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The Influence of animation on functional food intake in children

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Abstract

Stimuli elicit certain behaviors in people whether consciously or unconsciously. Food choice is not an exception. This project discusses children's behavior towards a dish presented in an animated way versus a regular way. Additionally, the area judgment is examined through different disposition of ingredients in the dish.

Results suggest a large and highly significant effect of animation, generating positive affect towards taste. When animation is perceived, information is processed in a connected way and therefore more fluent and efficient, evidenced by an overvaluation of the whole. It was also evidenced that children tend to refer to be more satiated when exposed to animation, even though quantities were the same as in the regular appearance condition.

Keywords: children, food, animation and Gestalt.

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1- Project purpose

According to Bandura's Social Learning Theory (1973)[i], each individual's attitudes and beliefs regarding food preferences are first developed under the influence of their role model (e.g., parents, peers). Research has shown that eating habits developed in childhood tend to be carried through to adult life (Owen et al., 1997). In this sense, it is important to positively affect children's eating habits in an early stage in order for them to be familiarized with functional food (healthy food) and avoid hedonic food.

The importance and benefits of functional food for the development and growth of kids are well known. However, studies conducted by Burgess and Bunker (2002) in UK showed that 31% of children ate neither fruit nor vegetables during their lunch meal on any day during the period of the investigation. Moreover, negative attitudes toward healthy messages and poor dietary habits revealed to be more alarming in boys than girls (Lund et al., 1990). Facing such results, data related to obesity is not surprising. Although many people believe that obesity is an aesthetic problem, it causes a number of diseases and death in both adults and children. Being able to change hedonic eating habits will reduce by 90% the obesity problem in the United States (Wansink, 2006).

Food is an important factor and a requirement for Human Being survival which is why we are constantly dependent on it; more than two hundred food decisions are made every day (Wansink, 2006). Surprisingly, there are cues other than internal ones (hunger, appetite, satiation or taste) that influence the way and what we eat, such as portion sizes, social norms, perceived volume (Wansink et al., 2007). These "See-food" traps can lead people to eat food simply because of the smell or sight of food (Spinnler et al., 1996). This sensory activation makes people think about food, which makes them hungry (Wansink, 2004). Eating scripts can also lead people to eat or to stop eating. The presence of others during the meal, whether a consumer is accompanied by family or friends for instance, also influences the duration of the meal, rhythm and quantity consumed (Platania and Moran, 2001; Bell and Pliner, 2003). Expectations about the flavor and taste of food can be manipulated, inducing consumption illusion (Wansink, 2006).

Children are mainly affected by visual cues (Macklin, 1996); research has shown that there was a positive correlation between vibrant colors and uncommon hues and attitudes toward the food. Salience, variety, sensory and volume perception are examples of cues that activate hunger.

Marketers are aware of those rules-of-thumb and use it for their own interest without caring about the consequences on the obesity epidemic. Fast food restaurants have been accused of being in part responsible for this epidemic. In fact, statistics show that outlawing advertisements in television on children's programming hours would reduce the number of overweight children by 18% (age 3 to 11) and by 14% (age 12 to 18) in the United States (Chou et al., 2008).

Taste expectations are influenced by a number of factors, namely labeling, ingredients used, among others (Wansink, 2005). Little research has been conducted to understand children's behavior toward food and what generates sensory expectations. Moreover, none of the research focused on the effect of animation.

The purpose of this paper is to understand the influence of animation on functional food intake in children (Appendix 1). Can functional food be perceived as "good"? Is it possible to bias attributes or tastes by giving animation to food? Is it possible to positively bias taste perceptions by combining healthy products with other favorably rated ones? If animation can prove to be able to induce children to eat functionally, this strategy can bring useful insights to reduce obesity numbers via changing children's eating habits.

2- The concept of functional food and taste

The concept of functional food is often misinterpreted. Some consumers believe the word to refer only to biologic food, while others think that the term is only applied to food that has no fat. In fact, the term applies to all the food that contributes to health beyond the basic nutritional function: whether to the heart, bones, immune system or even to health in general (Wansink, 2005). Some food, however, contains elements that might injure health. That is, food can have healthy and unhealthy components at the same time. A lot of debate has come up regarding the correct identification of some ingredients. Chocolate, for instance, has flavonoids that are good for brain stimulation and is high in antioxidants. However, the majority of people would consider it to be a hedonic food because of its high sugar and fat content. Nutritionist nevertheless recommend eating 200 calories of black chocolate (70% cacao) per day[ii]. If, however, the chocolate has a combination of biscuit or caramel, the health benefit decreases, being therefore considered a hedonic product.

A balanced health is dependent on the quantity of food intake and on the combination of functional foods. Mintz (1996)[iii] argues that there is the need for a meal to include a Core food item, a Fringe item and a Legume (CFL). However, our daily experience has shown that most of the food decisions taken are both emotional and driven by our habits and convenience to eat. Even though external cues play a major role when deciding what food to eat, most of the times we are not aware of that. Some consumers even claim not to be affected when experience shows the opposite. Years of evolution showed that consumers look for convenience, variety, palatable and familiar food (Wansink, 2005). Consumption of food is therefore dependent on both an informational and an affective component (Shiv and Nowlis, 2004).

Food perception (visual, tactile or olfactory) occurs via the sensory system. However, Van Toller (1994)[i] argued that children had a lower threshold for bitterness which induced them not to eat vegetables suggesting that children's palate is not as developed as adults and that the perception of food is not based solely on external cues. Other authors defend that taste is innate. When testing baby's preferences, results showed a tendency for sweets (Desor et al., 1973) and aversion to acidic tastes (Steiner, 1977)[i]. Another theory argues that children's preferences are developed through experience and through a continuous exposure to the product (Pelchat, 1995).This reasoning contradicts the assumption that "taste is subjective, people will taste what they expect to taste" (Wansink, 2005).

Perception also influences attitudes and behavior towards food (Fishbein and Ajzen, 1975)[iv]. In this sense, being able to positively bias taste of functional food can lead to a significant reduction of obesity and avoidance of diseases such as cancer, cerebrovascular disease and coronary heart disease (Terry et al., 2001).

Children may be influenced by the color of some vegetables. Studies have shown colors to be associated with flavors (Walsh et al., 1990). For instance, yellow food is associated with sour flavors; on the other hand, the greener the vegetable the lower the expectation of joy and the higher the odds children won't eat it (Wansink, 2005).

Past research has shown that when labels are described in a more sophisticated and presented in a more fashionable way subjects tended to eat more than with descriptive labels that were regular or basic (Wansink, 2005). Mood is another variable which is able to affect food consumption. In a study by Berridge and Winckielman (2003), subjects exposed to happy faces drank more of a juice with a poor taste than subjects exposed to angry faces.

Evidence of decreasing consumption of fruits and vegetables has been observed (Food Marketing Institute, 2002)[iv], while consumption of hedonic food (pizza, French fries, burgers) continues to lead in terms of food consumption. When observing the purchases made in restaurants, adults' orders consist of 50% of junk food, and only 14% of functional food (NDP Group, 2003)[iv]. Restaurants have been claiming that functional food is a great business in theory but not in practice, since a healthy variety is ignored by the majority of consumers (2005)[v]. Peer group pressure, smell, appearance and variety of food are some of the factors that influence food's choice (Wansink, 2004).

In a study conducted by the Dairy Council (2001)[vi] in the UK, results showed that 57% of primary school children do not eat any leafy green vegetables, 49% do not eat carrots and 48% do not eat peas. In contrast, over 80% of primary school children consume a weekly average of 126 g of chocolate.

In the case of children, those cues can be attenuated if hedonic food stops being available at home and in schools. Gatekeepers are responsible for 72% of food decisions, and in this sense, they are responsible for the diet of the family (Wansink, 2006). By buying less processed food and more functional products they would help the family achieve a more balanced diet. However, there are some barriers which must be overcome regarding functional food. The higher cost associated with those types of products revealed a lower consumption in low-income families (Drewnowski, 2005). Moreover, functional food requires time for preparation whereas junk food has the convenience of taking less time to prepare (Caraher et al., 2004). Last, but not least, healthy eating is more difficult for people who have poor cooking skills (Bifulco, 2007; Caraher et al., 2004).

3- Animism and the Gestalt notion

The need for children to project life to inanimate objects is known as anthropomorphism or animism (Boyer, 1996). Piaget (1929) argues this need to be more present in initial stages of cognitive development, referring that animistic responses tend to decrease with age. Research shows that children have difficulties to categorize objects into animate or inanimate (Looft, 1974)[vii]. The absence vs. presence of movement is the main factor responsible for children's confusion. For instance, results showed a tendency for defining a car or a cloud as animate and a plant as inanimate.

This outcome is not surprising since television and story books, for instance, are replete of animistic thinking via cartoons, animals that can talk in fables and so on. At school, anthropomorphism is also employed in learning, in order to motivate children. Animation has proven to be effective to transmit ideas and insights. For instance, drawings in story books have proven to motivate children to read, endorse imagination and develop mental rationality (Carney et al., 2002). Authors even claim an increased attention due to a more efficient assimilation of information. The text becomes therefore more clarified which energizes learning (Peeck, 1993).

Animistic dependence, however, decreases with cognitive development until children are able to accurately understand sentient distinctions (Tunner, 1985)[viii]. This progress is defended by Piaget (1929) who claims each individual needs to evolve ontogenetically through four development stages. Initially, children have no comprehension of the concept of life and are unable to make classifications under any criteria while in the subsequent stage, life is attributed to anything that moves. Those two stages are categorized as impulsive. The next two stages are defined as reflective, where life is attributed to anything that autonomously moves and finally, where life is attributed only to animals and plants that can breathe and reproduce (Berzonsky, 1974).

In Piaget's experiments children were asked to identify if the content in the pictures were alive or dead and why. Sequentially, they were asked whether the objects/animals/plants or people in the picture had any feelings, knowledge or the ability to breathe.

Evidence showed a relation between children's age and percentage errors to animate and inanimate stimuli, revealing a tendency for children between 3 and 4 years old to make more percentage errors in general when compared to older children and adults. Surprisingly, children with 5 years old demonstrated to make more errors when exposed to inanimate stimuli than when exposed to animate stimuli, compared to younger children. "Animism might be indicative of a more advanced, yet still incomplete knowledge of properties of objects" (Dolgin and Behrend, 1984). In accordance with Piaget, younger children have not acquired sufficient skills to be able to understand not only the "live" concept but also feelings or knowledge. Klingensmith (1953) argued that answers might be biased due to a misunderstanding of the term per se, and not due to the real meaning of the concept.

In this project, Piaget's stages of cognitive development will be applied. The first stage (pre-verbal) is characteristic for children up to two years old. In the second stage (pre-operational), due to a new physiological function, children between 3 and 6 year old develop symbolic thinking. The third stage (concrete operational) occurs when children reach the age of 7 to 11 and are able to use logic. The last stage continues until adulthood, revealing an increase in abstraction and logic allowing them to make hypothesis and conclusions (Piaget, 1964)

Adding animation to functional food can prove to be an effective strategy to motivate children to eat. Animation will bias visual cues by making the dish to be perceived as a whole and not as a combination of ingredients, as it is usually seen. Gestalt theory (Wertheimer, 1912, Koffka, 1915 and Kohler, 1967)[ix] shows that perception is developed through an interaction that forms an organized whole, and not developed through the conjunction of separate units. Koffka (1931)[x] exemplifies this with the melody of a song, arguing that the notes have no value separately and that playing the same melody in different keys enables one's recognition.

Human visual perception has proven to be underdeveloped, which is why we are subject to illusions based on the size, shape, hues or surface of objects. Research has shown that when an object has a salient sensory cue, it can more easily attract attention to it (Yantis, 1993). The presentation of a dish with animation can, therefore, grab children's attention which will bias expectations and thus activate appetite for functional food.

4- Discussion of the topic

H (general): Animation increases food intake in children.

Emotional interest theories suggest that animation and entertaining illustrations in textbook lessons motivate children to pay more attention and learn more through the use of an interactive and fun method. Though animation is considered to be redundant for the understanding of the story, it is used to energize and increase reader's curiosity and attention. Animation serves therefore as an affective and motivational tool for learning (Peeck, 1993; Carney et al., 2002). Contrary to this view, cognitive interest theories state that animation distracts reader's attention from the textbook and that learning becomes more interesting only if the applicant is interested in the issue (Harp et al., 1997).

Leveraging this notion to the topic in question, animation in food can either increase children's motivation to eat by creating positive expectations with functional food inducing them to eat more and in a much faster way or increase children's attention to the appearance by fostering aesthetic appreciation and therefore distract them, inducing them to eat in a slower way. It is expected that animation motivates children to eat in a much faster way when they already acquired the skills to identify and code information in a rapid way. However, when those skills are still being developed, animation works as a distracter inducing them to waste time to encode the information.

H1: Children in the first stage of cognitive development are less influenced by animation than children in the second and third stage.

Although there are standard age groupings it is difficult to determine with certainty the stage to which each child belongs (Piaget, 1964). For the purpose of this study, all children that belong to the same stage of cognitive development are assumed to be homogeneous. According to past research, there is a correlation between age and the "child's functional information-processing capacity" (Fisher, 1980)[xi], especially if children belong to the same school and same class. Cohorts are homogeneous in what concerns mental activity and learning (concepts, skills, etc).

Since the first stage (2 years old) is characterized by children with no understanding of animate concepts with sensory limitations and rapid learning (Pascalis and de Schonen, 1994), it is expected that animation will serve as a distracter and decrease the eating rhythm. "Infants seem to view objects in their surroundings in much the same way as adults, by exploiting a variety of visual cues available to them in the optic array" (Johnson, 1997)[xii]. Therefore, when exposed to animation, children become more distracted in order to process this uncommon hue and take more time to process the information and to become familiar with it. In this stage, children tend to pay more attention to environmental factors (Eliot, 2000).

H2: Appearance increases food liking (appearance and taste).

Food perceptions can be influenced through expectations, beliefs previously developed, salience and appearance. The way food is presented may allow parents and care takers to excite and stimulate children's appetite (White, 1999)[xiii]. This characteristic is also present in adults; new gastronomy increases food intake and is based on the assumption that there is an artistic process involved in the meal itself and that the presentation of the dish is not a mere combination of ingredients displayed "au hazard" (Gustafsson, 2004). By focusing on food appearance and visual cues children become more focused on feelings than taste.

"Sometimes, with kids, it is not what they eat, but what it looks like" (Thompson, 2005)[xiv]. By manipulating their perceptions via animation, children will be more motivated to eat and the meal will be seen as interactive allowing them to play while eating. An animate dish enables children to create positive affect and feelings toward functional food. Moreover, the dish ceases to be perceived as a combination of ingredients but is seen as a whole, increasing its value.

H3: Children's perception of food differs depending on whether they are exposed to a regular appearance or to animation.

The gestalt notion lies on the assumption that items are processed as a whole and not separately. When the whole is processed the information is processed in a much more efficient way (Palmer, 1982)[xv] and with greater fluency (Mishra et al., 2006). This fact is sustained by a higher cohesion in the perception of the whole, leading to an association of the form and symmetry that ease coding and interpretation. Separate items lack this cohesion which makes the process of retaining the information more difficult since there are no associations between parts. Past research has shown that wholes are processed faster and more accurately than separate parts (Pomerantz, 1977)[xv]. An illustration of this theory with large letters composed of small letters was developed David Navon (1981). The experiment determined the errors subjects made and the time they took to respond to different stimuli: when large and small letters were the same (consistent) and when large letters were formed by different small letters (conflicting) (Appendix 2). The author proposes that "global features are registered more quickly, which causes a more active perceptual processing by concentrating first on global letters before emphasis is put on local features". Moreover, global features become more salient, dominating therefore the response system. Following this rationale, food with animation would serve as a global feature, becoming more salient, which would grab children´s attention and therefore bias consumption. To ascertain this effect, children were asked to draw their dishes in the questionnaire. It would be expected that children would draw faces when exposed to animation and draw separate food items with no organized whole when exposed to a regular dish appearance. The

Gestalt effect would therefore be present when the drawing would represent cartoons or faces with no association to food items specifically.

H4: Children feel more satiated after eating an animated dish.

Objects can bias numerosity or size judgments when positioned within a certain distance or in a different spatial arrangement. In previous experiments conducted by Piaget (1968)[xvi] children considered that there were more candies when they were spaced out than when they were densely arranged. Other experiments revealed that children lacked ability to differentiate between perceptual appearance and conceptual reality. When exposed to different rows with the same number of items but stretched out in different ways, kids had a tendency to consider rows that looked bigger as having more items (Piaget 1965; Piaget & Inhelder, 1971)[xvi]. More recently, research showed this effect also to be present in adults. This spatial bias has to do with the way information is processed. If the area is processed in a global way, as the Gestalt theories suggest, judgment is based on a collective area and not on a combination of the areas of the individual items (Palmer, 1982)[xvi]. Moreover, results showed that when people are exposed to a figure formed of different items, recall of the mean size is based on the whole set rather than on any particular items and in a more accurate way (Ariely, 2001; Chang and Treisman, 2003)[xvi].

In an attempt to understand the numerosity judgment, Grinsburg (1978)[xvii] conducted an experiment where subjects had to judge which figure they thought had more dots (Appendix 3). Dots were arranged in a regular way or in a random way. Results showed a tendency for subjects to consider the arranged order as having more dots due to the illusion that dots in an arranged way occupy more space and therefore become more salient. Frith and Frith (1972) conducted an experiment to see if visual illusions differed between children and adults, but failed to find significant differences.

Analogously, it is expected that children consider being more satiated in the animation condition than in the regular condition, because the animated dish will be processed as a figure (face) and therefore estimated as more salient and more numerous.

5- Experiment

5.1 Subjects and setting

The experiment was conducted in a school located in Lapa with approximately 200 children between two and ten years of age corresponding to preschool, entry to school, and elementary school periods. Participants were 95 children between the ages of 2 and 10. The age range was chosen in order to fit Piaget's cognitive development theory. Out of 95, 70 (36 girls and 34 boys) were exposed to both conditions (one day without animation and another with animation).

Child exclusion criteria were pupils with Down syndrome (Trisomy 21), children who participated in only one of the conditions (either because they brought packed home meals or ate at home in the other condition) and children who did not want to participate in the experiment.

Children in the fourth stage of cognitive development were not measured since the pre-test (Appendix 4) revealed biased answers depending on whether they were alone or near others. This behavior is characteristic in this stage as they tend to be more influenced by the presence of others in the settings. To avoid any bias, adolescents were therefore not analyzed.

Authorization requests were sent to the person responsible for each child's education mentioning that I was studying children's behavior towards different appearances of food, suggesting that they would eat more in the presence of more attractive and salient food (Appendix 5). To avoid any bias the animation was not mentioned.

While doing the questionnaires (Appendix 6), none of the children was forced to answer since they told they could withdraw at any time. Two children showed constrain to fill in the questionnaire. All the other were motivated to participate and there were even children that did not participate in the experiment who wanted to fill in the questionnaire.

Participant characteristics are shown in Appendix 7. On average, the participants were of normal weight and height (BMI[1] percentile 58,71 ± 22,2) (Appendix 8).

5.2 Design

A between-subjects design with a within-subjects component was used. Each child was exposed to both conditions: the regular and animation condition. This criterion was relevant in order to make results comparable for each subject in both conditions, and therefore increase the power of the analysis. The regular condition served as a control treatment whereas the animation condition was the treatment.

For optimal control of the variables, the control condition was conducted on a Friday (April 17th) and the animation condition was conducted on the following Friday (April 24th). In this sense, all children that had Gymnastics or Music class before lunch in the regular session received the same treatment the following week. Behavioral aspects and comments were recorded by a hidden video camera and observed naturally.

[1] BMI- Body Mass Index

Weight difference between the initial weight of the dish and after 10 minutes was used to measure food intake whereas perception of food liking and taste, Gestalt presence and satiation were measured in the questionnaire. Height and weight measurements were taken on the playground after the two sessions.

5.3 The questionnaire (Appendix 6)

Questions were constructed in a format that could easily be understood and took less than 5 minutes to be answered.

The questionnaire was conducted in order to measure the Gestalt notion, preference regarding the appearance and taste of food and satiation.

<u>The Gestalt notion:</u> In the pre-test, some children revealed a lack of comprehension when asked to describe the picture of the dish; even though they recognized the animation easily, they thought they were being asked to describe the items on the dish. Therefore, in the main questionnaire they were asked to draw what they had eaten to ascertain whether there was any perception of the Gestalt notion. This measure allowed for an interpretation of how children perceived the whole. Whenever the drawing had a face, it was concluded that the child had successfully perceived the whole.

<u>Food liking (appearance and taste):</u> Appearance and taste were measured on a Likert scale (from 1: “I loved it” to 5: “I hated it”). Smiling faces were tagged to each measure to allow for a better identification of each level of the scale (Fisher, 2007). The purpose of those questions was to understand the impact of the appearance and to understand if taste could be biased by appearance.

<u>Satiation:</u> The thermometer scale was used in order to measure how satiated they felt after lunch.

5.4 Procedure

The experiment was conducted in the school cafeteria. Children aged 2 to 3 had lunch in a separate room, and the remaining children had lunch in the cafeteria. Lunch time was between 11:30 AM and 2 PM and groups ate sequentially, dependent on the class they were in.

To better control the experiment, six people were asked to help out. Four of them were instructed to stay in the room where the children aged 2 to 3 years had lunch. Their function was to weigh each dish before intake and code the dish with a number that would correspond to the child who was going to receive it. Children were instructed not to switch numbers. After 10 minutes, the children were instructed to stop eating and the volunteers would weigh each child's dish. After having finished the dish, a questionnaire was conducted to all of them in order to understand their perception towards food liking (appearance and taste), Gestalt presence and satiation.

Since children between 2 and 4 were unable to read, the volunteers explained the procedure in the same manner to each child. For instance, to explain how satiated they were volunteers asked whether they would like to eat anything else and based on this they instructed children to paint how satiated they were.

In the room where lunch was served to the children between 4 and 10, the procedure was a little different since the fast rotation did not allow any time for children to carry out the questionnaire. Therefore, as soon as they stopped eating they would go to the yard to fill out the questionnaire. While one was weighing the dishes before serving, the other two weighed the dishes 10 minutes after serving. Their task was to ask children their first name and to weigh their dishes. All dishes were coded with a number to ascertain that the initial weigh was matched to the weigh after 10 minutes of eating. The goal was for each child to keep his/her number in the yard, so that they could be matched by number to the questionnaire.

In the animation condition, serving with animation was more time consuming. Consequently, one of the volunteers who was in the first room in the previous condition changed rooms for the animation condition. In this animation condition, while one volunteer was preparing the animation on the plate, another one had to weigh and attribute a code to the dish. It is important to highlight that all children ate a soup before being exposed to the stimuli in both conditions.

The 10 minutes time limit was used because children were taught to eat everything whether they liked or not and no exception could be made for the experiment therefore, the forced consumption would limit the chance of obtaining results if the weight were measured only after they would stop eating. Measuring intake with time allowed to measure the velocity at which they ate, assuming that when children liked (versus disliked) the dish they would eat faster (versus lower) and vice-versa. It is important to highlight that all children ate a soup before being exposed to the stimuli in both conditions.

5.5 Results

The data was analyzed through SPSS (version 16.0) using the required standard test. Statistical significance at $\alpha \leq 0{,}01$ or $\alpha \leq 0{,}05$ was assumed for all tests. Age, gender, weight and height were analyzed according to past studies (Fisher, 2007) to understand if their effect was statistically significant.

The data was analyzed through the general linear model including Analysis of Variance with repeated measures and a between-subjects factor. The goal was to understand if the appearance of the dish as well as the gender and Piaget's stages of cognitive development influence the quantities (in grams) eaten in both conditions.

A chi-square test was used to test the impact of the Gestalt notion in visual perception (Appendix 12). A paired t-test was used to compare scores on appearance (Appendix 13), taste (Appendix 14) and satiation (Appendix 15).

Analyzing the results with a repeated measures ANOVA and between-subjects factor (Appendix 10), showed that the weight difference for all subjects in the regular condition was lower ($M_{regular}$ =74,13) than in the animation condition ($M_{animation}$=83,23).

When the analysis of weight difference is split between cognitive stages of development there is a tendency for children in the second stage to eat less in the animation condition ($Mean_{animation}$=55,10) when compared to the regular one ($M_{regular}$=60,06) for boys and girls. However, it is important to highlight limitations regarding the variable of Piaget's stage of cognitive development. The first stage (2 years) had only five observations which did not exceed acceptable limits, resulting in error estimations when many parameters were being measured. Moreover, though error variances were homogeneous across groups (all p>0,05 in Levene´s test of equality of error variances), this was not the case in a multivariate context (p=0,008 in box's test of equality of covariance matrices). The requirement to use repeated measures ANOVA test was not met, prohibiting a correct statistical analysis. Additionally, an in-depth analysis of ages in the second stage of cognitive development for weight differences for both conditions revealed that children with three years old were the only ones who decreased food intake in the presence of animation (Mean $_{regular}$=83,92 vs. Mean result $_{animation}$=49,58) (Appendix 11). All the other children grouped in the second stage (4, 5 and 6 years old) increased consumption. Weight differences however were not large enough to compensate the decreased consumption in children with 3 years of age, therefore biasing the analysis.

Due to those limitations the analysis with Piaget's stages of cognitive development were excluded. The analysis of repeated measure ANOVA was therefore conducted with age and gender as between-factors instead (Appendix 11). However, this analysis also evidences some limitations since the number of observations for each age might be considered small. Results revealed that, on average, girls eat less than boys for the regular condition (M $_{girls}$=69,19 vs. M $_{boys}$=79,35) and for the animation condition (M $_{girls}$=0,08vs. M $_{boys}$=86,56). Surprisingly, the effect of gender was not significant (F=0,02; p=0,887 and α>0,05). However, the age variable was large and highly significant (F=6,41; p=0,000 and α<0,01) but more importantly the interaction effect between age and weight difference was also highly significant (F=8,241; p=0,000 and α<0,01). As predicted by the general hypothesis, children tended to eat more and faster when the dish was presented with animation.

The Chi-square test revealed that, in both conditions, the number of times children drew separate items in the regular condition and a face or a cartoon in the animation conditions were higher (N=52 and 42 respectively for regular and animation condition) than the expected N (N=42 and 35 respectively for both conditions). However, results were only significant for the regular experiment (p=0,000 and α<0,01) and not significant for the animation condition (p=0,094 and α>0,05).

Consistent with Hypothesis 2, Paired t-test analysis showed that children liked the appearance of the dish more in the animation condition ($M_{animation}$ =1, 29 vs. $M_{regular}$ =2, 24; t=8,016; p=0,000 and α<0,01). It is important to note that the scale is inverted, meaning that the higher the preference the lower the score (1: love vs. 5: hate).

Paired t-test for taste showed that children referred a better taste in the animated experiment ($M_{no\ animation}$=1,53 vs. $M_{regular}$=1, 91; t=3,146; p=0,002 and α<0,05).

For what concerns satiation scores, participants in the animation condition gave higher scores ($M_{animation}$ = 84,6) than individuals in the regular condition ($M_{regular}$=71,92), which supports hypothesis 4. In other words, children felt more satiated in the animation condition (t= - 4, 926; p=0, 000 and α<0,01).

5.6 Discussion

As predicted by the general hypothesis, children have a tendency to increase food consumption when exposed to animation. Children in the first stage of cognitive development (2 years old) were not expected to increase consumption, suggesting that they would be distracted by an uncommon hue and would take time to process the information until the dish befall familiarization. Hypothesis 2 was therefore not confirmed since children ate more. Video observation showed that educators helped the children cut their food into smaller pieces so that they could more easily eat. The effect of animation would therefore have vanished and the dish became automatically familiarized, decreasing the time required to process the information. However, they were still exposed to animation even if just for a few minutes which would unconsciously affect food intake. Future research would therefore be required to further assess this effect.

The analysis of repeated measures ANOVA (Appendix 11) showed a significant interaction between age and weight difference however not significant between gender and weight difference. The results for children with 3 years of age were abnormal and future analysis would be required to understand this behavior. A possible justification would be that 3 years old children did not have their food being cut for them and therefore required more time to become familiarized with the dish. This fact might therefore explain why they were the only age range that showed decreased food consumption.

Contrary to what was expected, the analysis of visual perception under the Gestalt notion in line with Hypothesis 1, revealed no statistically significant effect of the whole present in the animation condition. However, results revealed that children who did not draw faces or cartoons in the questionnaire belonged to the younger age range. This fact suggests that children at this age may have some motoric limitations, meaning that it is more difficult for them to draw a face than separate items. Drawing of separate items might be related to representation unconnected with food. That is, children might feel like drawing balloons or other similar objects and not necessarily drawing of separate food items as requested. Results might be therefore accounted for as the drawing of separate food items when its representation was different. Moreover, qualitative analysis through natural observation and video showed evidence that children in this age range recognized the animation based on some comments and playing with the dish. For instance, children in one group were playing and commenting that “the eye is really good” which attest to the fact that animation was recognized.

Children scored higher grades for appearance when they were exposed to animation. This fact provides support to the idea that animation energizes and motivates children’s food intake eliciting an emotional effect for functional food that induces them to eat faster. The analysis of taste scores revealed that children considered the food to have a better taste when it was presented with animation. There are however some limitations since the food in one of the conditions could have had more salt or been drier inducing a bias in taste. However, there were no complaints observed on this matter and when testing a sample of the food there seemed to be no noticeable differences. Moreover, children were asked their perception towards the food's appearance not based on any comparison with the regular condition. This suggests that some children might have scored 1 for liking when they thought that the appearance was normal (and in this sense they had no complaints). It is important to remark, that in the pre-test the majority of children referred preference for the animation when asked which of the dishes they liked the most.

The results of satiation ratings demonstrated a significant relationship between "how satiated they were" with animation, referring to be more satiated when exposed to the animation condition as predicted in hypothesis 4.

Additional limitations should be highlighted. Faced with a high response rate, the Director of the school told me to test all the children at the school since all children would want to participate in the questionnaire. Although the Director took up the responsibility if any problem occurred, the ethical code does not allow for testing on children without the authorization of their supervisor which is a limitation of the study in what concerns the validity of the data from the questionnaire (UNICEF, 2002). The weight difference is however unaffected by this issue.

The weather in the regular condition was slightly different than the animation condition. Unfortunately, that variable could not be controlled. On the day the regular experiment was conducted, the temperature was 18º with a cloudy sky and it rained at lunchtime. On the other hand, the temperature when the animation condition was tested was 21º, and it didn't rain at lunchtime, although it was cloudy. According to Wansink (2006), people tend to eat more on cold and cloudy days and less when the days are sunny and warm. Consequently, the weather could have biased the results in a negative way, inducing children to eat less when exposed to animation. Therefore, the observed significant effect may have been attenuated.

The fact that children were not tested individually may also be considered a constraint. As previously explained, this variable can affect the rhythm, length and expectations toward a meal (Platania and Moran, 2001; Bell and Pliner, 2003). In this sense, a child's reaction can positively/negatively affect consumption intake. To attenuate this effect, all children in one table could be accounted for as one observation using the higher-order unit method. However, this method was not used because of limitations in the power of the analysis and in what concerned the statistical conclusions validity.

Since the school in Lapa was private, social class should also be considered as a limitation. Past research revealed that healthy food is more expensive and that lower social classes revealed not to buy fruit or vegetables due to the fact that hedonic food is less expensive and time-consuming (Kortzinger et al., 1994; Drewnowski, 2005). Future studies are needed to test how the results generalize to other social classes.

6- Conclusion

There are cues other than internal ones that affect consumption intake. Salience, appearance, smell, visual cues, volume perception are examples of external cues that affect food consumption.

This project has focused on the importance of animating food and its relevance on children's food intake. It was measured under the assumption that animation would transform the food into a whole, making it more salient, thus being processed faster, but also that this process becomes more interactive by grabbing children's attention. The animation effect would create a positive affect towards functional food, attenuating the properties that are usually attributed to them (boring, green and not tasty). Other, strategies such as saying that "carrots are good for the eyes", "if you eat a lot of sugar your teeth will fall", "you need to eat spinach to become strong as Popeye" led children to successfully take or avoid actions.

The experiment was conducted to determine whether animation in functional food would actually increase children's intake in a more direct way. This would show that the high intake of hedonic food provided by big enterprises such as MacDonald's, Chicken Fries and so on is not the consequence of their success but the treatment they provide to children. Children are treated as special with unique menus: happy meals or kids menu with a toy offer, being allowed to eat with the hands, and playing after eating.

I conclude that, animation in food increases food intake and in a more direct way than other methods. The dish is perceived as a whole, creating a more interactive eating environment. Food properties become attenuated and children pay less attention to whether they are eating carrots, salad or tomatoes. They get diverted by the appearance since they are able to play with the nose, eyes and mouth. In this sense, taste becomes influenced by appearance. Moreover, the organization of food in a dish biases the perceived area. Children tend to feel more satiated because of the animation.

An interesting line of future research would be to use other types of animation in functional food, for instance to modify vegetables hue into interactive forms in the shape of cartoons, numbers or animals. Animation should therefore be addressed as a significant environmental cue.

This strategy may not only help obese children eat more functional food but also control how much they eat by creating an area illusion. If the disposition of the food biases the perceived area, it may help decrease obese children’s consumption. Marketers could therefore use animation as a powerful tool to influence children in a way that wouldn’t be harmful. Gatekeepers would also benefit from this strategy since they wouldn’t have to use threats or bribes that most of the times imply long obstinacy and cries from children. Kids would be the ones who benefit the most since healthy eating habit lead to a decrease in diseases.

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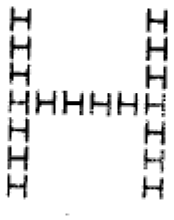
Appendices

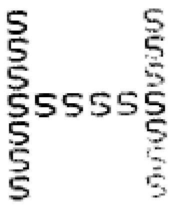
Appendix 1: Stimuli used (animation vs. no animation)

Appendix 2: Stimuli used in David Navon' experiment

A – Consistent

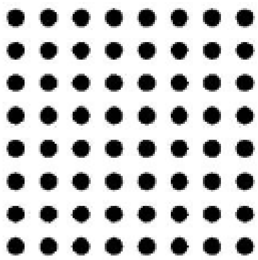


B – Conflicting

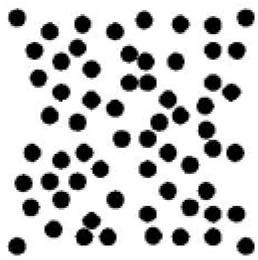


Appendix 3: Square illusion

A – Regular illusion



B – Random illusion



Appendix 4: Pre-test questionnaire

Número do questionário: ☐☐☐	Pré-teste

Dados pessoais

Idade: ____

Sexo:

Feminino ☐

Masculino ☐

Questões

Descrição da figura A:

____

Descrição da figura B:

____

Qual dos dois pratos preferias comer?

Figura A ☐

Figura B ☐

Obrigada pela atenção…

Appendix 5: Notification to parents

Notificação aos pais

Exmo./a responsável,

Sou uma aluna da Faculdade Nova de Economia de Campolide e estou a estudar, na minha tese de mestrado, o comportamento e percepção das crianças perante diferentes modos de apresentação dos pratos, sugerindo que as crianças comem mais comida funcional quando expostas a uma apresentação mais saliente e atractiva.

Deste modo, **gostaria de pedir autorização** para realizar um pequeno questionário de quatro perguntas apenas para saber a preferência e a percepção relativamente à aparência dos pratos, uma vez que a minha tese requer uma componente estatística para validar a teoria.

Trata-se, apenas de um estudo para saber se o modo como a comida é exposta, afecta o consumo de **comida funcional** e para compreender a percepção das crianças mediante esta alteração. Os resultados serão mais tarde revelados em caso de interesse dos responsáveis.

Agradecendo desde já a atenção dispensada e aguardando uma resposta favorável, subscrevo-me com os meus melhores cumprimentos,

Helena Paulino Pereira
Contacto: 91 441 03 18
E-mail: leninha.pp@gmail.com

☐ Autorizo a realização dum questionário no aluno/a

Nome do aluno/a………………………………………………………………………

___________________________ ___/04/2009

(Assinatura do responsável)

Obrigada pela sua colaboração…

Appendix 6: Questionnaire

Número do questionário: ☐☐☐	**Experiência A: com/sem animação**

Número do prato: ____ Quantidade inicial: _____

Quantidade final: _____

Dados pessoais

Idade: ____

Sexo: Feminino ☐ Masculino ☐

Peso: ___kg

Altura: ____cm

Questões

1- Desenha o teu prato:

2- Diz-me o quanto é que gostaste do **aspecto** da comida? Numa escala de 1 a 5 (1=adorei e 5=odiei), assinalando com uma cruz:

1 2 3 4 5

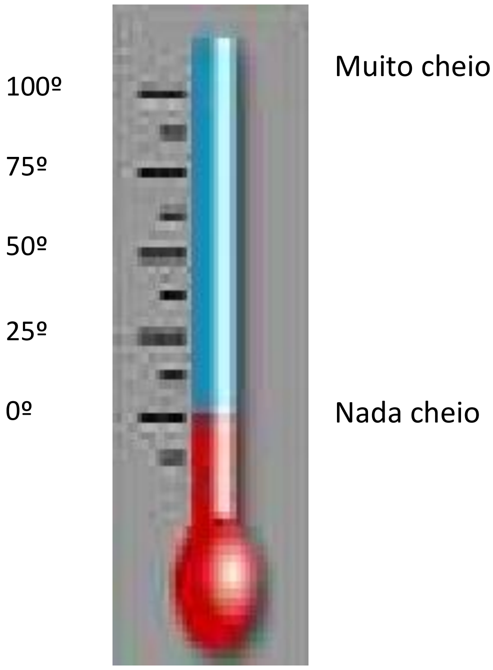
Adorei Odiei

3- Numa escala de 1 a 5 (1=adorei e 5=odiei) diz-me o quanto gostaste do **sabor** da comida (assinalando com uma cruz):

1 2 3 4 5

Adorei Odiei

4- Começa por baixo e pinta do 0 até à temperatura que mostre o quanto é que ficaste cheio.



Obrigada pela atenção…

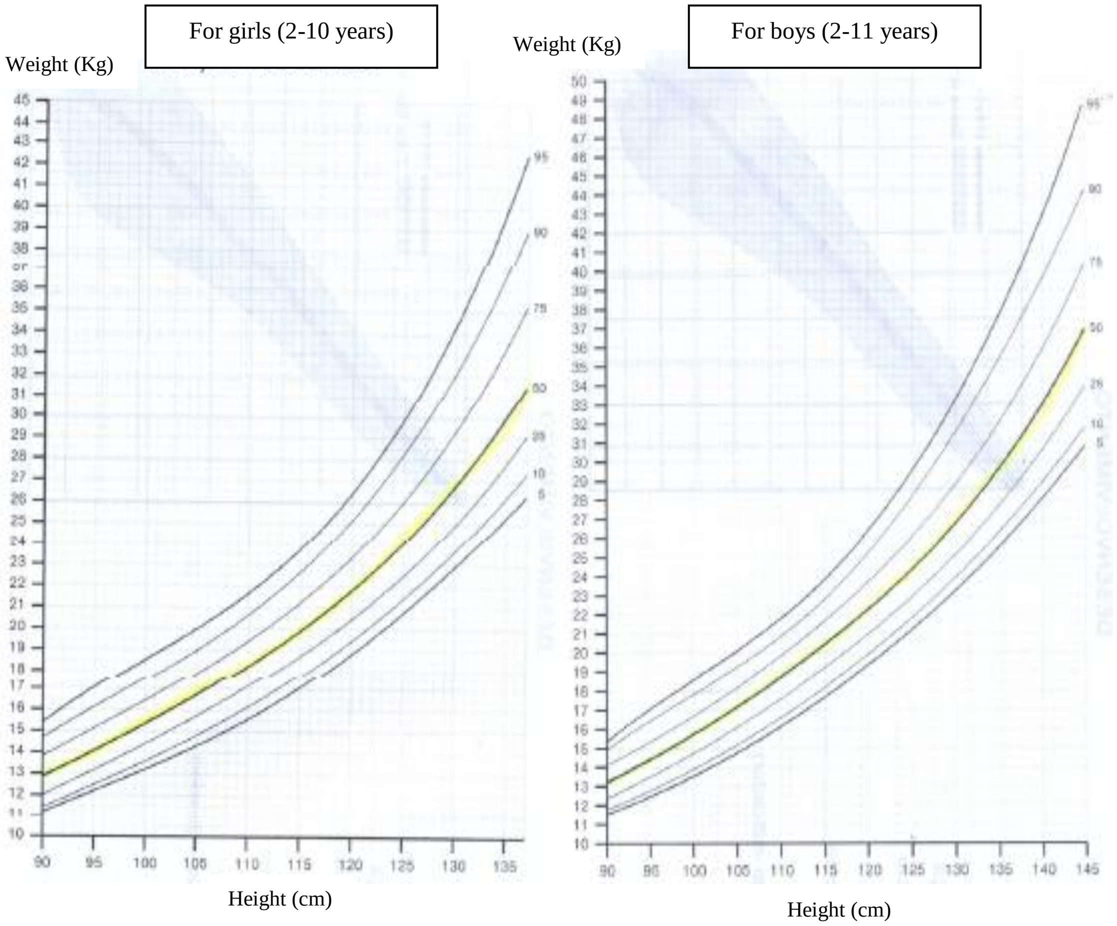
Appendix 7: Sample characterization for each stage of Piaget

* Values are mean ± SD

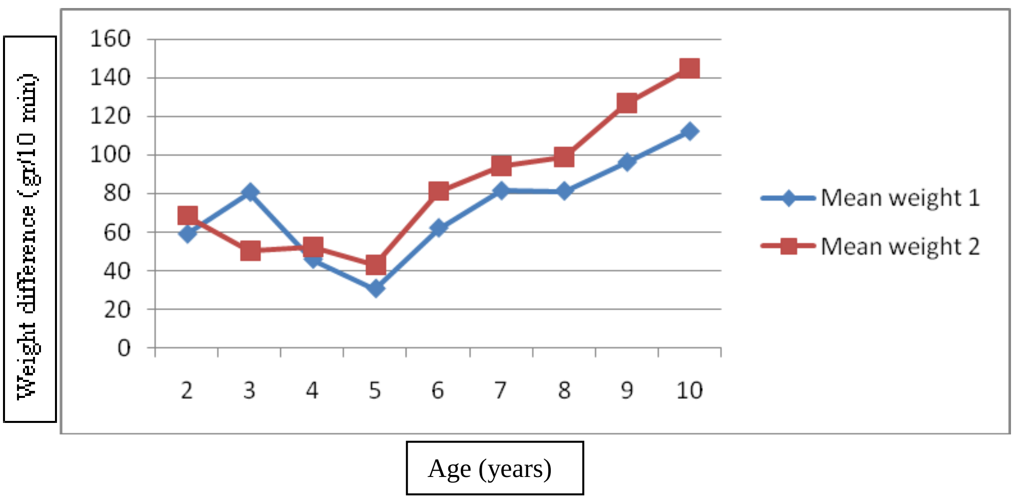
	First stage 2 years	Second stage 3 to 6 years	Third stage 7 to 10 years	Total 2 to 10 years
Age (years)	2 ± 0*	4,23 ± 1, 175*	8,21 ± 1,067*	6 ± 2, 473*
Gender	2 girls, 3 boys	17 girls, 14 boys	17 girls, 17 boys	36 girls, 34 boys

BMI percentile	53 ± 23,3*	63,54 ± 19,5*	55,14 ± 24,1*	58,71 ± 22,2*

Appendix 8: Relation weight-height for children



Appendix 9: Graphic



Appendix 10: ANOVA repeated measures with Piaget Group and gender as between-subject factors.

Descriptive Statistics

	Su...	Piaget ...	Mean	Std. Deviation	N
Weight diffence between the initial leftover and final in absence of animation	1	First stage	78,5000	9,19239	2
		Second stage	49,2941	29,37423	17
		Third stage	88,0000	30,04996	17
		Total	69,1944	34,33267	36
	2	First stage	45,6667	21,36196	3
		Second stage	73,1429	31,15188	14
		Third stage	90,4118	30,16840	17
		Total	79,3529	32,15199	34
	Total	First stage	58,8000	23,93115	5
		Second stage	60,0645	32,03533	31
		Third stage	89,2059	29,67478	34
		Total	74,1286	33,44341	70
Weight diffence between the initial leftover and final in presence of animation	1	First stage	1,0150 E2	27,57716	2
		Second stage	46,7059	18,52284	17
		Third stage	1,1094 E2	36,27063	17
		Total	80,0833	42,54166	36
	2	First stage	46,6667	13,05118	3
		Second stage	65,2857	32,92749	14
		Third stage	1,1112 E2	36,91355	17
		Total	86,5588	41,77878	34
	Total	First stage	68,6000	34,31181	5
		Second stage	55,0968	27,22420	31
		Third stage	1,1103 E2	36,03490	34
		Total	83,2286	41,99316	70

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Weight diffence between the initial leftover and final in absence of animation	,678	5	64	,642
Weight diffence between the initial leftover and final in presence of animation	1,429	5	64	,226

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Gender + Groupage + Gender * Groupage
Within Subjects Design: weightdifference

Box's Test of Equality of Covariance Matrices[a]

Box's M	32,375
F	2,272
df1	12
df2	532,377
Sig.	,008

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Gender + Groupage + Gender * Groupage
Within Subjects Design: weightdifference

Tests of Between-Subjects Effects

Measure:MEASURE_1
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	380616,936	1	380616,936	251,316	,000	,797
Gender	841,175	1	841,175	,555	,459	,009
Groupage	56966,856	2	28483,428	18,807	,000	,370
Gender * Groupage	9857,504	2	4928,752	3,254	,045	,092
Error	96927,636	64	1514,494			

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
weightdifference	Pillai's Trace	,062	4,204[a]	1,000	64,000	,044	,062
	Wilks' Lambda	,938	4,204[a]	1,000	64,000	,044	,062
	Hotelling's Trace	,066	4,204[a]	1,000	64,000	,044	,062
	Roy's Largest Root	,066	4,204[a]	1,000	64,000	,044	,062
weightdifference * Gender	Pillai's Trace	,017	1,118[a]	1,000	64,000	,294	,017
	Wilks' Lambda	,983	1,118[a]	1,000	64,000	,294	,017
	Hotelling's Trace	,017	1,118[a]	1,000	64,000	,294	,017
	Roy's Largest Root	,017	1,118[a]	1,000	64,000	,294	,017
weightdifference * Groupage	Pillai's Trace	,204	8,226[a]	2,000	64,000	,001	,204
	Wilks' Lambda	,796	8,226[a]	2,000	64,000	,001	,204
	Hotelling's Trace	,257	8,226[a]	2,000	64,000	,001	,204
	Roy's Largest Root	,257	8,226[a]	2,000	64,000	,001	,204
weightdifference * Gender * Groupage	Pillai's Trace	,009	,286[a]	2,000	64,000	,752	,009
	Wilks' Lambda	,991	,286[a]	2,000	64,000	,752	,009
	Hotelling's Trace	,009	,286[a]	2,000	64,000	,752	,009
	Roy's Largest Root	,009	,286[a]	2,000	64,000	,752	,009

a. Exact statistic

b. Design: Intercept + Gender + Groupage + Gender * Groupage
Within Subjects Design: weightdifference

Appendix 11: ANOVA repeated measures with age and gender as between- subject factors.

Between-Subjects Factors

		N
Subject gender	1	36
	2	34
Subject age	2	5
	3	12
	4	6
	5	7
	6	6
	7	11
	8	10
	9	8
	10	5

Descriptive Statistics

	Su...	Su...	Mean	Std. Deviation	N
Weight diffence between the initial leftover and final in absence of animation	1	2	78,5000	9,19239	2
		3	72,2000	39,84595	5
		4	45,0000	25,25866	4
		5	31,0000	11,36662	6
		6	55,5000	10,60660	2
		7	71,8000	30,55651	5
		8	78,0000	11,57584	5
		9	99,2500	15,06375	4
		10	1,1667 E2	48,54208	3
		Total	69,1944	34,33267	36
	2	2	45,6667	21,36196	3
		3	92,2857	24,56091	7
		4	44,5000	13,43503	2
		5	28,0000	.	1
		6	65,2500	27,82535	4
		7	89,1667	28,98563	6
		8	84,2000	36,67697	5
		9	92,7500	35,96642	4
		10	1,0500 E2	21,21320	2
		Total	79,3529	32,15199	34
	Total	2	58,8000	23,93115	5
		3	83,9167	31,83325	12
		4	44,8333	20,46868	6
		5	30,5714	10,43803	7
		6	62,0000	22,63625	6
		7	81,2727	29,59423	11
		8	81,1000	25,84763	10
		9	96,0000	25,76265	8
		10	1,1200 E2	36,48972	5
		Total	74,1286	33,44341	70

Weight diffence between the initial leftover and final in presence of animation	1	2	1,0150 E2	27,57716	2
		3	49,6000	14,80878	5
		4	50,5000	27,63452	4
		5	41,6667	19,85615	6
		6	47,0000	9,89949	2
		7	82,6000	22,21036	5
		8	1,0200 E2	14,01785	5
		9	1,2850 E2	18,59211	4
		10	1,4967 E2	59,60145	3
		Total	80,0833	42,54166	36
	2	2	46,6667	13,05118	3
		3	49,5714	24,81167	7
		4	61,0000	1,41421	2
		5	51,0000	.	1
		6	98,5000	36,59235	4
		7	1,0433 E2	35,11505	6
		8	95,8000	31,39586	5
		9	1,2650 E2	50,63925	4
		10	1,3900 E2	7,07107	2
		Total	86,5588	41,77878	34
	Total	2	68,6000	34,31181	5
		3	49,5833	20,38475	12
		4	54,0000	22,09072	6
		5	43,0000	18,46619	7
		6	81,3333	39,11862	6
		7	94,4545	30,70298	11
		8	98,9000	23,15383	10
		9	1,2750 E2	35,33109	8
		10	1,4540 E2	42,69426	5
		Total	83,2286	41,99316	70

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Weight diffence between the initial leftover and final in absence of animation	,982	17	52	,492
Weight diffence between the initial leftover and final in presence of animation	1,780	17	52	,057

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Gender + Age + Gender * Age
Within Subjects Design: weightdifference

Box's Test of Equality of Covariance Matrices[a]

Box's M	64,447
F	1,342
df1	36
df2	2,133E3
Sig.	,085

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Gender + Age + Gender * Age
Within Subjects Design: weightdifference

Tests of Between-Subjects Effects

Measure:MEASURE_1
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	669138,776	1	669138,776	488,007	,000	,904
Gender	27,993	1	27,993	,020	,887	,000
Age	70309,134	8	8788,642	6,410	,000	,496
Gender * Age	9816,279	8	1227,035	,895	,528	,121
Error	71300,637	52	1371,166			

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
weightdifference	Pillai's Trace	,285	20,743[a]	1,000	52,000	,000	,285
	Wilks' Lambda	,715	20,743[a]	1,000	52,000	,000	,285
	Hotelling's Trace	,399	20,743[a]	1,000	52,000	,000	,285
	Roy's Largest Root	,399	20,743[a]	1,000	52,000	,000	,285
weightdifference * Gender	Pillai's Trace	,003	,163[a]	1,000	52,000	,688	,003
	Wilks' Lambda	,997	,163[a]	1,000	52,000	,688	,003
	Hotelling's Trace	,003	,163[a]	1,000	52,000	,688	,003
	Roy's Largest Root	,003	,163[a]	1,000	52,000	,688	,003
weightdifference * Age	Pillai's Trace	,559	8,241[a]	8,000	52,000	,000	,559
	Wilks' Lambda	,441	8,241[a]	8,000	52,000	,000	,559
	Hotelling's Trace	1,268	8,241[a]	8,000	52,000	,000	,559
	Roy's Largest Root	1,268	8,241[a]	8,000	52,000	,000	,559
weightdifference * Gender * Age	Pillai's Trace	,178	1,403[a]	8,000	52,000	,217	,178
	Wilks' Lambda	,822	1,403[a]	8,000	52,000	,217	,178
	Hotelling's Trace	,216	1,403[a]	8,000	52,000	,217	,178
	Roy's Largest Root	,216	1,403[a]	8,000	52,000	,217	,178

a. Exact statistic

b. Design: Intercept + Gender + Age + Gender * Age
Within Subjects Design: weightdifference

Appendix 12: Chi-square test

Frequencies

Visual Perception1

	Observed N	Expected N	Residual
draw of seperate itmems	52	35,0	17,0
no result	18	35,0	-17,0
Total	70		

Visual Perception2

	Observed N	Expected N	Residual
draw of a face	42	35,0	7,0
no results	28	35,0	-7,0
Total	70		

Test Statistics

	Visual Perception1	Visual Perception2
Chi-Square	16,514[a]	2,800[a]
df	1	1
Asymp. Sig.	,000	,094

a. 0 cells (,0%) have expected frequencies less than 5. The minimum expected cell frequency is 35,0.

Appendix 13: Paired t-test for appearance

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1 1º	How much did you like the appearance of the food?	2,24	70	,984	,118
2º	How much did you like the appearance of the food?	1,29	70	,593	,071

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	How much did you like the appearance of the food? & How much did you like the appearance of the food?	70	,277	,020

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	How much did you like the appearance of the food? - How much did you like the appearance of the food?	,957	,999	,119	,719	1,195	8,016	69	,000

Appendix 14: Paired t-test for taste

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1 1	How much did you like the taste of the food?	1,91	70	,830	,099
2	How much did you like the taste of the food?	1,53	70	,880	,105

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	How much did you like the taste of the food? & How much did you like the taste of the food?	70	,281	,018

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	How much did you like the taste of the food? - How much did you like the taste of the food?	,386	1,026	,123	,141	,630	3,146	69	,002

Appendix 15: Paired t-test for satiation

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1 1	How much did you get full?	71,9203	69	25,76101	3,10126
2	How much did you get full?	84,6014	69	21,12908	2,54364

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	How much did you get full? & How much did you get full?	69	,600	,000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	How much did you get full? - How much did you get full?	-1,26812 E1	21,38288	2,57420	-17,81789	-7,54443	-4,926	68	,000

End notes

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