customer and market focus and business results (Jayamaha, Grigg, & Mann, 2011); and Perceived interactivity of advertising model, defined by several facets such as reciprocity, responsiveness and speed of response, (Johnson, Bruner, & Kumar, 2006).

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Thesis appendix B

Ethics approvals for conducting research

Undertaking this thesis has involved human intervention, for which I received approvals from the Macquarie University Ethics Committee. Copies of the final approval letters are provided in this appendix. The approval reference numbers are: 5201100651, 5201100944 and 5201300473.



16 August 2011

Associate Professor Lawrence Ang
Faculty of Business and Economics
Macquarie University, NSW 2109

Reference: 5201100651(D)

Dear Associate Professor Lawrence Ang

FINAL APPROVAL

Title of project: *Eating with your eyes: a typology of visual cues in food pictures and responses from professional stylists and consumers.*

Thank you for your recent correspondence. Your response has addressed the issues raised by the Faculty of Business & Economics Human Research Ethics Sub Committee, and you may now commence your research. The following personnel are authorised to conduct this research:

Lawrence Ang - Chief Investigator/Supervisor
Joe Damrongphiwat - Co-Investigator

Please note the following standard requirements of approval:

1. The approval of this project is **conditional** upon your continuing compliance with the *National Statement on Ethical Conduct in Human Research (2007)*.
2. Approval will be for a period of five (5) years) subject to the provision of annual reports. **Your first progress report is due on 16 August 2012.**

If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report on the project.

Progress Reports and Final Reports are available at the following website:
http://www.research.mq.edu.au/researchers/ethics/human_ethics/forms

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).
4. Please notify the Committee of any amendment to the project.
5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that might affect continued ethical acceptability of the project.
6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at: <http://www.research.mq.edu.au/policy>

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide Macquarie University's Research Grants Officer with a copy of this letter as soon as possible. The Research Grants Officer will not inform external funding agencies that you have final approval for your project and funds will not be released until the Research Grants Officer has received a copy of this final approval letter.

Yours sincerely

Alan Kilgore
Chair, Faculty of Business and Economics Ethics Sub-Committee



14 December 2011

Associate Professor Lawrence Ang
Faculty of Business and Economics
Macquarie University, NSW 2109

Reference: 5201100944(D)

Dear Associate Professor Lawrence Ang

FINAL APPROVAL

Title of project: Eating with your eyes: Phase II pilot study and experiment.

Thank you for your recent correspondence. Your response has addressed the issues raised by the Faculty of Business & Economics Human Research Ethics Sub Committee, and you may now commence your research. The following personnel are authorised to conduct this research:

Lawrence Ang - Chief Investigator/Supervisor
Nitiphon Damrongphiwat - Co-Investigator

Please note the following standard requirements of approval:

1. The approval of this project is **conditional** upon your continuing compliance with the *National Statement on Ethical Conduct in Human Research (2007)*.
2. Approval will be for a period of five (5) years) subject to the provision of annual reports. **Your first progress report is due on 14 December 2012.**

If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report on the project.

Progress Reports and Final Reports are available at the following website:
http://www.research.mq.edu.au/researchers/ethics/human_ethics/forms

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).
4. Please notify the Committee of any amendment to the project.
5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that might affect continued ethical acceptability of the project.
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Yours sincerely

Alan Kilgore
Chair, Faculty of Business and Economics Ethics Sub-Committee

Approved - 5201300473

1 message

Mrs Yanru Ouyang <yanru.ouyang@mq.edu.au>

Wed, Jul 31, 2013 at 10:19 AM

To: Associate Professor Lawrence Ang <lawrence.ang@mq.edu.au>

Cc: Associate Professor Hume Winzar <hume.winzar@mq.edu.au>, Joe Damrongphiwat
<nitiphon.damrongphiwat@students.mq.edu.au>

Dear Associate Professor Ang,

Re: 'Eating with your eyes: Phase III - What is a foodie? The moderating role of passion and knowledge about food on the effect of visual persuasion.'

Reference No.: 5201300473

Thank you for your recent correspondence. Your response has addressed the issues raised by the Faculty of Business & Economics Human Research Ethics Sub Committee. Approval of the above application is granted, effective "31/07/2013". This email constitutes ethical approval only.

This research meets the requirements of the National Statement on Ethical Conduct in Human Research (2007). The National Statement is available at the following web site:

http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/e72.pdf.

The following personnel are authorised to conduct this research:

Associate Professor Hume Winzar
Associate Professor Lawrence Ang
Mr Joe Damrongphiwat

NB. STUDENTS: IT IS YOUR RESPONSIBILITY TO KEEP A COPY OF THIS APPROVAL EMAIL TO SUBMIT WITH YOUR THESIS.

Please note the following standard requirements of approval:

1. The approval of this project is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007).
2. Approval will be for a period of five (5) years subject to the provision of annual reports.

Progress Report 1 Due: 31st Jul. 2014
Progress Report 2 Due: 31st Jul. 2015
Progress Report 3 Due: 31st Jul. 2016
Progress Report 4 Due: 31st Jul. 2017
Final Report Due: 31st Jul. 2018

NB. If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report for the project.

Progress reports and Final Reports are available at the following website:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).

4. All amendments to the project must be reviewed and approved by the Committee before implementation. Please complete and submit a Request for Amendment Form available at the following website:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms

5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that affect the continued ethical acceptability of the project.

6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at the following websites:

<http://www.mq.edu.au/policy/>

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/policy

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide the Macquarie University's Research Grants Management Assistant with a copy of this email as soon as possible. Internal and External funding agencies will not be informed that you have approval for your project and funds will not be released until the Research Grants Management Assistant has received a copy of this email.

If you need to provide a hard copy letter of approval to an external organisation as evidence that you have approval, please do not hesitate to contact the FBE Ethics Committee Secretariat, via fbe-ethics@mq.edu.au or 9850 4826.

Please retain a copy of this email as this is your official notification of ethics approval.

Yours sincerely,

Parmod Chand
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Inside back cover

Multi-modal food story immersion:

A persuasion mechanism and theory of photographic depiction of food products in advertising and marketing



MACQUARIE
University
SYDNEY · AUSTRALIA

This thesis is presented in partial fulfilment
of the requirements for the degree of Doctor
of Philosophy in Marketing and Management

Faculty of Business and Economics,
Department of Marketing and
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Macquarie University,
Sydney, Australia

February 2015