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Expectations Do Not Always Influence Food Liking

Jamie Phillip Hale
Eastern Kentucky University

CRITICAL THINKING AND ENVIRONMENTAL FACTORS

By

Jamie Hale

Thesis Approved:

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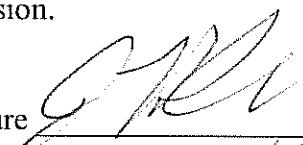
Signature 

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By

Jamie Hale

Bachelor of Science
Eastern Kentucky University
Richmond, Kentucky
1993

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Abstract

The purpose of the present experiment was to examine how expectations influence cracker ratings on a scale of likeability. A large body of research shows that expectations affect food experiences (Wansink, 2004; Eertmans, Baeyens & Van den Bergh, 2001; Kahkonen & Tuorila, 1998). Participants were not aware that the primary interest of the study was how expectations influence cracker ratings. Participants were assigned to either a positive expectation group or a neutral expectation group. Participants in the positive expectation group received a positive verbal cue indicating that the crackers had recently been rated high in a national taste test. The neutral expectation group did not receive the information concerning the national taste test. Participants were administered critical thinking tasks while consuming crackers. It was hypothesized that those in the positive expectation group would rate the crackers higher than those in the neutral expectation group. The results of the study did not support the hypothesis. There was no difference in how the groups rated the crackers.

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CHAPTER I

INTRODUCTION

People usually have expectations about how well they will enjoy a food before they decide to eat it. These expectations may be based on previous experiences, information about the product, and appearance of the product or other salient cues. Positive or negative expectations often determine whether or not the individual chooses to consume the food. People in the food industry often provide information or set up conditions to optimize the consumers experience and expectation of food. Advertisers are also aware of expectations and how they influence food choices. One of the primary objectives of advertisers is to present the food in a way that leads to the consumer having positive expectations of the food. A large body of research shows that expectations affect food experiences (Wansink, 2004; Eertmans, Baeyens & Van den Bergh, 2001; Kahkonen & Tuorila, 1998). Our taste and flavor likings are biased by our expectations and in many circumstances if you expect that you will like a food you probably will. However, expectation also works in the opposite direction; expect a food to taste unpleasant and it probably will (Wansink, 2006).

The primary area of focus in this study is how expectation affects food liking. Research shows expectation often plays a big role in the pleasure derived from food (Wansink, 2006; Eertmans, Baeyens, & Van den Bergh, 2001; Wansink, 2004). In addition to the influence expectation has on food liking, expectation (or induced

expectation) plays a big role in many other behaviors and experiences. As a secondary focus the influence of expectations in other areas will be discussed.

In the subsequent sections the following will be discussed: why the study of food likes is important, taste and flavor, and expectations and food related behaviors. In this paper previous research regarding expectations and food will be discussed by referring to four general categories: beliefs about labels, beliefs about food composition, price of food and food presentation. In addition there will be a brief mention of expectations from other fields of study, because expectations' influence is not restricted to the domain of food.

CHAPTER II

LITERATURE REVIEW

Food Likes / Dislikes

The influence of food liking on eating behavior has been demonstrated in several domains, including meal duration, rate of eating, amount eaten, (Spitzer & Rodin, 1981) and frequency of eating (Woodward, Boon, Cumming, Ball, Williams, & Hornsby, 1996).

Tuorila and Pangborn (1988**)** obtained questionnaire information about women's intended and reported ingestion of four foods and one category of foods- milk, cheese, ice cream, chocolate and high fat foods. They found that liking of food was a stronger predictor of consumption than health beliefs of the food. Woodward and colleagues (1996) found that liking and parent's consumption of the foods, rather than perceptions of health benefits of the foods could better predict self -reported frequency of food intake. Wardle (1993) found that taste was a more reliable predictor of food intake than health considerations. Steptoe and colleagues (1995) developed the Food Choice Questionnaire as a multidimensional measure of motives related to food choice. They found sensory appeal, health, convenience and price as the most important factors influencing eating behavior.

The best predictor of vegetable and fruit intake in children is whether or not they like the taste or flavor of these foods (Resnicow, Davis- Hearn, Smith, Baranowski, Lin,

Baranowski, Doyle, & Wang, 1997). The evidence concerning the impact of food likes on eating behavior is not completely decisive, but the preponderance of evidence suggests that food likes play a major role in eating behavior (Eertmans, Baeyens, & Van den Bergh, 2001; Beauchamp & Mennella, 2009; Rozin, 1990). It is important to note, food liking is relatively unstable and is one of many factors that influence eating behaviors (Donaldson, Bennett, Baic, & Melichar, 2009). But, this doesn't negate the importance of liking and its contribution to eating behavior. Discrepancies have been reported between food liking and food consumption (Eertmans, Baeyens, & Van den Bergh, 2001). As an example Lucas and Bellisle (1987) found that individuals who preferred medium to high sucrose or aspartame levels in a dairy product (based on sensory evaluation using spit and taste tests), actually chose lower levels for actual intake. It appears that these inconsistencies between food likes and actual consumption are influenced by several factors.

Taste & Flavor

Taste and flavor are terms that are often confused. Taste is determined by the gustatory system (sensory system of taste) located in the mouth. Flavor is determined by taste, smell and somatosensation.

Taste preference is strongly influenced by innate factors (Barotshuk & Beauchamp, 1994). Flavor preference is also influenced by innate factors, but more dependent on learning (Beuachamp & Menella, 2009). Humans display a strong innate preference for sweet and salty foods and beverages. Presumably, liking for sweet tastes

is an evolutionary development in plant eating animals. It is proposed that sweet tastes reflect caloric sugars, and distinguishes poisonous from non-poisonous plants (bitter taste in poisonous plants) (Beauchamp & Mennella, 2009). Getting caloric sugars and avoiding poisonous substances were both important aspects involved with survival in our ancestors. Preference for salty tastes may have evolved due to salts importance to neuronal health and hydration status. Sodium must be present in relatively large quantities to maintain nerve and muscle function (Wolfe, Kluender, Levi, Barotshuk, Herz, Klatzky & Lederman, 2006). Human infants as young as 4 months of age prefer salt water to plain water, and by the age of 2 their preference for salty foods is even greater (Cowart & Beauchamp, 1986). Bitter tastes are innately disliked, presumably because many bitter compounds in the wild are poisonous. From an evolutionary perspective we have evolved sensory systems that protect us from being poisoned, presumably leading to a natural dislike for bitter compounds (Beauchamp & Menella, 2009; Drewnowski, Henderson, & Fornell, 2001). Sour tastes are also innately disliked (Wolfe, Kluender, Levi, Barotshuk, Herz, Klatzky & Lederman, 2006). Sour tastes are the tastes of acids which at high levels may lead to tissue damage.

Smell (olfaction) occurs when chemicals stimulate olfactory receptors on a relatively small area of tissue found high in the nasal cavity. Olfaction is important for flavor perception. Olfactory receptors are thought to bind with odorants (smell / chemical molecules) that have been dissolved in mucus in the olfactory region of the nose. Each receptor is able to recognize only a small number of odorants. In contrast to the small number of tastes we detect, we can detect thousands of odors, thus contributing to the wide range of flavors we experience. When we chew and swallow food molecules are

released into the air inside of our mouths and forced up behind the palate into the nasal cavity where they stimulate olfactory receptors.

Evidence indicates that most odor preferences are learned. As an example, infants find the smells of sweat and feces pleasant and toddlers do not differentiate between odorants that adults find pleasant or unpleasant. Another example is Asians consider the smell of cheese to be very unpleasant, yet Westerners often consider the smell pleasant (Wolfe, Kluender, Levi, Barotshuk, Herz, Klatzky & Lederman, 2006).

Somatosensation is detected by receptors in the skin throughout the head; and in particularly in regards to food- receptors in the mouth and nose- an example is the burn of hot peppers and the cooling effect of menthol (Mennella, Jagnow, & Beauchamp, 2001). Somatosensation results from chemicals stimulating receptors and free nerve endings of the trigeminal (pair of cranial nerves which transmits somatosensation information from the face) and vagus nerves (pair of cranial nerves which transmits information about the heart, lungs, gastrointestinal tract, bronchi, trachea and larynx) leading to oral perceptions such as heat, pain, coolness, tickle, itch and tingling. Studies indicate that irritating sensations are important for flavor evaluation (Beauchamp & Mennella, 2009).

The most prominent feature of the food and drinks we consume is flavor. Flavor is defined as the perceptual combination of taste, smell, and somatosensation. Flavor preferences are highly influenced by early life experiences, even in utero experiences. Prenatal exposure to food flavors, which are transmitted from mother's diet to amniotic fluid, lead to increased acceptance and pleasure from these foods during weaning. In an experimental study, it was found that infants whose mother's drank carrot juice during the last trimester of pregnancy liked carrot-flavored cereals more than infants whose

mothers did not drink carrot juice or eat carrots (Mennella, Jagnow & Beauchamp, 2001). Flavor learning also occurs as a consequence of exposure to nutrients in human milk. Human milk is composed of the flavors that represent the food, and drinks ingested by the mother. Exposure to specific flavors in the mother's milk affects infants' liking of that flavor (Mennella, Jagnow & Beauchamp, 2001).

Expectations & Food

This section includes a discussion of expectations and their influence in food related areas.

Expectation is a difficult concept to precisely define, as it may involve various factors and mechanisms (Benedetti, 2009). Expectations often involve hope, previous learning, beliefs, anxiety, motivation and anticipations. The effects of expectations may be moderated by other cognitive processes such as decreases in negative thoughts, and increases in positive thoughts. Expectation can be thought of as a multi-component concept. In this paper expectation refers to beliefs or anticipations of a future outcome or response (reaction), similar to Kirsch's response expectancies (Kirsch, 1985).

In the following sections studies will be presented that examined different categories of food expectations: beliefs about labels, food presentation, beliefs about food composition and price of food.

Beliefs About Labels

The studies mentioned in this section reveal the strong influence that labeling can have on food preferences. In the following studies it is shown that labeling may be influential across a variety of different contexts.

Yeomans et al. (2008) conducted a study that looked at expectations related to food flavor by using an unusual flavor of ice cream: smoked salmon. One group ate the ice cream from a dish labeled "Ice cream" and another group ate the ice cream from a dish labeled "Frozen savory mousse." The experience of the food in the mouth generated strong dislike when labeled as ice-cream, but acceptance when labeled as frozen savory mousse. Labeling the food as ice-cream also resulted in stronger ratings of how salty and savory the food was than when labeled as a savory food. The individuals that ate the frozen savory mousse found the ice cream less salty and bitter, and found its overall flavor more pleasant.

Forty-nine graduate students at a wine and cheese reception were presented with wine with a label indicating it was from either California or North Dakota (Wansink, 2007). Actually, the wine was exactly the same, only the labels differed, but those who believed their wine was from California liked the taste of both the wine and the cheeses better. In a second study, 39 patrons attending a price–fixed dinner at a university–affiliated restaurant were given a glass of either North Dakota–labeled or California–labeled wine with their meal. The only real difference between the wines was the labels. The amount of leftover food and wine was measured. Both groups drank the same amount of wine (they were served 1 glass). Those whose wine was labeled from

California consumed 12% more of their entrée than those served North Dakota–labeled wine. The researchers concluded that not only does taste expectation influence one's taste ratings of accompanying foods, but that it also influences consumption of accompanying foods. Ostensibly, positive expectations associated with the California labeled wine lead to a more enjoyable food experience.

Many people believe products that have popular brand names are better than those that have names that are not as well known. If we expect a popular brand to be better we will probably rate it as better. It's not just the brand name, but also the packaging, pricing, and advertising that shape our positive expectations. An experiment was conducted to help distinguish contributing influences as being either product or marketing oriented, and to indicate the strength of the marketing influence on various brands (Allison & Uhl, 1964). The experiment involved groups of beer drinkers that drank and rated beer from unlabeled bottles and from labeled bottles. On an overall basis, the data showed that beer drinkers, as a group, could not distinguish taste differences among the brands in a blind taste test (nude bottles). However, when participants were tested with the labels appearing on the bottles all but two of the five ratings were significant. That is, ratings were different for three of the brands, while two brands showed no significant difference in ratings. All five brands in the labeled test were rated significantly higher than the same brands used in the blind test. In the labeled test the participants could clearly distinguish among beer brands. Apparently, labels and their associations did influence their ratings. Product differences, in the minds of the participants, were based on the firms' marketing procedures rather than specific flavor differences. However, it is important to point out that expectations play a role but

definitely are not solely responsible for taste and flavor interpretations. Sensory stimuli (stimulating sensory receptors) also play a role in taste and flavor interpretations. Refer to the section on taste and flavor for a more thorough discussion of taste and flavor.

A study was conducted to determine how taste ratings would be affected when consuming a well-known brand turkey versus an unknown brand turkey (Makens, 1964). Pieces were sliced from a turkey breast and placed on two ceramic plates. A cardboard carton was placed behind each plate. One carton was covered with plastic bag showing the known brand and the other carton was covered a plastic bag showing the unknown brand. Participants were given a sample from each plate and told the sample was taken from the brand that was displayed behind the plate, even though the meat on both plates was taken from the same turkey. After consuming the meat the participants were asked to rate the taste and texture. The results of the study showed that participants preferred the known brand to the unknown brand. In a second experiment, which was an extension of the first, samples that were either tough or tender, and they were placed on two ceramic plates. The participants were not told that the textures of meat were different. Participants were asked to indicate on a card, from which of the two brands displayed in Experiment 1 they believed the sample was taken from, and to indicate which they preferred. If the participants weren't sure they were given an option to indicate they weren't sure. The results indicated that the tender meat was preferred, and the participants believed that the preferred meat came from the known brand. The researchers concluded that consumers expect a well-known brand turkey to be a higher quality to an unknown brand.

A six-week field study was conducted at the University of Illinois faculty cafeteria, to see how descriptive labels would affect food sales (Wansink, Painter, & Van itterum, 2001). Six items were chosen and presented two times per week with a basic label (e.g., chocolate pudding), a descriptive label (e.g., satin chocolate pudding) or were not offered. The items were rotated through the six-week period, and offered for the regular price. The results showed that when products were given descriptive labels, their sales increased by more than one-fourth. Customers who ate the descriptively labeled food consistently rated those meals as being higher quality and a better value than those customers who ordered and rated products with regular labels. Customers who ate descriptively labeled products had higher opinions toward the restaurant, and believed that the restaurant was keeping up to date with the latest food trends. Not only did descriptive labels increase sales by 27 percent, they also increased the likelihood that customers would purchase those items again when returning to the restaurant. By using descriptive labels it is possible to raise the customers' expectations regarding the quality of the food, thus leading to higher sales and a more pleasant eating experience.

A brain imaging study was used to measure the effects of cognitive (semantic) priming on the neural responses to a delivery of odors (de Araujo, Rolls, Velazco, Margot, Cayeux, 2005). Odors were presented with descriptors on a screen. A test odor was labeled on different trials as "cheddar cheese" or "body odor." The same labels were paired with delivery of clean air in different trials. Alpha-ionone (pleasant, labeled "flowers") and Octanol (unpleasant, labeled "burned plastic") were used as references for pleasant and unpleasant stimuli for the psychophysics and neuroimaging. The participants rated the test odor as significantly more unpleasant when labeled "body

odor" than when labeled "cheddar cheese." The fMRI showed that the rostral anterior cingulate cortex / medial orbitofrontal cortex was significantly more activated by the test stimulus and by clean air when labeled "cheddar cheese" than when labeled "body odor." Recent neuroimaging studies have demonstrated that pleasant odors preferentially activate medial orbitofrontal regions, while unpleasant odors activate lateral regions. The findings of this study suggest expectation of odor may have an influence on flavor perception, as smell is a key component involved with flavor perception.

Food Presentation

Presentation has been shown to play a large role in the perception of food. When foods are presented in an appealing way, individuals may like the food more.

At a cafeteria in Urbana, Illinois, 175 people were given a free brownie dusted with powdered sugar (Wansink, 2006). They were told the brownie was a new dessert that may be added to the menu. They were asked how they liked the flavor and how much they would pay for it. All of the brownies were the same size and had the same ingredients. However, the brownies were served on a china plate, on a paper plate or on a paper napkin. Those who received the brownie on a china plate rated the brownie as excellent. The people eating the brownie from the paper plate rated the brownie as good. Those who were served the brownie on a napkin rated it as okay. Individuals eating from the china plate said they would pay an average of $1.27 for the brownie, while those eating from the paper plate said they would pay an average of 76 cents, and those eating from the napkin said they would pay and average of 53 cents.

Beliefs About Food Composition

Food composition plays a role in whether one likes a food or not. However, not only does food composition play a role, but also expectations about the composition may influence food liking.

Customers at a pub evaluated regular beer and a regular beer that contained a few drops of balsamic vinegar - "*MIT brew*"- (Lee, Frederick & Ariely, 2006). One group tasted the samples blind (not aware of the secret ingredient). A second group was informed of the secret ingredient before tasting. A third group learned of the secret ingredient immediately after tasting, but before indicating their preference. The results indicated the preference for the MIT brew was higher in the blind condition than in either of the two other conditions. However, the timing of the information mattered. Disclosure of the secret ingredient significantly reduced preference only when the disclosure preceded tasting, suggesting that disclosure influenced preferences by affecting the experience itself. The researchers concluded that preference for the MIT brew was influenced by disclosure of its contents, but only if disclosure preceded tasting, which suggests that expectations have a primary influence on the taste experience itself.

Food composition may influence food liking due to taste and flavor perception. Food composition may also influence liking in relation to the type of expectations associated with the composition.

Price of Food

Higher priced foods or drinks may be preferred to lower priced foods even when the ingredients of the lowered priced product are the same.

Goldstein et al. (2008) investigated the relationship between price and subjective appreciation of wines, when the price is not known. A sample of more than 6,000 participants from 17 US blind tastings were compiled and examined. Blind tastings help eliminate confounds such as price, and published expert ratings (both may contribute to expectations). The blind tastings followed a double blind protocol, in which neither the person serving the wine nor the person tasting the wine knew the type or price of wine. The tasters assigned an overall rating to the wine tasted, prior to discussing the tasting with the rest of the group. The prices of the wines used in the taste testing ranged from $1.65 to $150 per bottle. The main finding after examining the blind taste tests was that generally, individuals who are unaware of the price do not report higher ratings of more expensive wine. Actually, they enjoy more expensive wine a little less. However, in double blind taste tests, experts generally rate expensive wine higher than less expensive wine. The pleasure derived from consuming wine depends on taste and smell, but it also depends on price and presentation.

It may be argued that taste and smell activates a bottom-up process that influences our subjective appreciation, whereas price and presentation works through a top-down process, in that expectations about quality are also important determinants of our subjective appreciation (Goldstein, Almenberg, & Dreber, 2008).

Expectations May Have Opposite Effects

It is important to note that inducing expectations can backfire (Wansink, Van Ittersum & Painter, 2004). Backfiring may occur if the expectation is drastically disconfirmed (Richardson, Dick & Jain, 1994). Unrealistically high expectations may lead to a contrast effect on food ratings. That is, if the actual taste or flavor is substantially different than what was expected (Eertmans, Baeyens, & Van den Bergh, 2001) the rating may be lower or higher than it would have been if the taste or flavor were more consistent with the expectation. As an example, if you are presented with a new soda to evaluate and that soda doesn't have the sweet taste you expect, but a bitter taste (tea or coffee type taste) you will probably rate it lower than you would have had you simply been asked to rate a beverage. When asked to rate this drink rather than asked to rate this soda, expectations probably change and the flavor will not represent a drastic disconfirmation from what is expected.

Expectations and their effects on experience have limitations. As mentioned throughout the paper expectations often play a role in shaping experiences, but at other times they do not influence outcomes or they may influence outcomes in the opposite direction.

Researchers examined how extrinsic and intrinsic cues influence ratings of food quality (Richardson, Dick & Jain, 1994). Participants were asked to taste a food then rate its quality. Extrinsic cues were provided by placing a package from one of three brands (1 national brand, and 2 store brands), behind the food to be sampled. Participants were led to believe the package matched the food they were sampling. Sometimes the package matched the food to be sampled, and other times it didn't. Intrinsic cues were the actual

brands that the participants were sampling. Each participant sampled one product. There were five different products used in the study. The results suggested that the ratings of the foods were driven primarily by extrinsic cues, with those thinking they received a national brand rating foods higher. Mean quality ratings were highest for those who were led to believe they received the national brand and actually received the national brand. However, when they believed they would receive the national brand but received a store brand their ratings were lower than when actually receiving the national brand. This study indicates a limitation on the influence of expectation.

A study was conducted to examine how diet and health labels influence food rating (Wansink, Van Ittersum & Painter, 2004). The study was a 6-week field experiment conducted in a faculty cafeteria. Six different low-calorie entrées and 6 different low-calorie desserts were selected. The results show that diet labels and healthy labels influenced taste ratings for desserts but not entrées. Specifically, when compared with unlabeled desserts (control condition), people rated desserts with diet labels or with health labels as better tasting. It is suggested that the higher ratings for deserts can be explained by a contrast effect. That is, participants expected that the deserts wouldn't be very tasty, but they were pleasantly surprised and this led to a higher rating. Presumably their rating would not have been as high if their expectation had been higher. Disconfirmation of expectation can have effects that are in the opposite direction of the expectation.

In the next section expectations related to other areas will be briefly mentioned.

Expectations & Other Areas

Research shows that expectation often plays a role in the outcomes of studies investigating caffeine and energy drinks (Shiv, Carmon & Ariely, 2005; Kirsch & Weixel, 1988; Kaasinen, Aalto, Nagren, & Rinne, 2004; Beedie, Stuart, Coleman, & Foad, 2006; Beedie, Coleman, & Foad, 2007). Neuroscientific studies show that expectations influence different brain mechanisms including reward mechanisms (Benedetti, 2009; Scott, Stohler, Egnatuk, Wang, Koeppe, & Zubieta, 2007; Volkow, Wang, Yemin, Fowler, Zhu, Maynard, Telang, Vaska, Ding, Wong, & Swanson, 2003). Expectations have been shown to play a role in surgery outcomes (O' Malley, Petersen, Menke, Brody, Kuykendall, Hollingsworth, Ashton, & Wray, 2002; & Bovberg, 2004; Gordon, Smith, & Fields, 1981). A large body of research shows that expectations play a role in pain (Amanzio, Arslanian, Casadio, Maggi, & Benedetti, 2001; Arduino & Amanzio, 1999).

It is evident that the influence of expectations is seen a wide variety of areas. Expectations and/or the manipulation of expectations may lead to positive outcomes (or negative outcomes) that influence many of our experiences.

Expectations influence many behaviors and experiences (Kirsch, 1985). The influence of expectations has been shown in a wide variety of areas (Benedetti, Pollo, Lopiano, Lanotte, Vighetti, & Rainero, 2003; Kirsch, 1985; Benedetti, 2009). Positive expectations often lead to positive outcomes while negative expectations may lead to negative outcomes (Benedetti, Pollo, Lopiano, Lanotte, Vighetti, & Rainero, 2003; Flaten, Aslaksen, Lyby, Bjorkedal, E, 2011; Enck, Benedetti, & Schedlowski, 2008).

Much of the research into placebo and placebo related responses has focused on expectations as a key mechanism (Benedetti, 2009). In general, expectations of a future outcome and a future response- often called response frequencies- are held by each individual concerning his / her own emotional, behavioral and physiological response to various stimuli.

Various stimuli are used with an aim of inducing positive or negative expectations. These stimuli may include verbal, olfactory, visual, auditory or other stimuli (Benedetti, Pollo, Lopiano, Lanotte, Vighetti, & Rainero, 2003; Kirsch & Weixel, 1988; Bingel, Colloca, Vase, 2011; Rosenblum, 2010; Shankar, Levitan, & Spence, 2010).

Some of the best evidence available showing that expectations play a role in drug responses is that of covert therapies. With covert therapies a hidden administration of a drug is given to the patient. The patient does not know when they are receiving the drug. This eliminates the expectation the individual has concerning the outcome. Covert therapies are made possible by using machines to administer drugs to patients in the post-operative state, without the patient knowing when the drug is being administered (Colloca, Benedetti, 2005; Colloca, Lopiano, Lanotte, & Benedetti, 2004; Amanzio, Pollo, Maggi, & Benedetti, 2001). It has been found that when a treatment is hidden it is often less effective than when the patient knows that they have received the treatment, thus showing the role of expectation in the outcome (Colloca, Lopiano, Lanotte, & Benedetti, 2004).

It is important to realize that the magnitude of expectations is sometimes large and stretches beyond the realm of food hedonics (pleasure from food). The information

presented here regarding expectations was brief and not meant to be exhaustive as expectations in fields other than those related to food are not the primary focus of this paper.

Present Study

In the present study the primary interest is the relationship between positive induced expectation and food liking. Does a positive expectation lead participants to rate foods as more likeable?

The current study involved deception. The participants in the study were led to believe they were in a study investigating how environmental factors influence critical thinking. The critical thinking tasks were used to create a context that was different than contexts used in previous research. The deception used here was stronger in magnitude than deception used in previous food / food related studies. That is, presumably, the two groups of participants in the study would not be aware that they were participating in a study that was primarily focused on a food related behavior, nor would they associate the environment with food. In other food studies using deception the participants were in an environment that was more strongly associated with food (restaurant, taste test, etc.).

The study involved cover tasks (critical thinking tasks, rating scales), and a Likert scale for rating the crackers.

Prediction

It was hypothesized that participants in the positive expectation (verbal non-visual cue) group would rate the crackers higher than those in the neutral expectation (control condition) group, even though they would be consuming the same type of crackers. This study was similar to other studies in using a Likert scale and inducing positive expectations through verbal cues. In a study conducted by Cardello (1994) a verbal cue was used to induce positive expectations regarding a pomegranate juice mixed with distilled water. The positive verbal cue used by Cardello suggested that the juice had been nationally tested and almost everyone said they liked it very much. The study involved four groups. Group 1- control group: were told consumers neither liked nor disliked it; it received a neutral score. Group 2- low expectation: were told consumers disliked it very much. Group 3- high expectation: was the positive verbal cue group. Group 4- not manipulated: participants were only told they would be tasting a new juice (no mention of previous taste test). The juice was rated significantly higher in acceptance by participants in group 3 than those in the other groups. Thus, the positive expectation led to increased liking.

The study differs from other studies in that it involves deception, critical thinking tasks (as covers), a different type of verbal cue and is presented in a vastly different context. This study also used a verbal non-visual cue, that hadn't been used previously, to induce a positive expectation. In many studies involving food liking the participants are fully aware they are in a study that is primarily concerned with food or eating behavior. This was not the case in this study. In this study participants are forced to think of things

other than food. It is reasonable to suggest that in contrast to many studies on food liking the participants here will not allocate a great deal of effort to thinking about the food.

CHAPTER III

METHOD

Participants

Participants in this study were 46 students from Eastern Kentucky University. Participants received partial course credit in exchange for their participation. Participation was voluntary, and participants could terminate their involvement at any time during the study without penalty. All participants reported that they had no conditions that would prevent them from being part of the study (see Appendix A). Participants were randomly assigned to either the positive expectation group (n = 23) or neutral expectation group (n = 23).

Materials and Procedures

Materials used in the study include critical thinking tasks (see Appendix B), rating scales (Appendix C) a purpose of the study form (Appendix D), and crackers (see Appendix F).

Participants used the on-line research sign-up system to schedule a time to report in person to the laboratory. Other participants were recruited as they walked by the area where the study was being conducted. The researcher asked prospective participants if they were interested in participating in a study that involved critical thinking and

environmental factors. If they said they said "no" the researcher thanked them and wished them farewell. If they said yes they were then led to the lab where the study took place. Before beginning the study the participant read and signed an informed consent. (see Appendix A). Participants who signed up using the online research sign-up system were greeted by the experimenter upon arriving at the lab, and asked to read and sign an informed consent. The participants were previously informed (refer to Appendix A) that the intent of the study was to examine how environmental factors affect critical thinking. The real purpose of the study was to investigate whether or not those in the positive expectation group would rate crackers higher on liking than those in the neutral expectation group.

Data collected for one participant was dropped from the study due to a cracker rating score that was more than three standard deviations from the mean of other participants.

Before the distracter tasks / critical thinking tasks (see Appendix B) were administered the participants were read instructions. The instructions were different for the two groups. The instructions relative to the crackers were the manipulation for the study. The instructions for the positive expectation group were: "Please consume at least one cracker before / during the experiment. After consuming one you may consume as many from the plate as you would like. You do not have to consume more than one if you don't want to. These crackers are a new brand that was recently tested in a National taste test. The crackers were rated very high on the taste test." The instructions for the neutral expectation group were identical, except for the two sentences about the national taste test were omitted. The instructions were read aloud to the participants before they

started work on the distracter tasks. There were four crackers (purchased from a local grocery) on a paper plate.

After the instructions regarding the crackers were read, participants completed the distracter tasks. They were given a maximum time of seven minutes to finish the tasks. If they completed the tasks before seven minutes then they moved on to the next level of the study. After completion of the distracter tasks they were administered the rating scales (see Appendix C), of various environmental factors, in the following order: *Room Temperature, Cracker Rating,* and *Light Rating*. After completion of the rating scales participants were asked what the purpose of the study was (see Appendix D). They provided their answers in written format. Participants were told a debriefing would occur at a later time (see Appendix E).

CHAPTER IV

RESULTS

To test the hypothesis that participants in the positive expectation group would rate the crackers higher in liking than those in the neutral expectation group an independent sample t-test was conducted. The results of the independent samples t-test did not show a significant difference between cracker ratings from those in the positive expectation group ($M = 4.22$, $SD = .60$), versus those in the neutral expectation group (M=4.00, SD=.52), t (44) =1.31, $p > .05$, $d = .39$. Thus, the hypothesis was not supported.

To examine whether or not those in the positive expectation group would consume more crackers than those in the neutral expectation group an independent samples t-test was conducted. The dependent variable was number of crackers consumed. The number of crackers consumed by participants ranged from one to four. The results of the independent samples t-test did not show a significant difference between the number of crackers consumed for those in the positive expectation group ($M = 1.35$, $SD = .78$), versus those in the neutral expectation group ($M = 1.30$, $SD = .88$), t (44) = .18, $p > .05$, $d = .06$.

Frequency analyses showed that the sample consisted of 12 males (26%) and 34 females (74%). Participants ranging in ages from 18-21 made up 63.8% of the sample, while those ranging in ages from 22-26 made up 27.6% of the sample, and those ranging in ages from 27-40 made up 8.6% of the sample.

Answers given on the *Purpose of the Study* questionnaire revealed that no one who participated in the study was aware of the primary intent of the study.

CHAPTER V

DISCUSSION

The purpose of the study was to examine whether or not those in the positive expectation group would rate a cracker higher in liking those in the neutral expectation group. It was hypothesized that participants in the positive expectation group would rate the crackers higher than those in the neutral expectation group, even though they would be consuming the same type of crackers. The results of the analysis performed did not support the hypothesis. There was no relationship between type of expectation and cracker rating.

An analysis was conducted to see if the positive expectation group ate more crackers than the negative expectation group. The results of the analysis performed did not support the hypothesis. There was no difference in how many crackers the two groups consumed.

A questionnaire was administered in order to determine if participants were aware of the primary intent of the study. A wide range of answers was provided, but no one indicated that they knew the study was about expectations and food rating. Most of the answers mentioned factors associated with critical thinking.

Implications

The findings in this study suggest that positive suggestions do not always lead to increased ratings of food. One possibility for explaining this finding is that participants

in the positive expectation group actually did not have a positive expectation regarding the flavor of the crackers. Maybe the information about the taste test that was intended to induce a positive expectation did not work. It is possible that the participants didn't notice the part of the message that suggested the cookies were rated high on a national taste test – "These crackers are a new brand that was recently tested in a National taste test. The crackers were rated very high on the taste test". The participant's expectations were not directly measured so whether or not the positive expectation group had positive expectations about the crackers is unclear. Most of the participants seemed to be very attentive to the critical thinking tasks and when providing and an answer for the *Purpose of the Study* question they mentioned critical thinking. A heavy allocation of cognitive resources to the critical thinking tasks could possibly limit the amount of resources available for other cognitive processes, such as paying attention to the verbal information concerning the national taste test and rating of the crackers.

Another possibility for explaining the outcome of the study is the sensory properties of the food were inconsistent with the expectations. That is, participants in the positive expectation group expected the crackers to have a good flavor, but their expectations were disconfirmed when eating the crackers. A stronger manipulation could have possibly led to a stronger expectation which may have influenced the outcome. However, to reiterate, it is important to point out that expectations play a role but definitely are not solely responsible for taste and flavor interpretations. Sensory stimuli (stimulating sensory receptors) also play a role in taste and flavor interpretations.

Limitations

It is reasonable to suggest that if the sample had been larger there may have been a different outcome. This suggestion follows from the finding that even though there was not a statistically significant difference between the cracker ratings of the positive expectation and neutral expectation groups there was a close to medium effect size.

The small time frame, of seven minutes, may have influenced the outcome. Participants had access to the crackers while they were working on the critical thinking tasks. They had up to seven minutes to finish the tasks. If the time permitted to eat the crackers had been more extensive there is a possibility that this may have influenced the cracker ratings. However, the ratings may have increased or possibly decreased.

The type of food used in this study may place limitations on the outcome. Positive expectations may be hard to induce for a neutral food such as crackers. Most of us probably expect crackers to be neutral in flavor, and using a cue such as the one used here may have little effect on that expectation. If a food that is generally considered to be more flavorful were used the outcome may have been different.

Future Directions

It is important to continue with studies that investigate expectations and their roles in food liking and eating behaviors. Research shows that expectations help to shape our perceptions of food in a variety of different contexts (refer to introduction section). In the current paper, literature was reviewed suggesting that expectations influence food perception if induced in one of four general categories: beliefs about labels, food

presentation, beliefs about food composition and price of food. Presumably future research may uncover other areas or categories in which expectations play a large role in food perception and eating behaviors.

Future research aimed at inducing positive food expectations may use concepts from the field of social psychology to strengthen expectations. Using the authority principle and the self-fulfilling prophecy may induce expectations of a high magnitude.

The authority principle as it is used in social psychology refers to the tendency of individuals to comply with an authority. An authority can be anyone we feel has authority over us. Whether someone serves the role as an authority or not is contextual. As an example, in the experiment discussed in this paper (Critical Thinking and Environmental Factors) the researcher was the authority figure. The expectation could have possibly been strengthened in the current experiment if the researcher expressed agreement with the findings from the national taste test. A higher expectation could lead to a higher cracker rating.

The self-fulfilling prophecy refers to a situation in which one person's expectations about a second person lead the second person to behave in a manner that supports the first person's expectation. To make use of the self-fulfilling prophecy in the experiment discussed here the researcher could have used an additional verbal cue: *I believe you will enjoy the crackers.* This statement should serve as a cue to what the investigator expected regarding the cookie rating. If the self-fulfilling prophecy occurs there will probably be a higher rating in the crackers.

In the experiment discussed here a measure of expectation was not conducted. Future studies investigating expectations and their role in food liking should include

some type of expectation measurement, such as, asking participants what they expected the food to taste like.

How can new findings add to the applicability of what is already known about expectations and food? New findings have the potential to uncover new ways in which expectations may be used to promote better eating habits. For example, if individuals expect a food to be more enjoyable they will probably consume more of that food. If research shows using a simple verbal non-visual cue, such as the authority principle or the self-fulfilling prophecy can lead to positive food expectations it is reasonable to suggest that these techniques can be used to aid in establishing better nutritional practices. This type of expectation would be rather easy for most people to induce, is cheap and requires little effort. Better nutrition often means better health. Expecting nutritious foods to be more flavorful or tasty will probably lead to increased consumption of these foods.

In conclusion, there is a large body of research showing that expectations influence food perception in a variety of different contexts. However, in the experiment discussed here those findings were not supported. The findings in this study may suggest that in non-food related contexts expectations have little influence on food likes. The findings here may also suggest that when engaging in cognitively expensive tasks little thought is given to food, which may limit the influence expectations has on food liking. Further research is needed to explore various avenues in which food expectations may be induced. The primary goals concerning food expectation research are finding new areas where expectations influence food perception, and understanding how to use these findings to enhance nutrition quality.

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Appendix A

Exemption Statement to Appear on SONA System

Principal Researcher: Jamie Hale

Study Title: Critical thinking and Environmental Factors

Jamie Hale at Eastern Kentucky University is conducting this study. Participants in this study will be asked to complete three critical thinking tasks. The critical thinking tasks consists of solving problems, that require high levels of critical thinking. These tasks will be presented on a piece of paper and participants will have 7 minutes to finish. Upon completion of the tasks participants will be asked be asked questions that relate to environmental factors including room temperature, food consumption, and lighting.

Participants will be rewarded 1 credit for participating (reflecting your volunteering of 30 minutes total).

You should NOT PARTICIPATE in this study if you answer yes to any of the following:

- **you have any known metabolic abnormalities that would interfere with the consumption of crackers (e.g. food allergies, food intolerances, or any other contradictions)**
- **learning disorders**
- **abnormal sensitivity to light**

If you answer yes to any of the above you cannot participate in this study.

Participation is voluntary and you have the right to refuse to answer any question or withdraw from the study at any time without giving prior notice and without penalty. All data collected and responses will be confidential.

Appendix B

Critical Thinking Tasks

Complete the following tasks:

Answer the following: John is looking at Cindy but Cindy is looking at James. John is married but James is not. Is a married person looking at an unmarried person? A) Yes B) No C) Cannot be determined

Does a conclusion follow logically from the two premises?

Premise 1: All living things need food

Premise 2: Animals need food

Conclusion: Animals are living things

A) Yes B) No

Read and answer the following:

A suit and tie cost $120 in total. The suit costs $100 more than the tie. How much does the tie cost?

Appendix C

Rating Scales

Please rate your level of agreement for the statements below by circling one on the choices provided below the statement.

The temperature in the room was comfortable.

1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree

I liked the cracker(s).

1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree

The lighting in the room was good.

1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree

Appendix D

Purpose of the Study

Please answer the following question: What was the purpose of the study?”

Appendix E

Debriefing For Positive Expectations Influence Food Liking

Thank you for being a participant in our study. This study was conducted to examine how expectations influence food liking in a context that was non-food related. Expectations have been shown to influence food liking in food related contexts (e.g. studies in cafeterias, restaurants, studies where participants know they are participating in blind taste tests). Whether expectations influence food liking in a non-food related context has not been examined.

In this study you were assigned to either the positive expectation group or the neutral expectation group. If you were in the positive expectation group you received the following instructions before starting the distracter / critical thinking tasks: "Please consume at least one cracker before / during the experiment. After consuming one you may consume as many from the plate as you would like. You do not have to consume more than one if you don't want to. These crackers are a new brand that was recently tested in a National taste test. The crackers were rated very high on the taste test." The instructions for the neutral expectation group were identical, except for the two sentences about the national taste were omitted.

Overall, we expect that those in the positive expectation group will rate the crackers higher than those in the neutral expectation group.

If you are interested in learning more about the study contact Jamie Hale Jamie_hale15@mymail.eku.edu

Sincerely, Jamie Hale

Appendix F

Description of Crackers

Clover Valley Roasted Vegetable Snack Crackers

Calories per cracker: 15.6

Fat : .67 grams

Cholesterol: 0 mgs

Sodium: 33.3 mgs

Carbohydrate: 2.1 grams

Dietary fiber: .1 grams

Sugars: .2 grams

Protein: .2 grams