Executive Summary

Determining Consumer Preferences for Floral Designs Elements

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Industry Need:

Floral designers have long been taught that the most important attributes of a floral design are the elements of line, color, texture, pattern, form, space, and size. **Yet, little formal research has been conducted to determine which of these design elements are truly important to consumers and drive their purchasing behavior.** This project, co-funded by AFE and PMA, seeks to answer this overarching question and thereby enhance the likelihood of floral purchases in the future. Specifically, at the conclusion of the study, we wanted to be able to answer the following questions:

- Which visual elements of the arrangement or bouquet are noticed first and longest by consumers?
- What is the optimal mix of flowers in an arrangement or bouquet?
- Can some species be substituted without impacting consumer satisfaction?
- Do consumers prefer multi-colored floral arrangements over single-colored floral arrangements and to what degree does it impact their purchasing decision?
- Do consumers prefer mono-species bouquets over mixed-species bouquets?
- Do consumers prefer a flower arrangement because of its form or because of the species of flower(s) that are in it?
- Is there a significant difference between consumer preferences for arrangements with a symmetrical design versus an asymmetrical design?

We know from experience that people tend to “buy with the eye” when purchasing flowers (and produce). Therefore, we are using eye-tracking technology to obtain the “eye view” of consumers when viewing the elements of a floral design while shopping. The study was conducted at the Human Behavior lab at Texas A&M University.

The study was segmented into three stages due to the complexity of the study. If we were to include all of the elements of design in one study, it would simply be too large to sort out individual effects of each design element. So, we split the study into three manageable stages that focus on specific elements of floral designs. The emphasis in the first stage was looking at five design variables including line, balance, color, species, and price. In stage 2 of the study, we looked solely at the importance of form of the floral design and how it affects willingness to pay for five major types of designs. Lastly, stage 3 included an analysis of the importance of flower species and the symmetry of flowers included in the design.

Stage 1: Analysis of Line, Balance, Color, Species, and Price

In stage 1, we conducted a discrete choice experiment, followed by a second-price auction and a double auction. For the discrete choice experiment, the main objective was to evaluate consumer acceptance and willingness-to-pay (WTP) for the floral design attributes. As a secondary objective, we were also interested in comparing perceived beauty in floral designs to other art forms, such as sculptures, architecture, and fashion, to see if the elements of floral design translate to other forms of art in order to see if there were any correlations in perceptions. We aimed to reduce the potential transaction costs (including search and acquisition costs) associated with purchasing flowers by customizing floral design purchases based on an individual's preferred beauty style.

The various levels of the five attributes or design elements included in stage 1 are listed below in the following table. Mathematically, if we were to show all possible combinations to a person, they would see 256 products. Due to respondent fatigue, it is impossible for a person to differentiate among that many options, so a computer algorithm was used to choose the best sets of alternatives to view. The result included 16 choice sets consisting of four product alternatives each for a total of 64 products. These combinations are required for proper mathematical identification of each attribute so that willingness to pay (WTP) estimates can be calculated. Again, to reiterate, the product combinations were designed based on a mathematical algorithm that ensures a balanced and orthogonal design that enables us to accurately estimate WTP values.

Attribute	**Levels**
Line	Straight, Oblique
Balance	Symmetrical, Asymmetrical
Color	Polychromatic, Monochromatic, Complementary, Analogous
Main Species	Roses, Carnations, Chrysanthemums, Alstroemeria
Price Points	$20, $40, $60, $80 (arrangements created to resemble these price points)

Example of a floral arrangement choice set that the subjects viewed.

As stated earlier, we also used experimental auctions to augment the discrete choice experiments in order to analyze the same floral attributes using a different research tool. This was not included in the original grant proposal, so this portion of the study was funded entirely by the researchers. Two different auction tools were used: a second price auction and a double auction.

A second price auction is much like an auction most individuals are familiar with, where all of the subjects submit bids and an auctioneer accepts the highest bid as winner. In this case, the highest bidder of the auction wins, but they actually pay the *second highest* bid for the flowers they have purchased. This is what makes the second price auction unique; it prevents subjects from competitively bidding to win the auction for the purpose of winning and thereby overbidding (e.g. auction fever). This way, we can gain more of a true representation of the value placed on the auctioned item.

A double auction allows buyers and sellers to submit bids and prices simultaneously. We are used a double auction to see if a person who makes a discrete choice in the first experiment follows through with the same choice when they are bidding for a real, living product in an incentivized market environment. Furthermore, we were be able to capture potential differences in the attribute valuations with ownership of the floral designs. That is, those who play the role of sellers have in possession the floral designs and may have different valuations than buyers.

Example of an arrangement (hand-tied bouquet) used for the auction experiments.

Major findings from Stage 1 of the study include:

- Demographics in this stage were weighted more towards millennials, as well as females and persons in the "white" race category, with relatively equal percentages of education levels, and half of the sample frame had incomes over $90,000 per HH.

- Mixed logit analysis of the discrete choices of arrangements indicated that, relative to the baseline (oblique line, asymmetry, polychromatic color harmony, and alstroemeria species):
    - Straight line was no different, statistically-speaking, than oblique lines in terms of preferences.
    - Symmetrical arrangements are statistically different than asymmetric arrangements and subjects will pay an additional $23 for symmetrical designs.
    - Monochromatic color harmony is statistically different than polychromatic, and subjects will pay an additional $22 for an arrangement NOT to be monochromatic. Conversely, subjects would pay $23 more to have an analogous color harmony in their arrangement (also statistically different from polychromatic). Complementary color harmony is statistically no different than polychromatic.
    - If you were to rank color harmony, analogous would be most preferred, then complementary and polychromatic (because they are statically not different), and least preferred is monochromatic color harmony.
    - Roses were statistically different in terms of preference from alstroemeria; subjects would pay $40 more for an arrangement containing roses. Chrysanthemums are also statistically different from alstroemeria, but subjects would pay $26 NOT to have chrysanthemums in their arrangement. Carnations are not statistically different than alstroemeria therefore they are valued the same.
    - In summary, from the mixed logit regression model, we see the following:
        - Straight Line = Oblique Line
        - Symmetry > Asymmetry
        - Analogous > Complementary = Polychromatic > Monochromatic
        - Roses > Alstroemeria = Carnation > Chrysanthemum

- Even though some of these attributes are not significantly different from each other *statistically*, we can still understand the divergence of preferences by looking at the distributions.

- A *Single Linkage Hierarchical Cluster Analysis* was conducted on the fashion and art choices, floral attributes, and demographics. While we were unable to correlate the fashion and art choices with the floral attributes, four clusters of "like" consumers emerged from this analysis:
    - Cluster 1: Likes straight lines, symmetry, and analogous color harmony. Neutral on complementary color harmony. Dislikes monochromatic color harmony. Mostly white individuals. A high proportion of these individuals' favorite color is blue.

- Cluster 2: Likes oblique lines, symmetry, and roses. Has a slight dislike for chrysanthemums and likes analogous the least of the four clusters. Has a high proportion of "others" race individuals. Of the four clusters, Asians are least prevalent in this cluster. A high proportion of these individuals' favorite color is purple.

- Cluster 3: Likes asymmetry and analogous color harmony. Neutral on preference for straight or oblique lines. Highest proportion of graduate and bachelor's degree holders.

- Cluster 4: Strong preference for roses and oblique lines. Strong dislike for chrysanthemums. Slight preference for asymmetry and analogous color harmony. Mostly Asian. White individuals are least prevalent in this cluster. A high proportion of these individuals' favorite color is red.

- Note: Post analysis, we hypothesize that it would been helpful to not only ask about their color preferences but also ask about their least favorite color.

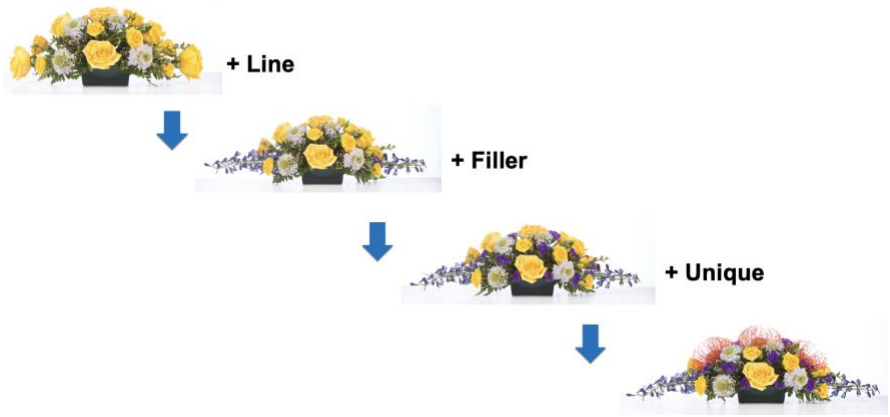
- Using both a Second Price Auction and a Double Auction the clearing price for a floral bouquet of $20 retail value was less than $20.

Stage 2: Analysis of Flower Form

In this stage, we created five types of floral designs including: *hand tied, horizontal, triangle, loose vase, and parallel designs*. We targeted each design at a low price point ($20) and a high price point ($80). The purpose of was to evaluate the product forms people look for when browsing for a relatively inexpensive design versus when they look for an expensive design. In other words, we hypothesize that form may signal the type of the design preferred which, in turn, relates to its perceived value.

Since floral forms interact with each other to create a complete holistic design, we couldn't study the mass, line, filler, or uniqueness (novelty) attributes by themselves. Therefore, we created four floral arrangements within each type of the five designs following the order:

1. Mass flowers only
2. Mass and line flowers
3. Mass, line, and filler flowers
4. Lastly, mass, line, filler and unique/novel flowers



Our research objective was to determine what matters to consumers who are looking for relatively inexpensive designs (e.g. Is filled space most important?) and what matters to consumers who are looking for expensive designs (e.g. Is differentiation more important)?

Major findings from Stage 2 of the study include:

- Even though floral designers can see the differences between $20 and $80 arrangements, consumers may not, based on the fact that their mean willingness to pay for the $80 floral arrangements is only $7.58 more than that of the $20 floral arrangements.

- At both the low and high price points, consumers placed the highest value in geometric designs as seen in the greatest increase in WTP for horizontal and asymmetrical triangle designs, which confirms that geometric design style is still highly preferred in the US as the typical American style. Loose vase designs had about same change in WTP at the two price points.

- At the $20 price point, the parallel design had no change in WTP compared to the baseline bouquet. None of the different forms of flower influenced WTP either. In other words, adding line, unique, or filler flowers to the mass flowers did not lead to an increase in profit for the arrangements at this price point.

- At the $80 price point, however, parallel design increased WTP significantly by $10.65. Adding line flowers in the $80 designs also significantly increased consumers' WTP by $2.43. The significant increase in WTP for both the parallel design and line flowers confirms consumer preferences for line in high-style designs as parallel design emphasizes online element of floral design.

- The mean WTP for our $20 floral designs was $21.63. About half of the subjects were priced out of the market at this price point. The mean willingness to pay for the $80 floral designs was $29.21. At this price point, only 1.6% of the subjects were willing to pay more than $80. The majority of the subjects were priced out of the market.

- There were statistically differences in WTP between demographic groups at both low and high price points.

Stage 3: Analysis of Flower Species

In Stage 3, we looked at individual species of flowers. This experiment was designed to answer questions such as if a more expensive flower species were substituted for a less expensive flower species of the same form type, would a consumer be able to tell the difference? Does symmetry of the flowers themselves impact the perceived beauty and monetary valuation of the floral designs? Do bilateral symmetry flowers have more attractiveness than radial symmetry flowers?

Major findings from Stage 3 of the study include:

Species Substitution

- As no statistically difference was shown in either willingness to pay or beauty rating for any of the expensive and inexpensive species comparison group, we could conclude that the expensive species could be substituted with less expensive species to increase profit margin.

- We applied monochromatic color harmony for all the bouquets in this study, the bouquets with both expensive and inexpensive species (e.g. nerine and alstroemeria) was considered as mixed-species. The ones with only inexpensive species (e.g. alstroemeria only) was considered mono-species. As consumers rated them equally, consumers prefer and value mono-species and mixed-species bouquets in this study equally.

Flower Symmetry

- Roses were rated the highest on attractiveness followed by dahlia and ranunculus. Anthurium was rated the lowest. No demographic differences were found for any of these flowers. Round and radial flowers are most commonly seen in the nature. They are considered to be easy to recognize and the most aesthetically appealing. Cultural influence may also explain why roses have the highest perceived beauty value, as rose is the national flower of the United States. This may endow it with symbolic value for this culture.

- The results of our study are consistent with previous studies. Radial flowers were considered most appealing, which may be due to the ease with processing, and peoples' preference for round objects over objects with sharp contours (Bar and Neta, 2006; Leder et al., 2011; Silvia and Barona, 2009; Westerman et al., 2012). Radially symmetrical flowers have the most axes compared with other two symmetry groups in this experiment. The processing time shortens, and the preference increases with the increase in an object's axes of symmetry (Evans et al., 2000; Tinio and Leder, 2009).

- Bilaterally symmetrical flowers had the lowest beauty rating. Bilateral flowers were less common and were generally perceived as difficult to recognize and categorize, which result in their low beauty rating (Hula and Flegr, 2016). According to Hula and Flegr (2016), some survey subjects in their study perceived bilateral flowers as bizarre.