



Rotating plates: Online study demonstrates the importance of orientation in the plating of food



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ABSTRACT

We report three online experiments designed to assess how the visual composition of the elements of a commercially-successful dish would be perceived by naïve assessors, in terms of their liking and willingness to pay. Experiment 1 showed that an upward orientation of the dish was preferred as compared to when the elements pointed downward/toward the observer, or else pointed to the side. Experiment 2 demonstrates that optimally orienting the plate translates into an increased willingness to pay for the food. In addition, the results also revealed that both a triangle formed by the three principal elements (onions), and the direction in which these v-shaped elements pointed, affected people's judgments of the ideal orientation of the dish as a whole. Finally, a citizen science experiment (Experiment 3) held at London's Science Museum provided further support for our findings. These results highlight the potential of a digital (Internet-based) testing methodology to determine the optimal visual presentation of food.

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1. Introduction

For the majority of chefs, the plating of food is typically approached in an intuitive manner: The visual design of the food on the plate is refined through a natural iterative process until the composition 'feels just right'. Recently, however, a new field of experimental research has started to investigate how differences in the visual arrangement of the food on a plate may modify a diner's expectations, and from there, presumably also their subsequent experience of the food (see [Spence, Piqueras-Fiszman, Michel, & Deroy, 2014](#), for a review).

A number of studies now show that the visual composition of the food on a plate can exert a significant influence over what people think about the dish. The commonly-made assertion that fits with such observations is that people eat first with their eyes (e.g., [Apicius, 1936, 1st Century](#); [Delwiche, 2012](#); [Spence, 2015](#)). The latest empirical evidence certainly supports such a claim (e.g., [Van der Laan, de Ridder, Viergever, & Smeets, 2011](#); [Zellner, Loss, Zearfoss, & Remolina, 2014](#)). Undoubtedly, what we see on

the plate leads to the generation of expectations concerning the taste, flavour, and enjoyment of a given dish ([Spence & Piqueras-Fiszman, 2014](#)).

Whenever we set our eyes on a dish in a restaurant, we estimate (consciously or otherwise) its likely value ([Michel, Velasco, Fraemohs, & Spence, 2015](#)). Recently, researchers have demonstrated how changes to the visual appearance of a dish can shape people's expectations, resulting in changes in consumption behaviour and enjoyment of the food ([Michel, Velasco, Gatti, & Spence, 2014](#)), and even influence our brains' response to a given taste (e.g. [Woods et al., 2011](#)). It is our contention that what has up until now primarily been an 'art' (of plating; see [Deroy, Piqueras-Fiszman, Michel, & Spence, 2014](#), for a review; [Styler, 2006](#)) could easily be turned into a science, or, at the very least, might benefit from a more rigorous scientific evaluation of the intuitions of the chef. In turn, we believe that the empirical approach outlined here could potentially provide an essential tool for the chef or restaurateur concerned with how his/her dishes appear (either in the restaurant setting or online), in order to increase either the expected or actual satisfaction of their diners.

Food photography now plays an increasingly important role as a medium of diffusion of the aesthetic genres of a chef's/restaurant's cuisine. The interest in the visual appearance of the food on the

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plate really emerged with the ‘nouvelle cuisine’ movement¹ (Halligan, 1990; Spence & Piqueras-Fiszman, 2014). The recent trend for food images to be shared online (e.g., the Instagram platform www.theartofplating.com) has undoubtedly helped accelerate this emphasis on how the food on the plate looks. Indeed, when it comes to the visual appearance of food, social media platforms are likely to start setting plating trends virally, defining the food aesthetic preferences of the general public.

Given that so much ‘hangs’ on the visual appearance of the food, and given the explosive growth of interest in food photography in recent years, it would seem sensible to check that the intuitions of the chef or restaurateur concerning how appealing a certain visual presentation is judged to be are shared by the population at large (or at least by the likely customer demographic eating at a given restaurant, or restaurant chain). We hereby illustrate the potential of an Internet-based testing methodology to study the plating of food. We demonstrate that changing the orientation of the elements of a commercially successful dish can give rise to significant differences in terms of people’s preferences and their willingness-to-pay (WTP) for the food.

Alberto Landgraf is an up-and-coming chef in the Sao Paulo restaurant scene in Brazil (<http://www.theworlds50best.com/latina-america/en/the-list/41-50/Epice.html>). One of the signature dishes at *Restaurant Epice* caught our eye because its main ‘visual feel’ seemed to point away from the diner (i.e., upwards², see Fig. 1). Note how the individual v-shaped elements of the dish (pickled onions) had all been arranged so as to point upward, but also that the Gestalt (‘whole’, Hartmann, 1935; see Wagemans, in press) forms a triangle whose orientation points upwards. Interestingly, research shows that in triangle-like shapes, orientation appears to matter, with downward pointing triangles being associated with threat (Larson, Aronoff, & Stearns, 2007).

The inspiration for laying out the dish in this way, in the words of the chef (and co-author) A. Landgraf, was as follows: ‘I put the onions upwards because I think it’s the most natural way for us to look at it, and to identify it as an onion. When you think about Japanese cuisine, it’s offensive to point things towards people, towards the guest or towards the chef.’

We wondered whether the chef’s ‘natural’ (intuitive) solution to placing the elements of the dish so as to be oriented away from the diner would also be the one that a random group of people would like the most as well. Alternatively, it could be argued that people might simply be uninterested in the overall orientation of the food on the plate. A picture of the chef’s dish was rotated so that the onions pointed to the right, left, up, or down. The participants were then asked to rank the images in order of preference (Experiment 1A). The participants also rotated the dish into their preferred orientation (Experiment 1B). A new group of participants subsequently expressed their WTP for the food when arranged in the various orientations (Experiment 2A). To assess whether the preference judgments were attributable to the whole (or Gestalt) formed by the three elements in the dish, or rather to the orientation of each single onion, the stimuli were modified computationally, now rotating the individual onions to various angles. The participants were asked to rotate the different arrangements of the dish into their preferred orientation (Experiment 2B). We sub-



Fig. 1. ‘Red onions, tapioca, sugar cane vinegar, peanut, fermented cream’, dish by Alberto Landgraf, restaurant Epice, Sao Paulo, Brazil [photo courtesy of Rafael Facundo and Pedro Santos]. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

sequently designed an interactive platform in collaboration with London’s ‘Science Museum’, where the participants had to rotate the image of the same food presentation into their own preferred orientation (Experiment 3).

2. Experiment 1

2.1. Materials and methods

2.1.1. Participants

Two-hundred-and-four individuals (62 female and 142 male) recruited from Amazon’s Mechanical Turk (MTurk) took part in Experiment 1 in return for a payment of 0.30 US dollars. The participants ranged in age from 21 to 70 years ($M = 36.0$ years). Only those living in the United States of America were able to take part in the study. The experiment was conducted on 22/08/2014, from 18:00 GMT onwards over a 2-h period (see Crump, McDonnell, & Gureckis, 2013; Woods et al., Submitted, for a methodological overview of Internet-based research). A large sample size was chosen, as the study was exploratory in nature. The stopping criterion was 200 participants (small variation is an inherent feature of online testing). The participants took an average of 156 s ($SD = 141$ s, 95% of respondents finished the study in between 69 s and 354 s) to complete the study. All of the participants provided informed consent prior to taking part in the study. This study has been approved by Oxford’s University Medical Sciences Inter-Divisional Research Ethics Committee (approval # MS-IDREC-C1-2015-007).

2.1.2. Stimuli

The image of Alberto Landgraf’s ‘Red onions, tapioca, sugar cane vinegar, peanut, fermented cream’ dish was isolated from its background using graphics software in order to obtain a transparent background. Careful attention was paid to ensuring that any shading around the food was removed. The image was then superimposed onto a photo of a plate proportionally equal to the original. The centre of the circle of the sauce in the food image was aligned with the centre of the plate. In the Ranking task (Experiment 1A), four separate resized 360×360 -pixel images were created. They showed the food oriented 0° , 90° , 180° , and 270° with respect to the original. For the Rotation task (Experiment 1B), the food (resized to 195×195 -pixels) could be rotated around this point on the plate (560×560 -pixels) by moving the cursor around the central position of the display. The degree of food rotation matched the degree of mouse rotation.

¹ ‘Really, the concern with how the food looked can be traced back to the emergence of nouvelle cuisine. The pictures of these dishes have set themselves in the mind of the public. Nouvelle cuisine was essentially photogenic... Think of the glorious coloured photographs of these dishes, which have become eponymous with the purveying of recipes.’ (Halligan, 1990, p. 121).

² It seems natural to refer to ‘away from the diner’ using the term ‘upwards’ in this case, even if one is referring to a horizontal visual arrangement (a plate of food). The implications of testing a visual element meant to be horizontal (a plate on a table), using an image presented on a vertical plane (a computer screen), will be discussed later.

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