Background colour & its impact

on food perception & behaviour

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ABSTRACT

Colour affects many aspects of our lives. One area of particular interest in recent years has been the role of colour cues in the perception of food and drink. While the majority of this research has tended to focus on the impact of changing the colour of the product itself, there is now a growing body of scientifically-credible research (building on earlier anecdotal claims) that the colour of the background against which food and drink is served affects both people's perception of it, and also their serving and consumption behaviour as well. In this review, the empirical evidence on this topic is summarized and the various mechanisms that have been put forward to account for such results outlined. Gaining a better understanding of when, and why, background colour impacts our food preferences, perception, and ultimately our behaviour, is likely to be important to chefs, food bloggers, restaurateurs, packaging designers, and those working on encouraging various special needs populations to consume more (or less).

KEYWORDS: COLOUR; TASTE; FLAVOUR; PLATEWARE; CONTRAST; SENSATION TRANSFERENCE; EXPECTATIONS.

Introduction

Colour affects our perception of food and drink in various ways. The most obvious of which relates to the colour of the product itself. Simply change the colour (e.g., hue and/or saturation) of a variety of different items and, very often, it will change the perceived taste/flavour too (see Spence, 2015; Spence, Levitan, Shankar, & Zampini, 2010, for reviews). Changing the colour of the ambient lighting can even influence people's perception of a drink when it is presented in a black tasting glass (thus ensuring that the ambient colour doesn't affect the perceived colour of the food itself; e.g., see Oberfeld, Hecht, Allendorf, & Wickelmaier, 2009; Spence, Velasco, & Knoferle, 2014).[1] Changes in the colour (not to mention brightness) of the ambient lighting have even been shown to affect how much people consume (e.g., see Cho, Han, Taylor, Huck, Mishler, Mattal, Barker, & Seo, 2015; Gal, Wheeler, & Shiv, 2007).

Packaging colour is important too, of course, for those products that are consumed direct from the packaging. However, after reviewing this literature, this review will shift to look at the growing body of empirical research showing that the background colour of the plates, bowls, mugs, cups, pots, and cutlery against which food and drink are often seen both prior to, and during, consumption also modulate various aspects of our food perception and behaviour. Such effects have been demonstrated in a variety of different situations and with a wide variety of different products (both those that are familiar and those that are not). I highlight the seemingly contradictory claims that have sometimes been made over the decades, e.g., with some claiming that eating from a blue tray reduces consumption, whereas others have suggested that eating from a blue plate leads to increased consumption (at least in those who may find it difficult to see the food in the first place).

The various perceptual/psychological accounts that have been put forward over the years in order to explain such behavioural effects are also reviewed briefly. To start with, though, I summarize the literature on packaging colour. At the outset here, it is important to note that the psychological/perceptual mechanisms underlying colour's influence in the case of flatware vs. product packaging may well be, at least to some extent, qualitatively different. In particular, packaging colour normally conveys some meaning about the contents in a way that the colour of flatware etc. simply does not – these areas will be addressed separately in the sections that follow.

In terms of the experimental designs that have been used to date, while some researchers have focused simply on assessing taste and flavour expectations on viewing a particular image, or object (product package or plate of food, say) – based on the view that our taste/flavour/hedonic expectations very often anchor our actual experiences on tasting (see Piqueras-Fiszman & Spence, 2015, for a review) – others have assessed actual ratings on tasting the food or drink product itself. As will be seen below, in terms of the context in which such studies have been conducted, this ranges from well-controlled (but possibly

[1] As one commentator noted almost half a century ago: *"A red light makes everything look red; a green light makes meat look grey and spoiled.*" (Lampi, 1973, p. 59).

limited ecological validity) laboratory studies, through online tests of consumers' expectations, experiments conducted at science fairs, all the way to a small but growing number of in-restaurant studies. The latter, while perhaps scoring higher in terms of ecological validity, inevitably lack some of the experimental control that one can more easily achieve in the laboratory setting. Understanding the effects of background colour, not to mention the mechanism(s) that may underlie such effects, is a topic of growing importance for everyone from packaging designers, through to chefs, restaurateurs, and food bloggers. And, as we will see later, these findings may well turn out to be especially important for those providing sustenance for the growing number of elderly people being fed in the setting of the hospital/care home, and whose vision may well be impaired (see Spence, 2017b, for a review).

Background colour's effect on taste and flavour perception

There have been reports of the influence/effect of background colour floating around in the literature for decades. In recent years, though, these anecdotal claims have increasingly been backed-up by more robust empirical research. In the sections that follow, I take a chronological look through the evidence concerning the impact of background colour, starting with the earliest reports emerging from research on the impact of changing the colour of the packaging. I will start with those products that are very often consumed direct from the packaging.

Packaging colour

Louis Cheskin was one of the first to suggest that changing the colour of product packaging influenced what people had to say about the taste/flavour of the contents (e.g., see Cheskin, 1957). In particular, the émigré marketer (Samuel, 2010) noted that when 15% more yellow colour was added to the outside of cans of 7-Up, the consumers who had been brought into the office to take part in a taste test reported that the flavour of the contents were more lemony. Much more recently, a similar situation occurred when Coke launched a white Christmas Coke can. Once again, this marketing intervention appears to have changed what many consumers had to say about the taste of the ubiquitous drink (Esterl, 2011; see also Abad-Santos, 2011). In fact, so vociferous were the complaints from consumers about the perceived change in taste, that the company soon withdrew the white cans from the shelves.[2] Of course, it is worth noting here that when drinking direct from the can, the only visual cue that consumers have to go on is, in fact, the colour of the packaging (i.e., they may well not even see the colour of the drink itself). Hence, packaging colour might, if anything, be expected to have a more pronounced influence under such conditions than in many other cases, where the consumer can see both the colour of the product and the packaging.

[2] The spare stock of white cans was apparently then distributed to the airlines (see Spence, 2017a).

In terms of more rigorous scientific research on the topic of packaging colour, Deliza and MacFie (2001) summarized an unpublished study by Deliza (1996) in which the appearance of the packaging of a carton of passion fruit juice was manipulated. The results apparently revealed that people (94 British participants) expected the juice in the orange background-coloured packaging to taste sweeter than the juice served in the packaging with a white background instead. The participants were also asked about their expectations concerning how pure, sharp, refreshing, fresh, natural, the drink would be, and their expected liking. The white packaging scored significantly higher on all these other measures. Deliza also conducted a second study with 96 participants in which their expectations in response to viewing packaging were assessed, followed by labelled and blind product tasting. A complex pattern of results was obtained. (The participants were clustering into three different groups.) That said, one conclusion that emerged was that the expectations elicited by the background packaging colour did indeed influence people's taste ratings, in line with the other results reported in this section.[3]

Subsequently, Ares and Deliza (2010) reported an experiment in which they studied the combined influence of packaging shape and colour on consumer expectations concerning milk desserts using the word association and conjoint analysis techniques. 105 Uruguayan participants viewed 6 containers, varying in terms of their shape (rounded vs. more angular) and colour (black, white, and yellow). Expected liking and willingness to pay were both influenced by the colour of the pack. Yellow was the colour that came out top on both measures, being associated with sweet-tasting, delicious, vanilla and *dulce de leche* type desserts. By contrast, the desserts presented in white packaging were liked less and were associated with plain, sour, tasteless, and fruity milk desserts instead. Finally, black packaging was associated (in the minds of the Uruguayan participants) with bitter, dark-coloured, chocolate desserts. Some associated the latter packaging with a 'disgusting taste', while another segment of those who were quizzed thought that it looked 'premium' instead. It is worth bearing in mind here that the participants in this study only saw the colour of the packaging (that is, they did not see the product itself). Nevertheless, the results clearly suggest that the colour of the packaging led to robust predictions/expectations concerning the taste/flavour of the (unseen) contents.

Elsewhere, Piqueras-Fiszman and Spence (2011) gave the UK-based participants in one of their laboratory-based studies crisps (potato chips) to try, direct from the packaging. The participants were presented with a series of already-opened 'salt and vinegar' and 'cheese and onion' coloured crisps packets (commercial packaging was used). The participants had to try and identify the flavour of the contents. In total, they evaluated four packets, two of which were congruently colour-coded, while the contents of the other two packets had been switched surreptitiously. Piqueras-Fiszman and Spence reported that their participants sometimes found it hard to identify the correct flavour of the crisps when presented in the incongruently-coloured packaging. By contrast, no such problems were observed in those trials in which the participants sampled from the congruently-coloured packaging instead.

[3] The importance of packaging colour is brought home by Singh's (2006) suggestion that colour drives 62–90% of consumer purchasing decisions.

In another study, 40 North American students evaluated the apparent healthiness and sweetness of four different food packages (consisting of breakfast cereal, ice-cream, iced tea, and yoghurt) presented in three colours (blue, green, or red; Huang & Lu, 2015). Each participant made a total of 24 ratings in this within-participants laboratory-based study. The results revealed that the participants reported expecting the product contained within the red packaging to be sweeter. The red-packaged products were also rated as less healthy. Of particular interest, these colour-induced expectations were particularly pronounced amongst those participants classed as 'high-external eaters' (see Brignell, Griffiths, Bradley, & Mogg, 2009; Rodin & Slochower, 1976; van Strien, Frijters, Bergers, & Defares, 1986). However, one limitation with this study is that it was based solely on taste expectations (see also Huang & Lu, 2013). While the results of such studies are undoubtedly useful, it is always important to remember that expectations may have more of an influence on product perception when the experience of the product itself (i.e., the taste in this case) turns out to be reasonably close to the expectations (see Piqueras-Fiszman & Spence, 2015; cf. Wang, Keller, & Spence, 2017). In other words, in-and-of-themselves, product expectations are only one, albeit important, factor contributing to the total product experience.

Finally, in this section, Barnett and Spence (2016) documented a significant change in people's rating of the citrus/fruity note in a craft beer as a function of the changing colour of the label. In this particular between-participants study, 142 members of the general public who visited the Edinburgh Science Festival (in Scotland) were given a small glass of beer to taste and rate. For one group of participants, the beer was poured from a plain (i.e., unlabelled) brown glass bottle. In the other two conditions, it was poured from a brown glass bottle with either a brown or greenish-yellow label (the latter designed to accentuate the citrus notes in the beer). The participants were invited to inspect the bottle before tasting. They then had to rate their experience of several of the attributes, including the beer's taste, quality, and citrus flavour, as well as estimate their purchase intent, and willingness-to-pay. Interestingly, the results revealed a significant change as a function of the colour of the label. In particular, the citrus/fruity notes were rated roughly 10% higher when tasting the beer that had been poured from the bottle with the yellowy-green label than for those participants who evaluated the beer from either the unlabelled or brown labelled bottles instead. The participants shown the yellowy-green label also scored the beer highest in terms of taste, quality, and their purchase intent. (There was no significant difference in terms of what people would have been willing to pay for the beer as a function of the label though.)

Barnett and Spence (2016) used commercially tenable label designs in their study. As such, the wording on the label, and not only the colour palate used, changed. Hence, given the evidence showing that written descriptions also influence taste and flavour perception (Anonymous, 1962; see Spence & Piqueras-Fiszman, 2014, for a review), the latter study cannot stand alone as a pure assessment of the impact of label colour on flavour perception. Nevertheless, these results undoubtedly do fit in with those reported more than half a century

earlier by Louis Cheskin (1957; see also Esterl, 2011; Favre & November, 1979; Lick, König, Kpossa, & Buller, 2017).[4]

Packaging colour: Interim conclusions

Summarizing what we have seen thus far, the limited available evidence, spanning over half a century of research, clearly suggests that changes in packaging colour can indeed give rise to reports of a change in the taste of the product contained within, even for familiar brands such as Coca-Cola and 7-Up. The basic idea here is that packaging colour automatically sets expectations in the mind of the consumer about the likely taste/flavour properties of the contents (see Huang & Lu, 2015; and see Piqueras-Fiszman & Spence, 2015, for a review).[5] Such expectations may be driven both by the hue and by the lightness of the packaging colour (see Tijssen, Zandstra, de Graaf, & Jager, 2017). These colour-based expectations then anchor, and possibly also influence, the subsequent tasting experience depending on, amongst other things, how far the actual experience is from the expectation (see Ares & Deliza, 2010; Deliza & MacFie, 2001; cf. Wang et al., 2017).

At this point, it is important to highlight the fact that the influence of packaging colour may be different in kind from the impact of the colour of the flatware. This is because the former is normally taken by the consumer to convey some meaning/information. That is, packaging colour often has specific brand connotations (think of the distinctive Coke red), or is used to signal the flavour, or else some other attribute: Think of how salt and vinegar / cheese and onion crisps are signalled by brand-specific colour schemes; Piqueras-Fiszman, Velasco, & Spence, 2012; Velasco, Wan, Salgado-Montejo, Woods, Andrés Oñate, Mu, & Spence, 2014). The fat content of milk is also signalled by a meaningful, if seemingly arbitrary, colour code that varies by country. In fact, packaging colour is used by the majority of food and beverage brands in order to indicate the type/flavour of product that can be found within (e.g., Danger, 1987; Gimba, 1998). Indeed, according to an informal store audit conducted some years ago by Garber, Hyatt, & Starr, 2001), more than 90% of brands on the supermarket shelf used packaging colour to convey relevant information about the contents. What is clear, then, is that in everything from carbonated beverages through to over-the-counter pharmaceuticals (Roullet & Droulers, 2005; Wan, Woods, Velasco, Salgado-Montejo, & Spence, 2015), the colour of the packaging sets expectations about the properties of the contents. As such, it can sometimes be hard to disentangle how much of the effect of colour in the case of product packaging should be attributed to such semiotic / semantic / symbolic associations (Ares & Deliza, 2010), and how much reflects the more intrinsic / direct impact of colour on perception / behaviour.

[4] Note here also the 7-Up and Coke examples are also confounded with the impact of branding, since the iconic colour scheme that is associated with the brand changed.

[5] Note that packaging colour also influences people's expectations of drug efficacy (e.g., see Roullet & Droulers, 2005), although a full discussion of this topic falls beyond the scope of the present review.

In terms of directions for future research in this area, one question to which we do not yet have a clear answer to is whether packaging colour has a more pronounced impact on product perception when the product itself is consumed direct from the packaging versus when it is removed from the packaging prior to consumption. Note here that according to estimates, roughly a third of the food and drink we consume is, in fact, consumed direct from the packaging. It is also unclear, based on the evidence collected to date, whether packaging colour has a more pronounced effect when the consumer doesn't get to see the colour of the product itself (as when drinking from a can, say).[6] Again, it would be good to know the answer to this question.

Having reviewed at the literature on background colour in the case of product packaging, I now want to switch to looking at the impact of background colour in the case of drinking vessels such as cups and mugs.

Cups & mugs

In what is perhaps the first published study of the importance of colour in glassware, Guéguen (2003) reported that people (40 French students tested in a laboratory setting) were more likely to pick the opaque blue glass (than an opaque green, red, or yellow glass) as containing the most thirst-quenching unnamed new soda drink (see **Table 1** for a summary of the results). Meanwhile, Ross, Bohlscheid, and Weller (2008) reported that the colour of the wine glass influenced rating of two red wines (a Syrah and a Pinot Noir) by a group of 10 trained panelists and 80 consumers. Those tested in this study had to evaluate the wines on a series of 7 sensory/descriptive attribute scales, as well as rate their liking. The wines were tasted in blue wine glasses under white light, in clear glasses under red illumination, and in a clear glass under white lighting. (Note that these researchers were primarily interested in masking rather than the effect of glass colour *per se*.) Nevertheless, Ross et al. found that the trained panellists evaluated the wines served in a blue glass as having a more astringent taste, while the consumer panellists liked the wines more when sampling them from the blue glasses instead.

INSERT TABLE 1 ABOUT HERE

Schifferstein (2009; Experiment 2) had his Dutch participants evaluate the experience of various drinking receptacles, either empty, or when part-filled with warm tea or a chilled soft drink (7-Up; there were 20 participants in each condition). All had a pinkish hue except for one receptacle which was transparent. While the material of the receptacles also varied, the key point to note for present purposes is that the participants' ratings of the sweetness that they associated with the transparent receptacle was significantly lower than for any of the pinkish cups (when empty). Importantly, however, once the receptacles had been filled, no

[6] While beyond the scope of this review, the colour of product packaging against which a product image is seen, or through which the product itself is seen (e.g., in the case of the increasingly popular transparent windows in product packaging), is also important in terms of optimizing product perception (see Simmonds & Spence, 2017; Simmonds, Woods, & Spence, 2018; Spence, 2016, for reviews).

obvious colour-based differences in sweetness, or any other attribute, remained. Results such as these might be taken to suggest that the participants may have transferred the experience of the pinkness of the cups (or rather, their intuitions about pink foodstuffs being sweet; see Spence, Wan, Woods, Velasco, Deng, Youssef, & Deroy, 2015) to their judgments of the drinking vessels themselves.[7] Interestingly, though, in this case, the expectations elicited by the colour of the cup did not carry over to influence perception once the cup had been filled. This is perhaps because the drinks – tea and a lemon drink, were not necessarily associated with sweetness in the first place.

Piqueras-Fiszman and Spence (2012) conducted a study in which their UK-based participants tasted hot chocolate from four different plastic vending cups. Two of the chocolate samples had been sweetened whereas the other two cups contained unsweetened samples. The 57 participants rated their liking of the drink, the chocolate aroma, chocolate flavour, and sweetness using line scales. The results revealed that the hot chocolate drink served from the reddish-orange (outside) and white (inside) cup was liked significantly more that when served from the plain white cup. The participants also rated the chocolate flavour as more intense from this cup than from either the white or red cup.[8] In the same year, Guéguen and Jacob (2012) had 120 French people taste coffee from four different coloured cups (blue, green, red, and yellow). In this case, though, the participants had to indicate which coffee was warmest (in terms of its temperature). 38% of the participants reported that the coffee served in the red cup was the warmest, followed by yellow (28.3%), green (20.0%) and, finally, the blue cup (13.3%).[9]

In 2014, Van Doorn, Wuillemin, and Spence conducted a couple of experiments in Australia showing that a hot milky coffee drink (i.e., a cafè latte) was rated as having a more intense flavour when served in a white ceramic mug as compared to in a clear glass beaker or blue mug (Experiment 1). In a second experiment, the hot beverage served in a glass with a white rubber sleeve was rated as tasting less sweet than when the same drink was served in a clear glass or a glass with a blue-sleeve instead. By contrast, no significant influence of the colour of the drinking vessel was reported on any of the other measures (e.g., sweetness, aroma, bitterness, quality, or acceptability). Van Doorn et al. suggested that their results might therefore be accounted for in terms of colour (rather than simultaneous) contrast (see below).

A year later, Risso, Maggioni, Olivero, and Gallace (2015) conducted three experiments designed to assess the taste expectations/experience of their Italian participants in response to samples of mineral water served in a white, red, or blue plastic cup. In their first study, the participants evaluated samples of mineral water (natural, slightly carbonated, and carbonated) from the three coloured cups in terms of their expected freshness (as in thirst-

[7] Schifferstein's (2009, p. 273) suggestion was that: *"participants may have combined the sweetness of the drink with the 'experienced' sweetness' induced by the pinkness of the cups in their judgments."*

[8] In this study, the trends for the colour of the cup to influence sweetness and chocolate aroma failed to reach statistical significance.

[9] Such results are certainly consistent with other findings highlighting the existence of crossmodal correspondences between colour and temperature (e.g., Ho, Van Doorn, Kawabe, Watanabe, & Spence, 2014).

quenching/refreshing), pleasantness, level of carbonation, and lightness using visual analog scales. Each of the participants in this laboratory-based study evaluated a total of 27 cups (3 cup colours x 3 mineral water samples x 3 repetitions). In a second experiment, these researchers went on to assess the expectations of a new group of participants (i.e., who looked at, but did not taste, the mineral waters). Finally, in a third experiment, Risso and her colleagues evaluated people's choice behaviour, assessing whether they would be more likely to choose water from a cup of a particular colour.

The results of Risso et al.'s (2015) first study revealed that people rated water as tasting slightly more carbonated when sampled from the red or blue cup, than when sampled from the white cup. The results of their second study showed that people expected the sparkling water in the blue cup to be less carbonated than the water in the white or red cup. The participants also expected that the lightly carbonated water would be more carbonated when served in either the white or red cup; They also expected the water samples to be fresher when served in the white cup than when served in a red cup. Risso et al.'s final experiment demonstrated that people preferentially chose the white cup for still water (69%; 25% blue; 6% red); the red or blue cups (42% and 44%, respectively) for semi-sparling water (14% white); and the blue plastic cup for the carbonated sample (M = 56%; vs. 28% red; 17% white). In summary, the results of this Italian study therefore clearly illustrate that people's expectations, perception, and choice behaviour in response to mineral water were <u>all</u> affected by the colour of cup. That said, it is a little harder to draw a coherent message/conclusion concerning the relative impact/importance of people's expectations on their actual tasting experience.

Flatware

As was the case with packaging colour, there have been anecdotal reports circulating for decades that plate colour matters. Just take the following quote from Lampi (1973, p. 60): *"A brown table and brown plates are not the best way of serving a brown steak. Food is not shown to advantage in monotone, because comparison becomes dependent on intellect and memory alone. The appetizing appearance of a well-browned roast is brought out against colourful green and red vegetables. On a black plate, food nearly always looks more appetizing than on a white one. This is because the food reflects more light towards the viewer than the black plate."* Or this from Lyman (1989, p. 112): "*Simultaneous color contrast suggests that foods can be arranged in combinations so that their colors are subtly enhanced, subdued, or otherwise modified. Yellow scrambled eggs on a yellow plate will look paler because of contrast. Purple grapes will look less purple on a purple plate and will look redder on a blue plate. A green salad will look less green on a green plate than on a plate that has no green in it. Red food on a blue plate will look more orange. Broccoli served with red fish will make the fish look redder, and slices of lime surrounding a grape mousse will enhance the color of both*." The focus of Lyman's suggestion here is very much on simultaneous colour contrast between the food and the plate as the underlying mechanism (see also Hutchings, 1999). However, before thinking more carefully about this as the most

likely explanation, let us first take a look at what the evidence concerning the colour of plateware actually shows.

The UK-based participants in an early laboratory-based study reported by Harrar, Piqueras-Fiszman, and Spence (2011) sampled sweet or salty popcorn from four differently coloured bowls (blue, green, red, and white). The salty popcorn was rated as tasting significantly sweeter when taken from a blue or red bowl, while the sweet popcorn was rated as tasting saltier when taken from the blue bowl. Although the magnitude of these effects was pretty small (averaging only a 4% change in people's responses for the food taken from the coloured bowl as compared to from the white bowl),[10] they were nevertheless statistically reliable.

In another within-participants study, which this time took place at Ferran Adrià's Alícia Foundation (a culinary school and research institute just outside Barcelona, Spain), Piqueras-Fiszman et al. (2012) had 53 participants rate the sweetness, flavour intensity, liking, and quality of a homogenously-coloured and textured pinkish-red strawberry mousse. The dessert was first evaluated on either a round black or white plate, and then on the plate of the other colour (though, strictly-speaking, of course, it should be remembered that black and white are achromatic colours). The order of presentation of the plated desserts was counterbalanced across participants. The latter were tested in groups of four and had a single taste of each mousse. Serving the dessert on the white plate resulted in participants rating it, on average, as 7% sweeter, as having a flavour that was 13% more intense. The participants also gave the mousse a 9% higher liking rating on the white plate than when the same dessert was served from the black plate instead. (All of these differences were significant.)[11]

Piqueras-Fiszman et al. (2013) went on to test the extent to which the colour of the plateware (again, black and white plates were used) influenced the gustatory and hedonic experiences of a more complex food; Specifically, desserts with layers and decorations having different colours, textures, tastes, and flavours. The latter between-participants study was performed in a naturalistic setting, namely at one of the restaurants at the Institut Paul Bocuse, in Lyon, France, under conditions that were as ecologically valid as possible. A between-participants experimental design was used, in which the diners (N=253) were served a three-course meal. Over the course of the two weeks during which the study was conducted, three different desserts were offered in the dining room (a *fraisier*, a *fraicheur* of raspberry and vanilla, and a *vacherin glacé* with vanilla, raspberry and basil). Once again, the colour of the plateware was found to exert a significant influence over people's rating of the foods that they were served. In this case, the effect of the background colour of the plate varied as a function of the particular dessert being served.

[10] Note also that the dominant taste of each popcorn was not influenced by the colour of the bowl.

[11] Moving forward, it is interesting to note that the foreground/background colour combinations that were rated as sweetest in a recent online study of the taste that people associated with various pairs of colours (see Woods, Marmolejo-Ramos, Velasco, & Spence, 2016), match-up pretty well with the food/plate colour combination (i.e., a pink dessert on a white plate) that gave rise to the higher sweetness ratings in Piqueras-Fiszman et al.'s (2012) study. Further research will, though, be needed in order to determine whether this reflects anything more than mere coincidence.

The *fraisier* was rated as significantly more appetizing and liked significantly more when served from the white plate than from the black plate. Taken together, the desserts were rated as having a more intense colour on the white than on the black plate (a 7% difference was observed). Meanwhile, the *fraicheur* was liked significantly more on the black than on the white plate (a 12% change in ratings was observed). Importantly, however, these results could not easily be accounted for solely in terms of contrast effects, since it was the dessert that had a somewhat darker brownish hue that participants rated more highly when served from the black plate. The other two desserts, which were red and creamy in colour, were rated as looking more delicious when served from the white plate instead. Once again, these results demonstrate a significant impact of plate colour. That said, though, it is a little harder to extract a simple message for those who might be wanting to apply the results in a commercial setting.

Stewart and Goss (2013) conducted a between-participants study in which their Canadian participants (based in Newfoundland) rated a sample of cheesecake in terms of its sweetness, flavour intensity, quality, and liking. The dessert was served on a white or black plate (some of the participants were served on a round plate, others on a more angular squared plate instead). Sweetness and flavour intensity were both rated significantly higher by those who tasted the dessert from the round white plate than from any of the other three plates (i.e., there were significant main effects of plate colour on both response measures). Meanwhile, higher quality and liking ratings were given for the desserts tasted from the round white and squared black plates than from the squared white or round black plates. No main effects of plate colour were observed in either case. It is, though, worth bearing in mind here that the sample size was quite small in each of the conditions in this between-participants study, and so these results should perhaps be treated with some caution.

Michel, Velasco, and Spence (2015) conducted a study in a hotel restaurant in Scotland as part of an experimental three-course lunch in which 121 international diners completed questionnaires concerning their meal. For dessert, a treacle tart with clotted cream ice-cream was served to half of the diners on a squared black plate versus on a round white plate for the diners sitting at the other tables. The conference delegates were asked about their liking of the dessert, and about its sweetness and flavour intensity. Those sitting at a table with squared black plates liked their dessert significantly more than those given a round white plate instead. No significant differences were detected on the other measures. Once again, the main point to emerge from this study was that changing the colour of the plate (black vs. white) influenced people's ratings.

In what is perhaps the only study of the impact of background colour on the perception of piquancy to have been published to date, Tu, Yang, and Ma (2016) conducted three experiments in which Chinese participants evaluated the expected/tasted piquancy of a sample of aromatic spicy bean curd. When presented on the red or yellow plate, the participants expected the bean curd to be significantly spicier (by around 10%) than when presented on a green or white plate instead (Experiment 1). The results of a second experiment revealed that the background plate colour exerted a significant impact over perceived spiciness as well, with participants rating the bean curd as tasting almost 20%

spicier when tasted from a red plate than from a white plate. Finally, in a third experiment, Yu and colleagues assessed both expected and then tasted spiciness within the same group of participants with the spicy bean curd sampled from a red or white plate. (The testing sessions were separated by a week in this case). Analysis of the results revealed that spiciness expectations (for the bean curd) set by the background colour of the plate mediated the impact on actual spiciness ratings. Interestingly, though, people's visual expectations did not appear to tell the whole story.

It is interesting to note that one aspect of background colour that may be peculiar to plateware is the fact that the majority of the plates sold are round and white. Hence, as such, this definitely becomes the norm as far as background colour is concerned. Hence, as soon as food is served off plateware of a different colour (or for that matter shape) the diner may perceive that a statement is being made. As to why white should have become the dominant plate colour, one can only imagine that it serves to make a wider range of foods look appealing than any other colour. Indeed, this intuition is captured by the following quote from 20 years ago: "*[Each dish was] photographed on pure white crockery… In this way, we have ensured that the food looks both as delicious and natural as possible*" (Anonymous 1997, p. 11). White may also be associated with cleanliness, as in the case of fridges.

Colour contrast between the plateware and food may also be important here. Relevant to this suggestion, van Ittersum and Wansink (2012; Study 5) tested the effect of colour contrast between the food and the plate on serving sizes in a realistic situation. The North American participants in the low colour contrast condition (white pasta sauce on a white plate or red pasta sauce on a red plate) served themselves significantly more pasta than those participants in the high colour contrast condition (e.g., white pasta sauce on a red plate or red pasta sauce on a white plate; though see also http://www.timvanderzee.com/the-wansink-dossier-an-overview/ for concerns concerning a number of the second author's published findings).

Colour aversion / Avoidance motivation

Red plateware has been the subject of several studies focusing specifically on this colour's role in triggering avoidance motivation (apparently due to its association with danger). In fact, three separate studies published over the last five years have all demonstrated that serving food from a red plate can lead people to consume less than when the same food is served off a plate of another colour, at least for those foods that are perceived to be somewhat unhealthy.[12] For instance, the Swiss participants in one study reported that people ate nearly twice as many pretzels when placed on a white (or blue) as opposed to a red plate, this despite the fact that a control study showed that plate colour exerted no influence over people's ratings of the tastiness of the food (Genschow, Reutner, & Wänke, 2012;

[12] Anecdotally, I have heard from my colleagues working in the pet food industry that much the same thing happens when, for examples, pets are served from red bowls. Apparently, they too eat less than when their food is served from a bowl of another colour (see also Humphrey & Keeble, 1978a, b; Siniscalchi, d'Ingeo S, Fornelli, & Quaranta, 2017).

Experiment 2). Similarly, the 41 males tested in the entrance hall of a university consumed less of a soft drink (white tea, lemon, or green tea – all slightly yellowish in appearance) from a clear plastic cup with a red label (M = 34 ml) as compared to a cup with a blue label (M = 57 ml), once again without any concomitant changes in liking (Genschow et al., 2012, Experiment 1).

Meanwhile, the following year, Italian researchers (Bruno, Martani, Corsini, & Oleari, 2013) extended these results to popcorn, chocolate, and skin cream. Across all three experiments, consumption was reduced without any significant impact on how appealing the products were rated as looking. Bruno et al. argued that the avoidance motivation seemingly elicited by red plateware was not simply attributable to any difference in achromatic (luminance) contrast. Instead, the suggestion was that red associated with danger and 'stop'. However, it is worth noting that all of the foods investigated in the two studies mentioned so far in this section (pretzels, popcorn, chocolate, and soft drinks) would not generally count as being especially healthy.[13]

Reutner, Genschow, and Wänke (2015) conducted a study in Switzerland showing that people consumed less dark chocolate from a red plate than from a white plate. Intriguingly, however, no such asymmetry was observed in the case of dark grapes. Specifically, in this between-participants study, the participants had to fill-out a questionnaire while being provided with either a red or white 'snacking plate' containing either 10 pieces of dark chocolate or 10 dark grapes. Yet, on average, the participants consumed a little over twice as much chocolate from the white plate than from the red one. Once again, no effect of plate colour was reported on tastiness ratings, thus suggesting that *"color directly cues behaviour without affecting evaluations."* (Reutner et al., 2015, p. 175). One explanation for the different impact of background colour on the two foods was that grapes are perceived as healthier than chocolate. In order to address the healthiness issue directly, Reutner et al. (2015; Study 2) went on to conduct a second study in front of a Swiss supermarket. Members of the general public were approached and asked to pick a piece of bread from a plate containing 16 small pieces of bread, each having either a red or green flag planted in them (mounted at the end of a canapé-style cocktail stick– the idea behind the flags was, in some sense, to try and draw people's attention to the 'background' colour).[14] The results revealed that when the plate was filled with white bread (considered unhealthy in Switzerland), fewer people chose a red- than a green-flagged piece (28% vs. 72%, respectively).[15] Crucially, this colour bias in food choice was reduced significantly when the plate was filled with pieces of half-white bread, and eliminated when the plate was filled with brown bread instead. Reutner et al. took these results to suggest that background red acts as an avoidance motivation

[13] The story around avoidance motivation and the colour red obviously becomes somewhat more complicated, when the colour happens to be associated with a brand: Just think of the distinctive Coca-Cola red that we came across earlier.

[14] Given that the lightness and chroma of the plates was fixed, only the hue (red or green) varied.

[15] Note that all of the studies that have assessed the effect of background red colour on consumption behaviour reported so far (e.g., Bruno et al., 2013; Genschow et al., 2012; Study 1; Reutner et al., 2015, Study 1) have been based on between-participants comparisons.

(specifically, a consumption-stopping) cue only when people are presented with foods that they perceive to be unhealthy.[16]

Taken together, then, the literature in this area would appear to suggest that the avoidance motivation properties of background colour are specific to the colour red, and specific to those foods that are deemed unhealthy. What is more, the avoidance motivation properties of red only occur under those conditions in which the colour has no specific meaning attached (e.g., as in the case of red for Coca-Cola).

Cutlery & coffee pots

Dichter (1964) reported a study in which the impact of the colour of the pot from which coffee was served on people's perception of the taste/aroma was assessed. Two hundred North Americans were given four cups of coffee to compare and evaluate (see Favre & November, 1979, p. 64, for a summary of the results). Each cup of coffee was served from a pot having a different colour (brown, red, blue, and yellow). The results apparently revealed that 73% of those tested reported that the coffee served from the brown container was 'too strong'; 84% of the female participants suggested the coffee served from the red pot to be rich and full-bodied; The aroma of the coffee from the blue jar was rated as having a milder aroma; And the coffee in the yellower container seemed to come from a weaker blend. The coffee was the same in all the pots. Once again, therefore, these results add to the growing literature illustrating the widespread impact of colour on taste/flavour perception.

Harrar and Spence (2013) reported a laboratory-based within-participants study in which the UK-based participants tasted one of two yoghurts (a regular white Greek yoghurt and the same yoghurt coloured a pinkish-red) from one of five coloured spoons (black, blue, green, red, and white). The participants rated the pink yoghurt sampled from the blue spoon as tasting significantly saltier than the white yoghurt served from the same spoon (cf. Harrar et al., 2011, for similar results showing that blue plateware is often associated with saltiness).

Background room colour

Relevant to the discussion here, a few studies have assessed the impact of the background colour of the environment against/in which a food is seen (e.g., Meléndez-Martínez, Vicario, & Heredia, 2005; Schifferstein, Howell, & Pont, 2016). So, for instance, Meléndez-Martínez et al. assessed the ability of trained panellists to arrange orange juice samples in terms of their concentration (various amounts of water had been added to generate samples having one of 8 concentrations varying from 10-100% juice). The 12 panellists who took part in this study performed this task against either a white or a black background. The panellists did a

[16] It should, of course, be noted here that the notion of an "unhealthy" food is not itself unproblematic. Though, in Reutner et al.'s (2015) study, pre-tests were carried out to ensure that people did indeed perceive the foods as either healthy, neutral, or unhealthy.

significantly better job of arranging the samples correctly when viewing them against a black background in the black-walled cabin.

Meanwhile, in another study, Schifferstein et al. (2016) had 44 participants (mostly North American students) rate the attractiveness of five differently-coloured vegetables (tomato, carrot, yellow bell pepper, cucumber, and eggplant) when viewed against one of four different backgrounds (either light or dark orange or light or dark blue). While the colour of the background did not affect the perceived colour of the vegetables themselves (as shown by the results of a colour matching task) it did affect the perceived attractiveness of the vegetables. However, once again, the optimal background, in terms of making the vegetables look most attractive depended on the vegetable under consideration. So, as the authors put it: *"we did find differences in the perceived attractiveness of the various vegetables. Each vegetable seems to have its own optimal background color(s), which typically involves a contrast in hue, blackness, and/or chromaticness. The optimal color is light orange for the cucumber (strong hue and blackness contrast), light blue for the eggplant (strong blackness contrast), light or dark blue for the yellow bell pepper (strong hue and chromaticness contrast), light or dark orange for the carrot (strong chromaticness contrast for both backgrounds and a strong blackness contrast for the dark orange background), and dark blue or dark orange for the tomato (strong hue, blackness and chromaticness contrasts)."* (Schifferstein et al., 2016, p. 178).

Elsewhere, a number of researchers have investigated the impact of changes in ambient colour of environment in which people taste wine (Oberfeld et al., 2009; Spence et al., 2014). So, for instance, Spence et al. investigated the impact of regular white lighting versus red or green lighting on people's rating of a glass of red wine tasted in a black tasting glass (so that the changes in the ambient lighting did not impact the appearance properties of the wine itself. The results revealed that people's ratings of the fruitiness/freshness of the wine were changed by approximately 15% simply as a function of switching between red and green lighting. Note that responses were collected from more than 3,000 people in this UK study. Intriguingly, many people reported that the taste/flavour of the wine changed as soon as the colour of the lighting changed, thus arguing against the colour affecting the participants' emotions and that, in turn, affecting their ratings of the wine.

Assessing the impact of background colour in special populations

Although a detailed review of this topic lies beyond the scope of the present review, it is worth noting, in passing, that enhancing the contrast between the food and the plateware has a beneficial effect on the consumption behaviour of the elderly and/or those who find themselves in hospital (e.g., Alzheimer's patients). It has been noted that such individuals often do not end up eating enough (see Adams 2013; AgeUK report, 2010; Spence, 2017b, for a review). In one study conducted at a long-term care facility in Boston, USA, for example, enhancing the visual contrast of the plateware led to a substantial increase in food and liquid intake in those individuals with severe Alzheimer's disease (Dunne, Neargarder,

Cipolloni, & Cronin-Golomb, 2004) – such patients are known to have deficient contrast sensitivity. Specifically, switching to high contrast red plates (from white), and introducing red cutlery, led to a 25% increase in food consumption (amongst 9 male patients, over the 10 days tested). Even more impressively, switching from white to red glassware resulted in the patients increasing their liquid intake by as much as 84%. Interestingly, the use of pale blue or red plates didn't change consumption relative to that seen with white tableware in the baseline condition. Given that follow-up research revealed that high contrast blue plates were just as effective in increasing consumption as high contrast red plates, it would appear that it is high contrast that is key to enhancing consumption amongst this particular group of patients (see Dunne et al., 2004, p. 538, on this point).

Elsewhere, in another Swedish study, older individuals ate more white fish when it was served from a blue (rather than white) plate (see Hultén, Broweus, & van Dijk, 2009, p. 119; see also Hutchings, 1999). Intriguingly, the above-mentioned results, suggesting that eating from blue plateware can be used to enhance consumption would seem to contradict earlier anecdotal reports concerning the 'blue plate special' in the USA. Specifically, according to Crumpacker (2006, p. 143): *'the term blue plate special became popular during the Great Depression because restaurant owners found that diners were satisfied with smaller portions of food if it was served on blue plates.'* However, as has hopefully become clear from this review of the literature, background colour can be used both to reduce and to increase consumption (e.g., Bruno et al., 2013; Dunne et al., 2004; Genschow et al., 2012). Quite what effect will be observed in any given situation would appear to depend both on the properties of the food being eaten (e.g., "Is it healthy or not?"; "What colour is it?") and who exactly is doing the eating (e.g., "Is it an older individual who may have problems discriminating the pale food from the background of a traditional white plate?").[17] The contrast between the food and the plateware seemingly also plays an important role (see below).

Before closing this section, it is perhaps also worth considering the unusual perceptual experience of those individuals (primarily males) who happen to have been born colour blind (see Broackes, 2010; http://www.colourblindawareness.org/colour-blindness/living-with-colour-vision-deficiency/food/). According to estimates, roughly 6% of the population suffer from some form of colour blindness. That said, there is surprisingly little published research on the question of how this visual deficit might affect the perception of food, and/or the modulatory role of background colour, in those who are affected.[18] In fact, colour blindness is rarely taken into account in studies of food colouring's impact on peoples taste/flavour expectations/perception either.

[17] Here, it is interesting to note that a number of companies have started-up in recent years offering high-contrast plateware and cutlery for such older individuals (e.g., https://www.indiegogo.com/projects/eatwell-tableware-for-people-with-special-needs#/; Robbins, 2015; Smyth 2016).

[18] And, at the other extreme, of course, one might wonder how the food experience of those mostly female tetrachromats who have a fourth cone type might differ from that of regular trichromats (Jameson, Highnote, & Wasserman, 2001; McCrone, 2002).

Conclusions

As this review of the literature has hopefully made clear, background colour exerts more of an influence over our taste/flavour perception than any of us might expect (at least initially). Thus, while people obviously cannot literally 'taste the plate', the colour of the plate, bowl, glass, cup, cutlery, pot, and package in/against which a product is seen can certainly influence how appealing a food looks, what it tastes like, and even how much we end-up consuming (and/or serving ourselves). And although explanations for the fact that the background colour (e.g., of the plate, cup, pot, etc.) impacts taste/flavour perception are not yet fully worked out, the results of a growing number of empirical studies now support the view that product-extrinsic colour really does matter, no matter where that colour is embodied (e.g., be it the colour of the plateware, the cutlery, and/or of the environment in which a food happened to be tasted).

A number of generalizations are supported by the research reviewed here. For instance, desserts taste sweeter when served off of a white plate while black plates may be more appropriate for savoury dishes (e.g., Piqueras-Fiszman et al., 2012, 2013; Stewart & Goss, 2013). Meanwhile, red plateware reduces people's consumption of those foods that are considered to be less healthy (Bruno et al., 2013; Genschrow et al., 2012; Reutner et al., 2015). That said, while a number of studies now concur in demonstrating that the colour of the plate (cutlery, glassware, etc.) can affect people's ratings of the taste and quality, not to mention their consumption, of the food that is placed upon it, the direction of that change, and whether or not it is preferred, appears to depend both on the nature of the food being served as well as on the characteristics of the diner. So, for instance, a dessert that is already 'too sweet' may be preferred when served from a black plate, whereas a dessert that, in isolation, is judged as not quite sweet enough, will likely be preferred from a white plate instead.

Given the range of findings concerning background colour that have been reported to date, it would seem highly unlikely that any single account could explain all of the published data. In fact, a number of different suggested explanations have been put forward by the researchers working in the field over the years; Several of these suggestions have already been mentioned in the preceding sections. It is important to note here, though, that these various accounts should not be treated as mutually exclusive. In fact, each one of them may help to explain some proportion of the empirical data.

To begin with, the colours present on product packaging may exert their effect due to their association with a specific brand or product attribute (think only of the use of packaging colour to denote whether a milk is low-fat or not). In these cases, it is what is signified by the colour, rather than the colour itself, that may be doing the work. In those cases where background colour has no such specific meaning (e.g., in the case of plateware colour), people's flavour expectations, their flavour perception, and even their food behaviours may be affected because of the associations that exist between particular colours and specific product attributes (e.g., blue with salty as well as with cold/refreshing; pinkish-red with sweetness; red with spicy and hot, but also with danger, etc.; Ho et al., 2014; Suzuki, Kimura,

Kido, Inoue, Moritani, & Nagai, 2017; see also Zellner & Durlach, 2002, 2003).[19] These associations (or crossmodal correspondences) are primed by the background colour and end-up anchoring, or biasing, the ratings that an individual subsequently makes. Another possible explanation for the impact of background colour is that it may influence our emotions and, by so doing, indirectly affect the taste of the food (see Jacquier & Giboreau, 2012a; Spence et al., 2014). As Oberfeld et al. (2009, p. 807) put it: *'if a colour induces a positive mood or emotion […] then the same wine tasted in this positive mood is liked better than when in a negative mood'.* The emotional mediation account has typically been put forward by those attempting to explain the effect of ambient colour (e.g., of an entire environment). However, there would seem no good reason why such an explanation should not also have some value when considering the effect of some more circumscribed patch of colour (e.g., the background colour of a plate or bowl).

Some researchers have argued for the existence of direct perceptual effects of background colour on simultaneous contrast (e.g., Harrar & Spence, 2013; Van Doorn et al., 2014) and perceptual fluency (e.g., Reber & Schwarz, 2001; Reber, Schwarz, & Winkielman, 2004). Simultaneous contrast (be it colour or brightness contrast) between any background colour (e.g., from the receptacle) and any food and drink items can make the latter appear more vivid, and hence possibly more appealing (e.g., Ekroll, Faul, & Niederée, 2004; Grether, 1942; Hutchings, 1999; Jameson & Hurvich, 1959; Leibowitz, Myers, & Chinetti, 1955; though see also Bruno et al., 2013).[20] Colour contrast results in a food that is situated on another background colour taking on some of the hue of the complementary colour to that of the background (e.g., the plate). For example, a grey circle on a green plate with likely seem a little pinker than it otherwise might. Meanwhile, according to Reber and his colleagues, increasing the contrast between the background and foreground colours (e.g., figure-ground contrast) may increase people's liking for a briefly-presented stimulus (e.g., a food or beverage item) due to enhanced perceptual fluency in terms of the processing of the stimulus (see also Genschrow et al., 2012; Gerard, 1958).

That being said, one of the limitations with much of the research assessing the impact of background colour that has been published to date is a lack of precise physical measurement (though see Bruno et al., 2013; Genschow et al., 2012, for exceptions); That is, most of the researchers working in this area tend to refer only to a rough colour category (or hue), such as light red, rather than providing an objective measure of the background, never mind the foreground, colour (e.g., by measuring the hue, saturation, and brightness). Future research will likely be aided by providing more objective measures of the stimulus characteristics. Another important direction for future research will be to assess the nature of any interactions taking place between the shape and colour of the background colour stimulus (e.g., the plate),

[19] According to Lightner and Rand (2014), natural colours can also be used to promote thoughts of seasonality in a meal.

[20] One other point to bear in mind here is that when the food or beverage product is familiar, say, people may well have colour memory of what the product *should* look like and this might give rise to some sort of perceptual constancy for the colour of the product itself (Troost, 1998). The prediction here, then, would be that the less familiar the food or beverage product under consideration, the more likely its apparent colour is to be influenced by the specifics of the background colour (e.g., Huang & Lu, 2015; see also Deliza & MacFie, 2001).

as this has also been shown to influence perception (e.g., Deliza & Ares, 2010; Stewart & Goss, 2013). Stewart and Goss, for example, found that the impact of the achromatic colour of the plate (black or white) or people's ratings of the taste of a dessert (a slice of cheesecake) was modulated by the shape of the plate (round vs. angular; though see also Piqueras-Fiszman et al., 2012). Finally here, it is worth noting that the impact of the background colour (e.g., of the plate or bowl) may itself be modulated by the colour of the broader colour of the background (e.g., think here only of a red plate been seen against a red versus white tablecloth; see van Ittersum and Wansink, 2012, Study 2, for one study along these lines; though again see http://www.timvanderzee.com/the-wansink-dossier-an-overview/; cf. Jacquier & Giboreau, 2012b).

It is worth noting that most of the research that has been published to date has focused on the role of background colour on expected/perceived taste/flavour, and to a lesser extent piquancy. Future research should therefore investigate whether background colour cues might also modulate the expected and/or perceived textural and/or mouthfeel properties of food (see Spence & Piqueras-Fiszman, 2016). And, having summarized the behavioural data on the influence of background colour, it would, in the future, be interesting to investigate whether neuroimaging techniques might help identify the various different mechanisms suggested here.

Given the impact of background colour on the perception of, and behaviour toward, food and drink, as summarized here, these results should be of great interest to those working in a number of sectors. For instance, marketers and packaging designers should all be able to use such insights in order to optimize the appearance of their food and beverage products as seen on or through (transparent) the packaging (e.g., Simmonds & Spence, 2017; Simmonds et al., 2018; Tu & Wang, 2013). Meanwhile, gaining a better understanding the impact of background colour on the perception of food and drink should obviously also be very relevant to chefs, restaurateurs, caterers, and the growing army of food bloggers out there. Indeed, assuming that the colour of the plateware does exert as much of an influence over the expected and perceived taste and flavour of food as this review of the literature would appear to suggest,[21] one has to question the approach of some restaurants (such as, for example, Denis Martin's namesake restaurant in Vevey, Switzerland) where each diner is given a charger plate of a different colour.[22] Evidence suggesting that the colour of the plateware affects the amount consumed should be of influence both to those wanting to nudge (e.g., elderly hospital patients) to eat a little more as well as to those wanting ways to help nudge others (e.g., those who are obese, or else dieting) to eat a little less (Bruno et al., 2013; Crumpacker, 2006; Genschrow et al., 2012; Reutner et al., 2015; Van Ittersum & Wansink, 2012). Looking a little further into the future, it is interesting to consider whether technology (such as augmented reality, projection mapping, and possibly even serving food direct from a tablet computer screen, will one day soon let practitioners optimize (or at the very least, play with) the eye-appeal of the food they serve by optimizing the background colour against which that food is seen (e.g., Huisman, Bruijnes, & Heylen, 2016; Spence, 2017c).

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[21] Given the 'file drawer problem' (Rosenthal, 1979), it is always going to be hard (in this area as in any other) to determine quite how many *null* results that there may be out there, sitting in the back of someone's file drawer.

[22] Given that increased variety has been shown to increase consumption, and given that colour variety (e.g., of sugar-coated candies) has been suggested as a relevant and salient dimension here (see Piqueras-Fiszman & Spence, 2014, for a review), it is at least possible to imagine that varying the background colour of the plateware might serve much the same purpose over the course of a multi-course restaurant meal, say. However, empirical support for such a suggestion will need to await empirical confirmation.

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