Appetite 96 (2016) 319–326

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Cooking and disgust sensitivity influence preference for attending insect-based food events

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ARTICLE INFO

Article history:
Received 6 February 2015
Received in revised form
14 September 2015
Accepted 24 September 2015
Available online 30 September 2015

Keywords:
Disgust
Insects
Entomophagy
Cooking

ABSTRACT

Insects are energy-efficient and sustainable sources of animal protein in a world with insufficient food resources to feed an ever-increasing population. However, much of the western world refuses to eat insects because they perceive them as disgusting. This research finds that both animal reminder disgust and core disgust reduced people's willingness to attend a program called "Bug Appétit" in which insects were served as food. Additionally, people who were low in sensitivity to animal reminder disgust were more willing to attend this program after having been primed to think about cooking. Cooking is a process by which raw ingredients are transformed into finished products, reducing the "animalness" of meat products that renders them disgusting. Sensitivity to core disgust did not interact with cooking to influence willingness to attend the program. While prior research has emphasized that direct education campaigns about the benefits of entomophagy (the consumption of insects) can increase willingness to attend events at which insect-based food is served, this is the first demonstration that indirect priming can have a similar effect among a subset of the population.

The United Nations (UN) recently predicted that food production will need to double by the year 2050 in order to accommodate the ever-increasing world population. To accomplish this feat, the UN has recommended additional consumption of insects as human food (Van Huis et al., 2013; Vogel, 2010). Currently, insects supplement the diet of two billion people worldwide, mainly in Asia and Africa. Approximately 2000 species of insects are currently consumed by humans, providing nutritional benefits comparable to those of traditional non-vegetarian foods (Premalatha, Abbasi, Abbasi, & Abbasi, 2011; Ramos-Elorduy, 1997). Furthermore, due to both the small amount of land required to house them and the small amount of feed required to farm them, insects are a much more energy-efficient source of animal protein than traditional Western choices such as cows, chicken, pigs, and fish (Martin, 2014).

While eating insects seems to be a rational solution to the challenge of efficiently supplying animal protein to a growing world population, many people—especially those in the Western Hemisphere—are unwilling to even contemplate eating insects. In the United States, those who do eat insects tend to do so as a dare (such as on the television show, "Fear Factor") rather than for their nutritional value.

This article investigates the factors that influence willingness to attend an event at which foods that contain insect-based ingredients are served. Specifically, a study among university students manipulates whether or not participants are primed to think about cooking, along with measuring individual differences in sensitivity to various dimensions of disgust. These factors—and their interactions with each other—are expected to impact the preference for attending an insect-based food event (rather than an alternative event at which no food is served).

1. Western culture and eating insects

The bias against consuming insects is thought to result from cultural conditioning rather than innate preferences (DeFoliart, 1999), as infants have shown a willingness to consume bugs (Mitsuhashi, 2010). In fact, humans are predisposed to learn new food preferences based on both the context in which these foods are consumed and the outcomes that occur subsequent to this consumption (Birch, 1999). Therefore, the Western aversion to eating insects is based on a perception that insects are disgusting

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http://dx.doi.org/10.1016/j.appet.2015.09.029
0195-6663/

(Yen, 2009), even though this judgment of disgust is inconsistent with other popularly accepted eating behaviors. For example, advocates for utilizing insects as food have long pointed out that many insects that are not eaten—due to their reputation as disgusting and dirty—are herbivores and therefore possess "cleaner" eating habits than animals that are considered mainstream delicacies, including oceanic bottom-feeders such as lobster (Holt, 1885).

One method of convincing a wider swath of the population to sample insects as food is to engage in direct educational efforts about the benefits of eating insects. Educational presentations to student groups—including a "bug buffet" of insect-based foods that can be sampled—have made those individuals more receptive to future presentations of bugs as food (Looy & Wood, 2006). A similar study conducted among students in Australia and the Netherlands found that providing information about entomophagy (the consumption of insects) and providing opportunities to sample insect-based cuisine are equally important in convincing novice insect consumers to try bugs as human food (Lensvelt & Steenbekkers, 2014).

From a practical perspective, it may not be possible to reach a critical mass of people with educational campaigns related to entomophagy. Many people are unwilling to invest the time to listen to an educational seminar, and it is expensive to make personal presentations to smaller groups. However, opportunities may exist for more targeted and indirect methods of persuasion. In the high-end world of gourmet cooking, the use of insect ingredients has increased in popularity in recent years (Martin, 2014). Much of this is due to the positioning of insects as adventurous and unusual. In fact, the television program "Bizarre Foods with Andrew Zimmern," in which the host travels to exotic locales and consumes foods that are considered disgusting in America, currently draws the largest ratings on the Travel Channel network (Platt, 2013). Zimmern (2015) lists insects such as bees, ants, crickets, giraffe beetles, grubs, and larvae among his list of "13 animals Americans should be eating."

Consistent with this framing, *Entrepreneur* magazine advises businesses who manufacture insect-based foods to describe their products as a "delicacy or novelty" (Taylor, 2014). However, substitutes for traditional meat proteins are most often utilized when they have similar taste and texture as more familiar foods (Verkerk, Tramper, Van Trijp, & Martens, 2007). For example, covering locusts in a common and desirable ingredient such as chocolate makes them more palatable than presenting them to the consumer with the insect fully visible (Schösler, De Boer, & Boersema, 2012).

2. Indirect persuasion through priming the idea of cooking

From an evolutionary perspective, the development of cooking allowed humans to spend less time chewing raw food and more time to devote to productive activities such as building tools, growing crops, and developing social relationships (Wrangham, 2009). As such, the purpose of cooking is to "transform" ingredients from nature—which may or may not be tasty, much less edible—into healthy and desirable foods and beverages (Pollan, 2013). The idea that transformation is essential to cooking has become entrenched in popular culture. On the popular Food Network television show "Chopped," chefs compete with one another to prepare meals in which they are instructed to "transform an unwanted ingredient, whether by elevating it or disguising it" (Erdos, 2013).

Thinking about the process of cooking sets up two distinct categories: the (disgusting) raw ingredient and the transformed (and appetizing) finished product. From a young age, people understand that delicious finished products are made from raw ingredients that are often inedible and disgusting. For example, no one would willingly consume raw eggs and flour, yet most people understand that baking them in an oven can result in a supremely edible cake.

While thinking about cooking should increase the desire for many types of foods, the transformative nature of cooking allows foods that contain animal ingredients—which are often dangerous if eaten raw—to morph from the category of "animal" to the more appetizing one of "food." Therefore, thinking about cooking may lead people to consider a wider variety of dietary options. Consistent with this idea, cooking skills are associated with individuals consuming more diverse menus of foods, including those that contain animal ingredients (Hartmann, Dohle, & Siegrist, 2013). By contrast, a lack of cooking skills is implicated in people's general inability to substitute alternative protein sources for traditional meats in their diet (Schösler et al., 2012).

3. Disgust and food consumption

Disgust is often viewed as a food-related emotion, with roots in oral consumption of animal contaminants (Rozin & Fallon, 1987). Specifically, disgust is a type of food rejection motivated by "offensive properties" that lead to the presumption that the food itself will have an unpleasant taste (Fallon & Rozin, 1983) or make people sick (Davey, 2011).

Individuals vary in their sensitivity to disgust (de Jong & Merckelbach, 1998; Haidt, McCauley, & Rozin, 1994; Olatunji et al., 2007), and this sensitivity extends to three dimensions of disgust: core, animal reminder, and contamination (Olatunji, Haidt, McKay, & David, 2008). Core disgust is rooted in the threat that stems from oral consumption of offensive items, animal reminder disgust is based on reminding people of their own animal nature, and contamination disgust is a reaction to the perceived threat of disease transmission from other people (Olatunji et al., 2007, 2008).

These three dimensions of disgust are "related but not redundant," as they have both common and distinct correlates with various personality traits (Olatunji et al., 2007). All three dimensions are correlated with one another, as well as with personality traits such as neuroticism and self-esteem, yet each dimension of disgust accounts for unique variance in other personality traits and behavioral measures such as repugnance for specific items in the environment (Olatunji et al., 2008).

A main focus in the current article is related to animal reminder disgust. The extent to which foods are similar to living animals is one of the two main concepts—along with food texture—that accounted for the most variation in rating the perceived "disgustingness" of various foods (Martins & Pliner, 2006).

Consistent with this idea that "animalness" in food (i.e., the perception of eating a living creature) is sufficient to induce disgust (Rozin & Fallon, 1987), the finished product of animal-based foods are often distinguished from live animals based on naming convention, such as "beef" versus "cow" (Angyal, 1941). As compared to meat-eaters, vegetarians have been shown to anthropomorphize animals by ascribing human emotions and psychological characteristics to animals that are commonly utilized as food (Bilewicz, Imhoff, & Drogosz, 2011), while meat-eaters generally perceive a greater dissimilarity between animals and humans (Loughnan, Bastian, & Haslam, 2014), regarding animals as possessing lower moral status (Loughnan, Haslam, & Bastian, 2010). In fact, categorizing an animal as food led to a moral disengagement in which the animal's perceived capacity to suffer during its death was reduced (Bratanova, Loughnan, & Bastian, 2011). In short, emphasizing the animal origins of food in products that are known to contain meat is generally considered to be disgusting.

Despite these findings, disgust sensitivity does not seem to predict vegetarianism. In fact, eating meat was positively correlated