Elements of Style in Floral Arrangements: How Discerning Are Consumers Toward Floristry Design Principles and How Much Are They Willing to Pay?

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Abstract. Florists use design theory to create arrangements that they assume will be pleasing to consumers, thus increasing purchase rates and spending. However, certain elements of design theory and their relationship with consumer acceptance and spending have not been empirically tested. Using mixed logit models and eye-tracking technology, we investigated whether consumer preferences support three key elements of existing floral design theory: line, color, and form. We also examined consumer preferences for floral species, which, although not a traditional element of design theory, may influence consumer purchasing decisions. Our findings challenge existing design theory because consumers did not uniformly favor it. Instead, they valued symmetrical form, arrangements with similar (but not identical) colors, and, surprisingly, the presence of roses in an arrangement was the most crucial factor in capturing consumer attention and increasing the willingness to pay.

Keywords. consumer preference, consumer purchasing, design theory, floral arrangement, floral design, floristry.

Floral arrangements predate agriculture, with flowers found lining the grave of a Natufian site more than 11,000 years ago (Nadel et al. 2013). The use of floral decorations likely predates even this, because people adorned themselves and their dwellings with flowers, just as they did with other precious natural artifacts such as shells, feathers, and bones.

The first evidence of formal floral arrangements dates back to the Egyptian New Kingdom period of approximately 1500 BC, which was a particularly wealthy and powerful era for Egypt. During this time, flowers transitioned from single-species bundles to ornate, multispecies arrangements designed by master craftworkers (Tomashesvka 2019). This period marked the emergence of what could be considered the first floral industry, during which supervisors inspected flowers picked by gardeners and florists worked in cooler night temperatures to produce arrangements of stunning variety and intricacy (Tomashesvka 2019).

Throughout history, flowers have gained spiritual significance, representing or paying homage to certain deities. For instance, the lotus flower of Buddha represents enlightenment, and the lily of Madonna represents purity. Floral arrangements were used to decorate royal courts, imperial palaces, and cathedral altars. They became ubiquitous markers of significant life events such as births, deaths, and marriages. In Victorian England, flowers were a secret language, with each species conveying a specific sentiment, question, or intention. Floral literacy was expected, particularly among the middle and upper classes. Floral arrangements were used to communicate secret messages between lovers, prolong the anticipation of courtship, and even serve as moral lessons for third-party observers (Engelhardt 2013).

The significance of flowers endures to this day. They are still used to mark important events and express sentiments, and they are ubiquitous in every level of society, culture, and demographic. Technological advances have increased accessibility to rare species, facilitated the creation of new hybrids, and enabled the rapid dissemination of these commodities worldwide. The floral industry is currently valued at $6 billion in the United States alone (Rose 2022), with arrangements comprising a significant portion of the revenue.

However, despite technological advancements, the modern floral industry faces constraints similar to those during antiquity. First, although cut flowers are grown and harvested like produce, they are mostly ornamental and lack significant utilitarian value, except for a small but growing market segment involving teas, medicine, and edible flowers (Shantamma et al. 2021). Second, flowers encounter the same challenges as produce in terms of growing, harvesting, and distribution, such as the need for a climate-controlled environment and a short shelf life. Third, because flowers are often considered luxury items (Hughes 2000), their value is entirely subject to consumer preferences and market trends.

New challenges for the floristry industry include budget-conscious consumers opting for unordered over arranged flowers and suboptimal revenue relative to employee output (Rose 2022). A study of floral consumers found that, in addition to the short shelf life, individuals aged 18 to 32 years and 33 to 50 years considered the prices of floral arrangements unreasonably high compared with other gifts like wine. These age groups also criticized the “trendiness” of flowers as gifts, although “trendiness” was not precisely defined (Ruhn et al. 2011).

Since 2000, overall florist sales in the United States have shown a downward trend, decreasing from $8.17 billion to $6.01 billion in 2022 (Rose 2022; Statista 2023). The number of florists in the United States declined at a faster rate than the retail trade sector and the economy overall (World 2022), with an average negative growth rate of 1.5% from 2017 to 2021 (Rose 2022). Sales in brick-and-mortar flower stores have decreased, and the number of florists has declined; however,
online store 1-800-flowers.com is one of the largest vendors (Cohen 2016; Linker 2020; Yue and Behe 2008). Supermarkets and superstores increasingly compete with florists by offering high-quality arrangements, placing pressure on florists to differentiate themselves and rely on other elements of their value to entice consumers to buy arrangements from their stores (Perdomo 2023). Overall, the floristry industry has been described as “struggling” (Rose 2022).

Given these constraints, it is critical for the floral industry to understand consumer purchasing behavior, particularly the preferences that drive it. Data already exist regarding several aspects of flower sales. For instance, ~80% of flowers are purchased as gifts, with the most imported species being roses, carnations, alstroemeria, and chrysanthemums (Loyola et al. 2019). Consumers prefer to purchase arrangements from brick-and-mortar florists as well as online (Yue and Behe 2008).

However, there are limited data regarding the type of arrangements that consumers prefer, including their specific properties. These properties are known as the elements and principles of floral design, which encompass the attributes, characteristics, and artistic guidelines that constitute each arrangement. According to the American Institute of Floral Designers (2005), there are eight elements: line, form, color, space, texture, pattern, fragrance, and size. Floral arranging is an art form rather than a science. Although there are definitions of different elements of design and guidelines regarding how these elements might be used, there are few recommendations regarding which elements are more appealing or might persuade consumers to purchase more arrangements at higher price points. Thus, this study aimed to test consumer preferences for the following design elements: line, form, symmetry (described as an aspect of form), color, and species.

Floral design elements

Line. Line is the visual path that directs eye movement through an arrangement. One study found that a straight-line design significantly increased consumer willingness to pay (WTP) a high price point (Wu 2020). Nonfloral research discovered that people prefer straight lines (horizontal or vertical) over curved or broken lines (oblique) (Palmer et al. 2013). However, when choosing between two lines forming an angle and a curved line, people preferred curved lines (Silvia and Barona 2009).

Form. Form is a description of the height, width, and depth of an arrangement that is sometimes used interchangeably with shape (Geall 2020). Testing consumer preferences for all types of forms is challenging because of their vast variety. Instead, symmetry, an aspect of form, has been extensively studied. A symmetrical arrangement achieves balance through the replication of a shape, as if a line were drawn down the middle of the composition, and the same design elements applied to each side (Geall 2020).

Symmetry. Research has shown that people find symmetrical objects aesthetically pleasing, possibly because symmetrical objects are more easily processed than nonsymmetrical ones (Enquist and Arak 1994; Enquist and Johnstone 1997; Jacobsen and Höfèl 2002; Jacobsen et al. 2006; Leder et al. 2004). With flowers, symmetry refers to whether one half of the flower is a mirror image of the other. Bilateral flowers are symmetrical, whereas asymmetrical flowers are not. Flowers can also be divided into three or more identical images around the middle, known as radial symmetry. In terms of consumer preference, consumers tend to rate radially symmetrical flowers as most appealing (Hila and Flegr 2016; Knuth et al. 2021; Wu 2020), followed by asymmetrical flowers, with bilaterally symmetrical flowers being the least preferred (Knuth et al. 2021). However, there is limited published research regarding consumer preferences regarding the symmetry of floral arrangements.

Color. Color theory has a complex history, with color preference varying based on context, object, associated feelings, and variables such as lightness, saturation, and hue. Blue is often considered a preferred color, followed by red. Yellow, especially dark yellow, tends to be the least preferred color (Camgöz et al. 2002; Ellis and Fick 2001; Hurlbert and Ling 2007; Ou et al. 2004; Palmer et al. 2013; Zemach et al. 2007). However, color preferences vary cross-culturally. For example, the African Himba prefer yellow and dislike blue (Taylor et al. 2013), and Kuwaitis also do not like blue (Chounourian 1968). During studies that directly measured consumer preference for flower color, consumers mostly preferred red and blue, and yellow was least favored (Hila and Flegr 2016; Yue and Behe 2010). Nevertheless, a study of geraniums found that pink and white flowers were most preferred, whereas red and lavender were least preferred. However, with their introduction, blue flowers became preferred (Behe et al. 1999).

In terms of arrangements, because an arrangement comprises multiple flowers or objects, the color combination refers to how the colors of these different objects relate to each other. There are four main color combinations: monochromatic (one color and its tints and shades), analogous (colors near or next to each other on the color wheel), complementary (colors on opposite ends of the color wheel, e.g., blue–orange, yellow–purple), and polychromatic (colors with a random association). In container gardens, consumers mostly prefer complementary color combinations, followed by monochromatic and analogous schemes (Mason et al. 2008). In containers of edible flowers, one study found the color combination of blue, yellow, and orange was the most popular (Kelley et al. 2001).

Species. The species of a flower is not formally considered an element of design and is often described as a secondary consideration or in relation to the elements of design (American Institute of Floral Designers 2005). However, the species of the flower may play a critical role in driving consumer purchasing behavior. Consumers vary in their knowledge of flower species. One hypothesis is that easily recognizable flowers are more appealing to consumers (Knuth et al. 2021). For instance, roses are the top imported flowers in the United States, driving most sales on Valentine’s Day, which is the largest flower-purchasing event of the year. Chrysanthemums, another top imported flower, dominate sales on Mother’s Day, which is the second-largest flower-purchasing event (Perdomo 2023). Consumers generally prefer multiple species in container gardens over single species (Kelley et al. 2002; Mason et al. 2008). Roses are often rated as the most attractive species, followed by dahlia, ranunculus, and anthurium (Knuth et al. 2021). Interestingly, when these more expensive species were replaced with inexpensive ones, consumers were just as willing to pay, and there was no difference in the attractiveness of the arrangements (Knuth et al. 2021).

Methods

Participants

Participants were recruited through newspaper ads, Craig’s List, Homeowner’s Association listservs, Facebook community groups, and previous or interested participants who were recruited via these methods for a subject pool maintained by the Human Behavior Laboratory at Texas A&M University. The sample size included 126 participants. The majority of participants were 18 to 34 years old (62%), followed by the 35 to 44 years old (11%), 45 to 54 years old (10%), 55 to 64 years old (12%), and 65 to 74 years old (5%). The sample was predominantly female (65%). There were high levels of participants with bachelor degrees (37%) and graduate degrees (35%). The income distribution was relatively equal across all categories, including households with income less than $30,000 (25%), $30,000 to $49,000 (20%), $50,000 to $69,000 (17%), $70,000 to $80,000 (11%), and more than $90,000 (28%) (Table 1). Participants identified their race as White (65%), Asian (16%), Black (7%), or Other (11%).

The most common frequency of flower purchasing was yearly (64%), followed by never purchasing flowers (21%) and monthly (15%) (Table 1). Favorite colors of flowers varied from white to black and from red to purple (Supplemental Appendix, Table A1). The most popular flower color was blue, with 25% of participants indicating that it was their favorite color (Supplemental Appendix, Table A1).

Materials

Participants visited the Human Behavior Laboratory at Texas A&M University (College Station, TX) over a period of 9 months (March–November) in 2019. The protocol and instruments were approved by the University Committee on Research Involving Human Subjects (IRB2019–0717M). Subjects were recruited through e-mail invitations sent to the general community. To avoid skewing the sample toward student populations, we ensured diverse recruitment from the general...
Table 1. Demographic characteristics of participants and frequency of flower purchase.

<table>
<thead>
<tr>
<th>Sample characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample</td>
<td>126 (100%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>29 (24.6%)</td>
</tr>
<tr>
<td>25–34</td>
<td>44 (37.3%)</td>
</tr>
<tr>
<td>35–44</td>
<td>13 (11.0%)</td>
</tr>
<tr>
<td>45–54</td>
<td>12 (10.2%)</td>
</tr>
<tr>
<td>55–64</td>
<td>14 (11.8%)</td>
</tr>
<tr>
<td>65–74</td>
<td>6 (5.1%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>43 (35%)</td>
</tr>
<tr>
<td>Female</td>
<td>81 (65%)</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
</tr>
<tr>
<td>High School/GED</td>
<td>27 (21.8%)</td>
</tr>
<tr>
<td>Associate degree</td>
<td>8 (6.45%)</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>46 (37.1%)</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>43 (34.7%)</td>
</tr>
<tr>
<td>Annual household income</td>
<td></td>
</tr>
<tr>
<td>≤$29,999</td>
<td>30 (24.6%)</td>
</tr>
<tr>
<td>$30,000–$49,999</td>
<td>24 (19.7%)</td>
</tr>
<tr>
<td>$50,000–$69,999</td>
<td>21 (17.2%)</td>
</tr>
<tr>
<td>$70,000–$89,999</td>
<td>13 (10.7%)</td>
</tr>
<tr>
<td>≥$90,000</td>
<td>34 (27.9%)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>81 (65.3%)</td>
</tr>
<tr>
<td>Black</td>
<td>9 (7.26%)</td>
</tr>
<tr>
<td>Asian</td>
<td>20 (16.1%)</td>
</tr>
<tr>
<td>Other</td>
<td>14 (11.29%)</td>
</tr>
<tr>
<td>Frequency of floral purchase</td>
<td></td>
</tr>
<tr>
<td>Yearly</td>
<td>79 (63.7%)</td>
</tr>
<tr>
<td>Monthly</td>
<td>19 (15.3%)</td>
</tr>
<tr>
<td>Weekly</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Never</td>
<td>26 (21.0%)</td>
</tr>
</tbody>
</table>

Additional demographic information is in Supplemental Appendix A.

GED = general education development.

population. Upon arrival at the testing location, participants entered the lobby and completed a consent form. The subjects were randomly assigned to test stations within the testing room in the laboratory and then seated. The eye-tracking software, iMotions, was calibrated to the participants’ eye movements. The experiment was presented through iMotions software on the computer’s monitor (24 inches wide × 18 inches high).

The stimulus images were integrated into the iMotions Biometric Research Platform 7.0 (iMotions A/S, Copenhagen, Denmark). The eye-trackers used were Tobii X2–60 and Tobii Spectrums set to collect at 60 Hz (standardized according to the X2–60 user manual).

The experiment began with instructions and one practice slide. It followed a discrete choice design, whereby participants selected from different hypothetical alternatives. Participants viewed 16 slides, with each containing four floral photographs (Fig. 1). A computer-generated randomizer determined the optimal combinations. On each slide, the question "Which of these floral arrangements do you prefer?" appeared. After visually evaluating each scenario, subjects rated their likelihood to buy one of the four floral designs presented on the screen. The WTP was measured using an 11-point Juster scale (0 = no probability of purchase; 10 = certain probability of purchase). Participants could choose only one arrangement on the screen to proceed.

At the end of the experiment, subjects completed a separate computer-based questionnaire (Qualtrics Online Survey Software) containing sociodemographic information. The experiment required 10 to 15 min to complete. Upon completion, the experimenter thanked the participants and compensated them with $30 for their participation.

Stimuli

To develop the study stimuli, 64 images were selected from the photographs taken by a professional photographer. An algorithm randomly assigned each person the best set of alternatives (called a choice set) to evaluate to maintain a manageable number of product evaluations per respondent. The choice experiment includes 16 choice sets consisting of four product alternatives each, for a total of 64 products using a D-efficient fractional factorial design. These combinations are required for proper identification of each attribute so that WTP estimates can be calculated. Each combination is listed in Table A2 in Supplemental Appendix A. The product combinations were designed based on a mathematical algorithm that ensured a balanced and orthogonal design that maximized the efficiency of the design for these two factors and enabled us to estimate WTP values associated with each of the design elements being examined.

Flowers were purchased at flower wholesalers in Houston, TX, USA, and the arrangements were created by accredited Certified Floral Designers at the Benz School of Floral Design the day before photographs were taken. The day after the arrangements were created (when arrangements are recognized to “peak” in their most optimal form), a professional photographer was hired to take and process the photographs. Each design was photographed four times (twice straight ahead and twice at a 45-degree angle from above). The photographs were edited to remove the background and imported into iMotions Biometric software and randomized to prevent picture ordering effects.

Floral attribute definitions

Line. Straight is when an unbroken line, whether vertical, horizontal, or diagonal, can be drawn through the center of the arrangement. Oblique is when a curving, bending, or dynamic “moving” line can be drawn through the center of the arrangement.

Symmetry is when a line can be drawn down the middle of the arrangement and it is mirrored on each side (asymmetric is when a line is drawn down the middle of the arrangement it is not mirrored on each side).

Color. There are four common color harmonies. Monochromatic refers to one color on the color wheel. White is generally not considered a color in color theory, but it is included because many species of flowers are white. Complementary refers to two colors opposite of each other on the color wheel. Analogous refers to three colors adjacent to each other on the color wheel. Polychromatic refers to four or more colors on the color wheel that have a random association. Each...
Table 2. Elements and variables.

<table>
<thead>
<tr>
<th>Design elements</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line</td>
<td>Straight, oblique (base)</td>
</tr>
<tr>
<td>Symmetry</td>
<td>Symmetrical, asymmetrical (base)</td>
</tr>
<tr>
<td>Color</td>
<td>Polychromatic (base), monochromatic, complementary, analogous</td>
</tr>
<tr>
<td>Main species</td>
<td>Roses, carnations, chrysanthemums, alstroemeria (baseline)</td>
</tr>
<tr>
<td>Price points</td>
<td>Arrangements were created based on $20, $40, $60, $80 price points (price levels were not presented in the study but were calculated based on WTP estimates)</td>
</tr>
</tbody>
</table>

WTP = willingness to pay.

of these color harmonies are mutually exclusive (i.e., an arrangement cannot be both complementary and polychromatic).

Species. Species refers to the main species or the most numerous species used in the arrangement (mass or filler flowers). The species were based on the following four most imported flowers because consumers are most likely to recognize these species: roses, carnations, chrysanthemums, and alstroemeria.

Price points. The price points for arrangements were based on the number of flowers that could be purchased from the floral wholesaler at $20, $40, $60, and $80. The price points were chosen because they represent common price levels for floral arrangements in the retail setting and are easy to distinguish (mutually exclusive) from one another. To prevent grounding effects, the price point of each arrangement was not revealed to the participants.

Eye-tracking

Eye-tracking is an objective measure of visual attention and interest (Behe et al. 2020; Du and MacDonald 2014; Polatsek et al. 2018). Eye-tracking enables researchers to observe the shopper’s “eye view” of the retail environment. Eye movement consists of two phases: fixations and saccades. Fixations occur when the eye stops and focuses on stimuli, whereas saccades happen when the eye moves between fixations (Pieters et al. 2002; Reutskaja et al. 2011). The locus of a fixation is the point at which the consumer’s attention is focused on the product. Therefore, creating targets that increase fixations can help consumers extract and process information about the product before making a purchase decision (Jones et al. 2014).

Eye-tracking has been frequently used in the green industry retail environment to study packaging, price location and size, color of sign verbiage, and retail consumer preference choice (Behe et al. 2013, 2014, 2015; Campbell et al. 2013; Zhu et al. 2017). To date, no literature has examined floral purchasing behavior using eye-tracking methods.

Mixed logit model

In the economic choice experiment literature, mixed logit models have been used to comprehensively model consumers’ preferences (Ghimire et al. 2019; Lusk and Parker 2009). Standard conditional logit models assume all consumers have the same preferences for the attributes in question. However, heterogeneity in preferences may exist because of differences in demographics, attitudes, and other factors. To account for preference heterogeneity (individual preference), mixed logit models have become the standard in discrete choice modeling (Greene 2018).

Assuming that the utility that individual i derives from choosing alternative j in choice scenario r has the following functional form:

$$U_{ijr} = \beta_i x_{ijr} + e_{ijr},$$  \hspace{1cm} [1]

where $x_{ijr}$ is a vector of observed attributes, $e_{ijr}$ captures all the unobservable factors and is assumed to satisfy iid type I extreme value distribution. $\beta_i$ is a vector of individual-specific parameters. Along with $e_{ijr}$, $\beta_i$ captures variations in preferences among individuals. Conditional on $\beta_i$, the probability that individual i chooses alternative j in choice scenario r is as follows:

$$Pr(y_{ijr} = j | \beta_i) = \frac{e^{\beta_i x_{ijr}}}{\sum_{k=1}^{J} e^{\beta_k x_{ijr}}}. \hspace{1cm} [2]$$

However, a group of researchers (Louviere et al. 2002, 2008) argued that choice behavior may be more random for some consumers than it is for others and can be better described as “scale” heterogeneity. That is, for some consumers, the scale of the idiosyncratic error component is greater than that for others. Although the scale of the error term in discrete choice models cannot be separately identified from the attribute coefficients, it is possible to identify relative scale terms across consumers (Fiebig et al. 2010).

Mixed logit in WTP space

Estimating the WTP for a particular attribute or variable allows the ranking of potential floral attributes (Van den Berg et al. 2010). We specify the utility parameters in WTP space to overcome challenges associated with specifying the distribution or scale of the price coefficient (Bazzani et al. 2018; Scarpa et al. 2008; Train and Weeks 2005). Therefore, the coefficients in our model can be interpreted as the WTP for the floral attribute:

$$Pr(Y = 1 | x) = \frac{\exp(x' \beta)}{1 + \exp(x' \beta)} = A(x' \beta)$$

Results

Choice experiment: mixed logit regression in WTP space

Consumer preference for elements of design are described in (Table 3).
Line. Line was not significant \( (P = 0.446) \); therefore, participants did not prefer a straight line over oblique lines (baseline) in floral arrangements.

Form. Participants would pay $23.76 more for a symmetrical arrangement than an asymmetrical (baseline) arrangement \( (P = 0.030) \). Color harmony. Participants would pay $23.76 more to have an analogous arrangement rather than a polychromatic (baseline) arrangement \( (P = 0.014) \). They would pay $22 less to have a monochromatic arrangement rather than a polychromatic \( (P = 0.032) \). If thought of inversely, then they would pay $22 to not have a monochromatic floral design when given the option between monochromatic and polychromatic. Complementary was seen as no different from polychromatic color harmony \( (P = 0.125) \).

Species. Participants would pay an additional $40.00 to have roses in their arrangement \( (P = 0.010) \). Participants would pay $26.75 less for a floral arrangement that has chrysanthemums than for an arrangement that has alstroemeria (baseline) \( (P = 0.010) \). Carnations are seen as no different from alstroemeria in an arrangement \( (P = 0.956) \). We anticipated that roses would be the most preferred species of the four, but alstroemeria was rated the same as carnations and higher than chrysanthemums.

### Distributions

Besides examining the average of what participants are willing to pay, we can also examine how they are distributed. Regarding line as an element of design (Fig. 2), the mean was close to zero (slightly negative), and the majority of participants were clustered around this point, indicating that most participants had no or weak preference. However, \( \approx 5\% \) of participants strongly preferred a straight line (near +100), and \( \approx 5\% \) of participants strongly preferred the oblique line (near –100).

Regarding symmetry (Fig. 2), the mean was close to zero (but slightly positive); however, the distribution was wide, with clusters at either end. Approximately \( 16\% \) of participants strongly preferred symmetry, whereas \( 10\% \) strongly preferred asymmetry (values \( < –100 \)).

Regarding analogous color harmony (Fig. 3), the sight distribution near a mean of zero showed that the majority of participants did not differentiate complementary color harmony from the baseline (polychromatic color harmony), although there was a slight positive preference for both.

### Eye-tracking

Participants spent more time looking at oblique line arrangements (straight line FFD coefficient = \( –0.0002 \)) and looked at them more frequently (straight line FC coefficient = \( –0.0002 \)). The TTFF was not different between arrangements with straight lines and oblique lines.

Symmetrical and asymmetrical arrangements were not different in the TTFF, meaning that the interest they initially generated was not different; however, the total FC and FFD were greater for symmetrical arrangements than for asymmetrical arrangement (Table 4). This meant that the participants spent more time looking at the symmetrical arrangement and returned to looking at this arrangement more often. This corresponded with the multinomial logit results indicating the value for symmetrical arrangements was $23.76 greater than that for asymmetrical arrangements.

Among the color harmonies, when compared with polychromatic color harmony arrangements, analogous color harmony arrangements had a lesser TTFF but a greater FC and a greater FFD. This means the polychromatic arrangement caught the attention of the participants first; however, participants spent more time fixating on the analogous arrangement and spent more time overall looking at the analogous arrangement. This was a similar result when comparing polychromatic color harmony arrangements to monochromatic and complementary color harmony arrangements. The participants looked
at the polychromatic arrangements first, spent more time looking at the polychromatic arrangement (FFD), and performed more total looks (FC) as compared with those for monochromatic and complementary color harmony arrangements. This corresponds with the value of the monochromatic color harmony arrangement being $22.63 less than that of polychromatic arrangements. However, it does not correspond with the complementary multinomial logit value, which was $13.00 greater than that of polychromatic arrangements.

When comparing arrangements with roses as the central species with alstroemeria arrangements, there was no difference in TTFF. There was more FC for alstroemeria arrangements and greater FFD. Yet, again, roses were more preferred during the choice selection and had a greater WTP estimate ($40.21). When comparing carnation or chrysanthemum arrangements to alstroemeria arrangements, there were no differences in the TTFF, FC, and FFD. This means that the participants looked at these arrangements an equal amount of time first, the number of times that they looked at each arrangement was the same, and the total time they looked at the arrangements was the same. A pairwise correlations test was also conducted to observe if there was an effect between the visual attention and WTP variables. Table A3 in Supplemental Appendix A displays the correlations. Although some of the variables were significant, there were very small correlation sizes among the visual attention variables and WTP variables (correlation minimum = −0.0021; correlation maximum = 0.0821).

**Discussion**

The results do not support the hypothesis that consumers prefer three specific elements of floral design (line, symmetry, and color). Instead, participants vary in the importance they attribute to each element and how much they are willing to pay for it. Moreover, even within a single element, participants value certain variations while being indifferent to others.

Interestingly, the attribute that had the strongest preference among participants was the species of flower, which is not traditionally considered a formal element of design. More precisely, participants highly valued arrangements with roses over almost all other design elements. They were willing to pay $40 more for an arrangement with roses, indicating a clear preference. This aligns with the eye-tracking data, which showed that participants looked at arrangements with roses before others and spent more time observing these arrangements. This finding contrasts with previous research that indicated that consumers are just as willing to pay for a less expensive substitute of roses (such as lisianthus). However, during this study, lisianthus were not included as a species, preventing a direct comparison.

This preference for roses could be attributable to their strong recognition, symbolic value, prevalence on significant occasions like Valentine’s Day, and frequent representation in literature, film, and art.

In contrast, participants least preferred chrysanthemums, and they were willing to pay $26.75 less for an arrangement with this species. This preference might be influenced by the younger age of the participants (62% younger than 35 years), who may associate chrysanthemums with gifts for an older generation. Participants were indifferent to whether carnations or alstroemeria were used in arrangements.

Regarding design elements, participants strongly favored symmetry and certain color combinations. Participants were willing to pay $23 more for a symmetrical arrangement, with 16% expressing a strong preference for symmetry. They also spent more time looking at symmetrical arrangements and returned to them more often, although the time to fixation was not significantly different. This preference aligned with other studies that suggested that people considered symmetrical objects more aesthetically pleasing. However, 10% of participants strongly opposed symmetry, indicating individual differences in preference.

Concerning color, participants clearly disliked monochromatic arrangements and were willing to pay $22 less for them. The eye-tracking data supported this preference, showing lower engagement with monochromatic arrangements across all measures. Participants looked at monochromatic arrangements last, less frequently, and for a shorter duration.

In terms of other color combinations, analogous arrangements were the most preferred, and participants were willing to pay $23.76 more for them. This contrasts with a previous study of color preferences in arrangements (Mason et al. 2008) that found that people preferred complementary color...
harmony, followed by monochromatic color harmony, and that they least preferred analogous color harmony. However, according to the eye-tracking data, the polychromatic arrangement caught participants’ attention first, yet they spent more time fixating on and observing the analogous arrangement. This difference could be attributable to a preference for more visually striking designs outdoors in container gardens compared with more harmonious color combinations indoors with arrangements. Participants clearly do not like monochromatic arrangements, prefer colors that are related, and become indifferent when colors clash or are blended randomly.

Participants showed no strong preference for whether the lines of the arrangement were straight or oblique. Unlike previous studies, during which consumers had clear preferences, this study found a small number of participants strongly in favor of straight lines and an almost equal number who were strongly against straight lines. The eye-tracking data suggested a slight preference for oblique lines, but participants were not willing to pay more for them.

This study represents the first empirical assessment of consumer preferences for elements of floral design. It serves as an initial step in exploring the types of arrangements consumers prefer and are willing to buy. However, there were limitations, including the participant sample being primarily from Texas and the limited elements and combinations tested during this initial study.

Further research could take the ideal arrangement predicted by these results (symmetrical, analogous color, with roses as the main species) and test it against its opposite (asymmetrical, monochromatic, with chrysanthemums as the main species) as well as various other variations. Additionally, it would be interesting to explore whether participants can distinguish between and recognize the three other top species and how this recognition influences their preferences. Further studies could also examine other elements of style in floral design, including texture, pattern, and size. Fragrance, a nonvisual element of style, might play a significant role in shaping consumer preferences. Species that are low in cost but high in perfume could potentially outperform other elements.

Finally, designing floral arrangements is both an art and a science. Just as some people prefer Monet’s paintings over Picasso’s, preferences in floral design can be highly subjective. However, in an industry where profit margins are tight and products are perishable, empirical research of this kind can help sustain floristry as a profitable art form. By ensuring that floral products meet and exceed the expectations and preferences of end users, this research can contribute to the future success of the floral industry.

**Conclusion**

Overall, the results do not fully support the hypothesis that consumers can distinguish or prefer specific elements of design in floral arrangements. Instead, they tend to identify and strongly favor certain elements while having no distinguishable preference for others. Consumers prefer symmetrical arrangements and those in which colors are related but distinct. Arrangements with a single color were significantly undervalued. However, the element most likely to capture consumer attention and increase their WTP for an arrangement was the species of the flower. Specifically, arrangements with roses were valued higher than any other design element. These findings could be instrumental in helping the floristry industry overcome its challenges. By creating arrangements that align with consumer preferences and focusing efforts on elements of design that consumers can discern and strongly favor, the industry can thrive.

**References Cited**


