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As I am now writing the last part of my dissertation and looking back at the three years that have passed, with their ups and downs, certain people come to mind that in some way have helped me in my endeavor.

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I would like to end this letter by giving a big thank you to the most important people in my life: my family and friends.

F. Alex

Aarhus, November 2016
Recent literature suggests that package design visuals such as shape, size, colors, and imagery can impact higher-level food inferences (e.g. Becker et al. 2011; Deng and Kahn 2009; Koo and Suk 2016; Poor, Duhachek, and Krishnan 2013; Schuldt 2013), while at the same time acting as cues for specific perceptual judgements that further impact food choice and consumption (e.g. Deng and Srinivasan 2013; Folkes and Matta 2004; Madzharov and Block 2010; Ordabayeva and Chandon; Sevilla and Kahn 2014).

Considering the recent interest in healthy eating (Euromonitor 2012; Nielsen 2015; Technavio 2015), and the role of package design in influencing both in-store and post-purchase food decisions (Chandon and Wansink 2012), it is important to acquire a more in-depth understanding of the role of package design in influencing health-related inferences and behaviors. In regards to health communication, most studies have thus far focused on the role of informational elements (Aschemann-Witzel, Maroscheck, and Hamm 2013; Kozup, Creyer, and Burton 2003; Roe, Levy, and Derby 1999; Van Kleef, van Trijp, and Luning 2005), and only sparse research has addressed the role of more implicit forms of package design (such as graphic and structural elements) in generating health-related inferences and influencing consumption behavior. Structural and graphic elements operate at a level outside of conscious awareness, affecting consumers’ perceptions more implicitly (Wansink and Chandon 2014). This becomes especially relevant in low-involvement contexts such as food shopping, where consumers spend a limited amount of time and cognitive resources to evaluate products and make a decision (Park, Iyer, and Smith 1989). When consumers are unmotivated or uninvolved, they are more prone to rely on unrelated cues (such as package design visuals) to make inferences about and evaluate the food products.

Considering the above, the undertaking in the present dissertation is to shed light on the role of package design visuals in regards to health communication and behaviors. In order to get a broader picture of the phenomenon, it takes on to explore both the marketing communication side – by trying to identify specific patterns of package design communication for health brands – but also looks into
how consumers actually respond to specific manipulation of package design visuals in regards to health-related inferences and behaviors. This research objective delineates two main and four secondary research questions that are addressed across three empirical articles:

RQ1: How is package design used to communicate health attributes to consumers?

A. What are the managerial discourses and practices in relation to package design? (Addressed in Article 1)

B. Is there any systematic use of package design elements for food health brands? (Addressed in Articles 1 and 3)

RQ2: How does package design influence health-related inferences and behaviors?

A. Can the use of specific implicit package design cues influence consumers’ attitudes, inferences (e.g. healthfulness, calorie estimation) and behavior? (Addressed in Articles 2 and 3)

B. Are there any individual and contextual factors that influence the effects of implicit package design cues on consumer response? (Addressed in Articles 2 and 3)

The present dissertation consists of five chapters. The first chapter presents readers with a general overview on recent literature demonstrating the role of package design on several aspects of consumption. The following three chapters represent individual articles empirically addressing particular aspects of our research inquiry. The fifth and final chapter discusses the main findings and contributions of this dissertation. Below, a summary of each article is provided.

Article 1: Although extant research indicates that package design visuals can influence a number of health related inferences and other consumption aspects (e.g. Becker et al. 2011; Karnal et al. 2016; Koo and Suk 2016), we currently have very little understanding of how package design is actually used by companies to convey health-related attributes and influence choice and consumption. At best, specific business reports and anecdotal evidence suggest a surge in packaging redesign decisions (Punchard 2016) in order to accommodate the health (re)positioning of brands and the increasingly health-oriented consumers (Euromonitor 2012; Nielsen 2015).
The undertaking in the present research is to explore this phenomenon. Specifically, the objectives of our investigation are twofold. On the one hand, we want to gain a better understanding of the practice surrounding package design for food brands. We accomplish this in Study 1 by carrying interviews with five brand and marketing managers from five different food companies in Denmark. Our second objective is to investigate whether certain patterns can be identified in the market when it comes to the package design visuals used to convey health-related attributes of specific brands, and whether these differ from those used for regular brands. We approach our second objective in Studies 2 and 3 by employing content analysis of package design communication across two countries (Denmark and USA) and several food product categories.

**Article 2:** The shape of packages and containers has been shown to influence the inferences consumers make about the content of food such as taste and calorie estimation (Becker et al. 2011; Koo and Suk 2016), or to even influence choice and consumption (Raghubir and Krishna 1999; Yang and Raghubir 2005). Our undertaking in the present research is to build upon and extend this literature stream, by investigating whether the actual curvature of the container can influence consumers’ inferences and consumption behavior.

In particular, in the first experiment we demonstrate that a food product presented in a convex (i.e. wider in the middle) vs. a concave (i.e. wider at the top and bottom) container is perceived to be higher in calories and less healthy. A second experiment also suggests that package shape can moderate how consumers’ eating control discourse influences their anticipated consumption guilt. Consumers high in eating control feel more anticipated consumption guilt than individuals low in eating control when the food product is presented in a convex package, but not when the product is presented in a concave package. Additionally, in the third experiment we show that consumers actually eat more when the food product is displayed in a convex container, as compared to when the food is displayed in a concave container. This is contrary to one’s first intuition that people will try to eat less from a food considered high in calories or unhealthy. Our explanation for this effect is that there is another mechanism that takes over in a consumption situation, where the package becomes a visual measurement tool to monitor consumption (Wansink 2004). In this sense, it is more difficult for consumers to monitor the food displaced from a convex container because the level remaining in
the container appears to decrease at a slower pace (due to a wider middle). The opposite holds true for a concave container.

**Article 3:** Building on the extant literature on conceptual metaphors (Lakoff and Johnson 1999; Landau, Meier, and Keefer 2010) and the role of spatial information in consumer decision-making (Cian, Krishna, and Schwarz 2015; Deng and Kahn 2009; Romero and Biswas 2016; Schlosser, Rikhi, and Dagogo-Jack; Sundar and Noseworthy 2014), the third article investigates the effectiveness of food-related claims when located differentially along the vertical dimension (of packages and ads). We propose and demonstrate across three experimental studies that verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at top, as compared to bottom locations, whereas verbal claims designating unhealthy food attributes (e.g. taste) elicit more positive consumer responses when placed at bottom, as compared to top locations.

Specifically, in Study 1 we show that health-related concepts are differentially mapped onto the vertical visual space, where healthy descriptors are associated with a higher visual location and unhealthy descriptors with a lower visual location. Drawing on this initial finding, in Study 2 we examine consumer response to messages varying in their health-related content (designating healthy or unhealthy product attributes) depending on their vertical location (top versus bottom). We hereby provide evidence that, in an advertising context, verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at the top, as compared to the bottom, whereas verbal claims designating unhealthy food attributes (e.g. taste) elicit more positive consumer responses when placed at the bottom, as compared to the top. Furthermore, these effects seem to be consistent across food product categories varying in their degree of healthfulness. In Study 3 we tested the replicability of these effects in a different marketing context (package design) and taking a different product (smoothie). We demonstrate that a claim denoting healthy attributes will elicit more favorable evaluations (pack attitude and anticipated product satisfaction) when placed at the top of the package. Conversely, a claim denoting unhealthy attributes (taste) will elicit evaluations that are more favorable when placed at the bottom of the package. The results of our third study represent an important development, as we show that claim location effects are pervasive across several different contexts. In a fourth and final study employing content analysis of packages, we show that most health-related claims on food packages are
actually placed at the bottom – this is contrary to our findings that health claims and messages are more effective when placed at the top.

Given its interdisciplinary nature, our research contributes to literature in several directions. First of all, in regards to food marketing, extant research has so far addressed the impact of explicit packaging information (e.g. nutrition labels, health claims) on caloric estimation (Chandon and Wansink 2007), health-related inferences (Ford et al. 1996; Garretson and Burton 2000; Kozup et al. 2003; Lähteenmäki 2013; Roe et al. 1999), food choice (Aschemann-Witzel et al. 2013; Van Kleef et al. 2005), and consumption (Belei et al. 2012; Chandon and Wansink 2007). Though essential in its own right, explicit information often interacts with, or is overridden by other stylistic elements of the package, as this research also suggests. This is in line with a number of recent studies highlighting the importance of visual metaphors in complementing textual elements and the impact they might have on either misleading or nudging consumers towards healthier food choices (Purnhagen, van Herpen, and van Kleef 2016; Romero and Biswas 2016). Our research further contributes to the graphic design literature by suggesting that simple stylistic adjustments can yield different consumer inferences and behaviors. At a more general level, we also bring our contribution to the literature attesting the pervasive impact of implicit cues in the environment on consumers’ every-day decision-making.

The contributions of this dissertation carry important implications for food marketing practices and public policy aimed at improving consumers’ food-related decisions.
Dansk resumé

Forskning indikerer at den visuelle fremstilling af indpakningsdesign såsom form, størrelse, farver og billeder kan influere på madmæssige følgeslutninger på et højere niveau (e.g. Becker et al. 2011; Deng and Kahn 2009; Koo and Suk 2016; Poor, Duhachek, and Krishnan 2013; Schuldt 2013) alt imens, at fremstillingen kan fungere som signaler for specifikke opfattelsesmæssige vurderinger, som yderligere kan influere madmæssige valg og indtagelse (e.g. Deng and Srinivasan 2013; Folkes and Matta 2004; Madzharov and Block 2010; Ordabayeva and Chandon ; Sevilla and Kahn 2014).

Taget den nylige interesse i sunde spisevaner i betragtning (Euromonitor 2012; Nielsen 2015; Technavio 2015), og indpakningsdesigns rolle i at influere både madbeslutninger i butikken og post-indkøb madbeslutninger (Chandon and Wansink 2012), er det vigtigt at opnå en mere dybdegående forståelse af indpakningsdesigns rolle i forhold til at influere madmæssige følgeslutninger samt opførsel.


Taget ovenstående i betragtning er det den nærværende afhandlings formål at belyse rollen af visuelle indpakningsdesignselementer i forhold til kommunikation af sundhed and adfærd. For at få en mere omfattende forståelse af
fønomenet udforsker afhandlingen den marketingskommunikationsmæssige side – ved at prøve at identificere specifikke mønstre relaterede til kommunikation af indpakningsdesign for sundhedsrelaterede varemærker – men den udforsker også, hvorfor forbrugere faktisk responserer på specifikke manipulationer af indpakningsdesign elementer i forhold til sundhedsrelaterede følgeslutninger og adfærd. Dette forskningsformål afgrænser to hoved, og fire sekundære, forskningsspørgsmål som er adresseret på tværs af tre empiriske artikler:

**RQ1:** Hvordan bliver indpakningsdesign brugt til at kommunikere helbredsegenskaber til forbrugere?

C. Hvad er den ledelsesmæssige debat og praksis i relation til indpakningsdesign? (Adresseort i artikel 1)

D. Bliver der gjort systematisk brug af indpakningsdesign elementer for mærkevarer relaterede til sund mad? (Adresseort i artikel 1 og 3)

**RQ2:** Hvordan influerer indpakningsdesign sundhedsrelaterede følgeslutninger og adfærd?

C. Kan brugen af specifikke, implicitte signaler i forbindelse med indpakningsdesign påvirke forbrugereres holdning, følgeslutninger (fx sundhed, kalorieestimering) og adfærd? (Adresseort i artikel 2 og 3)

D. Er der nogen individuelle og kontekstuelle faktorer, der påvirker effekten af implicitte indpakningsdesign signaler på forbrugerrespons? (Adresseort i artikel 2 og 3)


**Artikel 1:** Selvom eksisterende litteratur indikerer, at visuelle elementer i forbindelse med indpakningsdesign kan influere et antal sundhedsrelaterede følgeslutninger og andre forbrugsaspekter (e.g. Becker et al. 2011; Karnal et al. 2016; Koo and Suk 2016), så har vi, på nuværende tidspunkt, en meget begrenset forståelse af, hvordan indpakningsdesign faktisk bliver brugt af virksomheder til at
fremføre sundhedsrelaterede egenskaber og influere valg og forbrug. I bedste fald indikerer specifikke erhvervsrapporter og anekdotisk bevis en stigning i beslutninger i relation til at gendesigne indpakninger (Punchard 2016) for at kunne imødekomme sundhedsrelaterede (re)positioneringer af mærkevarer og de, i stigende grad, sundhedsorienterede forbrugere (Euromonitor 2012; Nielsen 2015).

Formålet med nærværende forskning er at udforske dette fænomen. Specifikt er der to formål med vores undersøgelse. På den ene hånd ønsker vi at få en bedre forståelse af de praksis, der omgiver indpakningsdesign for fødevarebrands. Vi opnår dette i Study 1 ved at udføre interviews med fem ledere inden for marketing og mærkevarer fra fem forskellige fødevarevirksomheder i Danmark. Vores andet formål er at undersøge, hvorvidt bestemte mønstre kan identificeres på markedet, når det kommer til visuelle indpakningsdesignelementer brugt til at tilvejebringe helbredsrelaterede egenskaber af specifikke mærkevarer, og hvorvidt disse er forskellige fra dem, der bliver brugt for almindelige mærkevarer. Vi tilnærmer os vores andet formål i Study 2 og 3 ved at benytte content analysis af indpakningsdesignkommunikation henover to lande (Danmark og USA) og adskillige fødevareproduktkategorier.

**Artikel 2:** Indpakningsbeholderes form har vist sig at influere forbrugeres følgeslutninger omkring madindholdet, såsom smag og kalorieestimering (Becker et al. 2011; Koo and Suk 2016), og har endda vist sig at influere valg og forbrug (Raghubir and Krishna 1999; Yang and Raghubir 2005). Vores foretagende er i nærværende forskning at bygge på og udvide denne litteratur ved at undersøge, hvorvidt den faktiske indpakningskurvatur kan influere forbrugeres følgeslutninger og forbrugsadfærd.

I det første eksperiment demonstrerer vi specifikt, at et fødevareprodukt forekommende i en konveks udformning (i.e. bredere i midten) versus en konkav (bredere i toppen og bunden), bliver betragtet som indeholdende et højere antal kalorier, og som værende mindre sund. The andet eksperiment indikerer også, at formen på indpakning kan moderere, hvordan forbrugeres diskurs i forbindelse med madkontrol influerer deres forventede skyldfølelse i forbindelse med forbrug. Forbrugere med et højt niveau af spisekontrol føler mere forventet skyldfølelse i forbindelse med forbrug end individer med lav spisekontrol, når maden bliver præsenteret i en konkav indpakning. Ydermere viser vi i det tredje eksperiment, hvordan forbrugere faktisk spiser mere, når maden bliver præsenteret i en konveks beholder, sammenlignet med, når maden er fremvist i en konkav beholder. Dette
står i modsetning til ens første intuition som ville være, at man vil forsøge at spise mindre fra en madkilde som man betragter som høj i kalorier og usund. Vores forklaring for denne effekt er, at en anden mekanisme tager over i forbrugssituationen, hvor pakken bliver et visuelt måleinstrument, hvorved forbrug kan monitoreres (Wansink 2004). På den måde bliver det mere besværligt for forbrugereren at monitorere maden fremvist via en konveks beholder på grund af, at niveauet tilbageblivende i beholderen ser ud til at formindskes langsommere (på grund af en bredere midte). Det modsatte viser sig at være sandt for en konkav beholder.


Specifikt i Study 1 viste vi, hvordan sundhedsrelaterede koncepter bliver kortlagt forskelligt på det vertikale visuelle felt, hvor sunde beskrivelser bliver associerede med en højere visuel placering og usunde beskrivelser bliver associererede med en lavere visuel placering. Ved at drage på dette indledende resultat, undersøger vi i Study 2, hvordan forbrugere reagerer på beskeder, der varierer i deres sundhedsrelaterede indhold (ved at angive sunde eller usunde produktegenskaber) afhængig af deres vertikale placering (top versus bund). Herved tilvejebringer vi bevis for at verbale udsagn, der tilkendegiver produktegenskaber relaterede til sundhed i en reklamekontekst, frembringer mere positiv forbrugerrespons, når de placeres ved toppen, sammenlignet med bunden, hvorimod verbale udsagn i forbindelse med usunde madegenskaber (for eksempel smag) frembringer mere positive forbrugerrespons, når de placeres ved bunden, sammenlignet med toppen. Ydermere virker det til, at disse effekter er konsistente
henover fødevarekategorier, der varierer i deres grad af sundhed. I Study 3 testede
vi replikerbarheden af disse effekter i en anderledes marketingskontekst
(indpakningsdesign) og med et anderledes produkt (smoothie). Vi demonstrerer at
et udsagn, der angiver sunde egenskaber vil lede til mere fordelagtige evalueringer
(holdning til indpakning og forventet produkttilfredshed) når udsagnet placeres
øverst på pakken. Omvendt, vil et udsagn som betegner usunde egenskaber (smag)
lede til mere fordelagtige evalueringer, når det placeres ved bunden af
indpakningen. Resultaterne af Study 3 repræsenterer en vigtig udvikling eftersom,
at vi viser, hvordan effekten af placeringsmæssige udsagn er udbredt over en række
forskellige kontekster. I et fjerde og sidste studie, der benytter sig af content
analysis af indpakninger, viser vi at hovedparten af de sundhedsrelaterede udsagn
på indpakninger faktisk bliver placeret ved bunden – dette står i modsætning til
vores resultater som viser, at sundhedsrelaterede udsagn og beskeder er mere
effektive, når de bliver placeret ved toppen.

Givet dens tværfaglige natur, bidrager vores forskning til litteratur i
adskillige retninger. For det første har eksisterende forskning inden for
fødevaremarketing indtil videre adresseret indflydelsen ved eksplicit
indpakningsinformation (for eksempel ernæringsetiketter, sundhedssagn) på
calorieestimering (Chandon and Wansink 2007) sundhedsrelaterede følgeslutninger
(Ford et al. 1996; Garretson and Burton 2000; Kozup et al. 2003; Lähteenmäki
dette er betydningsfuldt i sig selv, interagerer eksplicit information ofte med, eller
bliver underkendt af, andre stilistiske elementer ved indpakningen, hvilket denne
forskning også indikerer. Dette er i overensstemmelse med et antal nylige studier,
som understreger vigtigheden af visuelle metaforer til at komplimenterere tekstuelle
elementer, og den indvirkning de kan have i forhold til enten at mislede eller
skubbe forbrugere imod sundere madvalg (Purnhagen, van Herpen, and van Kleef
2016; Romero and Biswas 2016). Vores forskning bidrager yderligere til litteratur
inden for grafisk design ved at indikere at simple stilistiske tilpasninger kan give
forskellige forbrugermæssige følgeslutninger og adfærd. På et mere generelt plan
bidrager vi også til litteratur som bevidner den gennemtrængende indvirkning af
implicitte signaler i miljøet på forbrugeres beslutningstagning i hverdagen.
Ydermere har denne afhandlings bidrag også vigtige implikationer for fødevaremarketing praksis og offentlig politik, der sigter efter at forbedre forbrugerens madrelaterede beslutninger.
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Chapter 1
General Introduction
Introduction

Whether you do your grocery shopping in the supermarket, eat at your favorite restaurant or have a drink in a bar, your foods and drinks most often come in containers. This means that the contact we have with food is usually mediated by a package. Packages themselves come in all shapes, sizes and colors, even for products belonging to the same product category. The way these packages are designed influences not only our perceptions about the food products, but also our choices and finally our consumption (Wansink and Chandon 2014).

Package design has become especially relevant in light of the current focus on health food choice and consumption (Wansink and Chandon 2014). Worldwide, consumers are increasingly preoccupied with their weight management and the overall healthiness of their diet (Euromonitor 2012; Nielsen 2015; Technavio 2015). This means that they seek food products that promise to deliver on these attributes: products that are low in certain negative components (i.e. low in fat), that appear to be fresh, natural or minimally processed, but also food products that have beneficial ingredients that would help them fight disease or promote good health. As health is a benefit valued and sought more and more by consumers, companies are not coming short of trying to deliver it. In fact, health categories are growing faster than indulgent categories, a recent report from Nielsen indicates (Nielsen 2015).

Given the growing interest in healthy food choices and consumption, a particularly interesting inquiry relates to how package design can induce perceptions of healthfulness and further influence choice and consumption. Surprisingly, only sparse research has tackled the role of package design in health communication and food-related behaviors. And, whilst extant research has addressed the impact of explicit packaging information (e.g. nutrition labels, health claims) on caloric estimation (Chandon and Wansink 2007), health-related inferences (Ford et al. 1996; Garretson and Burton 2000; Kozup et al. 2003; Lähteenmäki 2013; Roe et al. 1999), food choice (Aschemann-Witzel et al. 2013;
Van Kleef et al. 2005), and consumption (Belei et al. 2012; Chandon and Wansink 2007), studies addressing how more implicit cues of package design impact healthfulness evaluations, choice and consumption have only recently emerged (Wansink 2004). However, this is of high relevance, both to practice and for a theoretical understanding of consumers’ food-related decisions.

Food-decision making has been shown to be especially low-involvement, with consumers only spending a limited amount of time to make their decisions (Park et al. 1989). This means that quite frequently consumers will not spend their time, nor will they allocate cognitive resources to read all the available written information; instead, they will simplify their decisions by using certain heuristic cues. Cues that are otherwise unrelated to the decisions-making context become diagnostic sources of information and thus guide specific inferences about the product and the brand (e.g. attributes and benefits). To illustrate, it is well documented that, in a food context, consumers often draw inferences about the caloric content and overall healthfulness of food items, using other unrelated external cues (Chandon 2013). Such cues could be for example how consumers perceive the food itself (if the food is seen as vice or virtue) (Chernev 2011; Oakes 2005), a food item’s designated name when the actual food items are identical (Irmak, Vallen, and Robinson 2011), or even the name of the restaurant serving the foods (Chandon and Wansink 2007).

In a similar manner, specific elements of package design can become diagnostic tools used by consumers to make certain product-related judgements. Recent literature shows that package design visuals such as shape, size, colors, and imagery can impact higher-level food inferences such as health perceptions (e.g. Becker et al. 2011; Deng and Kahn 2009; Koo and Suk 2016; Poor et al. 2013; Schuldt 2013), while at the same time acting as cues for specific perceptual judgements that further impact food choice and consumption (e.g. Deng and Srinivasan 2013; Folkes and Matta 2004; Madzharov and Block 2010; Ordabayeva and Chandon ; Sevilla and Kahn 2014).
The present dissertation takes its point of departure in these latter streams of research and addresses two main research objectives. Firstly, it sets to explore how package design visuals are used in the food marketplace, especially in regards to health branding. This endeavor is intended to reveal whether package design visuals differ in health positioned food brands, but also to explore managerial discourses and practices regarding brand communication through package design. Secondly, this dissertation aims to investigate how specific food package design visuals influence consumers’ attitudes, inferences (e.g. healthfulness, calorie estimation) and their food-related behavior, but also to explore certain boundary conditions, such as individual differences between consumers, or in context characteristics. This research objective delineates two main and four secondary research questions that are addressed across three empirical articles:

RQ1: How is package design used to communicate health attributes to consumers?

A. What are the managerial discourses and practices in relation to package design? (Addressed in Article 1)

B. Is there any systematic use of package design elements for food health brands? (Addressed in Articles 1 and 3)

RQ2: How does package design influence health-related inferences and behaviors?

A. Can the use of specific implicit package design cues influence consumers’ attitudes, inferences (e.g., healthfulness, calorie estimation) and behavior (e.g., consumption)? (Addressed in Articles 2 and 3)

B. How do individual (e.g., consumers’ health consciousness) and contextual factors (e.g., product type) influence the effects of implicit package design cues on consumer response? (Addressed in Articles 2 and 3)
Defining Package Design

In its most common sense, food package design encompasses all the ways food products are wrapped and presented to the consumers in the retail stores (Chandon 2013). The primary role of food package design is of a utilitarian nature, as it relates to food safety and preservation. However, the role of package design has gradually reshaped with the introduction of self-service, and it has become an essential component of the marketing communication strategy (Rettie and Brewer 2000). Package design has several advantages over other marketing instruments. One of them is that it has an extensive reach, meaning that it encounters nearly all purchasers of a certain product category. Furthermore, it reaches the consumers at the very important moment when they are scanning the shelves of the supermarket in order to make a purchase decision. Since evidence suggests that unplanned shopping and in-store decision-making have soared (Gilbride, Inman, and Stilley 2015), a wealth of opportunities lies in a good package design. In fact, a number of studies show that package design can draw attention to the product in the store, establish brand identity, communicate specific product attributes and ultimately influence choice and consumption (Chandon 2013; Orth and Malkewitz 2008). Clearly, consumers’ contact with food packaging is not reduced to the supermarket setting. Packages often come to be displayed on the kitchen counter or in the fridge, used to store the food up to the time of consumption, or even used as serving containers in some cases. This means that the influence of package design on consumers extends beyond the in-store decision-making and it further impacts food intake, product satisfaction and subsequent choices.

From a marketing communication perspective, package design consists of a set of elements that work together to convey a certain message to consumers. A look into the relevant literature indicates that there are various approaches to classifying the elements of package design. Silayoi and Speece (2007) classifies them as either informational (information about the product, slogan, and labels) or visual (graphics, color, imagery, shape, and size). On the other hand, Underwood
(2003) classifies them as either graphic (color, typography, and image) or structural (shape, size, and material). The first classification categorizes the structural and graphic elements in the same block (visual), while the second classification fails to consider informational elements. However, for a comprehensive understanding of package design communication, it is essential that all three categories be considered, as well as their differences and similarities. In regards to health communication, informational elements are those that position the food product as healthy (e.g. low fat) and represent the basis for the decisions regarding other package design elements. Furthermore, distinguishing between graphic and structural elements is also necessary, as these groups have distinctive characteristics. Graphic elements are those printed on the package, offering visual identity to the food product. The most prominent and well-documented graphic elements are colors and imagery (Becker et al. 2011; Poor et al. 2013), but other subtle graphic elements such as typography and arrangement of elements on the package have also been addressed in literature (Ampuero and Vila 2006; Chae and Hoegg 2013). As opposed to graphic elements, structural elements are those that give a form and texture to the product (e.g. shape, size, material). Although they also contribute to the visual identity of the food product and can affect consumer inferences (Koo and Suk 2016; Sevilla and Kahn 2014), they are mainly tied to their functional role (e.g. type of product, safety, transportation considerations).

Considering the above, the approach in the present research is to categorize package design elements as informational, graphic and structural. Naturally, this is a simplification; in reality, quite often these three categories of elements cannot be distinguished from each other – such as when the brand name or specific product claims are in fact a mix of informational elements (the verbatim used) and graphic elements (color and typography). Rather, the current approach to classifying package design elements is literature-driven and is meant to highlight the operational differences between them in generating product-related inferences and influencing consumer behavior. One important distinction is the form they take and how explicitly they convey information. Informational elements commonly
manifest either through written language (specific claims) or through a well-established system of symbols (such as when an organic logo is prescribed a meaning beforehand). This means that they are generally designed to communicate the message most explicitly. Even though quite often they can also be misinterpreted, informational elements still represent the most direct way to communicate certain attributes to consumers. Graphic elements manifest through pictorial and stylistic representations and therefore rely on specific metaphors and learnt associations to convey meaning. This implicit form of communication also entails that marketers have less of control of how the message is decoded at the other end of the communication channel - colors and imagery can have multiple meanings and what meaning is activated rests on the specificities of the marketing context and of the consumer. Finally, structural elements have a mainly functional role. Yet, similarly to graphic elements, structural elements also provide visual input that can generate higher-level inferences about the product, but also perceptually driven judgements (e.g. volume perception) (Raghubir and Krishna 1999). Another distinguishing feature of the structural elements is that they also operate in a three-dimensional environment. This means that consumers, besides their visual sense, can also use their haptic and motor senses to generate input – by touching or handling the package. This additional feature makes the study and understanding of structural elements more complex (Krishna and Morrin 2008). Our argument is that these three categories vary in how explicitly they convey product related-inferences (such as perceived healthfulness) to consumers. A visual depiction of the three main categories can be observed in Figure 1 below.

**FIGURE 1**

CLASSIFICATION OF PACKAGE DESIGN

<table>
<thead>
<tr>
<th>Informational elements</th>
<th>Graphic elements</th>
<th>Structural elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g. nutrition information, health claims)</td>
<td>(e.g. color, imagery)</td>
<td>(e.g. shape, size, material)</td>
</tr>
</tbody>
</table>

Health is communicated explicitly ↔ Health is communicated implicitly
In the following section, a more detailed account on the role of informational elements in consumer response is given. Subsequently, we proceed to talk about the role of visual design in conveying meaning to consumers and further detail on the role of graphic and structural elements as distinct categories of visual design.

**Informational Elements and Consumer Response**

With respect to package design, informational elements are meant to communicate relevant product information to consumers. They can take various forms such as verbal, numerical, pictorial, or a mix of these. The aspects that information on the package covers can be instructions of usage, brand, country/producer, price, ingredients, and food labelling.

In regards to health communication, the importance of food labelling in assisting consumers to make more informed and healthier food choices has been emphasized. For example, nutrition facts panels facilitate consumers’ understanding of the nutritional content of the food. Certain characteristics of food products are also communicated through nutrition claims (e.g. low fat) and health claims (e.g. reduces the risk of a heart disease). Another avenue is the use of process-related claims that indirectly convey health (e.g. natural, locally produced, organic, traditional certifications). Research suggests that when health claims and favorable nutrition information is present on the package, consumers’ perception of product healthfulness is positively influenced (Kozup et al. 2003). Albeit designed to be explicit in nature, informational elements are very often misinterpreted, to the extent that consumers believe food products to be healthier than they actually are (health halo effect), or even to prevent certain diseases (magic bullet effect) (Roe et al. 1999). This bias occurs because consumers tend to simplify their mental task and therefore extend the information available for one
food product attribute to other food product attributes. For example, if the food product is endorsed by a claim such as “low-fat”, consumers generalize that the food product scores favorably on all health and nutrition aspects, leading them to underestimate the number of calories and to believe they can eat more of it without any negative consequences (Wansink and Chandon 2006). The same effect can also be observed in the case of process-related claims such as fair-trade and organic claims. For example, one study provided evidence that social ethic claims (fair trade) mislead consumers to believe that the food products are lower-calorie and they can be consumed in larger quantities (Schuldt, Muller, and Schwarz 2012). In a similar manner, Lee et al. (2013) found that consumers evaluated the food products with organic labels to be lower in calories than those without the organic label. The above-mentioned research accounts for explicit information that is misinterpreted by consumers, defined herein as informational elements.

However, consumer’ biases are more pervasive, such that more implicit cues like graphic and structural elements of package design influence consumers jointly, but also beyond the content of informational elements. Although not explicit in nature, these cues activate certain associations that will spill over to inform specific consumer judgements. Next, we take upon to discuss the role of visual design in marketing and consumer behavior in general and subsequently address the influence of graphic and structural elements on consumer response in a food-related context.

**Visual Design as Information**

Visual design has been shown to mold consumer response in a number of ways. At its very basics, visual design has an important role in consumers’ aesthetic responses to marketing communication and products (Hagtvedt and Patrick 2014). At the same time, however, visual design has been shown to influence also other aspects of consumer response.
One important strand is visual’s design ability to generate higher-level inferential processes that are later used to form beliefs about a product or a brand (Deng and Kahn 2009; Jiang et al. 2014; Orth and Malkewitz 2008). These inferences are commonly rooted in specific associations with the physical space and the social context individuals operate in. One way to understand such effects is through the lens of the conceptual metaphors theory, which posits that humans make sense of more abstract notions such as importance, difficulty, morality, by relying on concepts from the experiential domain, which are more concrete (Lakoff and Johnson 1999; Landau et al. 2010). Such a cognitive mechanism allows people to use physical properties and experiences to reason about concepts otherwise ambiguous to the human mind. This is done by mentally linking experiences and knowledge from the sensorimotor domain with more subjective experiences. For example, the subjective experience of affection is typically linked to the sensory experience of warmth; attachment is often understood through physical proximity; power and morality are represented in the vertical space (Lakoff and Johnson 1999; Landau et al. 2010; Meier, Sellbom, and Wygant 2007). These metaphors also manifest in a number of other domains, including the judgements consumers make about products and brands as a result of various visual design manipulations (Barsalou 2008; Chae and Hoegg 2013). To illustrate, Jiang et al. (2016) found that circular logos are more suitable to promote comfortableness attributes of products (they take the examples of shoes and sofas), due to the softness associations activated by the circular shape. Taking the same products, they further show that angular logos are more suitable to promote durability attributes. Furthermore, Chae and Hoegg (2013) found that it is beneficial for the brand if pictures of novel products are displayed on the right side of an advertisement, while pictures of antique products should be displayed on the left. This is due to a linear and horizontal perception of time, where the past is visualized on the left and the future is visualized on the right. Similarly, Sundar and Noseworthy (2014) showed that powerful brands are benefited if the logo is displayed higher on the package, whereas less powerful brands are benefited if the logo is displayed lower on the
package, due to power-verticality space associations. These are only a few examples that demonstrate how small-scale design manipulations informed by conceptual metaphors can implicitly communicate different meanings about the product and the brand. Naturally, not all metaphors are physically grounded. Some rely on associations that are learnt in time and rather than being universal, they are embedded in the specific social context; such as when specific visual cues are used to symbolize certain abstract concepts in a culture, but not in others. A classic example is the use of the black color to symbolize death in Western cultures and white to symbolize death in Oriental cultures (Saito 1996). These examples tell us that the power of visual design to convey specific information lies both in the universal metaphors of human cognition, but also in the more specific, context and culture dependent metaphors. Apart from guiding specific inferences, design elements can also act as cues for perceptual judgements. A growing body of research demonstrates how different design elements alter consumers’ volume and size perceptions, which subsequently affects consumption behavior (Deng and Srinivasan 2013; Folkes and Matta 2004; Ittersum and Wansink 2012; Raghubir and Krishna 1999).

Taken together, these areas of research demonstrate that the influence of design elements on aspects of consumption is pervasive. Of particular significance to the present research is visual design’s ability to impact specific food-related inferences and perceptual judgements, which can guide food choice and consumption. In particular, the following subchapter will discuss the role of graphic and structural elements in consumer response, with an emphasis on food-related inferences and consumption. The literature presented is not meant to be exhaustive, but to provide a more detailed illustration of the phenomenon.
Graphic Elements and Consumer Response

Graphic elements are defined herein as those that are printed on the package, and thus as those that contribute the most to the visual identity and appearance of a product. While their aesthetic function in consumer response is incontestable (Deng, Hui, and Hutchinson 2010; Hoegg, Alba, and Dahl 2010; Patrick and Hagtvedt 2011), the focus of this section is to review their role in conveying meaning and thus generating specific product inferences.

Color is one of the most important graphic elements, and its pervasive influence on consumers in a variety of marketing settings is unquestionable (Labrecque, Patrick, and Milne 2013). Particular about color is that it acts upon individuals in two distinct but equally important ways. On the one hand, color has certain universal properties that span across cultures and contexts. These could be regarded as the attributes producing more visceral responses in consumers; such as when colors with longer wavelengths (e.g. red) are found to be more arousing than colors with shorter wavelengths (e.g. blue). This has been shown to further impact brain and heart activity, and subsequently consumer responses in the marketplace (Crowley 1993). On the other hand, color is very often socially embedded, which means that individuals make specific inferences depending on the context and the learnt semantic associations. The same color could symbolize different concepts and the activation of one meaning or another rests on the actual context in which the color is used. For example, black can symbolize death and mourning, but also elegance and quality. Furthermore, different cultures use distinct colors to symbolize the same concept, as when death and mourning are associated with black in Western traditions, but white is the color of death in China (Saito 1996). Labrecque et al. (2013) defines these as the embodied and referential meanings of color and propose that people’s perceptions and experiences are influenced by the activation of these meanings both in an individual and in a complementary fashion. These properties can be further used in the service of marketing, to trigger specific
responses and behaviors in consumers. In regards to food marketing, current research indicates that colors guides consumer judgments about food products such as taste (Becker et al. 2011), caloric content and overall healthfulness (Karnal et al. 2016; Schuldt 2013). To illustrate, one study reported that a candy bar was perceived to be healthier when the package had a green, as compared to a red calorie label, even though the labels had the same calorie content (Schuldt 2013). At the same time, highly saturated packaging colors lead consumers to anticipate a more intense product taste (Becker et al. 2011). Furthermore, colors have also been shown to carry a certain visual weight. In general, red and blue are the heaviest colors hues, whereas orange and yellow are the lightest (Pinkerton and Humphrey 1974). In this respect, Karnal et al. (2016) demonstrated that color heaviness influences consumers’ healthfulness perception. This means that consumers perceive food products to be healthier when lighter (as opposed to heavier) colors are used on the package.

Imagery is another key element of visual design. It is often argued that images are a more impactful way of communicating than using text-based information. The explanation for this phenomenon is that images are more vivid stimuli that attract more attention and they are processed faster than text-based information (Underwood and Klein 2002). Two main streams of research prevail with regard to the role of imagery in marketing communication. The first one treats imagery as mere sensory stimuli used to depict reality accurately – such as when the product presented on the package is a descriptor of the function and form of the product inside. The second stream, based on the theory of visual rhetoric, highlights the cultural meanings associated with visual images. In this view, images do not represent objective depictions of reality, but are the expression of symbolic thought that can produce higher-level inferences (Scott 1994; Scott and Vargas 2007). Regardless of the rationale, imagery has been indeed repeatedly documented to be a powerful tool in engaging and persuading consumers (Aydinoglu and Cian 2014; Peracchio and Meyers-Levy 2005; Scott 1994). In regards to food marketing, evidence suggests that image manipulation could influence a number of consumer
responses. For example, consumers use pictures on the package to infer intrinsic product attributes, such as healthfulness, freshness and tastiness (Poor et al. 2013; Underwood and Klein 2002). Poor et al. (2013) show that images of a food being consumed by a person (as opposed to an image of the food alone) increased taste perceptions of unhealthy food products, but not of healthy food products. Deng and Kahn (2009) also demonstrate how the location of the food image on the façade of the package affects consumer evaluations. Specifically, when the image is located in the lower-right section of a package, consumers infer the product to be heavy (vs. light); furthermore, consumers also prefer images of healthy foods (for which lightness is a desirable attribute) to be displayed at the top and images of unhealthy foods (for which heaviness is a desirable attribute) to be displayed at the bottom. Another study by Madzharov and Block (2010) also demonstrates that the number of product units displayed on a package biases consumers' perceptions of product quantity and it influences their consumption. Specifically, when more units of products were displayed on the package, consumers believed the pack contained more products and therefore consumed more of it (despite actual serving size suggestions). Furthermore, Chrysochou and Grunert (2014) found that imagery had a significant influence on perceived product healthfulness. As such, an image depicting well-being, exercise, freshness, might lead consumers to infer that the product is also more healthful. Another interesting finding is that consumers are also misguided by how processed the product depicted on the package is (Machiels and Karnal 2016). Specifically, images depicting unprocessed foods imply product naturalness; however, also less taste. Similarly, Smith, Barratt, and Selsoe Sorensen (2015) reported that taste of food products was perceived as more natural when images of the specific product were present on the package. This effect was enhanced when the image was a real photograph (as opposed to a drawing). Furthermore, food products depicted in motion (as opposed to static) generate better evaluations in terms of freshness and appeal (Gvili et al. 2015).
Structural Elements and Consumer Response

Structural elements can also carry certain underlying meanings, although not necessarily intended by marketers. Due to their functional primary nature, the role of structural elements in producing specific inferences and influencing consumer behavior is more elusive. Nevertheless, an increasing number of studies show that, similarly to graphic elements, structural elements also provide a visual input that can be later used by consumers to make product and brand-related inferences, but that can also influence their consumption. A distinguishing feature of structural elements is that they operate in a three-dimensional environment. This means that consumers, besides their visual sense, can also use their haptic and motor senses to generate input – by touching or handling the package. This additional feature makes the study and understanding of structural elements more complex (Krishna and Morrin 2008).

One of the more prominent structural elements is the shape of the package. Shape can offer products identity (Underwood 2003) and it can influence consumers’ perceptions and preferences for a product (Raghubir and Greenleaf 2006). Furthermore, it can evoke different taste impressions, such that more angular package shapes are associated with more intense flavors (Becker et al. 2011). Shape also has important influences on volume and quantity perceptions, which further influence consumption amount. For example, Raghubir and Krishna (1999) showed that rectangular packages that are more elongated are perceived to be larger than same-size packages that are less elongated. Such a distorted perception further influences how much consumers eat (Raghubir and Krishna 1999; Wansink and Van Ittersum 2003). On the other hand, Koo and Suk (2016) provided evidence that, at the same time, consumers perceive a food product in elongated packages to be less caloric than an identical food in wider packages of equal capacity. In the case of more organic and irregular shapes, Folkes and Matta (2004) unveiled a different mechanism, such that package shapes that attract more
attention are perceived to be larger than same size packages that attract less attention. Similarly, Sevilla and Kahn (2014) demonstrated that incompletely shaped products are perceived to be smaller. This effect backfires, as consumers also tend to eat larger quantities of the product, due to reduced size estimations. Closely related and sometimes indistinguishable from shape, size is another element that can influence consumer response. For example, the relative size of a package can influence consumers’ perception about food product quality (Yan, Sengupta, and Wyer 2014) and allows consumers to signal a certain status (Dubois, Rucker, and Galinsky 2012).

Material is another structural element that can be used to signal the nature of a food product. For example, when packaging texture is rougher, consumers believe the product to be crunchier and harder (Piqueras-Fiszman and Spence 2012). Consumers also perceive packaging material to have an important impact on the environment. Specifically, consumers believe paper-based packaging to be environmentally preferable to other materials such as plastic or metal. Such environment-related cues are often used to make inferences beyond their intended content. For example, Lee et al. (2013) found that consumers evaluated food products with organic labels to be lower in calories than those without the organic label. Similarly, a recent study also showed that CSR practices of a company can make consumers believe that a product is lower in calories and more healthy overall (Peloza, Ye, and Montford 2015). In a similar fashion, packaging materials perceived to be more environmental-friendly (e.g. recycled materials and paper) could make food products appear healthier to consumers (Labrecque and Milne 2012). Another characteristic of materials that has been shown to influence consumers’ response to packaged food and their consumption amount is the level of package transparency. Specifically, Deng and Srinivasan (2013) showed that transparent packages affect food salience and consumption monitoring, which can result in either an increased or decreased consumption amount, depending on food characteristics. For small and visually attractive foods, consumers eat more from a
transparent package (as opposed to an opaque package). For large foods, on the other hand, transparent packages decrease consumption.

Taken together, these studies demonstrate how visual design can influence a number of food-related inferences, but also generate specific perceptual judgements, which can further guide food choice and consumption. Considering the recent interest in healthy eating (Euromonitor 2012; Nielsen 2015; Technavio 2015), and the role of package design in influencing both in-store and post-purchase food decisions (Chandon and Wansink 2012), it is important to acquire a more in-depth understanding of the role of package design in influencing health-related inferences and behaviors. In regards to health communication, most studies so far have focused on the role of informational elements (Aschemann-Witzel et al. 2013; Kozup et al. 2003; Roe et al. 1999; Van Kleef et al. 2005) and only sparse research has addressed the role of more implicit forms of package design (such as graphic and structural elements) in generating health-related inferences and behavior. Structural and graphic elements operate at a level outside of conscious awareness, affecting consumers’ perceptions more implicitly (Wansink and Chandon 2014). This becomes especially relevant in low-involvement contexts such as food shopping, where consumers spend a limited amount of time and cognitive resources to evaluate products and make a decision (Park et al. 1989). When consumers are unmotivated or uninvolved, they are more prone to rely on unrelated cues (such as package design visuals) to make inferences about and evaluate the food products. Furthermore, the fact that graphic and structural elements are less regulated than informational elements grants marketers more creative freedom, but also room to deceive consumers.

Considering the above, the undertaking in the present dissertation is to shed light on the role of package design visuals in regards to health communication and behaviors. In order to get a broader picture of the phenomenon, it takes to explore both the marketing communication side – by trying to identify specific patterns of package design communication for health brands – but also looks into how
consumers actually respond to specific manipulation of package design visuals in regards to health-related inferences and behaviors.

Articles Overview and Summary

Implicit Communication of Food Product Healthfulness through Package Design

Objectives: Does package design differ in health positioned food brands? Besides some anecdotal evidence (for e.g. lighter colors might be used to signal lighter products), there is little insight into what represents a typical package design for healthy brands and what are the package design elements mostly used by marketers to convey healthfulness. Considering practitioners’ increased focus in the area, there is a need for a clear conceptualization regarding health communication through package design. The present study addresses this matter by firstly exploring managerial discourses and practices regarding package design and secondly, by investigating the most typical package design elements for health-positioned food brands.

Methodology: This purpose was addressed by following a mixed-method approach – key informant interviews and content analysis – across three studies. In the first, pilot study, we explored managerial discourses and practices regarding packaging, and in the second and third studies we tried to identify the most typical package design elements for health brands. For this, we used content analysis of packages across two countries (Denmark and USA) and six product categories in each country. The interview guide in Study 1 and the coding sheet in Studies 2 and 3 were both developed in line with current literature. Following a literature review, we first classified package design elements in three main categories: informational, graphic and structural elements.
Main Findings: Our findings indicate that: (a) packaging is an important tool in brand communication and certain package design elements are emphasized by managers in health communication; however, most packaging design decisions are based on (a1) managers’ own experience, being, thus, of a more intuitive nature; (a2) scrutinizing the market and the; b) there are differences in the package design elements (colors, imagery, material, shape) between health brands and regular foods and that (c) some of these differences are product category specific; these patterns are discussed into greater detail in the specific paper. Through the present study we tried to get a better understanding of happens in the marketplace regarding package design for health brands, and it therefore represents the foundation for the following studies, which are consumer-focused.

In Good Shape: The Influence of Container Curvature on Consumers’ Perceptions and Consumption

Objectives: The shape of packages and containers has been shown to influence the inferences consumers make about the content of food such as taste and calorie estimation (Becker et al. 2011; Koo and Suk 2016), or to even influence choice and consumption (Raghubir and Krishna 1999; Yang and Raghubir 2005). Yet, research in this area primarily accounts for rectangular shapes. In the case of more organic and irregular shapes, Folkes and Matta (2004) unveiled a different mechanism, such that package shapes that attract more attention are perceived to be larger than same size packages that attract less attention. Our undertaking in the present research is to build upon and extend this literature by investigating whether the actual curvature of the container can influence consumers’ inferences and consumption behavior. In particular, we want to determine whether container curvature (convex versus concave) can influence both consumers’ food related inferences (calories estimation, overall healthfulness, anticipated consumption guilt) and their consumption amount.
Methodology: Study 1 and Study 2 are based on online experiments with consumers. In both experiments, we used a one-factor between-subjects design with two levels: orange juice displayed in either a convex or a concave bottle (the same stimuli were used). Respondents were informed that they would first see an image depicting a new brand of orange juice and after seeing the image they will have to answer a number of questions about the product. Depending on participants’ random assignment to the container shape condition, the juice was displayed on a bottle, graphically manipulated to be either convex or concave. Participants reported calories estimation and perceived healthfulness (Study 1) and additional measures of anticipated consumption guilt and controlled discourse (Study 2). In Study 3 we used a one-factor between subjects design, where we measured consumption from a convex versus a concave container. Within the context of a food event and after exiting the presentation room for a break, participants were approached and asked to take part in series of studies related to food. Half of the participants were directed towards table A (the convex condition), while the other half were directed toward table B (the concave condition). The participants were instructed to serve themselves with as many M&Ms as they want to have for the snacking break. The M&Ms were placed in either a convex or concave glass container of equal capacity. To control for product accessibility, participants used a spoon as a serving tool. After they served themselves with M&Ms, they were asked to count the number of M&Ms they served. This measure was later used to compute the number of calories.

Main Findings: The present paper explored the influence of container shape (convex vs. concave) on consumers’ calories estimation, perception of healthfulness, anticipated consumption guilt and actual consumption. To summarize, in Study 1 we showed that consumers believe a product to have more calories and be less healthy when presented in a convex container, as compared to when presented in a concave container. Our account for this effect is that the concave package activates concepts related to slimness, while the convex package activates concepts related to heaviness. These cues are subsequently used to make
inferences about the number of calories and healthfulness. Previous research carried out in this area has shown similar effects in other contexts – consumers seem to be biased in their judgement about a food’s caloric content and overall healthfulness by different external cues (Chandon 2013), including package shape (Koo and Suk 2016). Based on Study 2, our findings also suggest that package shape can moderate the way consumers’ eating control discourse influences their anticipated consumption guilt. Consumers high in eating control feel more anticipated consumption guilt than individuals low in eating control when the food product is presented in a convex package, but not when the product is presented in a concave package. This is in line with previous research showing that health conscious consumers are more susceptible to nutrition information and derive more guilt when eating food they believe to be unhealthy (Wansink and Chandon 2006). Additionally, in Study 3 we show that consumers also eat more when the food is displayed in a convex container, as compared to when the food is displayed in a concave container. This is contrary to one’s first intuition that people will try to eat less from a food considered high in calories or unhealthy. Our explanation for this effect is that another mechanism might take over in a consumption situation, when the package becomes a visual measurement tool for monitoring consumption (Wansink 2004). In this sense, it is more difficult for consumers to monitor the food displaced from a convex container because the level remaining in the container appears to decreases at a slower pace (due to a wider middle). The opposite holds true for a concave container.
Health is Up, Indulgence Down: Effects of the Vertical Location of Food Product Claims on Consumer Response

Objectives: Building on the extant literature on conceptual metaphors (Lakoff and Johnson 1999; Landau et al. 2010) and the role of spatial information in consumer decision-making (Cian et al. 2015; Deng and Kahn 2009; Romero and Biswas 2016; Schlosser et al.; Sundar and Noseworthy 2014), the third paper investigates the effectiveness of food-related claims when located differentially along the vertical dimension (of packages and ads). Specifically, we propose and demonstrate across three experimental studies that verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at top, as compared to bottom locations, whereas verbal claims designating unhealthy food attributes (e.g. taste) elicit more positive consumer responses when placed at bottom, as compared to top locations.

Methodology: In Study 1 our aim was to explore whether any metaphorical associations occur between the concepts of “healthy” and “unhealthy”, and verticality in the visual space. For this purpose, we used a classification task where we asked respondents to place five pairs of two words in a top or in a bottom box. For each pair of words participants had to indicate which word they would place in the top box and which one they would place in the bottom box. In Study 2 we used a three factors between-subjects design. Participants were told that they had to evaluate an ad for a food product and then they were assigned to one of the eight conditions. Specifically, all the participants saw an ad depicting either a healthy snack (an apple) or an unhealthy snack (a chocolate muffin). The ads were digitally manipulated to include a health claim (your healthy choice) or an indulging claim (your tasty choice) that was positioned at the top or the bottom of the ad - above or under the product, which was placed in the middle of the ad. After they visualized the ad, respondents were asked to report on a number of questions. Study 3 served as a replication of Study 2 in a different
setting. This time images of packages were graphically manipulated, and we took only one product as stimuli (smoothies). The study was a two factors between-subjects design. In Study 4 we conducted a content analysis to determine which package locations are more frequently used for health-related claims in the marketplace.

**Main Findings:** The paper consists of three experimental studies that bring converging evidence that the location of claims can be used strategically to create favorable perceptions about the communication material (ads and packages) and the product itself (quality perception and anticipated product satisfaction). Specifically, in Study 1 we show that health-related concepts are differentially mapped onto the vertical visual space, where healthy descriptors are associated with a higher visual location and unhealthy descriptors with a lower visual location. Drawing on this initial finding, in Study 2 we examine consumer response to messages varying in their health-related content (designating healthy or unhealthy product attributes), depending on their vertical location (top versus bottom). We hereby provide evidence that, in an advertising context, verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at the top, as compared to the bottom, whereas verbal claims designating unhealthy food attributes (e.g. taste) elicit more positive consumer responses when placed at the bottom, as compared to the top. Furthermore, these effects seem to be consistent across food product categories varying in their degree of healthfulness. In Study 3 we tested the replicability of these effects in a different marketing context (package design), by taking a product that is more neutral in terms of healthfulness (smoothie). We demonstrate that a claim denoting healthy attributes will elicit more favorable evaluations (pack attitude and anticipated product satisfaction) when placed at the top of the package. Conversely, a claim denoting unhealthy attributes (taste) will elicit more favorable evaluations when placed at the bottom of the package. The results of our third study represent an important development, as we show that claim location effects are pervasive across several different contexts. In a fourth and final study employing content analysis of
packages, we show that most health-related claims on the packages are actually placed at the bottom – this is contrary to our findings that health claims and messages are more effective when placed at the top.
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Chapter 2
Empirical Article 1
 Implicit Communication of Food Product
Healthfulness through Package Design¹

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Abstract

Does package design differ in health-positioned food brands? The present study addresses this matter by firstly exploring managerial discourses and practices regarding package design and secondly by investigating the most typical package design elements for health-positioned food brands. Following a mixed-methods approach – key informant interviews and content analysis – across three studies, our findings indicate that (a) packaging is an important tool in positioning a brand as healthy, (b) differences exist in the use of package design elements (colors, imagery, material, shape) between health-positioned and regular brands, and (c) these differences are product category-specific rather than universal. The results of this research provide a starting point for better understanding the typical elements of health brand packages and the way they differ from regular food package elements. As such, it could be a useful instrument for food marketers to successfully convey the “health” message through package design but also a warning signal to food authorities of the different ways marketers use package design to mislead consumers.

Keywords: package design; packaging; healthy food; healthfulness; content analysis;

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Introduction

Increased competition in the “healthier” and “better for you” food market is forcing brand managers to find more effective ways to convey these values to consumers (Kemp and Bui 2011). Package design can be used strategically to communicate certain product attributes (Bublitz et al. 2010) and brand values (Orth and Malkewitz 2008) and to elicit consumer response (Bloch 1995). As opposed to other forms of marketing communications (i.e., advertising), consumers are exposed to package design from the moment they choose the product in the store all the way to final consumption (Chandon 2013; Rettie and Brewer 2000). Therefore, a proper selection of package design elements could better convey a product’s healthfulness and contribute to the success of the brand (Chrysochou 2010).

The most straightforward choice for marketers is to use package design elements that communicate healthfulness in a direct, explicit manner. This can be done in the form of verbal claims or labeling symbols. In fact, existing literature has addressed this topic extensively by investigating the impact of explicit packaging information (e.g., nutrition labels, health claims) on caloric estimation (Chandon and Wansink 2007), health-related inferences (Ford et al. 1996; Garretson and Burton 2000; Kozup et al. 2003; Lähteenmäki 2013; Roe et al. 1999), consumption guilt (Mohr et al. 2012), food choice (Aschemann-Witzel et al. 2013; Mohr et al. 2012; Van Kleef et al. 2005), and consumption (Belei et al. 2012; Chandon and Wansink 2007; Mohr et al. 2012).

While explicit information is essential, package design involves other considerations besides the straightforward decisions regarding health claims and nutrition information. For example, literature shows that package design elements, such as colors (Schuldt 2013), imagery (Underwood and Klein 2002), shape (Raghubir and Greenleaf 2006) and size (Ordabayeva and Chandon 2013) can also
guide inferences about specific food attributes (such as taste, healthfulness and quality) and can further influence choice and consumption.

Given their more implicit nature, such design elements become particularly effective in low-involvement situations such as food decision-making, when consumers only spend a limited amount of time to make their decisions (Park et al. 1989). This means that quite frequently consumers will not allocate sufficient cognitive resources to read all the available written information but will instead simplify their decisions by using certain heuristic cues. Cues that are otherwise unrelated to the decisions-making context become diagnostic sources of information and can guide specific inferences about the product and the brand (e.g., attributes and benefits). It is thus often the case that package design visuals will override the written information provided on the package and influence consumers’ health-related inferences and behaviors (e.g. Karnal et al. 2016; Koo and Suk 2016).

However, when it comes to how package design is used to communicate health-related attributes, not much is known besides some anecdotal evidence. Therefore, management decisions of package design could be rather arbitrary – either based on intuition and experience or by speculating on current trends in the “healthy foods” market. In time, however, a pattern might emerge such that certain package design elements will become typical of the health positioning within a food product category, while others will remain universal descriptors of the category or specific to the individual brands.

It is our undertaking in the present research to explore whether such patterns can be observed in the marketplace. Therefore, the objective of our investigation is twofold. Firstly, we want to gain a better understanding of the practice surrounding package design for food brands. We accomplish this in a pilot study by conducting interviews with five brand and marketing managers from five different food companies in Denmark. Secondly, we want to investigate whether certain patterns can be identified in the marketplace when it comes to the package design visuals used to convey health-related attributes of brands and whether these
differ from those used for regular brands. We approach our second objective in Studies 1 and 2 by performing a content analysis of package design communication across two countries (Denmark and the USA) and several food product categories.

Theoretical Background

Classification of Package Design Elements

In its most common sense, food package design encompasses all the ways food products are wrapped and presented to consumers in retail stores (Chandon 2013). Apart from its functional purpose, package design serves communication purposes, especially at point-of-purchase. The advantage of package design over other marketing instruments is that it reaches consumers the moment they are scanning the shelves of the store and try to make a purchase decision. As such, a properly designed package draws attention to the product, creates strong associations that differentiate it from competitors, evokes positive feelings, and has the power to influence choice and consumption (Chandon 2013; Orth and Malkewitz 2008).

Package design consists of a set of elements that work together to communicate a certain message to consumers. The way these elements are selected and put together is crucial in order to transmit the desired message. A look into the relevant literature indicates that there are various approaches to classifying the elements of package design. For example, Silayoi and Speece (2007) classify them as either informational (information about the product, slogan, and labels) or visual (graphics, color, imagery, shape, and size). On the other hand, Underwood (2003) classifies them as either graphic (color, typography, image) or structural (shape, size, material). The first classification categorizes structural and graphic elements
in the same block (visual), while the second classification fails to consider informational elements.

However, for a comprehensive understanding of package design communication, it is essential that all three categories be considered, as well as their differences and similarities. In regards to health communication, informational elements are those that position the food product as healthy (e.g., low fat) and represent the basis for the decisions regarding other package design elements. Furthermore, distinguishing between graphic and structural elements is also necessary, as these groups have distinctive characteristics. Graphic elements are those printed on the package, offering visual identity to the food product. The most prominent and well-documented graphic elements are colors and imagery (Becker et al. 2011; Poor et al. 2013), but other subtle graphic elements such as the typography and arrangement of elements on the package have also been addressed in the literature (Ampuero and Vila 2006; Chae and Hoegg 2013). As opposed to graphic elements, structural elements are those that give form and texture to the product (e.g., shape, size, material). Although they also contribute to the visual identity of the food product and can influence consumer inferences (Koo and Suk 2016; Sevilla and Kahn 2014), they are mainly tied to their functional role (e.g., type of product, safety, transportation considerations).

Considering the above, the approach in the present research is to categorize package design elements as informational, graphic or structural. Naturally, this is a simplification; in reality, these three categories are often indistinguishable from each other, such as when the brand name or specific product claims are in fact a mix of informational elements (the verbiage used) and graphic elements (color and typography). Rather, the current approach to classifying package design elements is literature-driven and is meant to highlight their operational differences in generating product-related inferences and influencing consumer behavior.

One important distinction is the form these elements take and how explicitly they convey information. Informational elements commonly manifest either through written language (specific claims) or through a well-established
system of symbols (such as when an organic logo is prescribed a meaning beforehand). This means they are generally designed to communicate the message more explicitly. Even though quite often they can also be misinterpreted, informational elements still represent the most direct way to communicate certain attributes to consumers.

Graphic elements manifest through pictorial and stylistic representations and therefore rely on specific metaphors and learned associations to convey meaning. This implicit form of communication also entails that marketers have less control over how the message is decoded at the other end of the communication channel – colors and imagery can have multiple meanings, and what meaning is activated rests on the particularities of the marketing context and of the consumer.

Finally, structural elements have mainly a functional role. Yet, similarly to graphic elements, structural elements also provide visual input that can generate higher-level inferences about the product, but also perceptually driven judgments (e.g., volume perception) (Raghubir and Krishna 1999). Another distinguishing feature of the structural elements is that they also operate in a three-dimensional environment. This means that consumers, besides their visual sense, can also use their haptic and motor senses to generate input – by touching or handling the package. This additional feature makes the study and understanding of structural elements more complex (Krishna and Morrin 2008).

Our argument is that these three categories vary in how explicitly they convey product-related inferences (such as perceived healthfulness) to consumers. A visual depiction of the three main categories can be observed in Figure 1 below. In the following section, we elaborate on the role of graphic and structural elements on consumer response in a food-related context.
Graphic Elements and Consumer Response

Graphic elements have an underlying meaning, conveying the message to consumers indirectly. Color is one of the most important graphic elements, as it has been shown to influence consumer response across many contexts (Labrecque et al. 2013).

In regards to food-related inferences, current research indicates that colors also guide consumer judgments about food product attributes such as taste (Becker et al. 2011), caloric content and overall healthfulness (Karnal et al. 2016; Schuldt 2013). To illustrate, one study reported that a candy bar was perceived as healthier when the package had a green as compared to a red calorie label, even though the labels had the same calorie content (Schuldt 2013). Certain properties of colors also affect consumers’ perceptions and responses. For example, highly saturated packaging colors lead consumers to anticipate a more intense product taste (Becker et al. 2011). Colors have also been shown to carry a certain visual weight. In general, red and blue are the heaviest color hues, whereas orange and yellow are the lightest (Pinkerton and Humphrey 1974). Karnal et al. (2016) further demonstrated that color heaviness influences consumers’ healthfulness perception.
Considering the pervasive impact of colors on consumer response, and in particular on judgments about specific food products attributes (such as healthfulness), our first aim is twofold. Firstly, we aim to identify what are the predominant color hues used in food package design – both at a general level and comparing health brands and regular brands. Secondly, we want to explore whether certain color tones are more frequently used (across and within health and regular brands). By color tone, we understand the degree to which the color is more dark and intense (as opposed to more light and faded). Our working definition does not therefore fully overlap with the term “tone” as used in color research. Therefore, our first research question is as follows:

**RQ1:** What are the predominant color hues and tones used in food package design, and do they differ between health brands and regular brands, both across and within food categories?

Apart from colors, imagery also plays a significant role in how consumers evaluate a food product. For example, consumers use pictures on the package to infer intrinsic product attributes, such as healthfulness and tastiness (Underwood and Klein 2002). Deng and Kahn (2009) show that when a product image is in the lower-right section of a package, consumers infer the product is heavy (vs. light), but this inference is weakened if they believe the product to be healthy. Another study, by Madzharov and Block (2010), demonstrates that the number of product units displayed on a package biases consumers' perceptions of product quantity and influences their consumption. Specifically, when more units of products were displayed on the package, consumers believed the pack contained more products and therefore consumed more of it (despite actual serving size suggestions). Furthermore, in an advertising context, Chrysochou and Grunert (2014) found that imagery had a significant influence on perceived product healthfulness. As such, an image depicting well-being, exercise, and freshness could cause consumers to infer that the product is also more healthful. Another interesting finding is that consumers are misguided concerning how processed the product depicted on the package is (Machiels and Karnal 2016). Specifically, images depicting unprocessed
foods imply product naturalness, although less taste. Similarly, Smith et al. (2015) reported that the taste of food products was perceived as more natural when images of the specific product were present on the package. This effect was enhanced when the image was a real photograph (as opposed to a drawing). Furthermore, food products depicted in motion (as opposed to static) generate better evaluations in terms of freshness and appeal of the food products (Gvili et al. 2015).

Given the importance of imagery in generating food-related inferences, our next objective is to identify what is the most frequent type of imagery used in food package design both at a general level and when comparing health brands and regular brands. Specifically:

**RQ2:** What is the predominant type of imagery used in food package design, and does it differ between health brands and regular brands both across and within categories?

**Structural Elements and Consumer Response**

Structural elements have also been shown to influence consumers’ responses in a number of ways. First, like graphic elements, they can carry certain symbolic associations that influence specific consumer inferences. However, they can also influence consumption amount, albeit through more perceptual and visually driven mechanisms.

In this regard, shape is one of the most well documented structural elements of package design (e.g., Becker et al. 2011; Folkes and Matta 2004). Shape can offer products identity (Underwood 2003), and it can influence consumers’ perceptions and preferences for a product (Raghubir and Greenleaf 2006). Furthermore, it can evoke different taste impressions, such that more angular package shapes are associated with more intense flavors (Becker et al. 2011). Shape also has important influences on volume and quantity perceptions, which further
influence consumption amount. For example, Sevilla and Kahn (2014) demonstrated that incompletely shaped products are perceived to be smaller. This effect backfires, as they also tend to consume more, due to reduced size estimations. When it comes to health inferences, recent studies have shown that shape can also bias calorie estimation. For example, products in wider packages are perceived to have more calories than products in elongated packages (Koo and Suk 2016).

Considering the subtle but powerful impact shape has on both specific food product inferences and consumption, our next objective is to identify the most frequent shapes used in food package design. Therefore:

**RQ3:** *What are the predominant shapes used in food package design, and do they differ between health brands and regular brands both across and within categories?*

Material is another structural element that can be used to signal the nature of a food product. For example, when the packaging texture is rougher, consumers believe the product to be crunchier and harder (Piqueras-Fiszman and Spence 2012). Consumers also perceive packaging material to have an important impact on the environment. Specifically, consumers believe paper-based packaging to be environmentally preferable to other materials such as plastic or metal. Such environment-related cues are often used to make inferences beyond their intended content. For example, Lee et al. (2013) found that consumers evaluated food products with organic labels to be lower in calories than those without the organic labels. Similarly, a recent study showed that a company’s CSR practices can make consumers believe that a product is lower in calories and healthier overall (Peloza et al. 2015). In a similar fashion, packaging materials perceived to be more environmentally friendly (e.g., recycled materials and paper) could make food products appear healthier to consumers (Labrecque and Milne 2012). Therefore, our fourth research question reads:

**RQ4:** *What are the predominant materials used in food package design, and do they differ between health brands and regular brands both across and within categories?*
Another characteristic of materials that has been shown to influence consumers’ response to packaged food and their consumption amount is the level of package transparency. Specifically, Deng and Srinivasan (2013) showed that transparent packages influence food salience and consumption monitoring which can result in either an increased or decreased consumption amount, depending on food characteristics. For small and visually attractive foods, consumers eat more from a transparent package (as opposed to an opaque package). For large foods, on the other hand, transparent package’s decreases consumption. Therefore, our fifth research question relates to how frequently is transparency used in food package design:

**RQ5:** *What is the predominant level of transparency (transparent vs opaque) used in food package design, and does it differ between health brands and regular brands both across and within categories?*

The present research takes an atomistic perspective (i.e., it treats each package design element separately), not without acknowledging that the interaction among the various elements (van Rompay and Pruyn 2011) and the holistic impression of the package design (Orth and Malkewitz 2008) are factors that ultimately influence consumer response. In what comes next, the results of our pilot study are presented, exploring management practices regarding brand communication through package design. Following this, the results of the first and second studies will be reported and discussed, exploring potential patterns in the package design of health brands in two different countries, Denmark and the USA.
Pilot Study: Managerial Beliefs on Package Design

Our pilot study provides insights into how marketing managers make decisions regarding package design and whether they consider implicit package design elements as relevant in brand communication. Our objective in this study was to explore how managerial decisions about the package design of food brands are actually made and whether package design elements are perceived as important in communicating brand values.

Method

We conducted five semi-structured key-informant interviews with brand managers from five food companies in Denmark. The key informant technique is an ethnographic research method originally used in the field of cultural anthropology and is now being used more widely in other branches of social science investigation (Marshall 1996). The method relies on in-depth interviews with subjects who are knowledgeable of the topic being investigated. For the purpose of our study, we used semi-structured focused interviews (Merton and Kendall 1946), in which respondents are interviewed for a short period, following a specific set of open-ended questions derived from a study protocol.

The selection of the brand cases aimed at achieving diversity in regards to several characteristics: food product category, type of claims, type of brand and type of company. The selected brands belong to the bakery, dairy, processed meat and jams and seasonings product categories (see Table 1). Furthermore, for the purpose of our study, we defined as key-informants the brand managers or marketing directors of each brand. This is because brand and marketing managers
are the most involved in the positioning of the product in the market and are therefore more knowledgeable about the different marketing instruments used for this purpose, including the package design of the brand. In total, five interviews were conducted, one for each brand case.

**TABLE 1**

SAMPLE BRANDS

<table>
<thead>
<tr>
<th>Cases</th>
<th>Product category</th>
<th>Positioning claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand 1</td>
<td>Bakery</td>
<td>Organic, Wholegrain</td>
</tr>
<tr>
<td>Brand 2</td>
<td>Bakery</td>
<td>Environmentally Friendly, High/Added Fiber, Low/No/Reduced Fat, No Additives/Preservatives, Wholegrain</td>
</tr>
<tr>
<td>Brand 3</td>
<td>Dairy</td>
<td>Organic, Convenient Packaging, High/Added Fiber, Low/No/Reduced Fat</td>
</tr>
<tr>
<td>Brand 4</td>
<td>Processed meat</td>
<td>Ease of use, Low/No/Reduced Fat, No Additives/Preservatives</td>
</tr>
<tr>
<td>Brand 5</td>
<td>Jams and seasonings</td>
<td>Low/No/Reduced Calorie, Low/No/Reduced Sugar, No Additives/Preservatives, Organic</td>
</tr>
</tbody>
</table>

We developed an interview guide that included questions focusing on the packaging strategy of the selected brand. Specifically, the discussion started with a warm-up talk meant to acquire background information about the respondents and their position in the companies. The next two sections focused on acquiring broader information about two essential aspects of our investigation: the packaging design process in the company and background information about the brand in focus. The fourth section aimed to dig more deeply into the role of package design in the marketing and communication strategy of the selected brand. Finally, we closed the interview by discussing the effectiveness of package design in the marketing strategy of the specific brand as well as the managers’ research needs in regards to package design. Each interview lasted approximately 60 minutes, was audio-recorded and was subsequently transcribed verbatim for data coding and analysis.
Package design was generally acknowledged as an important instrument for consumer experience and convenience enhancement, but also for communicating information about the products. For example, package design decisions are based on effective communication of core brand values (e.g., organic or healthy). For this purpose, managers see as essential the package design elements that directly communicate this (i.e., logos such as the keyhole, wholegrain, organic), but more-implicit cues, such as colors, are also seen as important.

While some informants emphasize the role of package design as a source of brand differentiation in the category and thus the need of continuous innovation in this area (e.g. “Continuous change in regard to packaging is very important as competition may try to copy our design characteristics, like for example the increase in the transparent part of the package”), other informants stated that package design may follow the standard design that competitors apply in their products (e.g. the plastic pack case for cold cuts), since it is the one dominating the market and consumers are familiar with it. Yet, it also depends who the competitor is, as sometimes it may be wise to avoid using design elements that consumers associate with low quality or low price, such as private labels. “If you go out in supermarkets and see how they design their own private labels, you will see that they are boring, low-price perceived, and then if you take the branded products…you can see a difference in the graphic elements, design elements, logos, as well. And we try to deal with those branded products…because I believe that the consumer will like nice things to look at and not those cheap things to look at.”

When it comes to specific elements of package design, our informants agreed that all package design elements are important to a certain extent in communicating brand values. Graphic elements such as color ($M=2.6$) and imagery ($M=3$) were perceived, on average, as more important than structural elements such as shape ($M=2.6$), size ($M=2.2$) and material ($M=2.6$) (See Table 2).
### TABLE 2

**IMPLICIT PACKAGE DESIGN ELEMENTS AND BRAND VALUES COMMUNICATION**

<table>
<thead>
<tr>
<th>Packaging element</th>
<th>Import. rating*</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>2,6</td>
<td>“You can create something, which looks terrible, with the wrong colors. But in terms of colors when you are selling organic products, you don’t want to be too colorful … I would say simple colors”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Because, if you look into the consumer, they are saying, a lot of them are going to look into the color. They know the blue color is what they normally buy. It’s a very low involved category, bread, so you are going very fast to the department of bread and there you can see the blue one and you pick it up.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“…if we would change the core colors, people wouldn’t recognize it and they wouldn’t pick it up, so I think for that sake they are very important because of tradition and they are associated maybe not with the brand but with the product.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“…in our opinion it’s a world in difference to add dark, let’s call it quality signals...”</td>
</tr>
<tr>
<td>Imagery</td>
<td>3</td>
<td>“We want the brand to stand out and we also want to make sure that the brand is trustworthy. With the photographs of the food we actually don’t make a lot of cheating in terms of using food styling; It’s just real, what’s inside … you want to make sure that the consumer gets what he sees.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Extremely important, if we have bad cheese images that can, you know, that can make people not pick you up…everything that can help people think how it would taste, is good.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“…we use photographic raw materials, tomatoes…and the new label sign use illustrations of the raw materials, so they are painted and then put on the labels.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“The old design we have had since 2006 and I think here 8 years later it’s time to look at it again and say what is normal in 2014 for high end products and we have used our advertising agency to tell us about some possible ways to go…and we chose to use ourselves hand-painted illustrations.”</td>
</tr>
<tr>
<td>Shape</td>
<td>2,6</td>
<td>“A lot of times it’s not something you really work with, but it’s important.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“It’s also important if you want to be different from the competitor or from our other brands”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“…people like to pick up different things, different shapes, different colors, different textures…and if it helps to understand how the cheese is, it’s even better …”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>”...earlier we have been working with round shape, it means that we will lose a lot of space in the coolers, that’s why all the packagings or nearly all the packagings are square.”</td>
</tr>
<tr>
<td>Size</td>
<td>2,2</td>
<td>“It’s also very important, because they are priced on pack.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“size does matter, because if you have 500 to 600 grams people wouldn’t buy it because it's too big.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“…we are working with a code of conduct in packaging sizes, we can’t go down in smaller size because we also have to make the products, they have to be able to be in the package and if we go up in packaging size, packaging would be much more expensive…”</td>
</tr>
<tr>
<td>Material</td>
<td>2,6</td>
<td>“We try to go for FSC cardboard ... because if we want to be considered as a social or environmental company, we also have to choose packaging, which is environmentally friendly. It’s going all the way from the core product to the packaging.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“…there are…from all clients specified demands on what type of material we can use, of course it has to be approved for food and then second it has to fit our machines…”</td>
</tr>
</tbody>
</table>

*1=not important; 3= very important;
Graphic elements. The discussion surrounding color was shaped by two main themes. The first theme emerged around the symbolic meaning of colors and their potency in signifying and communicating specific values, such as organic or quality: “In terms of colors when you are selling organic products, I mean, you don’t want to be too colorful.” “…in our opinion, it’s a world of difference to add dark, let’s call it quality signals…” A second theme revolved around the assertion that colors are important in fast brand or product category recognition, especially in low-involvement categories. For example, “If you change the color, people wouldn’t recognize the brand”. Further, the informants generally agreed that imagery is particularly important to communicate information about the content of the package. The images help consumers understand what the product is and how it would taste, but also indicates how it can be consumed: “It could be inspiring for the consumer”; “If we have any chance to do it, we always put a picture to imagine how you can use the products.” Informants also indicated that imagery should stand out, be realistic and increase trustworthiness: “Imagery is as realistic as possible so that the consumer gets what he sees”; “We want the brand to stand out, and we also want to make sure that the brand is trustworthy. So when we make photographs of the food we actually don’t make a lot of cheating, in terms of using food styling. It’s the real product…”

Structural elements. As expected, package shape is most often discussed in terms of its functional role, for example storage purposes: “With round shape … we lose space in the coolers, that’s why nearly all the packages are square.” While some of the informants also perceived it to be relevant for brand differentiation: “It’s also important if you want to be different from the competitor or from our other brands”, shape does not usually make the top of the list in managers’ priorities: “A lot of times it’s not something you really work with, but it’s important.” The decisions regarding material are often constrained by its functional purpose and by its technical specifications: “What type of material we can use, of course it has to be approved for food and then second it has to fit our machines…” However, informants also recognize the role the type of material used could have in communicating certain values about the brand and the company. “We try to go for FSC cardboard … because if we want to be considered as a social or
environmental company, we also have to choose packaging, which is environmentally friendly. It’s going all the way from the core product to the packaging.”

Discussion

From the excerpts above and from the general impression of the researcher after the interviews, it becomes obvious that our informants place a high degree of importance on package design. As to what design elements they consider relevant for communicating brand values, the details reside within each brand’s idiosyncratic characteristics and within each manager’s experience and appraisal. However, common themes emerged during the interviews, and certain “know-hows” seem to be widely spread within the profession and acknowledged as facts.

Study 1: Content Analysis of Package Design in Denmark

The aim of the first study was to explore what are the predominant visuals used in food package design in Denmark and whether they differ between health brands and regular brands. To address the objective of the study, a content analysis of food packages was employed. Content analysis is a research method that has been traditionally used to analyze the characteristics and content of written, spoken or pictorial communication (e.g., TV programs, books, magazines, advertisements) (Hsieh and Shannon 2005). More recently, it has also been employed for analyzing the content of package design communication, the same approach the current study takes (i.e. Elliott 2008).
Method

The data were drawn from Mintel GNPD (www.gnpd.com), a database that provides information about new product launches and covers a broad area of product categories. The information provided is both textual (i.e., certain characteristics of the products are already coded in the database) and visual (pictures of the product packages).

The sampling frame was defined according to three criteria: country, time interval of food product launches and food product categories. Two additional criteria were considered before extracting the sample. The first criterion was to ensure that the selected product categories have a high proportion of products that carry a dominant health-positioning claim. The second criterion was to vary the degree of virtuousness/viceness of the product categories. A vice product category is one that is perceived as less healthy and more impulsive (e.g., potato chips), while a virtue product category is one that is perceived as more healthy and less impulsive (e.g., yogurt) (Chernev and Gal 2010).

The extracted sample consists of food products launched in Denmark between 2012 and 2015 covering six product categories (yogurt, bread products, sweet and savory biscuits, breakfast cereals and juice). In total, 562 products were identified in the database, of which 148 (26.3%) carried the category dominant health positioning claim. The category dominant health-positioning claim (HPC) refers to the health-related claim that is carried more frequently in each product category, based on the extracted sample (see Table 3).
### TABLE 3

SAMPLE CHARACTERISTICS - DENMARK

<table>
<thead>
<tr>
<th>Category</th>
<th>HPC*</th>
<th>With HPC*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Yogurt</td>
<td>23</td>
<td>29.9</td>
<td>77</td>
</tr>
<tr>
<td>Bread products</td>
<td>48</td>
<td>43.6</td>
<td>110</td>
</tr>
<tr>
<td>Sweet and savory biscuits</td>
<td>18</td>
<td>18.8</td>
<td>96</td>
</tr>
<tr>
<td>Breakfast cereals</td>
<td>28</td>
<td>46.7</td>
<td>60</td>
</tr>
<tr>
<td>Carbonated beverages</td>
<td>11</td>
<td>22.4</td>
<td>49</td>
</tr>
<tr>
<td>Juice</td>
<td>20</td>
<td>11.8</td>
<td>170</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>148</td>
<td>26.3</td>
<td>562</td>
</tr>
</tbody>
</table>

* HPC stands for Health positioning claim

### TABLE 4

CODING SHEET

<table>
<thead>
<tr>
<th>Package design elements</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Informational elements</strong></td>
<td></td>
</tr>
<tr>
<td>Health positioning claim</td>
<td>If the product carries the dominant health related claim within the product category (Yes; No)</td>
</tr>
<tr>
<td><strong>Graphic elements</strong></td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Which are the more prominent colors on the package (White; Yellow; Orange; Red; Pink; Purple; Blue; Green; Brown; Black; Grey; Other)</td>
</tr>
<tr>
<td>Color tone</td>
<td>Which is the predominant shade of the colors on the package - more than 2/3 the pack (Dark and/or intense; Light and/or faded; Half and half;</td>
</tr>
<tr>
<td>Imagery presence</td>
<td>If there is an image on the package of the product (Yes; No)</td>
</tr>
<tr>
<td>Product imagery</td>
<td>If the image on the package depicts the product, either final or ingredients of the final product (Yes; No)</td>
</tr>
<tr>
<td>Nature imagery</td>
<td>If the image on the package depicts an element of nature that is not part of the final product (Yes; No)</td>
</tr>
<tr>
<td>Health imagery</td>
<td>If the image on the package communicates healthfulness (Yes; No)</td>
</tr>
<tr>
<td><strong>Structural elements</strong></td>
<td></td>
</tr>
<tr>
<td>Transparency</td>
<td>If the package is transparent (Yes; No)</td>
</tr>
<tr>
<td>Shape roundness</td>
<td>The shape of the package (Angular; Rounded)</td>
</tr>
<tr>
<td>Shape convexity</td>
<td>The shape of the package (Convex; Concave; Straight)</td>
</tr>
<tr>
<td>Material</td>
<td>What is the package material (Board; Paper; Plastic)</td>
</tr>
</tbody>
</table>
Each package extracted from the database represented the coding unit of analysis. A code sheet was developed to record informational, graphical and structural elements of package design. Table 4 presents the package design elements we included in the code sheet together with the description provided and the coded answers.

The content analysis of each package was conducted by two independent judges. To ensure objectivity, both judges were briefed and trained in order to increase familiarity with the coding scheme (Kolbe and Burnett 1991).

**Results**

The analysis was conducted by calculating frequencies and proportions for the whole sample of products, as well as for each product category separately. Differences between products with the dominant health positioning claim (+HPC) and without the dominant health positioning claim (-HPC) were further estimated (see Table 5).

**Graphic elements.** In relation to color, most packages had a predominantly white color (57.5%), followed by blue (26.4%), green (21.0%), red (20.6%), yellow (15.7%), black (15.1%), orange (13.0%), brown (9.1%), pink (7.8%), and purple (4.8%). No significant differences were observed in the use of colors for +HPC products and -HPC products. In regards to color tone, the majority of packages had a light/faded color shade (48.9%), followed by dark/intense (32.2%) and balanced (18.9%). Significant differences were found between products with and without a HPC. Products with a health-related claim had a predominant use of light/faded color tones as opposed to products without a health-related claim, which had a predominant use of dark/intense color tones. In relation to imagery, 89.9% of the products investigated had an image present at the front of the package. Of these, 79.8% were depictions of the product inside, 49.9% had an image representing health, and only 13.4% of the products had an image
representing nature. The only significant difference between products with and without a health claim was in the use of nature imagery. Specifically, images of nature were more frequently used for products carrying a health-related claim.

Structural elements. In relation to shape angularity, 66% of the products had an angular shape and 34.0% had a rounded shape. Significant differences between the two types of products were found. Products with a health claim had more packages with an angular shape (as opposed to round). Regarding the shape form, 84.2% of the products had a straight form, 9.3% a concave form and 6.6% a convex form. Significant differences between the two types of products were found. Products with a health claim had more packages with a straight form. With regards to transparency, 41.1% of the products had a transparent package. No significant differences between the two types of products were found. Finally, in relation to package material, the majority of products consisted of plastic (56.9%), followed by board (22.2%) material. Significant differences in the use of material between the two types of products were found. +HPC product packages consisted of more plastic (64.9%) and paper (8.8%) material, while –HPC product packages consisted of more glass (8.9%) material.
### TABLE 5
DISTRIBUTION OF PACKAGE DESIGN ELEMENTS – AGGREGATED RESULTS DK

<table>
<thead>
<tr>
<th></th>
<th>Total (%)</th>
<th>+HPC* (%)</th>
<th>-HPC* (%)</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Graphic elements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>57.5</td>
<td>60.8</td>
<td>56.3</td>
<td>0.92</td>
<td>0.339</td>
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<td>Blue</td>
<td>26.4</td>
<td>26.1</td>
<td>26.2</td>
<td>0.00</td>
<td>0.950</td>
</tr>
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<td>Green</td>
<td>21.0</td>
<td>20.9</td>
<td>21.0</td>
<td>0.00</td>
<td>0.986</td>
</tr>
<tr>
<td>Red</td>
<td>20.6</td>
<td>18.9</td>
<td>21.3</td>
<td>0.36</td>
<td>0.547</td>
</tr>
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<td>Yellow</td>
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<td>14.2</td>
<td>16.2</td>
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<td>0.567</td>
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<td>Black</td>
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<td>14.0</td>
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<td>Orange</td>
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<td>13.5</td>
<td>12.8</td>
<td>0.05</td>
<td>0.825</td>
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<td>Brown</td>
<td>9.1</td>
<td>10.8</td>
<td>8.5</td>
<td>0.73</td>
<td>0.392</td>
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<td>Pink</td>
<td>7.8</td>
<td>10.8</td>
<td>6.8</td>
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<td>0.116</td>
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<td>Purple</td>
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<td>5.4</td>
<td>4.6</td>
<td>0.16</td>
<td>0.690</td>
</tr>
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<td><strong>Color Tone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark/Intense</td>
<td>32.2</td>
<td>16.9</td>
<td>37.7</td>
<td>21.58</td>
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</tr>
<tr>
<td>Light/Faded</td>
<td>48.9</td>
<td>64.2</td>
<td>43.5</td>
<td>18.72</td>
<td>0.000</td>
</tr>
<tr>
<td>Balanced</td>
<td>18.9</td>
<td>18.9</td>
<td>18.8</td>
<td>0.00</td>
<td>0.983</td>
</tr>
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<td><strong>Imagery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imagery presence</td>
<td>89.9</td>
<td>88.4</td>
<td>88.8</td>
<td>0.23</td>
<td>0.629</td>
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<tr>
<td>Product imagery</td>
<td>79.8</td>
<td>80.5</td>
<td>79.5</td>
<td>0.05</td>
<td>0.817</td>
</tr>
<tr>
<td>Nature imagery</td>
<td>13.4</td>
<td>19.5</td>
<td>11.2</td>
<td>5.85</td>
<td>0.016</td>
</tr>
<tr>
<td>Health imagery</td>
<td>49.9</td>
<td>51.1</td>
<td>49.5</td>
<td>0.11</td>
<td>0.741</td>
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<td></td>
<td></td>
<td></td>
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<td><strong>Material</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic</td>
<td>56.9</td>
<td>64.9</td>
<td>54.1</td>
<td>5.15</td>
<td>0.023</td>
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<td>8.8</td>
<td>2.2</td>
<td>12.66</td>
<td>0.000</td>
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<td>Board</td>
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<td>18.2</td>
<td>23.7</td>
<td>1.86</td>
<td>0.173</td>
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<tr>
<td>Glass</td>
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<td>0.7</td>
<td>8.9</td>
<td>11.80</td>
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<td>Metal</td>
<td>5.7</td>
<td>4.7</td>
<td>6.0</td>
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<td>0.555</td>
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<td><strong>Transparency</strong></td>
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<td></td>
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<tr>
<td>Visible product</td>
<td>41.1</td>
<td>36.5</td>
<td>42.8</td>
<td>1.77</td>
<td>0.184</td>
</tr>
<tr>
<td><strong>Shape</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angular</td>
<td>66.0</td>
<td>77.0</td>
<td>62.1</td>
<td>10.86</td>
<td>0.001</td>
</tr>
<tr>
<td>Rounded</td>
<td>34.0</td>
<td>23.0</td>
<td>37.9</td>
<td>10.86</td>
<td>0.001</td>
</tr>
<tr>
<td>Convex</td>
<td>6.6</td>
<td>4.7</td>
<td>7.2</td>
<td>1.12</td>
<td>0.289</td>
</tr>
<tr>
<td>Concave</td>
<td>9.3</td>
<td>6.8</td>
<td>10.1</td>
<td>1.49</td>
<td>0.222</td>
</tr>
<tr>
<td>Straight</td>
<td>84.2</td>
<td>88.5</td>
<td>82.6</td>
<td>2.85</td>
<td>0.091</td>
</tr>
</tbody>
</table>

* HPC stands for Health Positioning Claim; +HPC = Products carrying the HPC; -HPC = Product not carrying the HPC
Discussion

In general, it seems that the most prominent differences between health brands and regular brands lie in the use of color tone, nature imagery, specific materials and shapes. Health brands make more use of light and faded colors, whereas regular brands are more likely to utilize dark and intense colors for the package. This might actually be an effective strategy, since previous research has shown that lighter colors on the package make a food product appear healthier (Karnal et al. 2016), whereas more saturated colors lead consumers to anticipate a more intense taste (Becker et al. 2011). Furthermore, nature imagery seems to be used more for healthy brands, although the proportion itself is not very large. Paradoxically, both plastic and paper materials are used more for health brands. The use of plastic might be in contradiction to the claimed healthfulness of the product, as consumers are often shown to infer health from environment-related cues (Lee et al. 2013; Peloza et al. 2015). Paper is also used more for health brands, although the proportion is negligible. This, however, might point to a growing trend to make a product look more healthy and natural through the use of natural packaging solutions. Finally, we also observed a more predominant use of angular shapes for health brands and rounded shapes for regular brands. While this might actually be an artifact of the specific product categories and their preservation and storage needs, research shows that the use of shape angularity can influence specific inferences about the product (Becker et al. 2011).

If we take a more in-depth look into the specific categories, we understand that not all the aggregated patterns manifest similarly within categories. Rather, each category might also have its specific characteristics and practices that frame the difference between health and regular brands (see Appendix A for an overview of the results within each food product category).
Study 2: Content Analysis of Package Design in USA

The aim of the third study is to explore what constitutes a prototypical package design for health food brands in the USA. The research design, sample selection criteria and coding procedure were the same as those used in Study 2. This time, six independent judges were trained to conduct the content analysis of the packages.

Method

The sample consists of food products launched in the US between 2013 and 2015, covering six product categories (corn-based snacks, potato snacks, savory biscuits and crackers, bread products, hot cereals and juice). In total, we identified 1804 products in the database, of which 40.3% carry the category dominant health-positioning claim (see Table 6).

<table>
<thead>
<tr>
<th>Category</th>
<th>HPC*</th>
<th>With HPC*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Corn-based snacks</td>
<td>Low/no/reduced transfat</td>
<td>191</td>
<td>44.5</td>
</tr>
<tr>
<td>Potato snacks</td>
<td>Low/no/reduced transfat</td>
<td>136</td>
<td>35.8</td>
</tr>
<tr>
<td>Savory biscuits &amp; crackers</td>
<td>Wholegrain</td>
<td>91</td>
<td>25.3</td>
</tr>
<tr>
<td>Bread products</td>
<td>Low/no/reduced transfat</td>
<td>231</td>
<td>31.0</td>
</tr>
<tr>
<td>Breakfast hot cereals</td>
<td>Wholegrain</td>
<td>125</td>
<td>60.7</td>
</tr>
<tr>
<td>Juice</td>
<td>Low/no/reduced sugar</td>
<td>180</td>
<td>42.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>954</strong></td>
<td><strong>37.5%</strong></td>
<td><strong>2545</strong></td>
</tr>
</tbody>
</table>

* HPC stands for Health positioning claim
Results

Graphic elements. In relation to color, the majority of the products had a white color (46.4%), followed by green (28.4%), red (27.4%), yellow (26.7%), blue (25.4%), orange (20.9%), brown (16.4%), black (12.5%), purple (8.4%) and pink (3.2%). In this study, we observed significant differences in the use of colors between products with and without HPC. Products with HPC had more white (49%), green (32.7%), yellow (29%) and brown (21.6%) on the package, while products without HPC had more black (14.9%) on the package. Furthermore, dark and intense colors are more likely to be used for –HPC products (45.6%), while balanced colors are more likely to be used for +HPC products (34.2%). In relation to imagery, 82.6% of the products had an image on the package. Of these, 88.9% represented the product inside, 24% depicted nature imagery and 47.5% had health imagery. We observed significant differences in the use of imagery between the two groups of products. More packages with an image (87.3%) were found among +HPC products than among –HPC products (79.8%). Furthermore, products with an HPC had more health-related imagery (56.2%) than products without an HPC (41.7%).

Structural elements. Regarding package material, the majority of products consisted of plastic (82.5%), followed by board (7.9%) and paper (4.7%) materials. We observed significant differences in the use of material between the two product groups. Products with an HPC consisted of more paper (8.6%) and less plastic (75.8%) material when compared with products without an HPC (2.4% and 86.5%, respectively). In relation to transparency, 42% of the products were visible through the package. Products without an HPC had significantly more packages with visible products (44.6%) than products with an HPC (37.8%). Regarding the shape, 63.5% of the products had an angular shape. Again, we can observe significant differences between the two groups. Products with an HPC had angular packages more often (68.4%) than products without a claim (60.5%) (see Table 7).
<table>
<thead>
<tr>
<th></th>
<th>Total (%)</th>
<th>+HPC* (%)</th>
<th>-HPC* (%)</th>
<th>$\chi^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Graphic elements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Color</strong></td>
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<td></td>
</tr>
<tr>
<td>White</td>
<td>46.4</td>
<td>49.0</td>
<td>44.9</td>
<td>3.9</td>
<td>0.049</td>
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<td>Green</td>
<td>28.4</td>
<td>32.7</td>
<td>25.9</td>
<td>13.7</td>
<td>0.000</td>
</tr>
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<td>Red</td>
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<td>27.5</td>
<td>27.4</td>
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<td>0.962</td>
</tr>
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<td>Yellow</td>
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<td>29.0</td>
<td>25.4</td>
<td>4.1</td>
<td>0.043</td>
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<td>Blue</td>
<td>25.4</td>
<td>23.5</td>
<td>26.5</td>
<td>2.9</td>
<td>0.091</td>
</tr>
<tr>
<td>Orange</td>
<td>20.9</td>
<td>20.9</td>
<td>20.9</td>
<td>0.0</td>
<td>0.984</td>
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<td>Brown</td>
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<td>21.6</td>
<td>13.3</td>
<td>29.6</td>
<td>0.000</td>
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<td>Black</td>
<td>12.5</td>
<td>8.4</td>
<td>14.9</td>
<td>23.3</td>
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<td>Purple</td>
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<td>2.8</td>
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<tr>
<td>Dark/Intense</td>
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<td>40.7</td>
<td>45.6</td>
<td>5.9</td>
<td>0.015</td>
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<td>25.2</td>
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<td>25.8</td>
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</tr>
<tr>
<td><strong>Imagery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imagery presence</td>
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<td>87.3</td>
<td>79.8</td>
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<td>0.000</td>
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<tr>
<td>Product imagery</td>
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<td>89.7</td>
<td>88.4</td>
<td>0.9</td>
<td>0.355</td>
</tr>
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<td>Nature imagery</td>
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<td>25.9</td>
<td>22.8</td>
<td>2.8</td>
<td>0.097</td>
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<td>Health imagery</td>
<td>47.5</td>
<td>56.2</td>
<td>41.7</td>
<td>42.0</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Structural elements</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic</td>
<td>82.5</td>
<td>75.8</td>
<td>86.5</td>
<td>47.7</td>
<td>0.000</td>
</tr>
<tr>
<td>Paper</td>
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<td>8.6</td>
<td>2.4</td>
<td>51.0</td>
<td>0.000</td>
</tr>
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<td>Board</td>
<td>7.9</td>
<td>9.3</td>
<td>7.1</td>
<td>4.0</td>
<td>0.045</td>
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<td>0.8</td>
<td>8.6</td>
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<td>0.3</td>
<td>4.3</td>
<td>0.038</td>
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<tr>
<td>Visible product</td>
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<td>37.8</td>
<td>44.6</td>
<td>11.1</td>
<td>0.001</td>
</tr>
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*HPC stands for Health positioning claim
Discussion

In contrast to the findings from the previous study, in Study 2, we find more specific differences in the use of color for health versus regular brands. Specifically, natural and light color hues such as white, green, yellow and brown are more frequently used for products with health-related claims. On the other hand, black appears more frequently on the packages of regular brands. Furthermore, in line with the findings from Study 1, dark and intense color tones are more frequently used for regular brands. However, this time, health brands did not have more use of light and faded colors than regular brands but seemed instead to have more balanced color tones on the package. As with the previous study, our results from Study 2 indicate a use of color that is largely in line with current suggestions in the literature (Becker et al. 2011; Karnal et al. 2016; Schuldt 2013). This time, we did not find any difference in the use of nature imagery. However, we did find differences in the use of overall health-related imagery, something that might also influence consumers’ health perceptions (Chrysochou and Grunert 2014). Also to be noted is the use of more paper and less plastic for health brands. This, as discussed before, might be a managerial attempt to link environmental cues with general health values. We also observe more use of transparent packaging for regular brands, something that might impact consumption (Deng and Srinivasan 2013). Finally, similarly to Study 1, angular shapes are more frequently used for health brands. This is an interesting finding, since current research demonstrates that angular shapes convey a more intense taste (Becker et al. 2011), something that might be in contradiction with a health-related positioning (Raghunathan et al. 2006). As with Study 2, idiosyncrasies within each product category arise. These can be seen in Appendix B.
General Discussion

Current research indicates that package design visuals can influence a number of health-related inferences and other consumption aspects (e.g. Becker et al. 2011; Karnal et al. 2016; Koo and Suk 2016). Despite this, we currently have little understanding of how package design is actually used by companies to convey health-related attributes and influence choice and consumption. At best, specific business reports and anecdotal evidence suggest a surge in packaging redesign decisions (Punchard 2016) in order to accommodate the health (re)positioning of the brands and increasingly health-oriented consumers (Euromonitor 2012; Nielsen 2015). How is package design used by brand managers? Are specific patterns of package design visuals used for health brands?

This research was designed to contribute in this direction by providing empirical evidence on the use of implicit information in the design of health brand packages. As such, beyond the informational elements previous studies have emphasized, this study investigated the use of graphic elements (color, imagery) and structural elements (shape, material, transparency) as types of implicit health elements on package design. In achieving this goal, it built on one pilot study and two main studies, the main findings of which are discussed next.

The pilot study used semi-structured interviews with key informants. Departing from the assertion that marketing professionals have an agency in shaping the field of knowledge, this study aimed at revealing the discourses and practices of key players surrounding package design and its perceived importance in communicating brand values. As the discussions with the informants unfolded, it became clear that marketing professionals combine their own understanding of the practice (as constructed by the years of experience within the field) with their formally achieved expertise in the decision-making process regarding package design. Package design appears to be a point of high priority in managers’ agendas and it is perceived as crucial in communicating brand-related values and conveying
messages at the point of sale. Regarding the informants’ perspective on individual elements of package design, graphic elements were generally perceived to be the most important in regards to brand communication. Colors, in their view, have the capacity to carry certain symbolic meanings (e.g., organic, quality) but also to trigger fast brand or product category recognition for consumers. Imagery is used to allure consumers into trying the product inside but also to communicate the trustworthiness of the brand. On the other hand, structural elements (such as shape and material) are often constrained by their functional roles, although informants recognized their potential role in brand communication. While managers have a broad understanding of their field of expertise, most of their decisions are based on experience and are, therefore, of a more intuitive nature. Marketing managers keep a close eye on the competition and the market, and in this way, they seem to develop a thorough understanding of the common practices regarding package design. By applying such organic knowledge, however, they help perpetuate and reinforce associations between design elements and certain brand values (e.g., black packaging for high-quality meat). Thus, some patterns might become evident within the practice of package design that further shape consumers’ expectations and associations.

The following two studies were based on such a contention in their aim to uncover patterns of package design elements that are applied by practitioners in order to communicate a specific brand value – healthfulness. In this light, content analyses of package design were employed in two countries (Denmark in the first study and the USA in the second study) in order to identify specific patterns of package design visuals used for healthy food brands. While some of the patterns are category specific, our findings also indicate that the use of some package design visuals spans across categories. A discussion of the main findings is carried out further.

Study 1 reports the results of the package design content analysis carried out in Denmark. In general, it seems that the most prominent differences between health brands and regular brands are in the use of color tone, nature imagery,
specific packaging materials and shapes. For the package design of health brands, light and faded tones are utilized to a larger extent. In contrast, the package design of regular brands includes more dark and intense tones. This might actually be an effective strategy, since previous research has shown that the use of lighter colors on the package makes a food product appear healthier (Karnal et al. 2016), whereas more-saturated colors lead consumers to anticipate a more intense taste (Becker et al. 2011). Furthermore, nature imagery seems to be used more for healthy brands, although the proportion itself is not very large. Paradoxically, both plastic and paper materials are used more for health brands. The use of plastic might be in contradiction to the claimed health of the product, as it has been shown that consumers often infer health from environment-related cues (Lee et al. 2013; Peloza et al. 2015). Paper is also used more for health brands, although the proportion is negligible. However, this finding supports the anecdotal evidence suggesting a strategic switch to natural packaging solutions that make food products appear more healthy and environmental. We also observe such evidence in our interviews with marketing managers in the pilot study. Finally, a more predominant use of angular shapes for health brands and rounded shapes for regular brands is also evident in the marketplace. While this might actually be an artifact of the specific product categories and their preservation and storage needs, research shows that the use of shape angularity can influence specific inferences about the product (Becker et al. 2011). If we take a more in-depth look into the specific categories, we understand that not all the aggregated patterns manifest similarly across categories. Rather, each category might also have its specific characteristics and practices that frame the difference between health and regular brands.

In contrast to the findings from the previous study, in Study 2, carried out in USA, we find more-specific differences in the use of color for health and regular brands. Specifically, natural and light color hues such as white, green, yellow and brown are more frequently used for products with health-related claims. On the other hand, black appears more frequently on the packages of regular brands.
Furthermore, like in Study 1, dark and intense color tones are more frequently used for regular brands. However, this time, health brands did not have more light and faded colors on the package than regular brands but seemed instead to have more balanced color tones. As with the previous study, our results from Study 3 indicate a use of color that is largely in line with current suggestions in the literature (Becker et al. 2011; Karnal et al. 2016; Schuldt 2013). Here, we did not find any difference in the use of nature imagery. However, we did find differences in the use of overall health-related imagery, something that might also influence consumers’ health perceptions (Chrysochou and Grunert 2014). Also to be noted is the use of more paper and less plastic for health brands. This, as discussed before, might be a managerial attempt to link environmental cues with general health values. We also observe more use of transparent packaging for regular brands, something that might influence consumption (Deng and Srinivasan 2013). Finally, similar to our findings from Study 1, angular shapes appear to be more frequently used for health brands than rounded shapes. This is an interesting finding, since current research demonstrates that angular shapes convey a more intense taste (Becker et al. 2011), something that might be in contradiction with a health-related positioning (Raghunathan et al. 2006). As with Study 1, idiosyncrasies within each product category arise.

**Contribution to Research**

Broadly speaking, our findings suggest that certain patterns in the use of package design visuals can be observed in the health brand food market. The power of such implicit cues to convey specific information lies in specific universal metaphors of human cognition (Lakoff and Johnson 1999; Landau et al. 2010), as well as other associations that are learned over time through exposure to a specific social and cultural context (Labrecque et al. 2013; Scott and Vargas 2007). For example, light colors used on the package could signal product healthfulness (Karnal et al. 2016;
Mai et al. 2016). Moreover, through the consistent use of specific visual design elements for health brands, practitioners might actually reinforce and perpetuate these associations (Janiszewski and Van Osselaer 2000). For example, if a light blue packaging is constantly paired with low-fat milk, this co-occurrence will strengthen the association between the two stimuli. As such, the activation and recall of “low fat milk” will likely increase when consumers are exposed to the light blue milk packaging. Our findings further indicate that studies manipulating explicit health elements (e.g. health claims) in mock-up or real product packages should account for the interactions resulting from other packaging elements that we find to be highly associated with health designs (e.g., light colors with light claims). Most elements do not act in isolation (Orth and Malkewitz 2008) and if these interactions are ignored the internal validity of such studies might be questioned. Apart from guiding specific inferences, design elements can also act as cues for perceptual judgments. A growing body of research demonstrates how different design elements alter consumers’ volume and size perceptions, which subsequently influences consumption behavior (Deng and Srinivasan 2013; Folkes and Matta 2004; Ittersum and Wansink 2012; Raghubir and Krishna 1999). Our investigation contributes to this research by exploring the use of such implicit elements in practice. In doing so, we also highlight the potential implications for practice and propose a future research agenda in this field.

**Contribution to Practice**

Our findings also outline possible implications for managers and public policy makers alike. To enhance a product’s health image, practitioners should inquire into the most-prominent package design elements used to position a product as healthy within the specific category. It should not be neglected that there might also be certain universal elements that apply across categories, which are usually based on more-general knowledge. However, some additional considerations
should be made. First, these elements should not be used in isolation but rather used together with the health claims and label to enhance the brand’s health appeal. Apart from their ability to generate specific inferences and influence consumption behavior, implicit elements are also more noticeable, are processed faster than text-based information and can elicit certain emotions (Underwood and Klein 2002). Second, if these elements convey healthfulness in isolation (i.e., consumers produce unconscious responses), then apart from their positive effects (i.e., helping consumers make unconscious health choices), they could also have a negative effect. For example, if consumers make unconscious choices, an unhealthy food package using health-associated design elements would easily mislead them. In this light, certain graphic and structural elements should be carefully considered as implicit indicators of food healthfulness through package design. This calls for certain policy measures to protect consumers from misleading implicit information.

**Limitations and Directions for Future Research**

Content analysis as a methodological tool is useful in identifying certain patterns of marketing communication. However, it does not provide evidence of the underlying reasons of the communicator nor of consumers’ actual response to the communication. The first limitation of our chosen methodological tool was addressed by including a first exploratory pilot study, where we tried to unveil managers’ discourses and practices when it comes to brand communication through package design. On the other hand, our research does not directly address the effect implicit health communication through package design has on consumers. Content analysis does, however, offer ground for speculating certain trends, and through the present study, we guide such speculations. We thus encourage future research to investigate the influence of implicit health-related visuals on consumer response. Furthermore, we suggest that these effects should not be addressed in isolation – the interplay between them should also be
accounted for, as previous research suggests (Orth and Malkewitz 2008; van Rompay and Pruyn 2011). For example, how do implicit elements interact with explicit elements, and how do implicit elements interact with other implicit elements? Furthermore, which are the individual and contextual factors that shape how consumers respond to this information?

Additionally, although our results give a glimpse into some of the implicit elements used to communicate healthfulness through package design, our list of coded elements may not be exhaustive. Future research should identify and explore additional implicit package design elements, and perhaps a more enlightening research undertaking would address the way these elements are actually combined in practice. Regarding our analytical approach, the analysis of the data in the content analysis only accounted for the number of products, whereas the market share of different brands may play a much larger role in what consumers are actually exposed to. For example, a brand like Coca-Cola has more visibility in the market than its competitors. Future studies could potentially address this issue.
APPENDIX A

Distribution of package design elements within product categories in Denmark – yogurt, bread products and breakfast cereals

<table>
<thead>
<tr>
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<th>Breakfast cereals</th>
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</tr>
<tr>
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<td>Nature imagery</td>
<td>Health imagery</td>
</tr>
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<td>----------------</td>
<td>----------------</td>
</tr>
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### Structural elements

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### Transparency

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### Shape

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</table>

**Note:** HPC stands for Health Positioning Claim; +HPC = Products carrying the HPC; -HPC = Product not carrying the HPC
*significant at <0.05 level, **significant at <0.01 level, ***significant at <0.001 level;
Distribution of package design elements within product categories in Denmark – savory biscuits, carbonated beverages and juice

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<th>Color</th>
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<th>Carbonated beverages</th>
<th>Juice</th>
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<td>-HPC (%)</td>
<td>χ²</td>
<td>Total (%)</td>
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*Note: HPC stands for Health Positioning Claim; +HPC = Products carrying the HPC; -HPC = Product not carrying the HPC

*significant at <0.05 level, **significant at <0.01 level, ***significant at <0.001 level
APPENDIX B

Distribution of package design elements within product categories in USA – bread products and hot cereals

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**Structural elements**

| Material | Plastic | 93.6 | 90.0 | 95.1 | 6.9** | 25.7 | 21.6 | 32.1 | 2.8 | 88.4 | 93.4 | 85.7 | 5.1* |
| Board | 2.0 | 1.3 | 2.3 | 0.9 | 31.1 | 26.4 | 38.3 | 3.2 | 9.5 | 2.9 | 13.1 | 10.5*** |
| Paper | 1.6 | 2.6 | 1.2 | 2.1 | 38.2 | 47.2 | 24.7 | 10.5*** | 0.5 | 0.7 | 0.4 | 0.2 |
| Glass | 0 | 0 | 0 | n/a | 0 | 0 | 0 | n/a | 0 | 0 | 0 | N/A |
| Metal | 0.4 | 1.3 | 0 | 6.7** | 0.5 | 0.8 | 0.7 | 0 | 0 | 0 | N/A |

**Transparency**

| Visible product | 81.5 | 82.3 | 81.2 | 0.1 | 7.3 | 6.4 | 8.6 | 0.4 | 0 | 0 | 0 | N/A |

**Shape**

| Angular | 38.7 | 45.9 | 35.4 | 7.3** | 60.7 | 68.8 | 48.1 | 8.8** | 88.2 | 97.1 | 83.2 | 16.1*** |
| Rounded | 60.9 | 54.1 | 64.0 | 6.6** | 39.3 | 31.2 | 51.9 | 8.8** | 11.8 | 2.9 | 16.8 | 16.1*** |
| Convex | 4.4 | 6.5 | 3.5 | 3.4 | 4.9 | 2.4 | 8.6 | 4.1* | 100 | 100 | 100 | N/A |
| Concave | 0 | 0 | 0 | n/a | 0 | 0 | 0 | n/a | 0 | 0 | 0 | N/A |
| Straight | 95.2 | 93.5 | 95.9 | 2.0 | 95.1 | 97.6 | 91.4 | 4.1* | 0 | 0 | 0 | N/A |

Note: HPC stands for Health Positioning Claim; +HPC = Products carrying the HPC; -HPC = Product not carrying the HPC.

*significant at <0.05 level, **significant at <0.01 level, ***significant at <0.001 level;
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Note: HPC stands for Health Positioning Claim; +HPC = Products carrying the HPC; -HPC = Product not carrying the HPC
*significant at <0.05 level, **significant at <0.01 level, ***significant at <0.001


Hsieh, Hsiu-Fang and Sarah E Shannon (2005), "Three Approaches to Qualitative Content Analysis," Qualitative health research, 15 (9), 1277-88.


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Chapter 3
Empirical Article 2
In Good Shape: The Influence of Container Curvature on Consumers’ Perceptions and Consumption

Alexandra Festila and Polymeros Chrysochou
Aarhus University

Abstract

Does the curvature of a food container influence consumers’ health-related inferences and consumption amount? If so, in what way? Using three experimental studies, we show that the shape of a product container can indeed influence both consumer response (calorie estimation and perceived healthfulness) and consumption. Specifically, our findings indicate the following: (a) a food product presented in a container curved outward (convex) leads consumers to believe that the food product is higher in calories and less healthy than when it is presented in a container curved inward (concave); (b) eating from the convex container triggers feelings of guilt in consumers that try to control their food intake; and (c) consumers tend to eat more from a convex container. The findings of our studies are relevant to both marketers and policy makers trying to nudge people into making healthier eating choices.

Keywords: package shape, package design, healthy, food consumption, calories;

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2 Submitted to the Journal of Consumer Research; an earlier version of this manuscript was presented at EMAC 2016 (main conference and doctoral colloquium) and will appear in the proceedings of ACR 2016;
Introduction

Whether we shop for groceries at a supermarket, eat at our favorite restaurant or have a drink in a bar, our foods and drinks most often come in containers. This means that the contact we have with food is almost always mediated by a package. Packages themselves come in all shapes and sizes, even for products belonging to the same product category. Consider, for example, the different package shapes found in the soda and juice categories - from the hourglass shape of the Coca Cola bottle to the rounded shape of Tropicana. Or, consider the differently shaped glasses used to serve various types of beers. However, does package shape influence our perceptions about a product and our consumption behavior?

Research has tackled this issue from many angles. The shape of packages and containers has been shown to influence the inferences consumers make about the content of food, such as taste and calorie estimation (Becker et al. 2011; Koo and Suk 2016) or even influence choice and consumption (Raghubir and Krishna 1999; Yang and Raghubir 2005). For example, Raghubir and Krishna (1999) showed that rectangular packages that are more elongated are perceived to be larger than same-size packages that are less elongated. Such a distorted perception further influences how much consumers eat (Raghubir and Krishna 1999; Wansink and Van Ittersum 2003). On the other hand, Koo and Suk (2016) provided evidence that consumers perceive a food product in an elongated package to be less caloric than an identical food in a wider package of equal capacity. The above-mentioned research accounts for rectangular shapes. In the case of more organic and irregular shapes, Folkes and Matta (2004) unveiled a different mechanism at work, such that package shapes that attract more attention are perceived to be larger than same sized packages that attract less attention. Our undertaking in the present research is to build upon and extend this literature by investigating whether the actual curvature of the container can influence
consumers’ inferences and consumption behavior. By container curvature we refer to the manner in which a container is shaped along the vertical dimension (see Figure 1 for a visual representation). We thus define a convex container as one curved outward along the vertical dimension and having a mid-point wider than the top and bottom (Figure 1; panel A). By contrast, we define a concave container as one curved inward along the vertical dimension and having a mid-point more narrow than the top and bottom (Figure 1; panel B).

**FIGURE 1**

**CONVEX VERSUS CONCAVE SHAPE REPRESENTATION**

Using three experiments, we try to obtain evidence that container curvature can indeed influence both consumer inferences about the food product and their consumption amount. In particular, in the first experiment, we determine whether presenting a food product in a convex (wider in the middle) vs. a concave (wider at the top and bottom) container influences consumers’ perceptions about the number of calories in, and the overall healthfulness of the product. In the second study, we test the level of guilt consumers feel at the idea of eating the product presented in the two different containers and whether eating control moderates this outcome. Finally, in the
third experiment we assess whether the shape of the container influences how much consumers eat. Our findings carry important implications for understanding how the mere manipulation of package curvature influences not only consumers’ perceptions of the food product but also their consumption amount. These implications could potentially inform both food marketing and public policy practitioners who aim to assist consumers in making optimal food-related decisions.

**Conceptual Background**

In the absence of more reliable information, consumers often draw inferences about the caloric content and overall healthfulness of food items using unrelated external cues (Chandon 2013). For example, such cues could include how consumers perceive the food itself (whether the food is considered a vice or virtue) (Chernev 2011; Oakes 2005), a food item’s designated name when the actual food items are identical (Irmak, Vallen, and Robinson 2011), or even the name of the restaurant serving the foods (Chandon and Wansink 2007).

At the packaging level, current literature suggests that when health claims and favorable nutrition information is present on the package, consumers’ perception of product healthfulness is positively influenced (Grunert et al. 2010; Kozup, Creyer, and Burton 2003). Although explicit in nature, much of this information is often misinterpreted to the extent that people believe food products to be healthier than they actually are (health halo effect) or to even prevent certain diseases (magic bullet effect) (Roe, Levy, and Derby 1999). This bias occurs because consumers tend to simplify their mental task and thus extend the information available for one food product attribute to other food product attributes. For example, if the food product is endorsed by a claim such as “low-fat,” consumers generalize that the food product
scores favorably on all health and nutrition aspects, leading them to underestimate the number of calories and to believe they can eat more of it without any negative consequences (Wansink and Chandon 2006). The same effect also occurs in the case of process-related claims such as fair-trade and organic claims. For example, one study provided evidence that social ethic claims (fair trade) mislead consumers into believing that the food items are lower in caloric content and can be consumed in larger quantities (Schuldt, Muller, and Schwarz 2012). In a similar manner, Lee et al. (2013) found that consumers evaluate food products with organic labels to be lower in calories than those without the organic label.

The above-mentioned research examines explicit information that is misinterpreted by consumers. However, consumer biases are more pervasive, such that more implicit cues like the colors used on the package (Schuldt 2013), the typeface depicting the brand (Karnal et al. 2016) and even the shape of the package (Koo and Suk 2016) carry certain symbolic meanings that are used by consumers to make inferences about a food item’s healthfulness. Although they are explicitly unrelated to health, these cues activate certain associations that will spill over into judgements about a food item’s healthfulness and caloric content.

Likewise, we propose that the curvature of the container is likely to act as a cue for evaluating a food item’s healthfulness, due to the different conceptual associations activated by the different shapes. Our premise is that the curvature of the container triggers associations with the human body (Epley, Waytz, and Cacioppo 2007) and that consumers use these associations to make inferences about caloric content and food product healthfulness. We thus propose that a concave shape, due to its resemblance with a healthy body (where the mid-point is more narrow than the upper and lower parts), activates concepts related to slimness, while a convex shape, due to its resemblance with an unhealthy body (where the mid-point is wider than the upper and lower parts), activates concepts related to heaviness. Based on these associations, consumers will make inferences about product healthfulness and caloric content,
which will result in a biased judgement. The slimness concept activated by the concave hourglass shape will lead consumers to underestimate the number of calories, while the heaviness concept activated by the convex shape will lead consumers to overestimate the number of calories. Similarly, consumers will perceive the product presented in the concave container as healthier than the product presented in the convex container.

Therefore, we propose the following:

**H1a:** A food product is perceived to be lower in calories when presented in a concave container than when presented in a convex container.

**H1b:** A food product is perceived to be healthier when presented in a concave container than when presented in a convex container.

The way individuals react to food stimuli is highly influenced by how concerned they are with food and healthy eating (Chrysochou et al. 2010). Health conscious consumers are likely to react more strongly to negative information about food products (i.e., unhealthy nutrients in foods) than less health conscious consumers do (Mohr, Lichtenstein, and Janiszewski 2012). This is because the two groups differ in their motivation and inclination to regulate food intake. On the one hand, controlled eaters will seek to behave in line with their health-oriented goals, whereas less controlled eaters do not have such goals to pursue (Ward and Mann 2000). Given their motivation to avoid foods that are not in line with their health goals, controlled eaters will derive more guilt from eating foods they believe to be unhealthy or high in calories (Wansink and Chandon 2006). We thus expect that the more controlled eaters will use the shape of the package as a diagnostic tool to keep in line with their goals (Scott et al. 2008). Namely, due to the associations between the convex shape and unhealthfulness, we expect that a convex container will trigger more anticipated consumption guilt for individuals high in eating control than for individuals low in eating control. However, since the concave container will trigger associations related
to healthfulness, we do not expect to find a difference in anticipated consumption guilt between the two categories of consumers for this shape.

Therefore, we propose the following:

**H2a:** Individuals with high eating control (vs. low eating control) derive more (vs. less) anticipated consumption guilt when a food product is presented in a convex container.

**H2b:** There is no difference in anticipated consumption guilt between the two groups when a food product is presented in a concave container.

More important, however, is what happens in a consumption situation. Intuitively, and in line with the rationale from Study 2, one would expect that a food product being served in a convex shape would lead consumers to eat fewer calories, as they try to limit the intake of a food perceived to be unhealthy or high in calories – meaning that the convex shape would make them more aware of their food intake. On the contrary, the concave shape would license consumers to eat more, as they perceive the product to be more healthy and lower in calories. This expectation is in line with previous studies showing that consumers indulge in and eat more of foods they perceive to be healthy (Irmak et al. 2011; Scott et al. 2008).

Therefore, we propose the following:

**H3a:** Individuals have a higher caloric intake when a food product is served from a concave (vs. convex) shaped container.

However, we propose that in a consumption situation, a different mechanism might take over, where the shape of the package serves as a “visual measurement tool” for how much people eat. Previous research has shown that consumers use certain visual cues and rules-of-thumb to monitor how much they eat (for example “until the bowl is empty”). Importantly, consumption monitoring is key in determining how much one should eat (Polivy et al. 1986). For example, due to certain visual biases,
consumers tend to consume more from larger plates than from smaller plates (Ittersum and Wansink 2012). In regard to container shape, it has been shown that individuals tend to consume more from a short and wide glass than from a tall and slim glass of equal capacity and this was due to volume misperception (Raghubir and Krishna 1999; Wansink and Van Ittersum 2003). Also notable in these findings is that consumers believed that they ate less than they actually were, which means that the use of such cues often results in biased estimates and leads to overconsumption (Wansink 2004). Following a similar rationale, we propose that individuals will consume more from a convex container and less from a concave container because the geometric properties of the two shapes make food intake monitoring more difficult. Previous research has shown that the height of a container is used as a simplifying visual heuristic when consumers make quantity and volume estimations (Raghubir and Krishna 1999). We propose that in a similar manner, consumers will estimate how much they should consume by monitoring the level of food displaced along the height of the container. This means that when the food product is displaced from the convex container, the level of the food product in the container will decrease at a slower rate, making consumers believe they ate less than they actually did. Conversely, a concave shape will make consumers believe they ate more than they actually did because when the food product is displaced, the level of the food product in the container will decrease at a faster rate. This process is depicted in Figure 2.

Therefore, we propose the following competing hypothesis:

**H3b:** Individuals have a higher caloric intake when a food product is served from a convex (vs. concave) shaped container.

If this is the mechanism, we expect the process to reverse following the midpoint of the container (something we do not currently account for in our paper).
Study 1: The Influence of Container Shape on Calories Estimation and Health Perception

The objective of the first study was to test hypotheses 1a and 1b – to see whether consumers infer different calories amounts and have different perceptions of product healthfulness depending on whether the food product is displayed in a convex or a concave container. The sample for this study (N=206; 55% women; Mage=37.4, SDage=12.9) was drawn from an online pool and consists of American consumers.
Method

Study 1 consisted of a one-factor between-subjects design with two levels: orange juice displayed in either a convex or concave bottle (see Appendix A). Respondents were informed that they would first see an image depicting a new brand of orange juice and after seeing the image, they would have to answer a couple of questions about the product. According to the random assignment of participants to the container shape conditions, the juice was displayed in a bottle graphically manipulated to be either convex or concave. The volumes of the bottles were kept constant through the information provided on the bottle (10 oz.). In this way, our stimuli would be more similar to real world products, which always indicate the volume in print on the package.

After seeing the image, respondents were asked to estimate the number of calories in the juice by dragging a slider anchored by min possible value=100 calories and max possible value=400 calories. A 10 oz. bottle of orange juice commonly contains approximately 128 calories. To guide themselves, the respondents were offered a list of three common food products and their caloric content. These products were a medium banana (105 calories), a slice of white bread (66 calories) and a milk chocolate bar (534 calories). After estimating the number of calories in the juice, they were also asked to report how healthy they considered the juice to be (1=not healthy at all; 9=very healthy).

Results

To test hypotheses H1a and H1b, we ran independent sample t-tests, with package shape (convex vs. concave) as the independent variable and calories estimation and
perceived healthfulness as the dependent variables. As expected, the juice presented in
the convex package was estimated to have more calories (M=199.43; SD=62.38) than
the juice presented in the concave package (M=169.48; SD=54.16), t(204)= 3.69,
p=.000, d=0.51. Additionally, the juice presented in the convex package was perceived
to be significantly less healthy (M=6.54; SD=1.6) than the juice presented in the
concave package (M=7.1; SD=1.5), t(204)=2.65, p=.009, d=0.36. Therefore, the
results of our first study support hypotheses H1a and H2a (see Figure 3).

FIGURE 3
THE INFLUENCE OF CONTAINER SHAPE ON CALORIES ESTIMATION AND
HEALTH INFERENCES

Discussion

These results support our contention that a food product presented in a concave
container is perceived to be healthier and to have fewer calories than when the same
product is presented in a convex container. Notably, our respondents estimated the juice in the convex container to have on average approximately 17.7% more calories than the juice in the concave container. Our findings are consistent with prior literature showing that consumers rely on certain external cues to make estimates about caloric content and to evaluate a product’s healthfulness (for a review Chandon 2013), even when the actual product is identical across conditions (Irmak et al. 2011).

**Study 2: The Influence of Container Shape on Consumption Guilt**

The results of our first study suggest that consumers might use the shape of the container to make inferences about product healthfulness and caloric content, in the sense that they seem to perceive a product to be healthier and lower in calories when presented in a concave container than when presented in a convex container. In Study 2, our objectives are twofold: first, we want to see whether the effects found in Study 1 are replicable in a different sample, and second, we want to investigate whether the shape of the container also influences consumers’ anticipated consumption guilt. Further, we test if this influence depends upon individuals’ level of control related to food consumption. The sample (N=339; 55% women; $M_{age}=51.7$, $SD_{age}=14.5$) was collected through an online experiment by a marketing agency and consists of Danish consumers.
**Method**

Study 2 consisted of a one factor between subjects design with two levels (convex vs. concave container). We utilized the same stimuli as in the first study, but adapted for the Danish consumers. Therefore, the name of the product was translated into Danish, and the volume of the bottles was displayed in ml (300 ml). Similar to Study 1, respondents were asked to answer through ratings a set of questions after being exposed to an image depicting a new brand of juice. This time, we used a different measure for calories estimation, where respondents had to fill in a text box with their estimated amount. The healthfulness of the product was rated on a 7-point Likert scale (1=not healthy at all; 7=very healthy).

In addition to the healthfulness and calorie estimation measures, respondents were also asked to rate on a 7-point Likert scale how guilty they would feel if they consumed the juice (1=not guilty at all; 7=very guilty). At the end of the questionnaire, we also assessed consumers’ eating control by adopting a three-item scale developed by Chrysochou et al. (2010), which measures healthy eating control discourse. The three items “I have a strict control of that what I eat is healthy”, “Health concerns play a role in everything I eat” and “I always look for a scientific proof to accept whether a food product is healthy” were measured on a 7-point Likert scale (1=totally disagree; 7=totally agree) and were averaged to form the predictor variable, eating control ($M = 3.49; SD = 1.2; \alpha = .72$).

**Results**

We first ran independent sample t-tests, with package shape (convex vs. concave) as the independent variable and calories estimation and perceived healthfulness as the
dependent variables. Similar to Study 1, the juice presented in the convex package was estimated to have more calories (M = 140.08; SD = 78.26) than the juice presented in the concave package (M = 125.20; SD = 76.84), although this difference was only marginally significant, t(337) = 1.77, p = .078, d = 0.19. On the other hand, contrary to our results from Study 1, we did not find any significant difference in the healthfulness perceptions of the two bottles, t(337) = .18, p = .855. Therefore, the results from Study 2 only marginally support hypothesis H1a, whereas hypothesis H1b is not supported.

Next, to test our second hypothesis, we conducted a regression analysis where the key dependent variable is anticipated consumption guilt and the independent variables are eating control discourse, package shape (coded as a dummy variable: 0 = convex; 1 = concave) and the interaction between eating control discourse and package shape. The two-way interaction between eating control and package shape was marginally significant (β = -.32, t(335) = -1.96, p = .051; see Figure 4). To test our predictions, we examined the slope of eating control at each level of package shape. When the juice was presented in the convex package, the slope of eating control was positive and significant (β = .42, t(335) = 3.85, p = .000). This means that the higher individuals scored on eating control, the more consumption guilt they anticipated when the product was presented in a convex package. However, when the juice was presented in the concave package, eating control did not have a significant influence on the anticipated consumption guilt (β = .09, t(335) = 0.79, p = .433). The results, therefore, confirm hypotheses H2a and H2b.
First, the results from Study 2 only partially replicate those from Study 1. Specifically, we found that consumers had a tendency to estimate more calories when the food product is presented in a convex container compared to when it is presented in a concave container, but we did not find any differences in the perceived healthfulness of the two conditions. The two studies’ differing results regarding perceived healthfulness might be due to cultural differences between our two samples. The sample from the first study consisted of American consumers whereas the sample from our second study consisted of Danish consumers. The prevalence of nutrition label use is higher in the US than in EU (75% vs. 45%; Campos, Doxey, and Hammond 2011), which may imply that compared to the Danish consumers, the
American consumers are more likely to have relied on calorie estimates when making judgements about overall product healthfulness.

Furthermore, the findings from Study 2 support our contention that anticipated consumption guilt does not vary with consumers’ eating control when the food is presented in a concave package. On the other hand, when the food is presented in a convex package, consumers with high eating control feel more anticipated consumption guilt than consumers with low eating control. Our explanation for this moderating effect is that consumers who are controlled eaters react more strongly to stimuli signaling unhealthy foods (Mohr et al. 2012).

**Study 3: The Influence of Container Shape on Consumption Amount**

Whereas our objective in the first two studies was to see whether consumers make different inferences about product healthfulness and anticipate more guilt depending on the shape of the container (convex or concave) in which the product is presented, our objective in the third study was to see whether and in what way simply altering the shape of the container influences the consumption amount. The participants in this study were recruited at a food-related event; all participants are US-based nutrition and food professionals (N = 61; 90% women; Mage = 42.5, SDage =11.4).
**Method**

In this study, we use a one-factor between subjects design, where we measure consumption from a convex (condition A) versus a concave (condition B) container. Within the context of the above-mentioned event and after exiting the presentation room for a break, the participants were approached and asked to take part in a series of studies related to food. Half of the participants were directed towards table A (the convex condition), while the other half were directed towards table B (the concave condition).

The participants were instructed to serve themselves with as many M&Ms as they wanted to have for the snack break. The M&Ms were placed in either a convex or concave glass container of equal capacity. To control for product accessibility, participants used a spoon as a serving tool. After they served themselves with M&Ms, they were asked to count the number of M&Ms they served. This measure was later used to compute the number of calories.

**Results**

To test hypothesis H3, we ran an independent samples t-test, with container shape (convex vs. concave) as the independent variable and calorie intake as the dependent variable. On average, the participants that served M&Ms from the convex shaped container had a significantly higher caloric intake (M=42.91; SD=19.89) than the participants that served M&Ms from the concave shaped container (M=26.36; SD=19.19), t(59) =3.29, p=.002, d=0.85. This means that the participants that served M&Ms from the convex glass had, on average, 63% more caloric intake than those that served the M&Ms from the concave glass (*see Figure 5*).
Contrary to our first intuition, the results from Study 3 show strong support for hypothesis H3b instead of hypothesis H3a. This result means that in consumption situations, individuals tend to have a higher food intake when the food is presented in a convex container as opposed to a concave container. Our explanation for this effect is that in a consumption context, the container becomes a visual measurement tool for consumption monitoring. We argue that the concave container will facilitate consumption monitoring, whereas the convex container will inhibit consumption monitoring due to the specific geometric properties of the two shapes and consumers’ visual biases. Previous research has also shown that various shapes and sizes of dinnerware and containers, due to their specific properties, can either help or misguide consumers in consumption monitoring and can thus have an effect on actual consumption (Raghubir and Krishna 1999; Wansink and Van Ittersum 2003).
General Discussion

The present paper explores the influence of container shape (convex vs. concave) on consumers’ calories estimation, perception of healthfulness, anticipated consumption guilt and actual consumption. To summarize, in Study 1, we show that consumers believe a product to have more calories and be less healthy when it is presented in a convex container compared to when it is presented in a concave container. Our explanation for this effect is that the concave package activates concepts related to slimness, whereas the convex package activates concepts related to heaviness. These cues are subsequently used to make inferences about the number of calories in and the healthfulness of the food product. Previous research carried out in this area has shown similar effects in other contexts; consumers’ judgements of a food’s caloric content and overall healthfulness seem to be biased by different external cues (Chandon 2013), including package shape (Koo and Suk 2016).

In Study 2, we show that package shape can moderate how consumers’ eating control discourse influences their anticipated consumption guilt. Consumers with high eating control feel more anticipated consumption guilt than individuals with low eating control when the food product is presented in a convex package, but not when the product is presented in a concave package. This result is in line with previous research showing that health conscious consumers are more sensitive to nutrition information and feel more guilt when eating food they believe to be unhealthy (Wansink and Chandon 2006).

In Study 3, we show that consumers eat more when the food is displayed in a convex container compared to when the food is displayed in a concave container. This result is contrary to one’s first intuition that people will try to eat less of a food considered high in calories or unhealthy. Our explanation for this effect is that there is another mechanism that takes over in a consumption situation, when the package
becomes a visual measurement tool to monitor consumption (Wansink 2004). In this sense, it is more difficult for consumers to monitor the food displaced from a convex container because the level remaining in the container appears to decrease at a slower rate (due to a wider middle). The opposite holds true for a concave container.

**Theoretical Contribution**

Overall, our findings indicate that the curvature of a package can influence what consumers’ infer about that product (the number of calories and perception of healthfulness), how they feel about consuming that product (anticipated consumption guilt) and ultimately their consumption behavior (how much they eat), extending previous research carried out in this area (Chandon 2013; Wansink 2004). We thus contribute to a growing body of literature that reveals how, by merely altering the shape and size of food containers and packages, one can influence consumers’ inferences about a food product, as well as their consumption behavior. In particular, we unveil yet another factor that could potentially misguide consumers’ inferences and consumption behavior – container curvature. At a more general level, we contribute to the literature attesting to the pervasive impact of implicit cues in the environment on consumers’ everyday decision-making.

**Implications for Marketing Practice and Public Policy**

The findings of our research have potential implications for both marketers and policy makers that try to nudge consumers into making healthier eating choices. For
example, if the aim is to enhance perceptions of healthfulness and to make products appear to have less calories, marketers might want to use a concave shaped package. This implication could be especially relevant for those products targeted towards consumers concerned with their weight or overall diet. Not only do consumers trying to control their diet infer a product to be healthier and less caloric when presented in the concave container, but they also anticipate less consumption guilt from the concave container. This means that they will be more likely to choose products that appear to be in line with their health goals and can thus reduce their consumption guilt. In fact, perhaps from mere intuition, some companies are already using such containers, particularly for products that promote slimness and weight loss.

Contrary to intuition, consumers might also benefit if they consume from a concave container, as this will enable them to downsize their consumption. The implications for public policy are thus twofold. On the one hand, consumers that are health oriented will be more likely to choose a product when it is presented in a concave container. However, this information might also be used by companies in an attempt to conceal the real nature of the food – to make unhealthy foods look healthier. Therefore, ethical business practices should be encouraged, such that concave containers should primarily be used to encourage actual healthy choices –this point is especially relevant in the grocery shopping context. On the other hand, our findings suggest that consumers tend to downsize their consumption from a concave container – which brings forth an apparent paradoxical relation between the two findings. Is a concave package good or bad for consumers? In an actual consumption situation, it might actually be beneficial for consumers to have an unhealthy product served in a concave container, as this will enable them to downsize their consumption. As such, this mechanism might be particularly relevant to the design of containers that consumers use to serve themselves, such as home, canteen and restaurant dinnerware, as well as glasses and cups used in pubs and cafes to serve miscellaneous drinks.
Limitations and Directions for Future Research

Our research is not free of limitations. We still need to acquire a more in-depth understanding of the mechanism behind these effects, and the generalizability of our current results should be accounted for through further replication studies. As we have observed in our previous studies, some cultural differences might emerge and thus play a role in consumers’ judgements. Additionally, certain contextual or individual factors might moderate the relations found in our studies. For example, in the first two studies, the food stimuli used was a relative virtue (orange juice), whereas in the third study the food stimuli was a relative vice (M&Ms). This categorization of foods has also been shown to impact consumers’ perception and consumption behavior (Chernev and Gal 2010).
APPENDIX

STIMULI USED IN STUDIES 1 AND 2
References


Scott, Maura L., Stephen M. Nowlis, Naomi Mandel, and Andrea C. Morales (2008), "The Effects of Reduced Food Size and Package Size on the Consumption


Chapter 4
Empirical Article 3
Health is Up, Indulgence Down: Effects of the Vertical Location of Food Product Claims on Consumer Response

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Abstract

Is a health-related claim more effective when located at the top? Using three experimental studies, this paper shows that the location of claims can be used strategically to create favorable perceptions about the communication material (ads and packages) and the product itself (quality perception and anticipated product satisfaction). Specifically, it proposes and demonstrates that (a) verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at top, compared to bottom locations, whereas verbal claims designating unhealthy food attributes (e.g., taste) elicit more positive consumer responses when placed at bottom, compared to top locations; (b) these effects are persistent across food product categories and marketing contexts; and (c) in a food market context, most health-related claims are actually placed at the bottom of the package, which is contrary to our findings that health claims and messages are more effective when placed at the top. This paper carries important implications for food marketing practices and public policy aimed at improving consumers’ food-related decisions.

Keywords: Visual design, claim location, healthfulness, indulgence;

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3 An earlier version of this manuscript was presented at EMAC colloquium 2016 and CMC 2016 conference and will appear in the proceedings of ACR 2016; the manuscript is in preparation to be submitted to the Journal of Marketing Research;
Positioning food products as either healthy or tasty is a widespread marketing strategy. This distinction has become especially relevant in light of the “healthy eating” trend. Worldwide, consumers are increasingly preoccupied with their weight management and the overall healthfulness of their diet. This means that they seek food products that promise to deliver on these attributes: products that are low in certain negative components (i.e., low in fat) and appear to be fresh, natural or minimally processed but also food products with beneficial ingredients that might help them fight disease or promote good health. However, for certain occasions, they also seek to indulge (Nielsen 2015). Therefore, the clear positioning of food products is critical for market success.

To this end, verbal claims are an essential way to communicate food product positioning, especially at the point of sales, through package design or shelf display and in other marketing contexts (such as advertising and web page display of information). A significant number of studies have investigated how such explicit information influences consumer response and decision-making (Andrews, Netemeyer, and Burton 1998; Belei et al. 2012; Kozup, Creyer, and Burton 2003; Van Kleef, van Trijp, and Luning 2005). Though essential in its own right, explicit information does not act in isolation; instead, it often interacts with other stylistic elements to create meaning (Orth and Malkewitz 2008). In this light, the present study proposes and demonstrates that, in a food-marketing context, distinctively locating specific claims contributes to a more effective design that can ultimately enhance product evaluations.

This paper builds primarily on the extant literature on conceptual metaphors (Lakoff and Johnson 1999; Landau, Meier, and Keefer 2010) and the role of spatial information in consumer decision-making (Cian, Krishna, and Schwarz 2015; Deng
and Kahn 2009; Romero and Biswas 2016; Schlosser, Rikhi, and Dagogo-Jack; Sundar and Noseworthy 2014), and investigates the effectiveness of specific food-related claims when distinctively located along the vertical dimension.

Across three experimental studies, this paper shows that the location of claims can be used strategically to create favorable perceptions about the communication material (ads and packages) and the product itself (quality perception and anticipated product satisfaction). Specifically, it proposes and demonstrates that verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at top, compared to bottom locations, whereas verbal claims designating unhealthy food attributes (e.g., taste) elicit more positive consumer responses when placed at bottom, compared to top locations. Furthermore, the results suggest that these effects are persistent across food product categories and marketing contexts. A fourth and final study employing content analysis of packages in the marketplace, shows that most health-related claims are actually placed at the bottom of the package, which is contrary to our findings that health claims and messages are more effective when placed at the top.

The present research contributes primarily to the stream of literature highlighting the impact of implicit cues in food decision-making, choice and consumption (i.e., Becker et al. 2011; Karnal et al. 2016; Raghbir and Krishna 1999) while also echoing more broadly into the graphic design and marketing literature (Orth and Malkewitz 2008). Furthermore, the contributions of this paper carry important implications for food marketing practices and public policy aimed at improving consumers’ food-related decisions.
Conceptual Background

Conceptual Metaphors of Verticality

Informed by the conceptual metaphors and grounded cognition theories (Lakoff and Johnson 1999; Landau et al. 2010), prior research has shown that the mere location of various composition elements (e.g., images, logos, textual elements) in the visual plane of advertisements and packages can influence consumers’ evaluations, beyond their descriptive content (Chae and Hoegg 2013). The conceptual metaphor theory suggests that many abstract concepts are understood through more concrete and perceptual concepts. Metaphors allow individuals to understand equivocal concepts such as power, morality and attachment, through more easily accessible perceptual cues, such as verticality, cleanliness or distance (Landau et al. 2010). According to grounded cognition theories, this occurs because in time, humans develop certain associations with the physical space they operate in, which are further transferred to various contexts, including the judgements they make about products and brands (Barsalou 2008; Chae and Hoegg 2013).

The visual location in space has been shown to be metaphorically associated with different abstract concepts such as luxury, power, morality and rationality across the vertical plane (Cian et al. 2015; Meier, Sellbom, and Wygant 2007; Sundar and Noseworthy 2014; van Rompay et al. 2012) or time, quantity and magnitude across the horizontal plane (Chae and Hoegg 2013; Romero and Biswas 2016). These associations further influence product and brand evaluations when utilized in a marketing context. To illustrate, Chae and Hoegg (2013) found that it is beneficial for the brand if pictures of innovative products are displayed on the right side of an advertisement, while pictures of traditional products should be displayed on the left.
This is due to a linear and horizontal perception of time, where the past is visualized on the left and the future is visualized on the right. Similarly, Sundar and Noseworthy (2014) showed that powerful brands benefit from the logo being displayed higher on the package, whereas less powerful brands are benefited if the logo is displayed lower on the package, due to power-vertical space associations. On the other hand, Cian et al. (2015) showed that a higher position in the vertical plane can also be associated with rationality, while a lower position can be associated with emotion. This means that rational appeals (e.g., slogans) will be more effective if placed at the top, while emotional appeals will be more effective if placed at the bottom.

Together, these studies support the idea that physically grounded metaphors have a tangible impact on human cognition and show how these metaphors later on manifest in consumers’ judgment and decision-making. Informed by this stream of research, we will next discuss how the vertical location of verbal claims conveying either healthy or unhealthy food product attributes can also influence consumer response, due to specific lightness/heaviness inferences.

**Vertical Representation of Lightness and Heaviness**

Beginning in early childhood, people acquire and integrate concepts related to their surrounding physical environment; they later use these early experiences to make judgments about more abstract concepts. Gravity is one of the dominating forces throughout human evolution and existence, shaping individuals’ perception of the world (Crawford 2009; van Rompay, Fransen, and Borgelink 2014). Since birth, individuals’ actions are guided by gravity—learning to walk, avoiding falling and understanding the “natural” location of objects in space. They discover that, in order to rise upwards, one needs to overcome resistance; to fall means to succumb to the force below. They learn that heavy objects (e.g., a rock) are anchored to the ground,
while lighter objects (e.g., clouds) float in the sky. It is from these early experiences of an unbalanced physical space that different locations are assigned unequal weights. This knowledge is ingrained early in childhood and is subsequently manifested in other areas of life. For example, children learn to draw by emulating the physical environment and therefore the laws of gravity – they draw flowers, trees, houses and everything that lies on the ground at the bottom of the page, whereas the clouds, sun and everything that floats in the sky can be found at the top of their drawing sheet.

It is no coincidence that a well-established principle in arts and visual perception is that objects can be assigned different visual weights depending on their location in the composition. Objects located at the top of a composition are perceived to be lighter than those located at the bottom (Arnheim 1954). Moreover, individuals’ previous knowledge about the weight of objects needs to match the location in the composition to create a perception of order and balance. This means that, visually, heavier items should lie at the bottom, whereas lighter items should float atop. The basic principle of “top-light” and “heavy-bottom” visual locations yields further implications in the design of miscellaneous marketing materials (e.g., ads, packages) (Deng and Kahn 2009). Guided by this idea, in the following section we put forward the notion that health and indulgence can be communicated by merely altering the location of the claims.

**Lightness and Heaviness of Foods**

Healthy food products are generally perceived to be lower in calories and less filling than unhealthy food products, and the source of such inferences is usually based on specific stereotypes about the product category (Oakes 2006) and the content of food product labels and claims (Gravel et al. 2012). To illustrate, product categories such as meats, dairy products, fats, and sweets are often perceived to be more filling than
product categories otherwise similar in caloric content but consisting of fruits, vegetables, and grains. Furthermore, if the same food product is described verbally as a pleasure food (rather than healthy or diet), it is perceived to be higher in calories (Gravel et al. 2012).

The perceived lightness or heaviness of foods has further downstream consequences in the design of packages and ads. Recent literature demonstrates that, by visually manipulating the “heaviness” of various package design elements, one can alter consumers’ inferences about the product. For example, when a food was presented in a heavier container, it was expected to be more satiating and dense than when the same food was presented in a lighter container (Piqueras-Fiszman and Spence 2012). Furthermore, Karnal et al. (2016) showed that a change in the visual weight of colors and typeface affects consumers’ healthfulness perception. Products that were assigned lighter (as opposed to heavier) colors and typeface were perceived as healthier. In a similar fashion, the location of different elements on the package can also influence perceived heaviness/lightness of the product. If the context matches the location - “light” locations for healthy products and “heavy” locations for unhealthy products - consumers’ evaluations are enhanced (Deng and Kahn 2009).

As healthy foods (as opposed to unhealthy foods) are perceived to be lighter, and lighter objects (as opposed to heavier objects) are associated with a higher vertical location, we propose that descriptors of light and healthy foods will be preferred at the top, whereas descriptors of heavy and unhealthy foods will be preferred at the bottom. Therefore,

**H1:** Healthy food descriptors are associated with a higher vertical location than unhealthy food descriptors and are thus preferred at the top (versus bottom).

Drawing on the notions of semantic match (or congruency) and processing fluency (Schwarz 2004), we next argue that, in a marketing context, a match between
the content of the verbal claim (healthy versus unhealthy) and vertical location (top versus bottom) will elicit more positive consumer responses.

**Semantic Match of Stimuli and Consumer Response**

Previous research has extensively demonstrated the effect of processing fluency on consumers’ evaluation and preferences. Processing fluency is defined as the ease or difficulty with which individuals process information and is an automatic mechanism (Reber, Schwarz, and Winkielman 2004; Schwarz 2004). A higher fluency will produce a more positive metacognitive experience (due to the ease of processing), which will often be misattributed to the external stimulus (Schwarz 2004). In line with this, previous research has shown, for example, that fluent processing influences a number of consumer responses, such as liking, aesthetic appeal, and credibility (Alter and Oppenheimer 2009).

Additionally, there are different possible sources of processing fluency – for example, stimuli that are visually clearer, phonologically simpler, or semantically consistent are perceived as more fluent and thus produce better evaluations of the stimulus itself (Alter and Oppenheimer 2009). An important source of fluent processing is the semantic match between different stimuli. In the context of the current study, a match between the vertical location and the content of the verbal claim should produce more fluent processing and thus elicit more positive evaluations. In the marketing literature, there are numerous accounts of how a match (vs. mismatch) between the visual location and product information results in more (vs. less) positive judgments (e.g. Chae and Hoegg 2013; Cian et al. 2015; Deng and Kahn 2009; Sundar and Noseworthy 2014).
Following the same rationale, we posit that a match between the vertical location (top vs. bottom) and the content of the verbal claim (healthy vs. unhealthy) will influence consumer response. Specifically,

**H2:** A match (vs. mismatch) between vertical location (top vs. bottom) and the content of the verbal claim (healthy vs. unhealthy) will produce more (vs. less) positive consumer responses:

*H2a:* Verbal claims conveying healthy food attributes will elicit more positive consumer responses when located at the top compared to the bottom

*H2b:* Verbal claims conveying unhealthy food attributes will elicit more positive consumer responses when located at the bottom compared to the top.

The present paper includes three experimental studies and one study employing content analysis of real packages. Study 1 provides evidence that consumers metaphorically associate healthy descriptors with a top location and unhealthy descriptors with a bottom location (H1). Studies 2 and 3 show that these associations further influence how consumers respond to marketing efforts in two different settings (ads and packages) and across product categories (H2). Finally, Study 4 reports the results of a content analysis of package design, showing that, in practice, most health-related claims are actually located at the bottom of the package.

**Study 1: Paired Words Association Task**

The aim of Study 1 was to explore whether any metaphorical associations occur between the concepts of healthy and unhealthy and verticality in the visual space. The sample for this study was collected from an online pool consisting of American individuals (N = 401; 54% men; Mage =32, SDage = 12).
Method

For the purpose of this study, a classification task was used in which respondents were asked to place five pairs of two words in a top or in a bottom box. For each pair of words, participants had to indicate which word they would place in the top box and which one they would place in the bottom box. They were not able to place both words in the same box. Two of the five pairs referred specifically to healthy or unhealthy foods (healthy foods-unhealthy foods and salad-burger), two pairs referred to attributes describing healthy or unhealthy foods (light-heavy, lean-fat), whereas another pair contained attributes describing mass (empty-full). The order in which the two words were presented was randomized in order to control for any order effects. We also included four filler trials in order to disguise the purpose of the study. These pairs of words were fruits-vegetables, running-walking, book-newspaper and street-home.

Results

A Chi-square Goodness-of-Fit test was run to determine if there were any differences in the frequency distribution (top box versus bottom box) within each pair of words. Overall, findings suggest that participants consistently placed the healthy words in the top box and the unhealthy words in the bottom box. Specifically, taking the healthy foods-unhealthy foods pair of words (pair A in Figure 1), 81.5% of participants placed the healthy foods at the top, $\chi^2(1) = 159.6, p = .000$; for the salad-burger pair (B), 57.1% placed salad at the top, $\chi^2(1) = 8.1, p = .004$. Taking the food attributes pairs, for the light-heavy pair of words (C), 78.3% of participants placed light in the top box, $\chi^2(1) = 128.5, p = .000$, whereas for the lean-fat pair (D), 86.5% placed lean in the top box,
\( \chi^2(1) = 202.6, p = .000 \). Finally, for the *empty-full* pair (E), 62.8% placed *empty* in the top box, \( \chi^2(1) = 26.5, p = .000 \).

**FIGURE 1**

THE FREQUENCY OF HEALTHY WORDS (VS. UNHEALTHY WORDS) PLACED IN THE TOP BOX

Discussion

The results of the first study provide initial evidence that individuals tend to associate healthy concepts with a top location and unhealthy concepts with a bottom location. Specifically, respondents in this study consistently and more frequently placed at the top words designating names of healthy foods (healthy foods, salad) and attributes of healthy foods (light, lean) but also words describing less mass (empty), supporting the
claim that the metaphor of lightness and heaviness of healthy and unhealthy foods manifests in the perceptual vertical space. In the following study, we investigate whether these effects can be verified in a marketing context by alternating the location (top and bottom) of two food product claims (health and taste).

**Study 2: The Vertical Location of Messages in Ads**

The first study investigated whether individuals associate health-related words with top, as opposed to bottom, locations. In the second study, the aim was to investigate whether these associations further influence consumers’ response in a marketing context. Specifically, the focus of the study was to explore whether there are differences in consumers’ evaluation of ads and products as an outcome of claim location. Based on a fluency account, the expectation was that consumers evaluate more positively ads and products when the content of the claim semantically matches the vertical location. Therefore, ads and products were expected to be evaluated more favorably when the health (vs. taste) claim was located at the top (vs. bottom) of the ad. The sample for this study was drawn from an online pool consisting of American consumers (N = 393; 51% women; Mage =34.6, SDAge = 12.5).

**Method**

In the second study, a 2 (type of claim: health vs. taste) x 2 (position: top vs. bottom) x 2 (product type: healthy vs. unhealthy) between-subjects design was used. Participants were told to evaluate an ad for a food product and then they were assigned to one of the eight conditions. Specifically, all the participants saw an ad
depicting either a healthy snack (an apple) or an unhealthy snack (a chocolate muffin). Two different products that varied in their degree of healthfulness were chosen in order to control for possible influences. The ads were digitally manipulated to include a health claim (your healthy choice) or an indulgent claim (your tasty choice) positioned at the top or bottom of the ad - above or under the product, which was placed in the middle of the ad (see Appendix A for stimuli).

After they visualized the ad, respondents were asked to report their attitudes towards the ad on a 5-item scale (Spears and Singh 2004), where 1 = unappealing, bad, unpleasant, unfavorable, unlikable and 9 = appealing, good, pleasant, favorable, likable (α=.95). Additionally, the perceived product quality was measured on a 9-point single item (1 = low quality; 9 = good quality). Two items measuring the perceived healthfulness of the two food products used as stimuli (1 = unhealthy; 9 = healthy) were included. Finally, to control for individual differences in health orientation, health consciousness (α = .87) was measured and used as a covariate.

Results

Manipulation check. A paired sample t-test was used to assess whether the two food products stimuli (apples and muffins) do indeed differ on perceived healthfulness. In line with the expectations, apples are perceived to be significantly more healthy ($M = 8.28$) than muffins ($M = 4.67$), $t(392) = 30.2$, $p = .000$.

Ad attitude. Taking ad attitude as a dependent variable, a 2 (position: top vs. bottom) x 2 (message: health vs. taste) x 2 (product: healthy vs. unhealthy) ANCOVA was conducted, controlling for individual differences in health consciousness. The covariate was significant ($F(1,384) = 87.12$, $p = .000$), indicating that health consciousness had a significant effect on consumers’ attitude (there was a positive relationship between the two variables). All the main effects were nonsignificant ($Fs <$
1). However, there was a significant two-way interaction between message and product, $F(1, 384) = 11.41, p = .001$, indicating that consumers’ attitude was more favorable when the healthy product was accompanied by a health message ($M = 7.49$) compared to a taste message ($M = 6.95$), whereas consumers’ attitudes were less favorable when the unhealthy product was accompanied by a health message ($M = 7.06$) compared to a taste message ($M = 7.39$). Importantly, the predicted interaction of position and message on ad attitude was also significant after controlling for health consciousness, $F(1, 384) = 7.36, p = .007$. In the model without the covariate, the interaction effect was marginally significant $F(1, 385) = 3.79, p = .052$ (see Figure 2A for means adjusted for the covariate). Simple effects tests revealed that consumers’ attitude was marginally more favorable when the health message was positioned at the top ($M = 7.44$) compared to the bottom ($M = 7.11$), $F(1, 384) = 3.39, p = .066$. On the other hand, consumers’ attitude was less favorable when the taste message was positioned at the top ($M = 6.99$) compared to the bottom ($M = 7.35$), $F(1, 384) = 3.98, p = .047$.

Additionally, the two-way interaction between product and position and the three-way interaction between product, message and position were nonsignificant ($F$s < 1).

**Product quality perception.** This time the product quality perception was taken as a dependent variable, and the same ANCOVA model was run: 2 (position: top vs. bottom) x 2 (message: health vs. taste) x 2 (product: healthy vs. unhealthy), with health consciousness as a covariate. Similar to previous results, health consciousness was a significant covariate ($F(1,384) = 78.62, p = .000$), and all main effects were nonsignificant. The two-way interaction between message and product was significant, $F(1, 384) = 11.41, p = .001$, indicating that consumers perceived the healthy product to be of higher quality when accompanied by a health message ($M = 7.66$) compared to a taste message ($M = 7.16$). On the other hand, when the product was unhealthy, consumers perceived it to be lower in quality when accompanied by a health message ($M = 7.06$) than a taste message ($M = 7.41$). As predicted, the two-way interaction between position and message was also significant, both in the model with covariate
(F(1, 384) = 14.5, p = .000) and without covariate (F(1, 385) = 8.95, p = .003) (see Figure 2B for means adjusted for the covariate). Simple effects tests revealed that consumers perceived the product to be of higher quality when the health message was positioned at the top (M = 7.6) compared to the bottom (M = 7.11), F(1, 384) = 6.01, p = .015. In contrast, consumers perceived the product to be of lower quality when the taste message was positioned at the top (M = 6.99) compared to the bottom (M = 7.58), F(1, 384) = 8.62, p = .004. As in the previous model, the two-way interaction between product and position and the three-way interaction between product, message and position were nonsignificant.

**FIGURE 2**

A. THE INTERACTION BETWEEN MESSAGE AND POSITION ON AD ATTITUDE

B. THE INTERACTION BETWEEN MESSAGE AND POSITION ON PERCEIVED PRODUCT QUALITY
Discussion

The results of the second study suggest that the location of different verbal claims does matter in a marketing context. Specifically, it was demonstrated that a message describing healthy food attributes will elicit more positive consumer responses (ad attitude and product quality perceptions) when placed at the top compared to the bottom. On the other hand, verbal claims describing unhealthy food attributes (e.g., taste) will elicit more positive consumer responses when placed at the bottom compared to the top. Furthermore, it was shown that these effects are consistent across food product categories (more versus less healthy); no three-way interaction was found. This suggests that the type of product does not moderate the effect of the match between claim and location on consumer evaluations. However, an interaction between type of product and claim content was noticed, indicating that healthy products elicit more positive responses when matched with a healthy claim, whereas less healthy products are better off when matched with an unhealthy claim. In the following study, the replicability of these effects is tested in a different marketing context (package design) for a different product category (smoothie).

Study 3: The Vertical Location of Claims on the Package

Building on the previous study, the purpose of Study 3 was to test the ability to generalize these effects in another context (package design) and with a different product (smoothies). The sample for this study (N = 402; 56% men; Mage = 31.8,
was drawn from an online pool (Prolific Academic) and consisting of American consumers.

Method

The respondents were assigned to one of the conditions in a 2 (type of claim: health vs. taste) x 2 (position: top vs. bottom) between-subjects design. All the participants saw an image displaying three variants of a fictitious new line of smoothies. Similar to the previous study, the type of claim that appeared on the package of each bottle was manipulated such that it was either healthy (your daily dose of health) or indulgent (your daily dose of taste), and the location of the claims was either at the top or bottom of the package. Furthermore, participants also saw a short description of the product, reinforcing the positioning of the brand (healthy vs. tasty) (see Appendices B1 and B2 for stimuli and product descriptions).

After viewing the packages, respondents reported their packaging attitudes on a 3-item scale, where 1 = unfavorable, negative, bad and 9 = favorable, positive, good (α = .97). Additionally, anticipated product satisfaction was measured on a 9-point item (1 = very unsatisfied; 9 = very satisfied). Finally, consumers’ perceptions of package novelty (1 = not at all novel; 9 = very novel) and consumers’ general perceptions of the smoothies’ healthfulness (1 = strongly disagree; 9 = strongly agree) were measured and included as covariates. Furthermore, in order to control for package visibility, respondents were asked whether they were able to see the packages without scrolling (yes; no). Those respondents (N = 35) that had to scroll in order to see the full package were excluded from the study, leaving a final sample of 367 respondents (56% men; Mage = 30, SDage = 10.9).
Results

Pack attitude. Taking pack attitude as a dependent variable, a 2 (position: top vs. bottom) x 2 (claim: health vs. taste) ANCOVA was conducted, controlling for respondents’ perception of pack novelty and smoothies healthfulness. Perceptions of pack novelty were unaffected by the independent variables (all $F$s(1, 363) < 1.25, NS). Perceptions of pack novelty was a significant covariate ($F(1,361) = 71.67, p = .000$), indicating that it had a significant and positive effect on consumers’ pack attitude. At the same time, consumers’ health perception of the smoothies was also a significant and positive covariate, ($F(1,361) = 8.18, p = .004$). All the main effects were nonsignificant (all $F$s < 1.01, NS). Importantly, the predicted interaction of position and claim on pack attitude was significant after controlling for perceptions of pack novelty, $F(1, 361) = 4.36, p = .038$. In the model without covariates, the interaction effect was marginally significant $F(1, 363) = 2.76, p = .097$ (see Figure 3A for means adjusted for the covariate). Planned contrasts revealed that consumers’ pack attitude was directionally more favorable when the health message was positioned at the top ($M = 4.91$) compared to the bottom ($M = 4.65$), but the difference was not statistically significant $F(1, 361) = 0.80, p = .372$. On the other hand, consumers’ pack attitude was significantly less favorable when the taste message was positioned at the top ($M = 4.26$) compared to the bottom ($M = 4.86$), $F(1, 361) = 4.2, p = .041$.

Anticipated product satisfaction. This time anticipated product satisfaction was taken as a dependent variable and the same ANCOVA model was run: 2 (position: top vs. bottom) x 2 (claim: health vs. taste) x 2 (product: healthy vs. unhealthy), with respondents’ perception of pack novelty and smoothies healthfulness as covariates. Similar to the previous results, both covariates were statistically significant predictors, positively related to the independent variable (all $F$s > 24, $p = .000$) and all the main effects were nonsignificant (all $F$s < 1.01, NS). As predicted, the two-way interaction
between position and message was significant in the model with covariates ($F(1, 361) = 4.1, p = .044$) but not significant in the model without the covariates ($F(1, 361) = 2.28, p = .132$) (see Figure 3B for means adjusted for the covariate). The direction of the means was also in the hypothesized direction. Planned contrast revealed that anticipated satisfaction is directionally higher when the health claim was positioned at the top ($M = 5.95$) compared to the bottom ($M = 5.58$), $F(1, 361) = 1.97, p = .161$. In contrast, anticipated satisfaction was directionally lower when the taste claim was positioned at the top ($M = 5.52$) compared to the bottom ($M = 5.9$), $F(1, 361) = 2.12, p = .146$.

**FIGURE 3**

A. THE INTERACTION BETWEEN CLAIM AND POSITION ON PACK ATTITUDE

B. THE INTERACTION BETWEEN CLAIM AND POSITION ON ANTICIPATED PRODUCT SATISFACTION
Discussion

Overall, the results from Study 3 suggest that the hypothesized effects are replicable across marketing context and product categories. Whereas in the second study ads featuring products that differed in health perception were used, the third study demonstrates that the same claim location effects also occur in a package design context and for another product category. Specifically, it was shown that a claim denoting healthy attributes will elicit more favorable evaluations (pack attitude and anticipated product satisfaction) when placed at the top of the package. Conversely, a claim denoting unhealthy attributes (taste) will elicit more favorable evaluations when placed at the bottom of the package. The results of our third study represent an important development, as they show that claim location effects are pervasive across several different contexts.

Study 4: Content Analysis

Thus far, Studies 1-3 support the assertion that the content of verbal claims communicating more (versus less) healthy attributes are metaphorically associated with a top (versus bottom) location, thereby influencing ad, package and product evaluations. In Study 4, a content analysis of food product packages drawn from Mintel GNPD was conducted in order to assess which vertical locations are more frequently used on packages to display health-related claims. Essentially, the purpose of this last study was to capture a snapshot of the marketplace and thereby identify whether marketing managers are using the location of verbal claims in an optimal manner – that is, whether health claims are more frequently placed at the top as opposed to other package locations (middle or bottom).
Mintel GNPD is a subscription-based online database that covers a broad area of product categories. The information provided is both textual (i.e., certain characteristics of the products are already coded in the database) and visual (pictures of the products packages). The sampling frame was defined according to several criteria. First, to narrow down the search, only food products launched in US between 2013 and 2015 were accounted for. An additional criterion was to ensure that the selected product categories have a high proportion of products that carry a dominant health-positioning claim. The category dominant health-positioning claim (HPC) refers to the health-related claim that is carried more frequently in each product category, based on the extracted sample.

The initial sample consisted of 2,545 food products and included six product categories (corn-based snacks, potato snacks, savory biscuits and crackers, bread products, hot cereals and juice). This sample was further narrowed down to select only those products that had the dominant health positioning claim (within each category) displayed at the front of the package, resulting in 527 food products that were subsequently used in the analysis. Each package extracted from the database represented the coding unit of analysis. Two coders documented the position of the health claim in the vertical plane of the package with three options: top, middle or bottom.

Results

Frequency tests revealed that most health positioning claims are located at the bottom of the package (51.8%), while only 26.8% are placed at the top and 21.4% are placed in the middle, $\chi^2(2) = 83.13, p = .000$. Additionally, a cross-tabulation across the
product categories shows that this distribution is more or less consistent across the food product categories. It is only in the savory biscuits/crackers category that the health claims are placed more frequently at the top than at the bottom or middle (see Table 1).

**TABLE 1**
LOCATION OF THE HEALTH CLAIMS ON THE PACKAGE

<table>
<thead>
<tr>
<th>Category</th>
<th>Top</th>
<th>Middle</th>
<th>Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn-based snacks</td>
<td>22.5</td>
<td>33.8</td>
<td>43.8</td>
</tr>
<tr>
<td>Bread products</td>
<td>16.9</td>
<td>16.9</td>
<td>66.2</td>
</tr>
<tr>
<td>Breakfast hot cereals</td>
<td>32.6</td>
<td>19.1</td>
<td>48.3</td>
</tr>
<tr>
<td>Juice</td>
<td>26.7</td>
<td>18.6</td>
<td>54.7</td>
</tr>
<tr>
<td>Savory biscuits/crackers</td>
<td>44.1</td>
<td>28.8</td>
<td>27.1</td>
</tr>
<tr>
<td>Potato snacks</td>
<td>29.6</td>
<td>16.9</td>
<td>53.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23.7</strong></td>
<td><strong>21.2</strong></td>
<td><strong>55.2</strong></td>
</tr>
</tbody>
</table>

**Discussion**

As outlined and demonstrated in the first three studies, if the content of the claim describes healthy attributes of food products, it is more effective if located at the top of the package (as opposed to the bottom). Contrary to this, the results from the fourth study suggest that, in practice, most health-related claims are located at the bottom of the package. This finding highlights the need for more research-driven managerial decision-making. Although at the outset it might seem like an inconsequential design decision, the location of the claims seems to be an important driver of product evaluation and possibly even choice.
This paper consists of three experimental studies that present converging evidence that the location of claims can be used strategically to create favorable perceptions about the communication material (ads and packages) and the food product itself (quality perception and anticipated product satisfaction). Specifically, in Study 1, it is shown that health-related concepts are differentially mapped onto the vertical visual space, where healthy descriptors are associated with a higher visual location and unhealthy descriptors with a lower visual location. Drawing on this initial finding, Study 2 explores consumers’ response to messages varying in their health-related content (designating healthy or unhealthy product attributes) depending on their vertical location (top versus bottom). Here, evidence is provided for the assertion that in an advertising context, verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at the top compared to the bottom, whereas verbal claims designating unhealthy food attributes (e.g., taste) elicit more positive consumer responses when placed at the bottom compared to the top. Furthermore, these effects seem to be consistent across food product categories varying in their degree of healthfulness. In Study 3, the replicability of these effects is tested in a different marketing context (package design) and with a different product category (smoothie). We demonstrate that a claim denoting healthy attributes will elicit more favorable evaluations (pack attitude and anticipated product satisfaction) when placed at the top of the package. Conversely, a claim denoting “unhealthy” attributes (taste) will elicit more favorable evaluations when placed at the bottom of the package. The results of the third study represent an important development, as they show that claim location effects are pervasive across several different contexts. In a fourth and final study employing content analysis of packages, we show that most health-related claims on packages are actually placed at the bottom. This is contrary to the findings
of our research, which suggests that health claims and messages are more effective when placed at the top.

Informed by art and visual perception literature (Arnheim 1954) and by the metaphor-transfer theory (Lakoff and Johnson 1999; Landau et al. 2010), our account for these findings is that items that are lighter and of lower magnitude are visually represented higher along the vertical dimension. In the context of food, this means that healthier items, which are generally perceived as lighter and less filling than less healthy items (Oakes 2006) will produce metaphorical associations with a higher location (Deng and Kahn 2009). The findings of this paper are in line with recent literature demonstrating that, by manipulating the heaviness of various package design elements, one can alter consumer inferences such as perceived food satiety, density and healthfulness (Karnal et al. 2016; Piqueras-Fiszman and Spence 2012).

**Theoretical Contribution**

The findings of this paper have consequential theoretical and practical implications. Recent research demonstrates the importance of spatial representation of information in effective marketing communication (Chae and Hoegg 2013; Cian et al. 2015; Deng and Kahn 2009; Schlosser et al.). We contribute to this stream of literature by showing that healthfulness is yet another abstract concept that finds its meaning in the perceptual space, an aspect that further influences consumer response.

Furthermore, in the marketing and health communication literature, a significant number of studies have shown the impact of more explicit information (in the form of various product claims) on consumer response (Andrews et al. 1998; Belei et al. 2012; Kozup et al. 2003; Van Kleef et al. 2005). Though essential in their own right, explicit information often interacts with other stylistic elements of communication materials (e.g., ads, packages, websites), as this research also suggests.
This is in line with a number of recent studies highlighting the importance of visual metaphors in complementing textual elements and the impact they might have in either misleading or nudging consumers towards healthier food choices (Purnhagen, van Herpen, and van Kleef 2016; Romero and Biswas 2016). This research provides further evidence that consumer evaluation is contingent not only upon the verbatim and descriptive content of the claim, but that the stylistic manipulation of claim location also carries certain symbolic associations that interact with the content of the claim, influencing consumer response. We demonstrate that a health-related claim might produce better product evaluations if placed at the top, a location that is semantically congruent with the content of the claim. This finding also echoes more broadly to the graphic design literature by suggesting that simple stylistic adjustments such as the location of a claim on the package could yield different consumer inferences.

**Implications for Marketing Practice and Public Policy**

Furthermore, potential implications can be outlined both for marketing practitioners and for policy makers that try to nudge consumers into making healthier food choices. First, positioning food products as either healthy or tasty is a widespread marketing strategy; our research suggests that the location of these positioning claims can impact consumer response. For example, for products positioned as healthy within a category, marketing practitioners might consider placing the health-related claims in top locations, as this small change in design will yield better consumer evaluations. This, on the other hand, does not seem to occur very frequently in the marketplace; the content analysis from Study 4 indicates that most health claims are located at the bottom of the package, and this occurs across food product categories. Also noteworthy is that the effect of claim location on product evaluation is pervasive; it
does not wane with product category, nor does it disappear when changing the marketing context. For example, consumers generally evaluate an unhealthy product less favorably when presented with health claims; however, the actual location of the health claim might improve their evaluation of the product. This means that, even for less healthy food products (e.g., muffins), a higher location of health claims still improves consumers’ product evaluations, despite a lack of fit between the product and the claim. The same holds true when the food product is of a more healthy nature, but carries indulging claims: better evaluation will be produced if the taste claim is located at the bottom. Additionally, these effects appear to persist across marketing contexts. Whereas in our research we accounted for advertising and package design contexts (with similar results), these findings could equally be applicable for other visual formats, for example webpages and menu cart designs but also for shelf display in the supermarkets.

In regards to public policy campaigns encouraging healthier food choices, a number of points merit reflection and potential action. On the one hand, it might be beneficial if consumers are nudged into making better food choices by placing health-related claims at top locations. What is unsettling, though, is that a top location for health-related claims seems to be equally effective for otherwise unhealthy food products. This leaves room for unethical business practices, whereby companies could use such information to make unhealthy foods look more appealing to health-conscious consumers. Nevertheless, our research suggests that this is not currently a strategy very frequently employed by marketing practitioners. More interesting is that consumer evaluations of healthy food products carrying taste claims can also be influenced by claim location. This occurs despite the well-known healthy ≠ tasty intuition (Raghunathan, Naylor, and Hoyer 2006) leading consumers to dislike healthy products claiming to be tasty. Implied here is the fact that healthy products can be made more appealing to those consumers seeking indulgence solely by shifting the location of taste claims from top to bottom.
Limitations and Directions for Future Research

In outlining the limitations of this paper, several avenues for future research are also presented. The results reported in this paper are in line with our proposition, suggesting a healthy-top and unhealthy-bottom intuition. However, we have not yet explored the underlying process in depth. There might be other plausible explanations for the effects reported in this study. For instance, prior research shows that valence and morality are abstract concepts that also manifest symbolically in the vertical space, where “good” and “moral” values are visualized at the top and “bad” and “immoral” at the bottom (Meier and Robinson 2004; Meier et al. 2007). Foods that are unhealthy are often deemed as bad and considered guilty pleasures; they are thus vices, appealing to a more immoral self. On the other end of the spectrum, healthy foods are considered to be good and virtuous, appealing to a moral self (Chernev 2011). Another possible explanation, not completely distinct from the aforementioned reason, is that health claims represent more rational appeals, whereas claims related to indulgent foods are more emotional in nature. As Cian et al. (2015) noted, rational appeals are mentally associated with a higher position in space than emotional appeals. Overall, these different accounts seem to point in the same direction: healthy is mentally linked to a higher location and less healthy is linked to a lower location in space. A fruitful avenue of research would therefore be to clarify if these effects are indeed generated due to a heaviness/lightness perception of food products, as hypothesized in the current paper, or whether other lay theories guide such inferences (Cian et al. 2015; Meier et al. 2007).

Furthermore, the present study measures only product evaluations and not consumer behaviors such as choice and consumption. Therefore, it would be worthwhile for future studies to examine the effects of claim location on actual behavior. For example, Romero and Biswas (2016) showed that laterally displaying...
healthy items to the left of unhealthy items influences not only product choice but also consumption volume. Similar effects

Finally, several factors might moderate the strength of these results. For example, consumers’ processing style and salient goals are but two of the factors that have been shown to influence responses to marketing information (Irmak, Vallen, and Robinson 2011). Furthermore, although these results are stable across different product categories and communication materials, they might depend on the specificities of various marketing settings.
APPENDIX A

STIMULI USED IN STUDY 2
APPENDIX B1

STIMULI USED IN STUDY 3
APPENDIX B2

PRODUCT DESCRIPTIONS USED IN STUDY 3

1. Health product positioning

Every bottle of this wholesome smoothie has been masterfully blended together to ensure you get the health benefits of fresh fruits and vegetables in every sip.

2. Indulgent product positioning

Every bottle of this delicious smoothie has been masterfully blended together to ensure you get a rich taste in every sip.
References


Gravel, Karine, Éric Doucet, C Peter Herman, Sonia Pomerleau, Anne-Sophie Bourlaud, and Véronique Provencher (2012), "“Healthy,” “Diet,” or


Nielsen (2015), "We Are What We Eat. Healthy Eating Trends around the World."


Romero, Marisabel and Dipayan Biswas (2016), "Healthy-Left, Unhealthy-Right: Can Displaying Healthy Items to the Left (Versus Right) of Unhealthy Items Nudge Healthier Choices?", *Journal of Consumer Research*.


Chapter 5
Final Discussion
Informed by the growing interest in healthy food choices and consumption (Euromonitor 2012; Nielsen 2015), and by the role of package design in influencing both in-store and post-purchase food decisions (Chandon and Wansink 2012), the present dissertation aimed to examine the role of package design visuals in regards to health communication and behaviors.

In this respect, most studies have thus far focused on the role of informational elements on consumer response (Aschemann-Witzel, Maroscheck, and Hamm 2013; Kozup, Creyer, and Burton 2003; Roe, Levy, and Derby 1999; Van Kleef, van Trijp, and Luning 2005) and only sparse research has addressed the role of implicit forms of package design (such as graphic and structural elements) in generating health-related inferences and influencing consumption behavior (e.g. Karnal et al. 2016; Koo and Suk 2016; Schuldt 2013). Structural and graphic elements operate at a level outside of conscious awareness, affecting consumers’ perceptions more implicitly (Wansink and Chandon 2014). This becomes especially relevant in low-involvement contexts such as food shopping, where consumers spend a limited amount of time and cognitive resources to evaluate products and make a decision (Park, Iyer, and Smith 1989).

In order to attain a broader picture of the phenomenon, this dissertation sought to explore both the marketing communication side – by trying to identify specific patterns of package design communication for health brands – but also looked into how consumers actually respond to specific manipulations of package design visuals in regards to health-related inferences and behaviors. These objectives delineated two main research questions that were addressed across three empirical articles. Below, a discussion of the dissertation is outlined around these two main research questions. Subsequently, the overall contribution of the dissertation is addressed.
Anecdotal evidence suggests a surge in packaging redesign decisions (Punchard 2016) in order to accommodate the health (re)positioning of the brands and the increasingly health-oriented consumers (Nielsen 2015). Despite this, there is currently very little understanding on how package design is actually used by companies to convey health-related attributes and thus influence choice and consumption. *Article 1* included in this dissertation aimed to gain a better understanding of the phenomenon by firstly exploring company practices surrounding package design for food brands and secondly, by investigating the use of package design visuals for health brands. These objectives were addressed across three studies employing a multi-method approach (key-informant semi-structured interviews and content analysis of package design).

The pilot study aimed at revealing the discourses and practices of key-players surrounding package design and its perceived importance in communicating brand values. In general, marketing professionals seem to acknowledge the importance of package design in brand communication, especially in regards to colors and imagery (graphic elements). Whilst managers have a broad understanding of their field of expertise, most of their decisions are based on experience and are therefore of a more intuitive nature. They keep a close eye to the competition and the market, and in this way they seem to develop a thorough understanding of the common practices regarding package design. By applying such organic knowledge however, they help perpetuate and reinforce associations between design elements and certain brand values (e.g. black package for high quality meat). Thus, some patterns might become evident within the practice of package design that further shapes consumers’ expectations and associations.
The findings from the following two studies suggest that certain patterns in the use of package design visuals can be observed in the health brands food market and the possible research and practical implications are outlined. In particular, we emphasize the need of both marketing practitioners and public policy to be alert to the nuanced ways in which package design visuals influence numerous aspects of consumption. We further call for future research that addresses the potential impact of implicit elements on health-related inferences and behaviors. Such research should also take into account the interplay between different elements, but also individual and contextual factors that shape how consumer respond to visual design manipulations.

In the following two articles, we specifically looked into how consumers actually respond to specific manipulation of package design visuals in regards to health-related inferences and behaviors.

How Does Package Design Influence Health-Related Inferences and Behaviors?

*Articles 2 and 3* included in this dissertation demonstrate how simple design manipulations in regards to both *structural elements* (container shape curvature) and *graphic elements* (vertical location of the claim) generate specific health-related inferences, influence attitudes and impact consumption.

In particular, in *Article 2* we propose and demonstrate that the shape of the container (convex or concave) can influence health-related inferences and consumption amount. Our research was informed by and contributes to the literature showing the effects of package shape on specific food-related inferences (e.g. taste and calorie estimation) (Becker et al. 2011; Koo and Suk 2016), product choice and consumption (Raghubir and Krishna 1999; Yang and Raghubir 2005).
By means of three experimental studies, we show that consumer infer a food product to have more calories and be less healthy when presented in a convex container (wider in the middle) than in a concave container (more narrow in the middle). We further report that package shape can moderate how consumers’ eating control discourse influences their anticipated consumption guilt. Consumers high in eating control feel more anticipated consumption guilt than consumers low in eating control when the food product is presented in a convex package, but not when the product is presented in a concave package. Additionally, in Study 3 we show that consumers also eat more when the food is displayed in a convex container compared to when the food is displayed in a concave container.

In Article 3, we further document how, by graphically manipulating the location of claims, one can influence consumers’ evaluations of the product. Specifically, the article builds on extant literature on conceptual metaphors (Lakoff and Johnson 1999; Landau et al. 2010) and the role of spatial information in consumer decision-making (Cian, Krishna, and Schwarz 2015; Deng and Kahn 2009; Romero and Biswas 2016; Schlosser, Rikhi, and Dagogo-Jack; Sundar and Noseworthy 2014) to investigates the effectiveness of food-related claims when distinctively located along the vertical dimension (of packages and ads).

We propose and demonstrate across three experimental studies that health-related concepts are differentially mapped onto the vertical visual space, where healthfulness descriptors are associated with a higher visual location and unhealthfulness descriptors with a lower visual location. We further demonstrate that verbal claims conveying product attributes related to health elicit more positive consumer responses when placed at top, compared bottom locations, whereas verbal claims designating unhealthy food attributes (e.g. taste) elicit more positive consumer responses when placed at bottom, compared top locations, across marketing contexts (ads and packages) and product categories. In a fourth and final study employing content analysis of packages, we also show that most health-related claims on the
packages are actually placed at the bottom – this is contrary to our findings, which suggest that health claims and messages are more effective when placed at the top.

Overall Contribution

Given its interdisciplinary nature, our research contributes to literature in several directions. First of all, in regards to food marketing, extant research has so far addressed the impact of explicit packaging information (e.g. nutrition labels, health claims) on caloric estimation (Chandon and Wansink 2007), health-related inferences (Ford et al. 1996; Garretson and Burton 2000; Kozup et al. 2003; Lähteenmäki 2013; Roe et al. 1999), food choice (Aschemann-Witzel et al. 2013; Van Kleef et al. 2005), and consumption (Belei et al. 2012; Chandon and Wansink 2007). Though essential in its own right, explicit information often interacts with or is overridden by other stylistic elements of the package when conveying product information to consumers.

Our research is in line with a number of recent studies highlighting the importance of visual metaphors in complementing textual elements and the impact they might have in either misleading or nudging consumers towards healthier food choices (Becker et al. 2011; Karnal et al. 2016; Koo and Suk 2016; Purnhagen, van Herpen, and van Kleef 2016; Romero and Biswas 2016). We contribute to this stream of literature by showing that (1) specific patterns can be identified in the marketplace in regards to health communication though package design and that (2) consumers are responsive to specific package design manipulation in regards to health-related inferences and behaviors.

Our research further contributes to the visual design literature, building on the idea that stylistic product properties do not only fulfil an aesthetic role, but can also generate specific inferences (Bloch 1995). At a more general level, we also bring our contribution to the literature attesting the role of conceptual metaphors and other
contextually and culturally driven associations in consumers’ decision-making process (Koo and Suk 2016; Meier, Sellbom, and Wygant 2007; Sundar and Noseworthy 2014). As already discussed in Chapter 1, the power of more implicit cues to convey specific information lies both on specific universal metaphors of human cognition (Lakoff and Johnson 1999; Landau, Meier, and Keefer 2010), and on other associations that are learnt in time through exposure to a specific social and cultural context (Labrecque, Patrick, and Milne 2013; Scott and Vargas 2007). Additionally, through the consistent use of specific visual design elements for health brands, practitioners can reinforce and perpetuate these associations (Janiszewski and Van Osselaer 2000). Apart from guiding specific inferences, design elements can also act as cues for perceptual judgements. A growing body of research demonstrates how different design elements alter consumers’ volume and size perceptions, which subsequently influences consumption behavior (Deng and Srinivasan 2013; Folkes and Matta 2004; Ittersum and Wansink 2012; Raghubir and Krishna 1999).

In the present research we focused on the role of universal metaphors (Article 3), culturally grounded metaphors (Article 2) and perceptual cues (Article 2) in influencing health-related inferences and behaviors. Yet, health-related inferences might also derive from market or product category specific associations, as already mentioned above. This process is highlighted in Article 1, where we identify which package design elements are most frequently used in health-positioned food categories. Here, we argue that package design elements can acquire meaning also by their long-term use to signal a specific product positioning (in our case health). A visual illustration of our overall contribution in this area is depicted visually in Figure 1.
The increased focus on healthy food choices and consumption makes consumers susceptible to use a number of unrelated cues in the environment to fulfill such goals (Chandon 2013; Wansink 2004). In accordance with previous research, this dissertation demonstrates that consumers are prone to infer health and regulate their consumption based on unrelated package design cues. Such findings have potential implications for both marketers and policy makers that try to nudge consumers into making healthier eating choices.

To illustrate, if a company wants to launch a new brand of juice targeting health-conscious consumers, they have several design decisions they have to make – in
regards to both graphic and structural elements. Drawing on the results reported in this dissertation, they might consider opting for a concave bottle (as opposed to a convex bottle) and locating the health-positioning claim at the top of the package.

However, the downside of such actions is that companies might actually try to conceal the real nature of the food and make unhealthy product appear healthier and more appealing. Therefore, there are a number of points to be reflected on and potentially acted upon by public policy campaigns encouraging healthier food choices. On the one hand, it might be beneficial if consumers are nudged into making better food choices by the use of design elements conveying health-related attributes. The concern is, though, that such implicit cues might be equally effective when applied to otherwise unhealthy food products. Therefore, ethical business practices should be encouraged, such that implicit elements conveying health-related attributes should primarily be used to nudge actual healthy choices.

Another note to be taken is that structural elements operate on two distinct levels. On the one hand, they can influence specific product inferences, as discussed above. However, based on more perceptually driven mechanisms, they can also be used by consumers to monitor their food intake, which often leads to specific serving biases. Sometimes, these two types of responses might come in contradiction. For example, in this dissertation we presented how consumers both infer more health and downsize their consumption from a concave container. We argued that in a shopping situation, it should be avoided to present unhealthy product in concave containers, as this might lead to suboptimal food choices. However, in a consumption situation, individuals might actually consume less of the unhealthy product when served in a concave container. This shows that it is not always straightforward what design choices are going to benefit consumers most, but instead it might very well depend on the specificities of the context.
Limitations and Directions for Future Research

Whilst limitations inherent to the characteristics and design of each empirical article were already presented, the focus here is to offer a broader perspective to the shortcomings of the present dissertation and possible avenues for future research in this area. The main challenge of this dissertation process was the attempt to fathom such a complex problem and break it into smaller and more manageable pieces. Whilst this approach offered a glimpse into the role of package design visuals in health-related consumer response, it is by no means exhaustive. Plenty remains unexplored and yet to be discovered in this area. For example, what other implicit elements impact consumers?; how to these interact and what is the role of more complex combination of design visuals on consumer response?; when are implicit package design cues more effective than explicit information?; what are the main cognitive processes underlying such effects?; what is the real effect on consumers, in a natural and not experimentally-controlled context? These are only few of the questions that offer a fruitful avenue for future research.


Deng, Xiaoyan and Raji Srinivasan (2013), "When Do Transparent Packages Increase (or Decrease) Food Consumption?" *Journal of Marketing*, 77 (4), 104-17.


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