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Insect consumption and aesthetic disgust: Using design fiction to imagine novel food experiences

ABSTRACT

Disgust is a strong emotion influencing human behaviour in many domains, including food choices. For example, many western consumers are hesitant about eating insects. This is understandable as insects have been connected with the emotion of disgust. We conducted two design workshops to gain a better understanding of factors that can give rise to the emotion of disgust in the context of grasshoppers and explore alternative food design solutions. Based on the insights, we created four design fiction examples to illustrate how disgust can be an integral part of grasshopper consumption. We argue that changing the attitude of Europeans towards novel food items like grasshoppers requires exploring design strategies that neither solely focus on the sustainability benefits of insect consumption nor take disgust to be something that must be circumvented.

KEYWORDS

food design
insect-based food
grasshoppers
design scenarios
disgust experience
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INTRODUCTION

Edible insects have been part of the human diet for centuries and are nowadays portrayed as a sustainable alternative to current ways of food consumption and production. They are presented as a meat replacement because of their nutritional values (Dagevos 2021) and as an example of environmentally sustainable farming techniques (Balzan et al. 2016). Most edible insects are collected in the wild and the concept of producing them in farms is relatively new (Yen 2015). The European Union, which regulates novel foods for its member states, approved insects to be used for human consumption in 2018 (Lähteenmäki-Uutela et al. 2021). By February 2022, three insects have been approved for consumption: the yellow mealworm, the migratory locust and the house cricket (European Commission 2022). As a result, insect-based products such as insect burgers in supermarkets (Kauppi et al. 2019), bars, chips, protein powders, cookies and even pasta have emerged (Clarkson et al. 2018b; Reverberi 2021). However, in the Netherlands, most consumers have never eaten insects (Statista 2022) and most of the introduced products disappeared from the shelves after some time. In the words of the spokesperson of Jumbo, one of the largest supermarkets in the Netherlands: ‘We attempted to lower the bar to eating insects several times, but have learned that customers are not ready to start eating them. They find it scary to eat insects and that has also to do with their appearance’ (de Jong 2020, translation added).

In line with the above comment, disgust is often identified as one of the key barriers to consuming edible insects (La Barbera et al. 2018; Ardoin and Prinyawiwatkul 2021; Naranjo-Guevara et al. 2021). As we will outline in more detail in Section 1, disgust can be triggered by entities having a certain smell, shape, unfamiliarity or by a violation of social codes and norms (Rozin et al. 2008). Food is a common trigger of disgust as its consumption literally involves inserting the disgust-eliciting entity into the intimate sphere of the body. Additionally, it is hypothesized that disgust originates from a biological mechanism that protects humans from toxic substances (e.g. Curtis and Biran 2001). However, given that edible insects are approved as a safe food item by the European Union and that insect consumption is part of people’s diet in many parts of the world, such as Africa, Latin America and Asia, it is puzzling why insects elicit disgust in many Europeans when disgust is primarily conceived as a biological defence mechanism against toxic substances (Van Huis et al. 2013). After all, western consumers frequently consume insect-based products such as cochineal insects, also known as food dye E120 (Gates 2017). Some food items, such as the Sardinian Casu Martzu cheese that contains live insect larvae, can even carry significant cultural meaning. Furthermore, food items that are biologically similar to insects and have comparable nutritive advantages, such as shrimps, are part of the diet of many western people but are not typically associated with disgust.

While disgust is typically considered as a negative emotion, as one of the so-called modes of aversion (Kolnai 2004), recent work on disgust proposes to introduce the category of *aesthetic disgust* to indicate that there are disgust experiences that are aesthetically appreciated in virtue of them being disgusting (e.g. Korsmeyer 2011). This idea suggests that the acceptance of insect consumption need not necessarily proceed through the removal of all disgust-eliciting elements from the product but can also take place through the explicit highlighting of disgusting features to give rise to an aesthetic experience.

To highlight how insect consumption in general, and the consumption of grasshoppers in particular, can give rise to aesthetic disgust, this article makes use of design fiction. Design fiction is an approach that uses prototypes and

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storytelling to speculate about alternative possible realities. The focus is on seeing the world as it could be rather than what it currently is (Grand and Wiedmer 2010; Malpass 2012). Design fiction can help uncover ethical, social and personal challenges that could arise as a result of the introduction of new technologies and designs (Lupetti et al. 2018), asking unanswerable questions or help reinterpreting the past (Grand and Wiedmer 2010). To materialize alternatives to the status quo, designers can use different media such as videos, sketches, prototypes or photographs (Grand and Wiedmer 2010). As we will clarify throughout the article, and specifically in Section 3, our design fictions function to move beyond the typical understanding of disgust as an individual emotional response in insect acceptability studies. Instead, using the idea of aesthetic disgust as a starting-point, we imagine possible futures where the disgust-eliciting features of insects are embraced in particular practical contexts.

The central question that is explored in this article is: 'How can aesthetic disgust be used to stage positive experiences in design fictions about the consumption of grasshoppers?' Our exploration proceeds in four steps. First, we explain the entanglement of disgust and food consumption to highlight how food items elicit disgust in different ways. Second, we propose to understand the disgust that many people in Western Europe experience when confronted with insects as an 'acquired distaste'. Third, we present different design fiction concepts exploring alternative ways of integrating grasshoppers in a western consumer context. Fourth, we reflect on potential questions to which these concepts give rise and outline how this notion can help when designing for aesthetic disgust experiences.

DISGUST AND FOOD CONSUMPTION

Do you see them there – sitting before the house – young creatures like phantoms of dreams? Children, they seem, slaughtered by their own kindred, their hands full of the meat of their own flesh; they are clear to my sight, holding their vitals and their inward parts, which their father tasted.

(Aeschylus 1848: 1217–23)

Aeschylus's play *Agamemnon* (±458 BCE), the first of the Oresteia trilogy, describes how Agamemnon's father Atreus tricks his brother Thyestes into eating the flesh of his own children. When visiting Atreus's palace, Thyestes is offered a stew that he consumes with taste, only realizing that he has been eating his children when Atreus's servants bring in a plate with the chopped-off hands of Thyestes's children holding their intestines. After having eaten his own children unwillingly, Thyestes is banned from the city of Mycenae for the unforgivable act of consuming human flesh.

This scene highlights two central aspects of the emotion of disgust: on the one hand, specific objects, such as dead human flesh, can trigger disgust. On the other hand, certain transgressions of moral or societal norms, such as the act of cannibalism, can be disgust elicitors. A bit closer to home, we can assign similar characteristics to the entities that elicit disgust. Typical disgust elicitors are faeces, rotten food or certain types of insects, such as cockroaches. We experience these things as disgusting by virtue of specific properties, such as their appearance or smell. Furthermore, people tend to be disgusted by acts

1. Another approach to disgust, that will remain undiscussed in this article, is grounded in psychoanalysis and links disgust to the notion of the abject. The most prominent work discussing disgust from this perspective, by building on Freud and Lacan, is Julia Kristeva's *Powers of Horror: An Essay on Abjection*. A detailed discussion of this perspective is beyond the scope of this article, but see for example: Korsmeyer (2011: 127–30).

like child abuse or other violent behaviours that are considered to be transgressions of moral and social norms.

Disgust has been characterized as one of the human 'modes of aversion' (Kolnai 2004) that functions as a safeguard not only against potential indicators of disease and parasites (Kelly 2013) but also against things that are a threat to a given social order (Douglas 1966).¹ As Kosonen (2022) has pointed out, these different functions correspond to two different, yet inter-related ways of understanding disgust. Biologically, disgust can be understood as a mechanism that protects humans from danger, whereas sociologically, it can be connected to the maintaining of a difference between 'us' and 'the others' that is important to how many contemporary societies are organized (Kosonen 2022: 92–93). The latter mechanism might be explanatory for why people living in Western Europe tend to be disgusted by (the idea of) eating insects: whereas it is not biologically harmful to consume insects, the cultural and culinary habits in Western Europe do not include insects, which is why they are perceived as belonging to the diet of 'others'.

In her book *Savoring Disgust*, Carolyn Korsmeyer (2011) points out that while disgust is an emotion that all humans seem to share, the situations in which disgust manifests are vastly different across cultures and even within cultures. For instance, haute cuisine dishes often contain potentially disgusting elements; think about blue cheeses or drinks like kombucha. Each of those contains stimuli that might elicit disgust outside the context in which they are served but are considered to be examples of haute cuisine precisely in virtue of their potentially disgust-eliciting qualities (Korsmeyer 2011: 64). She coins the term *aesthetic disgust* to capture the phenomenon that an individual can be genuinely disgusted by an object while simultaneously appreciating this object in virtue of its disgusting properties. This experience is not limited to food consumption but can also be extended to the appreciation of works of art that involve potential disgust elicitors, such as the scene in Aeschylus's *Agamemnon* described at the beginning of this section.

From this brief discussion, disgust in the context of food can be elicited:

1. By certain sensory properties of the food item (e.g. smell, visual appearance and texture).
2. By the perceived transgression of accepted moral and social norms.
3. By the perception of foreignness in the food item as in that it does not belong to one's own or culturally acquired eating habits.
4. By an aesthetic appreciation of a particular food item in virtue of its potentially disgusting characteristics.

In the next section, we discuss how these different manifestations of disgust play a role in the case of edible insects.

DISGUST AND THE ACCEPTABILITY OF INSECT CONSUMPTION

Research into insect consumption attempts to unravel why western consumers typically reject insects, even though they (1) have a nutritional value which is comparable to other food items (e.g. shrimps) and (2) are officially approved as food items that are safe for consumption. The strong aversion towards insects seems puzzling as western consumers knowingly and unknowingly eat many insect-based products such as honey, propolis or royal jelly (Deroy et al. 2015; Gates 2017). Deroy et al. propose to understand the disgust that

many people in Western Europe experience when confronted with insects as an 'acquired distaste' (2015). They consider this distaste to be grounded in a lack of exposure to the experience of eating insects, such that people are unfamiliar not only with their taste but also with tactile, visual and even olfactory factors that are part of the eating experience.

Much work on the acceptability of insect consumption tends to treat it as an individual eating experience, such that it is typically maintained that the key to increasing acceptance lies in lowering the associated feeling of disgust in the eating individual (e.g. Van Huis 2022). However, this focus as well as the emphasis on sustainability and nutritional benefits of insects consumption has shown little effect so far (Deroy et al. 2015). Deroy et al. (2015) maintain that appealing to reason is generally not the best strategy when attempting to modify food behaviour. In contrast, they suggest to focus on making western consumers enjoy this kind of food by finding the right categorization (e.g. emphasizing unique sensory qualities) and presentation form.

Furthermore, in her discussion of food practices around exotic food items in inter-war Paris, Lauren Janes (2010) points out that disgust responses are not so much the result of taste experiences (after all, most potential consumers have not tasted the food in question), but instead of what the food item in question is associated with. Hence, contextual factors such as social and culinary practices are likely to play a role in the context of acceptance of insects as a food source (House 2016). For example, *Maikäfersuppe* ('cockchafer soup') was a well-known dish until the mid-1900s in Germany and France (Van Huis 2020). In 1844, Johann Joseph Schneider outlined a recipe for such a soup also



Figure 1: Children collecting cockchafer in Münsingen, Switzerland. Image credit: Eugen Thierstein (1919–2010). Licensed under CC BY 4.0.

recollects how his students ate cockchafers alive or prepared them as sweets by covering them in sugar or honey (Schneider 1844). Seeing children collect the bugs (see Figure 1) to be eaten has vanished from the public eye due to changed agricultural and cooking practices (Rüschmeyer 2019).

This example illustrates that insects have been part of western consumers' eating habits – at least in some parts of Europe. The difference between the acceptance of specific insects back then and their rejection now can be illustrated with the aesthetic food experience model (see Figure 2) that outlines how food experiences can be staged. Staging can be defined as using and combining techniques, technologies and materials to deliberately create a

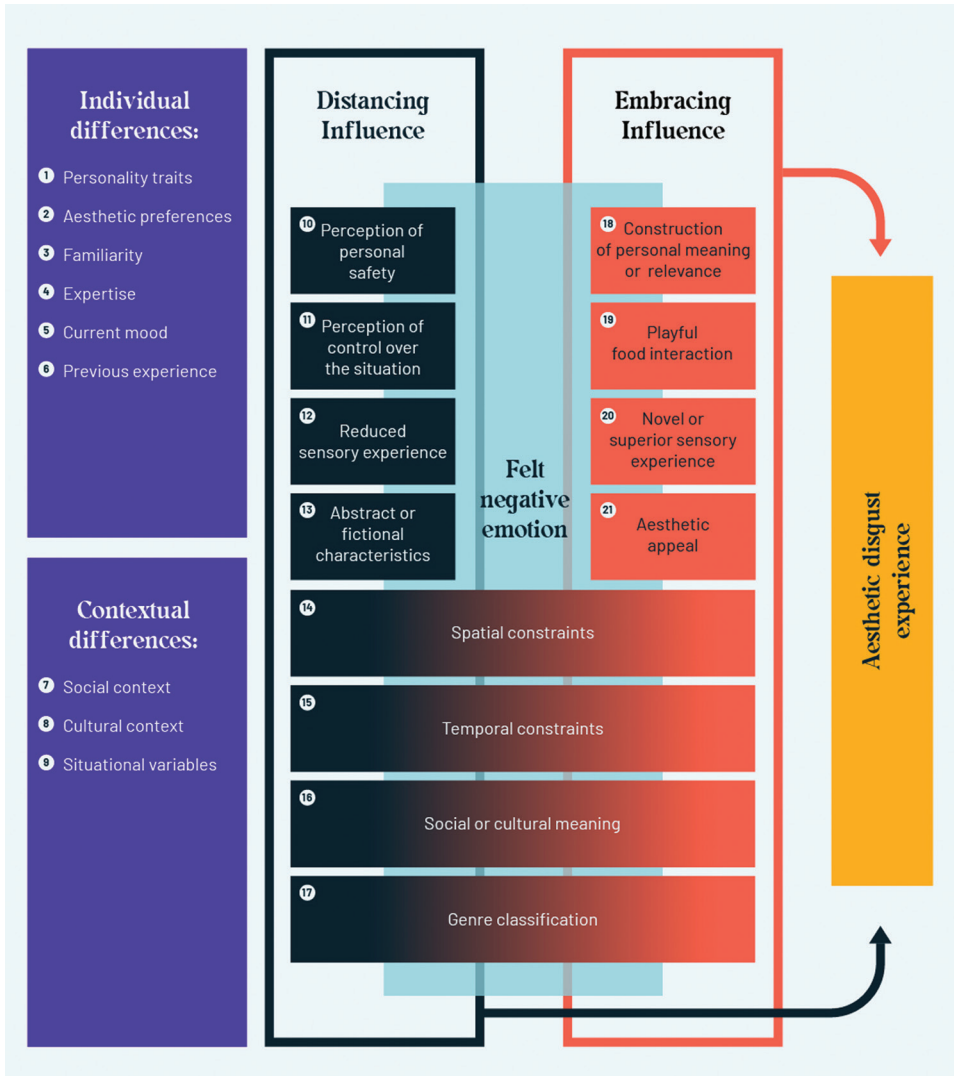


Figure 2: The aesthetic food experience model outlines different factors that help consumers to embrace the disgust-eliciting features and/or establish a cognitive distance to the food item and have an aesthetic experience. Image credit: authors.



Figure 3: Chocolate cockchafers. Image credit: [artpartner.de/Alamy](https://www.artpartner.de/Alamy) Stock Photograph.

visual, experiential and spatial composition of performance (Lemke and de Boer 2022).

Several elements of staging are present in the case of cockchafers. For example, the grubs of cockchafers are *spatially constrained* as they occur in certain European regions and appear in large numbers in three-to-five-year cycles, which forms a *temporal constraint* because people can eat the insect just during specific years. There is also a *playful food interaction* as they were manually collected and eaten as a sweet covered in sugar. Chocolate-formed cockchafers are still available as a treat in Germany today, see Figure 3. In addition, how the bugs were portrayed in children's books and appeared in children's songs contributes to *establishing personal meaning and relevance*.

EXPLORING DISGUST-ELICITING FEATURES WHEN EATING GRASSHOPPERS AND STAGING THE EXPERIENCE (DIFFERENTLY)

For this project, we focused on grasshoppers as food items. We organized two workshops with design students to explore the potential disgust-eliciting features of eating the insect and to brainstorm about how consumption could be increased. The workshops were held at the TU Delft in the Netherlands and were part of an introductory master course and a lecture series. Both of the workshops aimed to gather qualitative data. They started with a brief presentation about the food and the role of disgust. After this presentation, two activities were carried out. First, a brainstorming activity was performed, asking students to reflect on disgust-eliciting features of grasshoppers using post-its. We provided a photograph of the grasshopper as a prompt for the reflection. The second activity focused on brainstorming different ideas to use grasshoppers while reflecting on disgust in the context and noting ideas down on post-its. The first workshop lasted an hour and involved approximately 60 students. In the second workshop, we also included in the presentation the concept of design fiction in the form of critical food design examples. After the presentation, we asked students to brainstorm about disgust-eliciting features again but provided an image of a shrimp and a grasshopper. This was done based on observations during the first workshop where students compared the two. We then asked students to first discuss how to make the experience of eating the food item either less or more disgusting followed by making a drawing or collage and presenting the concept in front of the group. The

2. The efficacy of the design fiction of examples is currently unclear. Testing the efficacy of the design fiction examples is beyond the scope of this article, since the current is explorative and primarily intends (1) to highlight the potential of the notion of aesthetic disgust for increasing our understanding of why people in the West seem generally reluctant to consume insects and (2) to put forward why design fiction can be an innovative methodological tool to explore insect consumption.

second workshop involved 37 students and lasted 5.5 hours. The two workshops involved participants who were of different nationalities and none of the participants indicated familiarity with having eaten grasshoppers before.

During the workshop, participants indicated multiple features that they perceived as disgust eliciting, out of which four themes stood out. We will reflect on these four themes and use the aesthetic food experience model to suggest how these themes can be addressed by attempting to stage the consumption of grasshoppers differently:

1. Expected taste experience.
2. The overall appearance of the grasshopper.
3. Consumption contradicts current eating habits.
4. Unhygienic association with the insect.

Alongside the four themes, we present four design fiction examples that employ staging techniques to facilitate an aesthetic disgust experience when eating grasshoppers. The different critical designs presented in this article were created by the authors. Concepts generated by the students were used as a source of inspiration in the process but were expanded on and changed. We also used artificial intelligence platforms including Chat GPT3 and mid. journey to create ideas for scenarios and create visualizations.

The goal of making use of design fiction in the present context is to explore how the staging techniques identified above can be used to imagine possible realities in which the potentially disgusting features of insects give rise to aesthetic appreciation. By means of the design fiction examples, we intend to move beyond the typical focus on individual taste preferences in insect acceptability studies and to provide potential materializations of insect consumption in which their disgust-eliciting features are celebrated in different ways. We do so by providing fictional examples of practical and historical situations in which insects are embedded into a particular context each highlighting to different extents how insect consumption can give rise to aesthetic disgust. Each design scenario ends with the formulation of a couple of questions that highlight some of the societal implications of introducing insects in this manner and enable one to reflect on the degree of plausibility of the scenario.²

Expected taste experience

The first general theme singles out that insects might be disgust eliciting because of the anticipated taste and texture. While the taste of invertebrates, such as shrimps, is known to many western consumers, the taste of grasshoppers is typically not. The rigid chitin plates protecting the thorax and abdomen can be seen to either give rise to a crunchy mouthfeel on the one hand or a potentially dry and cracking experience on the other. This taste expectation is also reflected in culinary descriptions of grasshoppers, describing the taste of grasshoppers as 'crunchy and nutty with a strong umami hit' (see, e.g. *Insects: An Edible Field Guide* by Gates 2017: 28). To the unfamiliar eater, the taste of grasshoppers is compared to familiar tastes such as meat or shrimp.

In contrast to the insects that they are compared to, marine-based crustaceans such as shrimps or lobsters (which used to be referred to as cockroaches of the sea) are known for a specific and desirable flavour profile. A core difference between grasshoppers and marine crustaceans is that the latter are typically perceived to have their own unique flavour profile offering a *superior taste*

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experience while grasshoppers do not. Comparing them with flavours unique to nuts, meat or shrimps impacts on the perception of the food as having a *novel and superior sensory experience*: in short, having a unique taste in itself. The following part describes a design fiction concept for a luxury seasoning product (Figures 4 and 5).



Figure 4: The introduction of garum is accompanied with a tailored marketing strategy. Image credit: authors.



Figure 5: The product uses grasshoppers which are endemic to the European continent. Image credit: authors.

Design fiction 1

Advertisement for 'garum', a new seasoning product that uses grasshoppers as the main ingredient

Introducing garum, the new delicacy that is taking the culinary world by storm! The intense flavour of garum has been a favourite of ancient Romans and modern culinary enthusiasts alike. This unique condiment is made by fermenting grasshoppers and pearled barley koji in salt. Despite its intense flavour, garum is a versatile ingredient that can be used in a variety of dishes. Its salty umami flavour pairs well with fatty meats and rich sauces, making it a perfect addition to any meal. Whether you are looking to impress your guests at your next dinner party or simply want to try something new, garum is the perfect option. We source grasshoppers locally and ferment them in small batches by hand to secure the intense flavour experience that garum is known for.

The following staging techniques were used: *aesthetic appeal* by making the packaging resemble a luxury packaging line; *novel and superior sensory experience*; *reduced sensory experience* by using a fermented product; specific *cultural meaning* by using recipes that were already used by Romans. The questions that such a concept raises include: (1) will consumers know how grasshoppers taste when using this product, as the fermentation process will inevitably change the texture and flavour profile? (2) Will such a luxury food product increase acceptance on a broader scale?

The overall appearance of the grasshopper

The second domain of disgust elicitors focuses on the overall appearance of the grasshopper. An unpleasant mouthfeel due to the visual characteristics of insects, including their size and specific elements such as wings, has been mentioned to evoke a rejection in unfamiliar consumers such as children (Hémar-Nicolas et al. 2022). Rozin and Fallon (1987) suggest that nearly all animals are considered disgusting in western society, including insects and nearly all amphibians and mammals. The authors explain this situation with reference to the idea that humans tend to see themselves as distinct and superior to another animal. For example, while serving an animal head was part of elaborate food plating and even a complete dish in Europe in medieval times (Visser 2017), this practice is no longer common in a western dining context and potentially evokes a disgust response due to evoking an animal-reminder disgust.

Grasshoppers commonly have the head attached when served as a whole. Their small size limits any attempts to remove the hard outer part and requires the head and the 'shell' to be eaten with the perceived risk of wings or legs getting stuck in one's teeth. They are neither staged in a *playful manner* nor having a *social or cultural meaning* that can attract attention. The following part describes a design fiction concept for a cutlery set developed to remove any features that remind of the living insect (Figures 6 and 7).

Design fiction 2: The chopper

A food blog entry of a fine-dining experience involving a cutlery to eat grasshoppers

I was sitting in a fine-dining restaurant enjoying a delicious meal when I saw the grasshopper included in the dish. I could not help but notice the beauty of

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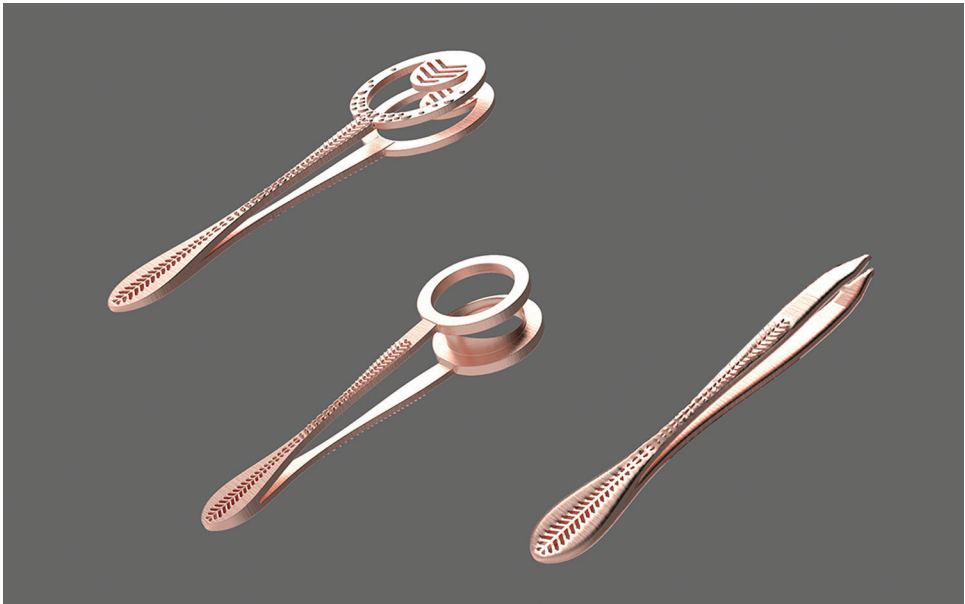


Figure 6: The cutlery set allows users to remove aspects of animality of the grasshopper. Image credit: authors.



Figure 7: The cutlery set consists of a chopper to remove the head, a gripper to hold the grasshopper and place it in the mouth and a pincher to remove legs and wings if required. Image credit: authors.

the creature, and I was reminded of how much I love nature. I watched as the grasshopper was slowly placed in front of me, and I could feel my heart racing as I thought about how I got my hands on one of these creatures. I love the way that grasshoppers are so small and delicate. They remind me of the way that life is so precious and fleeting. I take up my tongs and grab it by its torso. With the sharp blade that is embedded inside the chopper, I remove the head and leave it on the plate. Next, I remove the wings and legs with the provided tweezer before moving the delicious body into my mouth.

The following staging techniques were used for this design concept: *genre classification* by positioning the cutlery set into a fine-dining context which also entails *spatial* and *temporal constraints* due to the restaurant location. The concept raises the question: will enabling the consumer to remove the head, wings and legs increase disgust or help them enjoy the taste of the food?

Consumption contradicts current eating habits

The third theme focuses on current the fact that western consumers typically perceive insects as an unfamiliar and novel food item. Insects are commonly perceived as extreme (Veeck 2010) and culturally non-edible (Vane-Wright 1991). In food narratives focusing on aspects of deliciousness/disgust, aspects of purity and superiority play a role (Hey 2022). It has been pointed out that eating insects might evoke an aversive response in children reinforced by factors of the food being unfamiliar, unprocessed, part of remote culture's food practice and indicative of poverty (Hémar-Nicolas et al. 2022). In a western consumer context, insects so far have been dominantly used as animal feed (House 2018) or as a kind of thrill in TV shows where contestants have to eat edible insects as part of challenges to reinforce the image of insects being disgusting (Hémar-Nicolas et al. 2022). Establishing such food-related narratives potentially strengthens the perception that insects are unsuitable to be consumed as part of daily meals (Looy et al. 2014).

In addition, eating the insect as a whole might be seen as disgusting, and people following a vegan or vegetarian diet can perceive it as inappropriate for consumption and even repulsive (Elorinne et al. 2019; Dagevos 2021). It also needs to be considered that products that contain insects are often marketed as a protein replacement (e.g. to replace animal-based meat). They are positioned in supermarkets like Jumbo in the Netherlands next to similar vegetarian food items such as soy-based chicken-style pieces (House 2018). However, the texture and taste do not resemble one that consumers are familiar with, and insects can have very different flavour profiles (Gates 2017). Adding insects to food items such as burgers might encourage consumption, but it can also lead to a taste experience described as dull and boring (House 2018). A lack of recipes and knowledge of how to incorporate insects into existing recipes can also be a barrier in this context (Clarkson et al. 2018a) as consumers seem to be more willing to try insects when prepared in a restaurant (Balzan et al. 2016).

Grasshoppers as a food source thus lack a *social and cultural meaning* to western consumers or being perceived as a prototypical kind of *food genre* (e.g. fine-dining ingredients). Instead, they are often associated with food appropriate for exotic animals, pets, remote (and unfamiliar) cultures and indicative of poverty which stages the food negatively. The following design fiction example presents a different cultural perception of an acceptance of grasshoppers in a Dutch context (Figure 8).

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Figure 8: During the seasonal 'harvest' of grasshoppers, families collect grasshoppers in the Dutch countryside. Grandparents show their grandchildren where the best spots for finding grasshoppers are located and how they can be caught. Image created with *midjourney.com*.

Design fiction 3: The traditional gathering

Announcement for the traditional gathering of grasshoppers in the Netherlands

The ideal combination of catching butterflies and collecting mushrooms! This spring, families and groups of friends will again bring their equipment to the grass fields of the Netherlands to engage in the yearly tradition of grasshopper-gathering. As usual, spring marks the beginning of the grasshopper season that will kick off next week when the first 'net of grasshoppers' will be presented to the public during a festive ceremony. For two decades now, this tradition has replaced the 'herring season'. The major advantage is that only professional fishermen could participate in finding the 'first ton of herrings', whereas grasshopper-gathering is for everyone. You can just go to the forest and collect a net of fresh grasshoppers, ready to be cooked, just as your grandparents did when collecting mushrooms.

The concept describes a staged food environment emphasizing the *social and cultural meaning* that grasshoppers can take on. This also entails *spatial and temporal* constraints due to the seasonality aspect of the insect, similar to one of cockchafers described earlier. Furthermore, the *construction of personal meaning and relevance* through a *playful interaction with food* while gathering the grasshoppers are techniques that enable people to embrace disgust. The concept establishes these aspects by creating a sense of tradition, ceremony and familiarity with the harvest practice. This design fiction example raises the question: will the collection of wild grasshoppers lead to an inevitable insect extinction in the Netherlands?

Unhygienic association with the insect

The theme of unhygienic associations with grasshoppers related to concerns about sanitation, as grasshoppers can be associated with living in the dirt and insects being disease carriers (Veeck 2010) as well as being dirty and creepy

(Looy et al. 2014). In this context, it seems paradoxical that there is little aversion towards marine crustaceans such as lobsters or shrimps, which eat decaying matter and even dead fish (Looy et al. 2014) but herbivore insects such as grasshoppers, which have the same diets as sheep (Looy et al. 2014; Deroy et al. 2015) are perceived as disgust eliciting.

It is specific to disgust that almost everything that gets into contact with disgusting objects becomes a disgust stimulus itself. These contaminating qualities of disgust can explain the aversions towards insects and unhygienic associations. Rozin and Fallon capture these effects with their *Law of Contagion* and point out that the perceived contaminating qualities that insects seem to consist of can be perceived as lasting, causing an aversion to eat or drink anything they have come into contact with (e.g. an orange juice into which a sterilized cockroach has been dropped) (Rozin et al. 1986; Rozin and Fallon 1987). This explains why grasshoppers that have been living in the dirt where disease and parasites (seemingly) are more likely to appear render them disgusting themselves. Insects can indeed contain features such as toxins that need to be removed for consumption, and cultures that are more familiar with eating insects have developed measurements to transform non-edible insects into edible ones. This can include removing the intestines and head parts of the insect, cleaning them thoroughly and boiling them long enough to remove any toxic substances and making sure the insects can be stored for later consumption (Yen 2009).

Grasshoppers lack staging elements that convince consumers that they are *safe* to eat. Despite being approved by the European Union as a novel food item, people might feel hesitant to try it due to associations with insects being contaminated by parasites and its surrounding. They also lack *cultural and social* staging elements that position it as a food item historically grounded in local food practices. The following design fiction example presents a concept for a production environment that lets consumers understand how grasshoppers live and eat (Figure 9).



Figure 9: The grasshopper hotel comes in different sizes as a kit for the consumer's house. The installation requires minimal technical skills and secures an easy food supply. Consumers also get a 'grasshopper egg starter kit' to start production. Image created with [midjourney.com](https://www.midjourney.com/).

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Design fiction 4: The insect hotel

Product details of an insect hotel as a local food source

First, they emerged in national parks and specialized farms; insect hotels that prevented insect species from becoming extinct. Now they have evolved into a food source in people's own homes, as a protein-rich kitchen garden as it were. The main advantage over an ordinary kitchen garden is that you can harvest your grasshoppers multiple times a year when you possess sufficient skills. You can control what your grasshoppers eat, which species you breed and the other things they get in touch with. This is a safe, cheap and sustainable option for providing a varied and home-grown diet to you and your family!

The concept uses the staging techniques of constructing *personal meaning and relevance* by moving the production closer to the consumer and emphasizing *personal safety*. The concept raises the question: (1) is such a product more sustainable than other animal-based proteins? (2) Will seeing grasshoppers up close create some emotional connection that might make consumers see insects as pets rather than food items?

DISCUSSION AND CONCLUSION: FROM ACCEPTABILITY TO STAGING AESTHETIC DISGUST

How can these examples from design fiction help view insect consumption from a new perspective? As we indicated in Section 2, studies focusing on increasing the acceptability of insect consumption tend to conceive of disgust in terms of an individual taste preference that is tied to a particular food item. Disgust, then, is understood as an undesirable property that can be eliminated or suppressed when using the right strategies. The design fiction examples approach disgust differently in three crucial aspects: (1) our discussion of aesthetic disgust indicates that disgust should not be necessarily conceived of as a barrier to insect consumption because some food items can be appreciated in virtue of them having certain disgust-eliciting qualities, (2) disgust is embedded in practices and is historically situated, such that it is not primarily understood as an individual emotion but is experienced in the presence of companions and context-dependent, and (3) dependent on the goals of the practice in which one engages, certain potentially disgust-eliciting elements of a given entity might stand out or not.

All of the examples take as a starting-point that disgust is experienced relative to a certain situation; there might be occasions in which one is disgusted by (the idea of) consuming a certain food item, whereas the same food item is not experienced as disgusting in another situation. Given this situational nature of disgust, increasing the likelihood of someone eating insects does not (only) amount to changing certain psychological dispositions but instead staging disgust by embedding it into particular experiences and practices (Lemke and de Boer 2022). The design fictions presented above are then examples of how disgust can be staged. Let us now unpack the three aspects identified above in more detail.

The notion of aesthetic disgust indicates that there are occasions in which potential disgust-eliciting features are appreciated. Aesthetic disgust might occur because a particular food item is transformed from a disgust elicitor into something aesthetically pleasing, as in the case of consuming blue cheeses. Design fictions 1 and 2 are examples of how aesthetic disgust can become part of a food experience: insects are staged as instigating an exclusive

food experience, either because of the uniqueness of the taste (example 1) or because of the uniqueness of the context in which it is consumed that includes special kinds of cutlery (example 2). The former strategy relates to already existing efforts to introduce insects into western cuisine: cookbooks with insect recipes typically point to the uniqueness of their taste and structure. The latter strategy breaks with typical efforts to make people consume insects; typically, insects are removed from view and transformed into insect burgers or bars. Invoking the emotion of aesthetic disgust might help situate insect consumption into the domain of fine dining, attract early adopters and facilitate the wish to eat the meal another time by focusing on the insect's distinct taste (House 2016).

Staging can also be used to embed potential disgust elicitors into more general sociocultural practices, as what is proposed in the design fictions 3 and 4. Familiarity with an entity enables one to embrace disgust-eliciting features or an entity. It has been pointed out that familiarity with a certain food item is not a sufficient condition for eliminating the rejection of a food item (La Barbera et al. 2018). However, aesthetic disgust offers a novel perspective on familiarity: familiarity indeed does not eliminate feelings of disgust but can function as a technique to make people embrace disgusting elements by making them part of specific experiences. This is why our examples suggest making people familiar with insects by making people acquainted with particular food practices. Design fiction 3 makes use of familiarity and links insect consumption to earlier practices such as mushroom collecting or the herring season. Such events portray eating as a collective practice, focused on gathering or eating fresh products in the proximity of other people. Furthermore, it stages insect consumption as a tradition that can be passed over between generations. Traditions sometimes involve potential disgust elicitors (as in the case of herring) but highlight the potential disgust as something to be overcome or 'cultivate' in order to be able to participate in a (national) tradition. In design fiction 4, insects are embedded into another practice: that of care. Some people are already familiar with insect hotels that are present in cities in Western Europe as well as in the countryside. Caring for animals makes us less disgusted by some aspects of them: for instance, pet owners generally are not disgusted by kissing the face of their pets, regardless of where this face has been before (Rozin and Fallon 1987). Similarly, closely engaging with insects might lead to a decrease in the extent to which we are disgusted by them. However, it remains an open question if this will lead to an increase in insect consumption: after all, bonding with a certain animal species (e.g. a cat or dog) might make us feel disgusted when thinking about eating this species.

Lastly, dependent on the larger project in which they are engaged, people might or might not be disgusted by a certain entity. Designing such projects can be considered to be instances of staging disgust. For example, growing kombucha or sourdough involves interacting with a fungus that is not necessarily experienced as disgusting in light of the larger project that one pursues. Design fiction 3 embeds insects into a larger project by linking them to a family tradition or national tradition in which insects have a certain expected place that people anticipate. Interacting with insects then becomes a natural expectation, which might decrease the extent to which they are experienced as disgusting. Design fiction 4 highlights another aspect of embedding disgust elicitors into a larger project, namely control. Our workshop participants indicate that the lack of hygiene constituted a reason to be disgusted by insects.

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Staging a practice emphasizes the possibility to create a controlled environment that enables to mitigate hygiene concerns.

Our scenarios have different degrees of plausibility, since our primary goal is not to increase insect consumption per se or to modify people's psychological dispositions towards insects. Rather, we have intended to imagine certain practices that might help mitigate some of the concerns with insects identified by our workshop participants. It remains an open question whether developing these practices is desirable and if we should massively engage in insect consumption. However, pointing out that being disgusted by consuming insects – or other food items – is not a fact of nature but instead something arising in practice enables us to imagine novel interactions with food. Disgust, here, rather appears as an important factor to food consumption that can be played with rather than as something that should be eliminated per se.

Now it has been established that disgust can offer a novel perspective on food consumption, the next challenge for food designers is how it can be staged effectively. We noticed during the workshops that the idea of embedding elements of disgust on purpose as part of the food design concept seemed confusing as disgust is commonly used as an avoidance strategy (de Boer and Lemke 2021) rather than as something that can help disgust be integrated as part of a rich food experience. The design fictions developed in this article are an attempt to create novel ways to materialize food experiences around insect consumption. The next step now is to integrate fiction into reality and make people experience these novel ways of food consumption.

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