International Journal of Food Design
Volume 6 Number 2

https://doi.org/10.1386/ijfd_00031_1
Received 9 March 2021; Accepted 15 May 2021

CHARLES SPENCE
University of Oxford

Analysing stereotypical food consumption behaviours: 'This way up?' Is there really a 'right' way to eat a biscuit?

ABSTRACT

Many of the mundane foods that we eat on an everyday basis are consumed in a manner that may be considered stereotypical, conventional, habitual or, on occasion, even a playful ritual. There are a number of reasons for such behaviours, and the potential benefits for the consumer are discussed in the case of vertically asymmetrical foods where the upper and lower surfaces differ. Maximizing the eye appeal of the food product, maximizing the multisensory flavour experience and the ubiquitous benefits of ritual to the enjoyment of consumption experiences are all put forward as possible explanations for such behaviours in this opinion piece. Ultimately, however, the paucity of empirical evidence concerning the influence of the manner of eating such ubiquitous foods (right way-up or upside-down) on the multisensory tasting experience is highlighted. This is a seemingly important lacuna in the food science literature, given the multiple competing explanations concerning how such experiences might be affected, if at all, that suggest themselves. Looking to the future, it would clearly be of great interest, given the growing global obesity crisis, to understand whether it might be possible to increase sensory enjoyment and/or satiety by the better/optimized design of foods and/or food consumption behaviours.

KEYWORDS

food rituals
gastrophysics
asymmetrical foods
playful food
design
flavour optimization

1. INTRODUCTION

At the level of individual food products, many consumers engage in stereotypical, habitual or conventional consumption behaviours that can sometimes take on the status of playful rituals (e.g. Marshall 2005). The question of which of our everyday foods are associated with such consumption (or preparation) habits is an intriguing one. That said, the conventional/ritualized action sequences that are involved in preparing (i.e. rather than consuming) certain foods, such as the highly stylized and richly symbolic Japanese tea ceremony (e.g. Anderson 1987), will not be touched upon here (see also Quintao et al. 2017 on the rituals associated with the preparation of another ubiquitous beverage – coffee). While it has been argued that certain of these behaviours that are associated with particular branded foods may have been primed in a top-down manner by wily marketers (Amati and Pestana 2015), there is a rich seam of marketing-led press stories that are premised on identifying and/or questioning the appropriateness of those consumer food behaviours, many of which would appear to have emerged spontaneously amongst consumers (e.g. Best 2021; Gould 2021). More often than not, marketing would seem to have built upon such pre-existing habits, rather than necessarily creating them spontaneously. Consider here, for instance, only how the 1994 marketing campaign for Oreos built on the pre-existing stereotypical consumer behaviour with their 'Twist' campaign (see Advertising Age: The Best Awards 1994 as cited in Amati and Pestana 2015). That said, it has been reported that Kraft Foods struggled to introduce the 'Twist, Lick, and Dunk' action sequence when launching Oreos in China (Koellmann 2013). Meanwhile, the origins of other branded food habits or traditions, such as the ubiquitous slice of lime that is added to Corona beer in North America (and certain other countries), turn out to be of uncertain origin (e.g. Lindstrom 2008; Mikkelson 2010; Wilson 2007). At the same time, however, press stories are occasionally also triggered by queries that have been posted online by curious consumers (Gayle 2021).

Consumers exhibit a wide variety of stereotypical behaviours when consuming various foods, including everything from eating their sausage rolls (or hot dogs in the States) from end to end, rather than starting in the middle (see Gayle 2020), through to licking the peanut butter off of an inverted spoon. Or, as one agency blogpost put it: 'Have you ever eaten peanut butter from a spoon? You know, with the spoon upside down. How about folding your slice of pizza? Do you eat the red ones last? Do you Twist, Lick and Dunk?' (Anon. 2017). In this review, though, I will focus primarily on the case of the stereotypical consumption behaviours that are associated with a number of everyday vertically asymmetrical foods. I will consider the conventional consumption behaviours that are exhibited by people and how they might be explained. Importantly, a number of factors contributing to such stereotypical eating behaviours (in the case of asymmetrical foods) that I will examine include maximizing the food's eye appeal, helping to differentiate/

identify products, ease of handling and maximizing the multisensory flavour experience. No empirical data will be offered in this opinion piece.

Perhaps the more fundamental question here is how the consumer *should* eat certain food products in order to maximize their enjoyment of the taste experience (see also Bordewijk and Schifferstein 2020; Schifferstein 2016; Zampollo 2016; Zampollo and Peacock 2016). Of course, it is important to stress at the outset that our enjoyment of food and drink may sometimes be derived as much from the anticipation/expectation, as from the actual taste experience (see Berčík et al. 2021; Spence et al. 2016 for a review). Indeed, as the Roman gourmand Apicius put it long ago: '[w]e eat first with our eyes' (see Apicius 1936). What is more, there is also a sense in which the very fact that certain of our food consumption behaviours are ritualized may contribute to the enjoyment of the total experience (Vohs et al. 2013), as well as possibly providing some degree of comfort to the consumer (which, as it turns out, may be especially important in the era of COVID-19; see Randall 2021; Wang et al. 2021).

At the same time, however, it should be noted that in order to qualify as a (food) ritual (Visser 1991), there needs to be a symbolic element to proceedings (Ratcliffe et al. 2019), as perhaps present when one asks for one's egg 'sunny-side up' (cf. Meier and Robinson 2004), or when one bites the limbs off of Gummy Bears. Birthday cake is often mentioned as another highly symbolic and ritualized food experience (Rossano 2012; see also Fox 2003). Ritualized eating events are also often associated with religious ceremonies, be it the Passover Seder feast for Jews (Gray 2020) or the ritualized consuming of the body of blood of Christ for Christians in the form of sacramental (or communion) bread and holy wine as part of the Eucharist (Petric 2020). Thanksgiving has also become a ritualized feasting occasion in the United States (see Wallendorf and Arnould 1991). Kottak (1978) has even argued for the pleasures of a ritual meal out at McDonalds. According to the above definition, however, it is by no means clear that many of the simplistic stereotypical food behaviours that have been studied as 'food rituals' in the past necessarily involve any symbolic element. So, for example, the breaking off of a piece of chocolate from the bar in one of Vohs et al.'s (2013) oft-cited studies seems to have little symbolic about it, yet is unquestioningly described as a food ritual by the study authors. As the authors describe it:

> [P]articipants in the *ritual* condition were instructed, 'Without unwrapping the chocolate bar, break it in half. Unwrap half of the bar and eat it. Then, unwrap the other half and eat it.' In the *no-ritual* condition, participants relaxed for approximately the same duration and then ate the chocolate naturally.
>
> (Vohs et al. 2013: 1715, original emphasis)

Nevertheless, whether they meet the definition of ritualized behaviour or not, it is clear that stereotypical, habitual and/or conventional food consumption behaviours are a distinctive feature of our interaction with many mundane everyday food products, no matter whether we realize it or not. The questions that I would like to address here, specifically with reference to vertically asymmetrical foods, such as chocolate-covered biscuits, nigiri sushi and Pringles, is what impact such behaviours might be having on the consumption experience, and what the 'function' of such food behaviours might be (Section 2). In Section 3 I highlight a number of factors that may act to negate the benefits of

such stereotyped eating behaviours in terms of maximizing the tasting experience. In Section 4 I briefly discuss the question of ease of handling as a factor guiding the design of various foods. In Section 5 I come back to the question of what, if anything, differentiates food rituals from food traditions and other habitual/stereotypical food behaviours.

2. VERTICALLY ASYMMETRIC FOODS THAT ARE CONSUMED IN A STEREOTYPICAL MANNER

2.1. Chocolate-covered biscuits

Periodically, articles appear in the press concerning the right way to eat chocolate-covered biscuits (such as Chocolate Hobnobs, Jaffa Cakes and Chocolate Digestives): chocolate side up, or chocolate side down? According to the biscuits' manufacturer (McVitie's), the chocolate side is most definitely the underside, as these biscuits are all dunked in a reservoir of liquid chocolate during production. However, most consumers apparently prefer to eat their biscuits chocolate side up. Drawing attention to this discrepancy, the suggestion from the more excitable commentators is that many consumers have been eating their biscuits 'all wrong' (Pearson-Jones 2020b). But is there really a 'right' way to eat a biscuit?

Given that the brain or rather our eyes are drawn to energy-dense (or high-fat) foods, it certainly makes sense to have the chocolate side facing up, as that is simply going to be more visually appealing than staring at the biscuity base (e.g. Motoki et al. 2021; Spence et al. 2016).[1] Here, it is worth stressing how much of the pleasure of eating and drinking actually comes from the visual expectations that are elicited simply by looking at and possibly also smelling desirable foods (see Wang et al. 2004 for neuroimaging support for such a suggestion). This, after all, is why 'dine in the dark' restaurants never lead to an especially enjoyable food experience (Spence and Piqueras-Fiszman 2012, 2014). At the same time, the visible appearance properties of foods (primarily related to their colour) have been shown to influence people's taste expectations and, by so doing, to bias their subsequent taste/flavour experience (see Spence 2015b for a review).

While what counts as the top and bottom may be rather ambiguous when chocolate biscuits come wrapped end-to-end in a tube as they so often do, one might well point to the fact that in presentation trays/boxes, the chocolate is always visible (when not wrapped in foil, that is, as sometimes the case), again suggesting that the chocolate side should really be considered the upper one. At the same time, however, one might also wonder, from a flavour (or gastrophysics) perspective (Spence 2017), what the right thing to do is (if one wants to maximize the flavour experience). Given that the majority, but by no means all, of the taste buds (at least those that appear to give rise to a conscious perception of taste under conditions of naturalistic food consumption) are located on the surface of the tongue (Breslin 2013; Spence forthcoming; see also Trivedi 2012), one might be tempted to think that is where the most flavourful ingredients should be concentrated. According to this logic, the chocolate side should therefore presumably face down. Here one might also want to consider the pleasure that is potentially associated with the feeling of the chocolate melting on the tongue when the chocolate side is placed face down (see Spence and Piqueras-Fiszman 2016 for a review of the oral-somatosensory aspects of tasting; Hyde and Witherly 1993 on the pleasure associated with dynamic contrast in food experiences; and Crolic

1. One might also consider the correspondence or metaphorical mapping between elevation and positive affect (Meier and Robinson 2004), and/or the cross-modal correspondences that have been demonstrated between lightness and elevation (Sunaga et al. 2016), not to mention between sweetness and elevation (Velasco et al. 2019).

and Janiszewski 2016 on the theme of hedonic escalation). And yet all that delicious chocolatey flavour is really detected by the nose, both the orthonasal sniff, before/as we take a bite, and the retronasal pulses of volatile-rich air that are pushed out from the back of the nose as we masticate and swallow (e.g. Ni et al. 2015). The olfactory hit might well be maximized by ensuring the chocolate is on upper surface when the biscuit enters your mouth (certainly for orthonasal olfaction and possibly also for retronasal olfaction as well; see also Biswas et al. 2021).

Saliva also interacts with what we are eating, sometimes helping to release volatile aromas from the food matrix during mastication, or else retaining them in ways that the food scientists are still only now beginning to understand (e.g. Buettner et al. 2001; Canon and Neyraud 2017; Canon et al. 2018; Ge 2012; Spence 2011b; Taylor and Roozen 1996). Hence, while there are a number of reasons to believe that the multisensory flavour experience, narrowly defined (see Spence et al. 2015), might be impacted significantly by the orientation of an asymmetrical food (such as a semi-chocolate-covered biscuit) when consumed, it turns out (rather surprisingly) that there is virtually no peer-reviewed empirical evidence on this question. The closest one comes from those researchers investigating salt- and sugar-reduction strategies involving asymmetrically distributing and/or layering salt and sugar as a strategy to try and reduce the unhealthy ingredients while not compromising on taste perception (e.g. Hutchings et al. 2019; Mosca et al. 2012; Noort et al. 2012, 2010). However, rating an entirely unfamiliar food matrix, as is done in much of the literature in this area, is clearly a situation that is very far removed from the consumer's experience of, or expectations concerning, everyday asymmetrical food products such as biscuits.

Given the above, I would therefore question the suggestion from the press as to whether those consumers who choose to eat our biscuits with the chocolate on the upper side really are doing it all wrong. In the end, I doubt that McVitie's really care how their customers eat their chocolate biscuits. Nevertheless, given the public fascination with the 'right' and 'wrong' way to eat popular foods, bringing the topic up seems to be a marketing hook that the food brands, and the agencies they employ, just cannot resist, regardless of the merits, logic or even the seriousness of the underlying suggestion (see Figure 1).

2.2. Nigiri sushi

Another asymmetrical food that most people apparently eat in the wrong way is nigiri sushi. This Japanese delicacy is always presented with the fish on top (thus highlighting the element – the fish – that varies, while the rice base stays the same). Diners, though, are supposed to turn the sushi over on its way from presentation plate to mouth, so that the fish (and not the rice base) initially contacts the tongue directly (Haslett 2017) (note that a dab of wasabi is sometimes placed between the fish and rice. However, given that this trigeminal stimulant is placed in the middle of the sushi, the orientation of the latter when entering the mouth is unlikely to matter). This inversion is made easier once it is realized that nigiri sushi should be eaten with the fingers rather than handled with chopsticks (see Pearson-Jones 2020a). And, given that raw fish delivers more of a textural than necessarily an olfactory experience, this inversion perhaps makes more sense than in the case of chocolate biscuits. However, once again, it turns out that there is a surprising paucity of literature

Figure 1: Recent graphic illustration in the UK press concerning how best to eat one's semi-chocolate-covered biscuit. Reprinted from Best (2021) with permission.

(at least in English) on the impact of orientation of nigiri sushi on people's eating pleasure. Given the growing literature showing how visually attention-capturing energy-dense high-fat foods are (Harrar et al. 2011; Motoki et al. 2021; Toepel et al. 2009), there can be little doubting that the eye appeal of nigiri sushi is maximized with the fish visible on top (Spence et al. 2016 for a review).

2.3. Pringles

According to the manufacturers, the double horseshoe-shaped Pringle should be inserted into the mouth crosswise (that is, with the long side running from left to right) and with the front and back edges pointing upwards. This is supposed to help maximize the seasoning's contact with the tongue/taste buds (see Medler 2018). The seasoning, so it turns out, is only added to the upper side of Pringles (Blake 2017b). It is somewhat ambiguous from the press coverage as to whether 'seasoning' refers to the salty taste and/or aromatic flavour volatiles, though presumably it incorporates both. As such it is unclear which orientation would actually maximize the tasting experience. In this case, however, the asymmetrical shape of the product itself means that any difference in the reported tasting experience (as a function of orientation) might be attributable to shape rather than (or as well as) to the asymmetrically distributed seasoning (see also Lenfant et al. 2013). Given that Pringles are not appreciably more attractive visually on one side than the other, the recommendation about how to eat them would appear to be based squarely on maximizing flavour (i.e. rather than maximizing eye appeal) – one of the possible explanations for the orientation bias exhibited in the previous two examples that have just been discussed. At the same time, however, it should

also be noted that much of the pleasure of snack foods such as Pringles is derived from the sound of the crunch (Weiss 2001; Zampini and Spence 2004; see Spence 2015 for a review). Hence, one might also want to consider what the noisiest way in which to eat this snack might be (see Youssef et al. 2017 on the pros and cons of noisy eating).

Intriguingly, however, while the question would seem to be a very simple one, I am not aware of anyone having published research on the question of whether vertically asymmetrical foods such as semi-chocolate-covered biscuits, nigiri sushi or Pringles really do taste appreciably different, or whether the eating enjoyment or sensations/satiation are affected by the orientation with which these foods are placed in the mouth. One fundamental reason to explain why researchers may not have thought to undertake this research is due to a belief that flavour constancy would overcome any variations in the pattern and sequence (Spence et al. 2017) of proximal stimulation attributable to the way in which an asymmetrical food is inserted into the mouth. It is to the topic of flavour constancy that we turn next. One other point to note in passing here is how both chocolate biscuits and Pringles fracture easily when a consumer bites into them. This means that whatever started out on top when these foods enter the mouth is soon likely to move to the bottom of any food bolus that forms (Buettner et al. 2001). In this regard, the physical behaviour of nigiri sushi in the mouth is likely to be quite different, as is the behaviour of popular North American asymmetric foods such as donuts covered on one side with icing, or pretzels that have been salted on one side (cf. Wilson 2019).

3. FLAVOUR CONSTANCY

What the brain is really trying to figure out on eating/drinking is presumably what the food is (this is known as the distal stimulus) and ignore any variations in the proximal stimulus that happens to impinge on the sensory receptors that might be attributable to foibles/peculiarities in how we eat or how deeply we inhale, etc. (cf. Breslin 2013). As such, one might imagine that the brain engages in some sort of perceptual constancy for flavour designed to make up for variations in the way in which a given food or beverage product is experienced (Le Berre et al. 2013). There is, for example, some limited research out there to suggest that our brain discounts the size, or rather volume, of the sniff (see Teghtsoonian et al. 1978; see also Raudenbusch and Meyer 2001). Consider here only how presenting fine wines in different glasses (i.e. having different size and/or shape) changes the release of volatiles in the head space over the liquid without necessarily changing the tasting experience or 'nose' (see Spence 2011a for a review).

That said, Unilever, for one, would certainty seem to be convinced that they can trick the consumer's brain by loading more of the tasty, but typically less healthy, ingredients in the first bite and hence lowering their concentration in subsequent bites/sips of their food products. Their research suggests that we are unlikely to spot that anything has changed in the formulation, since our brains appear to assume that things that look the same taste the same (Dijksterhuis et al. 2010; Woods et al. 2010). At the same time, we also expect things that look different, such as the white and yellow of the yolk in a Cadbury's Creme Egg to taste different, which they do not (see Gallagher 2020). Consumers would appear to put any temporal decline in the tasting experience while enjoying a food or drink product down to adaptation (cf.

Cometto-Muñiz and Cain 1995). Meanwhile, in some of the research from the Crossmodal Research Laboratory in Oxford, we have demonstrated that increasing the surface area of a dish (and thus increasing its eye appeal) leads people to estimate that there is more food and hence to rate dishes more highly, again suggesting that it may be possible to 'trick' the consumer (e.g. Rowley and Spence 2018; Woods et al. 2016), delivering a more enjoyable (or satiating) taste, in this case by optimizing the expectations set by eye.

Looking to the future, therefore, standardizing how we eat might help to provide solutions concerning healthier food formulations, or else opportunities to personalize the food experience to a certain degree (see Spence 2017). At the same time, however, it is also worth questioning whether maximizing the taste/flavour sensations from food is really what people want; as if that were so, they might, for instance, chew their food more (Guinard et al. 1997; Kristeller and Wolever 2010; Luckett and Seo 2017; Potter et al. 2020), eat more slowly (Andrade et al. 2008), not use straws (Lin et al. 2013; though see also Pramudya et al. 2021), etc. There is also some suggestion that consumers may, in fact, sometimes intuitively optimize their interactions with foods (as when dunking a biscuit in a beverage such as tea) to maximize the ensuing multisensory flavour experience (see Blake 2017a; see also Douglas and Nicod 1974). Though questions about whether the milk should be added to the cup/mug before or after, pouring the tea turns out to be a more complex issue than one might at first imagine (Chadwick and Dudley 1983). According to the latest press reports (Pinkstone 2021), food scientists suggest that the answer may depend on the hardness of the water, while authorities on etiquette have their own opinion on the matter (Greep 2021). Passions apparently also run high when it comes to the question of whether the jam, or clotted cream, should be spread on a scone first (see Nikolic 2021).

4. EASE OF HANDLING

It is important to stress here that maximizing the eye appeal, or multisensory flavour experience, is not the only reason for eating foods in a particular manner (or orientation). There is also the question of ease of handling (and how the food fits/feels in the mouth – just think about how an inverted Pringle snuggles against the tongue, whereas otherwise the edges may poke uncomfortably against the upper palate). In this section, we will take a look at those hand-held foods that are organized (designed) so as to maximize ease of handling, rather than necessarily to maximize the flavour experience. For instance, the Earl of Sandwich was likely not thinking about the optimization of flavour perception when he invented the sandwich so that he would not have to leave the gambling table (see Bernstein 1998). Indeed, all of the foods that have been discussed so far are typically eaten with the hands. It has, for example, been suggested that there is a 'right' and a 'wrong' way to eat pizza. In this case, though, it is more about how to ensure that the toppings end up in your mouth and not your lap (Blake 2016). According to self-styled pizza expert Daniel Young, consumers are meant to fold over a slice of pizza into a wallet shape before trying to put any of it into their mouth. Following Young's suggestion would mean that just as is the case for sandwiches, burgers and hot dogs, the outer slices of bread, bap or bun are really there primarily to provide a non-sticky handle for the tasty contents contained within. This is despite the fact that from a flavour perspective, the arrangement might actually give rise

to a less flavourful experience overall (Lee 2015; Morgan 2015; though see also Sinnerton 2015).

At the same time here, it should also be noted that actions that we find easier to execute are liked a little more. Hence, by folding the pizza slice, the ensuing experience is likely to be little bit more enjoyable, as the wallet folding 'affords' grasping (e.g. see Cannon et al. 2010; cf. Elder and Krishna 2012). That said, one might worry that foods like semi-chocolate-covered biscuits and nigiri sushi that should be inverted on the way to the mouth would be liked a little less due to the reduced affordance of the action required (Gibson 1977).

5. RITUALIZED EATING VERSUS STEREOTYPED FOOD BEHAVIOURS, HABITS AND TRADITIONS

It has been argued by many commentators that our preference for eating specific foods in a particular orientation (or way, e.g., as in the case of sausage rolls, Jaffa Cakes, Oreos and the like) can be seen as a very simple kind of personal, or playful, ritual (Hobson et al. 2018; Ratcliffe et al. 2019; Vohs et al. 2013). The whole area of food rituals is a fascinating one: both why they exist in the first place, and why they seem to be attached to certain foods but not to others. Schivelbusch (1993) has written extensively about traditional/historic European drinking rituals (see also Wilson 1991 on medieval food rituals). At the same time, however, it is important to stress that in order for a stereotypical or conventional consumption behaviour to take on the status of a food ritual (strictly defined), there needs to be a symbolic element to proceedings (e.g. see Ratcliffe et al. 2019; Visser 1991). For example, many people exhibit stereotypical/habitual, but not necessarily ritualistic, behaviours whenever they eat everything from Cadbury's Creme Eggs through to Oreo cookies (Amati and Pestana 2015; Gallagher 2020; Houck 2016). Notice here, for example, how amongst those who always detach one of the dark biscuity discs of Oreo first before licking the fondant centre, there is no obvious symbolic element to the action sequences in these cases.

Some individuals take pleasure in biting the head and/or limbs off Gummy Bears. Indeed, look online and you will soon find plenty of people wanting to share the particularly savage ways in which they delimb these tasty treats with their teeth.[2] Such food behaviours would seem to be both symbolic and playful (e.g. Altarriba et al. 2020; Murer et al. 2013; Sandercock 2019; Stummerer and Hablesreiter 2019). At the same time, however, such behaviours do not necessarily appear to be a playful ritual in the sense that there is not necessarily a stereotypical sequence to the gelatinous dismembering that takes place. That is, sometimes the consumer might start with decapitation, while on other occasions it may be the legs that are detached first. One might say that rituals have meaning to the person who performs them, whereas a habit is merely a certain manner of doing things.

At other times, however, our food habits/stereotypical food behaviours may serve to help personalize/customize the food experience (Blake 2017b; Spence 2017). Consider here also only how fussy children sometimes deliberately choose to eat the foods on their plate in a specific order, perhaps saving the best element till last (Kranowitz 1998). Or else they may insist that different foods do not touch each other on the plate. As noted earlier, adopting a stereotypical action sequence or habit when interacting with food can sometimes give rise to increased pleasure from consumption (Vohs et al. 2013).

2. Note that this example is closer to traditional definitions of ritual as containing a symbolic element. I am not that sort of psychologist, but it is hard not to imagine that such behaviour tells you something about the individual's personality – that is, much like the varied answers people come up with when staring at Rorschach inkblots (see Meyer and Archer 2001).

However, we may well want to stop short of calling any food-related action sequence a ritual, especially if there is no obvious symbolic element to the proceedings. In fact, looking back, many of the food behaviours discussed in this opinion piece would be better classed merely as stereotypical action sequences or habits than necessarily as playful rituals. For instance, should a consumer always eat their biscuits chocolate side up, or make a point of having the fish on top when eating nigiri sushi, this pattern of behaviour seems best described as a food habit. See Vohs et al. (2013) for one particularly egregious example of this misclassification of a stereotypical food behaviour (or rather merely a set of instructions) as a 'ritual'.

Many of the widely accepted food rituals, such as those involved in religious ceremonies, or the South Korean ritual of eating dog meat to combat heat (Hsu 2012), tend to be part of age-old traditions. Hence it might well be argued that there is also a temporal element to the establishment of particular food rituals. Consider here only how one of the most often mentioned food rituals concerns tea, and here the notion of history, culture and tradition seems to play a large role in the establishment of such rituals, especially in the case of the age-old Japanese tea ceremony (Anderson 1987). Hence, while rituals, stereotyped food behaviours, food habits and traditions may sound very similar, and while the terms are often used interchangeably in the literature/press, their meaning is importantly different.

One obvious difference between stereotyped behaviours and habits relates to the fact that the former refers more to the sequence of steps or actions that are performed, whereas with habits, the focus is perhaps more on the goal of that action. For a stereotyped or habitual behaviour to take on the status of a ritual, it needs to take on symbolic meaning. As such, it could be imagined that habitual or stereotyped behaviours probably typically develop somewhat independently. The symbolic meaning attached to a given food behaviour presumably helps establish/formalize the ritual in the first place. Of course, it is at least theoretically possible that habitual/stereotyped patterns of behaviour are given a symbolic meaning after they have been established, though this seems less likely. Finally, it is noticeable how many genuine food rituals are intimately tied up with tradition/religion (Wallendorf and Arnould 1991).

In terms of those food marketers interested in trying to establish a new ritual around specific food and beverage products, simply explaining to the customer the stereotypical way of eating a food to maximize the latter's enjoyment of the tasting experience would not, in itself, seem sufficient to succeed, even should the consumer internalize those recommendations. At best, one might describe it as a stereotypical action sequence that, over time, might become habitual, but it would ultimately lack the symbolic element and fall short in terms of any element of tradition which is perhaps only established over a longer period of time than most food brands survive.

6. CONCLUSIONS

Ultimately, what counts as the top and what counts as the bottom of a biscuit, a potato chip – or any other food item for that matter – is likely determined by several factors, with the orientation of the product during the manufacturing process coming way down the list in order of importance. Maximizing the eye appeal of a food, by presenting the most desirable (be it expensive, tasty) or differentiating elements on top (as in the case of nigiri sushi) so that they can be seen by the customer/consumer is clearly important, especially given

that, as Apicius (1936) noted long ago, '[w]e eat first with our eyes'. Being able to discriminate between different items visually is clearly important to the consumer. Thereafter, in the case of those foods that are designed to be eaten with the hands, practical constraints around how easy it is to handle the food play a key role in the design of the food experience. Finally, one might also want to think about the food orientation that helps to maximize the multisensory flavour experience. Yet here it is worth reiterating the fact that the release of flavour volatiles as we masticate/eat is a phenomenally complex process, one that the food scientists are only just beginning to get a handle on. At a more macro level, though, the latest research suggests that looking at food (cookies, beverages and fruit snacks) prior to smelling it leads to enhanced taste experience when compared to those situations where smelling precedes seeing (Biswas et al. 2021).

Given that we really do eat first with our eyes, I believe that the tastiest (and/or certainly the most energy-dense) elements should always be visible (on top), thus helping to optimize the consumer's flavour expectations (see also Biswas et al. 2021). Ultimately, therefore, foods should probably be presented in the way that appeals to the eye as much as to the mouth, especially given how visually dominant we all are (Hutmacher 2019). At the same time, however, one of the key aims of this review is simply to highlight the lacuna in the food science literature to date concerning the means of consumption on the multisensory tasting experience. Given how many different factors would seem to be at play, it will likely only be as a result of carefully conducted experimentation that a clear empirical answer can be revealed.

REFERENCES

Altarriba, B. F., Lutz, R. and Isbister, K. (2020), 'Where interaction design meets gastronomy: Crafting increasingly playful and interactive eating experiences', *Second International Conference on Food Design and Food Studies, Experiencing Food, Designing Sustainable and Social Practices*, Lisbon, Portugal, 28–30 November.

Amati, F. and Pestana, F. (2015), 'Consumption rituals: A strategic marketing framework', *Studia Ekonomiczne*, 2:85, pp. 229–46.

Anderson, J. L. (1987), 'Japanese tea ritual: Religion in practice', *Man*, 22, pp. 475–98.

Andrade, A. M., Greene, G. W. and Melanson, K. J. (2008), 'Eating slowly led to decreases in energy intake within meals in healthy women', *Journal of the American Dietetic Association*, 108:7, pp. 1186–91, https://doi.org/10.1016/j.jada.2008.04.026. Accessed 29 September 2021.

Anon. (2017), 'The power of food rituals', Invok Brands, 11 July, https://www.invokbrands.com/consider-this/the-power-of-food-rituals. Accessed 21 September 2021.

Apicius (1936), *Cooking and Dining in Imperial Rome (c. 1st Century)* (trans. J. D. Vehling), Chicago, IL: University of Chicago Press.

Berčík, J., Paluchová, J. and Neomániová, K. (2021), 'Neurogastronomy as a tool for evaluating emotions and visual preferences of selected food served in different ways', *Foods*, 10:354, https://doi.org/10.3390/foods10020354. Accessed 29 September 2021.

Bernstein, P. L. (1998), *Against the Gods: The Remarkable Story of Risk*, New York: John Wiley and Sons.

Best, S. (2021), 'Chocolate side up or down? Scientist reveals the best way to eat a Chocolate Digestive – and claims you should pick up the biscuit with the topping on the top, but flip it over before you eat it', *Daily Mail Online*, 8 July, https://www.dailymail.co.uk/sciencetech/article-9768383/Chocolate-Scientist-reveals-best-way-eat-Chocolate-Digestive.html. Accessed 21 September 2021.

Biswas, D., Labrecque, L. I. and Lehmann, D. R. (2021), 'Effects of sequential sensory cues on food taste perception: Cross-modal interplay between visual and olfactory stimuli', *Journal of Consumer Psychology*, article first, https://doi.org/10.1002/jcpy.1231. Accessed 29 September 2021.

Blake, I. (2016), 'Now we're holding our pizza wrong! Why you should never pick takeaway up by the crust', *Daily Mail Online*, 14 October, https://www.dailymail.co.uk/femail/food/article-3837759/Now-holding-pizza-wrong-NEVER-pick-takeaway-crust.html. Accessed 21 September 2021.

Blake, I. (2017a), 'The proof that dunking a biscuit into tea does make it taste better (and a brew beats coffee when it comes to dipping our Digestives)', *Daily Mail Online*, 1 August, http://www.dailymail.co.uk/femail/food/article-4746630/PROOF-dunking-biscuit-tea-makes-taste-better.html. Accessed 21 September 2021.

Blake, I. (2017b), 'You've been eating them wrong! Why there's only one right way to eat Pringles (and it even makes them taste better)', *Daily Mail Online*, 18 April, https://www.dailymail.co.uk/femail/food/article-4420624/You-ve-eating-Pringles-wrong.html. Accessed 21 September 2021.

Bordewijk, M. and Schifferstein, H. N. J. (2020), 'The specifics of food design: Insights from professional design practice', *International Journal of Food Design*, 4:2, pp. 101–38, https://doi.org/10.1386/ijfd_00001_1. Accessed 29 September 2021.

Breslin, P. A. S. (2013), 'An evolutionary perspective on food and human taste', *Current Biology*, 23:9, pp. 409–18.

Buettner, A., Beer, A., Hannig, C. and Settles, M. (2001), 'Observation of the swallowing process by application of videofluoroscopy and real-time magnetic resonance imaging – consequences for retronasal aroma stimulation', *Chemical Senses*, 26, pp. 1211–19, https://doi.org/10.1093/chemse/26.9.1211. Accessed 29 September 2021.

Cannon, P., Hayes, A. E. and Tipper, S. P. (2010), 'Sensorimotor fluency influences affect: Evidence from electromyography', *Cognition and Emotion*, 24:4, pp. 681–91.

Canon, F., Neiers, F. and Guichard, E. (2018), 'Saliva and flavor perception: Perspectives', *Journal of Agricultural and Food Chemistry*, 66:30, pp. 7873–79.

Canon, F. and Neyraud, E. (2017), 'Interactions between saliva and flavour compounds', in E. Guichard, C. Salles, M. Morzel and A.-M. Le Bon (eds), *Flavour: From Food to Perception*, Hoboken, NJ: John Wiley and Sons, pp. 284–309.

Chadwick, S. and Dudley, H. (1983), 'Can malt whiskey be discriminated from blended whisky? The proof. A modification of Sir Ronald Fisher's hypothetical tea tasting experiment', *British Medical Journal*, 287, pp. 1912–15.

Cometto-Muñiz, J. E. and Cain, W. S. (1995), 'Olfactory adaptation', in R. L. Doty (ed.), *Handbook of Olfaction and Gustation*, New York: Dekker, pp. 257–81.

Crolic, C. and Janiszewski, C. (2016), 'Hedonic escalation: When food just tastes better and better', *Journal of Consumer Research*, 43:3, pp. 388–406.

Dijksterhuis, G. B., Le Berre, E. and Woods, A. T. (2010), 'Food products with improved taste', patent identifier no. EP2451289 A1, Google Patents.
Douglas, M. and Nicod, M. (1974), 'Taking the biscuit: The structure of British meals', *New Society*, 30, pp. 744–47.
Elder, R. S. and Krishna, A. (2012), 'The "visual depiction effect" in advertising: Facilitating embodied mental simulation through product orientation', *Journal of Consumer Research*, 38:6, pp. 988–1003.
Fox, R. (2003), 'Food and eating: An anthropological perspective', *Social Issues Research Centre*, pp. 1–21, http://www.sirc.org/publik/foxfood.pdf. Accessed 21 September 2021.
Gallagher, S. (2020), 'The right way to eat a Cadbury's Creme Egg, according to the people who make them', *Huffington Post*, 4 November, https://www.huffingtonpost.co.uk/entry/how-to-eat-creme-egg-cadbury_uk_5abb99e8e4b06409775bf4f9. Accessed 21 September 2021.
Gayle, L. (2020), 'Greggs sparks a huge debate on the right way to eat a sausage roll by sharing a snap with a bite taken out of the middle – but critics brand the idea "savage"', *Daily Mail Online*, 7 February, https://www.dailymail.co.uk/femail/food/article-7977949/Greggs-blasted-photo-sausage-roll-eaten-MIDDLE.html. Accessed 21 September 2021.
Gayle, L. (2021), 'Man sparks heated debate after asking whether vinegar or salt should be put on chips first – so, what do you think is the correct way?', *Daily Mail Online*, 7 March, https://www.dailymail.co.uk/femail/article-9335413/Man-sparks-heated-debate-asking-vinegar-salt-chips-first.html. Accessed 21 September 2021.
Ge, L. (2012), 'Why coffee can be bittersweet', *FT Weekend Magazine*, 13/14 October, p. 50.
Gibson, J. J. (1977), 'The theory of affordances', in R. Shaw and J. Bransford (eds), *Perceiving, Acting, and Knowing*, Hillsdale, NJ: Erlbaum, pp. 67–82.
Gould, J. (2021), 'We've been eating chocolate digestives wrong this whole time: McVitie's has made us rethink everything…', *Delish*, 8 July, https://www.delish.com/uk/food-news/a36965090/chocolate-digestive-how-to-eat/. Accessed 21 September 2021.
Gray, S. (2020), 'The history behind seven passover traditions', *Time*, 2 March, https://time.com/5188494/passover-history-traditions/. Accessed 21 September 2021.
Greep, M. (2021), 'How the Queen takes her tea: Etiquette expert reveals Her Majesty always pours the hot water and invites guests to add their own milk or sugar', *Daily Mail Online*, 7 April, https://www.dailymail.co.uk/femail/article-9444805/William-Hanson-reveals-correct-etiquette-making-cup-tea.html. Accessed 21 September 2021.
Guinard, J.-X., Zoumas-Morse, C., Walchak C. and Simpson, H. (1997), 'Relation between saliva flow and flavor release from chewing gum', *Physiology and Behavior*, 61:4, pp. 591–96.
Harrar, V., Toepel, U., Murray, M. and Spence, C. (2011), 'Food's visually-perceived fat content affects discrimination speed in an orthogonal spatial task', *Experimental Brain Research*, 214:3, pp. 351–56.
Haslett, S. (2017), 'Start with white fish, eat ginger between each piece and don't drink red wine: Top chef reveals the rules to eating sushi which you never knew', *Daily Mail Online*, 24 May, http://www.dailymail.co.uk/femail/article4536500/Rules-eating-sushi-NEVER-knew-existed.html. Accessed 21 September 2021.

Hobson, N. M., Schroeder, J., Risen, J. L., Xygalatas, D. and Inzlicht, M. (2018), 'The psychology of rituals: An integrative review and process-based framework', *Personality and Social Psychology Review*, 22:3, pp. 260–84.

Houck, B. (2016), 'The food surgeon dissecting Oreos and Reese's Cups is strangely relaxing', *Eater*, 2 February, https://www.eater.com/2016/2/2/10894048/food-surgeon-oreo-reeses-peanut-butter-cup-video. Accessed 21 September 2021.

Hsu, C. (2012), 'South Korean ritual of eating dog meat to combat heat attacked by activists', *Medical Daily*, 7 April, https://www.medicaldaily.com/south-korean-ritual-eating-dog-meat-combat-heat-attacked-activists-241805. Accessed 21 September 2021.

Hutchings, S. C., Low, J. Y. Q. and Keast, R. S. J. (2019), 'Sugar reduction without compromising sensory perception. An impossible dream?', *Critical Reviews in Food Science and Nutrition*, 59:14, pp. 2287–307, https://doi.org/10.1080/10408398.2018.1450214. Accessed 29 September 2021.

Hutmacher, F. (2019), 'Why is there so much more research on vision than on any other sensory modality?', *Frontiers in Psychology*, 10:2246, https://doi.org/10.3389/fpsyg.2019.02246. Accessed 29 September 2021.

Hyde, R. J. and Witherly, S. A. (1993), 'Dynamic contrast: A sensory contribution to palatability', *Appetite*, 21:1, pp. 1–16.

Koellmann, B. (2013), 'How Kraft Foods made Oreo a global brand', *Business Today*, 31 March, https://www.businesstoday.in/magazine/lbs-case-study/how-kraft-foods-won-over-customers-in-china-and-india/story/193162.html. Accessed 21 September 2021.

Kottak, C. (1978), 'Rituals at McDonalds', *Natural History*, 87, pp. 74–83.

Kranowitz, C. S. (1998), *The Out-of-Sync Child: Recognizing and Coping with Sensory Integration Dysfunction*, New York: Penguin Putnam.

Kristeller, J. L. and Wolever, R. W. (2010), 'Mindfulness-based eating awareness training for treating binge eating disorder: The conceptual foundation', *Eating Disorders*, 19:1, pp. 49–61.

Le Berre, E., Boucon, C., Knoop, M. and Dijksterhuis, G. (2013), 'Reducing bitter taste through perceptual constancy created by an expectation', *Food Quality and Preference*, 28:1, pp. 370–74.

Lee, J. (2015), 'How to make the perfect burger: Oxford food scientist claims to have answer: Oxford University chef says perfect burger is 7cm tall, should be eaten to music, given a name and should feel as good as it tastes', *The Telegraph*, 16 August, http://www.telegraph.co.uk/news/science/science-news/11823677/How-to-make-the-perfect-burger-Oxford-food-scientist-claims-to-have-answer.html. Accessed 21 September 2021.

Lenfant, F., Hartmann, C., Watzke, B., Breton, O., Loret, C. and Martin, N. (2013), 'Impact of the shape on sensory properties of individual dark chocolate pieces', *LWT – Food Science and Technology*, 51:2, pp. 545–52.

Lin, H.-M., Lo, H.-Y. and Liao, Y.-S. (2013), 'More than just a utensil: The influence of drinking straw size on perceived consumption', *Marketing Letters*, 24:4, pp. 381–86.

Lindstrom, M. (2008), *Buy-ology: How Everything We Believe about Why We Buy Is Wrong*, London: Random House Business Books.

Luckett, C. R. and Seo, H.-S. (2017), 'The effects of both chewing rate and chewing duration on temporal flavor perception', *Chemosensory Perception*, 10:1&2, pp. 13–22, https://doi.org/10.1007/s12078-017-9224-8. Accessed 29 September 2021.

Marshall, D. (2005), 'Food as ritual, routine or convention?', *Consumption, Markets and Culture*, 8:1, pp. 65–85.
Medler, K. (2018), 'Taste: It's not as simple as we think', *Baking Europe*, Spring, pp. 27–28.
Meier, B. P. and Robinson, M. D. (2004), 'Why the sunny side is up: Association between affect and vertical position', *Psychological Science*, 15:4, pp. 243–47.
Meyer, G. J. and Archer, R. P. (2001), 'The hard science of Rorschach research: What do we know and where do we go?', *Psychological Assessment*, 13:4, pp. 486–502.
Mikkelson, D. (2010), 'Corona lime wedge: Why we add a lime wedge to Corona beer', https://www.snopes.com/fact-check/lime-aid/. Accessed 21 September 2021.
Morgan, M. (2015), 'A 7 cm wide patty, crunchy lettuce and a warm bun… eaten with your hands: Chef reveals formula for the perfect burger (and how it sounds is as important as the taste)', *Daily Mail Online*, 25 August, http://www.dailymail.co.uk/femail/food/article-3210117/Chef-reveals-formula-perfect-burger-SOUNDS-just-important-taste.html. Accessed 21 September 2021.
Mosca, A. C., van de Velde, F., Bult, J. H. F., van Boekel, M. A. J. S. and Stieger, M. (2012), 'Effect of gel texture and sucrose spatial distribution on sweetness perception', *LWT – Food Science and Technology*, 46:1, pp. 183–88, https://doi.org/10.1016/j.lwt.2011.10.009. Accessed 29 September 2021.
Motoki, K., Saito, T., Suzuki, S. and Sugiura, M. (2021), 'Evaluation of energy density and macronutrients after extremely brief time exposure', *Appetite*, 162, article 105143, https://doi.org/10.1016/j.appet.2021.105143. Accessed 29 September 2021.
Murer, M., Aslan, I. and Tscheligi, M. (2013), 'Lollio – Exploring taste as playful modality', *TEI 2013*, Barcelona, Spain, 10–13 February.
Ni, R., Michalski, M. H., Brown, E., Doan, N., Zinter, J., Ouellette, N. T. and Shepherd, G. M. (2015), 'Optimal directional volatile transport in retronasal olfaction', *Proceedings of the National Academy of Sciences of the USA*, 112, pp. 14700–04.
Nikolic, I. (2021), 'S-cream of outrage! Furious Cornish shoppers threaten to boycott their local Sainsbury's after supermarket displays cream tea picture of a scone with the cream on first and jam on top', *Daily Mail Online*, 26 April, https://www.dailymail.co.uk/news/article-9512167/Furious-Cornish-shoppers-threaten-boycott-local-Sainsburys-cream-tea-row.html. Accessed 21 September 2021.
Noort, M. W. J., Bult, J. H. F. and Stieger, M. (2012), 'Saltiness enhancement by taste contrast in bread prepared with encapsulated salt', *Journal of Cereal Science*, 55:2, pp. 218–25.
Noort, M. W. J., Bult, J. H. F., Stieger, M. and Hamer, R. J. (2010), 'Saltiness enhancement in bread by inhomogeneous spatial distribution of sodium chloride', *Journal of Cereal Science*, 52:3, pp. 378–86.
Pearson-Jones, B. (2020a), 'Nobu's first female head chef reveals you should dip nigiri in soy sauce and eat it upside down with your hands rather than chopsticks and never add wasabi', *Daily Mail Online*, 10 October, https://www.dailymail.co.uk/femail/food/article-8507877/Nobus-female-head-chef-reveals-sushi-faux-pas-youve-making.html. Accessed 21 September 2021.
Pearson-Jones, B. (2020b), 'You've been eating Jaffa Cakes all wrong! McVitie's reveal the chocolate is on the bottom – but fans aren't convinced', *Daily Mail Online*, 31 October, https://www.dailymail.co.uk/femail/food/

article-8899861/McVities-reveal-chocolate-BOTTOM-Jaffa-Cake.html. Accessed 21 September 2021.

Petric, D. (2020), 'The symbolism of Christ's body and blood', unpublished manuscript, https://doi.org/10.13140/RG.2.2.33803.44326. Accessed 29 September 2021.

Pinkstone, J. (2021), 'Is this the secret to the perfect cuppa? British scientist claims adding milk before boiling water gives your tea "superior flavour"', *Daily Mail Online*, 6 April, https://www.dailymail.co.uk/sciencetech/article-9440599/British-scientist-claims-adding-milk-boiling-water-gives-tea-superior-flavour.html. Accessed 21 September 2021.

Potter, C., Gibson, E. L., Ferriday, D., Griggs, R. L., Coxon, C., Crossman, M., Norbury, R., Rogers, P. J. and Brunstrom J. M. (2020), 'Associations between number of siblings, birth order, eating rate and adiposity in children and adults', *Clinical Obesity*, 11, n.pag., https://doi.org/10.1111/cob.12438. Accessed 29 September 2021.

Pramudya, R. C., Singh, A. and Seo, H.-S. (2021), 'A sip of joy: Straw materials can influence emotional responses to, and sensory attributes of cold tea', *Food Quality and Preference*, 88, n.pag.

Quintao, R. T., Brito, E. P. Z. and Belk, R. W. (2017), 'The taste transformation ritual in the specialty coffee market', *Revista de Administração de Empresas*, 57:5, pp. 483–494.

Randall, I. (2021), 'How picking all the chocolate off your Jaffa Cakes before eating the rest can help ease pandemic isolation: Adopting unique rituals to make everyday tasks more meaningful can make you feel less lonely', *Daily Mail Online*, 5 March, https://www.dailymail.co.uk/sciencetech/article-9329475/Pandemic-Adopting-unique-rituals-make-everyday-tasks-meaningful-make-LONELY.html. Accessed 21 September 2021.

Ratcliffe, E., Baxter, W. L. and Martin, N. (2019), 'Consumption rituals relating to food and drink: A review and research agenda', *Appetite*, 134, pp. 86–93.

Raudenbush, B. and Meyer, B. (2001), 'Effect of nasal dilation on pleasantness, intensity and sampling behaviors of foods in the oral cavity', *Rhinology*, 39:2, pp. 80–83.

Rossano, M. J. (2012), 'The essential role of ritual in the transmission and reinforcement of social norms', *Psychological Bulletin*, 138:3, pp. 529–49.

Rowley, J. and Spence, C. (2018), 'Does the visual composition of a dish influence the perception of portion size and hedonic preference?', *Appetite*, 128, pp. 79–86.

Sandercock, J. (2019), *Edible Games Cookbook: Play with Your Food*, San Francisco, CA: Inquisiment.

Schifferstein, H. N. J. (2016), 'What design can bring to the food industry', *International Journal of Food Design*, 1:2, pp. 103–34.

Schivelbusch, W. (1993), *Tastes of Paradise: A Social History of Spices, Stimulants, and Intoxicants*, New York: Vintage Books.

Sinnerton, J. (2015), 'Burger battle: Boffins can kiss my buns', *Brisbane Courier-Mail*, 5 August, http://www.couriermail.com.au/news/queensland/is-this-queenslands-best-burger-ohio-cafe-owner-yogesh-koshe-reckons-his-recipe-cant-be-beat/story-fnihsrf2-1227514375022. Accessed 21 September 2021.

Spence, C. (2011a), 'Crystal clear or gobbletigook?', *The World of Fine Wine*, 33, pp. 96–101.

Spence, C. (2011b), 'Mouth-watering: The influence of environmental and cognitive factors on salivation and gustatory/flavour perception', *Journal of Texture Studies*, 42:2, pp. 157–71.
Spence, C. (2015a), 'Eating with our ears: Assessing the importance of the sounds of consumption to our perception and enjoyment of multisensory flavour experiences', *Flavour*, 4:3, https://doi.org/10.1186/2044-7248-4-3. Accessed 29 September 2021.
Spence, C. (2015b), 'Visual contributions to taste and flavour perception', in M. J. Scotter (ed.), *Colour Additives for Foods and Beverages*, Cambridge: Woodhead Publishing, pp. 189–210.
Spence, C. (2017), *Gastrophysics: The New Science of Eating*, London: Viking Penguin.
Spence, C. (forthcoming), 'The tongue map and the spatial modulation of taste perception', *Food Quality and Preference*.
Spence, C., Okajima, K., Cheok, A. D., Petit, O. and Michel, C. (2016), 'Eating with our eyes: From visual hunger to digital satiation', *Brain and Cognition*, 110, pp. 53–63.
Spence, C. and Piqueras-Fiszman, B. (2012), 'Dining in the dark: Why, exactly, is the experience so popular?', *The Psychologist*, 25, pp. 888–91.
Spence, C. and Piqueras-Fiszman, B. (2014), *The Perfect Meal: The Multisensory Science of Food and Dining*, Oxford: Wiley-Blackwell.
Spence, C. and Piqueras-Fiszman, B. (2016), 'Oral-somatosensory contributions to flavor perception and the appreciation of food and drink', in B. Piqueras-Fiszman and C. Spence (eds), *Multisensory Flavor Perception: From Fundamental Neuroscience through to the Marketplace*, Duxford: Elsevier, pp. 59–79.
Spence, C., Smith, B. and Auvray, M. (2015), 'Confusing tastes and flavours', in D. Stokes, M. Matthen and S. Biggs (eds), *Perception and Its Modalities*, Oxford: Oxford University Press, pp. 247–74.
Spence, C., Wang, Q. J. and Youssef, J. (2017), 'Pairing flavours and the temporal order of tasting', *Flavour*, 6:4, n.pag., https://doi.org/10.1186/s13411-017-0053-0. Accessed 29 September 2021.
Stummerer, S. and Hablesreiter, M. (eds) (2019), 'Play with your food', in *Food: Bigger Than the Plate*, London: Victoria and Albert Publishing, pp. 138–45.
Sunaga, T., Park, J. and Spence, C. (2016), 'Effects of lightness-location consumers' purchase decision-making', *Psychology and Marketing*, 33:11, pp. 934–50.
Taylor, A. J. and Roozen, J. P. (1996), 'Volatile flavor release from foods during eating', *Critical Reviews in Food Science and Nutrition*, 36:8, pp. 765–84, https://doi.org/10.1080/10408399609527749. Accessed 29 September 2021.
Teghtsoonian, R., Teghtsoonian, M., Berglund, B. and Berglund, U. (1978), 'Invariance of odor strength with sniff vigor: An olfactory analogue to size constancy', *Journal of Experimental Psychology: Human Perception and Performance*, 4:1, pp. 144–52.
Toepel, U., Knebel, J., Hudry, J., Lecoutre, J. and Murray, M. (2009), 'The brain tracks the energetic value in food images', *Neuroimage*, 44:3, pp. 967–74.
Trivedi, B. (2012), 'Hardwired for taste: Research into human taste receptors extends beyond the tongue to some unexpected places', *Nature*, 486:7403, p. S7.
Velasco, C., Adams, C., Petit, O. and Spence, C. (2019), 'On the localization of tastes and tasty products in 2D space', *Food Quality and Preference*,

71, pp. 438–46, https://doi.org/10.1016/j.foodqual.2018.08.018. Accessed 29 September 2021.

Visser, M. (1991), *The Rituals of Dinner: The Origins, Evolution, Eccentricities, and Meaning of Table Manners*, London: Penguin Books.

Vohs, K. D., Wang, Y., Gino, F. and Norton, M. I. (2013), 'Rituals enhance consumption', *Psychological Science*, 24:9, pp. 1714–21.

Wallendorf, M. and Arnould, E. J. (1991), '"We gather together": Consumption rituals of Thanksgiving day', *Journal of Consumer Research*, 18:1, pp. 13–31.

Wang, G.-J., Volkow, N. D., Telang, F., Jayne, M., Ma, J., Rao, M., Zhu, W., Wong, C. T., Pappas, N. R., Geliebter, A. and Fowler, J. S. (2004), 'Exposure to appetitive food stimuli markedly activates the human brain', *NeuroImage*, 21:4, pp. 1790–97.

Wang, X., Sun, Y. and Kramer, T. (2021), 'Ritualistic consumption decreases loneliness by increasing meaning', *Journal of Marketing Research*, 58:2, pp. 282–98, https://doi.org/10.1177/0022243721993426. Accessed 29 September 2021.

Weiss, G. (2001), 'Why is a soggy potato chip unappetizing?', *Science*, 293, pp. 1753–54.

Wilson, B. (2019), 'Let's bring back the proper snack: Eating between meals doesn't have to be a vice, as long as we give our snacks the attention they deserve', *Wall Street Journal*, 5 September, https://www.wsj.com/articles/lets-bring-back-the-proper-snack-11567699282. Accessed 21 September 2021.

Wilson, C. A. (1991), 'Ritual, form and colour in mediaeval food tradition', in C. A. Wilson (ed.), *The Appetite and the Eye: Visual Aspects of Food and its Presentation within their Historic Context (Second Leeds Symposium on Food History and Traditions)*, Leeds, UK, April 1987, Edinburgh: Edinburgh University Press, pp. 5–27.

Wilson, M. (2007), 'A Corona, please, and don't hold the lime', *New York Times*, 6 November, B1, https://www.nytimes.com/2007/11/06/nyregion/06tongs.html. Accessed 21 September 2021.

Woods, A. T., Michel, C. and Spence, C. (2016), 'Odd versus even: A scientific study of the "rules" of plating', *PeerJ*, 4, https://doi.org/10.7717/peerj.1526.

Woods, A. T., Poliakoff, E., Lloyd, D. M., Dijksterhuis, G. B. and Thomas, A. (2010), 'Flavor expectation: The effects of assuming homogeneity on drink perception', *Chemosensory Perception*, 3:3&4, pp. 174–81.

Youssef, J., Youssef, L., Juravle, G. and Spence, C. (2017), 'Plateware and slurping influence regular consumers' sensory discriminative and hedonic responses to a hot soup', *International Journal of Gastronomy and Food Science*, 9, pp. 100–04, https://doi.org/10.1016/j.ijgfs.2017.06.005. Accessed 29 September 2021.

Zampini, M. and Spence, C. (2004), 'The role of auditory cues in modulating the perceived crispness and staleness of potato chips', *Journal of Sensory Science*, 19:5, pp. 347–63, https://doi.org/10.1111/j.1745-459x.2004.080403.x. Accessed 29 September 2021.

Zampollo, F. (2016), 'Welcome to food design', *International Journal of Food Design*, 1:1, pp. 3–9.

Zampollo, F. and Peacock, M. (2016), 'Food design thinking: A branch of design thinking specific to food design', *Journal of Creative Behavior*, 50:3, pp. 203–10.

SUGGESTED CITATION

Spence, Charles (2021), 'Analysing stereotypical food consumption behaviours: "This way up?" Is there really a "right" way to eat a biscuit?', *International Journal of Food Design*, 6:2, pp. 213–31, https://doi.org/10.1386/ijfd_00031_1

CONTRIBUTOR DETAILS

Charles Spence is a prize-wining experimental psychologist who researches the factors that influence what we choose to eat and what we think about the experience with the likes of world-leading chefs. His focus is on applying the latest insights concerning the multisensory nature of perception to everyday life. He is the author of the 2014 Prose Prize-winning *The Perfect Meal* with Betina Piqueras-Fiszman (2014, Wiley-Blackwell); the international bestseller *Gastrophysics: The New Science of Eating* (2017, Penguin Viking) – winner of the 2019 Le Grand Prix de la Culture Gastronomique from Académie Internationale de la Gastronomie; and *Multisensory Packaging Design* (2019, Palgrave Macmillan). His much-anticipated book *Sensehacking* was published in January 2021 by Penguin Viking. He is a regular on TV and radio and has been profiled by the *New Yorker* (http://www.newyorker.com/magazine/2015/11/02/accounting-for-taste); see also Charles Spence, *Sensploration* (https://vimeo.com/170509976).

Contact: Department of Experimental Psychology, Anna Watts Building, University of Oxford, Oxford, OX2 6BW, UK.
E-mail: charles.spence@psy.ox.ac.uk

https://orcid.org/0000-0003-2111-072X