Journal of tourism research institute, 2022, 3 (2), 159-166 ISSN: 2718-0093

A discipline examining the role of senses in flavor perception: Neurogastronomy[1]

Memet Şahan

ABTRACT

The aim of this study is to determine the benefits that this field will provide by explaining the development process of Neurogastronomy, the use of which is still new, and to create the basis for future studies on this subject and contribute to literature.

Our research is a fundamental research from the point of view of philosophy and an exploratory research from the point of view of its purpose. As a result of the literature review, Neurogastronomy is a new field related to Gastronomy and a limited number of studies can be reached in the national literature on this subject, this study is a fundamental research from the point of view of philosophy, but it is an exploratory study from the point of view of its purpose. In the research, which was carried out according to the qualitative research method, the data were obtained through document analysis. The research reveals that, thanks to neurogastronomy, harmful factors for human health can be eliminated, eating and drinking habits can be changed positively, diseases such as chronic obesity can be prevented and cancer patients can be provided with a better quality of life in the light of the literature.

Keywords: *Senses, Flavor, Gastronomy, Neurogastronomy.*
Submitted: 19.10.2022; Accepted: 26.12.2022. Review Paper

Lezzet algısında duyuların rolünü inceleyen bir disiplin: Nörogastronomi

Özet

Bu çalışmanın amacı, kullanımı henüz yeni olan Nörogastronomi'nin gelişim sürecini açıklayarak bu alanın sağlayacağı faydaları tespit etmek ve bu konuda ileride yapılabilecek çalışmalara temel oluşturup alan yazına katkıda bulunmaktır.

Araştırmamız felsefesi açısından temel araştırma olup amacı açısından ise keşfedici bir araştırmadır. Yapılan alan yazın taraması sonucunda Nörogastronomi konusunun Gastronomi ile ilgili yeni bir alan olduğu ve bu konuda ulusal alan yazında sınırlı sayıda çalışmaya ulaşılabildiği için bu çalışma felsefesi açısından temel bir araştırma olmakla birlikte amacı açısından keşfedici bir çalışmadır. Nitel araştırma yöntemine göre yürütülmüş olan araştırmada veriler döküman incelemesi yoluyla elde edilmiştir. Araştırma, nörogastronomi sayesinde insan sağlığı açısından zararlı unsurların yok edilebileceğini, yeme-içme alışkanlıklarının pozitif olarak değiştirilebileceğini, kronik obezite gibi rahatsızlıkları önlenebileceği ve kanser hastalarının daha kaliteli bir yaşam sürmelerinin sağlanabileceğini alan yazın ışığında ortaya koymaktadır.

Anahtar Kelime: *Duyular, Lezzet, Gastronomi, Nörogastronomi.*
Gönderilme Tarihi: 19.10.2022; Kabul Tarihi: 26.12.2022. Derleme Makale

Introduction

Mankind has been performing the act of eating and drinking as one of the most basic activities since its existence to meet a physiological need for survival. At first, this action was done in order to provide the energy needed by the body and to take the necessary nutrients into the body. However, it has become different over time and it has been made for psychological reasons such as entertainment, happiness, and pleasure, and

Memet Şahan Adıyaman University 0000-0002-3812-221X msahan@adiyaman.edu.tr Türkiye*
**Sorumlu Yazar*

[1]Bu makale GANUD - "3. INTERNATIONAL CONFERENCE ON GASTRONOMY, NUTRITION AND DIETETICS" adlı kongrede bildiri olarak sunulmuştur.

to meet social needs such as leisure, status, prestige, and social interaction (Özdemir, 2010). These experiences led to the emergence of Gastronomy, which serves these different purposes. This term was first used in scientific and official terms by Jean Anthelme Brillat-Savarin (Özbay, 2019) and aims to offer the best possible foods to the service of people (Brillat-Savarin, 2018).

The word gastronomy has passed into Turkish from French. Etymologically derived from the Greek words gastros (stomach) and nomos (science). According to the Turkish Language Association, it means the curiosity to eat well and healthy, well-arranged, pleasant and delicious cuisine, food order and system (TDK, 2021) (Oktay, 2018). According to historical findings, this concept was first used in a book written by the Sicilian Greek Archestratus in Ancient Greece in the 4th century BC, which is the earliest wine and food guide for the Mediterranean Region (Bağıran Özşeker, 2016; Santich, 2004). The word gastronomy, which has been defined by many chefs, writers and researchers, first entered the literature in the work "Gastronomy or Human From Farm to Table" written by French Joseph Berchoux in 1801 (Karaca, Yıldırım and Çakıcı, 2015; Oktay, 2018; Özbay, 2019). The first scientific and official definition was made by the French jurist writer Jean Anthelme Brillat-Savarin (1755-1826) in his book "Taste Physiology". The French academy added the word gastronomy to its dictionary in 1835, making it official (narrated by Oktay, 2018, from Savarin 1825).

In his book “Taste Physiology”, Savarin defines gastronomy as descriptive information about everything related to human nutrition (Brillat-Savarin, 2018). When it comes to human nutrition, gastronomy makes use of both natural sciences such as physics, chemistry, and biology, as well as social sciences such as economy, sociology, anthropology, psychology, literature, tourism, history and culture (Gillespie, 2001; Öney, 2016). It also encompasses artistic and aesthetic values (Oktay, 2018).

Gastronomy was first used about 200-250 years ago and the usage area of the concept has gradually expanded, and new topics and concepts related to gastronomy have started to come to the fore. One of these topics is Neurogastronomy, which studies the role that the senses play in our brain's perception of taste (Özgen and Göğüş, 2018). Taste, which has the ability to affect our food preferences, is related to the sensory evaluation of food and beverages. Taste is not simply in the food we eat. It is formed from food as a result of food intake by the brain. This multidisciplinary field is called neurogastronomy (Shepherd, 2015). Neurogastronomy starts with the brain and questions how food is perceived (Shepherd, 2012). In this sense, neurogastronomy emerges as a new gastronomy-related topic in the literature. The subject requires more thorough research, and this current study is considered to be important in terms of filling this gap in the literature and laying the groundwork for future research on this subject.

Neurogastronomy

Neurogastronomy emerged as a scientific discipline in the early part of the 21st century and is defined as the study of complex brain processes that lead to the flavors that we all experience while eating or drinking (Spence and Piqueras-Fiszman, 2014). This concept was first used by Professor Gordon Shepherd of the Yale University School of Medicine in an article published in Nature in 2006 (Firger, 2016). As an academic who has been studying the olfactory system since the 1960s, Shepherd has conducted studies examining the role of the five senses in taste perception and has made neurogastronomy a field of study for both neuroscientists and chefs (Firger, 2016).

Various studies have been done on this subject (Spence, 2015; Uçuk, 2022). In one of these, a group of hungry participants was shown their favourite food during the neuroimaging study and allowed to smell it. A 24% increase in brain metabolism was observed in the subjects who saw and smelled the food. This rate of change in brain activity is a huge change. (Spence and Piqueras-Fiszman, 2014). In addition, there are studies that show that the aesthetic presentation of foods affects the perception of taste and that the consumed food is perceived as more delicious (Dhini and Astrianoor, 2022; Zellner, Loss, Zearfoss and Remolina, 2014).

There are several factors that can impact the perception of taste in foods. These factors include taste, smell, sight, hearing and touch, as well as seasons, physiological differences, culture, etc. In addition, the positive or negative experiences of the person also affect the perception of taste (Karagöz, 2018).

Relation Between Senses and Taste

Sense of Sight and Taste

The initial impression of a food item to be consumed is usually the visual appearance of it. Much of our willingness to accept that food depends on its appearance (Hutchings, 1977). It is said that the appeal of food is partly visual. In this sense, Roman Apicius, known as the first cookbook author, explained the importance of the sense of sight by using the expression "the first taste is always taken with the eyes" (Spence and Piqueras-Fiszman, 2014). When a dish prepared with appropriate cooking techniques is prepared in a way that appeals to the eye, the formation of preliminary information about the food is provided by the presentation of the food before the senses of taste, smell, hearing or touch are activated, and it affects the judgment about the food. From this point of view, it can be said that the sense of sight has a significant effect on the formation of taste.

The appearance of food is shaped by various factors such as colour, shape, texture, size, clarity, foaming (Özgen and Göğüş, 2018). There are various studies that prove these factors contribute to the perception of flavour through the sense of sight of. One of these studies was conducted by Charles Spence et al., and the flavour intensity, taste and quality of the shape and colour of the plate in food were examined. In this study, researchers found that the same dessert was sweeter and tastier on a white plate than on a black plate, so they concluded that the colour of the plate had a significant effect on the perception of food (Piqueras-fiszman, Alcaide, Roura and Spence, 2012). In another study, it was concluded that yoghurt tasted with a light spoon was perceived as more intense and expensive compared to tasting with a heavy spoon. It was determined that the colour of the cutlery and the colour of the food were also effective in the taste of yogurt. In the same study, it was seen that pink yogurt tasted with a blue spoon was perceived as saltier than white yogurt (Harrar and Spence, 2013). In another study on the subject, it was seen that food served in a red plate was consumed less. The reason for this was believed to be the fact that the colour red evokes danger and stopping (Bruno, Martani, Corsini and Oleari, 2013; Kurgun, 2017). These studies show that the colour, shape and structure of the food, as well as the colour, shape and structure of the tools that it is presented and consumed with are also effective in the perception of the taste of the food.

Sense of Smell and Taste

The sense of smell is another sense that has an effect on the perception of taste. It is thought that 80% of the taste perception comes from the information transmitted by the olfactory receptors in the nose (Spence, 2013). In this context, it is seen that there is a strong relationship between the sense of smell and the sense of

taste. One of the most determining factors in taste is the sense of smell (Delwiche, 2004). When examining the role of the sense of smell in the perception of taste, two sensory systems play an active role. The first of these is the orthonasal system, which is related to the external odours we smell when smelling something, and the other is the retronasal system, which allows detecting the odours or aromas released from the foods we chew (Spence and Piqueras-Fiszman, 2014). While orthonosal odours are innate, retronosal odors are learned later. Retronasal odors cause flavour differences in foods. Chemical molecules released by chewing food activate the olfactory receptor cells and send signals to the brain. These signals combine with signals from other senses in the brain to form flavour (Kanwal, 2016). There are more than 400 receptors in the human nose. Each of these receptors responds to more than one odour molecule, and each odour molecule can activate more than one odour receptor. When a food is bitten, some molecules stick to the taste buds, which are the taste buds on the tongue, while some volatile odour molecules belonging to the food are released from the back of the mouth to the nose. These released odour molecules activate the olfactory receptors in the nose, and the signals received by these receptors are transmitted to the brain via the nervous system. These transmitted signals combine with signals from other senses in the orbitofrontal cortex of the brain to form flavour (Sheikh, 2017).

Sense of Flavour and Taste

The sense of flavour has an important place in the perception of taste. And accordingly, although a meal prepared with the necessary materials and appropriate cooking methods appeals to the auditory, visual, olfactory and tactile senses, it is not possible to form the flavour without tasting it (Menderes et al, 2019; Yılmaz, Akay and Er, 2021). Even though the five main senses play an active role in perceiving taste, there is a unique bond between the senses of flavour and smell (Delwiche, 2004). Although the sense of taste is categorized as sweet, sour, salty, bitter and umami, it has been determined that metallic and oily flavours can also be added to the list in recent studies. In fact, some researchers even mention 25 different flavours. Taste is produced by the stimulation of taste receptors in the tongue (Spence, 2013). When a food is chewed in the mouth, it is broken down by the enzymes in the saliva. These food particles come into contact with the tongue papillae in the tongue and are recognized and analysed by the sensory cells located in the taste buds, also known as the true taste organs, located in each papilla. As a result of the analysis made by the sense cells, the information about the food is transmitted to the brain through the nerve cells and combines with the signals from the other senses in the orbitofrontal region of the brain to form the flavour (Baral, 2015; Kurgun, 2017).

Sense of Hearing and Taste

It has been revealed in studies that the sense of hearing is another sense that contributes to the perception of taste, although not as much as other senses (Spence, 2015). In this context, Heston Blumenthal, the chef of the three Michelin-starred Fat Duck restaurant, states that for an effective dining experience, the food tasted should appeal to all the senses (Spence, 2013). Heston Blumenthal has designed and presented a restaurant menu called “Sounds of the Sea” in a way that appeals to all senses. In this menu, Heston Blumenthal placed the food in a glass-covered wooden box with sand and seashells and served with headphones hidden in seaweed, foam and seashells. By doing this, he aims that the guests hear the sounds of seagulls and waves while they are eating, and also that the fish is kept fresher and is better perceived (Fleming, 2014). In other studies, it has been suggested that the sounds we make while chewing food contribute to the perception of the consumed food as fresh and delicious (Kurgun, 2017; Özgen and Göğüş, 2018; Spence and Shankar, 2010). In addition, studies have shown that high-frequency sounds cause foods to be perceived as sweeter, while low-

frequency sounds are associated with more bitterness (Fleming, 2014). All these studies prove the contribution of auditory elements to the formation of taste.

Sense of Touch and Taste

Another sense that affects the perception of flavour in foods is the sense of touch. It has been reported that the weight of the tablecloth, the weight of the menu, the weight of the food, and the weight of the cutlery used are factors that can be determined by touch and affect the taste (Ünal and Türköz Bakırcı, 2019). In another study, it was reported that the taste of yogurt is perceived as more intense and expensive when it is made from a light spoon (Harrar and Spence, 2013). Another factor affecting the flavour formation determined by the sense of touch is the texture. Texture is a sensory indicator for determining the structural, mechanical and surface properties of foods, which can be determined by sight, hearing and kinaesthetic senses as well as by touch (Szczesniak, 2002). The sense of touch, like other senses, is a sense that has an effect on the perception of taste.

Discussion and Conclusion

The concepts of taste and flavour are often perceived as synonyms, but this is not the case. Taste is a sense that people have, and flavour is an evaluation made by the brain about foods as a result of the combination of information obtained from foods through the senses in the human brain through the nervous system. In addition to these senses, there are other factors such as culture, geography, season and tradition that affect taste. In this sense, it is known that some chefs and restaurants affect the perception of taste of the dishes they serve meticulously by using sensory stimuli in a place where there are different colours and shapes that remind us of our past and evoke beautiful moments in our memories (Kurgun, 2017). All these factors affecting taste formation are included in the study area of neurogastronomy.

Neurogastronomy aims to question how food is perceived by the brain and to find the driving factors. In this way, harmful elements for human health can be eliminated, eating and drinking habits can be changed positively, diseases such as chronic obesity can be prevented, and cancer patients can lead a better quality life (Shepherd, 2006). Because, it has been revealed in a study that the insulin values of individuals with obesity, who are exposed only to the sight and smell of the food, change in both stages (Sjöström, Garellick, Krotkiewski and Luyckx, 1980). In addition, it may be a new glimmer of hope for patients with impaired sense of taste and smell. Children exposed to chemotherapy and radiation often refuse to eat. This is because these children perceive food as having a metallic taste. In this sense, neurogastronomy may allow us to make food palatable again for these patients (Firger, 2016). In a study on patients, it was concluded that an aesthetic meal presentation increases consumption and reduces waste (Dhini and Astrianoor, 2022).

The world population is estimated to exceed 11 billion by 2100. At a time when the current 7 billion people already have enough problems with their diet, neurogastronomy may help us find new ways to feed the ever-increasing world population, making people choose to eat salads over hamburgers (Harrington and Rebecca, 2016).

First, it must be understood how the brain combines the different biological and associative forces that make up flavour. Instead of stimulating the appetite through the traditional and unhealthy trio of salt, sugar and fat, by directing attention to different things, the neural pathways in which flavour is structured in the brain can be used. As a result, more nutritious foods will be consumed. It is thought that the brain, not the body,

should be deceived, and the increasing influence of psychology on the eating experience is emphasized (Konnikova, 2016).

These studies in the literature clearly show that neurogastronomy is a discipline that reveals the role played by the senses in the perception of taste. Taste does not actually depend on the foods consumed. On the contrary, sensory information about food is combined in the orbitofrontal region of the brain as a result of the evaluation made by the brain about foods.

In the literature, there are studies that test the movements and changes in the brain caused by the foods that are already tasted (Aftanas, Pavlov, Reva and Varlamov, 2003; Ai and Han, 2022; Uçuk, 2022). In the future, the brain images of individuals with different sensory loss can be determined and the differences in taste perception of these individuals can be compared with previous studies.

References

Ai, Y., & Han, P. (2022). Neurocognitive mechanisms of odor-induced taste enhancement: A systematic review. *International Journal of Gastronomy and Food Science*, *28*, 100535.

Aftanas, L. I., Pavlov, S. V., Reva, N. V., & Varlamov, A. A. (2003). Trait anxiety impact on the EEG theta band power changes during appraisal of threatening and pleasant visual stimuli. *International Journal of Psychophysiology*, *50*(3), 205-212.

Bağıran Özşeker, D. (2016). Gastronomi Kavramı Tanımı ve Gelişimi. H. Kurgun ve D. Bağıran Özşeker (Ed.), *Gastronomi ve Turizm* içinde (1. Baskı., ss. 5–24). Ankara: Detay Yayıncılık.

Baral, S. (2015). Neurogastronomy 101: The Science of Taste Perception. Accessed on 5 May 2022 at https://www.eater.com/2015/10/19/9553471/what-is-neurogastronomy.

Brillat-Savarin, J. A. (2018). *Lezzetin fizyolojisi ya da yüce mutfak üzerine düşünceler*. (H. Bucak, Ed.) (2. Baskı.). İstanbul: Oğlak Yayıncılık.

Bruno, N., Martani, M., Corsini, C. & Oleari, C. (2013). The effect of the color red on consuming food does not depend on achromatic (Michelson) contrast and extends to rubbing cream on the skin. *Appetite*, *71*, 307–313. doi:10.1016/j.appet.2013.08.012

Delwiche, J. (2004). The impact of perceptual interactions on perceived flavor. *Food Quality and Preference*, *15*(2), 137–146. doi:10.1016/S0950-3293(03)00041-7

Dhini, D., & Astrianoor, M. (2022). The effect of food presentation and ingredients modifications on patient's leftovers at Harapan Insani Medical Center Hospital. *GHMJ (Global Health Management Journal)*, *5*(1), 32-35.

Firger, J. (2016). Brain Food: How neurogastronomy will soon alter your perception of flavor. *Newsweek Magazine*. https://www.newsweek.com/2016/05/06/neurogastronomy-taste-deprivation-smell-loss-palatable-food-452819.html adresinden erişildi.

Fleming, A. (2014). How sound affects the taste of our food. Accessed on 5 May 2022 at https://www.theguardian.com/lifeandstyle/wordofmouth/2014/mar/11/sound-affects-taste-food-sweet-bitter

Gillespie, C. (2001). *European Gastronomy into the 21st Century*. (J. Cousins, Ed.) (1. Baskı.). Oxford: Butterworth-Heinemann.

Harrar, V. & Spence, C. (2013). The taste of cutlery: how the taste of food is affected by the weight, size, shape, and colour of the cutlery used to eat it. *Flavour*, *2*(21). doi:10.1186/2044-7248-2-21

Harrington & Rebecca. (2016). A new movement that uses science to trick your brain could revolutionize how we eat. Accessed on 6 May 2022 at https://www.businessinsider.com/neurogastronomy-using-science-trick-brain-to-eat-better-2016-5

Hutchings, J. B. (1977). The Importance of Visual Appearance of Foods to The Food Processor and The Consumer. *Journal of Food Quality*, *1*, 267–278.

Kanwal, J. K. (2016). Brain tricks to make food taste sweeter: How to transform taste perception and why it matters. Accessed on 5 May 2022 at https://sitn.hms.harvard.edu/flash/2016/brain-tricks-to-make-food-taste-sweeter-how-to-transform-taste-perception-and-why-it-matters/

Karaca, O. B., Yıldırım, O. & Çakıcı, C. (2015). Gastronomi turizminde otlar, ot yemekleri ve sağlıkla ilişkisi üzerine bir değerlendirme. *Journal of Tourism and Gastronomy Studies*, *3*(3), 27–42.

Karagöz, Ş. (2018). Gastronomide tat ve aroma etkileşimleri. *IWACT 2018 Internatıonal West Asia Congress of Tourism Research* içinde (ss. 970–980). Van.

Konnikova, M. (2016). This Man Will Transform How You Eat. Accessed on 6 May 2022 at https://newrepublic.com/article/128899/man-will-transform-eat

Kurgun, H. (2017). Nörogastronomi. H. Kurgun (Ed.), *Gastronomi ve Trendleri Milenyum ve Ötesi* içinde (ss. 33–56). Ankara: Detay Yayıncılık.

Menderes, A. A., Enst, M., Gastronom, D., Sanatlari, M., Dorukan, H., Tez, B. ve Do, M. (2019). *Duyuların lezzet algısı ve satın alma niyetine etkisi*. Aydın Adnan Manderes Üniversitesi.

Oktay, S. (2018). *Gastronomi Bilimine Giriş*. İstanbul: Der Yayınları.

Öney, H. (2016). Gastronomi eğitimi üzerine bir değerlendirme. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *35*, 193–203.

Özbay, G. (2019). Dünden bügüne gastronomi. M. Sarıışık (Ed.), *Tüm Yönleriyle Gastronomi Bilimi* içinde (ss. 1–40). Ankara: Detay Yayıncılık.

Özdemir, B. (2010). Dışarıda yemek yeme olgusu: Kuramsal bir model önerisi. *Anatolia: Turizm Araştırmaları Dergisi*, *21*(2), 218–232.

Özgen, I. & Göğüş, N. (2018). Nörogastronomi. A. Akbaba ve N. Çetinkaya (Ed.), *Gastronomi ve Yiyecek Tarihi* içinde (1. Baskı., ss. 419–433). Ankara: Detay Yayıncılık.

Piqueras-fiszman, B., Alcaide, J., Roura, E. & Spence, C. (2012). Is it the plate or is it the food ? Assessing the influence of the color (black or white) and shape of the plate on the perception of the food placed on it. *Food Quality and Preference*, *24*(1), 205–208. doi:10.1016/j.foodqual.2011.08.011

Santich, B. (2004). The study of gastronomy and its relevance to hospitality education and training, *International Journal of Hospitality Management*, *23*, 15–24. doi:10.1016/S0278-4319(03)00069-0

Sheikh, K. (2017). The Science That Could Make You Crave Broccoli More Than Chocolate. Accessed on 5 May 2022 at https://www.theatlantic.com/science/archive/2017/02/neurogastronomy/516267/

Shepherd, G. M. (2006). Smell images and the flavor system in the human brain. *Nature*, *444*(16), 316–321.

Shepherd, G. M. (2012). *Neurogastronomy How the Brain Creates Flavor and Why It Matters*. New York: Columbia University Press Publishers.

Shepherd, G. M. (2015). Neuroenology: How the brain creates the taste of wine. *Shepherd Flavour*, *4*(19), 1–5. doi:10.1186/s13411-014-0030-9

Sjöström, L., Garellick, G., Krotkiewski, M., & Luyckx, A. (1980). Peripheral insulin in response to the sight and smell of food. *Metabolism*, *29*(10), 901-909.

Spence, C. (2013). Multisensory flavour perception. *Current Biology*, *23*(9), R365–R369. doi:10.1016/j.cub.2013.01.028

Spence, C. (2015). Multisensory Flavor Perception. *Cell*, *161*(1), 24–35. doi:10.1016/j.cell.2015.03.007

Spence, C. & Piqueras-Fiszman, B. (2014). *The perfect meal the multisensory science of food and dining*. Wiley Blackwell.

Spence, C. & Shankar, M. U. (2010). The influence of auditory cues on the perception of, and responses to, food and drink. *Journal of Sensory Studies*, *25*, 406–430. doi:10.1111/j.1745-459X.2009.00267.x

Szczesniak, A. S. (2002). Texture is a sensory property. *Food Quality and Preference*, *13*, 215–225.

TDK. (2021). Türk Dil Kurumu Sözlükleri. https://sozluk.gov.tr/

Uçuk, C. (2022). *Holistik tabak: Nörogastronomi, gastrofizik ve sinestezi ekseninde, yemek sunumunun insanın beğeni algısına olan etkilerinin belirlenmesi*. Nevşehir Hacı Bektaş Veli Üniversitesi

Ünal, F. U. & Türköz Bakırcı, G. (2019). Lezzet algısı, duyularımız, tat ve koku moleküleriyle nörogastronomi. Ş. Aydın, Ö. Çoban, Y. Karakuş ve N. Çalışkan (Ed.), *IV. Uluslararası Gastronomi Turizmi Araştırmaları Kongresi* içinde (ss. 366–368). Nevşehir.

Yılmaz, İ., Akay, E. & Er, A. (2021). Nörogastronomi. *Aydın Gastronomy*, *5*(2), 143–156.

Zellner, D. A., Loss, C. R., Zearfoss, J. & Remolina, S. (2014). It tastes as good as it looks! The effect of food presentation on liking for the flavor of food. *Appetite*, *77*, 31–35. doi:10.1016/j.appet.2014.02.009.

JTRI

Journal of Tourism Research Institute ISSN: 2718-0093

Etik Kurul Kararı ile ilgili beyan	
Araştırmanız etik kurul izni gerektiriyorsa, aşağıdaki bilgileri doldurunuz.	
Lütfen beyanı yaptığınızı belirtmek için kutucuğu işaretleyin.	[] Yazar(lar) Beyanı: Bu çalışmanın yazarı(ları) olarak, insan katılımcıların yer aldığı çalışmalarda gerçekleştirilen tüm prosedürlerin, kurumsal ve/veya ulusal araştırma komitesinin etik standartlarına ve 1964 Helsinki bildirgesine ve daha sonraki değişikliklerine veya karşılaştırılabilir etik standartlara uygun olduğunu beyan ederim(iz).
Etik kurul kararı veren kurum	
Etik kurul karar tarihi	
Etik kurul karar sayı no	
Araştırmanız etik kurul izni gerektirmiyorsa, nedenini aşağıdaki seçeneklerden birini tercih ederek belirtiniz.	
[X] Bu çalışmanın yöntemi için etik kurul izni gerekmemektedir.	
[] Bu çalışmadaki veri toplama süreci 1 Ocak 2020 tarihinden önce gerçekleşmiştir.	
Yazar Katkısına İlişkin Bilgi	
Yazar(lar) beyanı	[X] Bu çalışmadaki bulunan yazarların katkı oranlarının aşağıda belirtilen şekilde olduğunu beyan ederim(iz).
1. Yazar katkı oranı	%100