

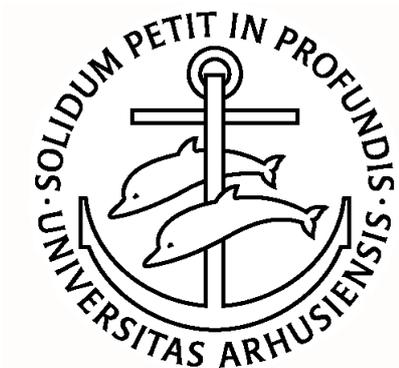
# **Meal satisfaction**

*Focusing on meals in worksite environments*

**By Pernille Haugaard**

A PhD thesis submitted to  
School of Business and Social Sciences, Aarhus University,  
in partial fulfilment of the requirements of  
the PhD degree in  
Management

December 2015





## Acknowledgement

One of the first words that come to mind, now that I will soon be finishing my life as a Ph.D. researcher, is gratitude. I'm so grateful and happy that I managed to reach the finishing line and the journey has been full of good and exciting experiences. At the same time it has also been a tough period that has challenged me on both a professional and a personal level. Some days have been a breeze, others as a struggle to get through. I have learned so much, not least on my research topic and doing research, but also about myself. I am certainly more persistent than I had expected – to give up has sometimes been tempting, but never a real option in my mind. Many people have supported and helped me on this journey. I'm so grateful that you all have been a part of my life and I would not have come so far without you.

First and foremost, I would like to express my sincere gratitude to my main supervisor Professor Liisa Lähteenmäki and co-supervisor Associate Professor Lars Esbjerg. Liisa, I have the greatest respect for your method of working and your great contribution to research. You have always been there to help and guide me, also in difficult times, and for that I'm deeply grateful. You have been very patient with me, you believed in me and it has made me come so far. Lars, thank you for your guidance throughout the years, for your text reading and valuable comments. Thank you both for everything.

I would also like to thank Professor Klaus G. Grunert for giving me the opportunity to be a part of the MAPP group. It has been a great honour to work with such competent and dedicated colleagues. There are many colleagues that have been a pleasure to work with – thanks to Violeta Stancu, Catalin M. Stancu, Lone L. Jensen, Livia Marian, Sarah Krøtel, Susanne Pedersen, Charlotte Rosholm and Julia R. Stacy and many others –

thanks for all your help and good talks. Special thanks to Birgitte Steffensen for your great help proofreading this thesis. You are always kind and extremely helpful.

A big hug and my sincerest gratitude must go to my former colleague and good friend Madeleine B. Toft. We joined the department two days apart as research assistants back in 2011. I will be forever grateful for our time together here at the university. This journey would definitely not have been the same without you. We have shared many joys and worries, laughed and cried, but stuck together through thick and thin. Thank you for being you.

This research would not have been possible without the support from the SENSWELL project funded by the Innovation Fund Denmark. Thank you to all partners in the project, especially to Professor Per B. Brockhoff for instructing me in “R” with great expertise and patience.

Thank you to Anne Bech at Consumer Insights for our collaboration. It was a pleasure working with you as you are dedicated, experienced and have a very professional mind-set.

Professor Inga Thorsdottir, thank you for our collaboration and the opportunity you gave me to visit you and your team at the University of Iceland, Unit for Nutrition Research. Your kind welcome and hospitality during my stay was extraordinary. It was indeed a great experience.

I would also like to express my sincere gratitude to the members of my assessment committee, Professor Monique Raats, Associate Professor F.J. Armando Perez-Cueto and Associate Professor Jessica Aschemann-Witzel. Thank you for the valuable recommendations you have given me to improve my work.

Last but not least, thanks to my lovely family and friends. Thanks to my parents and my ex-mom-in-law for cheering me on and taking so good care of my beloved children when I had to work or travel. Thank you to my wonderful boyfriend who was so brave to jump on board in the middle of this challenging journey. I'm grateful for your support and hugs whenever needed.

Pernille Haugaard

Aarhus, March 2016



## Summary in English

This PhD thesis contributes enhanced knowledge about consumers' perception of meal satisfaction and the factors contributing to meal satisfaction. Special attention has been paid to exploring satisfaction with lunch buffet meals consumed at work. Improved knowledge about meal satisfaction is important as it may influence general consumer satisfaction and well-being. By reviewing relevant literature in the area of food and meal consumption, a conceptual framework was developed to guide the studies conducted. The review revealed a lack of real-life environment studies dealing with consumer satisfaction with the entire meal experience, but it also showed that there is an extensive body of research related to food consumption and behaviour from domain-specific viewpoints. The overall objective of this PhD thesis is to combine the various research perspectives on eating to expand our knowledge about meal satisfaction and how food-related, personal and situational factors contribute to meal satisfaction and meal variety in real-life work environments. Four specific research questions are addressed in answering this overall research question: *How do consumers perceive meals and which food-related, personal and situational factors contribute to meal satisfaction and perceived meal variety?*

*RQ1. Which associations do consumers use to describe meal (dis)satisfaction in different situational contexts?*

Research paper 1: To increase our insight into the factors that contribute to meal satisfaction, the aim of the study was to explore the associations that consumers use to describe meal (dis)satisfaction in different situational contexts. The word association technique was applied to evoke consumers' associations. Data were collected via an online survey (N=118). Results show that meals were categorised into seven broad thematic categories: overall meal

evaluation, food-related preferences and experiences, surroundings and ambience, emotions and physical sensation, social context, resources available – including time and money – and behaviour-related strategies. The themes associated with both delightful and disappointing meals overlapped, but delightful meals were significantly more often associated with the surroundings and ambience and the social context, whereas disappointing meals were significantly more often associated with emotions and physical sensation, resources available and behaviour-related strategies. The meal context was relatively unimportant in the types of associations with delightful and disappointing meals, but there were clear differences in the types of words within themes.

*RQ2. How do consumers talk about their meal-related expectations and how do they link meal experiences with satisfaction?*

Research paper 2: To improve our understanding of how consumers perceive meal satisfaction and the meals satisfaction formation process, the aim of the study was to explore how consumers talk about their meal-related expectations and how they link meal experiences with satisfaction. An additional aim was to explore the role of the food eaten for lunch as well as personal and situational factors in meal satisfaction. In-depth pre and post-lunch interviews were carried out in a work environment (N=25). The results suggest that consumers view meal satisfaction as a holistic experience integrating the sensory experience of food, physiological consequences of eating, and the social and physical environment of the meal. Consumers have both short and long-term goals that are linked to achieving or maintaining physical and mental well-being. Meal satisfaction increases when consumption is in alignment with consumers' meal-related goals.

*RQ3. Which food-related, personal and situational factors contribute to consumers' meal satisfaction and what are their relative roles?*

Research paper 3: To determine the factors contributing to meal satisfaction, the aim of the study was to examine the relative roles of different food-related, personal and situational factors in meal satisfaction. An additional aim was to examine individual differences in meal satisfaction across meals. Repeated data on the same participant were collected via pre and post-lunch surveys in a real-life work environment. Pictures of participants' lunches were used to calculate the nutritional content of each meal (N=71; meals in total=519). Results show that meal satisfaction was directly associated with a positive ambience and a positive evaluation of both the quality of the food eaten and the buffet assortment, whereas the energy content of the meal did not contribute to meal satisfaction. Additionally, meal satisfaction was associated with a more positive mood, lower hunger level as well as feeling less busy and stressed after lunch. The buffet assortment, a more positive mood before lunch and mindful eating contributed to the perceived food quality but was not associated with the pre-lunch hunger level. Time available, mindful eating and eating with close colleagues were positively associated with perceived ambience.

*RQ4. How are consumers' perceptions of meal variety related to objective measures of meal variety?*

Research paper 4: Within-meal variety is one of the food-related factors that contribute to meal satisfaction. The aim of the study was to explore possible relationships between objective measures of meal variety including the number of components and food groups represented in the meal as well as visual cues related to the colours, sizes and shapes of the food within the meal. The study was part of a study presented for research paper 4. Repeated data on subjective meal variety was collected via a post-lunch survey in a real-life work

environment. The pictures of participants' lunches were analysed in order to measure objective meal variety (N=71; meals in total=510). Results show a marginal association between subjective variety and the number of food groups; however, no associations were found with other objective measures of meal variety including the number of components chosen from the buffet or any of the visual cues of the meal. The study demonstrates that defining variety can be a difficult task, especially in real-life eating situations.

## Summary in Danish

Denne ph.d.-afhandling bidrager med øget viden om forbrugeres opfattelse af måltidstilfredshed og om de faktorer, der har indflydelse på måltidstilfredsheden. Fokus har især været på at undersøge tilfredsheden med frokostmåltidet indtaget på arbejdspladsen. Det er vigtigt at opnå en forbedret viden om måltidstilfredshed, da det kan have indflydelse på befolkningens generelle tilfredshed og trivsel. Et litteraturstudie af relevante undersøgelser inden for mad og måltidsforskning dannede baggrund for udviklingen af en konceptuel ramme til at guide udarbejdelsen af de undersøgelser, som denne ph.d.-afhandling indeholder. På trods af en omfattende mængde undersøgelser relateret til mad og måltider inden for forskellige forskningsområder afdækkede litteraturgennemgangen en mangel på undersøgelser om forbrugeres tilfredshed med hele måltidsoplevelsen i autentiske omgivelser. Det overordnede formål med denne ph.d.-afhandling er at kombinere perspektiver fra de forskellige forskningsområder inden for mad og måltider for at øge vores viden om måltidstilfredshed, og hvordan madrelaterede, personlige og situationsbestemte faktorer bidrager til måltidstilfredshed og måltidsvariation i en arbejdskontekst. Fire specifikke forskningsspørgsmål behandles for at kunne besvare det overordnede forskningsspørgsmål: *Hvordan opfatter forbrugerne deres måltider, og hvilke madrelaterede, personlige og situationsbestemte faktorer har indflydelse på måltidstilfredsheden og forbrugernes opfattelse af måltidsvariation?*

*FS1. Hvilke associationer anvender forbrugerne til at beskrive u/tilfredshed med måltidet i forskellige situationsbestemte kontekster?*

Artikel 1: For at opnå en øget indsigt i de faktorer, der bidrager til måltidstilfredshed, blev dette studie sat op for at undersøge, hvilke associationer forbrugerne anvender til at beskrive

u/tilfredshed med måltidet i forskellige situationer. Metoden "Word Association" blev anvendt til at fremkalde forbrugernes associationer. Data blev indsamlet via et online-spørgeskema (N=118). Resultaterne viser, at måltiderne var inddelt i syv brede tematiske kategorier: overordnet evaluering af måltidet, madpræferencer og -erfaring, omgivelser og stemning, følelser og fysiske fornemmelser, social kontekst, ressourcer til rådighed herunder tid og penge samt adfærdsrelaterede strategier. De samme temaer var forbundet med både tilfredsstillende og skuffende måltider, men de tilfredsstillende måltider blev signifikant oftere forbundet med omgivelserne, stemningen og den sociale kontekst, hvorimod skuffende måltider blev signifikant oftere forbundet med følelser og fysisk fornemmelse, ressourcer til rådighed og adfærdsrelaterede strategier. Måltidets kontekst var forholdsvis uvæsentlig i de associationer, der blev forbundet med tilfredsstillende og skuffende måltider, men der var tydelige forskelle i det ordforråd, der blev anvendt inden for hver af de tematiske kategorier.

*FS2. Hvordan taler forbrugerne om deres måltidsrelaterede forventninger og hvordan forbinder de deres måltidserfaringer med tilfredshed?*

Artikel 2: For at forbedre vores forståelse af, hvordan forbrugerne opfatter måltidstilfredshed, og hvordan måltidstilfredshedsprocessen dannes, var formålet med dette studie at undersøge, hvordan forbrugerne taler om deres måltidsrelaterede forventninger, og hvordan de forbinder måltidserfaringer med tilfredshed. Derudover ønskede vi at undersøge, hvilken indflydelse madrelaterede, personlige og situationsbestemte faktorer har for måltidstilfredsheden. Før og efter frokost blev der lavet dybdegående interviews med deltagere på deres arbejdsplads (N = 25). Resultaterne viser, at forbrugerne ser måltidstilfredshed som en holistisk madoplevelse, der integrerer den sensoriske oplevelse af maden, fysiologiske konsekvenser af at spise, og de sociale og fysiske omgivelser under selve måltidet. Derudover har forbrugerne både kort- og

langsigtede mål relateret til måltidet, som er knyttet til opretholdelse og/eller forbedring af fysisk og psykisk velvære. Når forbrugernes madindtagelse og måltidsoplevelsen generelt er i overensstemmelse med de kort- og langsigtede mål, så har det positiv indflydelse på måltidstilfredsheden.

*FS3. Hvilke madrelaterede, personlige og situationsbestemte faktorer bidrager til forbrugernes måltidstilfredshed, og hvad er deres respektive roller?*

Artikel 3: For at klarlægge de faktorer, der bidrager til måltidstilfredshed, er formålet med dette studie at undersøge forskellige madrelaterede, personlige og situationsbestemte faktoreres respektive roller i måltidstilfredshed. Derudover ønskede vi at undersøge individuelle forskelle i måltidstilfredshed på tværs af flere måltider. Data blev indsamlet via spørgeskemaer både før og efter frokostmåltidet på deltageres arbejdsplads. Gentagne målinger blev udført på den samme deltager for flere forskellige måltider. Derudover blev der taget et billede af de frokostmåltider, som deltagerne havde valgt fra kantinens buffet. Billederne blev anvendt til at beregne næringsindholdet i hvert måltid (N = 71; måltider i alt = 519). Resultater fra denne undersøgelse viser, at måltidstilfredshed er direkte forbundet med en positiv stemning og en positiv evaluering af både kvaliteten af den valgte mad og buffetens sortiment, mens energiindholdet ikke bidrog til måltidstilfredshed. Desuden blev måltidstilfredshed forbundet med et mere positivt humør efter frokost, lavere sultniveau samt en følelse af at føle sig mindre travl og stresset efter frokost. Buffetens sortiment, et positivt humør før frokost og ”mindful” spisning bidrager til en øget kvalitetsvurdering af den valgte frokostmad, hvorimod den ikke er forbundet med sultniveau før frokost. En positiv stemning til frokost er forbundet med at have tid til rådighed, ”mindful” spisning og at spise sammen med tætte kolleger.

*FS4. Hvordan er forbrugernes opfattelse af variation i måltidet relateret til objektive mål for måltidsvariation?*

Artikel 4: Variation i måltidet er en af de madrelaterede faktorer, der bidrager til måltidstilfredshed. Formålet med dette studie var at undersøge mulige sammenhænge mellem objektive mål for måltidsvariation herunder antallet af komponenter (retter) og fødevaregrupper repræsenteret i måltidet samt visuelle aspekter relateret til madens farver, størrelser og former. Studiet var en del af undersøgelsen præsenteret i artikel 3. Gentagne målinger af deltagernes subjektive opfattelse af variation i deres måltid blev indsamlet via et spørgeskema efter kantinefrokostmåltidet. Billeder af deltagernes frokost blev analyseret for objektivt at måle variation i måltidet (N = 71; måltider i alt = 510). Resultaterne viser en marginal sammenhæng mellem den subjektive måltidsvariation og antallet af fødevaregrupper i måltidet. Der blev ikke fundet sammenhænge mellem den subjektive måltidsvariation og de øvrige objektive mål, herunder antallet af komponenter eller nogen af de visuelle aspekter i måltidet. Studiet demonstrerer, at det kan være en vanskelig opgave at definere måltidsvariation, måske især i måltider som er sammensat fra en buffet i en autentisk spisesituation.

## Content

1. Introduction.....	1
1.1. Research gaps and overall research question .....	2
1.2. Thesis structure.....	4
2. Theoretical background.....	5
2.1 Meal definition .....	5
2.2 Expectancy-Disconfirmation Theory .....	5
2.3 Satisfaction with meals.....	7
2.4 Food-related factors.....	7
2.5 Personal factors .....	9
2.6 Situational factors.....	10
2.7 Theoretical framework .....	11
3. Overview of research objectives .....	13
4. Methodological approach.....	15
4.1 Word association – study 1 .....	16
4.2 In-depth interviews – study 2 .....	17
4.3 Mixed methods - study 3 .....	18
4.4 The link between the research papers.....	20
5. Consumer perception of delightful and disappointing meals.....	23
6. Consumer satisfaction with real-life meal experiences: An interview study .....	53
7. Determinants of meal satisfaction in a work environment .....	87
8. Objective measures of meal variety lacking association with consumers’ perception of variety with self-selected buffet meals at work.....	119
9. Conclusion .....	145
9.1 Contribution of each research paper.....	146
9.2 Limitations.....	150
9.3 Implications .....	152
9.4 Future research .....	153
References.....	155



## **1. Introduction**

Meals are an important recurring event in most people's lives. Meals are vital in order to meet nutritional and physiological needs; also they are a source of hedonic and multi-sensory experience (Auvray & Spence, 2008). However, meals are often consumed in a distinct social and situational context which may contribute to the entire meal perception and experience. Satisfaction with meal experiences contributes to quality of life, and because people's food-related lives interact with several other life domains, satisfactory meal experiences affect general life satisfaction (Grunert, Dean, Raats, Nielsen, & Lumbers, 2007). Accordingly, satisfactory meal experiences may contribute to increased overall well-being and life satisfaction in general.

Meal satisfaction is a relevant concept not only in terms of consumer well-being but also for the food and catering industry. Despite changing meal patterns, Danes generally have three main meals a day – breakfast, lunch and dinner and most Danish employees have lunch at work (Lund & Gronow, 2014). Catering companies are interested in attracting loyal customers, as only 20 percent of the Danish workforce with access to canteen meals eat canteen meals every day, another 5-9 percent eat canteen meals three out of four days per week, and between 50-62 percent buy a canteen meal less than once a month or never (Groth, 2009). Moreover, catering companies want satisfied customers as these are more loyal (Ladhari, Brun, & Morales, 2008; Szymanski & Henard, 2001) and show repeated buying behaviour (Kim, Ng, & Kim, 2009). Improved insight into meal satisfaction with canteen lunches and the factors contributing to meal satisfaction would be useful knowledge for the catering industry to improve its product offering. Moreover, employers may be interested in employees who are satisfied at lunch time, as it may influence overall job satisfaction and improve company image.

To food policy makers, targeting workplace lunches seems to be a priority setting to change food-related behaviours as it gives access to a large proportion of the adult population (Lassen, Thorsen, Trolle, Elsig, & Ovesen, 2004). Increased knowledge about consumers' choices and behaviours in relation to meal satisfaction can help food policy makers in their endeavours to promote well-being to improve the general health status among the population. Policy makers wish to promote wholesome eating to reduce the risk of non-communicable diseases and thereby to cut health care costs related to treating these diseases.

### **1.1. Research gaps and overall research question**

Food and meals have been the objects of much research across many disciplines, e.g., sociology, physiology, sensory and food behaviour research, but often from specific research domain viewpoints (Meiselman, 2008). Various approaches have been used to study drivers of food choice and behaviour. Some studies focus on the sensory and quality experience with food mainly measuring acceptance, liking and preferences (King, 2007; Robinson, Blissett, & Higgs, 2013; Wadhera & Capaldi-Phillips, 2014; Zellner, 2014), whereas others studies have explored physiological aspects of eating on food consumption such as hunger and satiety (Brunstrom, Collingwood, & Rogers, 2010; Brunstrom & Shakeshaft, 2009). A large body of research has explored the situation in which the meal is consumed, for instance, the social context and its effect especially on food consumption (Bell & Pliner, 2003; Hetherington, Anderson, Norton, & Newson, 2006; Pliner, Bell, Hirsch, & Kinchla, 2006; Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007). The importance of situational factors in eating has been acknowledged in past literature (Edwards & Gustafsson, 2008 for a review; Stroebele & De Castro, 2004; Wansink, 2004); variations in situational factors in different eating situations, however, remain poorly understood (Bisogni et al., 2007). Satisfaction is suggested as being a promising measurement in real-life settings compared to

traditional measures such as food liking and preferences, which focus on the hedonic aspects of the food itself (Cardello, 2000).

Satisfaction implies a much broader view on food appreciation including not only the food per se but also different situational and personal factors; thus it is suggested to be a better tool in predicting consumers' meal-related choices and behaviour. Meal satisfaction can be viewed as a multidimensional concept influenced not only by sensory expectations and experience, but also by situational, personal and nutritional factors that play a role in consumers' perceived meal satisfaction. However, it is necessary to get a better understanding of the relative roles of the factors contributing to meal satisfaction.

Moreover, there is a lack of real-life meal studies; many studies on consumer choice and behaviour were conducted in laboratory settings, which make it difficult to transform findings into knowledge about consumer choice and behaviour in real-life settings (Meiselman, 2013). For instance, King and colleagues (2004) studied context effects on food acceptability suggesting that caution must be exercised when predicting more complex context situations from CLT (central location tests) and laboratory test data. However, laboratory findings must be tested in real-life meal situations to increase validity and applicability of findings.

The aim of this thesis is to combine the various research perspectives of eating to improve our understanding of the concept of meal satisfaction and how different food-related, personal and situational factors contribute to meal satisfaction and meal variety. Moreover, the aim is to gain more insight into meal satisfaction in real-life environments, i.e. meals that consumers choose and compile themselves from the work canteen buffet as a part of their everyday eating.

The overall thesis research question is:

***How do consumers perceive meals and which food-related, personal and situational factors contribute to meal satisfaction and perceived meal variety?***

The study for the thesis was conducted as a part of the SENSEWELL project funded by Innovation Fund Denmark (grant no. 0603-00418B). The main objective of the SENSEWELL project was to get a better understanding of the role of consumers' real-life meal choices in meal satisfaction.

## **1.2. Thesis structure**

This thesis consists of nine chapters. As presented above, chapter 1 gives an introduction to the importance of studying meal satisfaction as well as explaining the thesis focus of lunch meal satisfaction in a worksite environment. Moreover, the chapter presents research gaps in the literature and the overall aim of the thesis. Chapter 2 presents the theoretical background including a definition of a meal and a description of the Expectancy-Disconfirmation Theory (Oliver, 2010). This chapter also consists of a brief review of relevant literature on the food-related, personal and situational factors that previously have been found to be important in studying food-related choices and behaviour, i.e. factors that are expected to contribute to meal satisfaction. Based on the literature review a conceptual framework is developed and presented in the chapter. Chapter 3 gives a short overview of the studies conducted, while chapter 4 presents the methodological approach and explains the link between the research papers. The four research papers are presented in chapters 5-8. Chapter 9 consists of concluding remarks including the contribution and limitation of each study. Moreover, implications and directions for future research are discussed.

## **2. Theoretical background**

### **2.1 Meal definition**

Understanding meal satisfaction requires an understanding of the concepts of both meal and satisfaction. Eating can typically be distinguished into two different types: a meal or a snack. The Oxford Dictionary defines a meal as “any of the regular occasions in a day when a reasonably large amount of food is eaten such as breakfast, lunch and dinner”, whereas a snack is defined as “a small amount of food eaten between meals”. Meiselman (2008) argues that meal definitions are approached differently depending on the research perspective. The amounts eaten as well as the time of the day constitute important differences between a meal and a snack (Drummond, Crombie, & Kirk, 1996). It is also worth noting that meals consist of different types of foods and not only of single food items. Moreover, a meal is more than the food eaten; it is also an event that takes place in a situational context (Meiselman, 2008). Meals consist of food and it takes place in a situational context, however meals can also be a marker for social relations (Mäkelä & Meiselman, 2009). Mäkelä and Kjærnes (2001) divided the eating event into two choices, whether the meal should be at home or in a public location, and whether the meal eaten alone or in a social context.

### **2.2 Expectancy-Disconfirmation Theory**

Customer/consumer (dis)satisfaction is a well-known and established concept in the field of marketing (Fornell & Wernerfelt, 1987, 1988; Kotler, 1991) and consumer research (Oliver, 1980; Yi, 1990). In these areas satisfaction has been treated as a relative concept where it is judged in relation to a certain standard. Historically satisfaction definitions are discussed as either an evaluation process or an outcome, though most researchers have favoured consumer satisfaction as a response to an evaluation process, for instance, as an affective response (Haistead, Hartman, &

Schmidt, 1994) or as an overall evaluation (Fornell, 1992). Various competing theories to explain satisfaction are founded in assimilation theory, contrast theory and expectation-disconfirmation theory, among others. These theories suggest that satisfaction is a comparison between experience with product performance and initial expectations, where consumers either tend to adjust or exaggerate perceived disparity. Despite the widespread application of consumer satisfaction, a consensual definition is still lacking (Giese & Cote, 2000). Giese and Cote (2000) developed a framework on satisfaction aligned with current literature and consumer views on satisfaction during interviews. They identified three general elements: consumer satisfaction is a response (emotional or cognitive), the response pertains to a particular focus (expectations, product, consumption experience, etc.) and the response occurs at a particular time (after choice or consumption, based on accumulated experience, etc.).

Oliver's (Oliver, 2010, p. 120) Expectancy-Disconfirmation model for studying consumer satisfaction has received wide acceptance among researchers. He defines satisfaction as a fulfilment response: 'a judgement that a product/service feature, or the product or service itself, provided/providing (Oliver, 1980) a pleasurable level of consumption-related fulfilment, including levels of under and over-fulfilment'. This model implies that consumers purchase products and services based on their pre-purchase expectations about anticipated performance. The expectation level thus becomes a standard against which the product is judged. Disconfirmation results from either a positive or a negative discrepancy between meal expectations and meal experience. If consumers perceive the meal to be better than expected – a positive disconfirmation – it provides satisfaction, and if consumers experience that the meal is worse than expected – a negative disconfirmation – dissatisfaction is the outcome. Two approaches have been proposed to measure satisfaction: the transaction-specific and the cumulative/summary approaches. The transaction-specific approach defines consumer satisfaction as an emotional response to the most recent

transactional experience, whereas the cumulative approach reflects the overall satisfaction with various facets of product performance (Oliver, 2010, p. 10).

### **2.3 Satisfaction with meals**

The factors that are expected to affect meal experiences and satisfaction are classified into three general categories: food-related, personal and situational factors (Blake, Bisogni, Sobal, Devine, & Jastran, 2007; Edwards, Meiselman, Edwards, & Leshner, 2003; Meiselman, 2003). Food-related factors include variables that relate to the food in itself, the sensory characteristics and nutritional content of the meal. Personal factors include variables that relate to the individual, psychological as well as physiological variables. Situational factors include variables related to the physical eating location and situation, but also the social aspect of eating. Relevant literature on each of the food-related, personal and situational factors contributing to meal satisfaction is outlined in the following sections.

### **2.4 Food-related factors**

Several studies report that food quality and sensory properties of food are important factors contributing to meal satisfaction in a restaurant setting (Andaleeb & Conway, 2006; Blanck et al., 2009; Law, Hui, & Zhao, 2004; Namkung & Jang, 2008; Walter, Edvardsson, & Öström, 2010). The sensory properties of food such as taste, appearance, aroma, temperature and texture have major influence on food intake and appreciation (Wilkinson, Dijksterhuis, & Minekus, 2000) and findings suggest that liking is associated with greater consumption (Brunstrom & Shakeshaft, 2009). For instance, appearance of the meal produces expectations about liking (Hurling & Shepherd, 2003). Expectation and experience with different foods influence consumer choice when composing a meal, thus the sensory characteristics of the meal, including taste, odour, appearance and texture, are relevant for meal satisfaction. Previous research has found that the appearance of a

meal influences consumption and meal experiences, such as presentation (Zellner, 2014) and colours (Piqueras-Fiszman & Spence, 2014 for a review). Visual appearance is important as it tends to be a consumer's first sensory contact with the food, which then provides expectations about taste quality and liking (Hurling & Shepherd, 2003). Appearance properties comprise visual properties, including colour, physical form and shape, and mode of presentation (Hurling & Shepherd, 2003). For example, a visual cue such as the colour of foods has been shown to influence flavour perceptions and experience with the food (Spence, Levitan, Shankar, & Zampini, 2010; Zellner, 2013). Similarly food textures have been found to affect consumption (Forde, 2013). Furthermore, research suggests that both pre and post-test measures of expected liking/disliking, appropriateness of food in a specific eating situation and post-test ratings of whether food items were better/worse than expected were good predictors of overall meal satisfaction (Cardello, Schutz, Snow, & Leshner, 2000).

Variety is one of the food-related factors that have been shown to influence meal satisfaction in restaurant settings (Bell, Meiselman, Pierson, & Reeve, 1994; Law et al., 2004). Several studies have found that variety increases food intake (Brondel et al., 2009; Hetherington et al., 2006; Levitsky, Iyer, & Pacanowski, 2012 for a review; McCrory, Burke, & Roberts, 2012; Rolls et al., 1981). This phenomenon is referred to as the variety effect, which describes the increase in food intake when offered multiple foods with different sensory characteristic such as taste, smell, texture and visual appearance (Epstein, Robinson, Roemmich, Marusewski, & Roba, 2010). Within-meal variety proposes that the foods must be sufficiently dissimilar in terms of sensory properties such as taste, texture, smell and visual appearance. Three types of variety should be distinguished: dietary variety which refers to food intake across a long period of time; across-meal variety which refer to variety of food intake within a day or across days, and within-meal variety which is related to the variety of components in a meal (Meiselman, deGraaf, & Leshner, 2000). Dietary variety is essential

to maintain an adequate intake of macro and micro nutrients (Weiss, Feinstein, & Dalbor, 2004), though too much variety in the consumption situation may lead to increased food intake and may cause excess intake of energy. When consumers are exposed to a variety of foods as, for instance, in a buffet context, the risk of overeating is present leading to weight problems and obesity in the long term. Consumers seek variety when they eat and most natural eating situations contain a decision about what to eat (Rozin & Markwith, 1991). Moreover, most studies focus on the influence of actual or objective variety on food choice and amounts eaten, and few include perceived or subjective measures of variety expressed by the participants. One of these studies was conducted by Kahn and Wansink (2004), who found that perceived variety of food assortment led to an increase in food intake even when the actual assortment variety was held constant. However, many variety-related studies have been conducted in laboratory settings with pre-defined foods, which do not allow participants to compose their own meals as they do in real-life situations.

## **2.5 Personal factors**

A study investigating the sources of positive and negative emotions in food experience revealed that people experienced emotions such as satisfaction, enjoyment and desire most frequently, while less often they experienced emotions such as sadness, anger or jealousy (Desmet & Schifferstein, 2008). Furthermore, the same study showed that conditions, which elicited the emotion, varied from statements referring directly to sensory properties of food and experienced consequences to those referring to indirect conditions such as expectations or associations. Another study found three sources of customer satisfaction with restaurant service: positive emotions, negative emotions and perceived service quality (Ladhari et al., 2008). Prior studies have found that consumers eat according to their mood (Macht, 1999); meals eaten in a negative or positive mood were found to be

relatively larger compared to meals eaten in a neutral mood (Patel & Schlundt, 2001). Stress level has shown to change food behaviours (Zellner et al., 2006).

Physiological sensation related to hunger, satiety and desire to eat has been found to be associated with meal satisfaction (Boelsma, Brink, Stafleu, & Hendriks, 2010). Satiety is described as the process that ends an episode of eating and satiety is defined as the inhibition of further eating together with the (usual) suppression of hunger (and increase in fullness) that occurs once eating has ceased (Allison, Allison, & Baskin, 2009). Expected satiety has been shown to affect food choice and consumption (Brunstrom & Shakeshaft, 2009). Studies, moreover, suggest that satiety expectations can change over time because of acquired processes that some foods are more or and some less satiating than expected (Brunstrom, Shakeshaft, & Alexander, 2010).

## **2.6 Situational factors**

Meals are consumed in different situational conditions related to the physical environment and the social context; both may influence perceived meal satisfaction. Research has thus shown that consumption in different locations and meal settings influence consumers' food-related expectations and food acceptability.

Ambience is often related to a specific location and include lighting, sounds, temperature and smells (Stroebele & De Castro, 2004), though other elements may play a role in perceived ambience such as the atmosphere created by the surrounding people. A way of describing ambience is that it consists of "parts that are hard to localize and that surround the organism" (Stroebele & De Castro, 2004).

Previous research has especially dealt with the relationship between the social context during and food consumption. Findings suggest that people tend to eat more when they are in company with

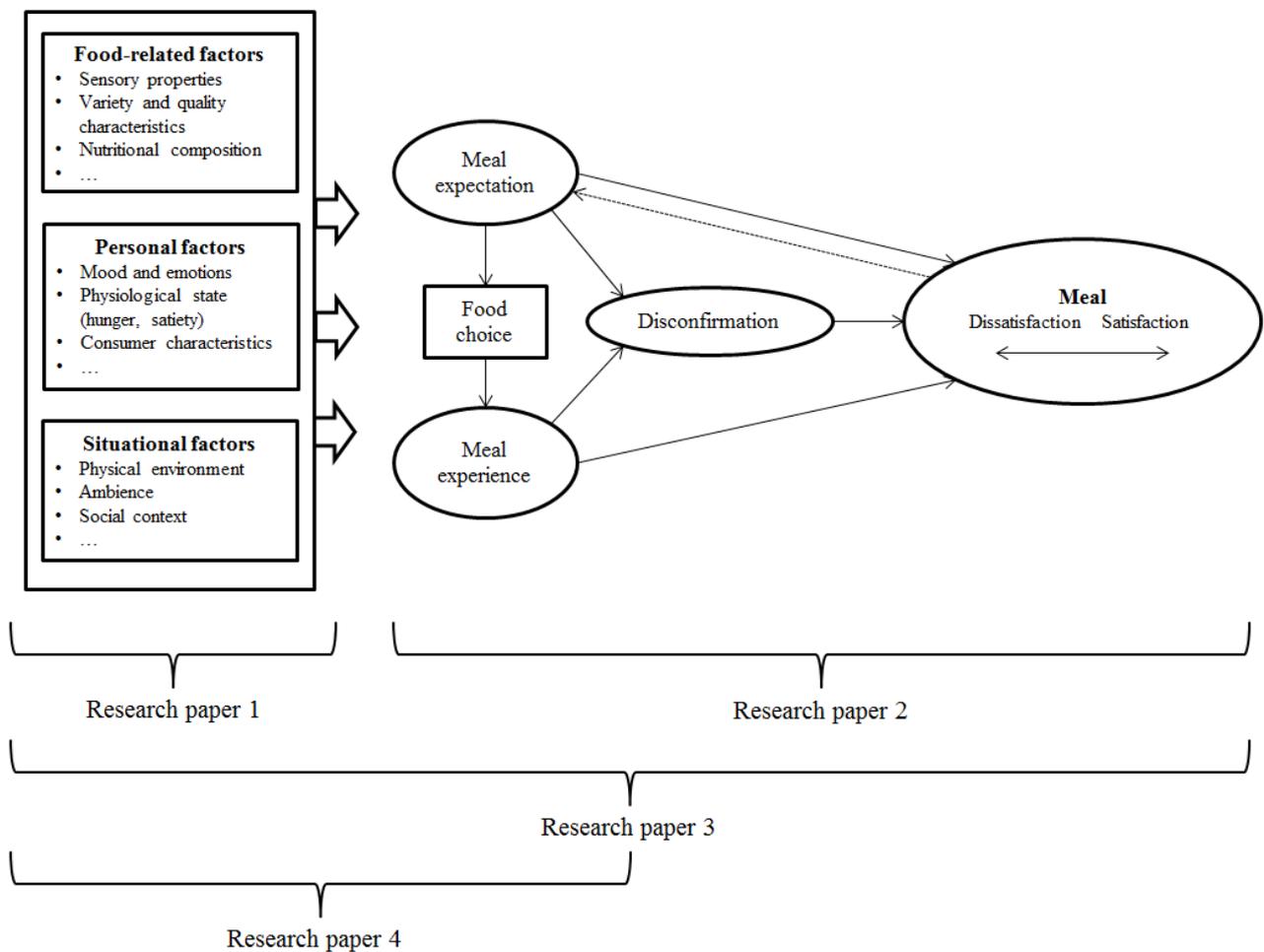
others compared to solitary eating, which is called the social facilitation effect (de Castro, Brewer, Elmore, & Orozco, 1990). The effect of group size on food consumption has been found to be mediated by meal duration (Bell & Pliner, 2003; Pliner et al., 2006). King and her colleagues (2007) found that social interaction did not influence food acceptability, and Pliner and Bell (2006) found that familiarity with the other eaters did not lead to social facilitation. Being in company with others also seems to enhance the emotional experience of eating (Brown, Edwards, & Hartwell, 2013).

## **2.7 Theoretical framework**

To guide the empirical research conducted in relation to this thesis, a conceptual framework was developed (Figure 1). This framework is based on the Expectancy-Disconfirmation Theory covered in section 2.2; the framework explains the possible formation of meal satisfaction. Using Oliver's (2010, p. 120) expectancy-disconfirmation theory consumers make their meal-related choices based on their pre-meal expectations about the anticipated meal experience. The expectation level becomes a standard against which the product is judged. Disconfirmation occurs when there is either a positive or negative discrepancy between expectations and the meal experience. If consumers experience the meal to be better than expected, the outcome is positive disconfirmation. A meal experience living up to expectation should result in satisfaction, and the level of satisfaction should go up with the degree of positive disconfirmation. Similarly, if consumers experience the product to be poorer than expected, a negative disconfirmation is the outcome, which should lead to dissatisfaction. Expectations for the next meal occasion will be adjusted depending on past experiences with meals. Meal satisfaction varies on a continuum; the intensity ranging from dissatisfaction to satisfaction (indicated with the doubled arrow). Confirmation is also a possible outcome, which means that meal-related expectations have been just met and thereby reflect the level of expectation that already exists (Oliver, 2010, p. 107).

Moreover, the review of relevant literature on food and meal behaviour covered in section 2.3 has been used for an a priori proposition of the factors that are expected to contribute to meal satisfaction. The factors that are classified into three broader categories: food-related, personal and situational factors (Blake, Bisogni, Sobal, Devine, & Jastran, 2007; Edwards, Meiselman, Edwards, & Leshner, 2003; Meiselman, 2003).

Figure 1: Conceptual framework



### **3. Overview of research objectives**

This PhD thesis consists of four research papers, which are based on three different studies. In this section a brief explanation of main objective behind conducting the studies as well as specific research questions are addressed.

*RQ1. Which associations do consumers use to describe meal (dis)satisfaction within different situational contexts?*

Research paper 1: The aim of the first study was to understand how three context factors: type of meal (lunch or dinner), social context (alone or in company) and location (home or outside home) were linked to the associations that consumers used to describe high disconfirmation in meal experience compared to expectations, namely delightful (highly satisfactory) and disappointing (highly dissatisfactory) meals. We were interested in extracting consumers' associations from past meal experiences retrieved from participants' memory. Broader insights into the associations used by the consumers can add to the list of factors that potentially contribute to meal satisfaction.

*RQ2. How do consumers talk about their meal-related expectations and how do they link meal experiences with satisfaction?*

Research paper 2: To get a better understanding of how consumers perceive meal satisfaction, the aim of the second study was to get a better understanding of how consumers talk about their meal-related expectations and how they link meal experiences with satisfaction. An additional aim was to understand the role of the food eaten for lunch as well as personal and situational factors in meal satisfaction. In this study, meal satisfaction was explored in a work and study environment where

respondents described their lunch-related expectations and reflected on their choices and experiences with self-selected buffet meals.

*RQ3. Which food-related, personal and situational factors contribute to consumers' meal satisfaction and what are their relative roles?*

Research report 3: To determine the factors contributing to meal satisfaction, the aim of the study was to identify the relative roles of different food-related, personal and situational factors in meal satisfaction. An additional aim was to examine individual differences in meal satisfaction across meals. In this study we repeatedly approached the consumers in their own meal environment making choices from their ordinary lunch buffet; surveys were distributed before and after lunch. Additionally, lunch pictures were used in order to calculate the energy content of each meal.

*RQ4. How are consumers' perceptions of meal variety related to objective measures of meal variety?*

Research report 4: Variety is often mentioned in nutrition recommendations or referred to as a factor that increases intake of food and satisfaction with meals. The overall objective of the fourth study was to get insights within consumer perception of meal variety. The aim of the study was twofold: first to explore the relationship between subjective meal variety and objective measures of meal variety including the number of components and food groups represented in the meal as well as visual cues related to the colours, sizes and shapes of the food within the meal and, and second, to explore the associations between subjective meal variety, decision-making rules and individual eating styles. The data was collected as part of the third study (research paper 3).

## **4. Methodological approach**

This chapter outlines the methodological approach used to explore the concept of meal satisfaction and the factors contributing to meal satisfaction as well as the outcome. Moreover, it describes the link between the studies and thereby the research papers. In the thesis a mixed methods approach has been applied since both qualitative and quantitative research has been conducted. Qualitative methods are often useful when the research topic is difficult to observe or measure, and also when a complex and more detailed level of knowledge is required. Qualitative methods tend to be resource demanding, and often it is difficult to include a large group of respondents. Using quantitative methods enables measurement and quantification of data and furthermore causal relationships between the factors of interest can be explored. One of the advantages of quantitative studies is that the results are generalizable.

Applying both qualitative and quantitative research methods is valuable as it provides a more complete and nuanced view of the research topic (Johnson & Onwuegbuzie, 2004). Another advantage is that a research method applied in one study can add to the following studies, i.e. knowledge gained from one study approach can be applied in the next. Using multiple methods enables covering different aspects of the research topic and allows a more valid picture of the research topic. However, using multiple methods also has some challenges and disadvantages as it is resource demanding in terms of time, money and effort. When using a multiple methods, researchers have to be flexible and open-minded to various paradigms to exploit the full potential of the methods applied.

The two first studies of the thesis were primarily qualitative: an exploratory approach to start with was considered to be useful as the concept of meal satisfaction is a relatively new research topic. One of the advantages of conducting qualitative studies before quantitative ones is that qualitative

studies give the opportunity to explore and identify concepts and variables, which afterwards can be quantified and tested in a quantitative study.

*Table 1: Overview of methods*

<b>Overview</b>	<b>Research paper 1</b>	<b>Research paper 2</b>	<b>Research paper 3</b>	<b>Research paper 4</b>
<b>Study</b>	Study 1	Study 2	Study 3	Study 3
<b>Method</b>	Semi-qualitative; Word association task (online questionnaire)	Qualitative; In-depth interviews (pre and post lunch surveys plus meal photos)	Quantitative; Longitudinal approach (pre and post lunch surveys plus lunch photos)	Quantitative; Longitudinal approach (post lunch survey plus lunch photos)
<b>Target meal</b>	Lunch and dinner (as concepts)	Lunch in real-life setting (private company)	Lunch in real-life setting (public and private companies)	Lunch in real-life setting (public and private companies)
<b>Participants</b>	N=118	N=25	N=71	N=71
<b>Data</b>	Number of associations=1346	Transcripts= 878 pages	Meals=519	Meals=510

#### **4.1 Word association – study 1**

The word association technique was used to explore the associations that consumers use to describe delightful (highly satisfactory) and disappointing (highly dissatisfactory) meals. Data were collected at a Science Festival venue where participants filled in an online survey. The word association technique is about presenting stimuli (in this case written sentences) to respondents who then respond with the first words that come to mind. The word association technique is a semi-

qualitative method, as the collected data are qualitative, though analysed in a qualitative way, e.g. measuring frequencies. The word association technique is useful for exploring consumers' conceptual structures and for providing insights as regards which associations consumer relate to satisfying and dissatisfying meal experiences. One of the advantages of using the word association technique is that it is an easy, convenient and efficient way of determining the content of human minds; it reflects the structure of people's perceptions, beliefs and attitudes, without much researcher interference (Ahlawat & Subbarini, 1988; Roininen, Arvola, & Lähteenmäki, 2006). The disadvantages of the word association technique are that it may underestimate the strength of weak associations and provide relative, but not absolute indices of strength (Nelson, McEvoy, & Schreiber, 2004). Moreover, using the word association technique may produce shallow results that are difficult to interpret (Roininen et al., 2006).

#### **4.2 In-depth interviews – study 2**

Semi-structured in-depth interviews were conducted to get a better understanding of consumers' meal-related expectations and experiences with meals at work. Interviews are used to reveal individuals' feelings, experiences and attitudes toward the research topic (Kvale & Brinkmann, 2009). An interview guide ensures that the same knowledge is obtained across the interviewees; however, to discuss matters beyond the content of the interview guide is a great opportunity to get even deeper insights as regards the research topic. This flexibility in data collection produces knowledge and insights, which the researcher may not have anticipated. These are some of the advantages of conducting interviews; however, conducting useful in-depth interviews requires psychological and social interviewer skills to create an intimate atmosphere that induces interviewees to talk freely. The disadvantages of in-depth interviews are that they are time-consuming, and it is not possible to generalise results.

### **4.3 Mixed methods - study 3**

A mixed methods approach was used in the third study, where both quantitative data (i.e. longitudinal data) and observational data (i.e. pictures of meals) were collected. Both research paper 3 and research paper 4 are based on this study, however explored with different aims. In research paper 3 the aim of the longitudinal study was to explore the relative roles of food-related, personal and situational factors of satisfaction with meals at work, and to explore any individual differences in meal satisfaction across meals. A longitudinal study is a quantitative research method in which the same data are gathered for the same individuals repeatedly over a period of time – in this study for three months. Typically data are collected several times during the research period, which is also the case in this study. The major benefits of longitudinal studies are, first of all, that it is possible to establish causal relationships between factors; more data over long periods of time allow for better and more concise results, thus higher validity. Moreover, collecting repeated measures at the individual level is an advantage as they may be more powerful compared to cross-sectional studies, i.e. individual differences between meals as well as differences across meals (or take into account the time perspective in general) can be taken into account. The disadvantage of longitudinal research is that it is generally time consuming. This means that the researcher has to wait until all data are collected to complete the analysis and gain the results. Moreover, the long time span also means that participants have to be highly committed to continue completing surveys during the entire research period; if they are not; missing data is a negative drawback.

The observational data included meal pictures of participants' lunches. Meal pictures have been used in past research to get a better understanding of patients' meal experiences in a hospital context (Justesen, 2014). In research paper 3, the main objective of collecting meal pictures was to calculate nutritional content of the lunches, thus testing for the impact of nutritional content of the

meal on meal satisfaction. The meal picture method has the advantage of being easy and convenient for participants when reporting what they have been eaten. Moreover, meal pictures can be captured in the actual meal situation which limits the risk of reporting bias (for instance compared to write food-diary once a day). However, the picture method need to be valid in order to be an alternative to other more comprehensive methods, such as weighing each food items (Hinton, 2013).

A study was conducted to validate the method using meal pictures to calculate nutritional content. The aim of the validation study was to prepare a number of meals (N=9), calculate the nutritional content using both weighing and the meal picture method and then to compare the nutritional values to see how much they differ. If there was a less than 20-percent difference on average between the two methods, the picture method was viewed as acceptable. The meal picture method includes two important processes: first identification of the foods on the plate, and second, estimation of how many grams of each food item or dish there are on the plate. The results showed that on average the total energy across meals differed by 13.66 percent, and that both under and overestimations occurred. In 33 percent of the meals, the total energy calculation was overestimated (estimating more calories from the pictures than from weighing). The main conclusion was that the method is usable and valid, but that it seems to vary across meals. The challenges of using the meal picture method was related to plates that were filled up, which made it difficult both to identify the foods on the plate as well as to estimate the weight of each component. However, simple meals, with few food component on the plate and with a simple plate composition, i.e. that different foods and dishes were placed side by side and not in piles, were found to have the lowest level of difference (below 6 percent) using the two different methods.

In research paper 4, the meal pictures were the foundation for measuring objective within-meal variety. The method of using meal pictures to measure objective meal variety is thoroughly explained in chapter 8.

#### **4.4 The link between the research papers**

Each of the four studies in this thesis contributes to a better understanding of the concept of meal satisfaction and the different factors that play a role in meal satisfaction from a consumer's point of view. The overall aim of the thesis was to explore the concept of meal satisfaction and the factors contributing to meal satisfaction from different perspectives using multiple methods.

Initially, we started with a rather broad and exploratory approach studying consumers' associations with delightful compared to disappointing meals. In relation to the conceptual framework, our aim was to identify the food-related, personal and situational factors that are relevant for experiencing meal satisfaction. The results showed that the same themes were associated with both delightful and disappointing meals; however, with clear differences in the words within themes. The meal context had relatively little importance in the types of associations with delightful and disappointing meals. Moreover, delightful meals were significantly more often associated with the surroundings and ambience and the social context, whereas disappointing meals were significantly more often associated with emotions and physical sensations, resources available and behaviour-related strategies.

The first study confirmed several of our initial expectations related to consumers' perceptions of meals and meal satisfaction, although it opened up for a new question to be answered: how do consumers link their meal expectations and experiences with satisfaction? The aim of the second study was to answer this question providing in-depth understanding of consumers' satisfaction with lunches in a work environment using the Expectancy-Disconfirmation Theory. The second study

contributed with knowledge about how consumers' define and achieve meal satisfaction.

Consumers link both short- and long term goals with satisfaction, where aligned meal experiences and goals lead to meal satisfaction. Results indicated that consumer satisfaction with meals is a multidimensional concept affected by several food-related, personal and situational factors integrating the sensory experience of food, physiological consequences of eating, and the social and physical environment of the meal.

Due to the qualitative nature of the second study it opened up for new interesting questions: what are the relative roles of the different factors contributing to meal satisfaction? And secondly, are there any individual differences in perceived meal satisfaction? The third study tried to answer these questions by conducting a study with a longitudinal approach; repeated lunch data from consumers' buffet lunches at work were collected. Results suggested that a positive ambience and a positive evaluation of both the quality of the food eaten and the buffet assortment, but not the meal's energy content, contributed to meal satisfaction. Meal satisfaction was found to contribute to a more positive mood, lower hunger level as well as feeling less busy and stressed after lunch. Moreover, results suggested that meal satisfaction differed from day to day, but that daily variability did not differ between individuals.

The first three studies each give insight into the food-related, personal and situational factors that contribute to meal satisfaction and many of the factors were addressed in all three studies. Within-meal variety was one of the factors that were repeatedly found important in all three studies. The variety within a meal seems to play a vital role in meal-related expectations, experience and satisfaction from a consumer point of view. The overall objective of the fourth study was to get insights within consumer perception of meal variety. The aim of the study was twofold: first to explore the relationship between subjective meal variety and objective measures of meal variety

including the number of components and food groups represented in the meal as well as visual cues related to the colours, sizes and shapes of the food within the meal. Results show that subjective variety was marginally associated with the number of food groups, but there was no association with other objective measures, such as number of components chosen from the buffet or any of the visual cues of the meal. The second aim was to explore the associations between subjective meal variety, decision-making rules and individual eating styles. The main result was that subjective meal variety was linked with the decision-making rule of having many dishes when compiling buffet lunches.

## 5. Consumer perception of delightful and disappointing meals

Pernille Haugaard<sup>1</sup>, Violeta Stancu<sup>1</sup> and Liisa Lähteenmäki<sup>1</sup>

<sup>1</sup>*MAPP Research Centre, Department of Management, School of Business and Social Sciences, Aarhus University, Bartholins Allé 10, DK-8000 Aarhus C, Denmark*

### **Abstract**

Meals are consumed in different contexts and expectations related to these meals may vary greatly, and consequently (dis)satisfaction as a positive or negative disconfirmation may be experienced in different ways. Our objective was to improve our understanding of consumers' meal satisfaction by exploring consumers associations with delightful (highly satisfactory) and disappointing (highly dissatisfying) meals in three contexts including meal occasion, social condition and location. Stimuli were presented to participants (N=118) in an online questionnaire; short sentences were composed by combining the three context conditions into short descriptions, such as “delightful lunch in company with others outside home”. A total number of 1346 associations were produced and coded using content analyses. Consumer perceptions on delightful and disappointing meals were categorised into seven broad thematic categories: an overall meal evaluation, food-related preferences and experiences, surroundings and ambience, emotions and physical sensations, social context, resources available – including time and money – and behaviour-related strategies. The same themes were associated with both delightful and disappointing meals, but delightful meals were significantly more often associated with the surroundings and ambience and the social context, whereas disappointing meals were significantly more often associated with emotions and physical sensations, resources available and behaviour-related strategies. The meal context had relatively

little importance in the types of associations with delightful and disappointing meals, but there were clear differences in the types of words within themes. Results provide the food and catering industry with insight for developing their products and services to provide meal experiences to boost customer satisfaction and curb customer dissatisfaction.

## **Introduction**

Meals are important recurring events in people's daily lives and they have been the object of much research in many disciplines, e.g., psychology, physiology, sociology, marketing and nutrition, but often studies have limited the approach to discipline specific aspects (Meiselman, 2008). For instance, in sociology meals are viewed as social events, whereas solitary eating is not considered a meal. Nutritionists often avoid the word meal instead using terms as eating episode or ingestion concentrating on the amount eaten and its chemical composition and physiological consequences. However, "meal" can be used to refer to the event of eating as well as to the product that is eaten (Meiselman, 2008), which emphasises that a meal consists not only of food but further of a situational context in which the meal is consumed.

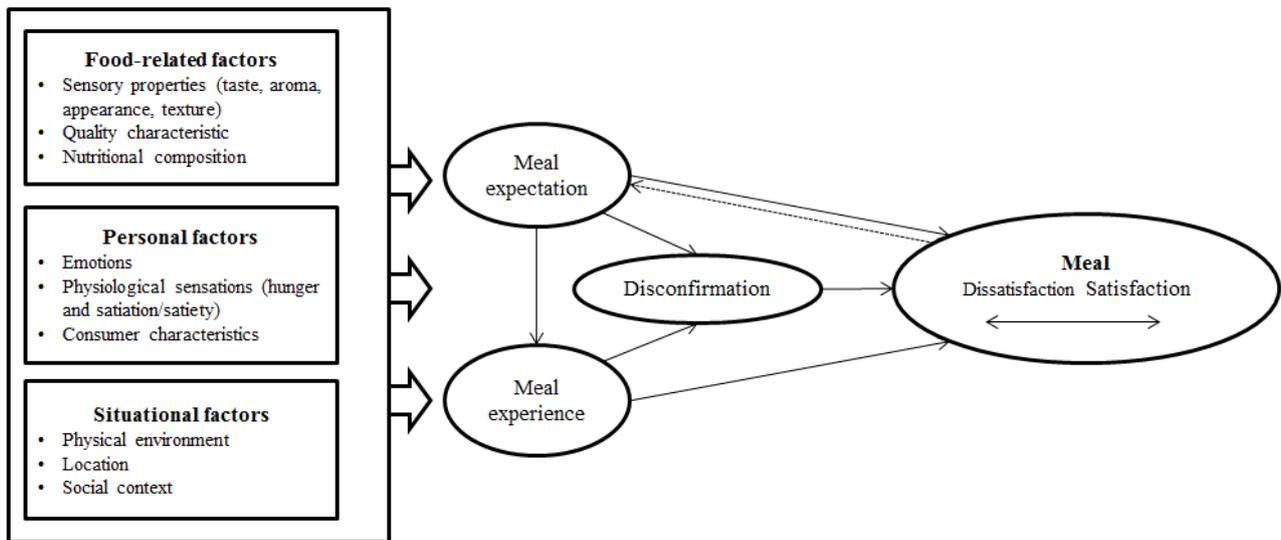
Despite acknowledging the importance of situational factors in meal experience, they remain poorly understood (Bisogni et al., 2007). Meals are consumed in different physical environments and social contexts (Edwards, Meiselman, Edwards, & Leshner, 2003; Stroebele & De Castro, 2004), but also the temporal context and type of meal can be included in the situation. Kjærnes (2001) divided an eating event into two dimensions, namely private (home) or public environment, and individual (alone) or social meals. Eating in a social context rather than alone has been associated with increased consumption (De Castro, Brewer, Elmore, & Orozco, 1990) and prolonged meal duration (Bell & Pliner, 2003; Pliner, Bell, Hirsch, & Kinchla, 2006), but whether this is reflected in the way meals are perceived as giving satisfaction is unknown.

Consumer satisfaction is a term that is widely used to assess consumers' overall response to products and services. Oliver (2010) defines satisfaction as "a fulfilment response: a judgement that a product/service feature, or the product or service itself, provides a pleasing level of consumption-related fulfilment, including levels of under- and over-fulfilment". The disconfirmation paradigm is

central in this definition of satisfaction as satisfaction with food and meals is defined in terms of pleasing level of fulfilment, which in meal and food terms can be translated into whether expectations are confirmed or disconfirmed (Cardello, 2007). Disconfirmation results from either a positive or negative discrepancy between expectations and experience. If consumers perceive the meal to be better than expected (=a positive disconfirmation), it provides satisfaction, and if consumers experience that the meal is worse than expected (=a negative disconfirmation), it provides dissatisfaction. Depending on the level of disconfirmation, namely satisfaction and dissatisfaction, the experience is described using different terms. In our study we were interested in strong disconfirmation effects and therefore we used the terms “delightful” and “disappointing” to reflect this. The reason for our interest in the condition of strong disconfirmation is that these are the meals that are likely to evoke specific memories and thereby elicit terms with high positive or negative valence, which consumers link with these incidents.

Our conceptual framework assumes (Figure 1) that meal satisfaction is, in addition to situational factors, affected by a number of individual and food-related factors as suggested by the framework developed by Bisogni and colleagues (2007) and previous research (Edwards et al., 2003). However, we do not know if these aspects play a different role depending on the situational context of the meal.

Figure 1: Conceptual model



The food constituting a meal is likely to contribute to satisfaction as, based on previous experience, some foods are better liked than others and their expected physiological consequences differ (Brunstrom & Shakeshaft, 2009). Moreover, the presentation of the meal influences meal experience (Zellner, 2014) as do colours (Piqueras-Fizman & Spence, 2014 for review). The learned link between nutrition content and the composition of the meal may also influence perceived meal satisfaction.

Individual factors included in the conceptual model consist of selected psychological and physiological variables. Emotions play a role in meal satisfaction and most food-related emotions tend to be positive (Desmet & Schifferstein, 2008; King & Meiselman, 2010), while less often negative emotions such as sadness, anger or jealousy were experienced (Desmet & Schifferstein, 2008). Furthermore, Desmet and Schifferstein (2008) argue that the sources of elicited emotions varied from statements referring directly to the sensory properties of food and experienced consequences to those referring to indirect conditions such as anticipated consequences. Meals are

expected to be satiating and filling to produce positive responses (Dalton, Finlayson, Esdaile, & King, 2013). Whereas food in itself produces mainly positive emotional responses, both positive and negative emotions played a central role in consumer satisfaction with restaurant meals (Ladhari, Brun, & Morales, 2008).

Word association is a commonly used technique to explore consumers' conceptual structures and has been applied in the food area including studies of consumers' perceptions and beliefs about food in general (Rozin, Kurzer, & Cohen, 2002), traditional food (Guerrero et al., 2010), functional foods (Ares, Giménez, & Gámbaro, 2008) or foods produced by means of various production methods (Roininen, Arvola, & Lähteenmäki, 2006). Research into semantic processing and memory organisation provides a foundation for understanding people's associations with target stimuli. The Spreading Activation Theory of Semantic Processing (Collins & Loftus, 1975) or Theory of Memory (Anderson, 1983) posits that memories and meanings are organised in associative networks of nodes, which are linked according to their interrelationships; thus associations tap into lexical knowledge. When a concept or word is activated at its particular node in the network, it leads to activation of other linked nodes and so forth. The strength of links between nodes is determined both by semantic similarity and frequency of activation. As a result these two factors can be seen as important determinants of associations. In this view, semantic similarity and frequency can provide insight into how people think about the stimuli, such as past meal experiences and satisfaction presented in the word association task.

According to Ahlawat and Subbarini (1988), one of the benefits of using the word association method is that it is an easy and efficient way of determining the content of human minds: it minimizes researcher intervention and reflects the structure of people's perceptions, beliefs and attitudes. Furthermore, the associations that come first to mind are believed to be the ones that are

most accessible and thereby influential in consumer choice situations (Roininen et al., 2006). The word association method, however, has its limitations; the strength of weak associations might be underestimated and the method provides a relative, but not absolute index of strength (Nelson, McEvoy, & Schreiber, 2004). At its best, the word association method can be used as a fast and convenient tool for exploring motives behind food choices, but at its worst, it could provide results that are shallow and difficult to interpret (Roininen et al., 2006).

The aim of the study was to explore how three context factors, namely type of meal (lunch or dinner), social context (alone or in company) and location (home or outside home) are linked to the associations that consumers use to describe high disconfirmation in meal experience compared to expectations, namely delightful and disappointing meals.

## **Method**

### **Stimuli and study design**

Stimuli of delightful and disappointing meals were presented as a combination of three situational conditions namely type of meal (lunch or dinner), social context (alone or in company) and location (home or outside home) e.g. “*disappointing dinner in company with others outside home*”. The questionnaire was designed to display four of the 16 possible stimuli to each participant to minimise the number of stimuli each participant had to respond to. The stimuli were divided into four blocks and each participant responded to one block. The design was balanced so that each block contained two delightful and two disappointing meals, two lunches and two dinners, two alone and two with others conditions and finally two home and two away from home conditions. The reasoning behind using this design rather than purely randomised selection of stimuli was to give each participant a wide variety of different contexts and eliminate the risk of participants being exposed to four

stimuli containing the same context. The data are divided evenly among the four blocks. In order to eliminate order effects, the order of stimuli within each block was randomised for each participant.

Data were gathered via an online questionnaire programmed with Qualtrics using the word association technique. At the beginning of the questionnaire participants were informed that there were no right or wrong answers to our questions and that their answers would be treated confidentially. Then participants were asked to imagine having a meal and to respond with their first three thoughts, images or associations that came to mind while reading the sentence. Having generated associations with each stimulus, participants were instructed to rate on a 7-point scale ranging from “very negative” to “very positive” how positive or negative they found each of their associations. Furthermore, demographic information was collected.

## **Participants**

The data were gathered at a science festival at Aarhus University where, for instance, university departments disseminate their research to the Danish public. The venue is an annual event open to the general public, but it is primarily targeted at people who in their daily lives are not in touch with research and scientific work. Participants were recruited by facilitators who approached visitors at the venue asking if they would volunteer for a survey in connection with a research project about consumers’ meal perceptions. Participants filled out the online questionnaire independently, but facilitators were available for help throughout the entire procedure of participants filling out the questionnaires. Participants completed the questionnaire sitting at a computer in a peaceful corner at the venue location and received a small gift afterwards. The reason for collecting data at the science festival was primarily convenience. The expected wide representation of gender, age and occupational level of participants did not fully come off; participants’ demographic characteristics display an uneven distribution of age (e.g. 54% below the age of 25 years) and occupational level

(e.g., 62% students). In total, two participants were excluded due to incompleteness. Responses from 118 participants were used in the following data analysis.

*Table 1: Socio-demographic characteristics*

<b>Socio-demographic characteristic</b>	<b>N</b>	<b>%</b>
<b>Gender</b>		
Male	57	51,7
Female	61	48,3
<b>Age</b>		
15 - 24	64	54,2
25 - 34	16	13,6
35 - 44	4	3,4
45 - 54	10	8,5
55 - 64	11	9,3
64 +	13	11
<b>Education</b>		
Primary School	12	10,2
Secondary School	46	39
Vocational Education	4	3,4
Short term Higher Education (up to 3 years)	7	5,9
Medium term Higher Education (3-4 years)	18	15,3
Long term Higher Education (more than 4 years)	31	26,3
<b>Occupation</b>		
Employed	22	18,6
Student	73	61,9
Pensioner	17	14,4
Other	6	5,1
<b>Household size</b>		
1 member	46	39
2 members	34	28,8
3 members	12	10,2
4 members	14	11,9
5 members or more	12	10,2
<b>Number of children (younger than 18) in household</b>		
None	92	78
1 child	12	10,2
2 children	10	8,5
3 children	4	3,4

## **Analysis**

The data analysis was based on content analysis using a summative approach (Hsieh & Shannon, 2005). The data analysis involves categorizing the responses into broader themes and identifying any underlying association patterns. In total, 1346 associations were produced in the study. To begin with, all associations were exported into excel and read through several times to get an overview of the content of the associations. Initial sub-categories were developed and new sub-categories were added as the coding of associations proceeded. However, 16 percent of the associations did not fit into any of the sub-categories or any new category; the criterion for releasing a new sub-category was a minimum of five related responses. If a participant had fed two or more unconnected associations into one response box, only the first response was coded into its respective sub-category. If a response was framed as a sentence, the essence (from the researcher's point of view) was extracted and the response was coded into the most suitable sub-category.

Categorising some associations was difficult due to ambiguity in interpreting the actual meaning behind some of the words, which especially concerns homonyms (words spelt identically but with different meanings). An example of this is the response "alone" which may mean that the person concretely is in an alone condition with no other people present, i.e. a social context, though it may also mean that the person feels alone, which is an emotional response. Alone responses were interpreted as a social condition, based on the assumption that "alone" as a single word is less likely to be associated with "feeling alone" or "lonely". Responses related to feeling lonely were coded as emotional responses. Another example of how the results from the association method can be difficult to interpret is the response "boring". Boring can basically relate to food, ambience or emotional reaction: all three options are conceivable as boring is mentioned in connection with these different themes in other responses framed as sentences. Therefore plain "boring" responses were coded into the category "hedonic evaluation", as this category contains responses related to an

overall hedonic evaluation of the meal without relating it to a specific part of the meal, for instance, the food or the social context.

The coding into categories did not consider whether associations were positive or negative, but each association was rated as on a 7-point scale from negative to positive. As expected, mean values of ratings showed that associations related to delightful meals were rated more positively than disappointing meals. Mean values for delightful meals varied between 5.0 and 6.2 with an overall mean of 5.8, and between 2.3 and 2.8 (with lunch, home and alone being rated as 3.3) for the disappointing meals, with overall mean of 2.7 on a 7-point scale. To check the reliability of the categorisation, another person coded 10 percent of the associations electronically selected at random. The reliability check showed that 80 percent of the associations were coded identically. The coding process and frequencies were conducted in Excel 2010, and SPSS 21 was used to analyse the valence and chi-square statistics.

## **Results**

Fifty-two different subcategories could be defined from the total of 1346 associations produced by the participants. These subcategories were combined into seven wider categories (Table 2); five of these could be located under the expected factors related to meal satisfaction. One category related to the hedonic experience of the meal and one related to the characteristics of food and food preparation food. Two categories were related to situational factors: both physical surroundings and ambience, and social context were associated with meals. Personal factors included emotions and feelings together with physiological sentiments of hunger and satiety. However, there were two categories that appeared on top of those anticipated, namely the resources and behavioural strategies used. There were also a number of other associations (16%) that could not be categorised meaningfully.

Table 2: Overview of main categories

Categories of associations	Delightful	Disappointing	Lunch	Dinner	Alone	With others	Home	Outside home	Total
Food-related preferences and experiences	208	190	198	200	207	191	220	178	398
Surroundings and ambience	147	63	95	115	94	116	103	107	210
Emotions and physiological sensations	57	112	86	83	90	79	73	96	169
Overall meal evaluation	66	61	61	66	73	54	54	73	127
Social context	64	25	40	49	27	62	46	43	89
Resources available - time and money	21	63	47	37	48	36	30	54	84
Behaviour-related strategies	16	52	40	28	29	39	34	34	68
Other associations	103	107	109	101	110	100	108	102	210
<b>Total</b>	<b>676</b>	<b>670</b>	<b>675</b>	<b>671</b>	<b>674</b>	<b>672</b>	<b>666</b>	<b>680</b>	<b>1346</b>

The largest share of associations was related to food-related preferences and experiences (30%; see Table 2). The majority of these were related to specific foods that people associated with delight or disappointment followed by associations linked to the surroundings and ambience (16%) and emotions and physiological sensations (13%). An overview of main association categories also reveals a large number of associations (9 %) related to hedonic or evaluative overall assessment of meals. Delightful meals were associated with terms such as delicious, satisfaction, pleasant and a wonderful experience. Disappointing meals were, on the other hand, associated with terms like dissatisfactory, boring or monotonous. These associations are relevant as they are part of the vocabulary that consumers use to express the essence of meal satisfaction, although they add very little to our understanding of factors that are linked to delight or disappointment with meals.

The analysis explored whether there was a significant difference between the association frequencies on the main category level and age as well as gender. It was found that young people (age below 25) had significantly more associations regarding food-related preferences and experiences compared to the rest of the participants ( $\chi^2=13.416$ ;  $p < 0.01$ ). No other significant differences between age groups were found. No differences between genders were found. In the

following the associations used with delightful and disappointing meals are compared both in general and in relation to different situational contexts.

### **Associations linked with delight and disappointment**

When looking at the seven main categories, there are only few differences between categories used to describe the delightful and disappointing meals. The most commonly used category of food-related associations was split evenly between the two types of meals: both disappointment and delight can be linked to specific foods, but the specific foods mentioned differed across participants (Table 3). The same food can thus be associated with a delightful or disappointing meal depending on the individuals' experiences.

*Table 3: Food-related preferences and experiences*

<b>Food-related preferences and experiences</b>	<b>Delightful</b>	<b>Disappointing</b>	<b>Lunch</b>	<b>Dinner</b>	<b>Alone</b>	<b>With others</b>	<b>Home</b>	<b>Outside home</b>	<b>Total</b>
Food and beverage	99	70	87	82	97	72	96	73	169
Food appreciation	52	32	33	51	43	41	33	51	84
Cooking and preparation	14	9	12	11	10	13	16	7	23
Texture	2	21	14	9	9	14	12	11	23
Variety	6	12	12	6	8	10	11	7	18
Healthy food	12	5	11	6	10	7	9	8	17
Cleaning	7	7	2	12	8	6	13	1	14
Lack of specific food	0	14	7	7	5	9	10	4	14
Freshness	4	9	10	3	7	6	8	5	13
Temperature	4	6	5	5	7	3	6	4	10
Organic food	6	1	3	4	1	6	2	5	7
Colours	2	4	2	4	2	4	4	2	6
<b>Total</b>	<b>208</b>	<b>190</b>	<b>198</b>	<b>200</b>	<b>207</b>	<b>191</b>	<b>220</b>	<b>178</b>	<b>398</b>

However, there are some interesting points in the subcategories of food-related associations. Food appreciation was used more often in relation to delightful meals, although the dis-appreciation was relatively common as well. The appreciation of food and meal quality seemed to be used more often in relation to dinners and eating outside home compared to lunches and eating at home.

Associations related to food texture were dominantly linked with disappointing meals, but they

seemed to split fairly evenly in the different situational factors. Another disappointing feature in meals was lack of specific foods: again the specific foods that were missed varied among participants.

Surroundings and ambience was the category that was second largest wide category showing a clear majority of associations being linked with delightful meals ( $\chi^2=46.297$ ;  $p < 0.001$ ; Table 4). A cosy atmosphere was linked with delightful meals especially when consumed in company with other people rather than alone. Type of meal or location showed much less difference. A calm atmosphere was relatively evenly distributed between delightful and disappointing meals, but was linked more often with the social context of eating alone. Entertainment during meals, mainly performing other activities such as watching television, listening to music or reading, was linked with delightful meals but only when alone and at home. Meals outside home were strongly associated with special locations, which can be expected from the questionnaire design.

*Table 4: Surroundings and ambience*

Surroundings and ambience	Delightful	Disappointing	Lunch	Dinner	Alone	With others	Home	Outside home	Total
Cosy atmosphere	74	6	35	45	21	59	45	35	80
Location	18	12	16	14	13	17	2	28	30
External surroundings	13	9	12	10	11	11	10	12	22
Calm atmosphere	11	8	10	9	17	2	11	8	19
Entertainment	12	4	9	7	14	2	14	2	16
Eating environment	13	3	6	10	7	9	9	7	16
Atmosphere, other	4	12	5	11	5	11	12	4	16
Service	2	9	2	9	6	5	0	11	11
<b>Total</b>	<b>147</b>	<b>63</b>	<b>95</b>	<b>115</b>	<b>94</b>	<b>116</b>	<b>103</b>	<b>107</b>	<b>210</b>

Emotions and physiological sensations were more often associated with disappointing than with delightful meals ( $\chi^2=17.195$ ;  $P < 0.005$ ; Table 5). Yet, the overall differences between situations were small. However, the emotions expressed differed in their valence: delightful meals were described as providing relaxation and happiness, suggesting that delightful can be linked to

emotions that are both low and high in arousal. Similarly, disappointing meals were related to sadness, frustration and stress, again negative emotions with a varying degree of arousal. Loneliness could be associated both to delightful and disappointing meals. Type of meal (lunch or dinner) made no difference, but loneliness was more often associated with eating outside home than with meals at home. Physiological feelings of hunger and energy were more closely linked to disappointing meals, but there were also associations with delightful meals. Delightful meals were associated with physical conditions of being hungry, feeling full and full of energy by reflecting either fulfilment of a positive consequence or removal of a negative antecedent at different time points in relation to the meal, i.e. feeling hungry *before* eating, feeling full *right after* eating and energetic in the *time after* consuming the meal.

Table 5: Emotions and physiological sensations

Emotions and physiological sensations	Delightful	Disappointing	Lunch	Dinner	Alone	With others	Home	Outside home	Total
Loneliness	8	16	12	12	24	0	8	16	24
Relaxation	21	1	12	10	11	11	10	12	22
Disappointment	0	20	4	16	3	17	9	11	20
Hunger	6	11	12	5	11	6	5	12	17
Energy	5	10	10	5	9	6	7	8	15
Other negative emotions	1	13	6	8	6	8	6	8	14
Happiness	13	1	5	9	5	9	8	6	14
Sadness	1	12	7	6	8	5	6	7	13
Satiety	2	9	6	5	5	6	6	5	11
Frustration	0	10	5	5	4	6	4	6	10
Stress	0	9	7	2	4	5	4	5	9
<b>Total</b>	<b>57</b>	<b>112</b>	<b>86</b>	<b>83</b>	<b>90</b>	<b>79</b>	<b>73</b>	<b>96</b>	<b>169</b>

Social context was significantly more often associated with delightful than disappointing meals ( $\chi^2=16.573$ ;  $p < 0.005$ ; Table 6). Consumers associated delightful meals with conversation and being together with other people. Furthermore, delightful meals were associated with specific people either family members, friends or colleagues. The type of meal or location did not have any impact on how the social context was linked with meals. Disappointing meals were associated with

being alone; words like alone, anti-social, and isolation were used, and linked to the characteristics of specific people, e.g. enemies or grumpy people. These data also produced some artefacts: most social context associations were simply repeating the stimuli 'alone' or 'in company'.

*Table 6: Social context*

Social context	Delightful	Disappointing	Lunch	Dinner	Alone	With others	Home	Outside home	Total
Company	23	10	18	15	3	30	17	16	33
Alone	13	9	7	15	21	1	12	10	22
Conversation	12	2	7	7	0	14	7	7	14
People	10	3	6	7	3	10	5	8	13
Community	6	1	2	5	0	7	5	2	7
<b>Total</b>	<b>64</b>	<b>25</b>	<b>40</b>	<b>49</b>	<b>27</b>	<b>62</b>	<b>46</b>	<b>43</b>	<b>89</b>

Time and money resources were associated significantly more with disappointing than delightful meals ( $\chi^2=20.209$ ;  $p < 0.05$ ; Table 7). Lack of time and meals being expensive in relation to quality were linked to disappointment with meals. The financial cost was mainly related to meals outside home and to some extent more to dinners than lunches. However, meals being cheap or worth the money were mentioned less often and did not split between delightful and disappointing meals: a cheap meal can be disappointing or delightful.

*Table 7: Resources - time and money*

Resources - time and money	Delightful	Disappointing	Lunch	Dinner	Alone	With others	Home	Outside home	Total
Quick meal	3	21	19	5	19	5	14	10	24
Waste of money/expensive	2	29	11	20	15	16	1	30	31
Time	6	5	7	4	4	7	4	7	11
Long meal	6	3	4	5	4	5	6	3	9
Worth the money/cheap	4	5	6	3	6	3	5	4	9
<b>Total</b>	<b>21</b>	<b>63</b>	<b>47</b>	<b>37</b>	<b>48</b>	<b>36</b>	<b>30</b>	<b>54</b>	<b>84</b>

In five percent of the total associations, mainly linked to disappointing meals ( $\chi^2=17.270$ ;  $p < 0.001$ , Table 8), consumers referred to a specific behaviour that could be used to cope with future meal

situations. Improvements in cooking and finding alternatives could be used mainly at home, whereas strategies of leaving or not returning were related to meals outside home.

*Table 8: Behaviour-related strategies*

<b>Behaviour-related strategies</b>	<b>Delightful</b>	<b>Disappointing</b>	<b>Lunch</b>	<b>Dinner</b>	<b>Alone</b>	<b>With others</b>	<b>Home</b>	<b>Outside home</b>	<b>Total</b>
Improvements	1	17	7	11	6	12	10	8	18
Change eating pattern	5	6	5	6	4	7	8	3	11
Food alternative	0	11	8	3	6	5	8	3	11
Not returning	2	7	5	4	3	6	0	9	9
Indulgence	6	2	6	2	6	2	4	4	8
Leave	0	6	4	2	1	5	2	4	6
Alternative activities	2	3	5	0	3	2	2	3	5
<b>Total</b>	<b>16</b>	<b>52</b>	<b>40</b>	<b>28</b>	<b>29</b>	<b>39</b>	<b>34</b>	<b>34</b>	<b>68</b>

## **Discussion**

This study provides a view to the vocabulary that consumer use to describe meal (dis)satisfaction and it gives valuable insight into the various factors that potentially contribute to meal (dis)satisfaction. As expected associations covered food-related, person-related and situational terms, however, a number of associations widened this picture to resources and behavioural responses in relation to satisfaction and especially dissatisfaction.

Food-related associations being dominant is not surprising but may be boosted by the word association method used as the method tends to produce idiosyncratic responses that are difficult to place in any general categories (Roininen et al., 2006). Although specific food terms were used generally, they revealed some interesting aspects about the way they were used in connection with satisfaction. Individual preferences and experiences are reflected in single foods being mentioned in connection with positive and negative experiences, but foods can also be missed thereby causing disappointment. Sensory aspects did not come up in association with satisfaction apart from food texture which seemed to be associated mainly with disappointment.

Surroundings and ambience were predominantly linked with delight which underpins the earlier findings on the importance of the situational context in consumers' experience of meals consumed outside home (see Edwards & Gustafsson, 2008 for a review; King, Weber, Meiselman, & Lv, 2004; Namkung & Jang, 2008). Our findings suggest that surroundings and ambience are equally often mentioned in connection with meals at home and outside home, the eating environment thus being important in everyday life as well as on special occasions. However, when having a meal in company with others, the surroundings and ambience are more often linked with delight than when having a delightful meal alone.

In addition to physical surroundings and ambience, the social context in general, and especially company, seems to be linked with delightful meal experience, but there is very little difference between lunch and dinner, or whether the meal is eaten at home or outside home. Meals in social company tend to last longer (Pliner, Bell, Hirsch, & Kinchla, 2006; Stroebele & De Castro, 2004) and have larger amounts of food (Hetherington, Anderson, Norton, & Newson, 2006; Wansink, 2004 for a review); both factors are likely to indicate satisfaction rather than dissatisfaction with the meal. However, disappointment could be linked with company as well where social contact may be reflected negatively in the meal experience. What is noteworthy is that company was as often mentioned in relation to home as in outside home meals: although the company is likely to differ in the two conditions, the quality of the social context is important in both locations (De Castro, 1994; Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007). Furthermore, the social context seems more often to be disappointing with meals eaten at home, suggesting that home meals offer both positive and negative experiences (Blake, Bisogni, Sobal, Devine, & Jastran, 2007; Daniels, Glorieux, Minnen, & van Tienoven, 2012), whereas for meals outside home, the social context is mainly mentioned in relation to delightful meals.

Surprisingly, meal associations related to emotions and physiological sensations were more often related to disappointing than delightful meals. Apart from trivial association with the word ‘disappointing’, also sadness, frustration, stress and loneliness were related to disappointing meals. This suggests that negative experiences create stronger emotional reactions, which may be due to the fact that they deviate from the expected. Mostly people would expect a meal experience to be positive (Desmet & Schifferstein, 2008; King & Meiselman, 2010; Macht, Haupt, & Salewsky, 2004) even when not reaching the level of delight. Although delight is categorised as a high arousal emotion, delightful meals were associated with relaxation, which is a low arousal emotion. In addition to emotional responses, feeling hungry or low satiety after the meal was a cause of disappointment: again these were expressed more in relation to dissatisfaction than satisfaction suggesting that the disappointment represents a deviation from the expected.

Another interesting finding related to dissatisfaction was that it produced a number of behavioural associations: what to do to avoid the negative experience in the future both at home and when eating outside home. These behavioural strategies included complaining, leaving and not returning to the specific location when eating out, strategies related to food preparation and shopping practices when experiencing disappointment at home.

This study has some limitations. Gathering data at the Science Festival venue produced a participant group that had a large share of young adults, which may have biased the results as young people often are students and have only limited resources. However, results suggest that young people compared to the older part of the participants did not differ in the number of associations in each of the main categories. However, the young group had significantly more food-related associations, mainly about appreciation and healthiness of the food as well as cooking and preparation. Another limitation is that some of the associations add very little new information: either they are self-

evident and repeat the words in the stimulus description or they are idiosyncratic and based on individuals' experiences. Despite these limitations, the method produced a rich description of factors that are linked to meal satisfaction, and furthermore it is easy to respond to by participants requiring relatively little effort.

The results from this study have implications for stakeholders in the food and catering industry as the knowledge of what consumers associate with both a delightful and a disappointing meal may help them offer a product or “meal event” that will make their customers more satisfied. First of all, meal satisfaction is strongly related to specific food products and dishes, which means that the direct experience with products is a central element in meal satisfaction – be it a positive or negative experience. However, satisfaction goes beyond the food as such including the surroundings and social context of eating. These are factors that are difficult for food manufacturers to influence, when these products are used, although the factors are present in home meals as well. For the catering industry, however, these non-food aspects are crucial and they need to be aware that consumer satisfaction with the meal is related to more than the meals per se. Restaurants tend to be aware of this and try to provide a cosy ambience, an enjoyable social context and a pleasant physical environment (Andersson & Mossberg, 2004; Lin, 2010; Ryu & Jang, 2008), but less emphasis in these non-food factors is paid in many everyday eating situations outside home, such as workplace lunches.

Meal satisfaction was associated with economic as well as time resources; especially quick meals were regarded as disappointing. The two messages to take out from this would be to make sure that meals outside home provide good value for money and that enough time should be reserved for having lunch, as these are often disappointing and quick meals. In workplaces this could mean creating norms that favour adequate time for midday meals. The time pressure may be due to

employees' own prioritisation of time at workplaces or due to pressure from the organisation not to "waste" time while eating or due to lunch meetings. In both cases, by banning other activities during lunch breaks and giving informal support to adequate lunch breaks by providing facilities and having management showing an example, the organisation can send employees a message. Trying to improve those factors that are linked to dissatisfaction is especially important as dissatisfaction seems to be linked with negative emotions and produces behavioural responses, such as looking for alternatives including leaving or not re-visiting the facility.

## **Conclusion**

The context had little impact on the broad themes that were associated with satisfaction and dissatisfaction, but there were differences in the types of words associated with different contexts. Satisfaction seems to be the norm and creates mainly descriptive associations whereas negative experiences create emotional reactions that can be recollected later, e.g. by means of behavioural actions.

## **Acknowledgement**

The study is conducted as a part of the Senswell project, which is funded by Innovation Fund Denmark (grant no. 0603-00418B).

## References

- Ahlawat, K. S., & Subbarini, M. (1988). Gender and the subjective meaning of health: An integrated approach. *Quality & Quantity*, 22(2), 151-165.
- Anderson, J. R. (1983). A spreading activation theory of memory. *Journal of Verbal Learning and Verbal Behavior*, 22(3), 261-295.
- Andersson, D. T., & Mossberg, L. (2004). The dining experience: do restaurants satisfy customer needs? *Food Service Technology*, 4(4), 171-177.
- Ares, G., Giménez, A., & Gámbaro, A. (2008). Understanding consumers' perception of conventional and functional yogurts using word association and hard laddering. *Food Quality and Preference*, 19(7), 636-643.
- Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., & Devine, C. M. (2007). Dimensions of everyday eating and drinking episodes. *Appetite*, 48(2), 218-231.
- Blake, C. E., Bisogni, C. A., Sobal, J., Devine, C. M., & Jastran, M. (2007). Classifying foods in contexts: How adults categorize foods for different eating settings. *Appetite*, 49(2), 500-510.
- Bell, R., & Pliner, P. L. (2003). Time to eat: the relationship between the number of people eating and meal duration in three lunch settings. *Appetite*, 41(2), 215-218.
- Brunstrom, J. M., & Shakeshaft, N. G. (2009). Measuring affective (liking) and non-affective (expected satiety) determinants of portion size and food reward. *Appetite*, 52(1), 108-114.
- Cardello, A. V. (Ed.) (2007). *Measuring consumer expectations to improve food product development*. In H.J.H. Macfie (Ed.), *Consumer-led food product development* (pp.223-261). Cambridge: Woodhead Publishing.
- Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review*, 82(6), 407-428.

- Dalton, M., Finlayson, G., Esdaile, E., & King, N. (2013). Appetite, satiety, and food reward in obese individuals: A behavioral phenotype approach. *Current Nutrition Reports*, 2(4), 207-215.
- Daniels, S., Glorieux, I., Minnen, J., & van Tienoven, T. P. (2012). More than preparing a meal? Concerning the meanings of home cooking. *Appetite*, 58(3), 1050-1056.
- De Castro, J. M. (1994). Family and friends produce greater social facilitation of food intake than other companions. *Physiology & Behavior*, 56(3), 445-455.
- De Castro, J. M., Brewer, E. M., Elmore, D. K., & Orozco, S. (1990). Social facilitation of the spontaneous meal size of humans occurs regardless of time, place, alcohol or snacks. *Appetite*, 15(2), 89-101.
- Desmet, P. M. A., & Schifferstein, H. N. J. (2008). Sources of positive and negative emotions in food experience. *Appetite*, 50(2-3), 290-301.
- Edwards, J. S. A., & Gustafsson, I.-B. (2008). The room and atmosphere as aspects of the meal: a review. *Journal of Foodservice*, 19(1), 22-34.
- Edwards, J. S. A., Meiselman, H. L., Edwards, A., & Leshner, L. (2003). The influence of eating location on the acceptability of identically prepared foods. *Food Quality and Preference*, 14(8), 647-652.
- Guerrero, L., Claret, A., Verbeke, W., Enderli, G., Zakowska-Biemans, S., Vanhonacker, F., . . . Hersleth, M. (2010). Perception of traditional food products in six European regions using free word association. *Food Quality and Preference*, 21(2), 225-233.
- Hetherington, M. M., Anderson, A. S., Norton, G. N. M., & Newson, L. (2006). Situational effects on meal intake: A comparison of eating alone and eating with others. *Physiology & Behavior*, 88(4-5), 498-505.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288.

- King, S. C., & Meiselman, H. L. (2010). Development of a method to measure consumer emotions associated with foods. *Food Quality and Preference*, 21(2), 168-177.
- King, S. C., Weber, A. J., Meiselman, H. L., & Lv, N. (2004). The effect of meal situation, social interaction, physical environment and choice on food acceptability. *Food Quality and Preference*, 15(7-8), 645-653.
- Kjærnes, U. (Ed.) (2001). *Eating patterns - A day in the lives of Nordic peoples*. Lysaker, Norway: National Institute of for Consumer Research.
- Ladhari, R., Brun, I., & Morales, M. (2008). Determinants of dining satisfaction and post-dining behavioral intentions. *International Journal of Hospitality Management*, 27(4), 563-573.
- Lin, I. Y. (2010). Restaurant servicescape, service encounter, and perceived congruency on customers' emotions and satisfaction. *Journal of Hospitality Marketing & Management*, 19(8), 819-841.
- Macht, M., Haupt, C., & Salewsky, A. (2004). Emotions and eating in everyday life: Application of the experience-sampling method. *Ecology of Food and Nutrition*, 43(4), 11-21.
- Meiselman, H. L. (2008). Dimension of the meal. *Journal of Foodservice*, 19(1), 13-21.
- Namkung, Y., & Jang, S. (2008). Are highly satisfied restaurant customers really different? A quality perception perspective. *International Journal of Contemporary Hospitality Management*, 20(2), 142-155.
- Nelson, D., McEvoy, C., & Schreiber, T. (2004). The University of South Florida free association, rhyme, and word fragment norms. *Behavior Research Methods*, 36(3), 402-407.
- Oliver, R. L. (2010). *Satisfaction: A behavioral perspective on the consumer* (2. ed.). New York: M.E. Sharpe.
- Piqueras-Fizman, B., & Spence, C. (2014). Colour, pleasantness, and consumption behaviour within a meal. *Appetite*, 75, 165-172.
- Pliner, P., Bell, R., Hirsch, E. S., & Kinchla, M. (2006). Meal duration mediates the effect of “social facilitation” on eating in humans. *Appetite*, 46(2), 189-198.

- Roininen, K., Arvola, A., & Lähteenmäki, L. (2006). Exploring consumers' perceptions of local food with two different qualitative techniques: Laddering and word association. *Food Quality and Preference*, 17(1-2), 20-30.
- Rozin, P., Kurzer, N., & Cohen, A. B. (2002). Free associations to "food:" the effects of gender, generation, and culture. *Journal of Research in Personality*, 36(5), 419-441.
- Ryu, K., & Jang, S. (2008). DINESCAPE: A Scale for customers' perception of dining environments. *Journal of Foodservice Business Research*, 11(1), 2-22.
- Salvy, S.-J., Jarrin, D., Paluch, R., Irfan, N., & Pliner, P. (2007). Effects of social influence on eating in couples, friends and strangers. *Appetite*, 49(1), 92-99.
- Stroebele, N., & De Castro, J. M. (2004). Effect of ambience on food intake and food choice. *Nutrition*, 20(9), 821-838.
- Wansink, B. (2004). Environmental factors that unknowingly increase a consumer's food intake and consumption volume. *Annual Review of Nutrition*, 24, 455-479.
- Zellner, D. A. (2014). It tastes as good as it looks! The effect of food presentation on liking for the flavor of food. *Appetite*, 77, 31-35.

## Appendix 1: Coding book

### 1. Food-related preferences and experiences

Food and beverage	Bread, rye bread, pasta, meat, beef, chicken, fish, salmon, eggs, vegetables, salad bar, olives, cream, gravy, cheese, chocolate for dessert, chicken sandwich, rye bread with mackerel and milk, frozen pizza, casserole, spaghetti with ketchup, leftovers, buffet, garnish/ accompaniments, Italian food, red wine, beer, water, juice, soft drink
Food appreciation	Something I like, delicious food, tasty, tastiness, taste experience, tastes good, exciting food, enjoying the food, good wine, something that I do not like, boring food, boring buffet, poor food, bland food, tasteless, un-tasty, unappetising
Cooking and preparation	Home cooked, homemade food, homemade bread, others have prepared the food, cooking, I do not cook myself, not complicated to prepare, poorly prepared, overcooked vegetables, difficult preparation, overcooked, too little time spent on cooking
Texture	Stale bread, stale rye bread, dry sandwich, tender beef, tough meat, soggy, soggy sandwich, fatty food, greasy, heavy
Variety	A variety of foods, different cold cuts, several dishes, large diversity, uniform food, lack of variety, poor selection, only a pizza, only pasta and ketchup, only water to drink
Healthy food	Healthy food, something healthy, as long as it is healthy, healthy salad, a possibility to eat healthy, unhealthy
Cleaning	Dishwashing, clean up, dishes, much cleaning, I have to do the dishes myself, waste of dishes, cleaning can wait until tomorrow, luckily we have a dishwasher, more to do the dishes
Lack of specific food	Too little food, no cold cuts, no garnish, no pudding, no fruit, no meat, no butter, no pickled herring, too little pickled herring, empty fridge, forgot to shop, we forgot to take something out of the freezer
Freshness	Fresh, fresh vegetables, dishes made from fresh ingredients, not fresh food, poor ingredients, poor food quality, old sandwich, old liver pâté, mouldy bread, mouldy cheese

Temperature	Cold food, cold roast, cold milk, cold dish (which was supposed to be hot), hot food, warm cheese, warm “cold cuts”
Organic food	Organic, organic beef, organic salad, organic dessert, organic ice-cream, not organic
Colours	Colours, colourful, no colouring, lack of colours in dishes, lack of colours.

## 2. Surroundings and ambience

Cosy atmosphere	Cosy, very cosy, cosy family atmosphere, cosy atmosphere, after all a cosy atmosphere, cocoon
Location	City, restaurant, fine restaurant visit, café, sitting at an idyllic café downtown, canteen, university, hot dog stand, Mc Donald’s, at friends’ house, at sister’s house, at neighbours’ house, home is great, dorm kitchen, dinner at the dorm
External surroundings	Nature, sky, sunshine, sunshine through the window, light, warmth, cloudy weather, rain, darkness, cold
Calm atmosphere	Calm, peace, quiet, silence, silent
Entertainment	Watching a movie, TV, eating while watching a great serial, reading the newspaper, reading at the table, nice music on the radio, music, sitting in front of the computer, lack of entertainment
Eating environment	Nicely set table, pretty arrangement, the arrangement, candle on the table, checkered tablecloth, flowers, plate, paper plate, cutlery, couch, duvet, a different environment, eating in a different environment
Ambience, other	Good atmosphere, bad atmosphere, un-relaxed atmosphere, boring atmosphere, negatively loaded atmosphere, noise
Service	Good service, a competent waiter, service, poor service, too long waiting time, rude service, surly waiter

### 3. Emotions and physiological sensations

Loneliness	Lonely, loneliness, a bit lonely, a feeling of loneliness
Relaxation	Relaxation, relaxed, relaxing, relax, no stress, now I want to relax
Disappointment	Disappointment, disappointed, regret, disappointing that it did not live up to expectations, disappointing menu, disappointed face
Hunger	Hunger, appetite, hungry again in the evening, hungry later on, still hungry, not hungry, not hungry at all, lack of appetite, loses one's appetite
Energy	A lot of energy, energetic, good energy, surplus of mental resources, necessary fuel, lunch has to keep me running, eating to refuel energy again, less energy, lack of energy, lack of mental resources, tired
Other negative emotions	Boredom, embarrassing, longing, regret, awkward, indifferent, bad mood, depressed, anxiety
Happiness	Happiness, joyful, I feel good, laughter, lots of laughter
Sadness	Sad, sadness, I would be sad about that
Satiety	Feeling full, not filling, I was not satiated at all, less satiety, not completely satiated, not full, insatiable
Frustration	Frustrated, irritating, annoyance, I would be annoyed
Stress	Stressed, not relaxing

### 4. Overall meal evaluation

Experience	A pleasant experience, experience, food experience, eating experience, a strenuous experience, boring experience
Hedonic evaluation	Delicious, satisfaction, satisfactory, pleasure, pleasant, delightful, good, exciting, a wonderful experience, fun, wonderful, comprehensive, positive, not boring, ok, boring, dissatisfactory, monotonous, not fun, little matter, bad, negative

## 5. Social context

Company	Company, social, being together, nice company, cosy to be together with others, other people, see others, lovely having company, then we have to enjoy the company instead of the meal, it is not really disappointing when sitting together, nice that I had company
Alone	Alone, anti-social, no community, nobody, isolation, I would like to have company, lack of company, a bit boring to sit alone, lack of other people, would be even better together with others, there should have been others to share the delightful meal with, it would have been nice having others around the table
Conversation	Conversation, talking, nice chats, family conversation, talking about the meals that did not live up to our expectations
People	Family, friends, a date, old friends, a rich husband, possibly new acquaintances, breakfast rolls with colleagues, enemies, grumpy people
Community	Community, sense of community, unity

## 6. Resources – time and money

Quick meal	Quick, quick food, quick dinner, in a hurry, quick consumption, probably being busy, get it over with, get it over with in a hurry, in a hurry, I wish I had more time, too little time
Waste of money/ expensive	Waste of money, not worth the money, no value for money, annoying that I paid so much for a poor meal, waste of money to eat alone at a restaurant, expensive, that was expensive, costly, high price, higher price
Time	Time alone, quality time, time to think, worth the time, break, weekday break, waste of time
Long meal	Lengthy, time-consuming, time-demanding, in good time, it takes longer time to eat a boring lunch than a delicious lunch, long enough break, slow consumption
Worth the money/cheap	Worth the money, money well spent, price is fair, money saved, cheap, the lunch was cheap, food for free

## 7. Behaviour-related strategies

Improvements	It will be better some other day, I could cook this better myself, I could do this better, I should have done better, I will make more trouble for myself, we have to step up, better luck next time, we'll use another recipe next time, they should attend a cooking course, I hope they will come again and try once more, this we can cook ourselves, room for improvement
Change eating pattern	Then I eat too much, I eat more, I eat more for dinner, I eat less, do not eat the same again, try to vary my diet, I have to diet, toss some of my lunch package
Food alternative	We grab something else to eat, treat when I come home, maybe I should go shopping, I have to shop, I should have eaten a kebab instead, pasta with ketchup is better, pizza is an alternative, now I want to snack, having better food later
Not returning	I will never return to this place, do not come again, from now on I would eat at home, I should have eaten at home
Indulgence	Self-indulgence, nurturing oneself, indulgence, eat just as I want to, I eat something delicious, nice to have a treat
Leave	We leave the table, finish quick to move on, move on, let us move on, the bill please
Alternative activities	I have to do something meanwhile, think of some foods that are better, laugh about the disappointing food, delaying tactics

## 8. Other associations

Associations framed as question marks	Why?, disappointing?, the food?, guilt?, food or company?, why disappointing?, why am I here?, should I complain?, why don't invite others?
Associations outside the categories	Bellyache, good digestion, good nourishment, my fault, routine, pleasant experience, surprises, everyday situation, freedom, victory, defeat, easy, novelty, yellow, red, Babette's feast, good idea, life is beautiful, play, bin, traffic, blank, I hope there is something for pudding, the rest of the day will be better, standing lunch, eat the food my boyfriend does not like, never happens, never alone

## **6. Consumer satisfaction with real-life meal experiences: An interview study**

Pernille Haugaard <sup>1</sup> and Liisa Lähteenmäki<sup>1</sup>

*<sup>1</sup>MAPP Research Centre, Department of Management, School of Business and Social Sciences, Aarhus University, Bartholins Allé 10, DK-8000 Aarhus C, Denmark*

### **Abstract**

The objective was to explore consumers' expectations and experiences with buffet lunches at workplaces, using the disconfirmation paradigm. Consumers (N=25) were interviewed before and after eating a buffet lunch. Interviews were transcribed and content analysed. The results demonstrate that consumers perceive meal satisfaction as a holistic experience integrating sensory- and quality experiences of the food, physiological consequences of eating as well as social and environmental aspects of the meal. Consumer meal satisfaction was linked to achievement of short and long-term goals on maintaining or improving physical and mental well-being. Alignment of meal-related goals and behaviour promotes meal satisfaction.

## **Introduction**

Lunch consumed at work is a regular event for most Danish employees (Lund, 2014). Danish employees consume between 25-40 percent of their food intake at work. In 2010 the Danish Ministry of Food, Agriculture and Fisheries launched objectives for healthy canteen management to develop a company meal policy; the objectives targeted both public and private companies (Danish Veterinary and Food Administration, 2010). Nevertheless, only 20 percent of the Danish employees who have an access to canteen meals eat canteen meals every day, another 5-9 percent eat canteen meal three or four days per week, and between 50 and 62 percent eat a canteen meal less than once a month or never (Groth, 2009). The reason for this low canteen meal attendance is not known, but one possible explanation is dissatisfaction with the canteen meals provided by catering companies. Satisfaction has shown to affect consumer loyalty (Szymanski & Henard, 2001; Ladhari, Brun, & Morales, 2008; Choi, Wilson et al., 2013) and complaint behaviour (Nyer, 2000; Gursoy, McCleary et al., 2003), and therefore understanding the factors influencing consumer satisfaction with canteen meals is relevant for catering companies.

Customer/consumer (dis)satisfaction is a well-known and established concept in the field of marketing (Fornell & Wernerfelt, 1987, 1988; Kotler, 1991) and consumer research (Oliver, 1980; Yi, 1990). In these areas satisfaction has been treated as a relative concept where it is judged in relation to certain standards. Despite the widespread application of customer/consumer satisfaction, a consensual definition is still missing (Giese & Cote, 2000). Historically satisfaction definitions are discussed as either an evaluation process or an outcome, though most researchers favour consumer satisfaction as a response to an evaluation process, e.g. as an affective response (Haistead, Hartman, & Schmidt, 1994) or as an overall evaluation (Fornell, 1992). In this study we use Oliver's (1980) definition of satisfaction as a fulfilment response: 'a judgement that a product/service feature, or the product or service itself, provided/providing a pleasurable level of consumption-related fulfilment,

including levels of under and over-fulfilment'. Two ways of measuring satisfaction have been proposed: the transaction-specific and the cumulative/summary approaches. The transaction-specific one defines consumer satisfaction as an emotional response to the most recent transactional experience, whereas the cumulative approach reflects the overall satisfaction with various facets of product performance (Oliver, 2010, p. 10).

Consumers may strive for satisfaction as it is a desirable end-stage of consumption and it may also reaffirm consumers' future decision-making (Oliver, 2010, p. 4). According to the Food Choice Process Model (Furst, Connors, Bisogni, Sobal, & Falk, 1996), consumers are actively involved in constructing how they think, feel, and act related to food in response to their past experiences and other factors such as ideals, resources, social framework and food context. The model emphasises individual differences in food choice, while also conceding that people construct food choices in ever-changing biological, physical, and social worlds that are beyond their control. The approach recognises that individuals make choices, but these choices are influenced by biological factors and embedded in evolving societal structures.

Various competing theories to explain satisfaction draw on assimilation theory, contrast theory and expectation-disconfirmation theory, among others. These theories suggest that satisfaction is a comparison between experience with product performance and initial expectations, where consumers either tend to adjust (assimilation) or exaggerate (contrast) perceived disparity. Oliver's (2010, p. 120) expectancy-disconfirmation model for studying consumer satisfaction has been widely accepted by researchers. This model implies that consumers purchase goods and services based on their pre-purchase expectations about the anticipated performance. The expectation level thus becomes a standard against which the product is judged. Disconfirmation occurs when there is either a positive or negative discrepancy between expectations and product experience. If consumers experience a product to be better than expected, the outcome is positive disconfirmation.

A product living up to expectation should result in satisfaction, and the level of satisfaction should go up with the degree of positive disconfirmation. Similarly, if consumers experience the product to be poorer than expected, a negative disconfirmation is the outcome, which should lead to dissatisfaction. Oliver (2010, p. 63) defines expectations as “anticipation of future consequences based on prior experiences, current circumstances or other sources of information”, but discusses that expectations go beyond a subjective probability of events to include intangible expectations that do not have clear-cut outcomes. As for meal expectations the wider perspective on expectations implies that satisfaction depends on consumers’ level of abstraction: whether they focus on product performance or expectations related to higher-order outcomes e.g. goal attainment.

Goals represent desirable end stages attained through action (Kruglanski et al., 2002). Some goals are consciously activated and pursued, while others are activated automatically as consumers move through their environment. When reflecting on experienced satisfaction with meals, the more abstract goals linked to eating in general, are activated. How consumers pursue goals depends on how different means are linked to the goals; e.g. are meals seen as a tool to attain only concrete short-term product-related goals such as removing hunger or having a tasty meal, or are meals a means to achieving long-term well-being and sustaining health? Individuals’ specific goal-means configuration determines which goals are activated (Kopetz, Kruglanski, Arens, Etkin, & Johnson, 2012).

Influence on consumers’ experiences with meals and satisfaction can be classified into three broader categories of food-related, personal and situational factors. Studies have shown that food quality (Kim, Moreo et al. 2005) and food variety affect consumer satisfaction in the restaurant industry (Law, Hui, & Zhao, 2004). The sensory properties of the food such as taste, appearance, aroma, temperature and texture have a major influence on food intake and appreciation (Wilkinson,

Dijksterhuis, & Minekus, 2000). For instance, appearance of the meal produces expectations about liking (Hurling & Shepherd, 2003). Furthermore, research suggests that both pre and post-test measures of expected liking/disliking, appropriateness of food in a specific eating situation and post-test ratings of whether food items were better/worse than expected were good predictors of overall meal satisfaction (Cardello, Schutz, Snow, & Lesher, 2000). Moreover, post-test measures including meal satisfaction were good for explaining meal consumption.

The personal factors that influence meal perceptions and satisfaction cover psychological and physiological aspects. Positive emotions (happiness, pleasure, excitement, contentment and enjoyment) and negative emotions (anger, frustration, contempt, boredom, disgust, embarrassment and sadness) were associated with customers' satisfaction with restaurant services, when participants were asked to rate their most recent dinner experience (Ladhari, et al., 2008). Food choices and amounts of food have shown to be affected by expected satiety (Brunstrom & Shakeshaft, 2009), thus fulfilled satiety expectation provides satisfaction with the meal.

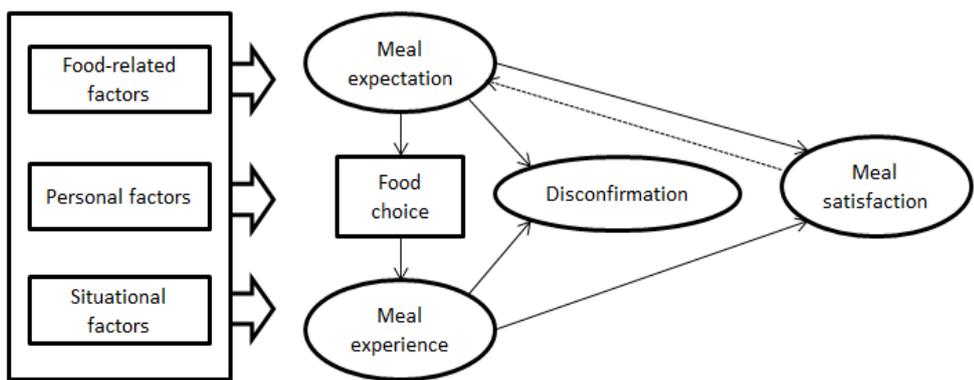
Situational factors include aspects related to the social context, resources available (such as time and money), surroundings (such as physical environment and ambience) and the canteen's service level. Waiting time (Lee and Lambert, 2005), staff attitude (Law, et al., 2004), price, responsiveness of frontline employees (Andaleeb & Conway, 2006), atmosphere (Andaleeb and Caskey, 2007) and perceived service quality (Ladhari, et al., 2008) are among the situational factors that influence restaurant/catering service satisfaction. Meals also play a role in social life, as many meals are social events. Social eating norms among colleagues, i.e. perceived standards of what constitutes appropriate consumption play a role in terms of amounts and specific food choices (Higgs, 2015). One explanation as to why social norms are followed is the expected emotional consequences of compliance (social approval) or non-compliance (social disapproval). Meals eaten in the company

of others compared to those consumed alone may affect how satisfied consumers are with the meal experience including how satisfied they are with their choices, amounts eaten and the social context per se.

To guide our study we developed a conceptual model based on the expectancy-disconfirmation paradigm and prior literature on factors that contribute to meal satisfaction (Figure 1). In this model, meal expectations affect meal-related choices which create the basis for meal experiences.

Expectations are related to food, personal and situational factors that are regarded as important in meal experience. Consumers will reflect their experiences against expectations, which will lead to either meal satisfaction or dissatisfaction depending whether the discrepancy between experiences and expectations are positive or negative. Future expectations about next meal occasions will be adjusted depending on past experiences with meals.

Figure 1: Conceptual model for studying meal satisfaction



In this study, meal satisfaction was explored in a natural environment where participants described their lunch-related expectation and reflected on their choices and experiences from self-selected buffet meals in workplace canteens. The advantage of this approach is that consumers themselves explain important factors in meal experiences as opposed to ranking pre-defined factors. The

objective was to get a better understanding of the way consumers talk about their meal-related expectations and how they link meal experiences with satisfaction. As regular consumers of canteen meals presumably will tend to be satisfied with the canteen offering in general, the main interest was to explore the degree of meal satisfaction, i.e. why some meals are experienced as more satisfactory than others. Furthermore, we wanted to explore the role of food eaten for lunch as well as personal and situational factors of meal satisfaction.

## **Method**

### **Study design**

Semi-structured in-depth interviews were carried out to explore consumers' meal-related expectations and experiences with workplace lunches. Interviews are used to reveal individuals' feelings, their experience and attitudes toward a topic (Kvale & Brinkmann, 2009). Due to the explorative nature of the study, the interview guide contained all relevant questions, but in the actual interview situation the order of the topics could change if participants moved spontaneously from one topic to another. The interviewer ensured that all topics in the interview guide had been covered at the end of the interview. With this approach, the interviews resembled an everyday conversation where it was natural to talk about matters that were relevant to the participants.

In this study we use the satisfaction definition provided by Oliver (2010) and perceived satisfaction as a post-consumption evaluation that incorporates a transaction-specific measure of satisfaction.

Interviews with each participant were carried out in two parts: one interview before and one after lunch. A semi-structured interview guide covered questions on lunch expectations and lunch experience, satisfaction with lunch as well as the food-related, personal and situational factors that may have an influence on meal satisfaction. Prior to the interview, participants were informed that their data would be treated confidentially and reported anonymously. The interviewer emphasised

that there were no right or wrong ways of talking about their meal-related lives. Furthermore, participants were required to buy their lunch from the canteen buffet on the day of the interview. A buffet situation gives participants a certain amount of choice of composing different kinds of lunches, although they have no influence on the offering and only a limited number of food options to choose from. Before consumption the interviewer took a picture of the participants' lunch plate; this was used as stimulus when discussing food choices, plate composition, sensory experience and perceived meal satisfaction in the post-lunch interview.

The pre-lunch interviews started by our explaining that we had a general interest in the participants' food-related lives and, in particular, interest in their lunch expectations and experiences on that day. Participants were encouraged to talk about their general involvement in food and meals in the beginning of the interview to make them feel relaxed to openly discuss all thoughts of their food-related lives, choices and behaviours. During the pre-lunch interview participants were questioned about their expectations of the upcoming lunch and previous lunch experiences at work. Moreover, participants were asked to reflect on their expectations in relation to various aspects of the meal and their influence on lunch choices. The topics included expectations related to the sensory experience with the food, the social context, the canteen environment and ambience as well as current hunger and mood level. During the post-lunch interview participants were asked to discuss positive and negative aspects of their lunch experience and whether their meal expectations discussed pre-lunch were confirmed. Moreover, participants were asked to reflect on their choices related to composition of the meal in which lunch pictures were available. Finally, participants were asked to discuss whether they were satisfied or not with their lunch and to reflect on which factors contributed to meal (dis)satisfaction. Both pre and post-lunch interviews lasted about 40 minutes, which means that each participant was interviewed for 80 minutes on average.

## **Participants**

In total, 25 employees were recruited at two different workplaces: a private company and a public institution (10 men; 15 women). The private company is a global company in the energy sector with more than 10,000 employees. The public institution is an educational institution with around 2,000 employees and more than 15,000 students per year. At the private company, a manager gave permission to recruit participants by allowing us to send out a department e-mail, and participants voluntarily signed up. At the public institution, participants were recruited by face-to-face invitations in the canteen area. All participants were required to have taken meals in the canteen before and had to agree on lunching in the canteen on the day of the interview. At the public institution both employees and students were approached for participation in the study. The public institution offers training courses within the health area, but health and nutrition students were excluded as their professional background was seen as creating a bias in the sample.

The public canteen themselves defined their offering as food that is healthy, simple and made of high quality ingredients following the existing dietary guidelines with an innovative approach to use fruit and vegetables of the season. The public buffet served one hot dish of the day, a salad buffet with both single items and mixed salads, rye bread with a limited choice of toppings, sandwiches, soup several days a week, smoothies, fruit and cake once a week. The focus of the private canteen was on serving a variety of healthy foods prepared from high quality ingredients applying both traditional and innovative approaches along with high quality service. The private canteen offered two warm dishes daily (a traditional Danish dish and an exotic/innovative dish), soup every day, a salad buffet with both single and mixed salads, rye bread with different toppings to choose from (e.g. fish, cold cuts and eggs), fruit and cake once a week. In recognition of participation, all participants received a small gratuity consisting of a gift certificate of DKK 200 (≈27 €). Table 1 gives an overview of the socio-demographics of the participants.

Table 1: Demographics of participants

Gender	Age	Type of company	Level of education	Size of household	Children in household
Female	20	Public	Upper secondary	2	
Female	21	Public	Upper secondary	2	
Female	21	Public	Upper secondary	1	
Female	21	Public	Upper secondary	2	
Female	22	Public	Upper secondary	2	
Male	24	Public	Upper secondary	1	
Male	24	Public	Upper secondary	1	
Female	25	Public	Upper secondary	2	
Male	31	Public	Upper secondary	2	
Male	31	Private	Higher education	3	
Female	31	Public	Higher education	1	
Male	32	Private	Higher education	3	1
Male	32	Private	Higher education	4	2
Female	33	Public	Upper secondary	5	3
Male	33	Private	Medium education	4	2
Female	39	Private	Higher education	1	
Male	39	Private	Medium education	1	
Female	40	Public	Upper secondary	4	2
Female	43	Private	Short education	4	2
Male	45	Private	Higher education	4	
Female	46	Public	Higher education	4	2
Male	46	Private	Higher education	4	2
Female	48	Public	Higher education	6	4
Female	50	Public	Medium education	2	
Female	61	Public	Medium education	1	

## **Coding and analysis**

The interviews were electronically recorded and transcribed verbatim by a professional agency. Qualitative content analysis was used to analyse the data using the NVivo software as a tool to systematically code the text material. Hsieh and Shannon (2005) define qualitative content analysis as a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns. Content analysis is a flexible text analysis method (Cavanagh, 1997) and therefore direct content analysis (Hsieh & Shannon, 2005) was deemed as appropriate due to the relatively limited prior research in meal satisfaction. Additionally, it seemed suitable when assessing disconfirmation theory i.e. the conceptual model's appropriateness in explaining meal satisfaction or to extend the conceptual framework (Hsieh & Shannon, 2005).

For the analysis, all transcripts were read through to get an overview of the data material and then initial categories (Nodes) were developed based on the conceptual model. New themes emerging during data analysis and research findings were added to the category list. The food-related categories included the overall meal context category, i.e. which meal was discussed such as the lunch as a meal, the best meal experience, the worst meal experience and other meals (e.g. dinner). The main category named food-related expectations was based on the pre-lunch interview and included sub-categories such as food appearance, taste, aroma and texture. Based on the after lunch interview, two main categories were developed: lunch food choices and lunch experience. The two main categories: prior canteen experiences and health were added during coding. The category covering the personal factors included the two main categories feelings/emotions and physiological aspects. The category covering the situational factors included the social context and surroundings, time/break and money. Furthermore, the two main categories: fulfilment of expectations and meal satisfaction were included in the coding. The approach made the coding an iterative process where

categories could be added, re-defined and re-named when appropriate. Furthermore, data were coded containing several sentences including conversations, because meanings often emerged in the dialogue between interviewer and participant. Excerpts from data were coded into multiple categories when more than one theme was addressed in the text. According to Tesch (1990) qualitative content analysis allows the simultaneous assignment of a unit of text to more than one category.

## **Results**

The results are presented in three sections: First, the way participants talked about their meal-related expectations, which cover the general and more specific expectations that they had for the upcoming lunch meal including the role of expectations when they made their lunch buffet choices. Second, the way participants discussed the link between meal-related expectations and satisfaction, and third, the way participants elaborated and linked short and long-term meal-related goals with meal satisfaction.

### **Lunch expectations and role in decision-making**

Participants were generally looking forward to having lunch and expected to enjoy the meal. High level expectations were expressed and adjusted according to previous canteen meals experiences. Participants seemed to distinguish between expectations, hopes and desires. Expectations were related to how they thought the meal was going to proceed, whereas hopes and desires were linked to how they preferred the meal to proceed. Participants' reflections showed that often lunch choices and behaviour in the canteen were based on routine and habits without explicitly thinking about expectations. Different strategies were used to select food for lunch, e.g. browsing the entire buffet before choice-making, starting from the beginning of the buffet or heading straight to the preferred

food. High-quality, well-prepared dishes and adequate quantities for everyone were expected, because participants paid for it and some found the price to be rather expensive.

*Well, I expect that it is as it always is, that is a varied meal or that it is possible to compose a varied meal and that it is tasty. It usually is. You see, my expectations, of course, are adapted to what it's usually like (female, 48, public).*

Lunch expectations primarily centred on the sensory properties and quality aspects of the food served, which influenced plate composition decisions. The food was expected to be tasty, which was a major criterion for choosing the food. Tasty dishes were sometimes linked with getting a varied flavour experience. The difference between liking and the desire to eat specific food was discussed. Liked foods cover a broad range of dishes, whereas desired dishes were related to desiring specific foods at a given point of time. Moreover, participants expected a buffet where the display of the dishes would make the food look delicious and appealing to their eyes. When appearance was evaluated positively, the food was tempting and appetite-enhancing which would increase the likelihood of choosing that particular dish. Sometimes food aromas from the canteen kitchen could be smelt before lunch or when approaching the canteen buffet. Pleasant food aromas created high expectations and appetite, whereas unpleasant food aromas lowered expectations and suppressed appetite. The texture of the food was considered before choosing and foods may be rejected due to negative texture expectations. Adding other foods or separating foods on the plate could compensate for negative texture. Touching the food was sometimes used as a decision-making cue to support sight to judge how well the food fulfils the expected quality.

*I run my eyes over the buffet, and then I let my eyes decide what I want to eat today (female, 46, public).*

*Sometimes it is actually lovely [that one can smell the food that is under preparation], and sometimes it is not that great. It can also have the opposite effect, if the smell of food is too strong, for instance of minced meat patties or something like that. It can actually suppress my appetite (female, 48, public).*

*In fact I almost fingered all of them, they [sandwiches] were wrapped...I had to make a choice (female, 21, public).*

A certain variety was expected as regards the lunch buffet, and different views on variety were discussed. Some participants linked variety to different sensory experiences (e.g. taste, colour, flavour, texture), whereas for others variety signified a lot of different buffet dishes to choose from, both on a particular day and over time. Variety was furthermore linked to eating varied during the day, for instance lunch choices could be affected by what was planned for dinner to avoid similar foods at the two consecutive meals. Variety was discussed also from a health perspective, where health was regarded as an important factor in food choices. Concerns about eating from a buffet were related to choosing among several dishes, which could lead to eating too much. Using dietary guidelines, trying to balance diet and eat less at other meals during the day were discussed as ways of dealing with these concerns.

*I think the canteen offers an incredible variety of foods; you cannot say that Monday we always have this, Tuesday we always have this (...), which I think is positive. Often you can get really fed up with canteen food, when you have eaten there for a while – because of the repetition (female, 50, public).*

*Yes, I follow the guidelines in the sense that I take a bit of everything, but I have also found out what is best for me, how much to take of each so that I get a good feeling of satiety and how my digestion is affected and so on. I do not know if I follow the*

*guidelines as such, there are so many guidelines. Some say not to eat carbohydrates and some say to eat a little less, well... I think I'll do it my way (female, 31, public).*

Physical needs were expected to be met by lunch; these were usually fulfilled. Some defined their expectation as feeling full for a period of two or three hours after the meal. Based on prior experience, participants tended to choose the amount of food that they expected would make them full, which was often expressed as learned routines. Not eating too much was important because overeating would lead to feeling too full which was related to feelings of bodily discomfort or guilt. Rules were set up to avoid overeating, e.g. eating specific types of food, not allowing second helpings, or waiting some time to see if there was still a feeling of hunger. Feeling full was regarded as important mainly because it gave energy to continue the day. Some participants had learned the reaction of their body to different types of food and they know what energises them, e.g. eating food that stabilises their blood sugar, which was seen as important to feel vigorous.

*If I only eat, for instance, a lot of rice and a lot of carbohydrates, then I know from experience that I will feel hungry soon again, that is the reason why I eat proteins (female, 31, public).*

Expectations were to a lesser extent related to the physical environment, and those expressed were mostly related to the canteen service such as the level of skills and service provided by the canteen staff, i.e. having lunch in a pleasant and clean canteen environment.

### **Meal experiences and satisfaction**

Meal satisfaction was referred to as a positive holistic experience described by the phrase “when everything comes together”, which indicates that several factors should be fulfilled in order to obtain meal satisfaction. Participants’ discussions on meal experience and satisfaction can be divided into four main categories, namely 1) sensory experience with a meal, 2) physiological

outcomes, 3) social context, and 4) physical environment including ambience. Meal satisfaction was explained as met expectations, and amply met expectations were believed to lead to a higher degree of satisfaction. Furthermore, expectation-exceeding positive experiences produced high future expectations, which were said to be more difficult to meet, and as a result the same high degree of satisfaction was difficult to achieve. Getting accustomed to a high level of meal satisfaction was, for instance, expressed as follows:

*When we first moved here, I think that the first couple of times, it [the lunch] was so overwhelmingly delicious. I think that getting your expectations more than fulfilled is really something special. Now we have become used to the high level (female, 48, public).*

### **The Food, Sensory Experiences and Satisfaction**

Meal satisfaction was closely related with foods and dishes that were enjoyed and gave pleasure. Some explicitly mentioned they do not want to eat food that only makes them healthy or satiated. Satisfactory taste experiences may include meals with a lot of flavour, food with that little extra flavour added, or flavours that match. New or unexpected tastes were related to happiness and satisfaction with the meal for some participants, whereas others preferred well-known sensations of taste. Meal satisfaction was often related to specific foods and dishes, the quality of food (e.g. quality ingredients) and food variety including following dietary recommendations. Following dietary guidelines was related to feeling proud and happy with food choices. Though, sometimes following the guidelines was seen as challenging as they were perceived as moving targets changing constantly over time. Guidelines tended to be adjusted using common sense and prior experience of how different kinds of food and amounts were perceived to influence the body.

*Well, all the talk that I have to eat this and that, because it's good for me or makes me satiated, I don't want that. It makes me feel weary. I want to eat food that I really like (female, 21, public).*

*I really enjoyed the crispy corn together with the crunchy salad and tasty dressing (...). And the peach was a bit acidic and along with this smoothie, or whatever it's called, some kind of blended fruit. It was actually very delicious (male, 32, private).*

### **Physiological outcome and satisfaction**

Satisfaction often referred to the direct physiological outcomes of the meal. Participants discussed various experiences and types of satiety: the good kind of satiety where they feel comfortable, calm, light and full of energy, and the bad kind where they feel uncomfortable, bloated and tired after eating. Not feeling full after lunch was related to sadness and dissatisfaction with the meal. Often the good kind of satiety was the outcome of having eaten an adequate amount of food, not too little, not too much, and was associated with physical well-being, a positive mood and meal satisfaction. Several ways of feeling satiety were discussed; also the difficulty in explaining what it actually feels like. In relation to these difficulties, participants used interjections and gesticulation to express how they experience the various kinds of satiation. Meal dissatisfaction was discussed as still feeling hungry after a meal. Different experiences and types of hunger were discussed, as hunger was sometimes described as a sensation in the stomach that varied from churning to real pain, whereas other types of hunger were related to having no energy and a low blood sugar level. In this sense hunger was used to describe the level of both perceived satiation when finishing a meal as well as feelings of satiety after a meal.

*It cheers me up that it was a square filling meal (female, 21, public).*

*I actually don't know what to say, it is very difficult to explain the feeling of fullness  
(female, 21, public).*

### ***Social context and satisfaction***

When talking about the social context, meal satisfaction was experienced both in the company of others and alone, though most preferred to share their meal with others. To many of the participants, the social aspect was crucial for enjoying a meal. Lunch was regarded as a break where you can meet up with colleagues, e.g. those that are located far away and who you do not see that often during the work day. A social meal could include a work-related goal, e.g. discussing a task or networking and/or a personal goal of meeting a social need of enjoyment, pleasure and belonging.

*Of course, it is nice to sit down together with people you like or some whose company you enjoy and share the experience (female, 40, public).*

*Sitting down with others is just a pleasant feeling, and then you can sit for half an hour or 45 minutes and talk, laugh, have fun and have a nice time (male, 24, public).*

Cosy or cosiness was often used to explain a positive social meal context. Cosiness seems to be a holistic concept just as meal satisfaction, and is often referred to in connection to satisfaction. Cosiness were described as a complete experience where a number of elements fit together, including the food, an emotional state of relaxation and balance and as an outcome created in a social sphere.

*I think that meal satisfaction and meal cosiness are closely related. I think that if it is not cosy, there is less satisfaction with the meal as compared to a cosy meal. Danes are known for that [cosiness]. Food is cosiness – they fit together (female, 33, public).*

*Well cosiness is that you can relax and let your mind wander, that the company is pleasant, that you have something to eat – it could be anything: a snack or a well-prepared meal. Being together is quite important. On the other hand, you can also experience cosiness while cooking; for instance a meal where you make a special effort or make gravy from scratch. You are excited about tasting it and also getting other people's opinion about it. You can get a conversation going and enjoy that. That is what cosiness is to me; being together and great experiences you can share with others. Food is actually an easy way of doing that, in my opinion (male, 31, public).*

Meal satisfaction in relation to a solitary condition was perceived differently. Sometimes it was seen as a necessary condition due to being busy and eating in the office in front of the computer. In other cases, no close colleagues were present to join for lunch. Those eating alone used lunch primarily as a break to relax, to connect to others via social media, or to do other things while eating, e.g. reading magazines or working. Lunches eaten alone were also perceived to be consumed faster, because focus was placed on other activities such as working or getting back to work. Few of the participants, however, related sitting alone with negative emotions of feeling alone and to some extent being left out of the social community, which were related to meal dissatisfaction.

*Whether you sit with someone else or you sit alone, it is actually not that important, as long as you can relax. Of course if there is someone to talk with, I would prefer that, but it is more important that it is a break – one has to keep that in mind (female, 21, public).*

*In relation to sitting alone, I would feel like people are staring at me and you feel a bit left out. There are so many other people around you, that people might think – why is he sitting alone? – and then you could feel a bit like alone in the world. This might also explain why the meal was rather short (male, 24, public).*

The importance of an inner emotional state of serenity and balance to be able to enjoy the meal was discussed. This emotional balance could be influenced by the people surrounding you both positively and negatively. Serenity could be negatively affected by disagreements or if people were slandering others; this would create a negative atmosphere. A participant explained her reaction to meal situations with a negative atmosphere as follows:

*It creates discomfort in my stomach, and anxiety and noise. There is no peace and then I cannot eat. It closes down and you lose your appetite. Physically you lose your appetite (female, 40, public).*

### ***The eating environment and satisfaction***

The ambience was discussed in relation to the meal experience and linked with satisfaction, whereas no special attention was given to the physical environment of the canteen. The insignificance of the physical environment could be a matter of it remaining unchanged from one day to the next. Though special events such as seasonal decorations or thematic events had an impact on perceptions of the physical environment, e.g. Christmas decorations induced a positive atmosphere in the canteen environment. Even though the physical environment was not linked directly to meal satisfaction, there seemed to be a link between the physical environment and the perceived ambience.

*There are indeed a lot of chairs and tables and I think it is really nice that they have different colours. It is really cosy that the chairs are red and green, but it is not something that I think about, only when you asked me [about the physical environment]. And the ceiling is high and there is room enough to make it comfortable (female, 21, public).*

The number of people present in the canteen area affected perceived ambience. A balance between there being too many or too few people in the canteen created a positive ambience and thereby satisfaction with the meal. Too few people in the canteen were related with a lack of ambience and disappointment with the meal experience. On the other hand too many people in the canteen area were expressed as creating a noisy atmosphere and environment, which had a negative influence on the meal experience.

*There were actually not that many people today. It was quiet and calm, a bit disappointing. When I go to the canteen, it is because I want to experience a nice atmosphere, but today there were too few and the atmosphere was kind of dead (female, 20, public).*

When lunching at the canteen the weather conditions could contribute to a pleasant atmosphere, e.g. sitting outside in summertime. The sun and light are furthermore enjoyed indoors when sitting close to the windows. One of the participant mentions that he always chooses a seat close to the windows and he explains:

*This is to find peace and quiet. I am always sitting close to the windows, it is calmer down there and there is lighter, there is a natural lighting effect. It is really nice and I love it (male, 32, private).*

The service provided by the canteen staff was an important aspect of a positive meal experience contributing to meal satisfaction. Especially a kind and accommodating canteen staff provided a welcoming and positive environment. The perceived effort and care that was made by the canteen staff to create a cosy environment and prepare delicious food for its customers was highly appreciated. The canteen staff should also keep the buffet area hygienic and spotless, because suspicions of substandard hygiene affected meal experiences negatively in the choice situation.

*The aesthetic aspect [of the food] is important, that someone has made an effort to prepare it. This is a great feeling, because it is aimed at us as students and someone thinks that it is important that we should have a delicious meal. It is nice. Then you actually feel appreciated, right? And when someone makes an effort, it also means that more will buy the food and then a nice atmosphere is created around buying the food (female, 21, public).*

*I said hi to some of the canteen girls, they are always so kind. They have a competent manager who is good at creating an atmosphere where we feel welcome. This is really important to me. It is also important to give them positive response, because I know it goes in both directions, so if I smile and talk to them, it has an impact on their work environment and their mood as well (female, 48, public).*

Queuing was another aspect that was related to the canteen environment, both in terms of standing in line at the check-out but also standing in a queue at the buffet waiting to choose. Queuing was something that most of the participants found annoying, because it was perceived as a waste of time, especially when taking time from their limited lunch break. Furthermore, the price seemed to play a role in how satisfied participants were with their meal experience. Fair prices and/or value for money were linked with meal satisfaction. Especially when prices were perceived to be unfair, it affected the lunchtime atmosphere and subjective mood, which led to a degree of meal dissatisfaction.

*And when you stand in line, then it bugs you that you have to wait for your food, but when you have been served and are eating, it is not a problem anymore – it does not annoy me enough that I want to complain about it (female, 43, private).*

*It was so extremely expensive. We did not even want to eat it and we discussed how expensive it was. It really created a bad atmosphere. We so much look forward to it, and then it was so expensive. I think it was unfair. I was moody, because I felt cheated. I mistrusted the canteen staff, because I did not receive anything for my money, so I was a bit disappointed (female, 21, public).*

### **Satisfaction and meal-related goals**

Participants' reflections on the satisfaction with their meal seemed to be closely related to their, often implicit, multiple goals for the meal. Goals did not seem to vary much, but how participants prioritised the importance of the goals seemed to be more diverse. Meal satisfaction was seen as a goal in itself but also as a means to provide satisfaction in other areas of life. Furthermore, goal awareness in the actual eating situation differed: some participants were more aware of their goals and actively strived to achieve their goals in the eating situation, e.g. when making food choices at the buffet whereas others seemed to be less aware of their goals.

*I just took the portion that I thought I could eat. Otherwise I did not reflect that much on it. There were some small bowls with something. It did not look appealing to me, so I went over to a table with a meat dish, pasta and some garnish and I took some of that. The salad looked healthy: a mixture of cabbage and apples, it looked fresh, a bit crispy and tasty (male, 24, public).*

*A variety of different diets have meant a lot to me in the past. I simply have tried them all – Nupo, Atkins and so on (...). But I have never had this satisfactory feeling of goal attainment in relation to weight reduction. So now I am trying to lead a healthy lifestyle and do a lot of exercise. I hope this works (female, 21, public).*

The goals had different levels of abstraction and both short and long-term goals were expressed. Achieving short-term goals were linked with immediate meal satisfaction and referred to the eating occasion such as enjoying eating especially a tasty, varied and healthy meal with a clear conscience. Short-term goals were also related to the immediate physiological outcomes of the meal, such as feeling satiated, keeping a stable blood sugar level and getting the energy to continue working. Moreover short-term goals were related to enjoying the company of other people and networking with colleagues during lunch.

*I have a good conscious if I eat healthy, I feel that I do something good for myself, and I pride myself because I have exercised and eaten healthy today (female, 21, public).*

*One thing is that the food should be delicious and look appealing and I feel that it is healthy for me, so I do not stuff my body with bad energy, i.e. very fatty foods and sugar and stuff like that. That I get a good, healthy feeling because I take in sound nutrition, which gives me energy and further that I feel full with the right satiety to continue my work tasks. It is all about well-being. I really enjoy eating in the company of others. I know that I feel good about eating good, healthy food and a varied diet. It means a lot to me and also to be satisfied with myself and the food that I eat (female, 21, public).*

*I think lunch is a great opportunity to meet up with colleagues that are not a part of my usual circle. I have colleagues that have similar job profiles and I only meet them in the canteen for lunch, unless I call a meeting, but here we talk together in a different way.*

*Lunch is also a kind for networking for me (female, 46, public).*

Long-term goals were linked with more general cumulative satisfaction with meal-related life such as physical health, improving or maintaining bodily functions, and avoiding unhealthy consequences such as developing diseases. As regards physical health, some participants expressed

the goal to maintain or lose weight. Moreover, physical and mental well-being, i.e. living a healthy and happy life was believed to be closely linked together. Happiness was related to being sociable at lunch as it seemed to meet the goals of belonging to a group, thus sharing private and work-related experiences. Furthermore, happiness was related with self-fulfilment and satisfaction with their private social lives including family and friends.

*I am predisposed to cardiovascular disease. This has a huge influence on what I expose myself to in relation to exercise and eating (...). I know that I have to take care of myself, because it is also a genetic thing (female, 48, public).*

*I take care of my body. I used to eat a poor diet, and I'm aware of the consequences it has for my body when it gets something that cannot be used for anything else than transforming it to empty and fast energy. I get depressed, tired and boring, my mood swings, my skin is spotty and in general my body is not functioning properly. Today I make choices that make my body function in a better way and I feel better. The people I see enjoy my company more when I eat healthier, and I have a much better life now where I've taken these active healthy choices (male, 24, public).*

## **Discussion**

This study explored consumers' meal satisfaction in a real-life situation when having a lunch buffet at workplace canteen. The study is unique as it explores meal satisfaction with meals in a real-life everyday life-situation, i.e. satisfaction with the entire meal experience in a situation that is a repetitive part of weekday routines. Meal satisfaction was linked to meal experiences, which is in accordance with earlier findings (Choi, et al., 2013). Similar to earlier findings by Bisogni and colleagues (2007) meal satisfaction was viewed as a holistic experience covering the sensory and quality aspects of the food served, the physiological outcome as well the social and physical

environment including ambience and level of service. The results suggest that these different factors can play different roles and the holistic experience of meal satisfaction is related to how well the various components fit together. This compatibility of factors is well demonstrated in that the factors influencing meal satisfaction had varying importance depending on the external constraints, such as having time or being busy. Thus single factors contributing to the meal satisfaction may differ from one meal occasion to the next.

Most previous studies on meals have looked at the role of food components or liking in meal satisfaction (e.g. Cardello, et al., 2000; Robinson, Blissett, & Higgs, 2013). In these studies the expectations and appropriateness of food have predicted the experiences and satisfaction with meals. Our study confirms that liking for food as well as sensory and quality aspects of the meal have an important influence on overall meal satisfaction, whereas appropriateness was not mentioned in connection with meal satisfaction. In our study the buffet items were likely to be perceived as appropriate for lunch, thus this aspect was not relevant to the participants as foods are typically served in appropriate contexts in real-life situations.

Like in earlier findings (Andersson, & Mossberg, 2004; Walter, Edvardsson, & Öström, 2010), social context was regarded as an important factor in perceived meal satisfaction. In this study we found that eating alone or in the company of others can be equally satisfying or dissatisfying depending on one's mood, external constraints such as time for eating and how relaxed the ambience at the table is. Yet, social meals were often preferred, which is in line with previous research (Larson, Nelson, Neumark-Sztainer, Story, & Hannan, 2009). Eating in the company of others may increase the feeling of belonging, but at the same time it creates direct reference points which one's own behaviour can be compared to, and also judged on. As Polivy and Pliner (2015) point out, much of the literature on social meals tends to focus on how the presence of other people

influences specific food choices and amounts of food eaten, e.g. effects of modelling, social facilitation and impression management. Comparing own choices with the choices of others can make people more or less satisfied with their choices and themselves. The results from this study suggest that participants are well aware of the immediate enjoyment that social interaction and meal sharing bring to the meal situation contributing to the more abstract long-term social goal of belonging to a group.

Apart from direct comments on food quality, meal satisfaction was described on a higher level of abstraction incorporating different kinds of short and long-term goals. First of all, sensory and overall quality of food contributed to the immediate pleasure derived from lunch and thereby meal satisfaction when expectations were confirmed or exceeded. Similarly, reaching expected short-term physiological outcomes of feeling satiated after eating could be compared with expectations. Furthermore, the short-term goals were related to the social and environmental context, i.e. enjoying the company of others while eating in a pleasant and accommodating atmosphere. This kind of satisfaction was based on the actual eating experience and seems to be affective in nature. Secondly, satisfaction with a meal was linked to achieving long-term goals. These long-term goals were related to maintaining or improving work-related life, physical health and mental well-being. This kind of satisfaction seemed to be based on cognitive processes and was more reflective in nature. The highest level of satisfaction could be reached when short-term and long-term goals could be aligned: having a pleasure-providing meal experience that supported weight management and overall long-term well-being.

Results furthermore provided the insight that consumers linked meal experiences and satisfaction to the context of the other meals and their eating behaviour throughout the day, as well as with their general food-related life. This could be due to some of the long-term goals, such as a healthy life,

only being attainable if those goals are incorporated in all meals. If consumers succeed in eating according to their goals, they are more satisfied not only with their meal but also with themselves, and their lunch-related decisions. A meal should therefore not be considered a disconnected event but as a part of food-related life as an entity.

The results challenge the applicability of the expectations-disconfirmation paradigm in explaining holistic meal satisfaction including the alignment with long-term goals. The disconfirmation paradigm is built on the prerequisite of judging experiences against expectations. In our study, participants were able to express expectations about the food quality, anticipated sensory experiences and immediate physiological outcome, but to a much lesser extent about the social and ambience-related factors related to short-term goals. Long-term goals were practically absent in expectations. Basing meal satisfaction purely on factors that were expressed in expectation would produce a very narrow view on meal satisfaction and would be likely to fail to attend to how satisfaction is linked to other spheres of life. This also means that inquiry into the fulfilment of specific expectations will give a simplistic picture of whether consumers actually were satisfied with the meal or not. The risk of oversimplifying consumer experience when controlling for contextual variables especially in laboratory settings has been discussed in previous literature (King, 2007; King, Weber, Meiselman, & Lv, 2004), but the problem of oversimplification can also be the result of using very narrow theoretical frames when studying real-life experiences.

Although the expectancy-disconfirmation paradigm may have limited value in the study of real-life experiences, it is likely to be useful in its more conventional application in connection with measuring product and service satisfaction. Consumers might have more concrete expectations toward product attributes (meal as a food product) and services than of experiences (meal as an experience). This study supports this as most expectations were related to the “core” of the meal,

namely the food, whereas experiences were reflected also against contextual factors and long-term goals. The expectancy-disconfirmation approach is valuable in explaining how concrete attributes of the core product, namely the food, contribute to satisfaction with the meal, but when it comes to psychological and physiological outcomes and their impact on meal satisfaction, the disconfirmation theory seems to fail.

The results from this study are valuable for the catering sector as they provide an in-depth insight into how their customers discuss their buffet lunches, what are their expectations and how they link meal experiences with meal satisfaction. Catering companies should be aware that the food-related factors are very important for meal satisfaction, but personal and situational factors that are beyond their control also affect meal satisfaction. Catering companies might take into account several of the factors to increase customer satisfaction with meals, but it is also important to realise that some factors cannot always be fulfilled, as they are individual or situational. As meal satisfaction relates to how different components come together, providing flexibility in how, when and what to eat may be a key factor in improving meal satisfaction among the catering clientele. Catering companies analysing whether their customers are satisfied with their offering should be aware of how their customer define meal satisfaction, which may not depend on the food and service only, physiological and social context factors are also important drivers of meal satisfaction.

### **Limitations and future research**

The study focused on a specific group of individuals in a special lunch context. The results may not be applicable outside this context; however, even in this limited lunch context, individual and situational factors became highly relevant when participants were discussing their meal satisfaction. In more diverse contexts these factors are likely to be even more important. The canteens selected offered a quality buffet which limited the insights to experienced meal satisfaction. In real life it is

highly unlikely that customers would choose a restaurant that often disappoints them, though. Participants did furthermore know that they would be interviewed after lunch about their experience, which might have influenced food choices and experience. Some participants expressed that the pre-lunch discussions made them more alert during lunch, which might have boosted their reflections on their meal experience when interviewed after lunch.

Future research might focus on quantifying meal satisfaction and explore the relative importance of the factors that influence meal satisfaction in different meals contexts, e.g. lunches consumed at home or dinners at home.

## **Conclusion**

This study shows that consumer satisfaction with meals is a multidimensional concept which is affected by several food-related factors as well as personal and situational factors. Consumers perceive meal satisfaction as a holistic experience integrating the sensory experience of food, physiological consequences of eating, and the social and physical environment of the meal.

Consumers have both short and long-term goals that are linked to achieving or maintaining physical and mental well-being. Meal satisfaction increases when consumption is in alignment with participants' meal-related goals.

## **Acknowledgement**

The study is conducted as a part of the Senswell project, which is funded by Innovation Fund Denmark (grant no. 0603-00418B).

## References

- Andaleeb, S. S. & Caskey A. (2007). Satisfaction with food services. *Journal of Foodservice Business Research*, 10(2), 51-65.
- Andaleeb, S. S., & Conway, C. (2006). Customer satisfaction in the restaurant industry: an examination of the transaction-specific model. *Journal of Services Marketing*, 20 (1), 3 - 11.
- Andersson, D. T., & Mossberg, L. (2004). The dining experience: do restaurants satisfy customer needs? *Food Service Technology*, 4(4), 171-177.
- Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., et al. (2007). Dimensions of everyday eating and drinking episodes. *Appetite*, 48(2), 218-231.
- Brunstrom, J. M., & Shakeshaft, N. G. (2009). Measuring affective (liking) and non-affective (expected satiety) determinants of portion size and food reward. *Appetite*, 52(1), 108-114.
- Cardello, A. V., Schutz, H., Snow, C., & Lesher, L. (2000). Predictors of food acceptance, consumption and satisfaction in specific eating situations. *Food Quality and Preference*, 11(3), 201-216.
- Cavanagh, S. (1997). Content analysis: concepts, methods and applications. *Nurse Researcher*, 4(3), 5-13.
- Choi, E. K., A. Wilson, et al. (2013). Exploring customer experiential components and the conceptual framework of customer experience, customer satisfaction, and actual behavior. *Journal of Foodservice Business Research*, 16(4), 347-358.
- Danish Veterinary and Food Administration (2010). Healthy food at work - from goals to action (In Danish: Sund mad på arbejdet - fra målsætning til handling). Søborg, Denmark. *The Danish Ministry of Food, Agriculture and Fisheries*.
- Fornell, C. (1992). A national customer satisfaction barometer: The Swedish experience. *Journal of Marketing*, 56(1), 6-21.

- Fornell, C., & Wernerfelt, B. (1987). Defensive marketing strategy by customer complaint management: A theoretical analysis. *Journal of Marketing Research*, 24(4), 337-346.
- Fornell, C., & Wernerfelt, B. (1988). A model for customer complaint management. *Marketing Science*, 7(3), 287-298.
- Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: A conceptual model of the process. *Appetite*, 26(3), 247-266.
- Giese, J. L., & Cote, J. A. (2000). Defining consumer satisfaction. *Academy of Marketing Science*, 1, 1-24
- Groth, M. V., Sørensen, M. R., Biloft-Jensen, A., Matthiessen, J., Kørup, K. and Fagt, S. (2009). *Danes' meal habits, attitudes, motivations and barriers to healthy eating 1995-2008*. National Danish Food Institute, Department of Nutrition.
- Gursoy, D., K. W. McCleary, et al. (2003). Segmenting dissatisfied restaurant customers based on their complaining response styles. *Journal of Foodservice Business Research*, 6(1), 25-44.
- Haistead, D., Hartman, D., & Schmidt, S. (1994). Multisource effects on the satisfaction formation process. *Journal of the Academy of Marketing Science*, 22(2), 114-129.
- Higgs, S. (2015). Social norms and their influence on eating behaviours. *Appetite*, 86(0), 38-44.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288.
- Hurling, R., & Shepherd, R. (2003). Eating with your eyes: effect of appearance on expectations of liking. *Appetite*, 41(2), 167-174.
- Kim, Y.-S., P. J. Moreo, et al. (2005). Customers' satisfaction factors regarding university food court service. *Journal of Foodservice Business Research*, 7(4), 97-110.
- King, S. C. (2007). The effects of contextual variables on food acceptability: A confirmatory study. *Food Quality and Preference*, 18(1), 58-65.

- King, S. C., Weber, A. J., Meiselman, H. L., & Lv, N. (2004). The effect of meal situation, social interaction, physical environment and choice on food acceptability. *Food Quality and Preference*, 15(7-8), 645-653.
- Kopetz, C. E., Kruglanski, A. W., Arens, Z. G., Etkin, J., & Johnson, H. M. (2012). The dynamics of consumer behavior: A goal systemic perspective. *Journal of Consumer Psychology*, 22(2), 208-223.
- Kotler, P. (Ed.). (1991). *Marketing Management* (1 ed.). New Jersey: Prentice Hall.
- Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., Chun, W. Y., Sleeth-Keppler, D. et al. (2002). A theory of goal systems. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology*, 34, 331-378, San Diego, CA: Academic Press.
- Kvale, S., & Brinkmann, S. (Eds.). (2009). *InterViews: Learning the craft of qualitative research Interviewing* (2 ed.). London: SAGE.
- Ladhari, R., Brun, I., & Morales, M. (2008). Determinants of dining satisfaction and post-dining behavioral intentions. *International Journal of Hospitality Management*, 27(4), 563-573.
- Larson, N. I., Nelson, M. C., Neumark-Sztainer, D., Story, M., & Hannan, P. J. (2009). Making time for meals: Meal structure and associations with dietary intake in young adults. *Journal of the American Dietetic Association*, 109(1), 72-79.
- Law, A. K. Y., Hui, Y. V., & Zhao, X. (2004). Modeling repurchase frequency and customer satisfaction for fast food outlets. *International Journal of Quality & Reliability Management*, 21(5), 545-563.
- Lee, W. and C. U. Lambert (2005). The effect of waiting time and affective reactions on customers' evaluation of service quality in a cafeteria. *Journal of Foodservice Business Research*, 8(2), 19-37.
- Lund, T. B. (2014). Deconstruction or continuity? The daily rhythm of eating in Denmark, Finland, Norway and Sweden in 1997 and 2012. *Appetite*, 82, 143-153.

- Nyer, P. U. (2000). An investigation into whether complaining can cause increased consumer satisfaction. *Journal of Consumer Marketing*, 17(1), 9-19.
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17(4), 460-469.
- Oliver, R. L. (Ed.). (2010). *Satisfaction: A behavioral perspective on the consumer* (2nd ed.). New York: M. E. Sharpe.
- Polivy, J., & Pliner, P. (2015). "She got more than me". Social comparison and the social context of eating. *Appetite*, 86(0), 88-95.
- Robinson, E., J. Blissett, et al. (2013). The influence of recent tasting experience on expected liking for foods. *Food Quality and Preference*, 27(1), 101-106.
- Szymanski, D. M., & Henard, D. H. (2001). Customer satisfaction: A meta-analysis of the empirical evidence. *Journal of the Academy of Marketing Science*, 29(1), 16-35.
- Tesch, R. (Ed.). (1990). *Qualitative research. Analysis types & software tools*. London: RoutledgeFalmer.
- Walter, U., Edvardsson, B., & Öström, Å. (2010). Drivers of customers' service experiences: a study in the restaurant industry. *Managing Service Quality: An International Journal*, 20(3), 236-258.
- Wilkinson, C., Dijksterhuis, G. B., & Minekus, M. (2000). From food structure to texture. *Trends in Food Science & Technology*, 11(12), 442-450.
- Yi, Y. (1990). A critical review of consumer satisfaction. *Review of Marketing 1990*. In V. A. Zeithaml (Ed). 68-123. Chicago: American Marketing Association.

## 7. Determinants of meal satisfaction in a work environment

Pernille Haugaard<sup>1</sup>, Catalin M. Stancu<sup>1</sup>, Per B. Brockhoff<sup>2</sup>, Inga Thorsdottir<sup>3</sup> and Liisa Lähteenmäki<sup>1</sup>

<sup>1</sup>*MAPP Research Centre, Department of Management, School of Business and Social Sciences, Aarhus University, Bartholins Allé 10, DK-8000 Aarhus C, Denmark*

<sup>2</sup>*DTU Compute, Department of Applied Mathematics and Computer Science, Technical University of Denmark, Matematiktorvet, DK-2800 Kgs. Lyngby, Denmark*

<sup>3</sup>*Unit for Nutrition Research, Faculty of Food Science and Nutrition, School of Health Sciences, University of Iceland & Landspítali-University Hospital*

### **Abstract**

Workplace lunches are recurrent meal occasions that can contribute to the general well-being of employees. The objective of our research was to study which factors influence consumers' satisfaction with these meals by exploring the relative role of food-related, personal, situational factors. Using a longitudinal approach, we monitored a total of 71 participants compiled and experienced 519 meals from their workplace canteen buffet during a three-month period; in addition the composed lunches were photographed. Before and after the lunch choice period respondents filled in a questionnaire on several meal-related variables. A mixed modelling approach was used to analyse the data. Meal satisfaction was directly associated with a positive ambience and a positive evaluation of both the quality of the food eaten and the buffet assortment, whereas the meal's energy content did not contribute to meal satisfaction. Additionally, meal satisfaction was associated with a more positive mood, lower hunger level as well as feeling less busy and stressed after lunch. The buffet assortment, a more positive mood before lunch and mindful eating contributed to the

perceived food quality, but not associated with the hunger level before lunch. Time available, mindful eating and eating with close colleagues were positively associated with perceived ambience. The results indicate that consumers' satisfaction with workplace meals can be increased by putting emphasis on the quality of food served, but equally important is the ambience in the lunch situation. Most of the ambience factors were related to available time and mental resources of the participants and the possibility to share the meal with close colleagues. These are factors that can be facilitated by the service provider, but not directly influenced.

## **Introduction**

A high quality of life is something that most people strive for in their everyday lives. Quality of life can be divided into objective quality of life such as health indicators, income and education and subjective quality of life such as life satisfaction, physiological well-being and satisfaction with various life domains (Sirgy, 2012 p. 31). Such life domains cover satisfaction with work, health and social relationships/friendships (e.g. Argyle, 2001; Hsieh, 2003). Grunert and colleagues (2007) added satisfaction with food-related life as an important domain, because satisfaction with one's food-related life affects one's general life satisfaction and interacts with several other domains of our lives. As most of the food is consumed at meals reoccurring at frequent intervals, satisfaction with meals is highly relevant for the overall satisfaction with one's food-related life and is likely to be one of the major contributors to consumer well-being.

Meal satisfaction is a relevant concept not only in terms of consumer well-being but also for the food and catering industry and policy makers. Catering companies want satisfied customers who repeatedly buy their service offerings (W. G. Kim, Ng, & Kim, 2009) and stay loyal (Ladhari, Brun, & Morales, 2008). Policy makers wish to promote wholesome eating to reduce the risk of non-communicable diseases and thereby to reduce costs related to treating these diseases in the health care system. Most Danish employees eat lunch at work on a regular basis (Lund, 2014) and it is estimated that they consume between 25 to 40 per cent of their food at work (Danish Veterinary and Food Administration, 2010). The workplace is thus recognised as a priority setting to change food-related behaviours as it provides access to a large proportion of the adult population (Gursoy, McCleary, & Lepsito, 2003).

Giese and Cote (2000) noted that despite the widespread application of customer/consumer satisfaction, a consensual definition of satisfaction is still missing. Traditionally satisfaction

definitions have been discussed as either an evaluation process or an outcome, though most researchers have favoured consumer satisfaction as a response to an evaluation process, e.g. as an affective response (Haistead, Hartman, & Schmidt, 1994) or as an overall evaluation (Fornell, 1992). Various definitions of satisfaction have been proposed, one of the most commonly used is the one by Oliver (2010) who defines satisfaction as a fulfilment response: “a judgement that a product/service feature, or the product or service itself, provided/providing a pleasurable level of consumption-related fulfilment, including levels of under and over-fulfilment”.

Giese and Cote (2000) developed a satisfaction framework that identified three general elements of satisfaction: an emotional or cognitive response pertaining to a particular focus (expectations, product, consumption experience, etc.) occurring at a particular time (e.g. before, during or after consumption). The transaction-specific and cumulative/summary approaches have been proposed as two ways of measuring satisfaction. The transaction-specific approach defines consumer satisfaction as an emotional response to the most recent transactional experience, whereas the cumulative approach reflects overall satisfaction with various facets of product performance (Oliver, 2010, p. 10). In this study meal satisfaction is viewed as a multidimensional concept capturing a combination of both affective and cognitive consumer responses to a discrete experience just after finishing the meal.

According to Edwards et al. (2003) the appreciation of an eating occasion is influenced by three classes of variables, namely those related to the food itself, those related to the environment and those related to the individual. Several studies report that the quality and direct experience based on sensory properties of the food eaten are important factors contributing to meal satisfaction in a restaurant setting (Andaleeb & Conway, 2006; Blanck et al., 2009; Law, Hui, & Zhao, 2004; Namkung & Jang, 2008; Walter, Edvardsson, & Öström, 2010). Liking for food increases food

intake (e.g. de Graaf et al., 2005) and therefore it is likely that higher perceptions of food quality will increase the energy content of meals chosen, especially in buffet meals where variety further supports higher intake (McCrory, Burke, & Roberts, 2012). Therefore higher perceptions of food quality, including liking for food, are expected to increase the energy content of the meal. However, whether energy content in addition to perceived food quality impacts meal satisfaction remains to be tested. Moreover, expectations of the food quality seem to play a role in meal satisfaction as the post-evaluations of food items as better/worse than expected seem to be good predictors of overall meal satisfaction (Cardello, Schutz, Snow, & Leshner, 2000). Appearance of the buffet food creates expectations and therefore the evaluation of the buffet assortment is likely to have an impact on perceived food quality and thereby to increase meal satisfaction.

Environmental factors cover factors like the location, ambience, the social context, and time available for the meal. Ambience is often used to describe the meal environment that goes beyond the physical location. The Oxford dictionary defines ambience as “a sense of some specific or individual atmosphere”, whereas Stroebele and de Castro (2004) used the term to cover all external conditions, including food-related factors. In our study we use a more restricted approach and define ambience as the atmosphere of the lunch situation. The social context is recognised as an important part of the meal affecting food choice and consumption, e.g. consumers eat more in groups compared to eating alone (Clendenen, Herman, & Polivy, 1994; Hetherington, Anderson, Norton, & Newson, 2006; Stroebele & De Castro, 2004). In these studies the type of social relation such as eating with friends or strangers and eating with the same or the opposite sex impacts food consumption. Converse results have also been found showing no effect of social context on food consumption (Bell & Pliner, 2003; Pliner, Bell, Hirsch, & Kinchla, 2006). Moreover, it has been found that social interaction has no effect on food acceptability either in laboratory or restaurant settings (King, Meiselman, Hottenstein, Work, & Cronk, 2007). Most of the studies on social

context and its impact on eating behaviour have been carried out in experimental conditions, but there is a lack of studies on how the social context of eating influences everyday meals in a natural environment.

In addition to social context, other situational factors are likely to contribute to the ambience. At workplace lunch conditions, the conflicting demands from work tasks may limit the time available for eating or induce stress. Time scarcity may lead to multitasking while eating, such as working while eating or speeding up consumption (Jabs & Devine, 2006); also stress levels have been shown to change food behaviours (Zellner et al., 2006). These can all be regarded as distractions that work against mindful eating which has been associated with psychological well-being and satisfaction (Bays, 2009; Orzech, Shapiro, Brown, & McKay, 2009). Framson and colleagues (2009) describe mindful eating as “a non-judgmental awareness of physical and emotional sensations associated with eating”. Eating food with great awareness, thus shutting one’s mind to possible distractions while eating, could lead to a positive evaluation of the meal, whereas an inner emotional state related to mindful eating might be reflected in perceptions of the ambience.

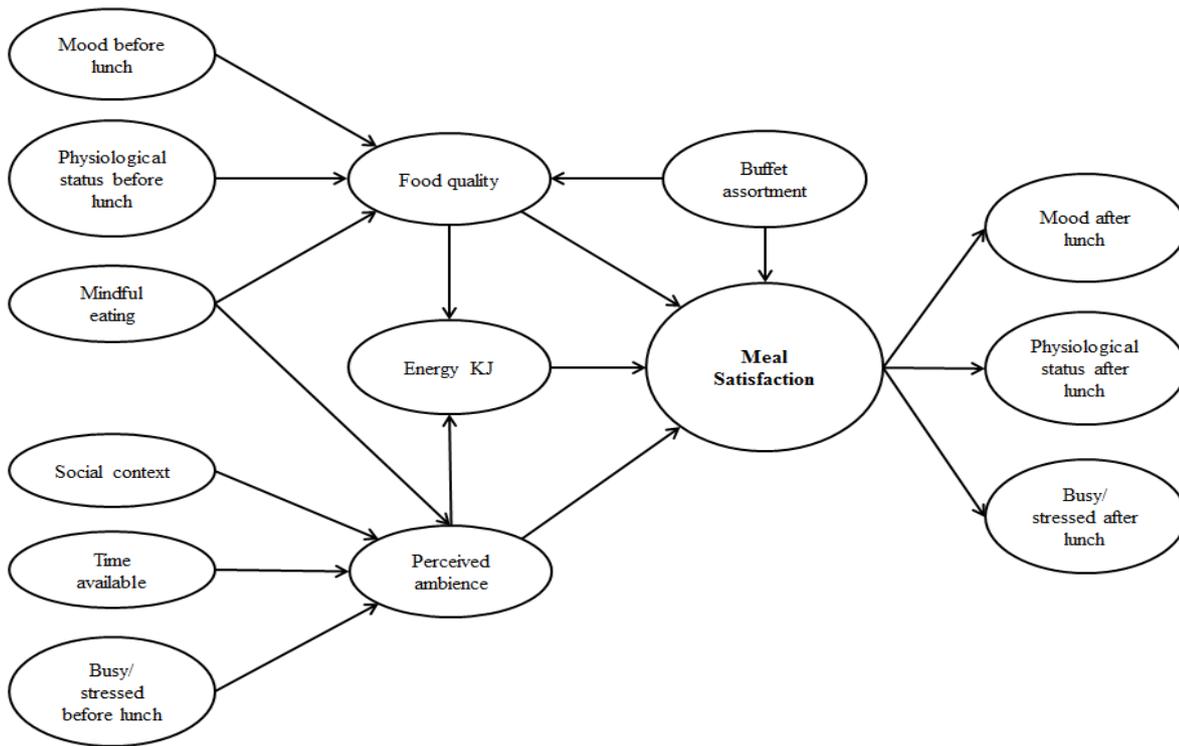
Personal factors such as mood and physiological state are important in food choice and behaviour. Consumers eat according to their mood (Y.-S. Kim, Moreo, & Yeh, 2005; Patel & Schlundt, 2001) and therefore pre-lunch mood is likely to affect consumers’ food quality evaluation and consequently meal satisfaction. However, the valence of this link is difficult to predict as a good mood may improve the perception of food as such; alternatively good food can raise the mood and thereby increase the level of satisfaction. Moreover, prior research has found that satisfaction with the food eaten is linked to positive emotions in restaurant dinners (Ladhari, et al., 2008) and that food consumption per se is mainly linked with positive emotions (Desmet & Schifferstein, 2008). Based on this we expect that meal satisfaction will affect post-lunch mood. Food consumption

should have a higher reward value when people are hungry (Rolls, 2015). Physical state related to hunger and perceived satiety has been found to be associated with meal satisfaction (Boelsma, Brink, Stafleu, & Hendriks, 2010).

Most of the studies on consumer perception of meals and foods use experimental designs and study the impact of single factors on individuals' assessments. In this partly longitudinal study we repeatedly approach the same consumers in their own meal environment making choices from their ordinary lunch buffet to study whether findings from mainly experimental studies hold in a natural, everyday setting. Using a transaction-specific approach, the objective of this study was to explore the relative roles of food-related, personal and situational factors in meal satisfaction. Furthermore, the longitudinal aspect allows us to explore if there are individual differences in meal satisfaction across lunches.

In our conceptual model we propose that meal satisfaction is associated with the overall quality evaluation of the food eaten, the quality of the buffet assortment, the energy content as well as the overall perceived ambience (Fig. 1). The perceived quality of the food is expected to be associated with pre-lunch factors including mood, physical state (hunger vs satiety), mindful eating and buffet assortment. Perceived ambience at lunch is expected to be linked with the closeness of the company, time available, and being busy/stressed before lunch, as well as mindful eating. Meal satisfaction is expected to increase mood, reduce levels of hunger and perceived stress after lunch.

Figure 1: Conceptual Model: Direct and Indirect Factors involved in Meal Satisfaction



## Material and methods

Data were collected in a real-life work environment where participants had lunch from the canteen buffet. The work location was an international centre for innovation and knowledge transfer in the agricultural and the associated technology sector. This centre comprised 50 companies with approximately 1000 employees. The canteen provides a buffet lunch for approximately 500 daily customers. The daily buffet includes one hot dish, a salad buffet with both single and mixed salads, different types of cold-cuts and different types of bread and butter. Buffet lunches allow participants a certain number of options to choose from and thereby a limited freedom to compose varied kinds of lunches; however, they do not have any direct influence on the buffet menu.

## **Study design**

In total, 71 participants took part in the study reporting on 519 lunch meals. Repeated data were collected over a period of three months offering 31 lunch occasions to participants in the study.

Participants were asked to report on 8 -10 meals during the three month period. Five per cent of the participants reported on 11-12 meals, 55 per cent reported on 8-10 meals, 32 per cent reported on 3-7 meals and 7 per cent reported on one meal.

Prior to the lunch choice period, we distributed a background survey related to demographic characteristics, food-related behaviour including Food Neophobia (Pliner & Hobden, 1992), the shortened version of the Three-Factor Eating Questionnaire (Karlsson, Persson, Sjöström, & Sullivan, 2000) as well as questions on food and meal patterns. During the lunch choice period surveys were distributed before and after lunch (see Table 1 for measures). The pre-lunch survey consisted of questions related to current state of mood, physiological state and levels of feeling busy and stressed. The survey link was activated half an hour before the canteen opened and participants were instructed to fill out the survey just before going to lunch. When participants had picked their lunch and filled their plate, they were asked to get a research assistant to take a photo of their lunch plate. The participants paid for their lunch by a card which recorded whether they had included the hot dish of the day in their choice. The after-lunch survey was activated 35 minutes after recorded payment and the participants were instructed to fill out the after-lunch survey as soon after lunch as possible. In addition to a number of identical questions from the before-lunch survey, the after-lunch survey asked participants to evaluate their meal experience related to the buffet assortment, the quality of the food eaten, mindful eating, overall perceived ambience and perceived time available for lunch. Moreover, participants were asked about the social company during lunch. To make responding as flexible as possible for participants in a work environment, both the before and the after-lunch surveys could be filled in using mobile phones or computers. However, nobody used

their mobile phone. A consumer research company facilitated the recruitment of participants, distribution of surveys and took pictures of buffets and lunches. The canteen staff provided written overviews of the lunch menus.

*Table 1: Overview of constructs*

<b>Constructs</b>	<b>Questions</b>	<b>Cronbach's <math>\alpha</math></b>
<b>Mood</b>  <i>(measured before and after lunch)</i>	<ul style="list-style-type: none"> <li>• How pleasant do you feel at this moment?</li> <li>• How satisfied do you feel at this moment?</li> <li>• How sleepy do you feel at this moment? (reversed)</li> <li>• How relaxed do you feel at this moment?</li> <li>• How physically energetic do you feel at this moment?</li> <li>• How mentally alert do you feel at this moment?</li> </ul> Scale:  “Not at all” (1); “Very” (7)	Before lunch: 0.895  After lunch: 0.873
<b>Feeling busy; stressed</b>  <i>(measured before and after lunch)</i>	<ul style="list-style-type: none"> <li>• How busy do you feel at this moment?</li> <li>• How stressed do you feel at this moment?</li> </ul> Scale:  “Not at all” (1); “Very” (7)	Before lunch: 0.650  After lunch: 0.705
<b>Hunger</b>  <i>(measured before and after lunch)</i>	<ul style="list-style-type: none"> <li>• How hungry do you feel at this moment?</li> <li>• How full do you feel at this moment? (reversed)</li> <li>• How great is your desire to eat at this moment?</li> </ul> Scale:  “Not at all” (1); “Very” (7)	Before lunch: 0.864  After lunch: 0.748
<b>Meal satisfaction</b>  <i>(measured after lunch)</i>	<b>How would you describe your lunch experience today?</b> <ul style="list-style-type: none"> <li>• “Not at all satisfying” (1); “Very satisfying” (7)</li> <li>• “Not at all agreeable” (1); “Very agreeable” (7)</li> <li>• “Much worse than expected” (1); As expected (4); “Much better than expected” (7)</li> </ul>	After lunch: 0.747

<b>Buffet assortment</b>  <i>(measured after lunch)</i>	<b>How did you experience the canteen buffet offered?</b> <ul style="list-style-type: none"> <li>• “Nothing that I wanted to eat” (1) ; “Much that I wanted to eat (7</li> <li>• “Not at all a varied assortment” (1); “ A very varied assortment”(7)</li> </ul>	After lunch: 0.824
<b>Food quality evaluation</b>  <i>(measured after lunch)</i>	<b>How would you describe the food for lunch today?</b> <ul style="list-style-type: none"> <li>• “Not at all filling” (1); “Very filling” (7)</li> <li>• “Not at all healthy” (1); “Very healthy” (7)</li> <li>• “Not at all tasty” (1); “Very tasty” (7)</li> <li>• “Not at all varied” (1); “Very varied” (7)</li> <li>• “ I did not like it at all” (1); I did like it very much” (7)</li> <li>• “Of low quality”(1); “Of high quality”(7)</li> </ul>	After lunch: 0.891
<b>Perceived ambience</b>  <i>(measured after lunch)</i>	<b>How would you describe the ambience at lunch today?</b> <ul style="list-style-type: none"> <li>• “Not at all cosy” (1); “Very cosy”(7)</li> <li>• “Not at all boring” (1); “Very boring” (7)</li> </ul>	After lunch: 0.842
<b>Mindful eating</b>  <i>(measured after lunch)</i>	<b>How aware were you of the food you ate for lunch today?</b> <ul style="list-style-type: none"> <li>• I noticed subtle flavours in the food?</li> <li>• I ate so quickly that I didn’t taste the food? (reversed)</li> </ul> Scale:  “Not at all” (1); “Very” (7)	After lunch: 0.759
<b>Time available</b>  <i>(measured after lunch)</i>	<b>How much time did you have available for lunch today?</b> <ul style="list-style-type: none"> <li>• “Very little time available” (1); “Plenty of time available” (7)</li> </ul>	
<b>Social context</b>  <i>(measured after lunch)</i>	<b>Which of the following options fits with your lunch today?</b> <ul style="list-style-type: none"> <li>• I had lunch with someone that I know very well (1)</li> <li>• I had lunch with someone that I know, but not very well (2)</li> <li>• I had lunch with someone that I do not know (3)</li> <li>• I had my lunch alone (4)</li> </ul>	Categorical variable
<b>Location</b>  <i>(measured after lunch)</i>	<b>Where did you eat your lunch today?</b> <ul style="list-style-type: none"> <li>• In the canteen (1)</li> <li>• At another location (2)</li> </ul>	Categorical variable

## Measures

An overview of the construct measurements is shown in table 1 along with questions, scales and Cronbach alpha values. The construct of meal satisfaction was conceptualised as satisfaction with the entire meal experience. Meal satisfaction was measured using three questions including how satisfying the meal experience was, how cosy the meal experience was and if the meal experience was worse/better than expected. Mood was operationalised as a general feeling of well-being before and after food consumption, i.e. postprandial wellness (pleasantness, satisfaction, relaxation, sleepiness, physical energy and mental alertness) (Boelsma, et al., 2010). The physiological status was measured by sensations related to hunger, satiety and desire to eat (Porrini, Crovetti, Testolin, & Silva, 1995). This factor will be referred to as “hunger” throughout the paper to improve readability. Perceived ambience was conceptualised as an overall evaluation of the ambience framed as a cosy or boring atmosphere. Two items from the Mindful Eating Questionnaire (Framson, et al., 2009) related to awareness and distraction during eating were used to measure mindful eating which is found to have highest relevance for repetitive everyday meals.

From the lunch photos nutrition researchers from the University of Iceland analysed the energy content by identifying the food components on each plate and estimating the weight of each component. The photos of the buffet offerings as well as the written menus were used to enable identification of the food components available on each meal occasion. To estimate the weight of the food items on each lunch photo, a pictorial book displaying different portions of food items and their estimated weight in grams was used (The Icelandic Directorate of Health, 2010). The identified food and its estimated weight were entered into the “CEFOOD 2.0” (2011) computer software to calculate the nutritional value including energy content of a meal based on standardised food composition tables.

## **Participants**

Volunteers were recruited by sending invitations via personal e-mails to all employees, by setting up place cards at canteen tables and by hanging posters in the canteen area. Invitation material informed about our interest in personal lunch experience and what was expected from each participant, e.g. the number of surveys to fill in, when they needed to be completed as well as the number of meals to report on. As the study design requires strong participant commitment, clear information about these demands was given before sign-up in order to curb drop-outs. Participants signed consent forms informing them about data confidentiality, guaranteed anonymity and about their right to opt out during the research period. Participants had their research lunches paid for, which was used as an incentive to attract participants. Depending on the subsidy the participants received from their employer, the free lunch had different values. Eighty-seven per cent of the participants were part of a discount scheme where they paid approximately one third of the listed lunch price. Another incentive was a subsidy for a special, high quality lunch offered to all participants as well as all other employees in the canteen after the study. Participant demographics are shown in Table 2.

Table 2: Demographics of participants

<b>Demographic characteristics</b>	<b>N</b>	<b>%</b>
<b>Gender:</b>		
Men	36	50.7
Women	35	49.3
<b>Age:</b>		
20-29	9	12.7
30-39	13	18.3
40-49	22	31.0
50-59	18	25.4
60-69	9	12.7
<b>Level of Education:</b>		
Upper secondary	4	5.6
Vocational	11	15.5
Higher education	56	78.9
<b>Work Area:</b>		
Administration	29	40.8
Communication, IT, Technology	25	35.3
Agriculture, Food, Health, Nutrition	12	16.9
Other	5	7
<b>Working-hour status:</b>		
Full-time employment (+30 HPW)	64	90.2
Part-time employment (8-29 HPW)	4	5.6
Other	3	4.2
<b>Household size:</b>		
1 person	9	12.7
2 persons	28	39.4
3 persons	11	15.5
4 persons	15	21.1
5 persons	8	11.3
<b>Household distribution:</b>		
1 child	41	57.7
2 children	9	12.7
3 or more children	21	29.6

### **Participant characteristics and general lunch patterns**

Participants rated their general health by a mean of 5.6 on a seven-point scale ( $\sigma = 1.1$ ). Moreover, using the Warwick Edinburgh Mental Well-being Scale (Tennant et al., 2007), participants rated their mental well-being by a mean of 5.1 on a seven-point scale ( $\sigma = 0.95$ ). The mean BMI for participants was 24.6; 64.8 per cent was of normal weight (18- 25) and 22.5 per cent were moderately overweight (25-30). Moreover, 11.3 per cent were obese ( $\geq 30$ ). Among the participants 66.2 per cent wanted to lose weight. Regarding exercise, 52.1 per cent of the participants met or nearly met the Danish Health and Medicines Authority's recommendation of at least 30 minutes of exercise a day, whereas 19.7 per cent stated that they were far from meeting this recommendation. All participants were non-smokers or former smokers with one exception. Only three respondents out of 71 followed a special diet. For most respondents (64.3%) dinner was the main meal whereas 11.3% considered lunch as the main meal of the day. The lunch at the canteen was typically eaten in company of others (93.0%), generally with those recognised as close colleagues.

### **Data analysis**

A linear mixed model (LMM) approach was used to analyse the longitudinal data by means of the statistical program R, via R Studio, using the lme4 and lmerTest packages (Bates, Maechler, Bolker, & Walker, 2014; Kuznetsova, Brockhoff, & Christensen, 2015). These packages provide functions to fit and analyse mixed effects incorporating both fixed and random effects in the model. LMM analysis is useful when examining longitudinal data consisting of a hierarchy of different populations, i.e. the same participant rating several meals during the choice period. By modelling each meal as a separate event grouped by meal occasion (i.e. the day/date of the meal) and by participant (i.e. unique ID number), the mixed-effects model takes the repeated-measures aspect of the data structure into account. Description of participant characteristics, correlation matrix and factor analysis was conducted in SPSS version 21.

## Results

### Description of meal satisfaction and other constructs

In general meal satisfaction was rated relatively high by the participants with a mean of 5.1 on a seven-point scale (Table 3). In general participants were in a positive mood both before and after lunch, but there was a small increase in the reported mood after lunch (paired t-test (518) = -5.633;  $p < 0.001$ ). The level of hunger decreased after lunch as could be expected, but the reported level of feeling busy/stressed did not change. In general, participants rated the buffet assortment and the food quality positively. Lunch was a social event in 92 per cent of the occasions; 72 per cent of these were with close colleagues. Ninety-three per cent of the lunch meals were consumed in the canteen area. Correlations between variables are presented in Table 4.

Table 3: Description of meal satisfaction and its determinants

<b>Construct</b>	<b>Mean</b>	<b>Std. Deviation</b>
<i>Before lunch:</i>		
Mood	5.0	1.01
Hunger	5.1	1.17
Busy/stressed	4.0	1.27
<i>After lunch:</i>		
Meal satisfaction	5.1	0.92
Food quality	5.4	0.94
Buffet assortment	5.1	1.23
Perceived ambience	5.6	1.16
Mindful eating	5.6	1.03
Energy content (KJ)	2270.7	824.21
Energy KJ/BMI	93.9	35.23
Time available	5.1	1.30
Mood	5.2	0.89
Hunger	2.1	0.92
Busy/stressed	3.9	1.26

Table 4: Correlation matrix

Measure	Mood BL	Hunger BL	Busy/stressed BL	Meal satisfaction	Food quality	Buffet assortment	Perceived ambience	Mindful eating	Energy content	Energy KJ/BMI	Time available	Mood AL	Hunger AL	Busy/stressed AL	
Mood BL	1														
Hunger BL	.076	1													
Busy/stressed BL	-.287**	-.002	1												
Meal satisfaction	.325**	.086*	-.107*	1											
Food quality	.381**	.082	-.101*	.677**	1										
Buffet assortment	.300**	.091*	-.112*	.615**	.804**	1									
Perceived ambience	.254**	.038	-.107*	.611**	.312**	.259**	1								
Mindful eating	.219**	.179**	-.042	.338**	.340**	.302**	.312**	1							
Energy content	.091*	.053	.092*	.099*	.107*	.068	.036	.074	1						
Energy KJ/BMI	.104*	.077	-.055	.111*	.117**	.075	.039	.134**	.906**	1					
Time available	.132**	.043	-.359**	.333**	.204**	.140**	.405**	.358**	.056	.132**	1				
Mood AL	.750**	.135**	-.242**	.382**	.457**	.318**	.230**	.320**	.04	.049	.175**	1			
Hunger AL	-.256**	-.03	-.007	-.259**	-.376**	-.289**	-.153**	-.211**	-.136**	-.120**	-.004	-.330**	1		
Busy/stressed AL	-.251**	-.036	.774**	-.153**	-.131**	-.116**	-.132**	-.071	.103*	-.05	-.412**	-.254**	.014	1	

Note: BL = before lunch; AL = after lunch

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

### **Determinants of meal satisfaction**

The evaluated food quality, perceived ambience during lunch and the evaluation of the buffet assortment were positively associated with meal satisfaction (Table 5). The energy level, as calculated in proportion to BMI, showed no significant link with meal satisfaction.

Individual subject-dependent effects of food quality, buffet assortment and ambience on meal satisfaction were tested by random coefficient models allowing for random varying individual subject regression coefficients. It was found that the effect of food quality was marginally significantly different across individuals ( $\chi^2(2) = 7.02; P < 0.05$ ). However, the effect was always positive and many of the values (individual food quality coefficients) were quite similar with a coefficient spread at 0.13 standard deviations. This means that despite individual variation, there was consistency in how food quality affected meal satisfaction. No significant subject-dependent effects of buffet assortment or ambience were found.

Moreover, possible moderating effects of gender were tested and a significant gender-specific effect of buffet assortment was found (Table 5). For women the effect of buffet assortment on meal satisfaction was 0.11 higher than for men for whom the effect was 0.10. No gender effects of food quality and ambience were found.

Table 5: Unstandardized regression coefficients of LMM analysis: Meal satisfaction as dependent variable

Variable	B	95% CI
Food quality	0.43***	[0.34; 0.52]
Buffet assortment	0.14***	[0.08; 0.20]
Perceived ambience	0.34***	[0.30; 0.38]
Energy KJ/BMI	0.0005	[-0.001; 0.001]
Moderating effects of gender:		
Food quality: gender	-0.08	[-0.26; 0.10]
Buffet assortment: gender	0.13*	[0.01; 0.26]
Perceived ambience: gender	0.08	[-0.01; 0.17]

\*\*\*  $p < 0.001$

\*  $p < 0.05$

Meal satisfaction contributed to a more positive mood after lunch and a decrease in hunger level (i.e. increased satiety level; Table 6). Moreover, meal satisfaction was associated with a decrease in the level of feeling busy and stressed.

Table 6: Unstandardized regression coefficients of LMM analysis: Meal satisfaction as explanatory variable

Construct	B	95% CI
Mood after lunch	0.18***	[0.11;0.25]
Hunger after lunch	-0.20***	[-0.28;-0.12]
Busy/stressed after lunch	-0.10*	[-0.19;-0.01]

\*\*\*  $p < 0.001$

\*  $p < 0.05$

### Determinants of the food quality evaluation

A strong significant positive association between the evaluation of the buffet assortment and the evaluation of the food quality was observed (Table 7). Mindful eating and positive mood were associated with a more positive evaluation of the food. Hunger ratings did not have a significant

effect on the evaluation of the food quality. Moreover, no significant association was found between energy content and food quality.

*Table 7: Unstandardized regression coefficients of LMM analysis: Food quality as dependent variable*

Construct	B	95% CI
Mood before lunch	0.08**	[0.03; 0.13]
Hunger before lunch	-0.01	[-0.05; 0.03]
Mindful eating	0.08**	[0.03; 0.13]
Buffet assortment	0.49***	[0.45; 0.53]
Energy KJ/BMI	0.0004	[-0.001; 0.002]

\*\*\*  $p < 0.001$

\*\*  $p < 0.01$

### **Determinants of perceived ambience**

Perceived ambience was significantly associated with time available, mindful eating and the social context (Table 8). More time available for lunch as well as higher levels of mindful eating contributed to a more positive ambience. The results also show that eating in close company increased perceived ambience positively, more so when compared to eating alone. Being busy and stressed before lunch had no significant effect on perceived ambience.

*Table 8: Unstandardized regression coefficients of LMM analysis: Ambience as dependent variable*

Construct	B	95 % CI
Time available	0.17***	[0.09; 0.25]
Mindful eating	0.20***	[0.10; 0.30]
Busy/stressed before lunch	-0.02	[-0.10; 0.06]
Energy KJ/BMI	-0.002	[-0.004; 0.0004]
Close vs. distant company	-0.64***	[-0.86; -0.42]
Close company vs. alone	-1.66***	[-1.97; -1.35]

\*\*\*  $p < 0.001$

### **Variability in meal satisfaction**

In order to find out whether some individuals vary more than others in their meal satisfaction, the components of variance in meal satisfaction were calculated. The variance may have a complex structure arising from several identifiable sources such as variance between individuals and/or between meals. The variance components were calculated for meal satisfaction on the individual level (the 71 participants), the meal level (the 31 meal occasions) and the residual level, which include the individual/meal interaction effect (0.540). Meal variability in meal satisfaction was low (0.027), which indicates that satisfaction did not vary much between lunch occasions. Moreover, the higher levels of individual variability (0.292) implied that individuals differ in meal satisfaction between lunch occasions. To test the individual variability of meal satisfaction, Levene's Test for Homogeneity of Variance was conducted. This resulted in a non-significant overall F-value ( $F(70)=1.1949$ ;  $P=0.1484$ ; ns), indicating that although individuals vary in meal satisfaction, this variation is not substantially different across individuals, thus no participants seemed to vary significantly more in meal satisfaction than others.

### **Discussion**

This study explored consumers' meal satisfaction in a real-life situation, namely everyday lunches chosen from a workplace canteen buffet. The study is unique as it explores the relative roles of different food-related, personal and situational factors contributing to meal satisfaction across several meal occasions in consumers' own eating environment. This approach has both strengths and limitations: most studies on meals have been experimental, often carried out in controlled conditions or explored consumers' perception of meals in a restaurant environment. While increasing external validity of the findings, studying meal choices in a natural habitat means loss of control over a number of factors. Everyday meal situations happen in a certain location, but several situational factors vary from day-to-day. In this study we have tried to measure a number of the

factors that are known to have an impact on food-related behaviour, such as mood, stress level and context of eating to uncover whether they are associated with meal satisfaction. Furthermore, measuring the energy intake from pictures allowed us to avoid asking people to report their food choices, which might reduce the reporting bias partly by reducing the effort required for reporting and partly by reducing the social desirability bias. The downside of this approach is more uncertainty in the measurement as interpretation of the pictures requires more assumptions. However, these assumptions could be based on knowledge of foods available on that particular day and validated tools for estimating food quantities. The approach of studying consumers making normal choices also means that we do not catch many dissatisfying meals: in order to frequent a food service, users are likely to be relatively happy with the overall quality of the meals. However, we can catch the differences in the level of satisfaction, and more importantly, when gathering data from the same individuals we can assess how satisfaction differs from one day to the next. On the whole, the approach applied in this study helps us to understand whether findings from earlier, more controlled studies hold in everyday situations, and how everyday meal satisfaction is associated to what is offered (food-related factors), situational factors and individuals' state and tendencies.

Similar to earlier findings from the restaurant environment settings (Andaleeb & Conway, 2006; Namkung & Jang, 2008; Soriano, 2002), we found that food-related factors contribute to meal satisfaction: a positive evaluation of the quality of the food consumed increases satisfaction as does a positive evaluation of the buffet assortment. In a study by Cardello and colleagues (2000), in a test cafeteria environment perceived food quality was found to be strongly associated with satisfaction with the food eaten and moreover associated with increased consumption. Positive assessment of buffet assortment is likely to increase expectations and through assimilation perceived food quality, but the additional impact of buffet quality suggests that some features of the buffet quality per se contribute to satisfaction. In our study, a positive evaluation of the food, including a liking rating,

was surprisingly not linked with energy content of the meal eaten, which is contradictory to earlier findings in which liking was found to be associated with greater consumption (Brunstrom & Shakeshaft, 2009; de Graaf, et al., 2005). The mean energy content of the meals (mean 2270 kJ/543kcal) was estimated to be well in line with the Danish recommendation that lunch should provide about one third of the daily energy intake (Nordic Council of Ministers, 2005). This finding further suggests that buffet meals do not induce overeating among people who have it as a daily option for meals, although variety is known to increase the amount of food eaten in experimental situations (Raynor & Epstein, 2001; Wansink, 2004). When choosing everyday meals, people may have learnt the right heuristics to keep the energy consumption at an appropriate level, such as using the size of assortment, size of plate or amount of food as a cue (Kahn & Wansink, 2004; Brunstrom, 2011; Van Ittersum & Wansink, 2012). Moreover, people may anticipate the effect of variety in the buffet situation and adjust meal size accordingly (Wilkinson, Hinton, Fay, Rogers, & Brunstrom, 2013).

Although hunger ratings could be expected to be associated with increased liking for food and higher energy content, the level of hunger before lunch did not explain the perceived food quality in our study. One explanation could be that going to lunch is typically dependent on opening hours of the canteen in most work environments. As can be expected, the hunger level decreased after the meal, but this decrease was not linked with the energy content of the meal. The lack of association between energy content and meal satisfaction is highly interesting. Despite the fact that overall meal satisfaction was not linked with the energy content of the food, the higher satisfaction was associated with greater feelings of satiety after the consumption. These findings suggest that satisfying meals are likely to produce better satiety as well, but this higher level of satisfaction does not require higher energy intake. It seems that in everyday decisions individuals have learned strategies and heuristics to respond appropriately to environmental cues. As satisfying meals were

associated with an increase in mood and feeling less busy and stressed, providing good quality meals in an enjoyable ambience is likely to contribute to individuals' well-being.

Parallel to food, perceived ambience contributed strongly to meal satisfaction in our study. The important role of ambient factors has earlier been acknowledged in studies on restaurant meals (Namkung & Jang, 2008; Ryu & Han, 2011; Ryu & Jang, 2007) and experimental situations (for a review, see Stroebele & De Castro, 2004), but our findings suggest that ambience is important in everyday meals as well. As expected, ambience was partly related to the social context and partly to the individual's own approach to eating, such as reserving time to have a meal and mindful eating. Eating with close colleagues increased the positive ambience, indicating that the social factor is important in meal satisfaction at workplace meals. More importantly, ambience was not related to energy content and did not induce eating more during lunch. As improved ambience was linked to higher meal satisfaction and thereby a better mood and perceived satiety after the meal, these findings carry a message to food providers and policy makers to pay more attention to the eating environment of workplace lunches. Workplace caterers can influence the ambience by modifying the eating environment. However, time resources for the meal and paying attention to the food are mainly related to individuals' own approach to eating. Time available for lunch is likely to be partly defined by the workload, but the informal culture of a workplace can play a significant role in how important lunch is in a working day. From a managerial perspective, encouraging employees to take clear meal breaks and supporting social interaction during meals can contribute to meal satisfaction and thereby to improve the general workplace well-being. Similarly, mindful eating was linked with ambience and perceived food quality in our study. This is in accordance with earlier findings where mindful training was shown to produce more positive evaluations of foods (Hong, Lishner, Han, & Huss, 2011). Mindfulness was associated with the perceived ambience on top of social context, eating with others does act as a distractor of food awareness. As mindfulness is something that you

can practice and learn, our findings suggest that investing in higher awareness of eating and time for meals will have a positive impact on meal satisfaction and may be repaid in better work efficiency after the meal due to improved mood and lower stress-level. Nevertheless, the results also suggest that several elements of meal satisfaction may be difficult to change by caterers or workplace management as they are dependent on situational and/or personal factors.

Food policy makers should be aware that consumers' meal satisfaction with daily workplace lunches is not driven by physiological needs, such as hunger. Instead the quality of food, including an assessment of tastiness and wholesomeness of the meal, contributed to the satisfaction independently of the energy content. As long as the options available in the buffet assortment are mainly nutritionally good options, providing enjoyment with food does not lead to over consumption in an everyday situation, but it seems to support perceived satiety. This insight could be beneficial when communicating and promoting health-related messages. For instance, dietary recommendations could include an element of meal-related satisfaction and enjoyment of eating to motivate the population to follow the guidelines.

## **Conclusion**

From this study we conclude that providing high quality meals in a cosy ambience increases meal satisfaction and perceived satiety without increasing energy intake. These findings support the role of meal satisfaction in promoting overall well-being without causing overeating.

## **Acknowledgement**

The study is conducted as a part of the Senswell project, which is funded by Innovation Fund Denmark (grant no. 0603-00418B).

## References

- Andaleeb, S. S., & Conway, C. (2006). Customer satisfaction in the restaurant industry: an examination of the transaction-specific model. *Journal of Services Marketing*, 20 (1), 3-11.
- Argyle, M. (Ed.). (2001). *The Psychology of Happiness* (2nd ed.). Hove, East Sussex: Routledge.
- Bates, D., Maechler, M., Bolker, B. M., & Walker, S. (2014). lme4: Linear mixed-effects models using Eigen and S4. R package version 1.1-7. Available at: <https://cran.r-project.org/web/packages/lme4/>.
- Bays, J. C. (Ed.). (2009). *Mindful eating: A guide to rediscovering a healthy and joyful relationship with food*. Boston: Shambala Publications.
- Bell, R., & Pliner, P. L. (2003). Time to eat: the relationship between the number of people eating and meal duration in three lunch settings. *Appetite*, 41(2), 215-218.
- Blanck, H. M., Yaroch, A. L., Atienza, A. A., Yi, S. L., Jian Zhang, & Mâsse, L. C. (2009). Factors influencing lunchtime food choices among working Americans. *Health Education & Behavior*, 36(2), 289-301.
- Boelsma, E., Brink, E. J., Stafleu, A., & Hendriks, H. F. J. (2010). Measures of postprandial wellness after single intake of two protein-carbohydrate meals. *Appetite*, 54(3), 456-464.
- Brunstrom, J. M., & Shakeshaft, N. G. (2009). Measuring affective (liking) and non-affective (expected satiety) determinants of portion size and food reward. *Appetite*, 52(1), 108-114.
- Brunstrom, J. M. (2011). The control of meal size in human subjects: a role for expected satiety, expected satiation and premeal planning. *Proceedings of the Nutrition Society*, 70(02), 155-161.
- Brunstrom, J. M., Shakeshaft, N. G., & Scott-Samuel, N. E. (2008). Measuring 'expected satiety' in a range of common foods using a method of constant stimuli. *Appetite*, 51(3), 604-614.

- Cardello, A. V., Schutz, H., Snow, C., & Leshner, L. (2000). Predictors of food acceptance, consumption and satisfaction in specific eating situations. *Food Quality and Preference*, *11*(3), 201-216.
- Clendenen, V. I., Herman, C. P., & Polivy, J. (1994). Social facilitation of eating among friends and strangers. *Appetite*, *23*(1), 1-13.
- Danish Veterinary and Food Administration. (2010). *Healthy food at work - from goals to action (In Danish: Sund mad på arbejdet - fra målsætning til handling)*. Søborg, Denmark: Danish Veterinary and Food Administration.
- de Graaf, C., Kramer, F. M., Meiselman, H. L., Leshner, L. L., Baker-Fulco, C., Hirsch, E. S., et al. (2005). Food acceptability in field studies with US army men and women: relationship with food intake and food choice after repeated exposures. *Appetite*, *44*(1), 23-31.
- Desmet, P. M. A., & Schifferstein, H. N. J. (2008). Sources of positive and negative emotions in food experience. *Appetite*, *50*(2-3), 290-301.
- Edwards, J. S. A., Meiselman, H. L., Edwards, A., & Leshner, L. (2003). The influence of eating location on the acceptability of identically prepared foods. *Food Quality and Preference*, *14*(8), 647-652.
- Fornell, C. (1992). A national customer satisfaction barometer: The Swedish experience. *Journal of Marketing*, *56*(1), 6-21.
- Framson, C., Kristal, A. R., Schenk, J. M., Littman, A. J., Zeliadt, S., & Benitez, D. (2009). Development and validation of the Mindful Eating Questionnaire. *Journal of the American Dietetic Association*, *109*(8), 1439-1444.
- Giese, J. L., & Cote, J. A. (2000). Defining consumer satisfaction. *Academy of Marketing Science Review*, *2000*(1).
- Grunert, K. G., Dean, M., Raats, M. M., Nielsen, N. A., & Lumbers, M. (2007). A measure of satisfaction with food-related life. *Appetite*, *49*(2), 486-493.

- Gursoy, D., McCleary, K. W., & Lepsito, L. R. (2003). Segmenting dissatisfied restaurant customers based on their complaining response styles. *Journal of Foodservice Business Research*, 6(1), 25-44.
- Haistead, D., Hartman, D., & Schmidt, S. (1994). Multisource effects on the satisfaction formation process. *Journal of the Academy of Marketing Science*, 22(2), 114-129.
- Hetherington, M. M., Anderson, A. S., Norton, G. N. M., & Newson, L. (2006). Situational effects on meal intake: A comparison of eating alone and eating with others. *Physiology & Behavior*, 88(4-5), 498-505.
- Hong, P., Lishner, D., Han, K., & Huss, E. (2011). The positive impact of mindful eating on expectations of food liking. *Mindfulness*, 2(2), 103-113.
- Hsieh, C. (2003). Counting importance: the case of life satisfaction and relative domain importance. *Social Indicators Research*, 61, 227-240.
- Jabs, J., & Devine, C. M. (2006). Time scarcity and food choices: An overview. *Appetite*, 47(2), 196-204.
- Kahn, B. E., & Wansink, B. (2004). The influence of assortment structure on perceived variety and consumption quantities. *Journal of Consumer Research*, 30(4), 519-533.
- Karlsson, J., Persson, L. O., Sjöström, L., & Sullivan, M. (2000). Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. *International Journal of Obesity & Related Metabolic Disorders*, 24(12), 1715.
- Kim, W. G., Ng, C. Y. N., & Kim, Y.-s. (2009). Influence of institutional DINESERV on customer satisfaction, return intention, and word-of-mouth. *International Journal of Hospitality Management*, 28(1), 10-17.
- Kim, Y.-S., Moreo, P. J., & Yeh, R. J. M. (2005). Customers' satisfaction factors regarding university food court service. *Journal of Foodservice Business Research*, 7(4), 97-110.

- King, S. C., Meiselman, H. L., Hottenstein, A. W., Work, T. M., & Cronk, V. (2007). The effects of contextual variables on food acceptability: A confirmatory study. *Food Quality and Preference, 18*(1), 58-65.
- Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2015). lmerTest: Tests in Linear Mixed Effects Models. R package version 2.0-25. Available at: <https://cran.r-project.org/web/packages/lmerTest/>.
- Ladhari, R., Brun, I., & Morales, M. (2008). Determinants of dining satisfaction and post-dining behavioral intentions. *International Journal of Hospitality Management, 27*(4), 563-573.
- Law, A. K. Y., Hui, Y. V., & Zhao, X. (2004). Modeling repurchase frequency and customer satisfaction for fast food outlets. *International Journal of Quality & Reliability Management, 21*(5), 545-563.
- Lund, T. B. (2014). Deconstruction or continuity? The daily rhythm of eating in Denmark, Finland, Norway and Sweden in 1997 and 2012. *Appetite, 82*, 143-153.
- McCrary, M. A., Burke, A., & Roberts, S. B. (2012). Dietary (sensory) variety and energy balance. *Physiology & Behavior, 107*(4), 576-583.
- Namkung, Y., & Jang, S. (2008). Are highly satisfied restaurant customers really different? A quality perception perspective. *International Journal of Contemporary Hospitality Management, 20*(2), 142-155.
- Nordic Council of Ministers. (2005). *Nordic Nutrition Recommendations 2004: Integrating nutrition and physical activity*. Copenhagen.
- Oliver, R. L. (Ed.). (2010). *Satisfaction: A behavioral perspective on the consumer* (2nd. ed.). New York: M. E. Sharpe.
- Orzech, K. M., Shapiro, S. L., Brown, K. W., & McKay, M. (2009). Intensive mindfulness training-related changes in cognitive and emotional experience. *The Journal of Positive Psychology, 4*(3), 212-222.

- Patel, K. A., & Schlundt, D. G. (2001). Impact of moods and social context on eating behavior. *Appetite, 36*(2), 111-118.
- Pliner, P., Bell, R., Hirsch, E. S., & Kinchla, M. (2006). Meal duration mediates the effect of “social facilitation” on eating in humans. *Appetite, 46*(2), 189-198.
- Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite, 19*(2), 105-120.
- Porrini, M., Crovetto, R., Testolin, G., & Silva, S. (1995). Evaluation of satiety sensations and food intake after different preloads. *Appetite, 25*(1), 17-30.
- Raynor, H. A., & Epstein, L. H. (2001). Dietary variety, energy regulation, and obesity. *Psychological Bulletin, 127*(3), 325-341.
- Rolls, E. T. (2015). Taste, olfactory, and food reward value processing in the brain. *Progress in Neurobiology, 127–128*, 64-90.
- Ryu, K., & Han, H. (2011). New or repeat customers: How does physical environment influence their restaurant experience? *International Journal of Hospitality Management, 30*(3), 599-611.
- Ryu, K., & Jang, S. S. (2007). The effect of environmental perceptions on behavioral intentions through emotions: The case of upscale restaurants. *Journal of Hospitality & Tourism Research, 31*(1), 56-72.
- Sirgy, M. J. (Ed.). (2012). *The Psychology of Quality of Life: Hedonic Well-being, Life Satisfaction, and Eudaimonia* (2nd. ed.). New York: Springer.
- Soriano, D. R. (2002). Customers’ expectations factors in restaurants: The situation in Spain. *International Journal of Quality & Reliability Management, 19*(8/9), 1055-1067.
- Stroebele, N., & De Castro, J. M. (2004). Effect of ambience on food intake and food choice. *Nutrition, 20*(9), 821-838.

- Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., et al. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes*, 5(1), 63.
- The Icelandic Directorate of Health. (2010). *Portion size for food*.
- Van Ittersum, K., & Wansink, B. (2012). Plate size and color suggestibility: The Delboeuf illusion's bias on serving and eating behavior. *Journal of Consumer Research*, 39(2), 215-228.
- Walter, U., Edvardsson, B., & Öström, Å. (2010). Drivers of customers' service experiences: a study in the restaurant industry. *Managing Service Quality: An International Journal*, 20(3), 236-258.
- Wansink, B. (2004). Environmental factors that unknowingly increase a consumer's food intake and consumption volume. *Annual Review of Nutrition*, 24, 455-479.
- Wilkinson, L. L., Hinton, E. C., Fay, S. H., Rogers, P. J., & Brunstrom, J. M. (2013). The 'variety effect' is anticipated in meal planning. *Appetite*, 60(0), 175-179.
- Zellner, D. A., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., et al. (2006). Food selection changes under stress. *Physiology & Behavior*, 87(4), 789-793.



## **8. Objective measures of meal variety lacking association with consumers' perception of variety with self-selected buffet meals at work**

Pernille Haugaard<sup>1</sup>, Per B. Brockhoff<sup>2</sup> and Liisa Lähteenmäki<sup>1</sup>

<sup>1</sup>*MAPP Research Centre, Department of Management, School of Business and Social Sciences, Aarhus University, Bartholins Allé 10, DK-8000 Aarhus C, Denmark*

<sup>2</sup>*DTU Compute, Department of Applied Mathematics and Computer Science, Technical University of Denmark, Matematiktorvet, DK-2800 Kgs. Lyngby, Denmark*

### **Abstract**

Food variety has been linked to higher diet quality and increased food intake, but what constitutes variety for consumers is underexposed. The aim of the study was twofold: first to explore the relationship between objective measures of meal variety and subjective post-meal ratings of perceived variety, and second to explore the associations between subjective meal variety and decision-making rules and individual eating styles. Data consist of 510 meals compiled from workplace lunch buffets by 71 respondents over 31 optional days. Meals were photographed and coded according to the number of components (dishes served), food groups, colours, size and shape of food on the plates. A mixed model approach was used to analyse data due to the repetitive structure of the data. Results show that subjective variety was marginally associated with the number of food groups, but there was no association with other objective measures, such as number of components chosen from the buffet or any of the visual cues of the meal. Subjective meal variety was linked with the decision-making rule of having many dishes when compiling buffet lunches. Participants with higher scores on uncontrolled eating and food neophobia were found to perceive

their meals less varied than those with lower scores. Moreover, the rule of having many dishes was positively associated with uncontrolled eating and negatively associated with cognitive restraint. Consumers' perception of within-meal variety seems to be more linked to their idea of how to compose their meal and individual tendencies towards food and eating rather than the objective measures applied in this study.

## Introduction

Variety is viewed as an important dimension of eating. Food policy makers and dietary experts underline the importance of variety in food intake. For instance, a varied diet is a part of the Danish dietary recommendations to secure a proper nutrient intake leading to better health. Three types of variety should be distinguished: *dietary variety* which refers to food intake across a long period of time, *across-meal variety* which refers to variety of food intake within a day or across days, and *within-meal variety* which is related to the variety of components in a meal (Meiselman, deGraaf, & Leshner, 2000). Dietary variety is essential to maintain an adequate intake of macro and micro nutrients (Weiss, Feinstein, & Dalbor, 2004). Consumers seek variety when they eat and most natural eating situations contain a decision about what to eat (Rozin & Markwith, 1991). When it comes to an everyday meal such as lunch at work, the catering industry is an important actor to provide a healthy and varied assortment of food for its customers. Enhanced knowledge about how consumers perceive within-meal variety, catering companies could improve their food assortment to meet the demands of the consumers.

Several studies have found that variety increases food intake (Rolls et al., 1981; Hetherington, Anderson, Norton, & Newson, 2006; Brondel et al., 2009; McCrory, Burke, & Roberts, 2012; Levitsky, Iyer, & Pacanowski, 2012 for a review). This phenomenon is referred to as the variety effect, which describes the increase in food intake when offered multiple foods with different sensory characteristic such as taste, smell, texture and visual appearance (Epstein, Robinson, Roemmich, Marusewski, & Roba, 2010). Sensory specific satiety has been suggested as an explanation for the variety effect, which refers to a decrease in sensory pleasure of the food eaten while the pleasantness of uneaten foods remains unchanged. Hetherington and colleagues (2006) found that during eating the task of tasting and rating other foods delayed normal decrease in pleasantness of the food eaten, which could indicate that variety could increase intake by

maintaining or extending pleasantness of the food eaten. Brondel and colleagues (2009) found that pleasantness decreased during eating a specific dish, but increased when condiments were added leading to higher intake compared to eating the dishes without condiments. These studies show that bringing variety to a meal can alter and delay the sensory-specific satiety with the food eaten leading to higher food intake.

Consumer perception of food is affected by the sensory properties of the food along with the expectations it creates. Within-meal variety proposes that the foods must be sufficiently dissimilar in terms of sensory properties such as taste, texture, smell and visual appearance. Many studies have explored variety within taste and flavour experience as contributing to food appreciation, acceptance and overall liking for the food (Zellner, 2014), although taste is only one variety dimension among others. Visual appearance is important as it is typically a consumer's first sensory contact with the food, which then provides expectations about the taste quality and liking (Hurling & Shepherd, 2003). Appearance properties comprise visual properties, including colour, physical form and shape, and mode of presentation (Hurling & Shepherd, 2003). For example, a visual cue such as the colour of foods has been shown to influence flavour perceptions and experience with the food (C. Spence, Levitan, Shankar, & Zampini, 2010; Zellner, 2013). According to Wadhera and Capaldi-Phillips (2014) many studies overlook the effect of visual cues of meals such as visibility, colour, perceived and actual variety, size of food items, number of food items, shape and surface area.

Moreover, most studies focus on the influence of actual or objective variety on food choice and amounts eaten, and few include perceived or subjective measures of variety expressed by the participants. One of these studies was conducted by Kahn and Wansink (2004) who found that perceived variety of food assortment led to an increase in food intake even when the actual

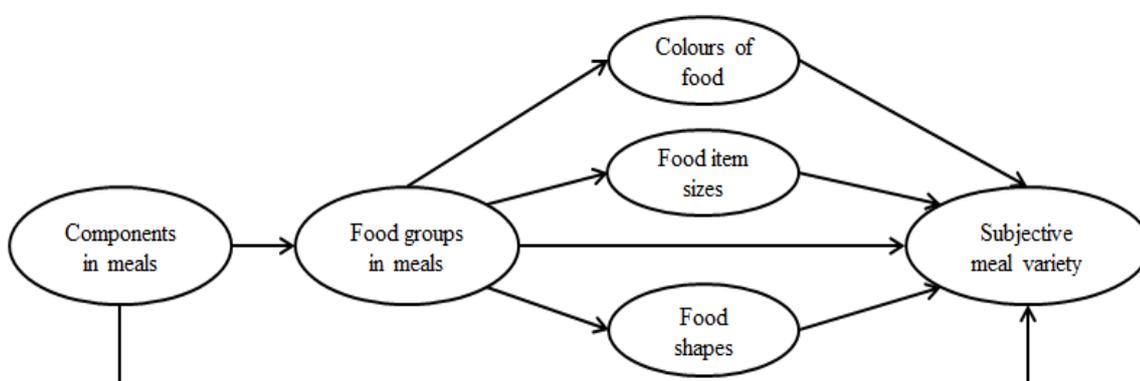
assortment variety was held constant. Moreover, many variety-related studies have been conducted in laboratory settings with pre-defined foods, which do not allow participants to compose their own meals as they do in real-life situations.

Consumers need variety in their diet to ensure proper nutrition, though too much variety in the consumption situation may lead to increased food intake and may cause excess intake of energy.

When consumers are exposed to a variety of foods as, for instance, in a buffet context, the risk of overeating is present leading to weight problems and obesity in the long term. Whenever variety is communicated as part of the nutritional recommendations, it is important that consumers share the same view of meal variety as professionals.

The aim of the study is twofold: first to explore the relationship between objective measures of meal variety including the colours, sizes and shapes represented in the meal and subjective variety with the meal (conceptual model presented in Figure 1), and second, to explore the association between subjective meal variety, decision-making rules and individual eating styles (conceptual model presented in Figure 2).

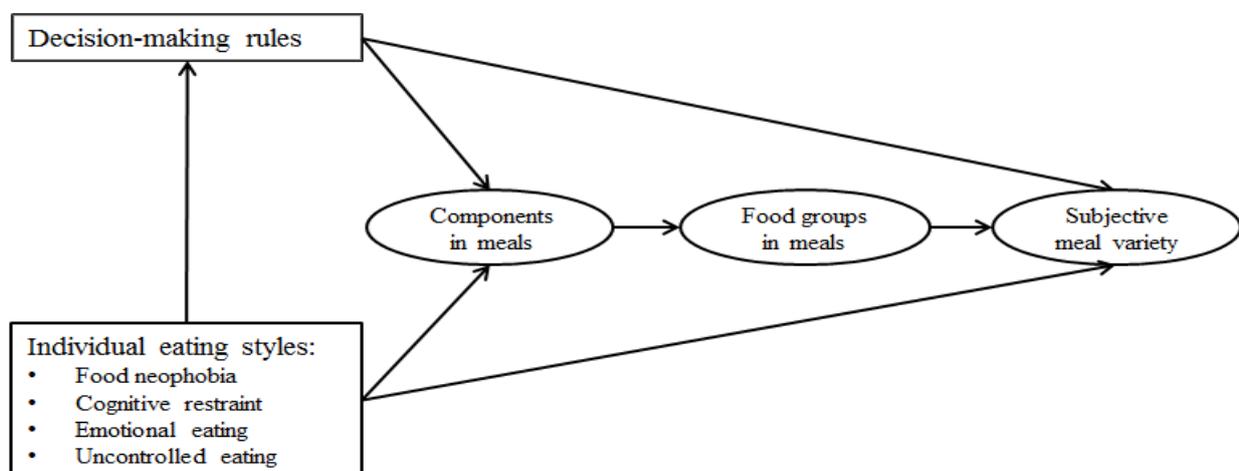
Figure 1: Conceptual model – objective and subjective meal variety



In addition to objective variability, we were interested in how important variety in its different forms is to consumers when making meal choices. As, to the best of our knowledge, no scale exists that measure this, we developed items that relate to different types of variety in a meal including different sensory aspects, functional properties and simply using numbers of foods as a basis for creating variety. These decision-making rules were tailored for buffet meals, and we expected the importance of variety to be positively linked with the number of components consumers chose to compile their meal of as well as how varied consumers perceive their meals.

Individual eating styles such as food neophobia, cognitive restraint, uncontrolled eating and emotional eating are expected to influence the type of decision-making rules that consumers use. Consumers with a high level of food neophobia and cognitive restraint are expected to choose fewer dishes compared to those with low levels of food neophobia or restraint, whereas uncontrolled eating is likely to have a positive association with the number of items. Individual eating style may also be reflected in subjective meal variety as a perception of variety rather than the objective number of components on the plate.

Figure 2: Conceptual model – the role of decision-making rules and individual eating styles in meal variety



## Method

### Participants and meals

Data consist of 510 lunches chosen by 71 participants who were recruited from a centre hosting 50 different companies with approximately 1000 employees. Demographic characteristics of participants are shown in Table 1. Participants chose their meals (1-12 per participant, average 7.2) from their general lunch buffet; the study took place over a period of 10 weeks offering 31 options to participate. Participants had their research lunches paid for, which was used as an incentive to attract participants. Consent forms stating the participants' expected contribution and rights, including the right to opt out during the research period, were signed by participants.

*Table 1: Demographics of participants*

<b>Demographic characteristics</b>	<b>N</b>	<b>%</b>
<b>Gender</b>		
Men	36	50.7
Women	35	49.3
<b>Age</b>		
20-29	9	12.7
30-39	13	18.3
40-49	22	31.0
50-59	18	25.4
60-69	9	12.7
<b>Level of Education</b>		
Upper secondary	4	5.6
Vocational	11	15.5
Higher education	56	78.9
<b>BMI</b>		
Underweight (<18)	1	1.4
Normal weight (18- 25)	46	64.8
Moderate overweight (25-30)	16	22.5
Obese (+30)	8	11.3

## **Procedure**

Participants were instructed to take part in 8-10 meals out of 31 possible days during a three-month period. On research days participants compiled their lunch plate from the canteen buffet as part of their normal lunch practices and then had their lunch plate photographed by research assistants. Besides taking lunch photos, the research assistants also took pictures of the buffet. Canteen staff provided a written overview of the lunch menu. The card-based payment recorded if participants had a small or large buffet for lunch, the latter included the hot dish of the day. Half an hour after starting lunch, participants completed an online survey rating how varied they found their lunch to have been.

Data were collected in a workplace canteen, which provided lunch buffets for approximately 500 customers on a daily basis. The daily buffet included one hot dish of the day, a salad buffet with both single and mixed salads and bread with different types of toppings to choose from. Buffet lunches gave participants the opportunity to compose varied kinds of lunches but participants had no influence on the buffet menu.

Before the participants made their lunch choices, a background survey was distributed consisting of questions related to demographic characteristics, different types of eating styles as well as general food and meal patterns.

## **Measurements**

Five categories of objective variety were coded from lunch pictures: the number of meal components, food groups, and different colours, sizes and shapes on the meal plate (Table 2).

Before coding the individual lunch pictures, each component on the buffet was pre-coded in terms of food groups represented; this was based on the information from the menu overview and buffet pictures. The pre-coding was of particular interest as regard complex dishes where various food

groups were present but not always visible on the plate. Coding of each lunch picture was performed in accordance with the pre-coding, unless the food group was clearly lacking, for instance, due to a limited portion size.

The meal components were coded as the number of separate dishes (equivalent to the buffet offerings) on the plate. The coding of types of food was based on information from the lunch photo, buffet photo and menu plan. Even if an ingredient (e.g. nuts or fruit in salad) was not visible in the lunch photo, it was coded as present if listed in the menu and/or in buffet photo – unless the portion was so small that it was obvious that the ingredient was not present. Food types can thus be derived from either being a complete dish (=component, e.g. boiled potatoes) or part of a dish (e.g. potatoes in mayonnaise sauce). Vegetables were further divided into several subcategories as they contain a wide range of sensory variability. Shapes are defined as cuts produced in the kitchen as part of food preparation. The food groups, colours, sizes and shapes represented in the meal were coded as binary measures; “0” indicates that, for instance, that the meal contained no red meat and “1” indicates that red meat was contained in the meal. In each of the categories, the total number of subcategories contained in the meal represented an objective measure of variety degree.

*Table 2: Coding categories of objective measures of meal variety*

<b>Categories</b>	<b>Subcategories</b>
Components	Hot components, cold components, bread, soup
Food groups	Red meat, poultry, fish, egg, legumes & lentils, nuts & seeds, leafy vegetable, root vegetables, cabbage vegetables, pickled vegetables, other vegetables, fruit, potatoes, rice & grains, pasta, pastry & similar, gravy & sauces, dressing incl. mayonnaise, other condiments, cheese, dessert & sweets, other foods
Colours of food	Green, yellow, orange, red, pink, purple, beige, brown, white, grey, black, other colours.
Food item sizes	Mashed, small particles, bite-size pieces, big chunks, large/whole pieces or slices.
Food shapes	Grated, sliced, cube, oblong, triangular, wedge, half, whole/uncut

Subjective variety for each meal was rated in a survey gathered about 30 minutes after starting the lunch; the survey used a seven-point scale from “not at all varied” to “very varied”. The decision-making rules describing the importance of variety when compiling meals from a buffet was measured with 14 items in the background survey (Table 3). Items were rated on a seven-point scale varying from “strongly disagree” to “strongly agree”. Individual eating styles such as the Food Neophobia Scale (Pliner & Hobden, 1992) and a shortened version of the Three-Factor Eating Questionnaire including cognitive restraint, uncontrolled eating and emotional eating (Karlsson, Persson, Sjöström, & Sullivan, 2000) were included in a background survey. The level of food neophobia among participants was generally low, however the distribution shows a range of consumers who vary in their level of food neophobia. The same applies for uncontrolled and

restraint eating as means were in the middle of the scale with relative normal distributions. The level of emotional eating was low so this variable was omitted from further analysis.

*Table 3: Construct overview of decision-making rules and individual eating styles*

<b>Decision-making rules<sup>1</sup></b>	<b>Mean</b>	<b>STD</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>	<b>Factor 4</b>
The rule of sensory properties (Cronbach's $\alpha = 0.82$ )	3.67	1.34				
<b>Dishes that match visually</b>	3.01	1.60	.650			
<b>Dishes with many different colours</b>	3.32	1.81	.589			
<b>Dishes where tastes fit together</b>	4.14	1.50	.642			
<b>Dishes with many different tastes incl. salt, sour, sweet, bitter</b>	3.83	1.67	.764			
Dishes with different flavours	4.85	1.29	.798			
The rule of maximizing mouthfeel (Cronbach's $\alpha = 0.59$ )						
Dishes where the texture of the foods are different	3.24	1.71		.741		
Dishes with many different forms and shapes	2.79	1.46		.782		
Dishes that are hot and others that are cold	3.23	1.69		.450		
The rule of many dishes (Cronbach's $\alpha = 0.74$ )	4.58	1.27				
<b>Few but special dishes (reversed)</b>	4.99	1.58			.720	
<b>As many dishes as possible</b>	4.17	1.71			.808	
Dishes that I know and others that are new to me	5.02	1.53			.639	
The rule of nutrition (Cronbach's $\alpha = 0.64$ )	4.80	1.48				
<b>Some dishes that are satiating for a long time</b>	5.11	1.56				.836
<b>Dishes with a proper mixture of carbohydrates, protein and fat</b>	4.39	1.81				.670
Dishes that have been cooked and others that are raw	4.22	1.78				.712
<b>Individual eating styles</b>						
Food neophobia (Cronbach's $\alpha = 0.70$ )	2.38	0.95				
Cognitive restraint (Cronbach's $\alpha = 0.76$ )	2.34	0.63				
Uncontrolled eating (Cronbach's $\alpha = 0.83$ )	2.18	0.57				
Emotional eating (Cronbach's $\alpha = 0.85$ )	1.65	0.75				

<sup>1</sup>Note that bold items are included in the final model.

## Data analysis

A principal component analysis was conducted in SPSS Statistics version 21 (IBM Corp, 2012) to explore the data structure of the decision-making rules. The internal consistency reliability of each subscale was examined using Cronbach's alpha. This was followed by a confirmatory factor analysis conducted in R Studio to test whether the data fit the conceptual model. The first model was based on the principal component analysis consisting of four factors i.e. the four decision-making rules and 14 items. The rule of sensory properties covers decisions based on choosing sensory balanced meals related to the appearance and taste of the dishes. The rule of maximizing mouthfeel covers decisions that are related to the physical sensations in the mouth such as food texture, temperature and different food shapes. The rule of having many dishes is about maximizing the number of dishes on the plate. The rule of nutrition covers decisions related to the nutritional composition of the meal providing optimal functional consequences. The four different decision-making rules were conceptualized as correlated factors.

The first model had reasonable but not "acceptable" fit indices when running the confirmatory factor analysis. The following fit indices were used to determine model fit; Goodness of Fit Index (GFI)  $\geq 0.90$  (Byrne, 1994); the Bentler Comparative Fit Index (CFI)  $\geq 0.93$  (Byrne, 1994); the Root Mean Square Error of Approximation (RMSEA)  $\leq 0.08$  (McDonald & Ho, 2002) and the Standardized Root Mean Square Residual (SRMR)  $\leq 0.08$  (Hu & Bentler, 1999).

To improve model fit, one factor consisting of three items (temperature, texture and shape) was omitted due to low internal consistency (Cronbach's alpha = 0.59) and high correlation with other items. Moreover, two items were omitted due to low factor loadings in the confirmatory factor analysis (new = 0.22 and raw = 0.33) and one item was dropped due to redundancy between items related to flavour and different tastes (flavour was omitted). The final model had three factors and

nine items (Table 3), which resulted in an overall acceptable model fit; GFI = 0.93; CFI = 0.97; RMSEA = 0.07 and SRMR = 0.07.

Linear mixed modelling was used to analyse the repeated part of the data structure by means of the statistical program R Studio (R Core Team, 2014) using the lme4 package (Bates, Maechler, Bolker, & Walker, 2014; Kuznetsova, Brockhoff, & Christensen, 2015). This approach was adopted as it takes into account that the same participant rated several meals over a period of time by modelling each meal as a separate event organised in groups by the date of the meal occasion and by a unique participant id number. Linear regression analysis and descriptive statistics were conducted in SPSS Statistics version 21 (IBM Corp, 2012).

## Results

### **The relationship between objective and subjective meal variety**

In general participants perceived their meals to be relatively varied, with a mean of 5.1 on a seven-point scale (Table 4). Participants chose on average 6.3 components of 16 different components, the number typically available at the lunch buffet corresponding to 38 percent of the dishes available.

*Table 4: Construct overview for subjective and objective measures of meal variety*

<b>Construct</b>	<b>Mean</b>	<b>Std. deviation</b>
Subjective variety with the meal	5.07	1.27
Components at the buffet	16.45	2.26
Components	6.30	1.96
Food groups	8.74	2.27
Colours of food	6.76	1.52
Food item sizes	3.49	0.71
Food shapes	3.50	1.00

As could be expected, the number of food groups in the meal was strongly associated with the number of components in the meal (Tables 5 and 6), as were the associations between the number of food groups in the meal and the objective measures of meal variety including colours, sizes and shapes of the food.

Subjective variety was only weakly associated with the objective measures of variety. The number of components, number of food groups, and number of colours present in the meal had low positive correlations with subjective variety (Table 5), but when all these measures were entered into a linear mixed model analysis only the number food groups had marginally significant positive association with subjective variety (Table 6).

Table 5: Correlation matrix (Pearson correlation)

Measure	Subjective meal variety	Number of components	Number of food groups	Colours of food	Food item sizes	Food shapes
Subjective meal variety	1					
Number of components	.133**	1				
Number of food groups	.173**	.643**	1			
Colours of food	.166**	.558**	.462**	1		
Food item sizes	.076	.458**	.333**	.348**	1	
Food shapes	.013	.453**	.328**	.317**	.282**	1

\*\* Correlation is significant at the 0.01 level

Table 6: The role of objective measures of meal variety on subjective meal variety

Dependent variable	Predictor variable	B	95% CI
<i>Linear mixed model analysis:</i>			
Food groups	Components	0.12***	[0.11;0.13]
Colours of food		0.60***	[0.49;0.70]
Food item sizes	Food groups	0.47***	[0.35;0.60]
Food shapes		0.37***	[0.27;0.47]
Subjective variety	Components	-0.02	[-0.31;0.27]
	Food groups	1.02*	[0.005;2.04]
	Colours of food	0.49	[-0.37;1.35]
	Food item sizes	0.31	[-0.37;1.00]
	Food shapes	-0.43	[-1.35;0.49]

\*\*\*  $p < 0.001$

\*  $p < 0.05$

### The role of decision-making rules and individual eating styles

Choice of components describes how participants composed their meals. However, there were no significant associations between the number of components and decision-making rules or individual eating styles when analysed with linear mixed models (Table 7). When controlling for decision-making rules and individual eating styles, the former significant association between subjective meal variety and the number of food groups present in the meal disappeared. Participants using the decision-making rule of having many dishes were more likely to perceive their meals as varied. On the contrary, participants with higher ratings of food neophobia and uncontrolled eating perceived their meals less varied. Moreover, participants rating high on the food neophobia scale were less likely to use the rule of sensory properties when compiling their meals. Uncontrolled eaters tended to use the rule of having many dishes contrary to the cognitive restraint.

Table 7: The role of decision-making rules and individual eating styles on subjective meal variety

Dependent variable	Predictor variable	B	95% CI
<i>Linear mixed model analysis:</i>			
Components	The rule of nutrition	0.01	[-0.84;0.84]
	The rule of sensory properties	0.02	[-0.05;0.08]
	The rule of many dishes	0.03	[-0.05;0.11]
	Food neophobia	-0.04	[-0.18;0.09]
	Cognitive restraint	0.02	[-0.15;0.19]
	Uncontrolled eating	-0.11	[-0.29;0.08]
Subjective variety	Food groups	0.84	[-0.16;1.84]
	The rule of nutrition	0.11	[-0.01;0.23]
	The rule of sensory properties	0.07	[-0.06;0.20]
	The rule of many dishes	0.52***	[0.38;0.66]
	Food neophobia	-0.31*	[-0.56;-0.06]
	Cognitive restraint	-0.06	[-0.38;0.26]
	Uncontrolled eating	-0.48**	[-0.81;-0.15]
<i>Linear regression analysis<sup>1</sup>:</i>		<b>Beta</b>	
The rule of sensory properties	Food neophobia	-0.39***	[-0.95;-0.23]
The rule of many dishes	Cognitive restraint	-0.33***	[-1.26;-0.18]
	Uncontrolled eating	0.41***	[0.21;1.52]

<sup>1</sup>Only significant associations are presented

\*\*\*  $p < 0.001$

\*\*  $p < 0.005$

\*  $p < 0.05$

## Discussion

Variety is often mentioned in nutrition recommendations or referred to as a factor that increases intake of food in meal situations. This study demonstrates that defining variety can be a difficult task, especially in real-life eating situations. In laboratory conditions, variety has been measured as

the number of distinct components and the number of same components replicated (Kahn & Wansink, 2004). When studying simple assortments, a positive association was found between actual variety and perceived variety in laboratory settings, for instance, with multi-coloured M&M's (Kahn & Wansink, 2004). However, in real life situations it is difficult to have such simplified settings as there are strong cultural conventions as to the composition of meals. In this study we tried to define the objective variety as number of components chosen, types of foods on the plate and a number of visual cues related to food characteristics. The relationship between these objective measures and perceived variety was low and it was not possible to replicate the finding from earlier experimental studies.

Variety has also been linked to complexity when components vary on several attributes (Kahn & Wansink, 2004). Similar problems have been found in trying to define factors influencing complexity and measuring perceived complexity (Mielby, Jensen, Edelenbos, & Thybo, 2013). Complexity and variety may overlap in some of the elements they include. Complexity has been defined as “sensations of many tastes and flavours” (Paulsen, Ueland, Nilsen, Öström, & Hersleth, 2012). In this study variety was measured from pictures of meals, which limited the possibility to assess the variability in tastes and flavours. However, if meals vary in taste and flavours, they probably also vary in other sensory attributes and vice versa: in real life a wide variety in components, foods available and visual cues are likely to produce a variety in taste, flavour and mouthfeel.

The weak relationship between perceived variety and the objectively defined variety may be partly contributed to the studied stimuli, namely buffet meals as a buffet is likely to offer more complex sensory characteristics in comparison to clear main course and side dish meals. Due to buffet study set-up, our meals were all rather varied, yet there were clear differences in the degree of perceived

variety and number of components chosen. Very few studies have looked at choices in natural eating environments and partly the limitations of this study are related to choosing to do so. Thus we have meals that are freely chosen from a type of selection that our respondents were used to, they did not have to report explicitly what they chose as the analysis is based on photographs of their meals and there was no attempt to change their behaviour. This study demonstrates that findings from experimental conditions do not always apply in natural settings.

Although not finding a link between objective measures of meal variety and subjective perceived variety may appear surprising, these results may reveal an important aspect of our choice decisions. The analyses of subjective variety and number of components chosen were made at meal level, but when in mixed model analyses the individual eating tendencies are added, these individual factors are associated with subjective variety. This suggests that perception of a meal, which is likely to have a certain level of variety (rather than being obviously monotonous), is likely to depend on the way individuals relate to food in general. Our study suggests that perceptions of variety may be due to some internal factors such as food neophobia and uncontrolled eating. Although the objective number of components is the same, more food neophobic individuals perceive the meal as less varied. The negative link between food neophobia and sensory variety not being important in composing meals is an expected one, but this did not result in objectively different meal variety.

Uncontrolled eating was another individual tendency that was negatively associated with subjective meal variety as well. Those who are likely to be more vulnerable to external cues seem to assess the variety lower in their meals; however, they were more likely to think that choosing many dishes is important in meal choices. Again the eating style is more related to the perception of the meal than actual content. Restraint eaters think that having fewer alternatives on the plate is important, but this does not result in choosing fewer or seeing the meals as less varied. This is in line with earlier

findings as Remick and colleagues (2009) in their review conclude that internal factors such as dietary restraint do not act as a moderator of the variety effect.

By exploring the strategies individuals use when making decisions from a buffet offering in everyday meals and real eating environments, this study contributes to the existing knowledge regarding food choice decisions. When deciding on portion sizes, hedonic aspects of the meal such as liking the food and the expected satiety are important (Yeomans, Blundell, & Leshema, 2004; Brunstrom & Shakeshaft, 2009). Portion sizes may also be determined by habitual behaviour, which may be based on past experience (M. Spence et al., 2013). In this study we found that consumers rate functional properties and having many dishes as important criteria for compiling buffet lunches. This indicates that physiological consequences of eating a satiating and nutritionally balanced meal are important drivers for decisions about what to eat for lunch.

Perhaps the more surprising finding other than the lack of link between objective and subjective variety is that those who think that having many dishes in a meal perceive the meal to be more varied. The results indicate that ‘many dishes’ may be a relative term – if one’s aim is to go for many dishes, more variety is found within the meal, regardless of the actual number of components on the plate. Moreover, decisions seem to be linked with both having familiar dishes and some new and unknown dishes for lunch. When consumers make decisions, they may use heuristics, i.e. rules of thumb based on mental shortcuts, to make quick decisions. For instance, it has been found that a simple heuristic such as judging only one attribute compared to more complex heuristics of weighing different attributes, are sufficient to explain food choices (Scheibehenne, Miesler, & Todd, 2007; Schulte-Mecklenbeck, Sohn, de Bellis, Martin, & Hertwig, 2013). Some heuristics are related attributes such as the size of the plate (Brunstrom, 2011; Van Ittersum & Wansink, 2012),

food volume (Keenan, Brunstrom, & Ferriday, 2015) and range of assortment (Kahn & Wansink, 2004).

Our study has some limitations and strengths. As mentioned earlier, the study was carried out in a real-life eating environment without manipulating participants or the environment. The downside of this approach is that we have a relatively small number of relatively well-educated participants in our study. The buffet offerings were also of high quality providing a number of options thus not allowing a study of meals with very low variety. This again is likely to be the situation in real-life food choices: many Danish lunch canteens offer these types of meals.

## **Conclusion**

In a real-life eating situation subjective meal variety was more associated with the way people make decisions about choices or relate to food in general than to the objective measures of variety, such as number of components or number of foods offered. The strategy of having many dishes increased perceived variety even when it did not increase the number of components chosen. Food neophobia and uncontrolled eating were linked with lower perceived variety suggesting that these tendencies are important in the way we interpret our own food choices, but not necessarily to the choices we make.

## **Acknowledgement**

The study is conducted as a part of the Senswell project, which is funded by Innovation Fund Denmark (grant no. 0603-00418B).

## References

- Bates, D., Maechler, M., Bolker, B. M., & Walker, S. (2014). lme4: Linear mixed-effects models using Eigen and S4. R package version 1.1-7. Retrieved from <http://CRAN.R-project.org/package=lme4>
- Brondel, L., Romer, M., Van Wymelbeke, V., Pineau, N., Jiang, T., Hanus, C., & Rigaud, D. (2009). Variety enhances food intake in humans: Role of sensory-specific satiety. *Physiology & Behavior, 97*(1), 44-51.
- Brunstrom, J. M. (2011). The control of meal size in human subjects: a role for expected satiety, expected satiation and premeal planning. *Proceedings of the Nutrition Society, 70*(02), 155-161.
- Brunstrom, J. M., & Shakeshaft, N. G. (2009). Measuring affective (liking) and non-affective (expected satiety) determinants of portion size and food reward. *Appetite, 52*(1), 108-114.
- Byrne, B. M. (1994). *Structural equation modeling with EQS and EQS/Windows: Basic concepts, applications, and programming*. Thousand Oaks: Sage Publications.
- Epstein, L. H., Robinson, J. L., Roemmich, J. N., Marusewski, A. L., & Roba, L. G. (2010). What constitutes food variety? Stimulus specificity of food. *Appetite, 54*(1), 23-29.
- Hetherington, M. M., Anderson, A. S., Norton, G. N. M., & Newson, L. (2006). Situational effects on meal intake: A comparison of eating alone and eating with others. *Physiology & Behavior, 88*(4-5), 498-505.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.
- Hurling, R., & Shepherd, R. (2003). Eating with your eyes: effect of appearance on expectations of liking. *Appetite, 41*(2), 167-174.

- IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.
- Kahn, B. E., & Wansink, B. (2004). The influence of assortment structure on perceived variety and consumption quantities. *Journal of Consumer Research*, 30(4), 519-533.
- Karlsson, J., Persson, L. O., Sjöström, L., & Sullivan, M. (2000). Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. *International Journal of Obesity & Related Metabolic Disorders*, 24(12), 1715.
- Keenan, G. S., Brunstrom, J. M., & Ferriday, D. (2015). Effects of meal variety on expected satiation: Evidence for a 'perceived volume' heuristic. *Appetite*, 89, 10-15.
- Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2015). lmerTest: Tests in Linear Mixed Effects Models. R package version 2.0-25. Retrieved from <http://CRAN.R-project.org/package=lmerTest>
- Levitsky, D. A., Iyer, S., & Pacanowski, C. R. (2012). Number of foods available at a meal determines the amount consumed. *Eating Behaviors*, 13(3), 183-187.
- McCrary, M. A., Burke, A., & Roberts, S. B. (2012). Dietary (sensory) variety and energy balance. *Physiology & Behavior*, 107(4), 576-583.
- McDonald, R. P., & Ho, M.-H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, 7(1), 64.
- Meiselman, H. L., deGraaf, C., & Leshner, L. L. (2000). The effects of variety and monotony on food acceptance and intake at a midday meal. *Physiology & Behavior*, 70(1-2), 119-125.
- Mielby, L. H., Jensen, S., Edelenbos, M., & Thybo, A. K. (2013). An approach to measuring adolescents' perception of complexity for pictures of fruit and vegetable mixes. *Journal of Sensory Studies*, 28(1), 66-75.

- Paulsen, M. T., Ueland, Ø., Nilsen, A. N., Öström, Å., & Hersleth, M. (2012). Sensory perception of salmon and culinary sauces – An interdisciplinary approach. *Food Quality and Preference*, 23(2), 99-109.
- Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite*, 19(2), 105-120.
- R Core Team (2014). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>.
- Remick, A. K., Polivy, J., & Pliner, P. (2009). Internal and external moderators of the effect of variety on food intake. *Psychological Bulletin*, 135(3), 434-451.
- Rolls, B. J., Rowe, E. A., Rolls, E. T., Kingston, B., Megson, A., & Gunary, R. (1981). Variety in a meal enhances food intake in man. *Physiology & Behavior*, 26(2), 215-221.
- Rozin, P., & Markwith, M. (1991). Cross-domain variety seeking in human food choice. *Appetite*, 16(1), 57-59.
- Scheibehenne, B., Miesler, L., & Todd, P. M. (2007). Fast and frugal food choices: Uncovering individual decision heuristics. *Appetite*, 49(3), 578-589.
- Schulte-Mecklenbeck, M., Sohn, M., de Bellis, E., Martin, N., & Hertwig, R. (2013). A lack of appetite for information and computation. Simple heuristics in food choice. *Appetite*, 71, 242-251.
- Spence, C., Levitan, C. A., Shankar, M. U., & Zampini, M. (2010). Does food color influence taste and flavor perception in humans? *Chemosensory Perception*, 3(1), 68-84.
- Spence, M., Livingstone, M. B., Hollywood, L. E., Gibney, E. R., O'Brien, S. A., Pourshahidi, L. K., & Dean, M. (2013). A qualitative study of psychological, social and behavioral barriers to appropriate food portion size control. *International Journal of Behaviour Nutrition Physical Action*, 10(1), 92-101.
- Van Ittersum, K., & Wansink, B. (2012). Plate size and color suggestibility: The Delboeuf illusion's bias on serving and eating behavior. *Journal of Consumer Research*, 39(2), 215-228.

Wadhwa, D., & Capaldi-Phillips, E. D. (2014). A review of visual cues associated with food on food acceptance and consumption. *Eating Behaviors, 15*(1), 132-143.

Weiss, R., Feinstein, A. H., & Dalbor, M. (2004). Customer satisfaction of theme restaurant attributes and their influence on return intent. *Journal of Foodservice Business Research, 7*(1), 23-41.

Yeomans, M. R., Blundell, J. E., & Leshema, M. (2004). Palatability: response to nutritional need or need-free stimulation of appetite? *British Journal of Nutrition, 92* S3-S14.

Zellner, D. A. (2013). Color–odor interactions: A review and model. *Chemosensory Perception, 6*(4), 155-169.

Zellner, D. A. (2014). It tastes as good as it looks! The effect of food presentation on liking for the flavor of food. *Appetite, 77*, 31-35.



## **9. Conclusion**

This thesis contributes to a better understanding of the concept of meal satisfaction from a consumer point of view; also it provides increased knowledge about the various factors contributing to meal satisfaction. Improved understanding of the concept of meal satisfaction and the factors contributing to meal satisfaction gives a deeper insight into the drivers of consumers' food and meal-related choices and behaviour. These study shows that consumer satisfaction with meals is a multidimensional concept which is affected by several food-related factors as well as personal and situational factors. Consumers perceive meal satisfaction as a holistic experience integrating the sensory experience of food, physiological consequences of eating, and the social and physical environment of the meal. Satisfying meal experiences, which include eating a high quality meal in a socially pleasant environment, contribute to increased mental and physical well-being. Moreover, it is important to mention that consumers do not view meals as single events; however, meal experiences are linked with short and long-term eating behaviour and goal attainment. When consumers succeed in eating according to their short and long-term goals, they are more satisfied with their meal-related choices and behaviour. A meal should by definition not be considered as an isolated event.

The Expectancy-Disconfirmation Theory (Oliver, 2010) was used as a theoretical foundation to explain the meal satisfaction formation process. However, the disconfirmation paradigm is built on the prerequisite of judging experiences against expectations. In our second study, participants were able to express expectations about the quality of the food, anticipated sensory experiences and immediate physiological outcome; however, few expectations about the social and ambience-related factors in achieving short-term goals were stated. The results thereby challenge the applicability of the Expectation-Disconfirmation paradigm in

explaining holistic meal satisfaction including alignment with long-term goals, which were more or less absent in our study. There is a risk of producing very narrow views of meal satisfaction if meal satisfaction is solely based on expressed meal-related expectations. Although the Expectancy-Disconfirmation paradigm may have limited value in the context of studying real-life meal experiences, it is likely to be useful in more conventional applications such as satisfaction with food products. The Expectancy-Disconfirmation approach is valuable in explaining how concrete attributes of the core product (the food) contribute to meal satisfaction; however when it comes to psychological and social interaction and its influence on meal satisfaction, the disconfirmation theory seems to fail.

### **9.1 Contribution of each research paper**

The first research paper (*chapter 5*) provides a vocabulary that consumers use to describe meal (dis)satisfaction, and it contributes insight into the various factors that potentially contribute to meal satisfaction. Context had little impact on the broad themes that were associated with satisfaction and dissatisfaction, but there were differences in the words associated with different contexts. Satisfaction seems to be the norm creating mainly descriptive associations whereas negative experiences create re-collectable emotional reactions, e.g. by means of behavioural actions. The results showed that food-related associations were rather dominant in describing meal (dis)satisfaction and were mentioned in connection with positive and negative meal experiences. Surroundings and ambience were predominantly linked with delight which underpins the earlier findings on the importance of the situational context in consumers' experience of meals consumed outside home (see Edwards & Gustafsson, 2008 for a review; King et al., 2004; Namkung & Jang, 2008). In addition to physical surroundings and ambience, the social context in general, and especially company, seems to be linked with delightful meal experiences, but there is very little

difference between lunch and dinner, or whether the meal is eaten at home or outside home. Surprisingly, meal associations related to emotions and physiological sensation were more often related to disappointing than delightful meals. Apart from trivial association with the word 'disappointing', also sadness, frustration, stress and loneliness were related to disappointing meals. This suggests that negative experiences create stronger emotional reactions, which may be due to the fact that they deviate from the expected. In addition to emotional responses, feeling hungry or low satiety after the meal were associated with disappointment: again these were expressed more in relation to dissatisfaction than satisfaction suggesting that disappointment represents a deviation from the expected. Another interesting finding related to dissatisfaction was that it produced a number of behavioural associations: what to do to avoid a negative experience in the future both at home and when eating outside home. These behavioural strategies included complaining, leaving and not returning to the specific place in question when eating out, strategies related to food preparation and shopping practices when experiencing disappointment at home.

The second research paper (*chapter 6*) contributes improved insight into how consumers' meal-related expectations and experiences in a real-life environment are reflected in meal satisfaction. One of the main findings was that consumers view meal satisfaction as a holistic experience integrating sensory and quality aspects of the food served, the physiological outcome as well the social and physical environment including ambience and level of service. Accordingly meal satisfaction can be defined as a multidimensional concept. An important insight retrieved from this study is that consumers link both short and long-term goals with meal satisfaction. By providing satisfaction with several food-related, personal and situational in the actual eating situation, meal satisfaction can be viewed as a goal in itself. However, meal satisfaction also contributes to long-term goal achievements related to

a healthy and happy life. Consumers found that the higher levels of satisfaction could be reached with an alignment of short and long-term goals. Moreover, the results challenge the applicability of the Expectancy-Disconfirmation paradigm in explaining holistic meal satisfaction. The disconfirmation paradigm is built on the prerequisite of judging experiences against expectations. However, we found that expectations of food quality, anticipated sensory experiences and immediate physiological outcome were expressed but to a much lesser extent so of the social and ambience-related factors related to short-term goals. The results suggest that examining meal satisfaction purely on factors that are expressed as expectations would produce a very narrow view on meal satisfaction and would oversimplify consumer experience (King, 2007; King et al., 2004). Consequently, when studying meal satisfaction in real-life environments, it is very important to identify the expectations which the experience is reflected against.

The third research paper (*chapter 7*) offers knowledge about the relative roles of various food-related, personal and situational factors contributing to meal satisfaction across several meal occasions in consumers' own eating environment. Moreover, the study also provides knowledge about the outcome of meal satisfaction. Findings suggest that a positive eating ambience and a positive evaluation of both the quality of the food eaten and the buffet assortment contribute to meal satisfaction; however the energy content of the meal did not contribute to meal satisfaction. A positive mood before lunch, a positive evaluation of the buffet assortment and mindful eating contribute to the perceived food quality; however, food quality was not associated with hunger level before lunch. Time available for lunch, mindful eating and eating with close colleagues were positively associated with perceived ambience. Additionally, meal satisfaction was associated with a more positive mood, lower hunger level as well as feeling less busy and stressed after lunch. Despite the fact that overall meal

satisfaction was not linked with the energy content of the meal, the higher satisfaction was associated with greater feelings of satiety after consumption. These findings support the role of meal satisfaction in promoting overall well-being without causing overeating. Moreover, the finding suggests that buffet meals, as a part of an everyday option, do not induce overeating although food quality (including ratings of perceived variety) is perceived as high. This is contrary to earlier findings as in experimental situations, variety is known to increase the amount of food eaten (Raynor & Epstein, 2001; Wansink, 2004).

The fourth research paper (*chapter 8*) contributes increased knowledge about consumers' perception of variety and the food decision-making that underlies compiling varied meals from self-selected buffets. Results show that subjective variety was marginally associated with the number of food groups, but there was no association with other objective measures, such as number of components chosen from the buffet or any of the visual cues of the meal. This finding implies that subjective meal variety is difficult to measure. However, subjective meal variety was associated with the decision-making rule of having many dishes when compiling buffet lunches. Participants with higher scores on uncontrolled eating and food neophobia were found to perceive their meals less varied than those with lower scores. Moreover, the rule of having many dishes was positively associated with uncontrolled eating and negatively associated with cognitive restraint. The results suggest that consumers' perception of meal variety seems to be linked more to their idea of how to compose their meal and is dependent on the way individuals relate to food in general i.e. individual eating tendencies rather than the objective measures. By exploring the strategies individuals use when making decisions from a buffet offering in everyday meals and real eating environments, this study contributes to the existing knowledge regarding food choice decisions. In this study we found that consumers rate functional properties and having many

dishes as important criteria for compiling buffet lunches. This indicates that physiological consequences of eating a satiating and nutritionally balanced meal are important drivers for decisions about what to eat for lunch. The results indicate that ‘many dishes’ may be a relative term – if one’s aim is to go for many dishes, more variety is found within the meal, regardless of the actual number of components on the plate.

## **9.2 Limitations**

One of the limitations of this thesis relates to the criteria that participants had to have canteen lunches on the day of collecting data (in research papers 2, 3 and 4). This could cause limitations in the insight gained related to dissatisfying meals. As found in study 1, meal dissatisfaction was significantly more often associated with behaviour-related strategies to avoid dissatisfaction in future meal experiences, such as finding alternatives or not returning. Recruiting participants who were canteen meal customers may have led to exclusion of consumers who are very dissatisfied with the canteen offering, as they may have deselected canteen meals overall and found an alternative such as bringing their own lunch. However, participants that do not buy canteen meals are probably satisfied with their current choice of meal and consequently including those in the study would not have contributed to a better understanding of meal dissatisfaction. In the interview study, participants who did not use the canteen offerings could have been part of the study, although the insights gained would then have related to past experiences, i.e. exploring why they did not consume canteen meals, which was not the scope of this study. In research paper 3, however, differences in the level of satisfaction could be found and data from the same individuals assess how satisfaction differs from one day to the next.

Participants furthermore knew which day they were to take part in a study reporting on meal experience and satisfaction, which is especially relevant for results found in research paper 2 and research paper 3. In research paper 2 participants were aware that after lunch they would be interviewed about their meal experience that day, which might have influenced food choices and experience. Moreover, in research paper 3 participants were also aware before lunch that they had to fill out a survey about their meal experience after lunch, which might also influence food choices and behaviour. Moreover, it may have biased results that participants themselves could choose which day they wanted to participate; thus there might be some special occasions where participants chose to participate or chose not to. For instance, participants may choose to participate on a day where they had surplus in energy or knew that they would have the time to participate.

When studying consumers' everyday meals in a real-life environment, it poses some limitations as a number of factors are beyond control. Everyday meal situations take place in a certain location, but several situational factors vary from one day to the next. Moreover, a real-life environment decreases the possibility of controlling respondents' behaviour. The majority of respondents followed the study instructions most of the time, but delays in responding to some of the post-lunch surveys is likely to cause variation. However, studying consumers in their natural environment increases external validity of findings.

Another limitation is that meal satisfaction and the factors contributing to meal satisfaction were explored with canteen meals in a work environment. The results from these studies may or may not be applicable in other contexts. What speaks in favour of high applicability is that the same food-related, personal and situational factors seem to be relevant for consumers describing satisfactory and dissatisfactory meals (research paper 1 and 2) and that

context factors seemed to have relatively limited influence on the overall category level (research paper 1).

### **9.3 Implications**

The results from this thesis have implications for stakeholders in the catering and restaurant industry, workplace management as well for food policy making. Catering companies should be aware that the food-related factors are very important for meal satisfaction, but personal and situational factors also affect meal satisfaction, and changing these may be beyond their control. Catering companies and restaurants conducting consumer satisfaction analyses should be aware of how consumers define meal satisfaction including the attributes that determine whether the meal experience provides satisfaction or not.

Both the catering and restaurant industries need to be aware that meal satisfaction is related to more than the meals per se and includes several non-food factors such as ambience and social context. Restaurants seem to be aware of this and try to provide a cosy ambience, an enjoyable social context and a pleasant physical environment (Andersson & Mossberg, 2004; Lin, 2010; Ryu & Han, 2011). Workplace caterers also have the possibility of influencing the ambience by modifying the eating environment.

Meal satisfaction is associated with having time available for lunch. Time available for lunch is likely to be partly defined by the workload, but the informal culture of a workplace can also play a significant role in how important lunch is in a working day. From a managerial perspective, encouraging employees to take clear meal breaks and supporting social interaction during meals can contribute to meal satisfaction and thereby to improve the general workplace well-being. At workplaces this could mean ensuring norms that favour adequate time for lunch.

Consumers' perceptions of meal variety were not associated with objective measures of variety. These results are applicable for the catering industry and policy makers. The catering industry is interested in satisfied customers, and perceived variety has been found to be associated with meal satisfaction (Bell et al., 1994). The catering industry should be aware that offering a multi-dish buffet does not lead to high variety in their customers' perceptions nor does a buffet which includes a varied assortment regarding the visual appearance of the dishes such as colours, food sizes and cuts.

Food policy makers should be aware that consumers' meal satisfaction with daily workplace lunches is not driven by physiological needs, such as hunger. Instead the quality of the food, including an assessment of tastiness, variety and wholesomeness of the meal, contributed to the satisfaction independently of the energy content. Under the assumption that the options available in the buffet assortment are mainly nutritionally decent, providing satisfaction with the meal does not lead to over consumption in an everyday situation; however, it seems to support perceived satiety. This insight could be beneficial when communicating and promoting health-related messages. For instance, dietary recommendations might include an element of meal-related satisfaction and enjoyment of eating to motivate the population to follow the guidelines.

#### **9.4 Future research**

The focus of this thesis was closely related to workplace buffet meals. However, workplace lunches can vary as the canteen may serve a dish of the day instead of offering a buffet option. This may affect consumer perception of food quality among other determinants and thereby meal satisfaction. Moreover, another option is that employees bring their own food for lunch, which may also influence the meal experience and thereby satisfaction. Future

research could include those different kinds of lunches at work to give a better understanding of how different types of meals influence satisfaction with workplace meals.

In this thesis several different workplaces are included in the study of meal satisfaction; however there are some similarities as the workplaces broadly require a relatively high level of education. In future studies it could be interesting to explore meal satisfaction across different types of workplaces and industries. For instance, workers at a manufacturing company may have a different view of a quality meal compared to employees with a more sedentary job, because of cultural differences as well as different levels of demands in calories.

There was a relatively high level of general satisfaction with the meals consumed at the different workplaces included in this thesis. At the same time it was possible to detect different levels of satisfaction across lunches and possible determinants that lead to meal dissatisfaction. However, in future studies it could be interesting to visit workplaces where employees are clearly dissatisfied with their lunches, which will give broader insights into the concept and determinants of meal dissatisfaction with workplace meals.

This thesis gives deep and broad insight into the concept of workplace meal satisfaction, how various situational, personal and food-related factors influence the level of meal satisfaction and how meal satisfaction interacts with consumers' short and long-term goals. However, more research is needed in terms of how workplace meal satisfaction affects job effectiveness, employee/job satisfaction and the overall company brand, as these are important parameters to attract and keep valuable employees.

## References

- Ahlawat, K. S., & Subbarini, M. (1988). Gender and the subjective meaning of health: An integrated approach. *Quality & Quantity*, 22(2), 151-165.
- Allison, D. B., Allison, D. B., & Baskin, M. L. (2009). *Handbook of assessment methods for eating behaviors and weight-related problems: measures, theory, and research*: Sage.
- Andaleeb, S. S., & Conway, C. (2006). Customer satisfaction in the restaurant industry: an examination of the transaction-specific model. *Journal of Services Marketing*, 20 (1), 3 - 11.
- Andersson, D. T., & Mossberg, L. (2004). The dining experience: do restaurants satisfy customer needs? *Food Service Technology*, 4(4), 171-177.
- Auvray, M., & Spence, C. (2008). The multisensory perception of flavor. *Consciousness and Cognition*, 17(3), 1016-1031.
- Bell, R., Meiselman, H. L., Pierson, B. J., & Reeve, W. G. (1994). Effects of adding an Italian theme to a restaurant on the perceived ethnicity, acceptability, and selection of foods. *Appetite*, 22(1), 11-24.
- Bell, R., & Pliner, P. L. (2003). Time to eat: the relationship between the number of people eating and meal duration in three lunch settings. *Appetite*, 41(2), 215-218.
- Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., & Devine, C. M. (2007). Dimensions of everyday eating and drinking episodes. *Appetite*, 48(2), 218-231.
- Blake, C. E., Bisogni, C. A., Sobal, J., Devine, C. M., & Jastran, M. (2007). Classifying foods in contexts: How adults categorize foods for different eating settings. *Appetite*, 49(2), 500-510.
- Blanck, H. M., Yaroch, A. L., Atienza, A. A., Yi, S. L., Jian Zhang, & Mâsse, L. C. (2009). Factors influencing lunchtime food choices among working americans. *Health Education & Behavior*, 36(2), 289-301.
- Boelsma, E., Brink, E. J., Stafleu, A., & Hendriks, H. F. J. (2010). Measures of postprandial wellness after single intake of two protein-carbohydrate meals. *Appetite*, 54(3), 456-464.

- Brondel, L., Romer, M., Van Wymelbeke, V., Pineau, N., Jiang, T., Hanus, C., & Rigaud, D. (2009). Variety enhances food intake in humans: Role of sensory-specific satiety. *Physiology & Behavior, 97*(1), 44-51.
- Brown, L., Edwards, J., & Hartwell, H. (2013). Eating and emotion: focusing on the lunchtime meal. *British Food Journal, 115*(2), 196-208.
- Brunstrom, M. J., Collingwood, J., & Rogers, J. P. (2010). Perceived volume, expected satiation, and the energy content of self-selected meals. *Appetite, 55*(1), 25-29.
- Brunstrom, M. J., & Shakeshaft, G. N. (2009). Measuring affective (liking) and non-affective (expected satiety) determinants of portion size and food reward. *Appetite, 52*(1), 108-114.
- Brunstrom, M. J., Shakeshaft, G. N., & Alexander, E. (2010). Familiarity changes expectations about fullness. *Appetite, 54*(3), 587-590.
- Cardello, V. A. (2000). Predictors of food acceptance, consumption and satisfaction in specific eating situations. *Food Quality and Preference, 11*(3), 201-216.
- Cardello, V. A., Schutz, H., Snow, C., & Leshner, L. (2000). Predictors of food acceptance, consumption and satisfaction in specific eating situations. *Food Quality and Preference, 11*(3), 201-216.
- de Castro, J. M., Brewer, E. M., Elmore, D. K., & Orozco, S. (1990). Social facilitation of the spontaneous meal size of humans occurs regardless of time, place, alcohol or snacks. *Appetite, 15*(2), 89-101.
- Desmet, P. M. A., & Schifferstein, H. N. J. (2008). Sources of positive and negative emotions in food experience. *Appetite, 50*(2-3), 290-301.
- Drummond, S., Crombie, N., & Kirk, T. (1996). A critique of the effects of snacking on body weight status. *European journal of clinical nutrition, 50*(12), 779-783. Retrieved from <http://ukpmc.ac.uk/abstract/MED/8968697>
- Edwards, J. S. A., & Gustafsson, I.-B. (2008). The room and atmosphere as aspects of the meal: a review. *Journal of Foodservice, 19*(1), 22-34.

- Edwards, J. S. A., Meiselman, H. L., Edwards, A., & Leshner, L. (2003). The influence of eating location on the acceptability of identically prepared foods. *Food Quality and Preference*, 14(8), 647-652.
- Epstein, L. H., Robinson, J. L., Roemmich, J. N., Marusewski, A. L., & Roba, L. G. (2010). What constitutes food variety? Stimulus specificity of food. *Appetite*, 54(1), 23-29.
- Forde, C. G. (2013). Texture and savoury taste influences on food intake in a realistic hot lunch time meal. *Appetite*, 60(1), 180-186.
- Fornell, C. (1992). A national customer satisfaction barometer: The Swedish experience. *Journal of Marketing*, 56(1), 6-21.
- Fornell, C., & Wernerfelt, B. (1987). Defensive marketing strategy by customer complaint management: A theoretical analysis. *Journal of Marketing Research*, 24(4), 337-346.
- Fornell, C., & Wernerfelt, B. (1988). A model for customer complaint management. *Marketing Science*, 7(3), 287-298.
- Giese, J. L., & Cote, J. A. (2000). Defining consumer satisfaction. *Academy of Marketing Science Review*, 2000(1).
- Groth, M. V., Sørensen, M. R., Biloft-Jensen, A., Matthiessen, J., Kørup, K. and Fagt, S. (2009). Danes' meal habits, attitudes, motivations and barriers to healthy eating 1995-2008. *National Food Institute, Department of Nutrition*.
- Grunert, K. G., Dean, M., Raats, M. M., Nielsen, N. A., & Lumbers, M. (2007). A measure of satisfaction with food-related life. *Appetite*, 49(2), 486-493.
- Haistead, D., Hartman, D., & Schmidt, S. (1994). Multisource effects on the satisfaction formation process. *Journal of the Academy of Marketing Science*, 22(2), 114-129.
- Hetherington, M. M., Anderson, A. S., Norton, G. N. M., & Newson, L. (2006). Situational effects on meal intake: A comparison of eating alone and eating with others. *Physiology & Behavior*, 88(4-5), 498-505.

- Hinton, E. C. (2013). Using photography in 'the restaurant of the future'. A useful way to assess portion selection and plate cleaning? *Appetite*, 63, 31-35.
- Hurling, R., & Shepherd, R. (2003). Eating with your eyes: effect of appearance on expectations of liking. *Appetite*, 41(2), 167-174.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), 14-26.
- Justesen, L. (2014). Understanding hospital meal experiences by means of participant-driven-photo-elicitation. *Appetite*, 75, 30-39.
- Kim, W. G., Ng, C. Y. N., & Kim, Y.-s. (2009). Influence of institutional DINESERV on customer satisfaction, return intention, and word-of-mouth. *International Journal of Hospitality Management*, 28(1), 10-17.
- King, S. C. (2007). The effects of contextual variables on food acceptability: A confirmatory study. *Food Quality and Preference*, 18(1), 58-65.
- King, S. C., Meiselman, H. L., Hottenstein, A. W., Work, T. M., & Cronk, V. (2007). The effects of contextual variables on food acceptability: A confirmatory study. *Food Quality and Preference*, 18(1), 58-65.
- King, S. C., Weber, A. J., Meiselman, H. L., & Lv, N. (2004). The effect of meal situation, social interaction, physical environment and choice on food acceptability. *Food Quality and Preference*, 15(7-8), 645-653.
- Kotler, P. (Ed.) (1991). *Marketing Management* (1 ed.). New Jersey: Prentice Hall.
- Kvale, S., & Brinkmann, S. (Eds.). (2009). *InterViews: Learning the craft of qualitative research interviewing* (2 ed.). London: SAGE.

- Ladhari, R., Brun, I., & Morales, M. (2008). Determinants of dining satisfaction and post-dining behavioral intentions. *International Journal of Hospitality Management*, 27(4), 563-573.
- Lassen, A., Thorsen, A. V., Trolle, E., Elsig, M., & Ovesen, L. (2004). Successful strategies to increase the consumption of fruits and vegetables: results from the Danish '6 a day' Work-site Canteen Model Study. *Public Health Nutrition*, 7(02), 263-270.
- Law, A. K. Y., Hui, Y. V., & Zhao, X. (2004). Modeling repurchase frequency and customer satisfaction for fast food outlets. *International Journal of Quality & Reliability Management*, 21(5), 545-563.
- Levitsky, D. A., Iyer, S., & Pacanowski, C. R. (2012). Number of foods available at a meal determines the amount consumed. *Eating Behaviors*, 13(3), 183-187.
- Lin, I. Y. (2010). Restaurant servicescape, service encounter, and perceived congruency on customers' emotions and satisfaction. *Journal of hospitality marketing & management*, 19(8), 819-841.
- Lund, T. B., & Gronow, J. (2014). Deconstruction or continuity? The daily rhythm of eating in Denmark, Finland, Norway and Sweden in 1997 and 2012. *Appetite*, 82, 143-153.
- Macht, M. (1999). Characteristics of eating in anger, fear, sadness and joy. *Appetite*, 33(1), 129-139.
- McCrary, M. A., Burke, A., & Roberts, S. B. (2012). Dietary (sensory) variety and energy balance. *Physiology & Behavior*, 107(4), 576-583.
- Meal. Oxford Dictionaries. Oxford University Press.  
<http://www.oxforddictionaries.com/definition/english/meal> (accessed March 31, 2016).
- Meiselman, L. H. (2003). A three-factor approach to understanding food quality: the product, the person and the environment\*. *Food Service Technology*, 3(3-4), 99-105.
- Meiselman, L. H. (2008). Dimension of the meal. *Journal of Foodservice*, 19(1), 13-21.
- Meiselman, L. H. (2013). The future in sensory/consumer research: .....evolving to a better science. *Food Quality and Preference*, 27(2), 208-214.

- Meiselman, L. H., deGraaf, C., & Leshner, L. L. (2000). The effects of variety and monotony on food acceptance and intake at a midday meal. *Physiology & Behavior, 70*(1–2), 119-125.
- Mäkelä, J., & Kjærnes, U. (2001). *Eating patterns. A day in the lives of Nordic People* (Vol. null).
- Mäkelä, J., & Meiselman, L. H. (2009). Meals: the social perspective. *Meals in science and practice: interdisciplinary research and business applications, 37-49*.
- Namkung, Y., & Jang, S. (2008). Are highly satisfied restaurant customers really different? A quality perception perspective. *International Journal of Contemporary Hospitality Management, 20*(2), 142-155.
- Nelson, D., McEvoy, C., & Schreiber, T. (2004). The University of South Florida free association, rhyme, and word fragment norms. *Behavior Research Methods, 36*(3), 402-407.
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17*(4), 460-469.
- Oliver, R. L. (2010). *Satisfaction: A behavioral perspective on the consumer* (2. ed.). New York: M.E. Sharpe.
- Patel, K. A., & Schlundt, D. G. (2001). Impact of moods and social context on eating behavior. *Appetite, 36*(2), 111-118.
- Piqueras-Fiszman, B., & Spence, C. (2014). Colour, pleasantness, and consumption behaviour within a meal. *Appetite, 75*(0), 165-172.
- Pliner, P., Bell, R., Hirsch, E. S., & Kinchla, M. (2006). Meal duration mediates the effect of “social facilitation” on eating in humans. *Appetite, 46*(2), 189-198.
- Raynor, H. A., & Epstein. (2001). Dietary variety, energy regulation, and obesity. *Psychological Bulletin, 127*(3), 325.
- Robinson, E., Blissett, J., & Higgs, S. (2013). The influence of recent tasting experience on expected liking for foods. *Food Quality and Preference, 27*(1), 101-106.

- Roininen, K., Arvola, A., & Lähteenmäki, L. (2006). Exploring consumers' perceptions of local food with two different qualitative techniques: Laddering and word association. *Food Quality and Preference*, *17*(1–2), 20-30.
- Rolls, B. J., Rowe, E. A., Rolls, E. T., Kingston, B., Megson, A., & Gunary, R. (1981). Variety in a meal enhances food intake in man. *Physiology & Behavior*, *26*(2), 215-221.
- Rozin, P., & Markwith, M. (1991). Cross-domain variety seeking in human food choice. *Appetite*, *16*(1), 57-59.
- Ryu, K., & Han, H. (2011). New or repeat customers: How does physical environment influence their restaurant experience? *International Journal of Hospitality Management*, *30*(3), 599-611.
- Salvy, S.-J., Jarrin, D., Paluch, R., Irfan, N., & Pliner, P. (2007). Effects of social influence on eating in couples, friends and strangers. *Appetite*, *49*(1), 92-99.
- Snack. Oxford Dictionaries. Oxford University Press.  
<http://www.oxforddictionaries.com/definition/english/snack> (accessed March 31, 2016).
- Spence, C., Levitan, C. A., Shankar, M. U., & Zampini, M. (2010). Does food color influence taste and flavor perception in humans? *Chemosensory Perception*, *3*(1), 68-84.
- Stroebele, N., & De Castro, J. M. (2004). Effect of ambience on food intake and food choice. *Nutrition*, *20*(9), 821-838.
- Szymanski, D. M., & Henard, D. H. (2001). Customer satisfaction: A meta-analysis of the empirical evidence. *Journal of the Academy of Marketing Science*, *29*(1), 16-35.
- Wadhera, D., & Capaldi-Phillips, E. D. (2014). A review of visual cues associated with food on food acceptance and consumption. *Eating Behaviors*, *15*(1), 132-143.
- Walter, U., Edvardsson, B., & Öström, Å. (2010). Drivers of customers' service experiences: a study in the restaurant industry. *Managing Service Quality: An International Journal*, *20*(3), 236-258.

- Wansink, B. (2004). Environmental factors that unknowingly increase a consumer's food intake and consumption volume. *Annual Review of Nutrition*, 24, 455-479.
- Weiss, R., Feinstein, A. H., & Dalbor, M. (2004). Customer satisfaction of theme restaurant attributes and their influence on return intent. *Journal of Foodservice Business Research*, 7(1), 23-41.
- Wilkinson, C., Dijksterhuis, G. B., & Minekus, M. (2000). From food structure to texture. *Trends in Food Science & Technology*, 11(12), 442-450.
- Yi, Y. (1990). A critical review of consumer satisfaction. *Review of Marketing 1990*. In V. A. Zeithaml-, ed. *Chicago: American Marketing Association*, 68-123.
- Zellner, A. D. (2013). Color–odor interactions: A review and model. *Chemosensory Perception*, 6(4), 155-169.
- Zellner, A. D. (2014). It tastes as good as it looks! The effect of food presentation on liking for the flavor of food. *Appetite*, 77, 31-35.
- Zellner, A. D., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., & Wolf, A. (2006). Food selection changes under stress. *Physiology & Behavior*, 87(4), 789-793.