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When the shape of the glass influences the flavour associated with a coloured beverage: Evidence from consumers in three countries

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ABSTRACT

We report a study designed to investigate the effect of the shape of the glass on colour–flavour associations in 300 participants from the UK, India, and South Korea. Participants viewed online photographs of red, green, yellow, blue, orange, and brown beverages presented in a water, wine, or cocktail glass, and indicated the first flavour or drink that came to mind from a list of 24 flavour options. The results revealed significant cross-cultural differences in terms of the flavour expectations that were elicited by viewing each of the coloured drinks. Furthermore, the crossmodal associations for the green, yellow, and orange drinks were also found to be influenced by the shape of the glass in which the drink was presented. These findings demonstrate how contextual factors (the shape and/or type of glass) can influence the crossmodal associations that exist between colour and flavour across different cultural backgrounds. Our results further highlight the importance of considering the appropriateness of the glassware in which a drink is presented (e.g., in advertising and in any images shown in product packaging).

Introduction

Imagine yourself at a social gathering where there are various glasses containing coloured drinks for you to choose from. Which drink would you pick up? Your decision might well depend on a number of contextual factors, such as the occasion, the time of day, your mood, desire, and your expectations concerning the likely flavour of the drinks that you see arrayed before you. Among the many factors that have been shown to affect multisensory flavour perception (see Delwiche, 2004; Köster, 2009; Spence, 2013; Stevenson, 2009, for reviews), colour is known to influence people's perception of the flavour of a variety of beverages. Although there is mixed evidence in the literature, a number of studies have demonstrated that increasing the intensity of colouring can increase the perceived intensity of a drink's flavour (see Spence, Levitan, Shankar, & Zampini, 2010, for a review). So, for example, early research demonstrated that red- and lime/lemon-coloured drinks having a darker colour were rated as sweeter-tasting (Johnson & Clydesdale, 1982; Roth, Radle, Gifford, & Clydesdale, 1988). Note also that the colour of a drink can influence the perceived identity of a beverage's flavour (e.g., DuBose, Cardello, & Maller, 1980). To date, numerous studies have demonstrated that people will often misidentify the flavour/odour of a foodstuff when colour is either absent or else unusual to (or incongruent with) their everyday experience of that product; e.g., just think of a strawberry-flavoured green drink (Morrot, Brochet, & Dubourdieu, 2001; Stillman, 1993; Zampini, Sanabria, Phillips, & Spence, 2007; Zellner, Bartoli, & Eckard, 1991). The existence of such robust crossmodal effects can presumably be attributed to the fact that every one of us will generate expectations (either consciously or otherwise) concerning the likely flavour of a drink based on the learned associations that we have picked up (and internalized) between certain flavours and specific colours and product formats (Maga, 1974; see Delwiche, 2012, for a review). Such crossmodal expectations concerning the flavour of a drink have also been shown to influence people's evaluation of these drinks (e.g., Deliza & MacFie, 1996; Raudenbush, Meyer, Eppich, Corley, & Petterson, 2002) and can even have an impact on people's consumption behaviours (see Piqueras-Fiszman & Spence, 2014, for a recent review).

The perception of flavour/odour is also influenced by a variety of contextual factors (for reviews, see Spence, Harrar, & Piqueras-Fiszman, 2012; Spence & Piqueras-Fiszman, 2014). So, for instance, the perceived taste of cream can be influenced by the material properties of the spoon that it is tasted from (Piqueras-Fiszman, Laughlin, Miodownik, & Spence, 2012) while the taste of popcorn

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is affected by the colour of the bowl in which it is presented (Harrar, Piqueras-Fiszman, & Spence, 2011; see also Lyman, 1989).

Crucially, the shape of a glass also exerts an influence over the perceived olfactory properties of wine (see Spence, 2011, for a review). Many drinks brands and glass manufacturers have started to show an increased interest in the design of various new types of glassware in order to enhance both the aesthetic appearance of the glass and to try and optimize the odour/flavour of the drink that is served from it (see Spence & Wan, 2014, for a review). Importantly, the shape of the glass has been shown to influence how much people pour (Wansink & van Ittersum, 2005), not to mention how much they consume (Attwood, Scott-Samuel, Stothart, & Munafò, 2012). Elsewhere, people's choice, preference, and post-consumption satisfaction have also been shown to be influenced by the container from which they happen to taste/consume a drink (e.g., Raghubir & Krishna, 1999). Recent research on the free sorting of wine glasses has also highlighted the importance of the shape of the glass (Faye, Courcoux, Giboreau, & Qannari, 2013). Finally, it is important to remember that glassware plays an important role in the marketing of alcoholic beverages (see Spence & Wan, 2014; Stead, Angus, Macdonald, & Bauld, 2014).

Recently, contextual factors such as the type of receptacle in which a beverage is presented have been shown to interact with the cultural background of the consumer/participant (in other words, the country they come from) when it comes to determining the flavour associations that people have with specific beverage colours. While certain colours appear to convey the same meaning in different cultures, others have quite different meanings/values (e.g., Jacobs, Keown, Worthley, & Ghymn, 1991; Madden, Hewett, & Roth, 2000). Therefore, it would seem reasonable to expect that consumers from different cultures (countries or regions) will sometimes have built up, over the course of experience, different expectations concerning the meaning of one and the same beverage colour. As a case in point, Shankar and colleagues (2010) reported that whilst those from the UK associate a brown-coloured drink with cola flavour, many Taiwanese consumers associate the colour with grape flavour instead.

Wan et al. (2014) recently demonstrated that participants from the USA and mainland China have different colour–flavour associations for green, yellow, orange, or brown drinks, but no such differences were found for red, blue, or colourless drinks. Importantly, the expected flavour of these drinks was also influenced by the type of receptacle in which they happened to be presented. The present study was designed to extend this ongoing line of experimental research in order to test participants from several other cultural backgrounds. The UK and USA might well be two of the most often chosen countries to represent "Western culture" in the literature on cross-cultural psychology, yet they have significant difference in terms of their respective food cultures (Albala, 2011; Brittin, 2010), and this might be expected to influence people's colour–flavour associations. India and China are both Asian and so-called BRIC countries (e.g., O'Neill, 2001), but dramatically differ in terms of their food culture (Albala, 2011; Brittin, 2010). Korea and China are both Asian countries and share some food styles such as the tradition of using chopsticks to eat rice with dish or noodles (Albala, 2011; Brittin, 2010), yet they have significant difference in agriculture (e.g., Wang & Mauzerall, 2004), and such difference in agriculture may, in turn be expected to lead to difference in the colour–flavour associations that are observed (e.g., Shankar et al., 2010). Therefore, participants from the UK, India and South Korea were chosen for test in the present study, and they had to specify the flavour that first came to mind on seeing coloured drinks that were presented in three differently-shaped glasses. Our aim in conducting this research was to examine whether the flavour(s) associated with drinks of a certain colour would be influenced by the shape of the glass that was used to present these drinks to people from different cultural backgrounds. Should such context-dependent cross-cultural differences be observed then these results would potentially have important implications for the marketing and advertising of drinks in different markets.

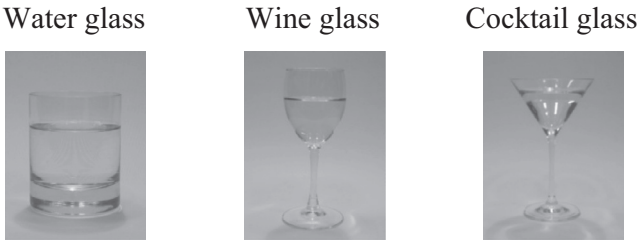

Fig. 1. Three different glasses (with water) shown in this study.

Methods

Participants

A total of 300 participants from the United Kingdom, India, and South Korea took part in this study online via the Flash-based Xperiment software package (http://www.xperiment.mobi), including 100 British participants (mean age = 19.0 years, SD = 2.8, ranging from 18 to 44 years; 76 women), 100 Indian participants (mean age = 31.3 years, SD = 8.8, ranging from 20 to 60 years; 38 women), and 100 Korean participants (mean age = 30.8 years, SD = 7.0, ranging from 19 to 44 years; 45 women). British participants were from York St John University and completed the study as part of a Psychology lab class. The Indian participants were recruited via Amazon's Mechanical Turk and were paid $0.60 for taking part. The Korean participants were recruited from the subject pool of the spatial cognition lab at the Psychology Department of Psychology, Tsinghua University, and they took part in this study by volunteering or else to fulfil the partial requirement of an introductory psychology course. All of the participants were required to read about the general purpose of this study before signing the online informed consent form electronically. Due to the differing levels of English proficiency, the British and Indian participants completed the experiment in English, whereas the Korean participants participated in a Korean version of the study. This study was approved by the Central University Research Ethics Committee of the University of Oxford.

Materials

The drinks photos generated by Wan et al. (2014)[1] were utilized in the present study. Each photo subtended 180 pixels horizontally and 240 pixels vertically on the computer monitor. The drinks were made by mixing commercial food colourings and still water. The six colours of drinks we were interested in testing were red, green, yellow, blue, orange, and brown; and the three glasses we were interested in comparing were a water glass, a wine glass, and a cocktail glass (see Fig. 1).

Procedure

The experiment lasted for about 15 min and consisted of two parts. During the first part of the study, all the pictures described

[1] We also used Wan et al.'s (2014) pictures of colourless water and those of coloured drinks presented in a plastic cup in the present study. However, these data were not reported here because they fall out of the scope of this paper.