

CAPTURING THE IMPLICIT MIND

**Quantitative fragrance imagery
by free association**

**Ruth DiCasoli
Gregory Stucky
Kristin Wiacek**

This paper focuses on how the qualitative/quantitative technique of Free-Choice Profiling was used to better understand consumers' unconscious and emotional reactions to fragrances in liquid fabric softener products via images, memories, emotions and characteristics. Generalized Procrustes Analysis was performed on the Free-Choice Profiling data in order to generate a "consensus design." The perceptual maps generated a visual display of the cognitive structures of fragrance imagery by illustrating the relationships among products based on the attribute ratings provided by each panelist. The valuable unspoken information gained by free association can be translated into information that is actionable and insightful for the perfumer and creative team, effectively breaking down the language barrier between consumer and perfumer. By utilizing indirect methods, such as Free-Choice Profiling, Takasago has the ability to listen to and understand the consumer's unconscious/subconscious fragrance experience.

INTRODUCTION

“I know that you believe that you understood what you think I said, but I am not sure you realize that what you heard is not what I meant” (Robert McCloskey, U.S. State Department spokesman).

Within the fragrance industry, the common conundrum is how to effectively break down the language barrier between consumers and perfumers. The consumer and the perfumer relate to and talk about fragrance quite differently. Perfumers and Evaluators can consciously describe fragrances by using a technical language (e.g., floral aldehydic), but much of the fragrance experience by the consumer is unconscious. Moreover, many of the conscious reactions of the consumer are emotional. Actually, the consumer is quite adept at using imagery – such as emotions (e.g., makes me feel tranquil), destinations (e.g., takes me to the tropics), and similes (e.g., smells like a baby) – to consciously express their fragrance experience (Ingersoll, 1997; Ingersoll and Winter, 2003). Of interest is how to tap into this imagery process of the emotive consumer in a manner that is meaningful to the perfumer.

The task for the consumer researcher is to capture and interpret these subconscious/unconscious impressions of a fragrance into language that is actionable for the perfumer (Nezlek, 1990; Toller and Dodd 1993; Jellinek, 2003). It is for this purpose that Takasago uses a Free-Choice Profiling technique (Williams and Langron, 1984) as a tool to generate the relevant imagery of fragrances for a particular product category, within and across cultures. The resulting perceptual maps are often used to guide our creative fragrance teams in the early stages of a project.

Free-Choice Profiling is one of the most widely used methods in the field of Sensory Research and/or Sensory Science, but is rarely implemented in Consumer Research among naive consumers. It is typically used for determining the similarities and differences of product characteristics. Free-Choice Profiling is unique from other methods in that it allows panelists to describe products in their own words (Stucky and McDaniel, 1997) rather than by a pre-determined structured questionnaire.

The method is actually executed in two stages, a qualitative free association stage followed by a quantitative evaluation stage. In the first stage, each respondent individually creates, via free association, attributes (e.g., terms, phrase, etc.) that “*profile*” a product; no common vocabulary is imposed upon them. Once all products are individually “*profiled*”, each consumer creates a master (but idiosyncratic) questionnaire for the set of products in the study. In the second stage each respondent uses their master idiosyncratic questionnaire to quantitatively rate the intensity of each characteristic for each product in the study.

Generalized Procrustes Analysis (GPA) is performed on the (idiosyncratic) Free-Choice Profiling data in order to generate a “consensus design.” A Perceptual Map depicts the relationships among products based on the attribute ratings provided by each panelist. Basically, a Perceptual Map based on Free-Choice Profiling facilitates our understanding of how products are differentiated by self-generated attributes. In this manner, the same maps generated by naive consumers can provide researchers with insight into the consumers’ mind by showing how consumers unconsciously structure (e.g., organize, approach, perceive) a particular product category.

The aim of our study is to show how Free-Choice Profiling can be used with the “emotive consumer” to generate meaningful fragrance imagery and/or profiles for the perfumer. The Perceptual Maps show how consumers unconsciously/subconsciously react to fragrances in several liquid fabric softener products.

EXPERIMENTAL

In order to obtain the imagery profiles of various fragrances, we set up a Central Location Test wherein consumers reacted to eight liquid fabric softener fragrances using the Free-choice Profiling methodology. Each panel consisted of 20 naive but articulate consumers.

Takasago International Corp. (USA) conducted the Blind Product Test at Q-Research Solutions, an independent research facility in Old Bridge, New Jersey. The technique of untrained panel Free-choice Profiling was applied to characterize the fragrances of various laundry care products in the damp stage.

Test Samples

Eight commercially available fabric softeners with varying scents were evaluated by naive (untrained) consumers. The variants were selected based on their olfactive diversity in the US marketplace. All products were store bought in Bergen County, New Jersey and are commercialized under five different brand names and eight different scents:

1. Downy[®] Simple Pleasures[™] Liquid Fabric Softener Relaxing Vanilla & Lavender
2. Ultra Downy[®] Liquid Fabric Softener April Fresh[®]
3. Ultra Downy[®] Liquid Fabric Softener Clean Breeze[™]
4. Arm & Hammer[®] Fresh ‘n Soft[®] Liquid Fabric Softener Classic Fresh[®]
5. Purex[®] Soft Liquid Fabric Softener Mountain Breeze[™]
6. Snuggle[®] Liquid Fabric Softener Sunkissed Breeze
7. Snuggle[®] Liquid Fabric Softener Spring Blush[™]
8. Suavitel[®] Liquid Fabric Softener Field Flower[®]

Panelists

The panel consisted of 20 naive but articulate and olfactory sensitive women. Ages ranged from 18 – 55 years. An ‘articulate’ consumer is defined as an individual who is able to describe (within 15 seconds) a simple concept using at least five words with minimal amount of pauses and no help from the interviewer (InsightsNow, Inc., 2005). An ‘olfactory sensitive’ individual has the ability to differentiate between products.

EXPERIMENTAL CONDITIONS

The panel was divided up into two groups of 10 respondents, and each group took approximately two hours to complete the study within the same day. All eight samples were presented to each group.

Fragrance Rooms. Fragrance evaluations were conducted in individual “Fragrance Rooms” (640 cubic feet) that are ideal for simulating a laundry environment. Each room is fully equipped with a full-size washer and dryer and a high-tech fragrance ventilation system with multiple settings and continual replenishment of fresh air. Each of the eight fragrances was tested in an individual room, and all evaluations were conducted at room temperature (68° to 72° F or 20° to 22.2° C).

Washing Machine Preparation. Each machine was filled with one cap of unscented liquid laundry detergent and then ran on medium cycle, light load, using hot water. This same procedure was repeated once to complete the process.

Sample Preparation. Using the medium load setting and warm water, each washing machine was set on the rinse cycle and a pre-measured amount of fabric softener was added as the water filled the tub. The container and cap were rinsed carefully so as to insure that the full amount of fabric softener was added to the wash. When the fabric softener was mixed and agitation began, 12 white hand towels were added to the machine. After the cycle finished, the 12 white hand towels were removed from the washing machine, wrapped in aluminum foil and placed in an aluminum hinged bin.

Presentation of Samples. For assessment, the damp laundry was removed from the aluminum foil and placed back in the bin and covered. The bin was then coded with a three-digit random number. Each respondent uncovered the bin, picked up a damp hand towel (using tongs) and sniffed the damp laundry. The hand towel was then placed back in the bin and the lid was replaced. The test samples were presented in a randomized and complete block design (Cochran and Cox, 1992). Respondents evaluated the samples at their own pace and

were given a 10-minute break in between products. Data were collected manually.

Fragrance Imagery Training. In an introductory session, the test moderator discussed the objectives, goals and outline of the study. The moderator informed the panel the study consists of two phases. In the first stage, each respondent will sniff a damp towel and individually write down the words that come to mind (e.g., positive and/or negative terms, phrases, characteristic, etc.) that “profile” the fragrance. In the second phase, each respondent will use their master list to rate the intensity of each attribute for each of the eight products in the study. As a warm up exercise, a neat sample of shampoo (1 oz. opaque bottle, one-half full, with flip-top) was given to each respondent to smell and evaluate. The group spent about five-minutes describing the fragrance of the shampoo. Thereafter, the moderator introduced the idea of a scale to rate the intensity of the characteristics.

Fragrance Imagery Testing. For Phase 1, each respondent was given a clean sheet of white paper (one for each test sample) and asked to write down the “Imagery” (i.e., words/phrases) that came to mind as the damp laundry was smelled. Once all eight test samples were evaluated, each panelist created a master list of the different words/phrases used to describe each fragrance, deleting any words/phrases with similar meanings. In Phase 2, the respondents evaluated each of the eight test samples (recoded), on each attribute from their personal master list. A 9-point rating scale (1 = very little and 9 = very much) was used for the intensity ratings. Respondents also assigned each attribute to a specific “imagery category”, i.e., emotions, memories, similes, description, images, and others.

DATA ANALYSES

Consumer Free-Choice Profiling data were analyzed by Generalized Procrustes Analysis. The generalized method takes each respondent’s raw data set as independent from all other respondents. The raw data (initial respondent configurations) are initially transformed and scaled to match a target configuration. This results in Transformed Respondent Configurations which are matched to a Transformed Target. This produces new Transformed Panelists Configurations and a new Transformed Target. The new configurations are rotated and scaled over and over (Procrustes algorithm loop) until the change in the Procrustes statistic is minimal. After the final transformation of the panelists’ configurations is made, a consensus configuration is determined by rotating the transformed panelist configuration to the principal axes where the first axis shows the highest percentage of variation among the samples.

The final result of a Generalized Procrustes Analysis (GPA) (InsightsNow, 2005) is a consensus configuration of the samples for the different principal axis combinations, (as presented in figures 1 - 4). Scatter plots of these combinations are created to illustrate the inter-sample differences. The first and second principal axes separate the samples by psychological dimensions of olfactive imagery – the degree of association made with images, memories, emotions and characteristics. The descriptors, determined by GPA, which have correlations > 0.50 are summarized over panelists for each principal axis and are listed at the end of the axes. The farther along the axis a sample lies, the more intense the relationship between the sample and the characteristics of that axis direction.

RESULTS AND DISCUSSION

The final result of a Generalized Procrustes Analysis is a consensus configuration of the samples which serves to define the relationships between products based on the attributes given to each sample by each panelist. Perceptual maps of the data representing Images, Memories, Emotions and Rationale, as presented in figures 1 - 4, have been generated to present a visual display of the cognitive structures of fragrance imagery. Professional olfactive descriptions of each product, as deciphered by Takasago's Odor Evaluation Board, are noted in parenthesis.

Figure 1
IMAGES

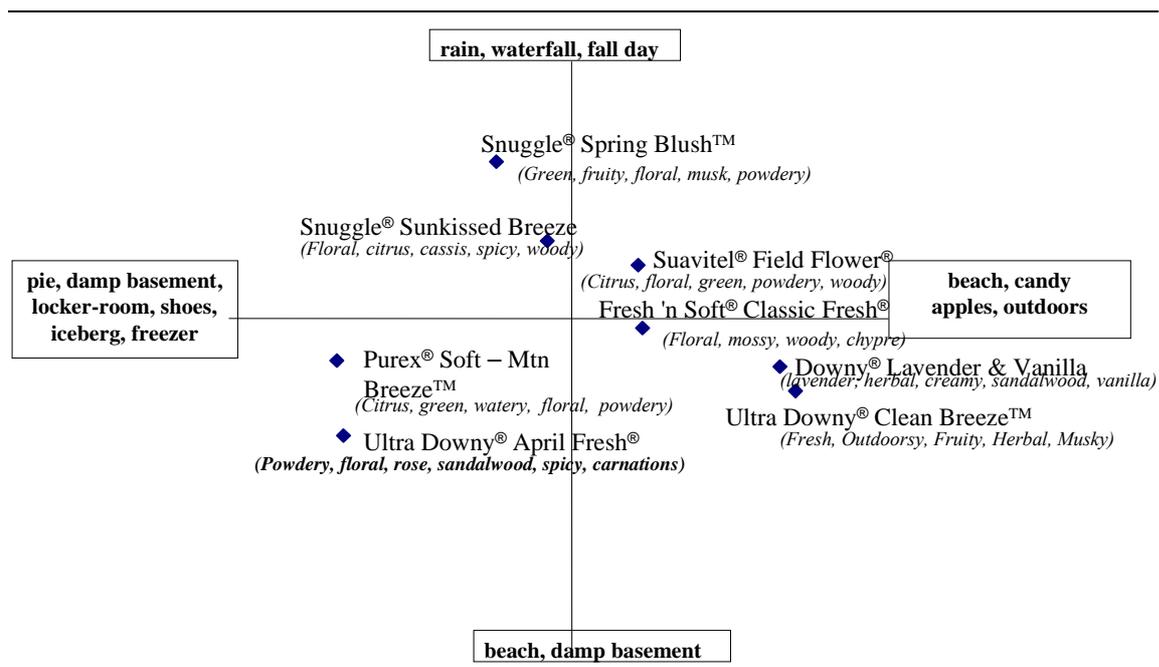


Figure 1 illustrates the spectrum of Images associated with the tested fabric softener products. Of interest is the observation that the “Image” Map generated a higher density of attributes than the “Memorial”, “Emotional”, and “Characteristic” Maps.

The first principal axis separates the samples by the perception of “sweet.” The variety of the visual characterizations suggest that consumers can communicate and characterize the different types of sweetness in a scent (e.g., vanilla sweet, fruity sweet, woody sweet, etc.). Without using the technical perfumery language, these consumers convey their perceptions via images. In this case, the horizontal axis representing “sweet” ranges from “stale sweet” (left) to “fresh sweet” (right).

The second principal axis relates to various associations with the “outdoors.” The top of the vertical axis contains images of “clean, ozonic, outdoors” and the bottom of the vertical axis shows images of “musty, outdoors.”

Within the “Image” map we find five distinct groupings:

Group 1: Sweet, Stale

- Ultra Downy[®] Liquid Fabric Softener April Fresh[®] (powdery, floral, rose, sandalwood, spicy, carnation)
- Purex[®] Soft Liquid Fabric Softener Mountain Breeze[™] (citrus, green, watery, floral, powdery)

Consumers associate these two products with images of *pie, damp basements, iceberg/freezer* and *locker room*.

Group 2: Ozonic, Outdoors

- Snuggle[®] Liquid Fabric Softener Spring Blush[™] (green, fruity, floral, musk, powdery)
- Snuggle[®] Liquid Fabric Softener Sunkissed Breeze (floral, citrus, cassis, spicy, woody)

Consumers associate these products with images of *rain, waterfalls* and *fall days*.

Group 3: Fresh, Sweet, Ozonic, Outdoors

- Suavitel[®] Liquid Fabric Softener Field Flower[®] (citrus, floral, green, powdery, woody)

Consumers associate this product with images of *rain, waterfalls, fall day* as well as *beach, candy apples* and *outdoor locations*.

Group 4: Fresh, Sweet, Outdoors

- Arm & Hammer® Fresh 'n Soft® Liquid Fabric Softener Classic Fresh® (floral, mossy, woody, chypre)
- Downy® Simple Pleasures™ Liquid Fabric Softener Relaxing Vanilla & Lavender (lavender, herbal, creamy, sandalwood, vanilla)
- Ultra Downy® Liquid Fabric Softener Clean Breeze™ (fresh, outdoorsy, fruity, herbal, musky)

This cluster of products is the largest group on the map. Images associated with these products are *beach*, *candy apples* and *outdoor locations*.

Figure 2
MEMORIES

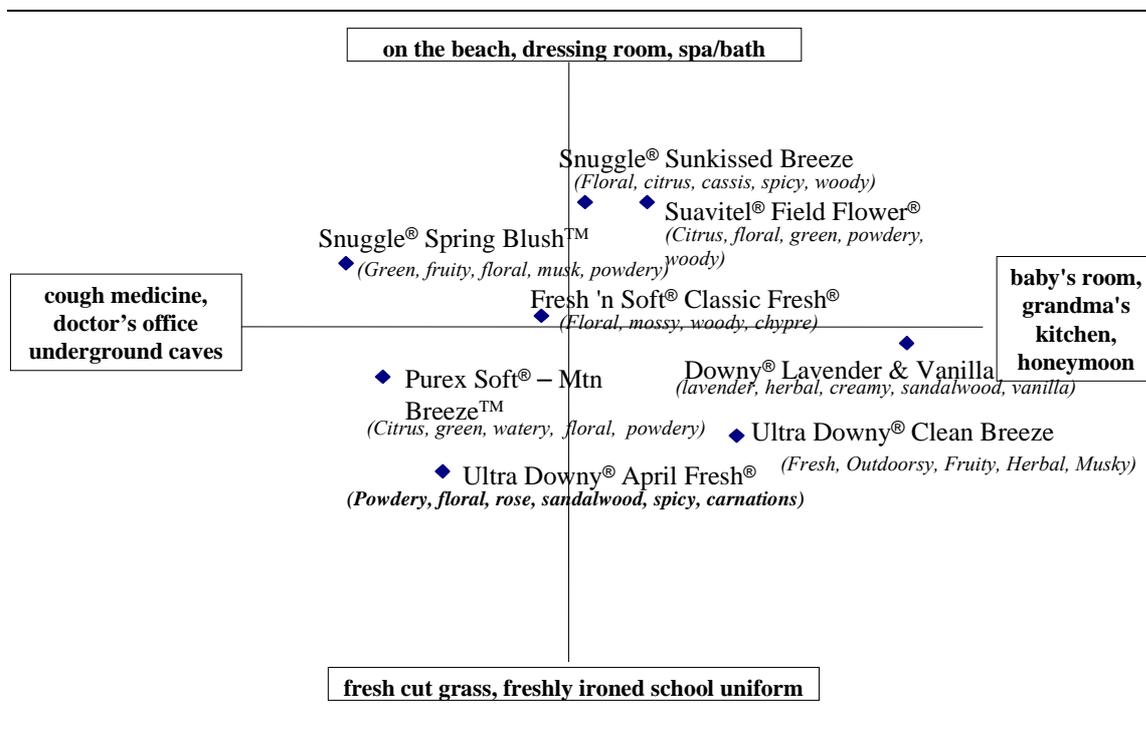


Figure 2 illustrates the continuum of Memories associated with the tested fabric softener products. The “Memories” Map also generated a high density of attributes; however, it did not generate more attributes than the “Image” Map.

Similar to the “Image” Map, the first principal axis of the “Memories” Map also separates the samples by the perception of “sweet.” However, the perceptions of “sweet” in this map are more medicinal and comforting (warmer) than the “Image” Map. In the “Memories” Map, the horizontal axis

representing “sweet” ranges from “sweet, musty and medicinal” (left) to “sweet, warm and comforting” (right).

The second principal axis relates to many associations of “airy,” ranging from “relaxed, clean and airy” (top) to sharp, crisp and airy (bottom).

Within “Memory” map are five distinct groups:

Group 1: Musty, Medicinal

- Snuggle[®] Liquid Fabric Softener Spring Blush[™] (green, fruity, floral, musk, powdery)
- Purex[®] Soft Liquid Fabric Softener Mountain Breeze[™] (citrus, green, watery, floral, powdery)
- Arm & Hammer[®] Fresh ‘n Soft[®] Liquid Fabric Softener Classic Fresh[®] (floral, mossy, woody, chypre)

Memories associated with this group were those of *cough medicine* and *underground caves*.

Group 2: Pampered, Relaxing, Airy

- Snuggle[®] Liquid Fabric Softener Sunkissed Breeze (floral, citrus, cassis, spicy, woody)
- Suavitel[®] Liquid Fabric Softener Field Flower[®] (Citrus, floral, green, powdery, woody)

Consumers associated these products with memories of *being on the beach*, *dressing room*, *spas* and *baths*.

Group 3: Comforting

- Downy[®] Simple Pleasures[™] Liquid Fabric Softener Relaxing Vanilla & Lavender (lavender, herbal, creamy, sandalwood, vanilla)

Consumers associated this product with memories of the *baby’s room*, *grandma’s kitchen* and *honeymoon*.

Group 4: Comforting/ Crisp, Airy

- Ultra Downy[®] Liquid Fabric Softener Clean Breeze[™] (fresh, outdoorsy, fruity, herbal, musky)

This product is associated with memories of a *baby’s room*, *grandma’s kitchen*, *honeymoon* as well as *fresh cut grass* and a *school uniform just after ironing*.

Group 5: Musty/Medicinal and Crisp/Airy

- Ultra Downy® Liquid Fabric Softener April Fresh® (powdery, floral, rose, sandalwood, spicy, carnation)

Consumers associated this product with memories of *fresh cut grass* and a *school uniform just after ironing* as well as *cough medicine* and *underground caves*.

Figure 3
EMOTIONS

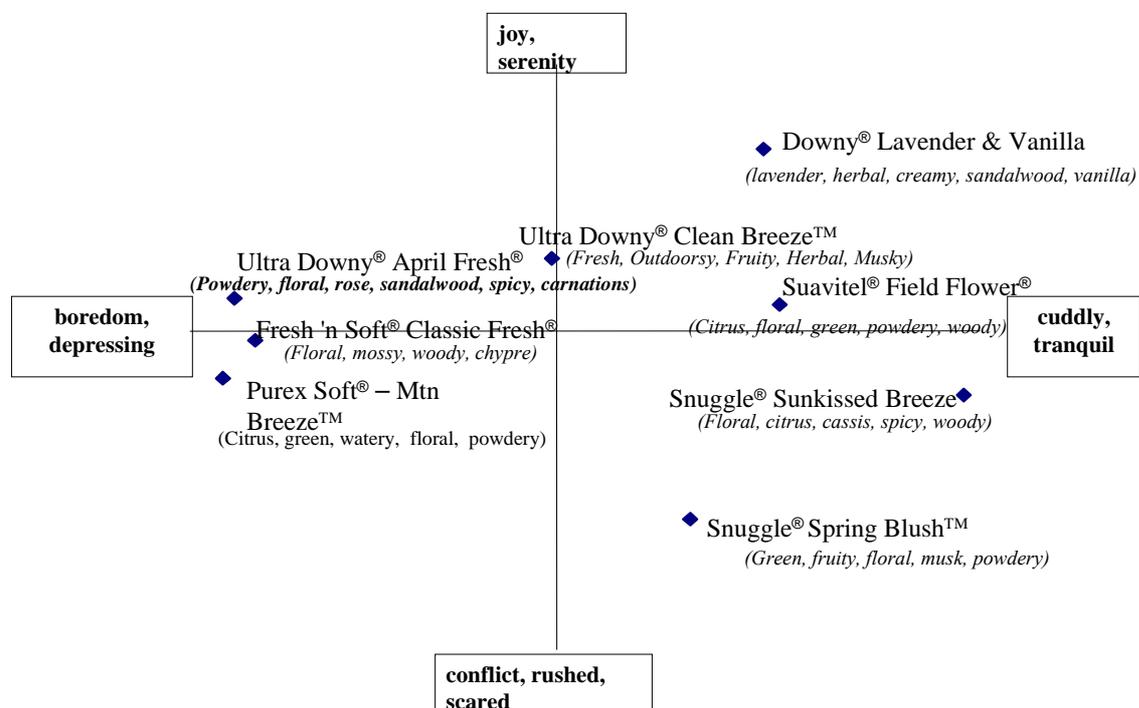


Figure 3 illustrates the array of Emotions associated with the tested fabric softener products. In observation, it was evident that the “Emotions” Map has a much lower density of attributes than the “Images” and “Memories” maps.

The first principal axis of the “Emotions” Map separates the samples by the perception of “energy levels.” In this case, the horizontal axis representing “energy levels” ranges from “negative, low energy” (left) to “positive, low energy” (right). The left side is characterized by more as depressing and boring, while the right side is perceived to be more cuddly and tranquil.

The second principal axis relates to several associations of “state of mind,” ranging from “positive and at peace” (top) to “negative and unsettled” (bottom).

Group 1: Negative/Low Energy

- Ultra Downy[®] Liquid Fabric Softener April Fresh[®] (powdery, floral, rose, sandalwood, spicy, carnation)
- Arm & Hammer[®] Fresh 'n Soft[®] Liquid Fabric Softener Classic Fresh[®] (floral, mossy, woody, chypre)
- Purex[®] Soft Liquid Fabric Softener Mountain Breeze[™] (citrus, green, watery, floral, powdery)

The emotional associations of these products are boring and depressing.

Group 2: Positive Peaceful Low Energy

- Downy[®] Simple Pleasures[™] Liquid Fabric Softener Relaxing Vanilla & Lavender (lavender, herbal, creamy, sandalwood, vanilla)

Consumers associate this product with feeling joyful and serene, as well as, cuddly and tranquil.

Group 3: Positive Comfortable Low Energy

- Suavitel[®] Liquid Fabric Softener Field Flower (citrus, floral, green, powdery, woody)
- Snuggle[®] Liquid Fabric Softener Sunkissed Breeze (floral, citrus, cassis, spicy, woody)

Products are associated with being cuddly and tranquil.

Group 4: Negative High Energy

- Snuggle[®] Liquid Fabric Softener Spring Blush[™] (green, fruity, floral, musk, powdery)

Consumers equate this product to feelings of conflict, being rushed and scared.

Group 5: Multiple Personalities

- Ultra Downy[®] Liquid Fabric Softener Clean Breeze[™] (fresh, outdoorsy, fruity, herbal, musky)

This product is found close to the center of the map and is not directly associated with any specific attributes.

Figure 4
CHARACTERISTICS

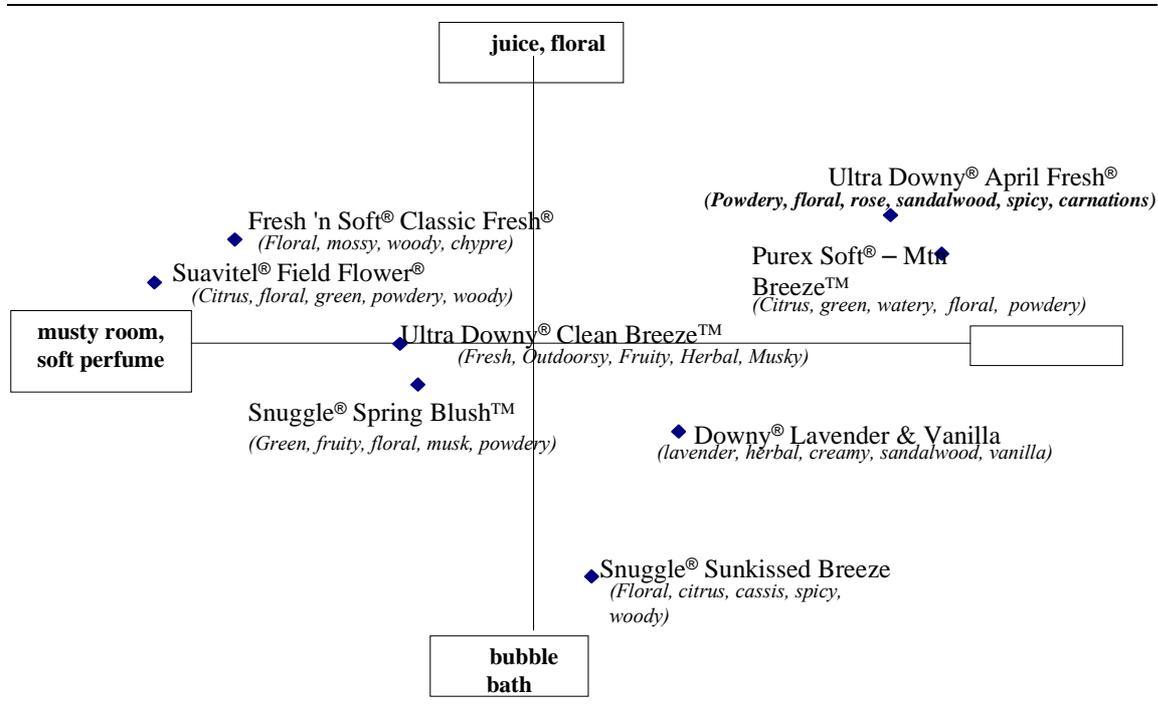


Figure 4 illustrates the range of Characteristics (e.g., descriptions, rationale, etc.) associated with the tested fabric softener products. Of all the maps, the “Characteristics” Map had the lowest density of attributes. However, it is important to highlight that it is not uncommon to have a low density of descriptive attributes as consumers evaluate fragrances emotionally and have difficulty describing the rational (or logical) characteristics of a scent.

Since the “Characteristics” Map has so few attributes, both the first and second principal axis could not be clearly defined in relative terms.

Group 1: Soft, Sweet, Musty

- Arm & Hammer® Fresh ‘n Soft® Liquid Fabric Softener Classic Fresh® (floral, mossy, woody, chypre)
- Ultra Downy® Liquid Fabric Softener Clean Breeze™ (fresh, outdoorsy, fruity, herbal, musky)
- Suavitel® Liquid Fabric Softener Field Flower® (citrus, floral, green, powdery, woody)
- Snuggle® Liquid Fabric Softener Spring Blush™ (green, fruity, floral, musk, powdery)

Consumers describe these products as smelling like a musty room and soft perfume.

Group 2: Sweet, Soapy

- Snuggle[®] Liquid Fabric Softener Sunkissed Breeze (floral, citrus, cassis, spicy, woody)

Consumers describe this product as being like bubble bath.

Group 3: Non Descript

- Ultra Downy[®] Liquid Fabric Softener April Fresh[®] (powdery, floral, rose, sandalwood, spicy, carnation)
- Purex[®] Soft Liquid Fabric Softener Mountain Breeze[™] (citrus, green, watery, floral, powdery)
- Downy[®] Simple Pleasures[™] Liquid Fabric Softener Relaxing Vanilla & Lavender (lavender, herbal, creamy, sandalwood, vanilla)

Consumers have no direct descriptions for these products.

CONSUMERS/FRAGRANCE TYPES

Since consumers typically react to fragrance on an emotional level they have no conscious rules for categorizing products by fragrance type. The results of this study illustrate that consumers do not profile fragrance similarly based on their olfactive characteristics. In fact, across the maps fragrances that are very different olfactively are often classified similarly by consumers. Interestingly, one type of imagery can often be achieved by a number of different olfactive directions.

Figure 1 (Images) illustrates a group of three products (Arm & Hammer[®] Fresh 'n Soft[®] Liquid Fabric Softener Classic Fresh[®], Downy[®] Simple Pleasures[™] Liquid Fabric Softener Relaxing Vanilla & Lavender, Ultra Downy[®] Liquid Fabric Softener Clean Breeze[™]) that are distinctly different olfactively, yet all convey a sense of “warm, sweet, fresh” (e.g., beach, candy apples, outdoor locations) to consumers. When translated to the Perfumer, this type of information can provide valuable insight as to what “technical” types of fragrance characteristics can help to convey a sense of warm, sweet, freshness to consumers.

Similarly, in figure 2 (Memories), Snuggle[®] Liquid Fabric Softener Sunkissed Breeze (floral, citrus, cassis, spicy, woody) and Suavitel[®] Liquid Fabric Softener Field Flower[®] (e.g., citrus, floral, green, powdery, woody) are both associated with “pampering, relaxing, airy” (e.g., on the beach, dressing room, spa/bath). For the Perfumer, this type of information can provide valuable insight as to what “technical” types of fragrance characteristics convey a sense of being “pampering, relaxing, airy”.

MARKETERS AND PERCEPTUAL MAPS

Perceptual Maps derived from Free-Choice Profiling also provide innovative, insightful information for Marketers. The Maps illustrate a visual representation of the “emotive-cognitive” structures of the consumer’s mind which can provide Marketers with interesting insight as to how the consumer actually approaches the liquid fabric softener category and makes decisions, without even knowing it. Perceptual Maps provides insight into what appeals to the target consumer and how consumers differentiate products (fragrances). In addition, the maps help Marketers to identify olfactive gaps in the marketplace, areas for improvement and/or opportunities for new product development. Since an extensive amount of imagery and terminology is generated by Perceptual Maps, Marketers can also use this information to help drive the concept development process, as well as advertising campaigns.

CONCLUSION

In terms of getting into the consumers’ mind, indirect quantitative methods (e.g., Free-Choice Profiling) are more meaningful in providing valuable consumer insight than traditional, quantitative methods that use traditional questionnaires. By utilizing indirect qualitative/quantitative methods, such as Free-Choice Profiling, we have the ability to listen to and understand the consumer’s unconscious/subconscious fragrance experience. The valuable unspoken information gained by free association can be streamlined and translated into information that is actionable, insightful and easy to use for the perfumer and creative team. Pictures of the data, in the form of a Perceptual Map, provide a comprehensive illustration of the cognitive structure of fragrance. This information, in conjunction with guidance from the researcher, can help to effectively break down the language barrier between consumer and perfumer.

If “a picture is worth a thousand words” (Napoleon Bonaparte, 1769-1821) then a Perceptual Map generated from Free-Choice Profiling data is the modern day Rosetta Stone for perfumers and evaluators.

REFERENCES

- Bonaparte, Napoleon (French general, politician and emperor, 1804-14). (1769-1821).
- Cochran, William G. and Cox, Gertrude M. (1992). *Experimental Designs* (2nd Ed.), John Wiley & Sons, Inc., New York.
- Ingersoll, David W. (1997). The Challenge of Using the “Inarticulate” Consumer as an R&D Partner in Cosmetic Product Development. In: *Surfactants in Cosmetics* (2nd Ed.), 68, M. M. Rieger and L. Rhein (ED.), Marcel Dekker, NY, 533-556.
- Ingersoll, David W. and Frank Winter. (2003). Building Cross-Cultural Consumer Insights of Women’s Colognes with Interactive Multivariate Statistical Tools. *Proceedings of the ESOMAR Fragrance Seminar*, Lausanne.
- InsightsNow, Inc. (2005). Free-Choice Profiling by Consumers – A Quick Overview of the Method. Web page address: <http://www.insightsnow.com>.
- McCloskey, Robert. (2005). State Department Spokesman. Web page address: <http://quotationspage.com/>
- Nezleck, J. (1990). *Fragrance Use and Social Interaction*, Society of Cosmetic Chemists, San Francisco, California.
- Stucky, G.J. and McDaniel, M.R. (1997). Raw Hop Aroma Qualities by Trained Panel Free-Choice Profiling. *ASBC Journal* 55(2):65-72.
- Toller, S. Van and Dodd, G.H. (Eds.) (1993). *Fragrance: The Psychology and Biology of Perfume*, Kluwer Academic Publishers, Dordrecht.
- Williams, A.A. and Langron, S.P. (1984). The Use of Free-Choice Profiling for the Evaluation of Commercial Ports. *J. Sci. Food. Agric.* 35(5):558-568.

THE AUTHORS

Ruth DiCasoli is Director of Consumer Insight & Marketing Research, Takasago International Corporation, United States.

Gregory Stucky is Vice President of Global Services, InsightsNow, Inc., United States.

Kristin Wiacek is Manager of Consumer Insight & Marketing Research, Takasago International Corporation, United States.