

Gateway Bugs: Disgust in Food System Pedagogy¹

MacKenzie Wade, M.A.

Department of Anthropology, UC Santa Barbara

“Oh *HELL* no!” a woman yells as she backs away from my presentation booth. I stand smiling and unphased, not only expecting this reaction but hoping for it. To arrange my booth, I slide bowls of June beetles to the front, clear away detached grasshopper legs the size of my pinky, and angle a fried tarantula plate. From afar, it has a Costco-style sampling appeal, attracting attendees with the promise of a quick snack.

As they move in closer, attendees are surprised to see insects on the table. For most, I have a front row seat to an embodied drama of cringes and exclamations. This scene represents direct sensory engagement with disgust, a response that is physically felt, yet culturally learned and historically produced (Douglas 1966). Though the word itself means “bad taste,” disgust is an emotion tied more to the sociocultural categories of what is deemed inedible or out of place (Rozin and Fallon 1987; Douglas 1966). Disgust, therefore, is a learned response that shifts alongside “changes in our state of knowledge” about what is good to eat (Douglas 1966). I have watched the physical manifestations of disgust unfold for participants in county fairs, university classrooms, museums, conferences, club meetings and elementary schools. When I bring edible insects into these spaces, disgust becomes a tool for engaging publics more deeply in a dialogue about food, categories of acceptance, and the socio-environmental impact of the industrial food system.

Sensory experience sits at the core of my work. I research Western perceptions of insect consumption and the emerging U.S. edible insect industry comprised of educators, farmers, researchers, businesses, and NGOs. These groups work to change public perception of edible insects in order to alter the material conditions of the industrial food system, characterized in part by biodiversity loss, land degradation, chemical use, waste production, and greenhouse gas emissions (Vermeulen, Campbell and Ingram 2012). I communicate these issues to public audiences, using disgust as a pedagogical tool for exploring food perceptions, food system impacts, and possibilities for change.

Like many event participants, you have now encountered my booth. Through disgust, we will explore edible insects and their relationship to the agro-industrial food system through four phases: The Pitch, Disgust Confrontation, Taste Experience, and Curiosity.

1. The Pitch

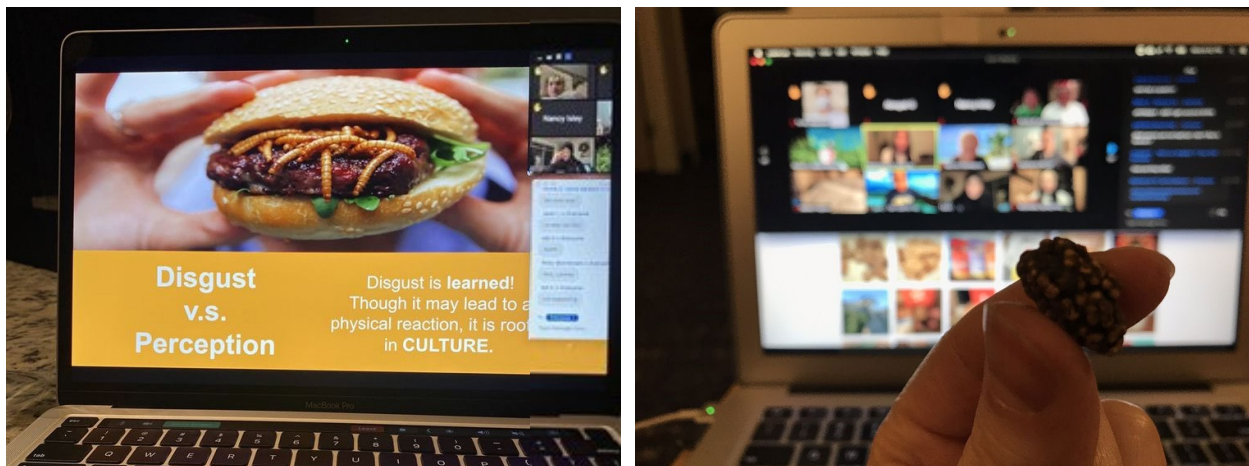
Welcome to my booth. Maybe you were drawn in by the promise of free food but what you have found has accosted your senses and reminded you of the set of *Fear Factor*. Some items look familiar: protein bars, tortilla chips, and hunks of chocolate, but the contents of surrounding bowls make you suspicious: crickets, grasshoppers, mealworms, bamboo wax worms, weaver ants. Don't leave yet. This isn't a gag or some bizarre food fad. Let me tell you why edible insects deserve consideration.

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Edible insects have been an important food source since early human evolution, and they are part of the cuisine for over 2 billion people today (Lesnik 2019; van Huis et al. 2013). There are over 2,000 edible insect species eaten in nearly half of the world's countries including grasshoppers in Mexico, silkworm pupae in Thailand, and mopane worms in Zimbabwe (van Huis et al. 2013; Lesnik 2019). Though insect consumption is most concentrated near the equator where insects are larger and more abundant, there are also instances of insect eating in more northern regions. Historically, cicadas were a popular dish for ancient Greeks and Romans, and locusts were deemed acceptable food in the book of Leviticus (Bodenheimer 1951; van Huis et al. 2013).

As the industrial food system intensifies, insects may be a potential alternative to unsustainable livestock meat. They provide comparable nutritional benefits like protein, vitamin B12, iron, and calcium, with a fraction of the resource requirements. Dominant livestock industries have contributed to global deforestation, land pollution, and greenhouse gas emissions. Insects, by contrast, can be raised with little feed, water, or land and they have a higher feed-conversion efficiency, meaning they turn organic waste into a nutritious food source more quickly than other livestock (van Huis and Oonincx 2017). Insects can also be raised at the home-level on kitchen scraps, which decentralizes food production, increases food sovereignty, and minimizes food waste at the local level.

Though edible insects are often presented as a “food of the future,” insects are both a food of the past and a food of the present. Yet obstacles to insect acceptance persist in much of the world. Insects remain classified as pests, disease carriers, and, more problematically, as a food not for “us” but for the colonial “other.” In films and literature, these negative classifications are reinforced in imagined dystopian futures (e.g., *Blade Runner*, *Snowpiercer*). Engagement in a bug-based sensory experience allows us to complicate these food biases. Through challenging disgust, we may ask: How are categories of food and non-food culturally defined? What are the social and environmental impacts of the food we eat? and How may changes to our food perceptions help create more sustainable, nutritious and equitable food systems? Engagement with these questions, however, is only a part of the experience and comes later. First, we must challenge our own food perceptions.



Attendees, Heath P. and Tara L., post photos during “Yelp Bugs Out,” a global virtual event with Yelp Santa Barbara (Yelp 2021)

2. *Disgust Confrontation*

After you encountered my booth and lingered long enough to hear my pitch, I ask you to close your eyes and imagine you are eating a tasty burger. Take a bite – cheese, caramelized onions, condiments of choice, maybe a brioche bun. You are about halfway through your imaginary gourmet burger when suddenly I tell you it’s horse meat. Did you put down your burger? Maybe you’re still poised for the next bite, shocked yet intrigued. The taste, of course, didn’t change. Now I tell you that it’s not actually horse meat. It’s dog. I am guessing your burger, brioche bun and all, has dropped back to the imaginary plate.

When I work through this activity with booth participants, I quickly receive a “Nope! Crossed the line!” at the mention of eating dog. Though the taste of the dream burger did not change, the “line” of food perception introduced cultural knowledge (we don’t eat dog) to the taste experience and disgust ensued. In the case of insects, our cultural knowledge tells us that insects are dangerous, dirty, and disease-ridden.

Disgust, like other embodied sensations, demonstrates just how intrinsically linked our bodies are to our culture (Classen 2010). Disgust is learned, yet it is also physically felt, characterized by a rolling stomach, cold sweats, and a ruined appetite (Haidt et al. 1997). In extreme cases, disgust may completely overtake our bodies to cause sickness or fainting. Because of these physical reactions, disgust may feel biologically “natural” and thus unchangeable, a fundamental part of who we are developed over time to signify danger. When confronted with edible insects, this response is interpreted as a warning, confirmed by years of enculturation into the perception of insects as disgusting and dirty, carriers of disease and ruin. Insects are *not* food.

Though the feeling of disgust may act as a disease-avoidance behavior, culture largely defines food rules, edibility, and acceptability (Curtis 2011; Mela 2000). Lobster, for example, a member of the arthropod phylum like insects, were once considered a disgusting food and were eaten mainly by prisoners and the very poor on America’s East Coast throughout the 18th century (Tao and Li 2018). Today, of course, lobster is a luxury big-ticket menu item in restaurants across the same coast. Food perception is therefore malleable, shifting with cultural norms and between cultural groups in relation to food rules, categories of edibility, and norms of acceptability (Haidt et al. 1997).

When I show participants that disgust, though physically felt, is culturally learned and thus malleable, they are able to more critically examine their own food perceptions. The sensory experience may then be used to spark deeper consideration of the socio-cultural and environmental impacts of the agro-industrial food system. Though edible insects are not a catch-all solution to the inherent problems of industrial agriculture, confronting feelings of disgust allows for a deeper engagement with these issues. This engagement uproots our idea of “normal” food and challenges us to think more deeply about the social and physical infrastructure reproducing these norms. The senses become a tool for exploring why we eat what we eat, and what broader impact this consumption may have.

Though disgust is experienced in the individual body, it is also a collective experience and the presence of others is important to the learning process. On “Kids’ Day” at the Santa Cruz County Fair, for example, a group of children held crickets in their palms and stared with uncertainty at the legs and heads, as their eyes darted to others for affirmation. Often during events for young people, affirmation is first sought from parents, teachers, or guardians and, upon receiving little, they next turn to friends and classmates. Murmurs of “you first” encourage the initial push as participants engage in the experience together. Just as disgust responses are learned and affirmed, so too are positive taste experiences or the perception of foods as “tasty.” After notions of disgust are

complicated by my pitch and recognized as learned and changeable, taste becomes the next step in the sensory experience.



Children try mealworms and crickets on Kids' Day at the Santa Cruz County Fair in Watsonville, CA (Santa Barbara Bugs 2019)

3. *Taste*

After you hear my pitch and challenge your feeling of disgust, the bowls of bugs in front of you may look more edible, maybe even... appetizing. The table is organized left to right by level of difficulty. On the left are familiar items like a bowl of tortilla chips, followed by whole crickets, mealworms, grasshoppers, June beetles, and maybe even tarantulas (though arachnids are not insects, we often informally classify them as bugs). You probably look to others for support as you hold an insect in your palm.

Taste is a physiological stimulus, but it is also a social sense and our experience of taste is a shared cultural activity (Højlund 2015; Bourdieu 1984). The taster is a “reflexive actor that communicates, performs, manipulates, senses, changes and embodies taste—rather than passively perceives a certain experience of food” (Højlund 2015). Though participants may accept the premise of the pitch that there is a need for more sustainable and nutritious food, and we may recognize the malleability of disgust, information alone does not extend to the acceptance of insects as “tasty” food. Studies have shown that environmental responsibility is a minimal factor when it comes to food choice (Berger et al 2018; House 2018). Though eaters may express a desire to eat sustainably or nutritiously, this desire is often easily overcome by a collective perception of the food as tasty, satisfying, and familiar.

There are over 2,000 species of edible insects and, though often grouped into a single category, each has a different taste profile. Aly Moore, a prominent edible insect educator, has mapped three general taste categories for edible insects: 1) earthy/nutty, 2) seafood-like, and 3) meaty (Bugible). She has systematically catalogued the taste experience of hundreds of people and often uses these flavor profiles to pair insects with wine and beer.

As I sat in her kitchen in Los Angeles, Aly pulled out jars of bugs and placed them on the counter next to our lunch of mealworm salad and chocolate chip cricket cookies left over from a YouTube video. She arranged small bowls and added a different insect to each. Embodying her dual persona as a scientist/social media influencer, she opened her laptop to an extensive Excel sheet

while live-streaming on Instagram. “Hi- I’m here with Kenzie Wade, and today we’re...”. I am nervous. My tastebuds are getting their time to shine; suddenly I am unsure how to taste. Though I have eaten a lot of bugs, I have never meditated on the distinct flavors or paid attention to their order of appearance. Without any hints from Aly, she watches for my reaction as I pop a scorpion in my mouth, let my taste buds do what they do best, and offer descriptive words as they arise.

For each bug, my first thought is “this is unlike anything I’ve ever tasted; there is no word for this!” but I attempt to find comparisons which arise like a bizarre attempt at poetry. Aly reads off what others have said. Some are creative: worn leather chair (mopane worm), menthol cigarette (bamboo wax worm). Some use familiar foods as a frame of reference: sunflower seeds (mealworm), the flakey skin of a peanut (weaver ant), charred bacon (sago grub). These distinct flavors demonstrate just how different each insect is, as well as the potential for culinary creativity, spearheaded by chefs like Joseph Yoon of Brooklyn Bugs.

For those who encounter my booth, I offer the opportunity for a taste experience as Aly did for me. Framed by contextual information, participants enter into their own taste experience and challenge their ingrained food perceptions. I begin the experience with familiar foods. Insects, like crickets and mealworms, are often dried and ground into a flour-like substance and baked into chips, cookies, and protein bars. Participants are often surprised at how “normal” these products taste, though some report slightly unfamiliar textures or aftertastes. I then bring the focus to whole insects, moving through levels of difficulty. The visual experience, like taste perception, also carries learned associations which influence the reactions to each insect (Deroy, Reade and Spence 2015). For some, eating a mealworm is much easier than a cricket because it lacks visible legs, wings, and a head, and can be more objectified. For others, however, the mealworm appears too maggot-like and the more familiar Jiminy Cricket is easier to swallow.

In these experiences, I sometimes probe a response by explaining what flavors to expect (i.e., sunflower seed, peanut skin) if the eater is particularly hesitant. Using familiar food terms for comparison, likening grasshopper to lobster for example, is helpful for reconceptualizing insects as food. For others, I replicate Aly’s method and allow more personalized flavors to arise, often asking the eater to try to describe the taste without food-words. By both personalizing and socializing their taste, participants learn through direct engagement with their senses.



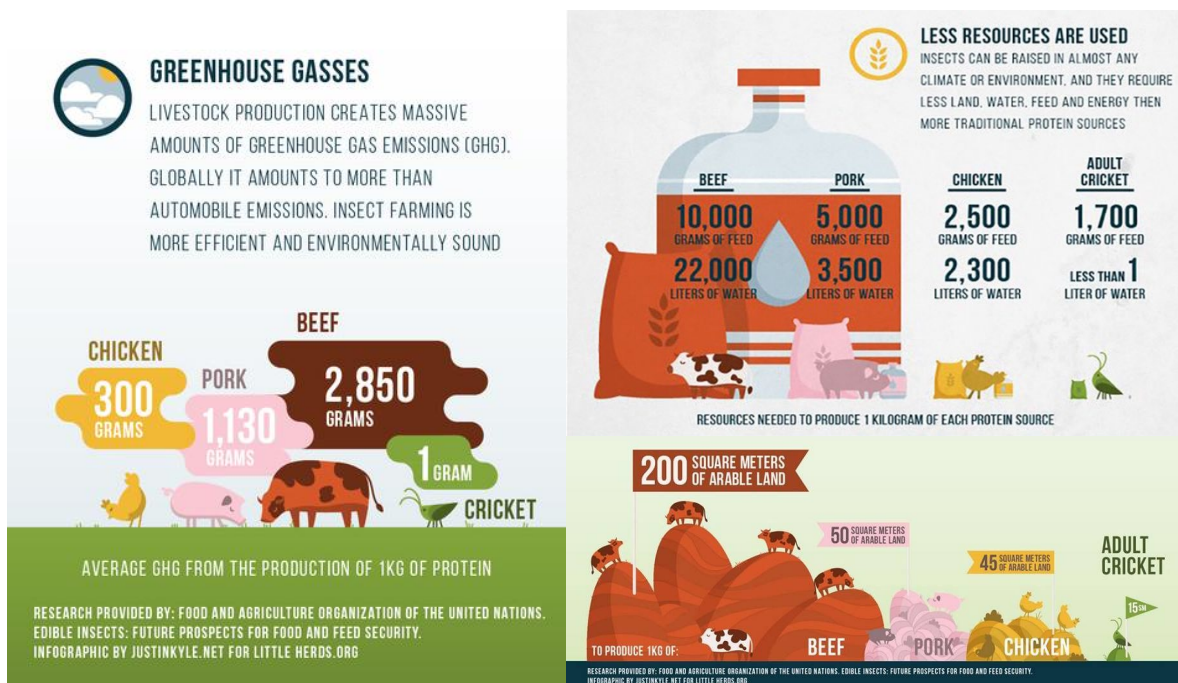
Costumed guests try grasshoppers during a Halloween event at MOXI, The Wolf Museum of Exploration + Innovation, Santa Barbara, CA (Santa Barbara Bugs 2019)

4. Curiosity

You encountered my booth, heard my pitch, challenged your disgust, and ate some bugs. If you are like most, you have many questions. Curiosity is the main goal I aim for in this experience, and it is not a difficult goal to achieve. While some of the questions deal with empirical facts, most are theoretical and create a space for thought experimentation. Some popular questions include:

Q: “What does it look like to farm insects?”

A: This question arises from the belief that we know what it looks like to farm other livestock; cue Farmer John and the quintessential red barn. Answering this question complicates what “farming” looks like in the 21st century, and what it may look like in the future. Advocates for edible insects are rethinking not just what, but also *how* we farm. These farms are not homogenous. Farmers are experimenting with diverse ways of raising insects that work best for their locality. Wendy-Lu McGill, for example, runs Rocky Mountain Micro Ranch, an insect farm in Denver, Colorado. She raises crickets and mealworms in solar-powered shipping containers outfitted for Colorado summers and winters. Insect farming takes a fraction of the space, feed, and water as other livestock (i.e., cows, pigs, chickens) and they can therefore be raised in more urban environments and at the home or community level (van Huis and Oonincx 2017). In a more localized food cycle, organic food waste can be repurposed as feed, and production and distribution chains can be minimized. Many in the edible insect advocacy community are envisioning ways to localize insect farming and offer open-access home farm plans online.



Insects take a fraction of the resources used by other livestock (Kyle; van Huis et al. 2013; Little Herds)

Q: “Don’t bugs carry diseases?”

A: We often associate insects with disease. We want them out of, and far from, our food. The Covid-19 pandemic, however, has led to a broad recognition of the disease risk of eating meat. Animals familiar to us and our plates are often mammals like cows and pigs. These animals are closely related to humans and the diseases they carry can often infect us. Insects, however, are much more biologically removed and therefore present less disease risk. Though, like with any live animal raised for food, clean, and disease-free rearing facilities are necessary to meet food safety standards, edible insects will likely not cause the next global pandemic.

Q: “Can you eat [insert insect name here]?”

A: I recently hosted a Zoom educational event for a local elementary school. After the presentation, I flipped through pages of small Zoom windows as 70+ kids jumped up and down waving their hands. Nearly every question followed the format: “Can you eat ____?” and the insects ranged from black widows to kitchen ants. A small kindergartener even stuttered through a description of his imaginary insect which, of course, I deemed edible. When the very concept of “food” becomes open territory for reconsideration, we become curious about the potential edibility of what surrounds us. Suddenly, food is not just what is plastic wrapped at the grocery store but may also be the plants and bugs in our backyards. Of course, there are insects that are inedible (e.g., poisonous caterpillars) but most common insects can be safely consumed. Though edible insects can be wild caught, it is important they are properly identified and isolated for about two days to ensure they have not consumed dangerous plants or pesticides. It is also important not to overharvest insects that may play an important ecological role and I encourage those interested to start a home insect farm.

Other questions tackle a wide range of topics. Some people question the impact of the meat they eat; however, insects may also provide a more sustainable alternative for those who follow vegan and vegetarian diets. Many vegans and vegetarians who encounter the booth question how insects fit into their construction of acceptability. Are insects, for example, sentient beings? Do the benefits of insects as more sustainable than monocrop vegetarian staples like soy outweigh the cost of insect suffering? Though the extent to which insects experience pain is largely unknown, there is a general consensus that insects are less sentient than other livestock animals and most insect farmers follow guidelines for ethical rearing, including humane slaughter methods like freezing.

Though some people become quick bug evangelists, many remain justifiably unconvinced that insects will be a feasible solution towards a more sustainable food system. Participants join a spontaneous think-tank as they talk through strategies for making change. Ideas range from improbable to genius, “we could shrink cattle to a more manageable size to help stop deforestation,” or “we should label our food products based on resource use.”

Price is also a point of discussion. Insects are often expensive in the U.S. because the industry is relatively new. Demand, however, is increasing and insect products are predicted to become more accessible and affordable (Wade and Hoelle 2020; Statista 2019). Some participants make the suggestion that food prices should reflect a product’s environmental cost through the production, processing, packaging and distribution process, in effect, raising the cost of unsustainably reared meat and increasing the accessibility of more sustainable alternatives.

As the event comes to a close, I let converted stragglers grab a last handful of bugs, gather my remaining information sheets, and snack on a few bugs while I put away my table. Regardless of what or how participants think as they leave my booth, the point is they are thinking, as I hope you are. The topic of edible insects opens a space for those who eat food (all of us) to think about what we eat, why we eat it, and what impacts it may have. Moreover, the topic provides an opening for thinking about the future and envisioning solutions towards a better one. Questions are essential for driving thought and action and I encourage you to engage in the Q&A in the comments section below or bring the topic to your dinner table. If someday you find yourself staring down bowls of insects at my booth, come have a bug and join the conversation.

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