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Understanding Westerners' disgust for the eating of insects: The role of food neophobia and implicit associations

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ABSTRACT

The interest for the potential introduction of insects in the human diet is progressively increasing and several benefits for both human health and the environment have been hypothesised. However, especially in Western Countries, this trend could be jeopardized by the aversion that people show for insects as food. In the present paper, we study the impact of food neo-phobia and disgust on the intention to eat insect based food, and we look at how disgust is related to implicit attitude towards insects. Results show that both food neo-phobia and disgust make independent contributions to the intention to eat insects, and the explanatory power of disgust is considerably higher. Moreover, a significant effect of implicit attitude on disgust and an indirect effect of implicit attitude on intention mediated by disgust have been found. Implications for attempts to encourage people to incorporate insect-based foods into their diet are discussed, with special reference to the role of implicit association in determining the disgust reaction.

1. Introduction

The interest for the potential introduction of insects in livestock feeding and in the human diet as well has dramatically increased over the last few years. A number of health and agricultural international organizations has contributed to this growing interest: the Food and Agriculture Organization (FAO), which has worked on edible insect since 2003, has hypothesised benefits for both human health and environment, and research evidence seems to provide encouraging results (Food and Agriculture Organization, 2006, 2009, 2013). Ooninx et al. (2010) indicate that greenhouse gas emissions and ammonia production from insect rearing are lower compared to conventional livestock. Ooninx and de Boer (2012) performed a Life Cycle Assessment (LCA) finding a very low impact in terms of land use and global warming potential. In the same fashion, comparing different meat substitutes Smetana, Mathys, Knoch, and Heinz (2015) showed that insect-based products were the best performing in term of LCA. Insects are also characterized by a low feed conversion rate, when compared with the traditional livestock such as chickens and, above all, beef (FAO, 2015; van Huis, 2013).

The growing interest in insects as food, supported by the many potential benefits, increases the need for a clear and comprehensive legal framework at the international level. On this specific issue, in 2015, the European Commission requested from the ESFA a review of

the current knowledge about the different risks associated with production and consumption of insects. EFSA did not show any serious safety concerns *per se*, since risks of using insects as food or feed are no greater than those associated with other animals, and the main risk are the food substrates and the handling and storage of farmed insects rather than insects species themselves. A further step toward a more comprehensive legal framework has been made in December 2015 when the European Parliament and the Council have adopted the new Regulation on Novel Food (2015/2283), which explicitly aims to make it easier for food business operators to place novel foods and food ingredients on the EU market. Although insects, according to the Regulation, fall under the definition of a novel food, they could be allowed to be placed on the market on the basis of a simple notification, if the applicant is able to demonstrate that the food/ingredient has been safely consumed by a significant part of a third country's population for at least 25 years.

Also the interest of the business world has gradually grown. Many insect food companies are starting up in different European countries such as France, UK, Belgium and the Netherlands, and they are awaiting the definition of the regulatory framework to compete in this new emerging market. Of course, many questions remain still unanswered, both in terms of risk assessment and evaluation of the actual benefits that the potential breeding and consumption of insects could lead to regarding human health and the environment.

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Overall, it becomes increasingly likely that insect-based food could be available on the market. Nevertheless, one of the crucial aspects that could jeopardize this trend is the aversion that European consumers and, more generally, those of Western countries show for insects as food (Looy, Dunkel, & Wood, 2014). Indeed, from the perspective of Western consumers, eating insects is a new phenomenon. Therefore the larger part of the research so far carried out aimed to identify the different factors that determine the intention to introduce insects into one's own diet.

The factors most frequently cited by previous research in order to explain the aversion that European consumers show for insects as food are disgust and neophobia (Hartmann, Shi, Giusto, & Siegrist, 2015; Martins & Pliner, 2006; Ruby, Rozin, & Chan, 2015; van Huis et al., 2013; Verbeke, 2015; Verkerk, Tramper, Van Trijp, & Martens, 2007).

While disgust and neo-phobia may be related, they are not identical constructs, as not all unfamiliar food products lead to disgust while some familiar food products may lead to disgust. There is still a lack of knowledge on how neo-phobia and disgust jointly contribute to the rejection of insects as food, and of their relative weight.

In addition, little is known about the psychological factors which determine whether and to what extent the eating of insects will elicit disgust in different people. Recent theoretical and empirical studies support the importance of implicit attitudes in food related behaviours. Implicit attitudes result from associations activated by the exposure to an item (Gawronski & Bodenhausen, 2006). Recently, Verneau et al. (2016) found that implicit associations predict the consumption behaviour of insect-based food. We argue here that disgust is related to implicit attitude towards insects, which is determined by the implicit associations that people have with the disgust-eliciting object, in our case insects.

Therefore, in the present paper, we pursued the following aims:

1. Testing and distinguishing the significance and power of the effect of food neo-phobia and disgust on the intention to eat insect-based food.
2. Understanding the relationships between disgust and implicit attitude towards insects.

2. Theoretical approach

2.1. Food neo-phobia and disgust

Food neo-phobia is the tendency to avoid unfamiliar food; it is hence a universal construct, but what is unfamiliar is of course culturally dependent. The Food Neo-phobia Scale (FNS) is the instrument developed and validated by Pliner and Hobden (1992) to quantify this individual characteristic. More specifically, the FNS examines the neophobia/neophilia continuum in humans. Since its publication in 1992, the FNS has been applied in several studies related to consumer responses to unfamiliar foods. More recently, the FNS has also been applied to the case of the possible introduction of insects in the human diet in order to evaluate the effect of food neophobia on the intention to eat food preparations based on or containing insects. Overall, research shows that food neophobia significantly and negatively affects people's willingness to eat insect-based food (Alemu, Olsen, Vedel, Pambo, & Owino, 2015; Pedersen, 2014; Tan, Fischer, van Trijp, & Stieger, 2016; Tan, van den Berg, & Stieger, 2016; Verbeke, 2015).

Disgust has been traditionally considered as a basic emotion, which is universal for all humans (Darwin, 1872; Ekman & Friesen, 1971; Kroeber-Riel, Weinberg, & Gröppel-Klein, 2009) and protects individuals from any potential source of disease (Haidt, McCauley, & Rozin, 1994; Matsumoto & Ekman, 2009; Rozin & Fallon, 1987). Although disgust is a universal emotion, it is important to note that the factors eliciting disgust can be different across individuals and cultures (Herz, 2012; Mignon, 2002). This is very clear in the case of

entomophagy, because this practice is not disgusting for at least two billion people in South and East Asia and in several African, South, and Central American countries, whereas it elicits disgust in many others (van Huis et al., 2013).

Despite the huge interest in food neophobia and disgust as factors influencing the willingness to eat insects, there is a lack of research exploring the relationships between the two factors. Disgust, however, has been shown to be an important motivation for the rejection of novel foods of animal origin (Pliner & Pelchat, 1991), such as insects. Fear of unfamiliar food, as well as feelings of disgust for eating insects, could be both related to risk avoidance (Baker, Shin, & Kim, 2016; Cederberg, Persson, Neovius, Molander, & Clift, 2011). As we already noted, disgust is related to the perception of danger (Haidt et al., 1994); in addition, people consider novel foods dangerous, and this belief negatively affects their willingness to eat them (Pliner, Pelchat, & Grabski, 1993). Hence, we could expect that more neophobic individuals are more likely to be disgusted by the eating of insects and show lower intentions to eat them. Therefore, we will test empirically whether FNS significantly predicts intention to eat insect-based food, and we will also test whether this effect is mediated by disgust.

2.2. Implicit associations

Research in social psychology has recently focused on implicit cognitive processes, which are assumed to affect behaviour by operating outside of conscious awareness (Banaji, 2001; Bargh & Ferguson, 2000; Blair, 2001). Strack and Deutsch (2004) distinguish the impulsive system and the reflective system: In the latter, the link between beliefs and behaviour is mediated by reasoning, whereas in the former, there are automatic associations between categories (such as "insect") and concepts ("bad" or "good"), which are directly linked to behaviour. Recourse to implicit measures – such as the Implicit Association Test (IAT – Greenwald, McGhee, & Schwartz, 1998) – in addition to traditional ones has been shown to improve the prediction of behaviour (Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Vantomme, Geuens, DeHouwer, & DePelsmacker, 2006).

Also in the food domain, research focused on the automatic processes involved in consumers' behaviour, showing the validity of implicit measures to predict individuals' food choices (Conner, Perugini, O'Gorman, Ayres, & Prestwich, 2007; Frieze, Hofmann, & Schmitt, 2009; Frieze, Hofmann, & Wänke, 2008; Greenwald et al., 2009; Maison, Greenwald, & Bruin, 2001, 2004; Perugini, 2005; Richetin, Perugini, Prestwich, & O'Gorman, 2007).

Importantly, Verneau et al. (2016) found that implicit associations predict the consumption behaviour of insect-based food. Coherently with theory – which posits that implicit associations occur in the impulsive system and are directly linked to behaviour – previous research has shown that implicit measures tend to be more powerful predictors of behaviour than of intentions (Verneau, La Barbera, & Del Giudice, 2017). Nonetheless, the effect of implicit associations on people's willingness to eat insects could be indirect, namely mediated by disgust.

As we underlined, disgust is a primary emotion. Since, however, the elicitation of disgust is culture specific, the elicitation must be based on some kind of learned associations between the stimulus eliciting disgust (here, insects) and something else that is a more basic source of disgust. There is rich empirical evidence about insects being associated, by Westerners, to disgusting items (e.g., faeces, decaying matter), and often with the idea of disease transmitters (Looy et al., 2014; van Huis et al., 2013). Therefore, the implicit attitude deriving from implicit associations with insects could affect whether the exposure to insects or insect-related items – such as insect-based food – would elicit at disgust or not.

The IAT is a measure of the implicit attitudes that individuals hold in relation to a given stimulus in their impulsive system, so it should mirror the – culture specific – quality (positive or negative) and strength of the implicit associations to insects that can explain disgust

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