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Can, Cup, or Bottle? The Influence of Service Vessel on Consumer Perceptions of Taste and Willingness to Pay

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Abstract

This study examines the influence of beverage service vessel on taste evaluations and willingness to pay through two experiments, each with four conditions: an aluminum can, a glass cup, a plastic cup, and a glass bottle. Study 1, a virtual scenario-based design with 141 participants, showed that taste expectations and willingness to pay were lowest for the beverage served in the aluminum can and that taste expectations mediated the effect of beverage vessel on willingness to pay. Study 2, a lab-based experiment with 82 participants, assessed taste perceptions and willingness to pay. Study 2 replicated the results of Study 1 in a live context with real consumption, extending the findings from expectations to actual perceptions. Theoretical and practical implications of these results are discussed.

Keywords: taste perceptions, willingness to pay, package shape, beverage evaluation, extrinsic cues, beverage presentation

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1. Introduction

A consumer's perceptions of product quality, price, and value are generally thought to be fundamental elements in their purchasing behavior and selections (Zeithaml, 1988). Packaging is important to the formation of these perceptions, as the package can be considered a part of the product to the extent that package and product are often indistinguishable until the moment of consumption (Rundh, 2009). Further, consumers rely on symbolic meanings drawn from visual cues derived from packaging, such as size, shape, and color, in order to form opinions about product attributes, even when an attribute (e.g. taste) is unrelated to the visual cue (van Rompay, Finger, Saakes, & Fenko, 2017). In the case of foodservice and the restaurant industry, specifically the on-premise sector where food and/or beverages are consumed in the same location they are purchased, "packaging" translates to food presentation and the restaurant's choices of food containers and serviceware, which provide critical tangible cues for the formation of consumer perceptions (Namkung & Jang, 2008; Raajpoot, 2002).

Food quality in restaurants has been researched extensively (Ha & Jang, 2010; Kivela, Inbakaran, & Reece, 1999; Kim, Ng, & Kim, 2009; Namkung & Jang, 2007; Peri, 2006; Raajpoot, 2002; Sulek & Hensley, 2004), yet remains difficult to study, since the construct of quality is multidimensional and is altered by factors such as consumer experience, consumption context, and characteristics such as the product features, durability, and serviceability (Krishna & Morrin, 2008; Lawless, 1995). Food presentation has also been studied, albeit to a lesser degree, with a focus on visual appeal and the effects of service vessel choices (Kuo & Barber, 2014; Sobal & Wansink, 2007). But, alcoholic and non-alcoholic beverages also serve to enhance the dining experience for the consumer through both their flavors and their presentation (Society of Wine Educators, 2012).

Beverages also offer restaurant operators vast potential for profit, as they contribute to an increase in check average and return a higher profit margin than food, thus contributing to both top-line sales and bottom-line profits (Bujisic, 2014; Walker, 2014)

Just as restaurant operators have a myriad of choices for food containers and dishware, they also have a wide variety of container and glassware options for alcoholic and non-alcoholic beverages. For instance, water and carbonated soft drinks, which are the top two liquid refreshment beverage sub-categories in the United States (Beverage Industry, 2017) and standard non-alcoholic restaurant beverage offerings, both require restauranteurs to make decisions regarding presentation. Leading brands like Coca-Cola and Pepsi can be dispensed from a post-mix soda fountain into a glass or plastic cup, or be presented in "ready to drink" bottles and cans (Drysdale, 2015). Water can be served bottled or directly from a filtered tap in a cup or glass. Bottled water, once sold primarily in plastic or glass bottles, is now available in cans due to the introduction of brands like La Croix, which experienced sales of $226 million in 2016 (Peterson, 2016). Further, the rise of premium coffees and teas has extended the presentation options for these beverages beyond the traditional ceramic mug or foam cup to include cans and bottles of different shapes and sizes as well as high-quality serviceware (Berry, 2016).

This paper builds on and extends prior research on food and beverage taste perceptions, packaging, and product cues, which suggests the vessel a beverage is served in could alter the consumer's sensory perceptions of the beverage and impact the consumer's attitude towards the product and the brand (Attwood, Scott-Samuel, Stothart, & Munafò, 2012; Barnett, Velsaco, & Spence, 2016; Cavazanna, Larsson, Hoffman, Hummel, & Haehner, 2017; Piqueras-Fiszman & Spence, 2012; Schifferstein, 2009; Spence & Wan, 2015; Van Doorn et al., 2017; Wan, Woods, Seoul, Butcher, & Spence, 2015; Wilcox, Cordúa, Cruz, & Neal, 2013). Research also indicates that taste is a significant attribute of food quality (Namkung & Jang, 2007) but, as noted by Spence and Van Doorn (2017) in their recent review, few studies have addressed the sensory aspect of taste in regard to beverages and the formation of beverage evaluations. Thus, the central question underlying this research is to what extent visual perceptions of beverage presentation can influence taste perceptions and behaviors. More specifically, to what extent do variations in beverage presentation impact subsequent taste impressions and willingness to pay (WTP) for that beverage? Two studies were conducted to investigate the effects of beverage service vessel on consumers' evaluation of taste and WTP. In Study 1, we used a scenario-based experiment with four beverage vessels to examine differences in consumers' taste expectations and WTP. In Study 2, we sought to replicate the results of Study 1 in a lab-based experiment through the use of real vessels and beverage product, which allowed us to test taste perceptions, rather than expectations, and WTP.

2. Literature Review

2.1. Beverage vessels and taste

Product attributes such as taste, smell and appearance make up the sensory experience during food consumption and therefore are also strongly related to the hedonic dimension of food product quality (Grunert, Bech-Larsen, & Bredahl, 2000). These attributes are affected through cue diagnosticity, where consumers base decisions on information that is both accessible and analytic. For instance, consumers have been found to use information made accessible through product labels (e.g., "organic") and interpret this information to form perceptions about the taste of the product (Ellison, Duff, Wang, & White, 2016). Relevant to this paper are extrinsic product cues: the characteristics of a product that, when changed, do not alter the physical nature of the product itself (Piqueras-Fiszman & Spence, 2015). Extrinsic cues such as price, which often serves as a signal of product quality, and labels, which provide pertinent information, are fairly obvious, but more subtle cues related to product packaging include color, size, shape, and service container/vessel, all of which also convey information to consumers and allow them to make evaluations and form expectations about the product (Kuo & Barber, 2014; Machiels & Karnal, 2016; Piqueras-Fiszman & Spence, 2012; Zhou, Wan, Mu, Du, & Spence, 2015).

Formed expectations about a food or beverage based on packaging (made during the purchase decision) are important prior to consumption and contribute to consumer perceptions of sensory characteristics during consumption (Deliza & MacFie, 1996). The process of forming expectations relates to judgmental heuristics, the decision-making shortcuts used by consumers when performing cognitive tasks that influence downstream behaviors including product evaluation, purchasing, and consumption (Provencher & Jacob, 2016). Taste has been found to be one of the most significant factors when evaluating and making purchase decisions of consumable goods (Arvola, Lahteenmaki, & Tuorila 1999; Kourouniotis et al., 2016) and is considered a hedonic quality dimension (Grunert, Bech-Larsen, & Bredahl, 2000). Research on chemosensory systems has identified five dimensions that formulate our evaluation of what most consumers refer to as “taste”: sweet, salty, sour, bitter and umami (Chandrashekar, Hoon, Ryba & Zuker, 2006). Often used interchangeably with taste is the term flavor. At the scientific level, flavor is made up of both taste and aroma components, along with their interaction (Keast, Dalton, & Breslin, 2004). Within this research, we use the term taste as the overall evaluation of both the taste and flavor components of the consumption experience.

As our sensory perceptions are not limited to a single sense, one could argue that effects of judgmental heuristics on taste may be explained by multiple external cues that influence a variety of senses. For instance, Krishna and Morrin (2008) examined the hardness attribute of a beverage vessel, finding that flimsy cups led to lower taste perceptions. Schifferstein's (2009) results demonstrated that when participants were presented with cups made from different materials, including glass, translucent plastic, and ceramic, ratings of sweetness changed. Responding to Spence and Wan's (2015) call for more research on the effects of surface texture, van Rompay et al. (2017) 3D-printed two different cup exteriors in order to vary surface texture between angular and rounded, and found this change in texture influenced ratings of both bitterness and sweetness.

However, previous research has shown that when there is incongruence between a visual cue and another sensory cue, the visual cue will dominate the formation of taste perceptions (Elder & Krishna, 2010; Hoegg & Alba, 2007). For instance, Zhou et al. (2015) found the color of Asian noodles, a visual cue, influenced taste perceptions such that red noodles were perceived as spicier and yellow noodles as more savory. In the context of beverages, when provided with the same juice that had been darkened with a flavorless food coloring, the color was found to create a significant difference in taste perceptions despite the juices being the same (Hoegg & Alba, 2007). Notably, the monochromatic appearance of most beverages and corresponding lack of textures and details suggest that visual cues are critical to the formation of product perceptions and evaluations (Spence, 2015; Zhou et al., 2015).

As noted by Spence and Wan (2015), the beverage vessel which has received the most attention in this regard is the wine glass [see Spence (2011) for a review], and much attention is paid in some segments of the restaurant and beverage industries to matching wine varietals to specific glassware. However, results across this body of research indicate the effect of a wine glass on taste only holds when study participants can see and/or interact with the glass, thus suggesting this effect is due to cross-modal associations rather than physio-chemical factors.

More recently, extant research has investigated the relationship between the shape properties of other beverage service vessels, such as cappuccino cups, coffee mugs, and beer glasses, and ratings of taste, aroma, and flavor. The studies that have explored this relationship have largely shown that bitter and sour tastes are more strongly associated with angular shapes, while sweeter flavors are more strongly associated with rounded shapes (Velasco, Woods, Petit, Cheok, & Spence, 2016; Spence & Van Doorn, 2017). Further, challenging physio-chemical explanations are the most current findings, which reveal that beverages served in rounded/curved vessels are rated as tasting sweeter and/or fruiter than the same beverage served in a straight-sided glass (Mirabito, Oliphant, Van Doorn, Watson, & Spence, 2017; van Rompay et al., 2017). Van Doorn et al. (2017) also demonstrated the relevance of vessel height and diameter using coffee mugs, with results revealing short mugs associated with bitterness, narrow mugs associated with stronger aromas, and wide mugs associated with sweetness.

While each of these studies provides valuable insights about shape-taste cross-modal correspondence, they focused on very specific contexts, such as comparing two styles of beer glasses (Mirabito et al., 2017), canned versus bottled beer (Barnett et al., 2016), or a standard cola glass versus a water glass (Cavazzana et al., 2017). For several of the product offerings available to restaurant operators, including soda, water, beer, and tea, there are more packaging and presentation options available. Additionally, as noted by Spence and Van Doorn (2017), the absence of appropriate controls makes it difficult to determine whether it is expectations based solely on visual cues or a combination of visual cues and haptic-tactile properties that are influencing taste perceptions. For example, in Cavazzana et al.'s (2017) study, the differences in weight of the two glasses used as compared to the flimsiness of the plastic bottle was a noted limitation. In Barnett et al.'s (2016) study, participants observed the beer being poured from a bottle or can, but actually consumed it from a plastic cup. Additionally, they were encouraged to pick up the full can or bottle to read the label, which introduced two potential confounds: brand perceptions (the beer was from a local micro-brewery that participants may have been familiar with) and haptic cues (e.g. weight and texture of the vessel). One aim of the current research was to address these potential confounds and extend findings in this area by a) designing a realistic industry context where cans, glass/plasticware, and bottles are all available options, and b) controlling for haptic transference and brand associations.

Thus, as taste expectation is one of the top attributes influencing consumer decisions related to consumption (Kikulwe, Wesseler, & Flack-Zepeda, 2011), it is important to understand the factors that aid in forming these expectations. The beverage service vessel used within a restaurant has the ability to act as an extrinsic cue and influence consumers' expectations and perceptions of taste. Taking into account previous literature and theory on cross-modal correspondence, the following is hypothesized:

> **H1:** There are differences in beverage service vessel in regard to consumer expectations and perceptions of beverage taste.

2.3. Willingness to pay

A consumer's willingness to pay (WTP) for a product is defined as the maximum price a buyer is willing to pay for a given amount of goods or services (Le Gall-Ely, 2009; Wertenbroch & Skiera, 2002). WTP can be influenced by numerous factors, including satisfaction (Homburg, Koschate, & Hoyer, 2005; Huber, Herrman, & Wricke, 2001), product features such as quantity (Sevdalis & Harvey, 2006), customization (Merle, Chandon, & Roux, 2008), price perceptions (Krishna, Wagner, & Yoon, 2006), and quality perceptions (Carpio & Isengildina-Massa, 2009).

Product packaging, design, and presentation were also found to be determinants of consumers' WTP, although the evidence from prior studies specific to beverage vessels is conflicting. In a cross-cultural study, Wan, Zhou, Woods, and Spence (2015) found consumers were willing to pay significantly more when they perceived congruency between the vessel and the beverage (i.e. beer served in a beer mug, wine served in a wine glass, whisky served in a rocks glass). Conversely, Mirabito et al. (2017) found no difference in WTP between beer served in curved versus straight-edged glasses. These inconsistent results may be a product of different conditions; participants in Wan, Zhou, et al.'s (2015) study viewed images of the beverages online while participants in Mirabito et al.'s (2017) study tasted the beverage and touched the vessel. A second aim of this paper was to reconcile this discrepancy through the use of both images and physical product, while also implementing the aforementioned haptic transference and brand association control measures.

Although there are few studies focused on beverage service vessels, slightly more research has been conducted in general on food and beverage packaging as it relates to WTP. Products with aesthetically pleasing designs (i.e. interesting shape, color, texture) seem to trigger positive responses in consumers such that they are willing to pay more. An often used example of aesthetic packaging is the trademarked shape of the Coca-Cola bottle (Reimann, Zaichkowsky, Neuhaus, Bender, & Weber, 2010). Similarly, Becker, van Rompay, Schifferstein, and Galetzka (2011) found that both package and color saturation impacted price expectations and willingness to buy, a result echoed by Rebollar, Lidón, Serrano, Martín, and Fernández (2012). Therefore, based on the previous research findings, we propose the following hypothesis:

H2: There are differences in beverage service vessel in regard to consumer WTP.

In addition, as taste is a hedonic dimension of quality (Grunert, Bech-Larsen, & Bredahl, 2000), the taste perception of a beverage is likely to influence downstream behaviors. Research has shown taste expectations and perceptions influence consumption volume, choice (Raghunathan, Naylor, & Hoyer, 2006; Wansink, Payne, & North, 2007) and the visual display of a food and/or beverage influences taste evaluations and consumer WTP for the food item (Wan, Zhou, et al., 2015; Wansink, Payne, & Painter, 2014). For instance, Kuo and Barber (2014) studied the impact of restaurant dishware materials and design on WTP. They found consumers were willing to pay a higher price for food served on ceramic plates than paper plates, and that this effect was mediated by product evaluation. Thus, we propose the effect of a beverage vessel on WTP works through taste perceptions such that the greater the taste rating, the higher the willingness to pay. Stated formally:

H3: Beverage service vessel will influence WTP and the effect will be mediated by taste perceptions.

3. Study 1

3.1. Study design and sample

A scenario-based single-factor between-subjects experiment with four experimental conditions (aluminum can vs. glass cup vs. plastic cup vs. glass bottle) was conducted. The experiment was set up as an "evaluation of a beverage" task using images of the four different forms of beverage vessels. In each condition, after reviewing an image of the product, participants responded to questions about their taste expectations and willingness to pay (WTP) for the product. Random assignment was used to improve reliability and validity of the manipulated factors and to reduce individual biases that may occur due to differences among participants (Kuehl, 2000; Lu & Gursoy, 2017).

Participants were recruited online via Amazon Mechanical Turk (mTurk). MTurk is an Internet crowdsourcing marketplace run by Amazon.com in which "Human Intelligence Tasks" (HITs) are posted and "workers" are paid to complete HITs. Generally speaking, samples made up of online participants appear to be more representative of the population than lab-based studies (Woods, Valasco, Levitan, Wan, & Spence, 2015), and several studies have demonstrated support for the use of mTurk samples for behavioral research. These studies indicate that mTurk participants are capable of providing high-quality reliable results, as the mTurk database includes participants with diverse demographic characteristics such as age, gender, residency, and socio-economic status (Buhrmester, Kwang, & Gosling, 2011; Casler, Bickel, & Hackett, 2013; Goodman, Cryder, & Cheema, 2013; Mason & Suri, 2012). Furthermore, online research is a useful complement to lab-based research (Woods et al., 2015). Using embedded tools (i.e. IP addresses to determine location, screening questions, and mTurk age restrictions), participants were limited to those over the age of 18 and living in the United States.

3.2. Pre-tests

To ensure the beverage images were appropriate for an online study design, they were pre-tested using the same sample recruitment methods as in the main study (mTurk), and adjusted based on feedback received from participants. Four beverage vessels containing cola were selected as the final images with the statement "All branding has been removed for this survey" included at the bottom in 10-point font (Images are provided in Appendix A).

Once the images were finalized a second pre-test was conducted to examine vessel durability. Since the haptic properties of the aluminum can and the plastic cup had the potential to be perceived as flimsier than the glass bottle and glass cup due to their materials, and previous research has found the durability or firmness of a beverage vessel can influence taste expectations/perceptions and WTP (Krishna & Morrin, 2008), it was necessary to ensure this would not be a confounding variable. One-hundred and thirteen participants were recruited through mTurk (56% female; M_{age} = 38 years). The same images and random assignment procedure used in the main study were used for this pre-test. After viewing the image of the beverage, participants completed a 2-item measure for durability. The items consisted of (1) "how would you rate the durability of the beverage vessel?" (1 = very weak; 7 = very strong) and (2) "how would you rate the firmness of the beverage vessel?" (1= not at all firm; 7 = very firm) (ρ = 0.77). The pretest concluded with demographic questions. Though a significant difference in beverage durability ratings was found (F (3, 109) = 6.90, p < .001), a Tukey's post-hoc test revealed the significance was driven by differences between the glass bottle versus plastic cup (p < .001) and the glass cup versus plastic cup (p < .01); both of which would be common knowledge based on consumers' experience. The difference in perceived durability between the other vessels was non-significant (*p's* > .08). Since glass is known to be more durable than plastic, these results were acceptable for use of the stimuli.

3.3. Procedures and measures

Participants were told the researchers were investigating the evaluation of beverages and were given the following scenario:

> "Imagine that you decide to go for a casual meal at a sit-down restaurant. The hostess greets you and takes you to your table, leaving you with the menu to review while you wait for your server. Your server comes to take your drink order and you order a soda. Then, the server returns with your beverage, pictured below".

With the exception of the aluminum can, the vessels shown were clear and contained a cola style of beverage. The aluminum can image was a standard silver can with no markings. As with other beverage studies designed to prevent brand associations from affecting assessments of the product, no brand information was provided (Cavazanna et al., 2017; Krishna & Morrin, 2008; Mirabito et al., 2017; Wilcox et al., 2013). Further, in order to control for the variety of sensory attributes that could influence consumers' perceptions, the height and diameter of all vessels were approximately the same. After viewing the image, participants completed a series of questions related to the beverage they reviewed.

Taste was captured using an established three-item, 7-point scale assessing the beverages taste, deliciousness, and flavor (1 = not at all; 7 = very). Item wording was modified to future tense to assess taste expectations and to fit the beverage-specific scenario; for example, "How delicious do you expect your beverage to be?" (Jang & Namkung, 2009; Lu & Gursoy, 2017; Namkung & Jang, 2007; Ryu, Lee, & Gon Kim, 2012). WTP was assessed by asking participants, "To assist a restaurant manager in determining beverage pricing, please indicate the maximum price you would be willing to pay for the beverage you reviewed" (Kuo & Barber, 2014; Mirabito et al., 2017). Participants then entered the dollar value in an open-ended response. To rule out perceived weight of the beverage from influencing the taste and/or WTP of the beverage, participants were asked to imagine picking up the beverage, and assess its weight (1 = very light; 7 = very heavy). A full list of measurement items is provided in Appendix B. An attention check measure was included within the study to exclude participants who were deemed not actively participating. Gender, age, participants' restaurant dining frequency, and spending habits were also collected.

3.4. Results

A total of 141 participants completed the study, were qualified by the attention check question, and were included in the analysis. The sample included slightly more female participants (57.4%) than male participants (42.5%). The age range of participants was 19-71, and the average age of the sample was 36 years old. Additional demographics are reported in Table 1.

>>> PLEASE INSERT TABLE 1 HERE <<<

3.4.1. Taste expectations. The three taste items were averaged to form a taste index. The level of internal consistency for this measure was acceptable, with a Cronbach's alpha value of 0.94. A one-way between-subjects analysis of variance (ANOVA) was conducted to explore the impact of beverage vessel on expected taste. Results revealed a main effect of beverage vessel (F (3,137) = 8.19, p < .001, η^2 = 0.15), thus supporting H1. Post-hoc analysis using the Tukey HSD test showed the expected taste of beverages served in the aluminum can (M = 4.42) to be significantly lower than the glass cup (M = 5.39), plastic cup (M = 5.82), and glass bottle (M = 5.38). The expected taste between the other vessels was non-significant (p >.05).

3.4.2. Willingness to Pay. A one-way between-subjects ANOVA was also conducted to investigate the influence of beverage service vessel on willingness to pay. Results supported H2, revealing a main effect of beverage service vessel on WTP (F (3,137) = 5.35, p < .001, η^2 = 0.11). Post-hoc analysis using the Tukey HSD test showed significant differences between the aluminum can (M = $1.50) and the glass cup (M = $2.42), plastic cup (M = $2.21), and glass bottle (M = $2.39). Again, the variance between the other vessels was non-significant (p > .05). Relevant statistics for both taste and WTP are summarized in Table 2.

>>> PLEASE INSERT TABLE 2 HERE <<<

3.4.3. Process evidence. To investigate taste as the underlying mechanism for participants' WTP based on the beverage vessel, a mediation analysis was conducted using PROCESS Model

4 with 5,000 bootstrap samples (Hayes, 2013). The indirect effect of beverage vessel on WTP was positive and supported mediation across conditions with the bootstrap confidence intervals failing to cross over zero (see Table 3).

>>> PLEASE INSERT TABLE 3 HERE <<<

3.4.4. Alternative explanation of weight. In order to determine whether haptic characteristics of the beverage vessel affected participant responses, we conducted additional analyses. First, a one-way ANOVA was conducted with perceived weight as the dependent variable. Results found the beverage vessel significantly influenced the perceived weight of the beverage in a pattern that mirrors taste and willingness to pay (F (3, 137) = 5.85, $p < .001$, $\eta^2 = 0.11$); indicating the can (M = 3.26) was perceived to be lighter than the glass cup (M = 4.24), plastic cup (M = 4.49), and glass bottle (M = 4.19). Building on the main effect results, an ANCOVA examining the effect of beverage vessel on taste expectations was run, which revealed perceived weight was not a significant covariate ($p > .40$). To rule out the alternative explanation of perceived beverage weight as the underlying mechanism driving the effect of beverage vessel on WTP, a second mediation analysis was conducted using PROCESS Model 4 with 5,000 bootstrap samples (Hayes, 2013). The indirect effect of the beverage vessel on WTP through perceived weight was non-significant at each level of the vessel, as the bootstrap confidence intervals each crossed over zero. Thus, the results demonstrate that perceived weight does not explain the effect of the beverage vessel on WTP.

3.5. Discussion

Our findings from Study 1 provide support for H1, H2, and H3. The vessel a beverage is served in influences a consumer’s taste expectations of the beverage and their willingness to pay for the beverage. Results showed that beverages served in aluminums cans are expected to taste worse than the other service vessel options and consequently, consumers are willing to pay less for these beverages. Furthermore, the findings support perceived taste as the underlying mechanism for the impact of service vessel on WTP. However, a limitation of Study 1 was that participants were only able to view the beverage vessel images, leaving the sensory element of taste perception under-examined. This limitation is addressed in Study 2.

4. Study 2

The purpose of Study 2 was to test Hypotheses 1 - 3 again in a real consumption experience in order to determine the extent to which the results from Study 1 were replicable as consumers moved from viewing the beverage to actually tasting the beverage prior to evaluation. A series of one-way ANOVAs along with PROCESS Model 4 were conducted in order to analyze the data collected in Study 2.

4.1. Study design and sample

To replicate the findings of Study 1, a single-factor experiment with the same four experimental conditions (aluminum can vs. glass cup vs. plastic cup vs. glass bottle) was conducted. This time, the experiment took place in a beverage lab at a large southeastern university where participants were able to see the vessel in a live setting and sample the beverage. As in Study 1, unlabeled/unbranded vessels were used and, to avoid any brand associations based on taste which could have confounded perceptions, a non-branded lightly flavored sparkling water was used rather than cola.

Participants were recruited from the university and invited to participate in a taste test of beverages. Participants were not aware of the purpose of the study and took part voluntarily. To achieve to same reliability and validity objectives as Study 1, random assignment to one of the four beverage vessel conditions was also used in Study 2. This experiment was approved by the university's Institutional Review Board.

4.2. Procedures and measures

With the exception of the aluminum can, the beverage vessels used in the experiment were purchased from a restaurant supplier. As new, unbranded aluminum cans were not readily accessible for non-commercial use, we purchased branded 12-oz aluminum cans from a local liquor store that were labeled with can sleeves as opposed to direct printing (Watermark Design, 2016). The sleeves were removed by a research assistant and the cans were then emptied and cleaned within the University beverage lab to ensure proper sanitization and to remove any potential contamination from the previous beverage (i.e. residual flavor or aroma). Upon completion of this process, the can had the shiny silver exterior of new, unbranded aluminum cans sold to beverage manufacturers. The bottles were standard 12-oz clear bottles used in the packaging of a wide variety of both alcoholic and non-alcoholic beverages. To keep the glass and cup conditions as similar as possible to the can and bottle, the vessel sizes were kept the same at 12 fluid ounces in volume and were clear in nature. The plastic cup was made of a hard plastic, similar to cups used for soda and water in many restaurants. Images of the vessels used are provided in Appendix C.

In order to control for brand associations based on previous consumption experiences, which could confound responses, a generic product was selected over a branded product, and clear, lightly flavored sparkling water was used instead of soda. Each beverage vessel assigned to the condition was filled with 11 ounces of the chilled sparkling water product and placed on the tabletop with a clear straw inserted immediately prior to participants entering the room. The study questionnaire was placed alongside the vessel. All participants in the same session received the same beverage vessel. Participants were brought into the lab in groups of 8 – 10, seated separately in front of the respective beverage vessel, and asked to sample as much or as little as they would like. As a further control, following the procedure used by Krishna and Morrin (2008), participants were asked to sip through a straw and to avoid touching the vessel. This control was designed to prevent any transference based on haptic properties, such as vessel weight, hardness, or texture. After tasting the beverage, participants completed a brief pencil-and-paper questionnaire which contained the same three-item taste scale (α = 0.82) and demographic items used in Study 1. For the taste scale, the wording was modified slightly in order to assess taste perceptions rather than taste expectations; for example, "How delicious is the beverage?" (1 = not at all; 7 = very). Willingness to pay was assessed by asking participants to select the highest price they would pay for the beverage on a 9-point scale with endpoints of "I would not pay for this beverage" and "more than $7" (Kuo & Barber, 2014; Mirabito et al., 2017). Please refer to Appendix B for means and standard deviations of all measurement items.

4.3. Results

Eighty-two participants completed the study and were included in the analysis. The sample consisted of 23 males and 59 females, with a mean age of 23 years and an age range of 18-50. See Table 1 for additional demographics.

4.3.1. Taste. The results from a one-way ANOVA test revealed a significant main effect of beverage service vessel on taste evaluation (F (3,78) = 3.691, $p < .05$, $\eta^2 = 0.12$), which provided further support for H1. A post-hoc Tukey HSD test was conducted, and results showed that the mean score for the aluminum can (M = 4.15) was significantly lower than the glass cup (M = 5.17) and the glass bottle (M = 5.13).

4.3.2. Willingness to Pay. H2 was also supported, as a significant main effect of beverage vessel on WTP was found (F (3,77) = 3.447, $p < .05$, $\eta^2 = 0.12$), with post-hoc Tukey HSD results indicating the mean score for the aluminum can (M = \$2.10) was again lower than the glass cup (M = \$2.86) and the glass bottle (M = \$2.95). Relevant statistics for both taste and WTP are reported in Table 4.

>>> PLEASE INSERT TABLE 4 HERE <<<

Thus, the results for H1 and H2 from Study 2 were only slightly different than those obtained in Study 1, as in Study 2 no significant difference was found between aluminum cans and plastic cups for taste. The other results were replicated across the two studies. The aluminum can was the driver of significant differences for taste and for WTP; in both studies the lowest taste rating was attributed to the beverage served in the aluminum can and the amount participants were willing to pay was significantly lower for the can than any of the other vessel types. Another common finding across both studies was that no significant differences existed between any other vessel combinations (i.e. glass vs. plastic cup, plastic cup vs. glass bottle, etc.). Figures 1 and 2 provide a visual comparison of the results of Studies 1 and 2 for taste and WTP. Notably, the patterns in terms of mean WTP scores for both studies are identical, and the pattern for mean taste scores are almost identical, with plastic cup as the only variation.

>>> PLEASE INSERT FIGURES 1 AND 2 HERE <<<

4.3.3. Process evidence. To assess whether the effect of the beverage vessel on WTP works through taste perceptions, PROCESS Model 4 with 5,000 bootstrap samples was used to conduct a mediation analysis (Hayes, 2013). Study 2 also provides support for H3 as, across conditions, the indirect effect of beverage vessel on WTP was positive and the bootstrap confidence intervals failed to cross over zero, suggesting a significant mediation effect (see Table 5). The results show that participants who were assigned to the glass, plastic cup, and glass bottle conditions rated the beverage as tasting better than those in the aluminum can condition, and this enhancement in taste perceptions led to an increase in their WTP for the beverage.

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5. Discussion and implications

5.1. Discussion

The current paper examined the influence of beverage service vessel on consumer evaluations of taste and subsequent willingness to pay for the beverage in an on-premise service experience, and the findings contribute to the extant literature in several ways. First, we provide confirmation of previous findings, which is valuable given the recent calls for replication and reproducibility of scientific results (Baker, 2016). Although it was not our aim to replicate one single study, we intentionally incorporated stimuli and procedures from current beverage literature into our design (cf. Barnett et al., 2016; Cavazzana et al., 2017; Mirabito et a., 2017). Second, by investigating the effects across different types of beverages and a wide variety of service vessels, this study also extends prior research and offers additional external validity. As such, we believe the results of this article offer relevant theoretical and practical implications, as well as further extensions for continued research.

5.2. Theoretical implications

This research offers several academic contributions. First, by isolating the beverage vessel attributes to only the visual cue, and eliminating other sensory influences, we contribute to the literature on sensory cues, packaging and taste perceptions. The combined results provide evidence that the visual elements of a beverage vessel do impact taste expectations and post-consumption taste perceptions. This result can be explained by research on cross-modal correspondences and shape symbolism, which theorizes that individuals have a tendency to associate an attribute in one sensory mode with an attribute in another sensory mode. More specifically, as it pertains to food and beverage, shape symbolism refers to the cross-modal mapping that exists between abstract shapes (a visual attribute) and other sensory attributes (Spence, 2012). Additionally, our results support the literature indicating that visual cues can dominate other sensory cues (Elder & Krishna, 2010; Hoegg & Alba, 2007), but more significantly, also extend this literature by demonstrating that the sensory interaction between vision and taste is sufficient, in and of itself, to change consumer ratings of their beverage without the influence of touch.

Second, through the use of two experimental studies using the same manipulated conditions and controls in different settings (an online scenario vs. live study in a lab), the findings of this research offer consistent evidence of the effect of packaging and presentation on WTP which advances prior studies (e.g. Mirabito et al., 2017; Wan, Zhou, et al., 2015). Although Study 1 used images and Study 2 used physical vessels, consumers were willing to spend the least for beverages served in the aluminum can across both studies. While the congruency effect (Wan, Zhou, et al., 2015) may be responsible for the results of Study 2, as canned sparkling water is the newest entry to the water sub-category and thus could have been perceived as an incongruent presentation, the participants in Study 1 viewed images of cola, a beverage for which presentation in a can is quite common. Thus, it is unlikely the type of beverage is responsible for the result.

Finally, these results also add to the body of research on judgmental heuristics by demonstrating how the vessel a product is served in may lead to differing sensory perceptions of that product. Notably, beverages served in aluminum cans were perceived to taste worse than the same beverage served in other vessels, and this effect was quite strong, as indicated by the relatively large effect sizes. Previous researchers have suggested that consumers use product packaging as a cognitive shortcut to make inferences about other attributes unrelated to appearance, such as taste or value (Becker et al., 2011; van Rompay et al., 2017). Our results support the theory that the use of heuristics by consumers can alter the consumption experience through taste (mis)perceptions (Provencher & Jacob, 2016). Moreover, our mediation results clarified that taste also serves as the mechanism through which packaging and presentation influence other downstream behaviors, such as WTP.

5.3. Managerial implications

This research also offers implications for foodservice venues such as restaurants and bars. Broadly speaking, operators must be aware that the vessel a beverage is served in has an impact on the consumer experience, and therefore should be taken into account when developing beverage menus. As discussed at the beginning of this article, beverage vendors offer their clients a variety of forms to serve a beverage (e.g. Coke can be served in a can, bottle, or fountain-dispensed into a cup/glass), and it is critical for operators to realize this choice has an impact on their bottom line. More specifically, the low ratings for both taste and WTP for the aluminum can are an interesting result from a practical standpoint, given that the craft/artisanal movement continues to trend and more products designed to garner a premium price point, including beer, water, specialty coffee, and tea, are sold to on-premise units in canned form. The shift towards aluminum cans is among the key trends in beverage packaging, since cans are more affordable than glass (Harfmann, 2017). Furthermore, brands like Red Bull encourage on-premise foodservice venues to provide the customer with the entire can, on the basis that this provides a brand awareness opportunity for the manufacturer (Breakthru Beverage Group, 2015). Operators should weigh the perceived benefit of having craft items on their menu and/or supporting brand awareness against the potential for a downgraded consumer experience and decreased rates of repurchase. In larger operations and more upscale restaurant segments, a shift to alternate presentation options may allow the operator to capitalize on the craft trends and maximize the consumer experience, thereby generating more revenue since the consumer is willing to pay more for their beverage. However, for fast-casual operations, the majority of beverages beyond fountain sodas are sold in a ready-to-drink format, meaning cans and bottles, and thus operators of these establishments should be judicious in their beverage menu decisions.

Another implication for operators stems from Study 1, which measured taste expectations based on images. More and more consumers are reviewing menu photos online via a restaurant's website or social media account prior to visiting an establishment (Kuo & Barber, 2014). Including beverage photos with appropriate vessel selections could make a difference in impacting customer product evaluations and WTP, especially in bars and other venues that rely on image-heavy channels such as Instagram. Finally, the lack of a significant difference between the glass cup and plastic cup offers implications for the casual dining restaurant segment. As the cost for plastic cups is typically lower than glasses, restaurateurs would have support for choosing a lower-cost option that will not influence the consumer hedonic experience or their willingness to pay for the same beverage.

5.4. Limitations and future extensions

While the findings of this research have relevant implications, there are limitations that provide opportunities for future research. For example, in order to avoid input from the haptic senses, participants did not have the opportunity to touch the beverage vessel. However, haptic-tactile properties have also been shown to influence taste (Spence & Van Doorn, 2017), and therefore future research would benefit from controlled studies of the interaction between visual and haptic inputs and those effects on taste. This line of research would be particularly relevant in an on-premise service environment where consumers hold and/or carry their beverages (e.g. bars without seating) during the consumption experience.

Second, although we presented a broad range of beverage vessel conditions, participants only viewed or tasted a single beverage type (cola in Study 1 and flavored sparkling water in Study 2). Future research could examine whether the effects we found translate to other, more complex, beverage sub-categories, such as craft beer and specialty coffees and teas. In line with this complexity, more nuanced measures of taste could also be incorporated, such as intensity, acidity, and bitterness.

Other areas deserving of more attention include associations with service context, quality, and consumption volume. Kuo and Barber (2014) proposed that when consumers viewed food served on plates they deemed to be of higher quality, they immediately associated the food with a specific (higher-end) restaurant type, which in turn influenced their WTP to increase. We speculated that the difference in WTP ratings may have been driven by a subconscious association of the beverage vessel with a specific service context, in this case a restaurant type, as our focus was the on-premise experience. However, this remains a theory that should be explored in future studies, to determine if there is linkage between beverage service vessel and restaurant type, or between beverage service vessel and perceptions of restaurant quality. For instance, it would be interesting to see how congruency of the beverage vessel and the type of restaurant (e.g., fast-casual, fine dining, etc.) influences taste and WTP. Understanding the effect of beverage vessel in an off-premise service context, where packaging of the beverage becomes more important in terms of convenience and the need to “grab and go” would also be a relevant line of future inquiry. Previous research has also shown that larger containers lead to greater consumption (Wansink &

Kim, 2005). Building on this, future research could examine the rate of consumption across a variety of beverage vessels, as this would have important real-world applications from both a sales perspective and, specific to alcoholic beverages, from a responsible vendor perspective, where consumers should be encouraged to indulge responsibly.

There is an old adage that says one should never judge a book by its cover. Yet, when it comes to beverage packaging and presentation and the cross-modal influence on taste and consequent impact on downstream behavior, the present research suggests consumers are doing exactly that.

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TABLES & FIGURES

Table 1
Demographic profile of sample.

	Study 1 (N = 141)		Study 2 (N = 82)	
	N	%	N	%
Gender				
Male	60	42.5	23	28.0
Female	81	57.4	59	72.0
Frequency of dining Out				
Daily	5	3.6	4	4.9
Weekly	99	70.0	52	63.4
2-3 times per month	28	20.0	21	25.6
Less than once per month	0	0.0	5	6.1
Never	9	6.4	0	0.0
	Mean (SD)	Range	Mean (SD)	Range
Age	36.07 (11.69)	19 - 71	22.6 (4.89)	18 - 50
Typical spend when dining out	$15.69 (9.11)	$3 - $50	$16.18 (6.38)	$7 - $40

Table 2
Study 1 ANOVA results for taste and WTP by beverage vessel.

	Can (N = 34)	Glass (N = 34)	Plastic Cup (N = 37)	Bottle (N = 36)			
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*F*	Sig.	η^2
Taste	4.42 (1.35)	5.39 (1.30)	5.82 (1.02)	5.38 (1.20)	8.19	0.000	0.15
WTP	$1.50 (1.10)	$2.42 (1.34)	$2.21 (0.77)	$2.39 (1.13)	5.35	0.000	0.11

Table 3
Study 1 mediation analysis results.

	Coefficient	S.E.	95% C.I.
Direct effect on taste			
Glass (X1)	0.971	0.296	0.385, 1.56
Plastic Cup (X2)	1.400	0.290	0.825, 1.97
Bottle (X3)	0.958	0.292	0.381, 1.54
Direct effect on WTP			
Glass (X1)	0.669	0.265	0.145, 1.19
Plastic Cup (X2)	0.353	0.270	-0.181, 0.887
Bottle (X3)	0.650	0.261	0.134, 1.167
Taste	0.259	0.074	0.113, 0.404
Relative indirect effect			
Glass (X1)	0.251	0.107	0.072, 0.493*
Plastic Cup (X2)	0.362	0.120	0.148, 0.617*
Bottle (X3)	0.248	0.100	0.075, 0.470*

Note: Reference group is aluminum can
* Indicates significant mediation effect, as 95% confidence interval did not pass through zero

Table 4
Study 2 ANOVA results for taste and WTP by beverage vessel.

	Can (N = 20)	Glass (N = 21)	Plastic Cup (N = 20)	Bottle (N = 21)			
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*F*	Sig.	η^2
Taste	4.15 (1.42)	5.17 (1.10)	5.07 (1.02)	5.13 (0.97)	3.69	0.015	0.12
WTP	$2.10 (0.72)	$2.86 (0.73)	$2.70 (1.22)	$2.95 (0.96)	3.48	0.021	0.12

Table 5
Study 2 mediation analysis results.

	Coefficient	S.E.	95% C.I.
Direct effect on taste			
Glass (X1)	1.020	0.358	0.312, 1.74
Plastic Cup (X2)	0.917	0.362	0.195, 1.64
Bottle (X3)	1.020	0.362	0.294, 1.74
Direct effect on WTP			
Glass (X1)	0.563	0.297	-0.027, 1.15
Plastic Cup (X2)	0.427	0.297	-0.165, 1.02
Bottle (X3)	0.658	0.300	0.061, 1.25
Taste	0.189	0.090	0.010, 0.368
Relative indirect effect			
Glass (X1)	0.194	0.116	0.016, 0.459*
Plastic Cup (X2)	0.173	0.097	0.009, 0.382*
Bottle (X3)	0.192	0.110	0.018, 0.445*

Note: Reference group is aluminum can

* Indicates significant mediation effect, as 95% confidence interval did not pass through zero

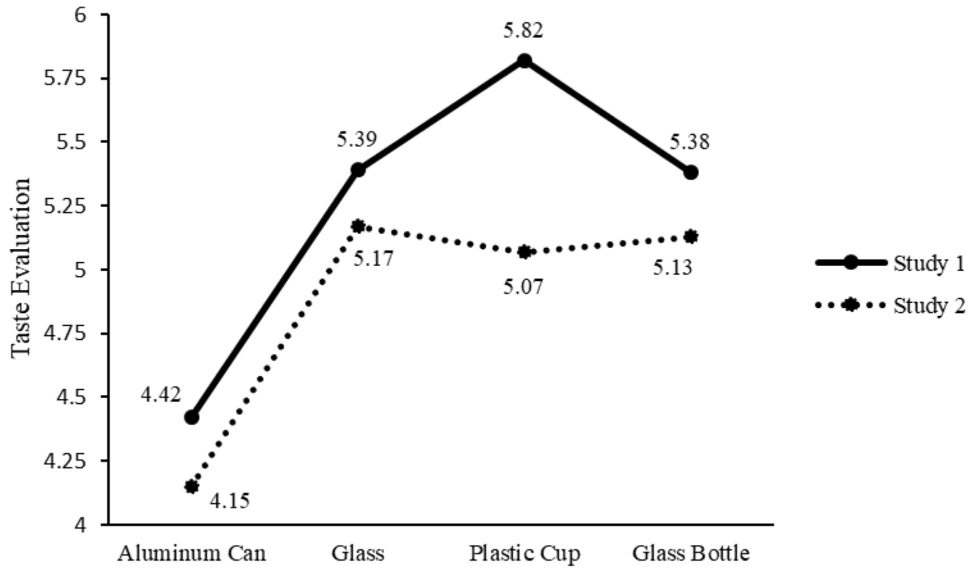

Fig. 1

Means of taste evaluations for studies 1 and 2.

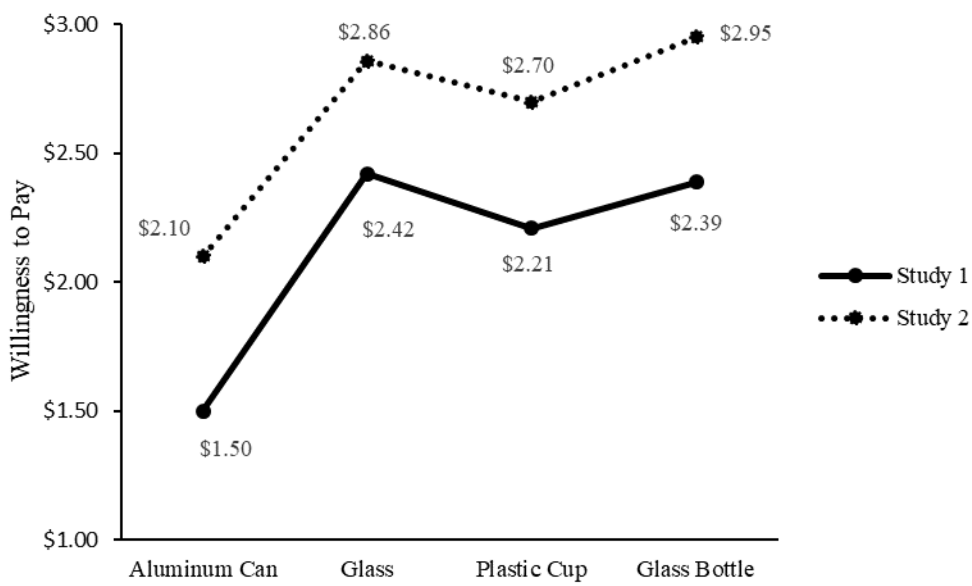

Fig. 2

Means of willingness to pay for studies 1 and 2.

Appendix A.

Fig. A1

Images used in Study 1.

(a) = aluminum can; (b) = glass cup; (c) = plastic cup; (d) = glass bottle

All images contained the text “All branding has been removed for this survey”

Appendix B.

Table A1

Study 1 measurement items, means, and standard deviations.

Item	Can (N = 34)	Glass (N = 34)	Plastic Cup (N = 37)	Bottle (N = 36)	Cronbach's Alpha
Taste Index	4.42 (1.35)	5.39 (1.30)	5.82 (1.02)	5.38 (1.20)	0.94
Taste1: How would you expect this beverage to taste? (1 = very bad; 7 = very good)	4.41 (1.33)	5.41 (1.28)	5.84 (1.01)	5.33 (1.31)	
Taste2: How flavorful would you expect the beverage to be? (1 = not at all flavorful; 7 = very flavorful)	4.47 (1.42)	5.47 (1.33)	5.84 (1.21)	5.53 (1.37)	
Taste3: How delicious would you expect the beverage to be? 1 = not at all delicious; 7 = very delicious)	4.38 (1.42)	5.29 (1.40)	5.78 (1.21)	5.28 (1.34)	
WTP: To assist a restaurant manager in determining beverage pricing, please indicate the maximum price you would be willing to pay for the beverage you reviewed. (Open-Ended)	$1.50 (1.10)	$2.42 (1.34)	$2.21 (0.77)	$2.39 (1.13)	
Imagined Weight: Imagine picking up the beverage. Do you think it would be: (1 = very light; 7 = very heavy)	3.26 (1.14)	4.24 (1.30)	4.49 (1.17)	4.19 (1.56)	

Table A2

Study 2 measurement items, means, and standard deviations.

Item	Can (N = 20)	Glass (N = 21)	Plastic Cup (N = 20)	Bottle (N = 20)	Cronbach's Alpha
Taste Index	4.15 (1.42)	5.17 (1.10)	5.07 (1.02)	5.13 (0.97)	0.82
Taste1: How would you expect this beverage to taste? (1 = very bad; 7 = very good)	4.15 (1.53)	5.05 (1.28)	5.10 (1.12)	5.15 (1.31)	
Taste2: How flavorful would you expect the beverage to be? (1 = not at all flavorful; 7 = very flavorful)	4.50 (1.50)	5.67 (1.07)	5.35 (1.09)	5.29 (1.01)	
Taste3: How delicious would you expect the beverage to be? 1 = not at all delicious; 7 = very delicious)	3.80 (1.85)	4.81 (1.66)	4.75 (1.33)	4.86 (1.40)	
WTP: What is the highest price you would pay for this beverage? (1 = I would not pay for this beverage; 9 = more than $7)	$2.10 (0.72)	$2.86 (0.73)	$2.70 (1.22)	$2.95 (0.95)	

Appendix C.

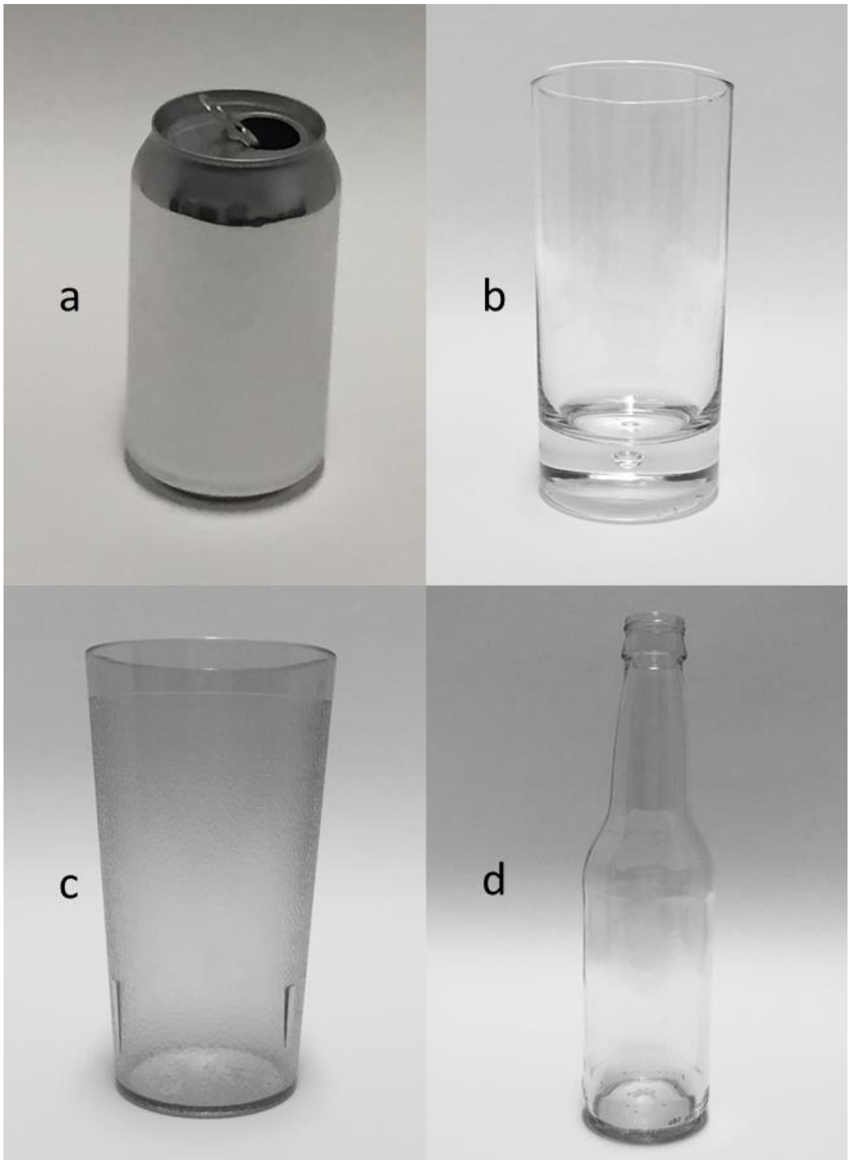

Fig. A2

Beverage vessels used in Study 2

(a) = aluminum can; (b) = glass cup; (c) = plastic cup; (d) = glass bottle