FOOD FILES

Words by Drs Russell Keast,
Gie Liem and Georgie Russell

3D printed foods. Will consumers accept it?

3D printed foods is still in its infancy and mostly confined to prototype construction rather than production of foods for the general population. There are many potential upsides to 3D printed foods, particularly for sub-populations such as the elderly with eating difficulties, or special foods for people with dysphagia. In theory there is promise for 3D printed meat, creating an environmentally sustainable meat product that has characteristics which closely mimic texture and flavour of muscle from animals.

For 3D printed foods to have a future, consumers must be willing to consume these products. When considering consumers there are multiple hurdles to pass including neophobia (avoidance of new foods), fear of new technologies, and safety concerns. In an exploratory study a group from Acadia University, Canada, had n=133 consumers taste a conventional sweet biscuit and a 3D printed sweet biscuit that was clearly labelled as 3D printed. They evaluated liking and attributes of the biscuits and were given open-ended questions to provide opinions of the 3D printed foods. Results showed that after consuming the "3D printed" cookie, the participants were willing to eat 3D printed foods. The authors suggest that the positive experience of consuming a 3D biscuit transferred generally to other 3D printed foods. The one exception was about safety and acceptability of 3D printed meats with open ended questions revealing consumer concerns. It is unfortunate that there is such consumer resistance to 3D printed meat analogues, but there is potential to have tasting events in supermarkets or central locations to provide consumers an initial positive experience, which hopefully is enough to change perceptions.

Manstan T *et al* (2021). Consumers attitude to 3D printed foods after a positive experience: An exploratory study. *Journal of Sensory Studies* 36 e12619. DOI: 10.1111/joss.12619

Overeating as a form of food waste

Increasingly it is recognised that diets should promote not only human health, but also planetary health.

Recently Denmark released new dietary guidelines, promoting a diet that positively impacts health as well as being climate-friendly, becoming one of the small number of countries to do so. Reducing food waste is a key component of sustainable diets. Food waste is defined as food that is discarded due to the behaviours of retailers and consumers, while food loss occurs prior to this during the processes associated with producing and processing foods to be ready for consumption. In developed countries like Australia, food waste is the bigger problem, while the converse is typically true in developing countries. Here, food waste is typically associated with throwing away food due to imperfections, food safety concerns or other reasons such as not using up left-over foods. However, another consideration is metabolic food waste. This is food waste created by consumers eating more calories than they need, and due to excess energy being consumed, is associated with overweight and obesity. An analysis by Toti et al (2019) has shown that metabolic food waste is vast, and

its associated health and ecological impacts are also enormous. So-called 'plate-cleaning' (finishing all food that has been served) is a key contributing factor to metabolic food waste. As consumers become increasingly aware of, and concerned about food waste, many will be faced with the dilemma of whether to discard extra food, or to 'plate-clean'. One solution to this problem is to teach or help consumers to select appropriate serving sizes. As part of this, there are opportunities for food businesses to offer foods in a range of portion or serving sizes for diverse consumer needs, or to utilise packaging designs that allows consumers to portion size appropriately. This will assist consumers to reduce metabolic food waste, which will benefit both human and planetary health.

Toti, E. Di Mattia, C. Serafini, M. (2019) "Metabolic Food Waste and Ecological Impact of Obesity in FAO World's Region" Frontiers in Nutrition, 23 August 2019. https://doi.org/10.3389/fnut.2019.00126

Questionnaires v biometrics

Food liking and intake can, in large part, be predicted by how much we like a food. When we want to know if people like a food, we can simply ask the question: "how much do you like this food?". The explicit response can, however, be impacted by people responding with what they feel will be more socially desirable answers, inconsistent scale usage, or the cognitive inability to understand the scale or verbalize the reason why certain foods are chosen and consumed. In addition, food choice and intake are driven by factors which the consumer is, to a greater or lesser extent, unaware. Therefore, explicit methods such as a liking or desire questionnaires might not be the best predictor of food choice and intake. To overcome these issues and to obtain a better insight in the psychophysiological responses to food, researchers have tried to find biometric measurements which could potentially replace questionnaires.

A recent paper in the journal Food Quality and Preference continued
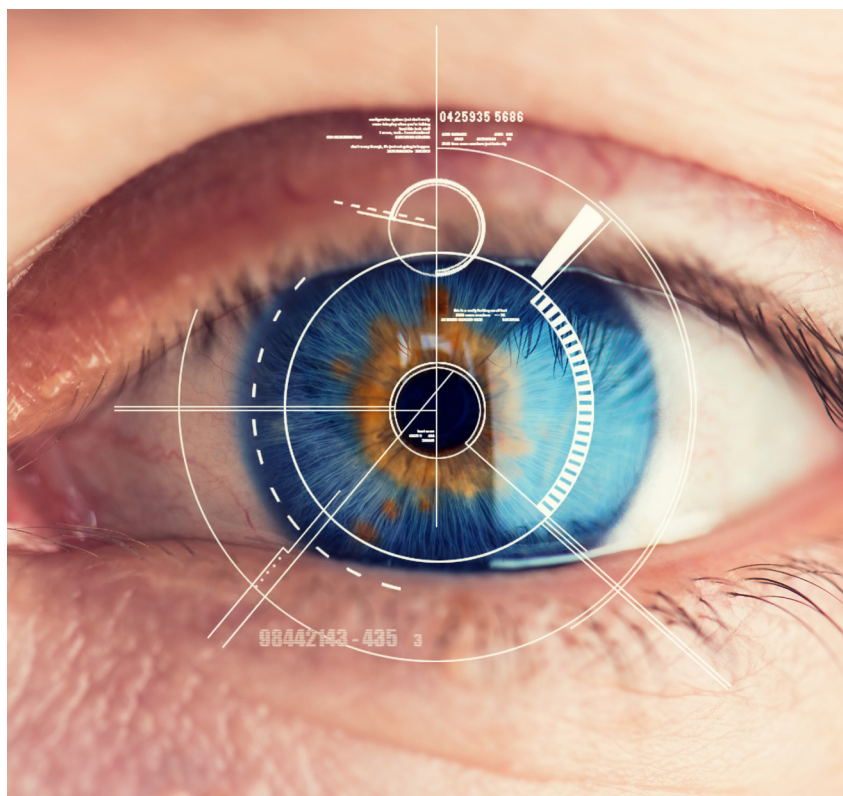
the search. In this experiment researchers obtained data from eye tracking to measure visual attention; electrodermal activity to measure the response of the autonomic nervous system and facial expression, and correlated this to food preference behaviour, food choice and food intake. One hundred normal weight adults first looked at pictures of food while wearing sensors which measured eye movement and fixation, electrodermal activity and facial expression. In addition, participants completed questionnaires which measured expected food liking and expected reward. After which participants were led to a room with a buffet from which they could choose anything they wanted to consume. It was found that eye-tracking was able to distinguish between different foods. Some foods received more visual attention than others depending on fat content and liking. Those foods which received more visual attention where the foods which were more liked and wanted, and which were more often chosen and consumed during the buffet. This suggests that our visual attention

might be one of the first steps we take in food choice and food intake. Neither the electrodermal responses nor facial expression were able to discriminate between different foods in a meaningful way. In contrast, the questionnaires about liking and wanting were able to discriminate between different foods. This suggests that although questionnaires might be old-fashioned, and biometric measurements are innovative, the old way of doing things is not a bad thing per se. This is not to say that biometric measurements have no place in sensory and consumer research, they most likely will, but we are not there...... yet.

Pedersen H. *et al.* (2021) Investigation of eye tracking, electrodermal activity and facial expressions as biometric signatures of food reward and intake in normal weight adults. *Food Quality and Preference*, 93, Oct 2021 https://doi.org/10.1016/j.foodqual.2021.104248

Dr Russell Keast is Professor, Dr Gie Liem is Associate Professor, and Dr Georgie Russell is Senior Lecturer. They are all members of the CASS Food Research Centre at Deakin University. 🔵