Insect disgust: Comparing influence types, gender differences and the relationships with right-wing authoritarianism and age.

Barry Sheppard

Student number 1547322

Submitted in partial fulfilment of the requirements of the BA Hons in Psychology at Dublin Business School, School of Arts, Dublin.

Supervisor: Dr. Patricia Frazer

Head of Department: Dr S. Eccles

March 2014

Department of Psychology

Dublin Business School

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Dublin Business School

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Acknowledgements

I would like to take the opportunity to thank my partner Meg Hilko without whose inspiration and support I would never have had the courage to return to academia.

A special thank you to Dr. Patricia Frazer who provided me with supervision, support, and direction for this study.

Abstract

Objective. Research on disgust, to date, has focused on general sensitivity. This experiment looks at disgust related of eating crickets, how it can be influenced and whether social conventionalism age and sex play a part.

Methods. A convenience sample of 352 participants completed an online questionnaire including the right-wing authoritarianiqm (RWA) scale, a measure of conventionalism. Participants, randomly assigned into groups, viewed an intellectual appeal, text, or a social appeal, video. They rated before and after, as a measure of disgust, their likelihood of eating a cricket or cricket bar.

*Results. T*he social appeal group were significantly more likely to eat a cricket bar, but not a cricket. The RWA scale was not found to correlate with the change. No difference was found for sex, and age negatively correlated with initial rating.

Conclusions. Results support the role of social influence, but not social conventionalism, in disgust of eating crickets.

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Introduction

General Introduction

This study will explore a single instance of disgust, how that disgust can be influenced, and the relationship between disgust and conformity. The elicitor of disgust in this instance will be the disgust associated with eating an insect.

Edible insects, such as crickets, are easy to raise, require little space, are efficient at creating protein compared to conventional meat, produce minimal CO2, and are highly nutritious. In a world of growing food concerns (Reklev, 2014), edible insects are a viable solution for the future (Huis, 2013a; Huis, 2013b; Looy, Dunkel, & Wood, 2013). For the average Westerner, however, the thought of eating an insect is distasteful. Culturally, Westerners, and many others, are disgusted by insects. If entomophagy, the eating of insects, is to be seriously considered as a future source of food, the psychology of this disgust needs to be considered and the ways to influence it evaluated. In considering this instance of disgust, this study hopes to give greater insight into the nature of disgust and why some cases elicit disgust while others do not.

What is disgust?

The emotion of disgust is a basic reaction of avoidance, from a sour taste, bad smell, or another person. Disgust is an emotion which is universal across all humans, although the triggers differ across individuals and cultures. Listed as one of the core emotions by Darwin (1872, p.

257-262) and later as a universal facial expression by Ekman & Friesen (1975), disgust does not have a great body of work compared to other emotions until recently. Darwin noted “disgust primarily arises in connection with the act of eating or tasting” (Darwin, 1872, p. 258). Items which may cause disease when ingested are considered disgusting and, as such, are avoided as food stuffs. The smell, sight, or taste of sour milk elicits this disgust reaction, triggering an avoidance or, if already ingested, a retching reaction to expel the offending foodstuff. This is a relatively simple behavioural model. It explains why foods that make an individual sick are avoided in the future.

It remained as such until Paul Rozin advanced the topic (Rozin, Millman, & Nemeroff, 1986; Rozin & Fallon, 1987), and the focus shifted to a model of a behavioural immune system (Park, Faulkner, & Schaller, 2003;Oaten, Stevenson, & Case, 2009) where any potential source of pathogen triggers an avoidance reaction. The typical physical reaction, when disgusted, is to recoil from the offending source with a facial expression that tightly closes the mouth, constricts the nostrils, and narrows the eyes. This reaction reduces the possibility of a foreign element being taken into the body. With this model, disgust is an emotion that protects individuals from any potential source of disease. As such, a person who has visible open sores elicits disgust, as do images of rats or other vermin known to carry disease. Here, the importance of the emotion can be seen without which mortality rates from disease would be much higher.

This development of disgust beyond mere food is important as it explains a number of additional reactions, and also implicates the emotion of disgust in a wider range of human behaviour. Where, in the earlier model, known food is acceptable and unknown food is a potential elicitor of disgust, the analogy can be extended to other individuals or, indeed, cultures. A recent study by Olsson et al. (2014) showed an example of this and found that healthy

individuals injected with endotoxin produced a scent that was more aversive when compared to those injected with a placebo. Similarly, known individuals from a known culture are acceptable, but strange foreigners from an unknown culture with strange customs, including scent associated with food, are a potential source of disgust. This suggests that disgust may be a factor in negative behaviours such as xenophobia, homophobia, or racism. Examples of this can be seen throughout history where groups being targeted were dehumanised by association with imagery of disgust such as rats, disease, or filth (Herz, 2012, p. 111). As such, further insight into how to influence the emotion of disgust may have possible social implications.

More recent work (Haidt, McCauley, & Rozin, 1994; Haidt, 2013, p. 21-27) considered the emotion of disgust in a moral context, though how exactly they relate is of some debate (Inbar & Pizarro, 2014). Disgust in this model, named the RHM model after the authors initials, has evolved to protect not just the body, but also the soul. Individuals are disgusted by the immorality of politicians, sexual deviancy, and acts of dishonesty. Although, in some cases, the use of language associated with disgust was hyperbole, in lab conditions participants were found to have activated the same parts of the brain when dealing with moral and non-moral examples of disgust (Moll et al., 2005). In this model, aberrant or anti-social behaviour is considered disgusting. Immoral actions, such as stealing from vulnerable individuals such as the elderly, are considered disgusting.

From an evolutionary perspective, this approach makes sense; those members of a group who act in a manner counter to the interests of the group are shunned and excluded. The negative side of this comes in the form of ideologies. Professor Haidt, in his book The Righteous Mind (2013, p. 170-177), makes the case that the disgust/sanctity moral foundation is the element that allows extreme and sometimes irrational beliefs to be maintained. The ideology of one's own

group is held sacred, while the ideology of an opposing group is repellent and disgusting. The current political divide in America between left and right wing ideologies may be reflective of this, with both sides so opposed that compromise is considered a dirty word.

In an experiment studying disgust, Schnall, Haidt, Clore, & Jordan (2008) surreptitiously exposed participants a disgust trigger, a bad smell, when they were making an assessment of another's actions. They found those exposed were significantly more likely to judge others as immoral than those who were not exposed. In another study, bitter taste was found to increase the likelihood of a negative moral judgement, while a sweet taste was more likely to result in a positive one (Eskine, Kacinik, & Prinz, 2011).

This research has two important implications; first, that disgust acts at an unconscious level to influence decision making. Participants were not aware that their decision making had been influenced. The second implication is that disgust is infectious, decisions were contaminated by the disgust of the odour. This view of contamination was confirmed by Rozin, Millman, & Nemeroff (1986) who described it as a "law of sympathetic magic". Items associated with digusting items took on those properties. In one example, participants were asked whether they would drink a glass of orange juice in which a sanitised cockroach had been dipped. Most, unsurprisingly, refused. In a second experiment participants were found to be significantly less likely to wear a piece of clothing that had belonged to disliked individual than when compared to a liked person. For example, a jumper worn by Hitler or a serial killer would be considered tainted, such that nothing short of destruction with fire would cleanse it (Nemeroff & Rozin, 1994). Participants, on a subconscious level, feel that immorality, like disease, is contagious.

The development of disgust

Considering the above, there are three possible sources of disgust; food related, pathogen related, and moral related. The emotion and response of disgust is universal. The sources of disgust, however, are not constant. Individual and cultural differences can be seen. Cheese, for example, is a staple of Western cuisine. In Asia, many consider the idea of consuming rotted animal lactation, cheese, disgusting (Herz, 2012, p. 2). Similarly, some Westerners have a dislike of cheese while some Asians may quite enjoy it. How do these differences appear?

Young children have a simple response to food; there is a preference for sweetness and a distaste for bitter foods (Mennella, Pepino, & Reed, 2005). This response to bitter food is an evolutionary protection; the bitterness is due to alkaloids which are often poisonous and are present in rotten food (Herz, 2012, p. 31). At a young age, this is the only trigger of a disgust reaction. Recent research considering infant preferences (Wertz & Wynn, 2014) found infants have a noticeable preference for foods from plants over non-plants, but only when they witness an adult eating. Experimenters found that both elements were required for an infant to have a preference. A fruit picked from a plant would fulfil the plant aspect but a plant picked from a man made object would not. The adult needed to place the fruit in their mouth and appear to be eating. Taking a non-eating action with the fruit would not create a preference in the child. A lesson from this research is that to encourage infants to eat fruit and vegetables, they should be shown both the connection to the nature plant, and an adult eating it. This also gives some insight into the development of food selection preferences, part social, part innate. It is reasonable to assume that a similar process would be present in the development of disgust.

Recent work (Rozin, Haidt, & McCauley, 2009; Chapman & Anderson, 2013; Tybur, Lieberman, Kurzban, & DeScioli, 2013) in disgust emphasised evolutionary development and

social learning, where culture influences the development of disgust. Disgust is a learned emotion, rather than an inherent one, which develops from basic biological responses (Jack, Garrod, & Schyns, 2014). As a child develops, they learn those items which are disgusting. develop disgust attitudes (Rozin, Fallon, & Mandell, 1984), and food habits (Feunekes, de Graaf, Meyboom, & van Staveren, 1998) similar to their parents. From a behavioural perspective, this includes learning from foods and situations which make an individual ill and avoiding those in future.

From a social learning perspective this also includes learning from the reactions of others to know what is and is not disgusting. This explains how insects can be considered disgusting even though an individual may never have tasted an insect. If an adult expressed disgust towards an insect, then an infant viewing the adult will learn to mimic this disgust. This also explains why something considered disgusting in one culture is not necessarily considered disgusting in another. The exact nature of this development, however, is unclear. Currently, little is known about how disgust develops, how cultural influences shape it, why there are differences between individuals and how attitudes of disgust can change.

The disgust sensitivity scale

The majority of disgust related research has used the disgust sensitivity scale as a measure of overall disgust. It was developed by Haidt, McCauley, & Rozin in 1994 with the aim of creating a self reported questionnaire of how sensitive to disgust an individual is in general. The scale is a combination of 8 domains of disgust; food, animals, body products, sex, body envelope violations, death, hygiene, and magical thinking. The scale was revised in 2007 following suggestions from Olatunji, Sawchuk, Jong, & Lohr (2007) to become the disgust

sensitivity scale revised (DS-R). The DS-R has has only 3 domains; core disgust, animal reminder disgust, and contamination disgust. Research relating to the scale post-2007 usually used the 2007 scale, however, for the purposes of this study the phrase ‘disgust sensitivity scale’ has been used to for all versions of the scale for simplicity.

Correlational research studies using the disgust sensitivity scale have found negatively correlates with age (Quigley, Sherman, & Sherman, 1997), that females have a significantly higher rating than males (Haidt, McCauley, & Rozin, 1994), and a positive correlation with political conservatism (Inbar, Pizarro, Iyer, & Haidt, 2011). Jonathan Haidt has further built on this to work suggest that disgust/sanctity forms an element of moral foundations (Haidt, 2013, p. 170-179). Disgust/sanctity has a greater emphasis in the right wing conservative moral structure when compared to that of a left wing liberal moral structure (Graham, Haidt, & Nosek, 2009).

What the scale does not address, however, is how different items elicit different levels of disgust for a single person, and how attitudes of disgust can change over time. A smoker, who later quits, may now find their old habit to be disgusting. A vegetarian who once ate meat with gusto finds the very thought of it now turns their stomach. The disgust sensitivity scale, as an average across many subscales and a theoretically stable trait across an individual's lifetime (Petrowski et al., 2010), considers disgust in a broad, rather than a particular, basis. A change in one or more habits might have a minor effect but doesn't significantly influence the overall result. In addition, the scale does not predict whether an individual will be disgusted by a source or not, merely the strength of the disgust reaction they will have if a source is deemed to be disgusting.

Studies on changing disgust attitudes

A small number of cases have considered specific instances of change. Paul Rozin (2008) studied how medical students rated a set of bodily-related disgust questions before and after their first dissection of a corpse and found a significant decrease in that disgust. Research relating to spider phobias (Smits, Telch, & Randall, 2002; De Jong, Andrea, & Muris, 1997) showed how disgust, in addition to fear, played a role in the phobia. Following intervention, patients displayed significantly less disgust towards spiders, although not a change in the disgust sensitivity scale. Fessler & Navarrete (2005) found that the death disgust sensitivity subscale of disgust sensitivity reduced rather than increased with age. The explanation proposed in these cases was that increased exposure to the source of the disgust reduced the disgust through habituation.

How to influence a disgust attitude

The benefits of entomophagy from an intellectual perspective are evident. Insects as a food source are healthy, ecologically sound, and economically beneficial (van Huis, 2013a; van Huis, 2013b; Looy, Dunkel, & Wood, 2013). A recent UN Food and Agriculture Organization communication (Reklev, 2014) indicated that the world would need to increase food production by 60% over the next few decades to feed the world's growing population, or risk food shortages that could result in social unrest and civil wars. It is unlikely, however, that presenting this information to an individual is going to overcome their natural sense of disgust at the thought of eating an insect. Previous studies have found habituation to be effective (Smits, Telch, & Randall, 2002; De Jong, Andrea, & Muris, 1997; Fessler & Navarrete, 2005), yet, in these cases participants have had a personal motivation to do so, either to overcome a phobia or complete medical school. While most individuals may be willing to allow themselves be convinced, most

would be unlikely to eat multiple meals of insects in an effort to habituate to eating insects. As such, in a real world setting, if a case is to be made for entomophagy, a different approach needs to be taken. In addition, little investigate has been made on actively influencing an attitude of disgust through methods other than habituation.

In considering approaches, Cialdini's six principles of influence (1984) are particularly relevant. These are commitment and consistency, social proof, liking, authority, reciprocation, and scarcity. A historical example of Caldini's principles applied to disgust can be seen in the form of the lobster that demonstrates a number of these principles.

The lobster is an arthropod, in the same phylum as an insect, and somewhat similar in appearance to a locust. When North America was first settled by Europeans, lobsters were considered a poverty food, fed to animals or even used as fertiliser rather than consuming. Today lobsters are considered a delicacy and normally are the most expensive item on the menu. This was a result, in part, of the arrival of the railroad in America. As lobster was relatively unknown in the central areas, railway owners began to market lobster meat as a rare exotic item (scarcity). Those individuals who did try it on the railway, without fully realising its nature, enjoyed it and sought it in other places even after learning more of it (commitment and consistency). As more people developed a taste for it, lobster became more culturally popular (social proof). In this way, the lobster, the "cockroach of the sea" as some still disgusted by lobster refer to it, became a luxury sought after item.

Research, similar in nature to that of disgust, relates to influencing children's attitudes towards healthy eating, trying to convince kids to eat more fruit and vegetables which, arguably, some children might also claim to be disgusting. Lakshman, Sharp, Ong, & Forouhi (2010) used a card game to teach and successfully improve healthy eating in students. Lowe, Horne, Tapper,

Bowdery, & Egerton (2004) used videos showing heroic children to increase the consumption of fruit and vegetables in students. Baranowski et al. (2003) used a children's multimedia game to do similar. In the above three examples, researchers used a combination of engaging teaching methods to educate students on the benefits of healthy eating and peer examples to show examples of other children eating healthily. Arguably, the researchers, as adults, may also have influenced the students by being an authority figure and as more students changed the social norm of the classroom would have become pro-healthy eating.

The difficulty of the approach, of course, is that individuals must first break the existing social norm to create a new one. In the example of lobsters, railway owners had concealed the nature of the food to make a profit, so, at first, the social norm was not challenged. In the case of the children, the possibly peer influenced social norm of not eating fruit and vegetables was overcome by video and game examples of a new social norm. That new social norm was then supported by adult confirmation acting as an authority. In the instance of the cricket, how can this be addressed?

Looking at previous examples, it is reasonable to assume that exposure to a new social norm, where consumption of crickets is acceptable, would have a positive effect on cricket related disgust. If, as in the lobster example, railway owners had used cricket meat to make their profits would cricket now be served at expensive restaurants? If the studies teaching children to eat fruit and vegetables had instead introduced those same children to cartoons where cricket meat was eaten, and adults had supported eating of crickets, would there be a similar increase in school yard children snacking on crickets? Would this approach be effective on everyone? How do individuals differ in their approach to social norms?

The Right-Wing Authoritarianism scale

One difficulty with assessing social proof as a method of influence is in how different individuals react differently to changes in social norms. Many social norms are developed at an early age and learned from parents. Other norms are developed through the lifespan of an individual as situations and social groups change. When faced with a new social influence that challenges an existing norm will the individual stay with the old or move to the new social norm? For example, if a person were to find themselves in a group of people where everyone else order crickets for lunch would they order crickets also?

The Right-Wing Authoritarianism (RWA) scale, developed by Bob Altemeyer (2006), is used to measure how willing an individual is to adhere to established authorities. Those who score highly on the RWA scale believe in social order, conformity, and tradition. Although the scale's intention is to measure attitudes to authority rather than political ideology, those individuals who score highly on the RWA scale are significantly more likely to have right-wing conservative political leanings (Altemeyer, 2006, p. 208). For disgust, those who score highly on the RWA scale may be more likely to adhere to existing social conventions and be resistant to change.

Further research on the RWA scale (Stenner, 2005) suggested the scale is best viewed as a response to an external threat. In this regard, from the perspective of disgust, external threats could be seen as unknown food sources, possible pathogens carried by strange individuals, or the customs of foreign cultures that differ. In addition, as the above research indicates, RWA score correlates with conservatism (Altemeyer, 2006, p. 43), and disgust sensitivity correlates with conservatism (Inbar, Pizarro, Iyer, & Haidt, 2011). It is reasonable to expect RWA to correlate with disgust sensitivity. Similarly, it could also be argued that those who score highly on the

RWA would be more likely to be swayed by social influence as the RWA is a measure of conformity, in addition to conservatism. This would be especially true if that social influence came from an accepted peer group to which the person conforms or if the influence came from an authority figure which the individual respects.

The current study

The current study proposes to fill a gap in the existing research by considering a specific instance of disgust, rather than general disgust sensitivity, and studying the nature of a change in that disgust attitude. In doing so, the study will seek to confirm whether a social proof-based appeal will be more effective than a non-social proof-based appeal. Participants will be asked to self rate their likelihood of eating a cricket or cricket-based product. Based on the theory of planned behaviour (Ajzen, 1991), this should be a more accurate rating of disgust attitude than asking participants to actually eat a cricket or cricket based product as attitudes influence intention rather than behaviour. Participants will then be exposed to either an intellectual appeal of informational text or a social appeal of a video of individuals enjoying a cricket based product. Participants will then be asked to re-rate their likelihood to determine if there has been any change.

If the study finds the social appeal more effective, it will add to the research supporting that disgust is a socially based emotion. It will also add to the body of research supporting interventions when dealing with disgust-based reactions. While the study will specifically look at a food based model of disgust, the findings may generalise onto other kinds such as pathogen-related and morality-related disgust. This may suggest further research opportunities on

influencing socially undesirable attitudes such as homophobia (sexual disgust), xenophobia (foreign pathogen based disgust), and extreme ideologies (moral based disgust).

One study, Quigley, Sherman, & Sherman (1997), found that disgust sensitivity correlates with age. A separate study found that age negatively correlates with the death disgust subdomain of the disgust sensitivity scale (Fessler & Navarrete, 2005). This study will examine if the positive overall disgust sensitivity correlation with age will hold for the specific example of eating a cricket, which could be considered part of the food and animal subscales.

Hypotheses

As such, this study hypothesises that a group given a social appeal will have a significantly greater increase in self reported likelihood of eating a cricket or cricket based product than a group given an intellectual appeal.

In addition, this study also hypothesises that there will be a significant positive correlation between a participant's score on the RWA scale and the change in self reported likelihood of eating a cricket or cricket-based product. Those individuals who score highly on the RWA scale should be less likely to change their attitude and be more likely to adhere to pre-existing social norms than those who score low on the scale.

This study will also investigate if two findings of the disgust sensitivity scale will also be evident in the self reported likelihood of eating a cricket or cricket-based product. The first, that there will be a positive correlation between age and likelihood of eating a cricket or cricket based, product. The second, that females will be significantly less likely to eat a cricket or cricket based product than males.

Participants will also be given the opportunity to submit any comments they feel are appropriate to the study. This will add a qualitative element to the study that will hopefully reveal some insight into the participants feeling of disgust.

Method

Participants

The participants were 354 volunteers who completed an online questionnaire. Participants were a convenience and snowball sample recruited through social media including Facebook, Twitter and Reddit. Participants received no reward for taking part in the study. The questionnaire received a total of 770 unique visits with a completion rate of 58%. During the questionnaire, participants were randomly allocated into two groups which received different appeal types, a social appeal or an intellectual appeal. Of those participants, two recorded an age of below 18 and were removed from the sample for ethical reasons. The social and intellectual appeal group demographics were similar enough in nature to assume no group bias was present. The sample and group demographics are summarised in table 1.

Table 1 *Demographic of overall sample and randomised groups*

	Participants		Age		Female		Male	
	n	%	M	SD	n	%	n	%
Overall	352	100%	35.24	11.82	211	59.9%	141	40.1%
Social appeal group	202	57.4%	36.32	11.69	124	61.4%	78	38.6%
Intellectual appeal group	150	42.6%	33.78	11.88	87	58%	63	42%

Research Design

Hypothesis 1 used an experimental two-way, mixed design. The unrelated measures independent variable was appeal type, with two groups (social appeal and intellectual appeal). The related measures dependent variable was change in the likelihood of eating a cricket. Participants were randomly assigned into one of the appeal type groups as part of the questionnaire that presented the participant with two options “Group A” and “Group B” in a randomised order and asked the participant to select the first option.

Hypothesis 2 used a similar design to hypothesis 1 replacing change in the likelihood of eating a cricket with change in likelihood of eating a cricket based bar.

Hypothesis 3 used a correlational design. The predictor variable was RWA score. The criterion variable was change in the likelihood of eating a cricket.

Hypothesis 4 used a similar design to hypothesis 3 replacing change in the likelihood of eating a cricket with change in likelihood of eating a cricket based bar.

Hypothesis 5 used a correlational design. The predictor variable was age. The criterion variable was likelihood of eating a cricket pre-intervention.

Hypothesis 6 used a similar design to hypothesis 5 replacing likelihood of eating a cricket with likelihood of eating a cricket based bar.

Hypothesis 7 used a quasi-experimental independent-groups design. The independent variable was sex. The dependent variable was likelihood of eating a cricket pre-intervention.

Hypothesis 8 used a similar design to hypothesis 7 replacing likelihood of eating a cricket with likelihood of eating a cricket based bar.

In addition, a qualitative element was added to the design with participants given the opportunity to add any comments they feel might be appropriate. These comments will be reviewed manually to look for any emergent patterns.

Materials

Demographic measures of age and sex were recorded, which relate to hypothesis 5, 6, 7, and 8. Participants were asked to type their age in years and to choose their sex. As a measure of disgust, participants were asked to self report their likelihood of eating a cricket or a cricket bar on a rating of 1 to 10, where 1 represented 0 to 10% and 10 represented 90% to 100%. This simple approach was taken for a number of reasons.

As an abstract concept, disgust is difficult to rate. Does the subject of disgust elicit in the participant a weak or strong disgust? As an abstract and often unconscious emotion, it is not something that a participant can reliably rate. A participant can, however, rate their intention to act. As this intention is influenced by the emotion of disgust, with efforts made to control for confounding variables, this can be a good indication of disgust.

To motivate action over inaction, the suggestion will be made that the participant is hungry. To reduce the influence of cultural norms, the situation will be set in a foreign country. To remove social influences, the situation will have the participants alone and presented the food from a vending machine rather than a human.

Although the rating is a scale from 0% to 100%, it seems needless to require the participant to consider whether they are 32% or 33% likely to eat a cricket. As such the scale is simplified to be a choice of 1 of 10 options where 1 represents 0% to 10% and 10 represents 90% to 100%.

The RWA scale is a measure of willingness to submit to authority, adherence to social norms, and hostility towards those who don't adhere to those norms. It is used in this experiment as a measure of the participant's acceptance of the social norms of disgust. It is hypothesised that individuals with a larger RWA score will be more resistant to change, and as such, RWA will significantly negatively correlate with any change.

Images used to remind participant of the cricket or cricket bars are included in Appendix D. The text used as the intellectual appeal is included in Appendix E. The details of the video used in the social appeal are included in Appendix F.

Procedure

Respondents were first presented with to an information page (see Appendix A) informing participants with a brief outline of the questionnaire, a warning that individuals with a phobia of insects should not complete this survey, and request that only those over 18 should complete it. Participants were then asked to type in their age and select their sex.

Participants were asked to rate the 22 statements of the RWA scale (see Appendix B) from -4 to +4 titled Part 1: Social attitudes. Next, participants were given the following scenario: "You find yourself hungry in a foreign country. You are on your own in a room where a food dispenser machine is available but only has cooked crickets." (See Appendix C) Participants were asked to indicate how likely they would be to eat a cricket from the machine. A score of 1 indicates a 0% to 10% likelihood while a rating of 10 indicates a 90% to 100% likelihood.

A picture of crickets cooked in soy sauce was also presented (see Appendix D, image D1). Participants were then given the following scenario "On further inspection you find that the food dispenser does not contain individual cooked crickets but contains bars that contain flour

made from crickets.” Participants were asked to indicate how likely they would be to eat a bar from the machine using the same rating system as in the previous question. A picture of a cricket based bar was also presented (see Appendix D, image D2). Participants were then presented with two options of ‘Group A’ and ‘Group B’ presented in a randomised order. Participants were asked to select the first option in the list. In so doing, respondents were randomised into two separate groups.

Group A were presented with text explaining some of the health, environmental, and livelihood benefits to eating crickets (see Appendix F). Group B were presented with a video of individuals eating, enjoying, and talking about a bar made from cricket flour (see Appendix F). Participants were then asked to again score their likelihood of first eating a bar made from a cricket product and then their likelihood of eating a cricket (see Appendix G). An option was given for respondents to include any additional comments they felt were appropriate. Finally, participants were presented with debrief text and provided the option to submit their data or not (see Appendix H).

RWA was scored as normal (see Appendix I). Change in likelihood of eating a cricket was scored by subtracting post intervention likelihood of eating a cricket from pre intervention likelihood of eating a cricket. Change in likelihood of eating a cricket based bar was scored in a similar manner by subtracting post intervention likelihood of eating a cricket based bar from pre intervention likelihood of eating a cricket based bar.

Results

Descriptive statistics

Data gathered from participants included age, sex, the individual elements from the RWA questionnaire, a self reported likelihood of eating a cricket before and after appeal, and a self reported likelihood of eating a cricket-based bar before and after appeal. The RWA score for each individual was calculated as per normal scoring method (Appendix I). The resultant mean, 48.12 (see table 2 for additional details), was low. Studies found Canadian students to have a mean RWA of 75 and Americans to have a mean RWA of 90 (Altemeyer, 2006, p. 14) indicating this study's sample showed low right wing authoritarianism overall. This mean was approximately equal in both the social appeal group and the intellectual appeal group (see table 2) indicating that neither group had been biased in RWA due to the randomised allotment.

Using the initial ratings and final ratings, the difference in rating of participants' likelihood of eating a cricket and a cricket-based bar were calculated (see table 2). The initial rating for the cricket differed between the social group and intellectual group by 0.15 or 1.5% with the social group showing the larger rating. Similarly, the initial rating for the cricket bar differed between the social group and intellectual group by 0.19 or 1.9% with the social group showing the larger rating. The intellectual group showed a greater change in rating for the cricket when compared to the social group, whereas the social group showed a greater change in rating for the cricket based bar when compared to the intellectual group.

Table 2 *Summary of Means, Standard deviations, and confidence intervals*

	Overall		Social Appeal		Intellectual Appeal	
	M (SD)	95% Cl	M (SD)	95% Cl	M (SD)	95% Cl
RWA	48.12 (20.36)	[45.99, 50.25]	47.64 (20.25)	[44.83, 50.45]	48.76 (20.55)	[45.44, 52.08]
Cricket						
Initial rating	5.44 (3.35)	[5.09, 5.79]	5.5 (3.27)	[5.05, 5.95]	5.35 (3.47)	[4.79, 5.91]
Final rating	5.64 (3.4)	[5.28, 5.99]	5.68 (3.29)	[5.22, 6.14]	5.58 (3.54)	[5.01, 6.15]
Change in rating	0.2 (.99)	[0.1, 0.3]	0.18 (0.82)	[0.06, 0.29]	0.23 (1.06)	[0.06, 0.4)
Cricket based bar						
Initial rating	6.86 (3.07)	[6.54, 7.18]	6.94 (2.96)	[6.53, 7.35]	6.75 (3.22)	[6.23, 7.27]
Final rating	7.33 (3)	[7.02, 7.65]	7.57 (2.79)	[7.18, 7.96]	7.01 (3.25)	[6.49, 7.54]
Change in rating	0.47 (1.25)	[0.34, 0.61]	0.63 (1.26)	[0.45, 0.8]	0.27 (1.22)	[0.07, 0.46]

Tests of normality

All scale variables to be tested were checked for normality. All variables had skewness and kurtosis z scores outside of the -1.96 to 1.96 range (see table 3 below). Shapiro-Wilk's tests for each of the variables were found to have $p < .001$. As such, variables were determined to not be normally distributed and non-parametric tests were used for analysis.

Table 3 *Standardised skewness and kurtosis coefficients*

	Standardized Skewness Coefficient	Standardized Kurtosis Coefficient
Bar change		
Social Appeal	10.25	23.37
Intellectual Appeal	0.99	15.84
Cricket change		
Social Appeal	12	33.18
Intellectual Appeal	10.24	11.72
Initial rating		
Cricket	-0.26	-5.75
Cricket based bar	-4.7	-3.8
RWA	11.36	10.69
Age	4	-1.26

Inferential statistics

Hypothesis 1. A Mann-Whitney U test was used to test the hypothesis that there will be a significant difference between the change in self reported likelihood of eating a cricket before and after given by participants exposed to the intellectual appeal and the social appeal. The intellectual appeal condition had a mean rank of 181.32 and mean change of 0.23 (SD = 1.06),

which was greater than the social appeal condition which had the mean rank of 172.92 and mean change of 0.18 (SD = 0.82). The Mann-Whitney revealed that the intellectual appeal condition and the social appeal condition did not differ significantly (Z = -1, p = .316).

Hypothesis 2. A Mann-Whitney U test was used to test the hypothesis that there will be a significant difference between the change in self reported likelihood of eating a cricket based bar before and after given by participants exposed to the intellectual appeal and the social appeal. The intellectual appeal condition had a mean rank of 164.78 and mean change of 0.27 (SD = 1.22), which was smaller than the social appeal condition which had the mean rank of 185.12 and mean change of 0.63 (SD = 1.26). The Mann-Whitney revealed that the intellectual appeal condition and the social appeal condition did differ significantly (Z = -2.19, p = .028).

Hypothesis 3. A Kendall's tau b correlation found that there was no significant association between RWA and change in self reported rating likelihood of eating a cricket before and after (tau b(352) = 0.028, p = .254, one-tailed).

Hypothesis 4. A Kendall's tau b correlation found that there was no significant association between RWA and change in self reported rating likelihood of eating a cricket based bar before and after (tau b(352) = 0.052, p = .105, one-tailed).

Hypothesis 5. A Kendall's tau b correlation found that there was a significant weak negative association between age and initial rating likelihood of eating a cricket (tau b(352) = -0.1, p = .005, one-tailed).

Hypothesis 6. A Kendall's tau b correlation found that there was a significant weak negative association between age and initial rating likelihood of eating a cricket based bar (tau b(352) = -0.11, p = .003, one-tailed).

Hypothesis 7. A Mann-Whitney U test was used to test the hypothesis that there will be a significant difference between males and females on the self reported likelihood of eating a cricket before appeal. The female group had a mean rank of 177.37, compared to the mean rank of 175.20 for the male group. The Mann-Whitney revealed that the male and female groups did not differ significantly ($Z = -.26$, $p = .798$)

Hypothesis 8. A Mann-Whitney U test was used to test the hypothesis that there will be a significant difference between males and females on the self reported likelihood of eating a cricket bar before appeal. The female group had a mean rank of 175.97, compared to the mean rank of 177.29 for the male group. The Mann-Whitney revealed that the male and female groups did not differ significantly ($Z = -.14$, $p = .887$)

Qualitative results

Of the 352 participants, 188 (53.4%) entered comments. Those comments were reviewed and categorised to form rough groups, some of which overlapped. Of those

- 43 were non-relevant comments
- 45 indicated a prior experience eating crickets or insects, of those one had studied entomology in college and another was an entomologist by profession
- 17 made some expression of general openness to new experiences
- 16 were vegetarians
- 15 expressed texture as a reason for the disgust
- 15 expressed visual factors as a reason for the disgust
- 11 claimed that hunger would have to be a factor before they would try

- 10 indicated preparation of the food as a major factor of which 6 were disgusted by vending machines
- 7 expressed a cultural or societal factor in their disgust
- 4 indicated a fear of insects
- 2 indicated their disgust of almond butter, which was mentioned in the video, put them off the bar
- 1 found the individuals in the video disgusting

Post hoc analysis

In addition to the hypothesis testing, additional post hoc analysis was completed to further investigate some results. A check was completed to see if the cricket rating and the cricket-based bar ratings correlated with each other.

A Kendall's tau b correlation found that there was a significant moderate association between change in self reported rating likelihood of eating a cricket based and change in self reported rating likelihood of eating a cricket based bar (tau b(352) = 0.34, $p < .001$). However, this is just above the weak cutoff point of 0.3 where a stronger correlation might have been expected.

A Kendall's tau b correlation was completed to see if the RWA score correlated with the initial rating of either the cricket or the cricket based bar.

A Kendall's tau b correlation found that there was not a significant association between RWA and initial rating likelihood of eating a cricket (tau b(352) = -0.52, p = .088).

A Kendall's tau b correlation found that there was a significant weak negative association between RWA and initial rating likelihood of eating a cricket based bar (tau b(352) = -0.12, p = .001).

The internal reliability of the RWA scale was reviewed to see if it indicated errors had been made in recoding or data collection. Cronbach's α of the RWA scale found good internal consistency (20 items; α = .9) for the data set. All corrected item-total correlations were between .2 and .7 and removing any one item would not alter the α from .9 when rounded to two decimal places.

A large number of participants submitted a maximum initial rating for likelihood of eating a cricket and cricket based bar. A number of participants indicated in the comments that they had dietary restrictions, and that they would never eat crickets for reasons outside of disgust. These ratings could not have improved following a positive appeal and may have influenced hypotheses 1, 2, 3, and 4. To investigate the effect of this, inferential statistics for hypotheses 1, 2, 3 and 4 were run again with a data set which removed participants who rated both initial ratings at 10 or who indicated a dietary restriction. The total number of participants in the revised dataset was 284.

Revised dataset, hypothesis 1. A Mann-Whitney U test was used to test the hypothesis that there will be a significant difference between the change in self reported likelihood of eating a cricket before and after given by participants exposed to the intellectual appeal and the social appeal. The intellectual appeal condition had a mean rank of 146.93 and mean change of 0.28 (SD = 1.16), which was greater than the social appeal condition which had the mean rank of

136.58 and mean change of 0.23 (SD = 0.91). The Mann-Whitney revealed that the intellectual appeal condition and the social appeal condition did not differ significantly (Z = -1.3, p = .194).

Revised dataset, hypothesis 2. A Mann-Whitney U test was used to test the hypothesis that there will be a significant difference between the change in self reported likelihood of eating a cricket based bar before and after given by participants exposed to the intellectual appeal and the social appeal. The intellectual appeal condition had a mean rank of 130.16 and mean change of 0.35 (SD = 1.31), which was smaller than the social appeal condition which had the mean rank of 149.08 and mean change of 0.79 (SD = 1.36). The Mann-Whitney revealed that the intellectual appeal condition and the social appeal condition did differ significantly (Z = -2.19, p = .028).

Revised dataset, hypothesis 3. A Kendall's tau b correlation found that there was no significant association between RWA and change in self reported rating likelihood of eating a cricket before and after (tau b(284) = 0.1, p = .412, one-tailed).

Revised dataset, hypothesis 4. A Kendall's tau b correlation found that there was no significant association between RWA and change in self reported rating likelihood of eating a cricket based bar before and after (tau b(284) = 0.04, p = .174, one-tailed).

Discussion

The aim of the current study is to attempt to fill a gap in the existing research by considering a specific instance of disgust, rather than general disgust sensitivity. In looking specifically at insect based disgust, this study also hopes to suggest a best approach to encourage entomophagy.

Hypothesis 1 and 2

Participants who saw the social appeal had a significantly greater change in the likelihood of eating a cricket-based bar than those participants who saw the intellectual appeal. However, those same participants did not have a significantly greater change in the likelihood of eating a cricket. As such, the results support hypothesis 1 but not the similar hypothesis 2.

The most obvious reason for this was that the video used did not have crickets visible, but instead, only showed the cricket based bar. A post hoc analysis revealed a moderate 0.34 correlation between change in the likelihood of eating a cricket and change in the likelihood of eating a cricket bar. This is just above the weak correlation mark of 0.3. This indicates that, while there are some links between the disgust of the cricket and the disgust of the cricket bar, there are also greater differences between them.

Nonetheless, it is questionable whether a social appeal of a video showing individuals enjoying crickets, rather than a cricket bar, would result in a significantly greater change in the likelihood of eating a cricket. This would seem counter-intuitive as the cricket flour contains all the qualities of the cricket except texture and appearance. If a cricket is less disgusting, all qualities of cricket flour will also be less disgusting but the reverse is not true. Some of the comments support this explanation, focusing on the visual and texture features of the cricket as a source of disgust: "If I closed my eyes so I wouldn't have to see the bugs... I'm sure I could get

through a bite or two." "I find the appearance of bugs deeply off-putting. However, so long as they are processed into a form that isn't obviously bug like, I probably wouldn't care." In today's society of convenience and processed food, this particular element may be a recent cultural development of disgust.

Hypothesis 3 and 4

Hypothesis 3 and 4 were not supported. RWA score did not correlate with either change in the likelihood of eating a cricket or change in the likelihood of eating a cricket-based bar. Based on this, it would appear that, in this instance, conventionalism did not play a part in moderating the change in attitude. This does not necessarily contradict previous research (Haidt, McCauley, & Rozin, 1994), as this case was specific to disgust of eating crickets and does not necessarily generalise to the broader concept of disgust sensitivity.

Another possible interpretation is that the aspects of conventionalism that the RWA scale measures are different from those aspects that are involved in insect disgust. The RWA and disgust sensitivity scale both contain a number of elements relating to sexual and bodily disgust that would not be relevant in this case. A post-hoc analysis found that RWA did not correlate with the initial rating of likelihood of eating a cricket but that there was a significant weak negative correlation association between RWA and initial rating of eating a cricket based bar. This result is somewhat surprising given the earlier findings. A possible explanation is that, once the more influential visual and texture sources of disgust are removed, conventionalism has a greater role. This interpretation does have its own difficulties in that it implies that conventionalism is at play in the original rating, but that it does not moderate any change to this attitude. Another possible explanation is that, in the absence of any other information, convention is relied on.

The findings may also be a result of a heavily biased sample; the mean RWA score was 48.12 which is low on the scale which has a potential score from 20 to 180. A sample of Americans in 2005 found an average score of 90 for participants, the average score for a sample of Canadian students was 75 (Altemeyer, 2006, p14). Cronbach's α of the RWA scale found good internal consistency (20 items; α = .9) so the possibility of incorrectly entered or coded scores can be discounted. As such, the sample in this experiment can be seen to have a low RWA scale score, which may have influenced results. This biased sample most likely was a result of the snowballing and self-selection bias, and the latter may explain why two entomologists were included in the sample.

Hypothesis 5 and 6

Hypothesis 5 and 6, that age would correlate with the initially rated likelihood of eating a cricket and a cricket bar, were not supported and, instead, in both cases a weak negative association was found. The older participants were, the more disgusted they appeared to be of eating a cricket or cricket bar. This was contrary to findings with disgust sensitivity which found that individuals were less like to be disgusted the older they were (Quigley, Sherman, & Sherman, 1997). In the instance of eating insects, it was found that older participants were more likely to be disgusted.

Again, as with hypothesis 3 and 4, it is possible that this instance of disgust does not generalise further into the disgust sensitivity scale. Older participants may be less likely to rate bodily and death related elements of the disgust sensitivity scale highly (Fessler & Navarrete 2005), but more likely to rate insect disgust as highly disgusting. Unfortunately, as this study did not include the disgust sensitivity scale, it is not possible to confirm or reject this explanation.

Another possible interpretation is that cultural influences form primarily in the formative years, and current social norms are less important to an individual than those norms they grew up with. As such, cultural influence, not age is the cause. Due to changes in culture towards elements of the disgust sensitivity scale overall, sensitivity has increased for each successive cohort. Similarly, due to changes in culture towards eating insects, possibly due to increased exposure to other cultures, disgust of eating insects has decreased for each successive cohort.

Hypothesis 7 and 8

Hypothesis 7 and 8, that females would rate themselves significantly less likely to eat either the cricket or cricket based product, was not supported. This contradicts the existing research (Haidt, McCauley, & Rozin, 1994) relating to the disgust sensitivity scale. As with hypothesis 3, 4, 5, and 6 this may be due to insect disgust relating to only partial elements of the overall disgust sensitivity scale. Increased sex, body products, and hygiene disgust sensitivity (subscales from the original DS) may be more sensitive for females when compared to males, bringing the overall sensitivity up, while animal and food related disgusts do not have a significant difference.

The idea that there could be a different emphasis within the disgust sensitivity scale for particular populations does raise a number of questions, and possibilities for future research. Are females more sensitive overall or are they only more sensitive in particular domains? Are males more sensitive than females in certain domains? Is the disgust sensitivity scale's weighing of domains appropriate? For example, should moral related disgust be weighted equally with pathogen related disgust when determining an overall sensitivity? How can specific instances be accounted for?

One of the questions in the disgust sensitivity scale (DS-R) relates to whether the respondent would go out of their way to avoid walking through a graveyard. If the respondent happened to grow up near a graveyard and felt comfortable walking through it, are they less disgust sensitive that someone who grew up in another part of the city?

Qualitative results

From a review of the comments entered, it appears that attitudes towards entomophagy have already begun to shift with 12.8% of all participants indicating that they have eaten insects at some point in their life already. Of the sample, 17.3% of participants, 61 of the 352, provided an initial rating of 90% to 100% likelihood of eating a cricket. For the cricket-based bar, 30.1%, 106 of the 352, of participants provided an initial rating of 90% to 100%. In addition to showing an increased acceptance of entomophagy, this posed some difficulty for analysis as these participants, having rated the highest possible score, were unable to be positively motivated and have their score increase. A post-hoc analysis of the data removing these participants and those who indicated a dietary restriction such as vegetarianism found that those instances that were significant for the full data set remained significant, and those which were not significant remained not significant.

Comments noted visual and textural disgust aspects as the main elicitors of disgust in eating crickets, with 15 comments mentioning visuals and 15 mentioning texture (of which one comment mentioned both). This would appear to relate to the animal related disgust of the disgust sensitivity scale. At least one participant, who had already tried crickets, noted that the legs were a potential choking hazard and should be peeled off before eating. The approach of removing these elements, by turning the cricket into processed flour, appears to be a good one.

Of the sample, another 10 indicated that preparation and presentation would be an important factor, expressing concerns over how clean and safe the food was. This would appear to relate to the pathogen related disgust, where concern of disease is not related to the cricket but instead to whether it has come into contact with any potential contaminants. In this example, one participant, the same who provided the legs tip, noted that smaller crickets should be avoided as the oil they are cooked in doesn't drain out sufficiently, and poor quality fats can cause stomach upsets.

In addition to the comments relating to the visual and texture elements, 2 participants indicated that they would be happy to eat the cricket bars if they did not know the contents included cricket. Visually and texturally, the bars do not elicit the same disgust reaction. This is reminiscent of the food additive E120 which is a commonly used red food dye made by crushing cochineal beetles into a fine powder. In the case of E120, the approach was made more effective by concealing the nature of the product. From habituation studies (Rozin 2008; Smits, Telch, & Randall, 2002; De Jong, Andrea, & Muris, 1997; Fessler & Navarrete, 2005) it can be seen that exposure to the source of disgust can reduce it. In habituation research, however, the participant is aware of the presence of the source of disgust. When vegetarians were made aware of the nature of E120, it caused outcry and anger, rather than acceptance.

Another example of this can be seen in public outcry against the "lean finely textured beef" product which recently has become more commonly known as "pink slime" (Johnson, 2012). The product consisted of the entrails and cast off meat products that were placed in a centrifuge to separate fat from meat, the product was then cleansed of bacteria using ammonia, after which it was washed, and added to ground meat to bulk it out. When American consumers discovered they had been eating pink slime, there was a general revulsion towards it, despite

consumers previously enjoying the product as part of their meals in McDonalds, Burger King, Taco Bell, and school lunches. Companies that had been using the product immediately pulled it and announced that their products did not contain it. From these examples, beyond the ethical implications, it is clear that surreptitiously adding cricket meat into the food supply would not alter attitudes towards it.

Limitations of the study

This study does have a number of limitations, some of which have already been discussed. Some of the hypotheses were based on the idea that findings relating to the disgust sensitivity scale would also apply to the specific instance of cricket consumption disgust. Unfortunately, as the disgust sensitivity scale was not included in the questionnaire, it is impossible to confirm if the findings were due to the difference between this specific instance of disgust, the disgust sensitivity scale, or whether the sample was biased.

Sampling bias, as seen with the low RWA score, may have occurred in other regards with the sample. The sampling method was not systematic and did not record the participant's nationality. As such, a cultural bias may exist undetected in the sample.

One possible flaw, as revealed by the comments, is whether the measure of disgust is valid. In 6 cases, the measure was confounded by a disgust of vending machines which was unexpected. Originally, the vending machine had been added to remove any social element of being given the product by another human being. Another 2 respondents noted a disgust of the almond butter flavour included in the bar. In 1 instance, a participant indicated a revulsion of the individuals in the video. Controlling for these confounding variables poses a challenge.

In addition to this, it is debatable whether any attitude of disgust has been influenced. It is possible that appeals have merely convinced participants to indicate a willingness to act despite an unchanged attitude of disgust. Despite these limitations, the measure as used, does give a reasonable way for the participant to rate what is essentially an abstract concept.

Strengths of the study

Despite the number of potential limitations noted, this paper succeeds in its purpose of considering a single instance of disgust and studying the effects of different types of influence on the affect. The assessment of disgust through self rated intention, while based on the assumption that the target does elicit disgust, is very easy for the participant to complete. As an intention can be considered as a reasonable indicator of behaviour (Ajzen, 1991), and the participant can easily rate their intention, with adequate control this can be taken as a relatively close estimate of disgust. In addition, the percentage based scale does have an advantage over a behavioural measure which would be limited in nature to a binary result of yes the participant ate the product or no they did not. Despite potential sample bias due to the haphazard sampling method, the sample size of 352 was relatively large and increases the power of the study.

Conclusion

One of the key findings of this experiment is that individuals are more influenced in their attitude of disgust by the actions of others than by information appealing to reason. In the case of entomophagy, it follows that seeing others, especially desirable role models such as celebrities, consuming insect based products would have the greatest influence on social attitudes.

Qualitative elements from the research point to appearance and texture as disgust elicitors, indicating that processing is an important step for acceptance.

The other key finding in this study relates to the lack of confirmation for hypotheses supported for the general disgust sensitivity scale when applied specifically to the disgust of eating insects. Does the disgust sensitivity scale measure sensitivity, or does it merely measure disgust across an average of existing attitudes? The disgust sensitivity scale is a well validated and confirmed reliable scale, yet some of the research does question the internal consistency between separate subscales (Schienle, Stark, Walter, & Vaitl, 2003; Olatunji, Sawchuk, Jong, & Lohr, 2007).

In considering the specific case of disgust of eating crickets, this study adds further insight into the nature of the emotion of disgust. Although the results confirmed only 1 of the 8 hypotheses, those hypotheses which were not confirmed were equally interesting. This study suggests the potential for further research on specific instances of disgust so that a greater understanding of the emotion can be developed.

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Appendix A

Introduction text

Thank you for taking my questionnaire.

Please note that you must be over 18 to complete this. If you have a phobia of insects, specifically crickets, you should not complete this.

As part of the requirements for my degree at Dublin Business School, I am carrying out a research study. My study is concerned with attitudes on disgust and society.

The study will involve a questionnaire with two separate sections. The first half will ask 22 questions relating to your attitudes towards society. The second half will assess your attitude towards crickets as a food source. In total it should take around 15 minutes. There may be a video with audio included so you should be able to listen without disruption.

Data will be anonymous and will only be saved following the debrief at the end, so you will have a chance to withdraw up until then. The results will be presented in the thesis, which may be published, presented or reproduced in other forms. Data will be held in anonymous form for up to 5 years.

I don’t envisage any negative consequences for you in taking part. It is possible that someone with extreme insect phobia may find pictures of crickets and the idea of eating them distressing.

If you need any further information, you can contact me at

Appendix B

The Right-wing authoritarianism scale

This survey is part of an investigation of general public opinion concerning a variety of social issues. You will probably find that you agree with some of the statements, and disagree with others, to varying extents.

Please indicate your reaction to each statement according to the following scale:

-4 if you very strongly disagree with the statement.

-3 if you strongly disagree with the statement.

-2 if you moderately disagree with the statement.

-1 if you slightly disagree with the statement.

0 If you feel exactly and precisely neutral about an item.

+1 if you slightly agree with the statement.

+2 if you moderately agree with the statement.

+3 if you strongly agree with the statement.

+4 if you very strongly agree with the statement.

Important: You may find that you sometimes have different reactions to different parts of a statement. For example, you might very strongly disagree (“-4") with one idea in a statement, but slightly agree (“+1") with another idea in the same item. When this happens, please combine your reactions, and write down how you feel on balance (a “-3" in this case).

Question 01. The established authorities generally turn out to be right about things, while the radicals and protestors are usually just “loud mouths” showing off their ignorance.

Question 02. Women should have to promise to obey their husbands when they get married.

Question 03. Our country desperately needs a mighty leader who will do what has to be done to destroy the radical new ways and sinfulness that are ruining us.

Question 04. Gays and lesbians are just as healthy and moral as anybody else.

Question 05. It is always better to trust the judgment of the proper authorities in government and religion than to listen to the noisy rabble-rousers in our society who are trying to create doubt in people's minds.

Question 06. Atheists and others who have rebelled against the established religions are no doubt every bit as good and virtuous as those who attend church regularly.

Question 07. The only way our country can get through the crisis ahead is to get back to our traditional values, put some tough leaders in power, and silence the troublemakers spreading bad ideas.

Question 08. There is absolutely nothing wrong with nudist camps.

Question 09. Our country needs free thinkers who have the courage to defy traditional ways, even if this upsets many people.

Question 10. Our country will be destroyed someday if we do not smash the perversions eating away at our moral fiber and traditional beliefs.

Question 11. Everyone should have their own lifestyle, religious beliefs, and sexual preferences, even if it makes them different from everyone else.

Question 12. The "old-fashioned ways" and the "old-fashioned values" still show the best way to live.

Question 13. You have to admire those who challenged the law and the majority's view by protesting for women's abortion rights, for animal rights, or to abolish school prayer.

Question 14. What our country really needs is a strong, determined leader who will crush evil, and take us back to our true path.

Question 15. Some of the best people in our country are those who are challenging our government, criticizing religion, and ignoring the "normal way things are supposed to be done."

Question 16. God's laws about abortion, pornography and marriage must be strictly followed before it is too late, and those who break them must be strongly punished.

Question 17. There are many radical, immoral people in our country today, who are trying to ruin it for their own godless purposes, whom the authorities should put out of action.

Question 18. A "woman's place" should be wherever she wants to be. The days when women are submissive to their husbands and social conventions belong strictly in the past.

Question 19. Our country will be great if we honor the ways of our forefathers, do what the authorities tell us to do, and get rid of the "rotten apples" who are ruining everything.

Question 20. There is no "ONE right way" to live life; everybody has to create their own way.

Question 21. Homosexuals and feminists should be praised for being brave enough to defy "traditional family values.

Question 22. This country would work a lot better if certain groups of troublemakers would just shut up and accept their group's traditional place in society.

Appendix C

Pre-intervention questions

In this second part we will look at your attitude towards eating a cricket.

On a rating of 1 to 10 how likely would you be to eat a cooked cricket (an insect similar to a grasshopper or locust).

You find yourself hungry in a foreign country. You are on your own in a room where a food dispenser machine is available but only has cooked crickets.

Please indicate how likely you would be to eat a cricket from the machine. A 1 indicates a 0% to 10% likelihood while a rating of 10 indicates a 90% to 100% likelihood.

Picture of barbecue crickets displayed - See appendix D image D1

On a rating of 1 to 10 how likely would you be to eat a food that contains cricket flour.

On further inspection you find that the food dispenser does not contain individual cooked crickets but contains bars that contain flour made from crickets.

Please indicate how likely you would be to eat a bar from the machine. A 1 indicates a 0% to 10% likelihood while a rating of 10 indicates a 90% to 100% likelihood.

Picture of cricket based bar displayed - See appendix D image D2

Select a group

Please select the first option in the list.

As the order is randomised this will randomly assign you into a group.

Group A Group B

Appendix D

Images

Image D1

Image sourced from http://queencleopatra.hubpages.com/hub/philippine-cuisine-filipino-dishes-for-everydayand-special-occasions

Image D2

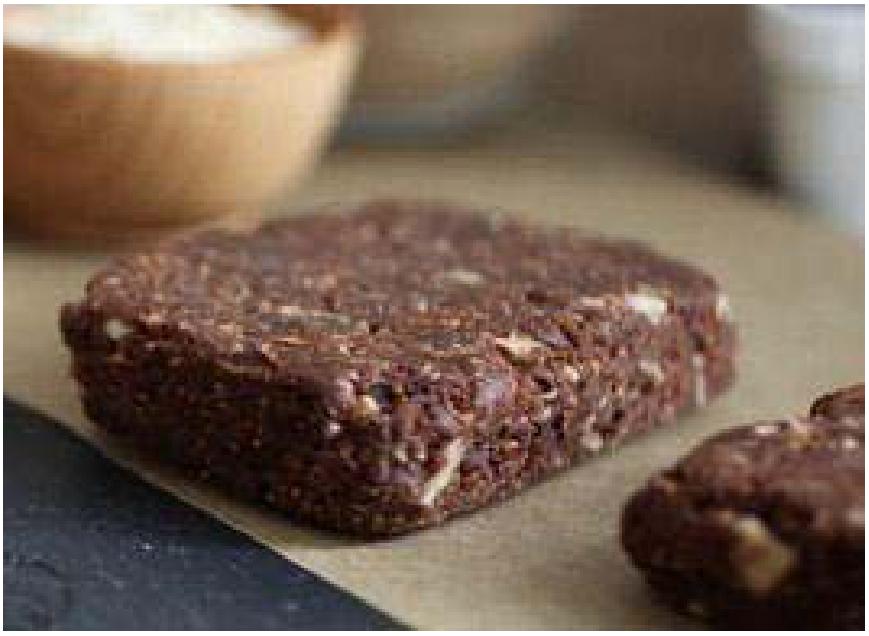


Image sourced from http://www.kickstarter.com/projects/exoprotein/exo-protein-bars-made-from-cricket-flour

Appendix E

Group A - Intellectual appeal

Please read the following

Why eat Crickets?

Health:

- Insects are healthy, nutritious alternatives to main stream staples such as chicken, pork, beef and even fish (from ocean catch).
- Many insects are rich in protein and good fats and high in calcium, iron and zinc.
- Insects already form a traditional part of many regional and national diets.
- Crickets are exceptionally nutritious. They are high in protein (69% by dry weight) and contain all the essential amino acids. They are also high in micronutrients: crickets have more iron than beef and almost as much calcium as milk.

Environmental:

- Insects promoted as food emit considerably fewer green house gases (GHGs) than most livestock (methane, for instance, is produced by only a few insect groups, such as termites and cockroaches).
- Insect rearing is not necessarily a land-based activity and does not require land clearing to expand production. Feed is the major requirement for land.
- The ammonia emissions associated with insect rearing are also far lower than those linked to conventional livestock, such as pigs.
- Because they are cold-blooded, insects are very efficient at converting feed into protein (crickets, for example, need 12 times less feed than cattle, four times less feed than sheep, and half as much feed as pigs and broiler chickens to produce the same amount of protein).

- Insects can be fed on organic waste streams.

- Crickets need 12x less feed than cattle, 4x less feed than sheep, and half as much feed as pigs and chickens to produce the same amount of protein. They produce 80x less methane than cattle, can reproduce much quicker, and barely require any water or space.

Livelihoods (economic and social factors):

- Insect harvesting/rearing is a low-tech, low-capital investment option that offers entry even to the poorest sections of society, such as women and the landless.

- Mini livestock offer livelihood opportunities for both urban and rural people.

- Insect rearing can be low-tech or very sophisticated, depending on the level of investment.

- Insect protein represents the first viable solution to the global food crisis.

Appendix F

Group B - Social appeal

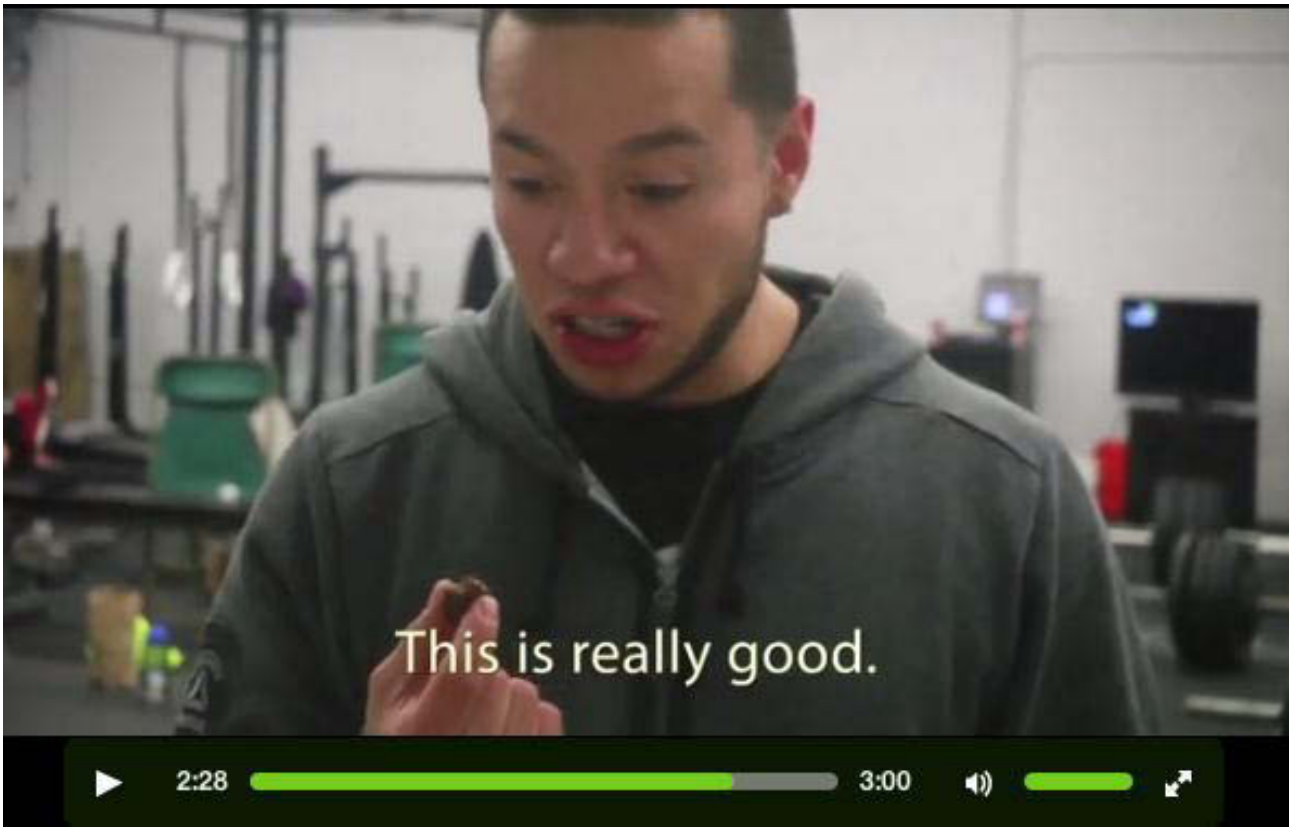
Please watch the below video.

Please note that the video does contain five instances of casual swearing. If you would find this offensive or troubling please click continue without watching the video and note as such in the comments box.

Once you have completed, please click continue.

http://www.youtube.com/watch?v=NKx9uhzAfyc&t=0m18s

Image F1 - Example from video



Appendix G

Post-intervention questions

On a rating of 1 to 10 how likely would you be to eat a food that contains cricket flour.

Having seen the above, if you were in the same situation hungry in a room by yourself at a machine, please rate again.

Please indicate how likely you would be to eat a bar from the machine. A 1 indicates a 0% to 10% likelihood while a rating of 10 indicates a 90% to 100% likelihood. Picture of cricket based bar displayed - See appendix D image 2

On a rating of 1 to 10 how likely would you be to eat a cooked cricket (an insect similar to a grasshopper or locust).

Having seen the above, if you were in the same situation hungry in a room by yourself at a machine, please rate again. Please indicate how likely you would be to eat a cooked cricket from the machine.

Please indicate how likely you would be to eat a cricket from the machine. A 1 indicates a 0% to 10% likelihood while a rating of 10 indicates a 90% to 100% likelihood. Picture of barbecue crickets displayed - See appendix D image 1

Additional comments please

This can contain anything you feel would be appropriate. For example - how the idea of eating a cricket made you feel, if you have tried cricket already etc.

Please note that comments could potentially be used verbatim in examination, reporting, publications or presentations following this work. Once finished, or if you have no comments to add, please scroll down to the next question.

Appendix H

Debrief

The purpose of this questionnaire study is to investigate disgust attitude towards a specific item, how that attitude can be influenced, and moderating factors in that change.

Your attitude of disgust towards eating cricket flour was checked at the start and then you were shown either informational text or a video of people enjoying the food. The text is an intellectual appeal giving you all the reasons why it would be good to eat insects. The video is a social appeal, showing you other people enjoying the insect based food. As your opinion of what is disgusting is influenced heavily by society I'm expecting the social appeal to be more compelling. That the change in attitude for the video will be significantly greater than that of the text.

The social questions at the start all relate to a scale referred to as the Right-Wing Authoritarian scale. Despite the name this doesn't necessarily relate to left/right political leanings but instead how likely someone is to accept convention and authority. In this research I am looking to see if those who score high on this scale are less likely to change their attitudes of disgust towards consumption of an insect.

More info on the right wing authorirtarian scale can be found at http://members.shaw.ca/jeanaltemeyer/drbob/TheAuthoritarians.pdf
More info on the benefits of eating insects can be found at http://www.fao.org/docrep/018/i3253e/i3253e.pdf

The video of people enjoying the cricket bars comes from the following company http://www.kickstarter.com/projects/exoprotein/exo-protein-bars-made-from-cricket-flour

At this point your data has not be saved and you still have the option for your information to not be used. If you wish to do so you just need to not continue, data will only be submitted once you hit submit at the end of the questionnaire.

If you need any further information, you can contact me at 1547322@mydbs.ie

Appendix I

The Right-wing authoritarianism scale scoring

Then let's score your answers, and get an idea of

whether you're cut out to be an authoritarian follower. First, you can skip your

answers to the first two statements. They don't count. I put those items on the test to

give people some experience with the -4 to +4 response system. They're just "warmups."

Start therefore with No. 3.

If you wrote down a "-4" that's scored as a 1.

If you wrote down a "-3" that's scored as a 2.

If you wrote down a "-2" that's scored as a 3.

If you wrote down a "-1" that's scored as a 4.

If you wrote down a "0" or left the item unanswered, that's scored as a 5.

If you wrote down a "+1" that's scored as a 6.

If you wrote down a "+2" that's scored as a 7.

If you wrote down a "+3" that's scored as an 8.

If you wrote down a "+4" that's scored as a 9.

Your answers to Items 5, 7, 10, 12, 14, 16, 17, 19 and 22 are scored the same way.

Now we'll do the rest of your answers, starting with No. 4.

If you wrote down a "-4" that's scored as a 9.

If you wrote down a "-3" that's scored as an 8.

If you wrote down a "-2" that's scored as a 7.

If you wrote down a "-1" that's scored as a 6.

If you wrote down a "0" or left the item unanswered, that's scored as a 5.

If you wrote down a “+1" that’s scored as a 4.

If you wrote down a “+2" that’s scored as a 3.

If you wrote down a “+3" that’s scored as a 2.

If you wrote down a “+4" that’s scored as a 1.

Now simply add up your twenty scores. The lowest total possible would be 20, and the highest, 180, but real scores are almost never that extreme.