UNIVERSITI TEKNOLOGI MARA

MODELLING VISUAL COGNITIVE MECHANISMS IN DIGITAL IMAGERY: A STUDY ON ENHANCING TASTE EXPERIENCE USING VISUAL STIMULI

NUR HASNI BINTI NASRUDIN

Thesis submitted in fulfilment
of the requirements for the degree of
Doctor of Philosophy
(Information Technology)

Faculty of Computer and Mathematical Sciences

September 2025

ABSTRACT

Nowadays, with more than 69% of the world's population having access to the internet, food marketing has progressively adopted online platforms. Ads that include relevant images saw a 94% jump in views, demonstrating the critical role that pictures play in digital marketing. The concept of "visual hunger" has emerged, describing the innate desire to view food images and the ensuing neural, physiological, and behavioural responses triggered by exposure to such visuals. Humans use their senses of taste (taste buds), touch, smell, hearing, and vision to comprehend their environment. When food is viewed through digital food graphics, the vision significantly influences how food tastes. This has caused HCI scholars to expand their study of food taste stimulators. Unfortunately, most taste stimulators are device-based, using chemical or electrical techniques that are unpleasant and difficult to lick or position on the tongue. Therefore, this study motivated the investigation of how the composition of digital food visuals affects the perception of food taste. The research methodology employed the interview technique as a means of gathering data in a qualitative manner. An interview was done with experts from three food-related areas (chef, gastronomy, and professional food photographer) revealed that visual cues such as colour, visibility, variety, and texture help web users perceive food taste. The initial conceptual model, called the digital food taste stimulator (DVTS), was then suggested. Interviews with web users were conducted to learn how taste perception is formed. Recognising the diversity of Malaysian cuisine, this study scope to investigate the two taste dimensions (sweet and spicy) of the traditional Malay food '*kuih'*. A mental model called Users' Food Visual Taste Perception (U-FVTP) has been proposed as part of the DVTS model. Participatory design was implemented to develop a website for food stakeholders, both familiar and unfamiliar, to validate the proposed DVTS model. This is followed with the model verification process which affirmed the effectiveness of the Digital Visual Food Taste Stimulator (DVTS) model in capturing and differentiating taste sensations through digital food imagery. Key visual cues—such as colour, visibility, texture, and variety—were found to significantly shape users' taste expectations. Majority of participants (n=20) reported that their visual-based taste perception closely matched the actual taste, while a smaller group (n=8) perceived a near match in terms of taste intensity. From a Human-Computer Interaction (HCI) perspective, these findings align with HCI Principle which is supporting user diversity, promote visibility of system status where together attests the significance of prior experience and visual clarity in making perception. The observed discrepancies in perceived taste intensity also point to opportunities for refinement, as guided by HCI Principle of support for perceptual and cognitive processes. Consequently, a final DVTS model has been proposed to serve as a guideline for individuals or organisations to construct a digital food visual that conveys food taste to the viewer. This study makes a theoretical contribution to the domain of user experience by proving that digital food visuals can mediate the users' perception of food taste. Concedes its limitations, future work is suggested, encompassing investigations into representing the degree of taste, exploring additional taste dimensions, and extending the model to diverse food categories and countries.

ACKNOWLEDGEMENT

Firstly, I express my gratitude to Allah for granting me the chance to pursue my PhD and for successfully completing this rigorous and challenging journey. I express my sincere appreciation to Dr. Afdallyna Fathiyah Harun, my main supervisor, and Prof. Ts. Dr. Wan Abdul Rahim Wan Mohd Isa, my co-supervisor, for their guidance and support during this endeavour. I would also like to acknowledge Prof. Dr. Nor Laila Md Noor, my former main supervisor, for providing me with the necessary guidance and encouragement to successfully complete this journey.

My appreciation goes to my family for their full understand and support with my studies workload and duty. Special thanks to my colleagues and friends for helping me with this project.

Finally, this thesis dedicated to my loving and supportive parents for the vision and determination to educate me. This piece of victory dedicated to both of you.

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CHAPTER 1
INTRODUCTION

1.1 Research Background

In this digital age, more than 69% of the world population has access to the internet (Internet World Stats, 2022) which has led food marketers to market products through the internet (Chaffey, 2019; Leung, 2019; Sherman, 2022). Vision becomes king in digital marketing, where 94% more views will be gathered if the relevant visual is used in the advertisement (Elson, 2019; Spence et al., 2022).

Furthermore, the eagerness to share food images on digital platforms, including websites and social media, is increasing; hence, the term visual hunger was coined by Charles Spence in 2015 (Cellante, 2021). “Visual hunger” is defined as the natural desire, or urge, to see food images. This then involves a subsequent array of neural, physiological, and behavioural responses that result from the individual's exposure to food images. This implies that unit-sensory (sight) stimulation plays a dominant role in the absence of any actual food (Cellante, 2021; Spence et al., 2015). Research indicates that visual cues such as colour, texture, and arrangement can significantly influence taste associations, activating the orbitofrontal cortex, which integrates sensory inputs (Pallante et al., 2024; Velasco et al., 2023).

From a social perspective, the act of sharing food experiences on a digital platform contributes favourably to customers' overall happiness and contentment with their food consumption, benefiting society as a whole (Mendini et al., 2019). In the business context, using food imagery in online marketing is an effective way to grab attention and efficiently convey information about food products, including visual appearance, ingredients, and the setting in which the food is presented, which can influence viewers' perceptions and eating choices (Ares et al., 2022; Leung, 2019; Spence et al., 2022). This is particularly relevant in the digital age, where consumers often make food choices based on digital representations. Conversely, while visual cues are powerful, they may not fully replicate the complexity of taste experiences, as the actual sensory experience involves multiple senses beyond sight, including smell, touch and taste receptors (tongue), which are often underrepresented in digital formats (Gupta & Vishwakarma, 2024; Rolls, 2015).