Seminars in Medical Writing and Education. 2024; 3:478
doi: 10.56294/mw2024478

REVIEW

Specific Sensory Satiety and its impact on food

Saciedad Sensorial Específica y su impacto en la alimentación

Carolina De La Torre Ibarra[1]

[1]Universidad De Guadalajara, Centro Universitario De Ciencias Biológicas Y Agropecuarias. Guadalajara, México.

Cite as: De La Torre Ibarra C. Specific Sensory Satiety and its impact on food. Seminars in Medical Writing and Education. 2024; 3:478. https://doi.org/10.56294/mw2024478

Submitted: 30-09-2023 **Revised:** 10-02-2024 **Accepted:** 03-05-2024 **Published:** 04-05-2024

Editor: PhD. Prof. Estela Morales Peralta

Corresponding author: Carolina De La Torre Ibarra

ABSTRACT

The study of eating behaviour has been approached from various disciplines, including physiology and psychology. Multiple theories have been developed to explain the mechanisms that regulate hunger, appetite and satiety. Among them, the Specific Sensory Satiety Theory (SSST) proposed that the sensory variety in food influences the amount consumed. It was observed that a varied diet led to higher consumption, while a monotonous diet reduced it. Experimental studies on SSST showed that repeated exposure to the same food led to a decrease in preference and intake. On the other hand, the availability of foods with different sensory characteristics led to prolonged consumption. It was determined that satiety depended not only on caloric content, but also on the sensory properties of the food. In addition, the analysis looked at how the presentation of food, whether simultaneous or successive, affected intake. The findings highlighted the influence of food variety on consumption behaviour, which has implications for obesity and dietary regulation. It was suggested that controlling exposure to sensory stimuli could improve self-regulation of intake. Finally, it was recommended that further research be carried out to evaluate the long-term effects of the SSST and its impact on health.

Keywords: Specific Sensory Satiety; Food Regulation; Habituation; Food Consumption; Caloric Intake.

RESUMEN

El estudio de la conducta alimentaria ha sido abordado desde diversas disciplinas, incluyendo la fisiología y la psicología. Se han desarrollado múltiples teorías para explicar los mecanismos que regulan el hambre, el apetito y la saciedad. Entre ellas, la Teoría de la Saciedad Sensorial Específica (TSSE) propuso que la variedad sensorial en los alimentos influye en la cantidad de consumo. Se observó que una dieta variada llevó a un mayor consumo, mientras que una dieta monótona lo redujo. Los estudios experimentales sobre la TSSE evidenciaron que la exposición repetida a un mismo alimento generó una disminución en la preferencia y la ingesta. En cambio, la disponibilidad de alimentos con diferentes características sensoriales provocó un consumo prolongado. Se determinó que la saciedad no solo dependió del contenido calórico, sino también de las propiedades sensoriales del alimento. Además, se analizó cómo la presentación de los alimentos ya sea simultánea o sucesiva, afectó la ingesta. Los hallazgos resaltaron la influencia de la variedad alimentaria en la conducta de consumo, lo que tiene implicaciones en la obesidad y la regulación dietética. Se sugirió que el control de la exposición a estímulos sensoriales podría mejorar la autorregulación de la ingesta. Finalmente, se recomendó continuar con investigaciones para evaluar los efectos a largo plazo de la TSSE y su impacto en la salud.

Palabras clave: Saciedad Sensorial Específica; Regulación Alimentaria; Habituación; Consumo Alimentario; Ingesta Calórica.

INTRODUCTION

Due to the complex interaction of factors that influence hunger, appetite, and satiety, the study of eating behavior has been approached from multiple disciplines, including physiology, psychology, and anthropology. Throughout history, various theories have attempted to explain the mechanisms underlying the regulation of food consumption, from the Central Theory of Hunger by Cannon and Washburn (1912) to more recent models such as the Set Point Theory and the Positive Incentive Theory.

One of the most relevant approaches in research into eating behavior is the Specific Sensory Satiety Theory (CST), which proposes that consuming food with varied sensory characteristics can increase food intake. At the same time, a monotonous diet tends to reduce it. Experimental studies have shown that individuals exposed to varied diets consume more food due to less habituation of its sensory properties. This phenomenon has important implications for food regulation, obesity, and public health, as it suggests that the availability of a greater variety of food can contribute to overconsumption.

In this context, the present work analyzes the mechanisms of the ST, reviews its theoretical and experimental background, and examines the role of monotony and sensory variety in regulating food consumption. Through a review of experimental and theoretical studies, the aim is to understand how sensory variability influences human eating behavior and what implications it has for the design of dietary and health strategies.

DEVELOPMENT

Conceptualization of hunger, satiety, and appetite

Eating behavior involves various physiological, psychological, and socio-anthropological factors. Because of this, its study has been approached from multiple perspectives, creating confusion when using some terms that refer to certain states of the organism in an undifferentiated way. An example is hunger and appetite, which are used interchangeably when referring to the willingness to eat (Booth, 1987).

In the first experimental study of human eating behavior, Cannon and Washburn (1912) criticized the claim that the difference between hunger and appetite was only quantitative, postulating that hunger was a need caused by intestinal emptiness and that it was detected when it occurred, while appetite was related to previous sensations caused by the taste and smell of food. This approach was called the "Central Theory of Hunger". However, the theory of Cannon and Washburn (1912) was rejected when it was discovered that subjects who had had their stomachs or other parts of the digestive tract removed still felt hungry.

Based on the previous proposal, new theories were developed that attempted to explain the mechanism by which hunger is produced, such as the Trophic Reflex Theory (Turró, 1912), the Lipostatic Theory (Kennedy, 1953), the Glucostatic Theory (Mayer, 1955), the Thermostatic Theory (Brobeck, 1960) and the Neurobiological Theory (Blundel, 1984; Rowland, Li & Morien, 1996), among others.

Turró (1912) and Rozin and Kalat (1971) indicated that consuming foods containing specific nutrients necessary for the proper functioning of the body is the product of adaptive specialization or learning. Therefore, specific hunger is a product of learning, in which variables such as post-ingestive effects produced by the ingested food and which can be beneficial or aversive for the organism (as an example of the latter, we can cite conditioned aversion to taste) are involved. Specific hunger could be considered as the result of the association made by an organism between a particular food (with certain orosensory qualities, such as taste and smell) and its beneficial post-ingestive effects.

Appetite could be called the psychological aspect of eating behavior, given that there is a relationship between the sensations of the smell and taste of food and the affective response that these generate. In this sense, it could be pointed out that appetite is determined by different elements of the environment (Booth, 1987; Turró, 1912).

Rowland (1990) stated that there are two types of "appetite": innate and acquired. The latter is the product of learning, in which a subject associates a particular taste (or any other oral-sensory characteristic of food) with specific post-ingestive effects.

For Young (1941), appetite is the body's demand for a specific food or nutrient. Based on this definition, Young proposed the terms partial hunger and specific appetites as synonyms for appetite and considered that this is an "infallible guide" for the organism, as it will feel appetite only for those foods that have the orosensory characteristics associated with substances that will adequately cover its nutritional needs.

On the other hand, Le Magnen (1999) distinguished between two kinds of appetite: appetite and specific appetites. Appetite is a reflection of orally stimulated consumption, controlled by the characteristics of the food, such as taste and smell. On the other hand, specific appetites are based on learning and consist of ingestive responses produced by the conditioned stimulus of food. Specific appetite, then, refers to a taste-determined preference in which the post-ingestive effects of food do not play a part. However, the term preference is not entirely adequate for Young (1966) because preference can be determined not only by the organ sensory characteristics of the food but also by other conditions, such as the availability of the food, the difficulty of consuming it, and the benefits of one food over another.

Rozin (2002) distinguished between preference and taste. He indicated that preference implies choosing one

https://doi.org/10.56294/mw2024478

food from two or more presented. On the other hand, taste constitutes one of the determinants of preference since taste refers to an affective response to food, consisting of the orosensory properties of the food being pleasant for the subject.

In this way, appetite is a preference determined by taste, which can be learned or innate. Unlike hunger, appetite is "guided" by food's orosensory qualities, which can be learned or innate (Sclafani, 1997).

By the definitions referred to above, it could be concluded that specific hunger (Turró, 1912), particular appetites (Le Magnen, 1999), and the appetite described by Young (1941) are concepts that refer to the same phenomenon.

Satiety is understood as a terminal state of the organism from which food intake is reduced or terminated (Carlson, 1996). Young (1966) distinguished between two types: partial and total satiety. In partial satiety, an organism satiated with one food will accept a different kind of food; in total satiety, on the other hand, the subject will not accept any food. This suggests that the sensory characteristics and nutritional content of food can determine the consumption or rejection of food when a variety of diets are available (Johnson & Vickers, 1993). Thus, in the case of partial satiety, we could be talking about satiety of appetite, as it depends on the orosensory characteristics of the food. In the case of total satiety, it would be consistent to speak of hunger satiety since it does not depend on the orosensory qualities of the food but on the organism's physiological state.

However, some subjects exposed to various foods consume more calories than they need to meet their needs. The body may have met its caloric and nutritional needs by having consumed a particular food that satisfies its hunger, yet show an appetite for other foods with different orosensory characteristics (Hetherington & Rolls, 1996; Raynor & Epstein, 2001). The subject probably continues to consume these foods without being hungry. However, at a certain point, the subject has to stop eating, even though the food is still appetizing. This is total satiety, which does not necessarily coincide with hunger satiety. The subject's hunger was likely satisfied long before total satiety set in.

Numerous studies have reported that subjects who have a variety of foods with different orosensory characteristics available to them consume a greater quantity of food than subjects with access to only one type of food (Armitage, Hervey, Rolls, Rowe & Tobin, 1983; Barber, Viña, Viña & Cabo, 1985; Booth, 1987; Hetherington & Rolls, 1996; Johnson & Vickers, 1993; McCrory, et al., 1999; Ramírez, 1987; Raynor & Epstein, 2001; Rolls, 1990; Rolls, Rowe, Rolls, Kingston, Megson, & Gunary, 1980).

Finally, it should be noted that hunger, satiety, and appetite present conceptual differences that depend on the discipline from which their definition is derived. On the one hand, hunger, satiety, and appetite are related to physiological processes in the body that allow it to meet internal energy demands. These processes are studied by physiology and biology. On the other hand, appetite, taste, and preference are related to psychological aspects that involve individual characteristics determined by the environment and are studied by psychology, anthropology, and other social sciences.

Specific Sensory Satiety Theory

In a recent work, B. J. Rolls and his collaborators (1981) proposed the Specific Sensory Satiety Theory (CST), which explains one of the causes of the over-ingestion of varied foods. This phenomenon involves a decrease in preference and intake for foods consumed on several occasions due to sensory saturation. On the other hand, if a food with different sensory properties is presented, the subject will continue to consume this food despite their state of satiety. This indicates that satiety can be specific to a food. Therefore, exposure to varied diets maintains intake for prolonged periods, as well as causing greater consumption (Hetherington, 1996; Hetherington, Foster, Newman, Anderson & Norton, 2006; Hetherington & Rolls, 1996; Meiselman, 1996; Raynor & Epstein, 2001; Rolls, 1985; Rolls, 1993; Rolls, 2007; Rolls, Rolls, Rowe & Sweeney, 1981; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981; Rolls, Rowe & Rolls, 1982a; Rolls, Rowe & Rolls, 1982b). Some theoretical contributions that predate the SSST will be reviewed below.

Background

Set point theory

Set point theory postulates that hunger is a lack of energy and eating is how energy resources recover their optimal level (Pinel, 2007, p.326).

According to Pinel (2007, p. 327), the Set Point Theory has some limitations, as it fails to explain how some metabolic problems and eating disorders develop fully. Pinel (2007, p. 327) pointed out that this theory does not recognize the influence of taste, learning, food availability, and other social factors on hunger, selection, consumption, and satiety. From these limitations arises the Positive Incentive Theory, which proposes that what moves humans and other animals to eat is not an internal lack of energy but rather the pleasure anticipated from ingesting food (Pinel, 2007, p.327). This theory recognizes that there are a large number of factors that interact with each other to determine the degree of hunger an individual feels. Therefore, no single element defines the degree of hunger in the individual (Pinel, 2007, p. 327).

https://doi.org/10.56294/mw2024478

Habituation

Raynor and Epstein (2001) pointed out that consuming foods with various flavors, smells, textures, or shapes provides a different "sensory experience" from what occurs when eating a single food. That is to say, consuming a varied diet during a meal changes the "sensory experience," while consuming a monotonous food provides a constant "sensory experience."

The aforementioned effect can be explained by habituation, understood as a behavioral phenomenon in which the response to certain stimuli decreases as a consequence of repeated exposure to them. The increase in the consumption of varied foods is due to the slow habituation to the sensory properties of these foods, in comparison with the effects observed in exposure to monotonous foods, with which habituation occurs in a short time (Hetherington & Rolls, 1996; Raynor & Epstein, 2001).

The primary technique for evaluating habituation is repeatedly providing a food or substance. After several exposures, the impact of these substances on subsequent consumption is evaluated. Subsequently, a different food or substance is provided with the aim of restoring the response. Suppose the new or disaccustoming stimulus causes an increase in the reaction. In that case, it is considered to be due to the change in the reinforcing value of the food, and it is ruled out that the initial responses are due to situations such as muscle fatigue and post-ingestive consequences. On the other hand, if the acceptance and intake of food decreases, it is considered a consequence of the habituation process. These data provide evidence to support the TSSE (Hetherington & Rolls, 1996; Raynor & Epstein, 2001).

Reaction to flavors

It has been observed that satiety is caused, to a greater extent, by repeated exposure to the flavor of food than by its post-ingestive effects, that is, by the caloric density it contains and the nutritional benefits it may provide.

Cabanac (1971, p. 1107) pointed out that a stimulus can induce a sensation of pleasure or displeasure in the subject, depending on the latter's internal state. Cabanac (1971, p. 1105) called this phenomenon anesthesia (a word composed of the phrases esthesia, which means sensation, and allies, which means change).

Cabanac's (1971) studies on allesthesia showed that the reinforcing value of food depended mainly on the degree of deprivation of the subject. Additionally, the degree of deprivation of the subjects influences food consumption, and satiety occurs when the caloric amount necessary for the organism is consumed. From the above, it can be pointed out that an individual in a considerable state of deprivation will consume a substance or food in a short period, generating a pleasant sensation for them; however, after ingesting a greater quantity of food (or substance), the individual will experience an unpleasant sensation before the stomach's receptors indicate to the brain's receptors that the level of satiety has been reached, that is, that the body's caloric requirements have been met.

Based on the above and other data, Berridge (1991, cited in Hetherington & Rolls, 1996) conducted various experiments that evaluated appetite or the "tendency to eat" and the degree of pleasure/displeasure produced by administering various substances with different flavors. The author found that satiety and the time at which it occurred depended largely on the taste of the substance given to the subjects and, to a lesser extent, on the caloric density of each substance.

These studies indicated that repeated exposure to a flavor produces different chemical reactions in the taste buds and a decrease in the pleasure produced by the food. Because of this, satiety occurs more quickly than when the food contains a high caloric density. In this sense, there is a greater probability that an organism will decrease its consumption of a specific food when it has become satiated with its flavor than by the amount of calories consumed (Hetherington & Rolls, 1996).

In general terms, the TSSE adopts the Set Point Theory, which states that an individual will initiate food consumption when they require energy. The Habituation Theory proposes that the individual will stop responding (or consuming food) after becoming accustomed to specific stimulus characteristics (in this case, the taste of the food). Finally, studies on reaction to tastes indicate that the taste of food (stimuli) plays a significant role in satiety, exerting a greater influence than the caloric content of the food.

Experimental studies on Specific Sensory Satiety and their main findings

Specific sensory satiety has been analyzed from different psychological perspectives and has focused on aspects such as neuropsychological reactions (Rolls, 2007), cognitive aspects (Hetherington & Rolls, 1996; Rolls, 2007; Rolls, Rolls, Rowe & Sweeney, 1981), and/or sensory (Rolls, Rolls, Rowe & Sweeney, 1981; Rolls, Rowe & Rolls, 1982a; Rolls, Rowe & Rolls, 1982b) aspects that influence the maintenance or termination of food consumption, among others.

In Specific Sensory Satiation (SSS) experiments, the common procedure is as follows: first, participants are presented with a group of foods as a sample and are asked to rate the acceptability of the flavors of the samples. Subsequently, one of the samples is provided to each of the participants, and they are instructed to consume as much as they wish until they are satisfied. Finally, the participants rate again the foods that were

https://doi.org/10.56294/mw2024478

presented to them at the beginning (Raynor & Epstein, 2001).

Generally, studies on SSS are based on verbal reports on the acceptability of food (the pleasure and liking or disliking according to the sensory properties) and the appetite (desire to continue eating). In addition, reports are made on the hunger and satiety states of the participants, before and after exposure to the food (Guinard & Brun, 1998; Hetherington, 1996; Hetherington, Foster, Newman, Anderson & Norton, 2006; Hetherington & Rolls, 1996; Hetherington, Rolls & Burley, 1989; McCrory, et al., 1999; Rolls, 1985; Rolls & McDermott, 1991; Rolls, Rolls, Rowe & Sweeney, 1981; Rolls, van Duijvenvoorde & Rolls, 1984; Smeets & Westerterp-Plantega, 2006; Snoek, Huntjens, van Gemert, de Graaf & Weenen, 2004).

Hetherington (1996) pointed out that the first reason for terminating food consumption is total satiety and, to a lesser extent, sensory satiety for a specific food. This leads us to conclude that satiety depends on both aspects and is not restricted to the influence of one of them.

It has also been pointed out that the acceptability and consumption of foods with markedly different sensory characteristics are more significant than the acceptability and consumption of foods with sensory traits very similar to those consumed during a meal (Raynor & Epstein, 2001; Rolls, Rolls, Rowe & Sweeney, 1981). Due to the above, one of the most significant effects of SSE is consuming varied foods during a meal (short-term exposure) (Rolls, 1993; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981). It has been observed that the smell and taste of food are the characteristics that have the most significant influence on SSE. The texture and appearance of food come second. On the other hand, it has been observed that the colors of food only influence subsequent selections of the same (Guinard & Brun, 1998; Rolls, 1985; Rolls, 1993; Rolls, Rowe & Rolls, 1982a; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981).

In addition, it has been observed that after a meal, the acceptability of foods consumed to satiety decreases markedly, while the acceptability of uneaten foods remains relatively stable. This acceptability influences the long-term choice and consumption of subjects (Hetherington & Rolls, 1996; Hetherington, Rolls & Burley, 1989; Meiselman, 1996; Rolls, 1985; Rolls, 1993; Rolls, Rowe & Rolls, 1982a; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981; Smeets & Westerterp-Plantega, 2006).

However, it is essential to point out that most studies focus on the short-term effects, that is, the effects observed in a single meal. Because of this, it is worth asking what happens if monotonous diets are presented over prolonged periods and what effects of specific sensory satiety are presented in the long term.

For example, Rolls and de Waal (1985) studied the preference for certain foods in a group of refugees in Ethiopia who were exposed to a monotonous diet for a period of 6 months. The authors measured changes in body composition and energy regulation and found a decrease in food acceptability and the emergence of different behaviors in search of a varied diet (McCrory et al., 1999; Meiselman, 1996; Rolls, 1993; Rolls & de Waal, 1985).

On the other hand, some studies have evaluated the acquisition of SSE and its relationship with variables such as age (Rolls & McDermott, 1991) and body weight (obese, overweight, or normal weight) (McCrory et al., 1999).

In relation to age, adolescents have been found to have a higher degree of SSE than the elderly, while in adults, this phenomenon is found at a medium level (Rolls & McDermott, 1991). On the other hand, neither the weight nor the body mass index of the subjects influences the degree of acquisition of SSE (McCrory et al., 1999; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981; Snoek, Huntjens, van Gemert, de Graaf & Weenenen, 2004).

Finally, it should be noted that based on knowledge of the basic mechanisms involved in specific sensory satiety, improvements in the human diet can be proposed. Continuous stimulation of the palate enables the selection of a varied diet, increasing the taste and consumption of diets with an adequate balance of nutrients that allows subjects to maintain an appropriate weight and state of health.

Monotony and sensory variety of food and their influence on eating behavior

Studies on the sensory variety and monotony of food are closely related to the evaluation of Specific Sensory Satiation, as these diets have been proposed as tools for studying this phenomenon.

A diet is considered monotonous when composed of foods with similar sensory characteristics and/or post-ingestive consequences. Several studies have observed that when this type of food is provided at a meal, there is no notable consumption; therefore, the greater the variety of foods in terms of their sensory characteristics, the more significant the increase in food intake during a meal (Raynor & Epstein, 2001; Rolls, 1985; Rolls, 1993; Rolls, Rowe & Rolls, 1982a; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981).

On the other hand, a diet is considered to be varied when it is composed of foods with at least one different sensory characteristic and/or by the differences in the post-ingestive consequences it generates (Hetherington & Rolls, 1996; Le Magnen, 1987; Meiselman, 1996; Raynor & Epstein, 2001; Rolls, 1985; Rolls, 2007; Rolls, Rowe & Rolls, 1982b).

In the studies that analyze the influence of food variety on intake, different experimental preparations have been made to present diets with dissimilar ingredients, making them distinct from each other. One of

the preparations consists of presenting the diet successively, that is to say, a meal composed of various dishes, offered separately, in such a way that there is a new meal in each interval (Hetherington, 1996; Hetherington, Foster, Newman, Anderson & Norton, 2006; Hetherington, Rolls & Burley, 1989; Rolls, Rowe & Rolls, 1982a; Rolls, Rowe & Rolls, 1982b; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981; Rolls, Rolls, Rowe & Sweeney, 1981; Rolls, van Duijvenvoorde & Rolls, 1984). Another experimental preparation consists of presenting the diet simultaneously (buffet style), that is, different foods provided simultaneously (i.e. Hetherington, Foster, Newman, Anderson & Norton, 2006). In these studies, participants are asked to consume until satiated and are commonly exposed to the same, similar, or different diets, depending on the study's objective (Raynor & Epstein, 2001).

Rolls and his collaborators (1981) pointed out that the successive presentation of food is more appropriate than simultaneous presentation because, in this type of arrangement, it is difficult to determine whether subjects consume more because of the availability of their favorite food or the variety.

On the other hand, it has been reported that the simultaneous presentation of food (buffet style) leads to greater intake compared to a situation in which food is presented successively (intermittent/timed eating) (Hetherington, Rolls & Burley, 1989; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981). Furthermore, it has been suggested that the number of courses presented in a meal in succession influences the amount of food consumed in both monotonous and varied conditions (Hetherington, Foster, Newman, Anderson & Norton, 2006; Hetherington, Rolls & Burley, 1989; Rolls, Rowe & Rolls, 1982a; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981; Rolls, van Duijvenvoorde & Rolls, 1984; Raynor & Epstein, 2001).

Among the study variables considered in this research, the amount of food consumed and calorie intake are traditionally analyzed (Guinard & Brun, 1998; McCrory et al., 1999; Rolls & McDermott, 1991; Rolls, Rolls, Rowe & Sweeney, 1981; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981; Rolls, van Duijvenvoorde & Rolls, 1984; Snoek, Huntjens, van Gemert, de Graaf & Weenen, 2004), as well as changes in the subjects' weight, fat gain, and/or fat loss, among other physiognomic aspects (McCrory et al., 1999; Raynor & Epstein, 2001; Rolls, 1985; Rolls & de Waal, 1985).

In conclusion, it is essential to point out that the effects of variety have been observed even in studies in which the quantity of nutrients and the calories in food are controlled (Raynor & Epstein, 2001; Rolls, Rowe & Rolls, 1982b), from which it can be inferred that the effects of variety depend mainly on the variation in their sensory characteristics.

On the other hand, to assess the effects of the sensory properties of food, some studies manipulate these variables while maintaining the energy content to maintain experimental control and obtain reliable data (Rolls, 1985; Rolls, 2001; Rolls, 2005; Rolls, 2007; Rolls, Rowe & Rolls, 1982a; Rolls, Rolls, Rowe & Sweeney, 1981; Rolls, Rowe, Rolls, Kingston, Megson & Gunary, 1981) or, on the contrary, the energy content of the food is modified, while its sensory characteristics are preserved (Rolls, 1993). In other experiments, both conditions varied (Snoek, Huntjens, van Gemert, de Graaf & Weenen, 2004).

The main conclusion reached in these studies is that the monotony and variety of food influence both the selection and consumption of food (Meiselman, 1996; Rolls, 1985; Rolls, 1993; Rolls, Rowe & Rolls, 1982a; Rolls, van Duijvenvoorde & Rolls, 1984).

Experimental Analysis of Eating Behavior

The various psychological studies on eating behavior provide information about what, when, and how much we eat. Some important data obtained in these studies indicate that most humans have a preference for sweet, fatty, and salty foods. In contrast, bitter and acidic foods are aversive (Pinel, 2007; Rozin, 1996a; Rozin, 1996b).

In addition, it has been found that individuals learn certain aversions and preferences for specific flavors, even from an early age (Rozin, 1996a; Rozin, 1996b). Preferences are generally associated with positive post-ingestive consequences, such as the contribution of calories, vitamins, minerals, and other nutrients to the body. On the contrary, aversions are associated with unpleasant or negative post-ingestive consequences, such as illness and even death (Pinel, 2007).

One of the main contributions of the Experimental Analysis of Behavior in studying human eating behavior has been the topographical measurement and operational definition of such behavior. The main parameters of this behavior are quantity, latency, frequency, sequence, and duration. These parameters can be recorded by means of video recordings, audio recordings, or behavioral and psychophysiological records made at the moment the behavior is performed. This way, a deeper and more objective analysis of each behavior can be carried out (Kazdin, 2000).

CONCLUSIONS

The Specific Sensory Satiety Theory has proven to be a relevant model for understanding how sensory variety and monotony influence eating behavior. From the studies analyzed, it has been shown that individuals tend to consume more food when offered a varied diet as opposed to a monotonous one. This phenomenon is explained by sensory habituation, which reduces the perceived pleasure of repeatedly consuming the same food, thus

https://doi.org/10.56294/mw2024478

encouraging the search for new sensory experiences.

In addition, experimental research has revealed that the simultaneous or successive presentation of food also influences intake, suggesting that the organization of meals can play a key role in regulating consumption. The interaction between flavor, texture, and other sensory properties with the physiological and psychological processes of appetite and satiety reinforces the idea that energy needs and sensory and environmental factors determine food.

These findings have significant implications for the prevention of obesity and the promotion of healthy eating habits. The excessive availability of highly palatable and sensorial diverse foods can encourage overconsumption, while dietary strategies that regulate exposure to these stimuli could contribute to better self-regulation of intake. Future studies should focus on understanding the long-term effects of SSBT and designing interventions that balance dietary variety with adequate control of energy intake.

REFERENCES

1. Armitage G, Hervey GR, Rolls BJ, Rowe EA, Tobin G. The effects of supplementation of the diet with highly palatable foods upon energy balance in the rat. J Physiol. 1983;342:229-51.

2. Asociación Psiquiátrica Americana. Manual Diagnóstico y Estadístico de los Trastornos Mentales DSM-IV-TR. Barcelona: Edit. Toray Masson; 2005.

3. Barber T, Viña JR, Viña J, Cabo J. Decreased urea synthesis in cafeteria-diet-induced obesity in the rat. Biochem J. 1985;230:675-81.

4. Becoña E, Vázquez F, Oblitas L. Promoción de los estilos de vida saludables. Investig En Detalle [Internet]. 2004;5. Disponible en: http://www.alapsa.org/detalle/05/index.htm

5. Blundel JE. Serotonin and appetite. Neuropharmacology. 1984;22:1537-51.

6. Bolles RC. A functionalistic approach to feeding. En: Capaldi ED, Powley TL, editores. Taste, Experience and Feeding: Development and learning. Washington, D.C.: American Psychological Association; 1993. p. 3-13.

7. Booth DA. Satiety and appetite are conditioned reactions. Psychosom Med. 1977;39:76-81.

8. Booth DA. Cognitive experimental psychology of appetite. En: Boakes RA, Popplewell DA, Burton MJ, edito-res. Eating habits: food, physiology and learned behavior. Gran Bretaña: John Wiley & Sons Ltd; 1987. p. 175-209.

9. Brobeck JR. Food and temperature. Recent Prog Horm Res. 1960;16:439-66.

10. Cabanac M. Physiological role of pleasure. Science. 1971;173:1103-7.

11. Cannon WB, Washburn AL. An explanation of hunger. Am J Physiol. 1912;29:441-54.

12. Capaldi ED. Hunger and conditioned flavor preferences. En: Capaldi ED, Powley TL, editores. Taste, Expe-rience, & Feeding: Development and Learning. Washington, D.C.: American Psychological Association; 1993. p. 157-69.

13. Capaldi ED. Conditioned food preferences. En: Capaldi ED, editor. Why we eat, What we eat. Washington, D.C.: American Psychological Association; 1996. p. 53-80.

14. Carlson NR. Fundamentos de Psicología Fisiológica. España: Prentice Hall; 1996.

15. Fernández AF. Tratamiento cognitivo-conductual de los trastornos de la conducta alimentaria (TCA): Anorexia y bulimia nerviosas. En: Caballo VE, editor. Manual para el tratamiento cognitivo-conductual de los trastornos psicológicos. Vol. 2. México: Siglo XXI; 1998. p. 185-208.

16. Foote JA, Murphy SP, Wilkens LR, Basiotis PP, Carlson A. Dietary Variety Increases the Probability of Nutri-ent Adequacy among Adults. J Nutr. 2004;134:1779–85.

17. Guinard JX, Brun P. Sensory-specific satiety: comparison of taste and texture effects. Appetite. 1998;31:141-57.

https://doi.org/10.56294/mw2024478

18. Herman CP, Polivy J. What does abnormal eating tell us about normal eating? En: Meiselman HL, MacFie HJH, editores. Food choice acceptance and consumption. Gran Bretaña: Blackie Academic & Professional; 1996. p. 207-38.

19. Hetherington MM, Rolls BJ. Sensory-Specific Satiety: Theoretical Frameworks and Central Characteristics. En: Capaldi ED, editor. Why We Eat, What We Eat: The psychology of Eating. Washington, D.C.: American Psychological Association; 1996. p. 267-90.

20. Hetherington MM. Sensory-Specific Satiety and its importance in meal termination. Neurosci Biobehav Rev. 1996;20:113-7.

21. Hetherington MM, Foster R, Newman T, Anderson AS, Norton G. Understanding variety: tasting different foods delay satiation. Physiol Behav. 2006;87:263-71.

22. Hetherington MM, Pirie LM, Nabb S. Stimulus satiation: effects of repeated exposure to foods on pleasantness and intake. Appetite. 2002;38:19-28.

23. Hetherington MM, Rolls BJ, Burley VJ. The time course of sensory-specific satiety. Appetite. 1989;12:57-68.

24. Johnson J, Vickers Z. Effects of flavor and macronutrient composition of food servings on liking, hunger and subsequent intake. Appetite. 1993;21:25-39.

25. Junta de Andalucía. Consejería de Asuntos Sociales. II Plan Andaluz Sobre Drogas y Adicciones. España: Con-sejería para la Igualdad y Bienestar Social, y Dia Cash, SL; 2002-2007.

26. Kazdin AE. Modificación de la conducta y sus aplicaciones prácticas. México: Manual Moderno; 2000.

27. Kennedy GC. The role of depot fat in the hypothalamic control and hormones during growth. Ann N Y Acad Sci. 1953;157:1049-60.

28. Le Magnen J. Efficacy of olfatory, tactile and other food stimuli in the acquisition and manifestation of ap-petite in rats. Appetite. 1999;33:43-51.

29. López-Espinoza A. Análisis experimental de la conducta alimentaria. An Psicol. 2007;23(2):258-63.

30. Martínez AG, López-Espinoza A, Aguilera V, Galindo A, De la Torre-Ibarra C. Observación y experimentación en psicología: una revisión histórica. Diversitas. 2007;3(2):213-25.

31. Marván LL, Pérez LA, Palacios GB. Sistema Mexicano de Alimentos Equivalentes. México: Fomento de Nu-trición y Salud, AC; 2004.

32. Mayer J. Regulation of energy intake and body weight. The glucostatic theory and the lipostatic hypothesis. Ann N Y Acad Sci. 1955;63:15-43.

33. McCrory MA, Fuss PJ, McCallum JE, Yao M, Vinken AG, Hays NP, Roberts SB. Dietary variety within food groups: association with energy intake and body fatness in men and women. Am J Clin Nutr. 1999;69:440-7.

34. Meiselman HL. The contextual basis for food acceptance, food choice and food intake: the food, the situa-tion and the individual. En: Meiselman HL, MacFie HJH, editores. Food choice acceptance and consumption. Gran Bretaña: Blackie Academic & Professional; 1996. p. 239-63.

35. Pavlov IP. Conditioned reflexes. London: Oxford University Press; 1927.

36. Pinel JPJ. Biopsicología. España: Pearson; 2007.

37. Rolls BJ. Experimental analyses of the effects of variety in a meal on human feeding. Am J Clin Nutr. 1985;42:932-9.

38. Rolls BJ, van Duijvenvoorde PM, Rolls ET. Pleasantness changes and food intake in a varied four-course

meal. Appetite. 1984;5:337-48.

39. Rozin P. Sociocultural influences on human food selection. En: Capaldi ED, editor. Why we eat, what we eat: The psychology of eating. Washington, D.C.: American Psychological Association; 1996. p. 233-63.

40. Unikel SC, Caballero RA. Guía Clínica para trastornos de la Conducta Alimentaria. México: Instituto Nacio-nal de Psiquiatría Ramón de la Fuente; 2010.

41. Weingarten HP. Learning, homeostasis, and the control of feeding behavior. En: Capaldi ED, Powley TL, ed-itores. Taste, Experience and Feeding: Development and learning. Washington, D.C.: American Psychological Association; 1993. p. 14-27.

42. Young PT. The experimental analysis of appetite. Psychol Bull. 1941;38(3):129-64.

43. Young PT. Hedonic organization and regulation of behavior. Psychol Rev. 1966;73(1):59-86.

FINANCIAL SUPPORT

None.

CONFLICT OF INTEREST

None.

CONTRIBUTION OF AUTHORSHIP

Conceptualization: Carolina De La Torre Ibarra.
Data curation: Carolina De La Torre Ibarra.
Formal analysis: Carolina De La Torre Ibarra.
Research: Carolina De La Torre Ibarra.
Methodology: Carolina De La Torre Ibarra.
Project administration: Carolina De La Torre Ibarra.
Resources: Carolina De La Torre Ibarra.
Software: Carolina De La Torre Ibarra.
Supervision: Carolina De La Torre Ibarra.
Validation: Carolina De La Torre Ibarra.
Visualization: Carolina De La Torre Ibarra.
Writing – original draft: Carolina De La Torre Ibarra.
Writing – review and editing: Carolina De La Torre Ibarra.