

OPINION

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Can you find the golden ratio in your plate?

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Abstract

A scientific approach to plating needs to be based on perceivers' responses and anticipate possible cultural and individual differences. It cannot just follow common sense principles, whose validity remain untested and only attract journalists' attention, like the claim that people will prefer food composition based on the golden ratio.

Keywords: Plating, Aesthetics, Colour, Composition, Psychology, Visual perception

Introduction

According to the latest scientific research, the visual appearance of a dish can affect how much diners like it, and even how they rate its overall flavor [1]. Whereas the majority of the research that has been published to date has focused on how specific properties, such as the colour of individual ingredients, can influence people's evaluation, the understanding of the visual appeal of a dish [2], such as a curry, with sauce, vegetables, and rice, undoubtedly needs to take into account the composition of the various elements on the plate [3-6]. According to Dr Hadley, a physicist at Warwick University's Department of Physics (Coventry, UK), applying a mathematical formula can tell you exactly how much rice and curry will look appealing to all consumers. A plate size of 27 cm, with a 23 cm diameter bed of rice precisely 5 mm thick, and supporting a low dome of curry with a diameter of 14 cm and a maximum height of 2.4 cm, represents, or at least so Dr Hadley would like to have us believe, the perfect presentation for a plate of curry, and should be liked by everyone. Other variants of the perfect curry can be envisaged, with equal precision, for a hungry student or an aficionado of nouvelle cuisine [7]. The press have certainly jumped enthusiastically onto this story [8,9].

The calculations applied here are supposed to satisfy what is known as the golden ratio, the ratio whereby the relation of the greater part to the sum of the two parts equals that of the two parts. To have the most aesthetically pleasing curry, then, the supposition is that the rice must be approximately 1.61 times wider than the circle of curry that is laid on top ($(\sqrt{5} + 1)/2$, to be exact). Of

course, here one needs to grant Dr Hadley the right to extend the concept of the golden ratio, usually meant to apply to rectangles and ellipses, to the relation between the radiuses of two circles. It is also not meant to explain the aesthetics of three dimensional objects, and apply to the height of objects, like here.

Is a claim that plates should obey the golden ratio science or enigmatic calculation? Are we not sprinkling some mysticism back onto the plate? In the past, a number of authors have supposed that the golden ratio dictates a viewer's preference for certain architectural achievements or visual displays (not to mention to be a proof of God's mathematical skills [10-12]). However, careful scientific research has demonstrated that this magical number actually explains little of the sense of balance and harmony that people typically attribute to shapes or composition. Despite some optimistic early results with rectangles ([13-16], but see [17]), Fechner, one of the fathers of modern psychology, failed to find any evidence that people actually preferred ellipses built on the golden ratio rather than others [18]. Furthermore, specialists in the field of experimental aesthetics have since demonstrated that many other factors bear on what people think has a balanced composition or harmonious figure [19,20].

What such research has demonstrated is that what counts as a balanced composition depends to a large degree on what is represented or presented, and preferences will differ for different shapes, colours, and objects [21,22]. In this sense, preferences for curry and rice might not be the same depending on whether it is a green or a red curry. Aesthetic preferences, if one chooses to extend them to the plating of food, will also vary with context [23] and present individual differences.

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If this is true for simple geometrical shapes, with different groups of individuals expressing markedly different preferences when it comes to judging the most beautiful of rectangles [20,24], it is also likely to be true when it comes to a plate of curry. Instead of the myth of the golden ratio, the reality will likely depend on the diner's cultural background, whether they happen to be hungry or not, the types of plating arrangements that they have been exposed to previously, and perhaps even their personality (see McManus *et al.* for a recent investigation of simple compositions [25]). The first thing to do, of course, would be to measure these preferences directly, by asking people to select the most pleasing or appetizing plate of curry (online testing might be useful here). This can be done at minimal cost, by any reasonable marketing department. If science needs to be involved, it will be to make sure that the presented pictures systematically vary along key dimensions, and that important interactions between, for example, size, colour, orientation, and so on, are not ignored.

Ignoring which science is relevant to the choice of the perfect plating, or the elaboration of the perfect meal, is perhaps the biggest problem at the present time. A plate needs to be resistant, smooth, and perhaps shiny, and physics and design may certainly be relevant. Students of physics might also be able to describe how to provide an equal distribution of weight in the plate if it is to be filled with a certain quantity of low-density rice and high-density curry. But when it comes to the preferences of diners, equations and simple premises are just not that relevant. It is rather the discovery of the fundamental premises themselves which is at the core of the work in this area, or at least it should be. As mentioned, many studies in experimental psychology were needed to show that the golden ratio does not necessarily represent a useful guide to people's visual preferences. Many more experiments are being performed, even today, in order to try and gain a better understanding of what governs the sense of balance or harmony in visual composition. It will take many more psychologists and careful testing to demonstrate what drives the preferences of consumers once the visual composition is also supposed to be eaten, as it is the case for a combination of curry and rice on a plate.

Take, for example, Hadley's claim that diners want a clear rim of at least 2 cm around the food on the plate. This is certainly not the case in the most admired Michelin-starred plating styles, where beautifully arranged sauces and spices cover all the plate's surface; and why would it be 2 cm rather than 3 cm or 5 cm? Do preferences depend on the color, the size, or even the shape of the plate, and the type of food that it contains? Is it the same for desserts, coming at the end of the meal, and starters? Dr Harvey's research [26] certainly rests

on intuitive aesthetic principles, which explain why the final result (the 'perfect curry') will indeed look appealing enough to a large body of individuals.

Given the role played by intuition in this research, one would rather trust the chef's intuitive sense of presentation. Claims that chefs and cooks 'have been getting curry all wrong', as reported in *The Times*, is not just provocative, but totally misplaced [8]. The development of a scientific approach to the presentation of food, in all its cultural, aesthetic, and individual complexity [3], is a noble prospect. For this very reason, we need more than merely the feeding of intuitions into complex equations. We certainly need more experimental rigor and to put the diners at the centre of our scientific investigation of the aesthetics of plating [27]. Not magic numbers.

Competing interests

The authors declare that they have no competing interests.

Authors' contribution

OD and CS contributed equally to this manuscript. Both authors read and approved the final version of the manuscript.

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