# DECODING THE OLFACTORY CHARM: A MIRYOKU ENGINEERING AND P-A MAPPING ANALYSIS OF WESTERN FRAGRANCES IN EAST ASIA

**Jia-Huei Yu, Min-Yuan Ma, Tseng-Ping Chiu**

*Department of Industrial Design, National Cheng Kung University, Taiwan,*
*p36144128@gs.ncku.edu.tw, mamy@mail.ncku.edu.tw, mattchiu@gs.ncku.edu.tw*

**ABSTRACT**

As the global fragrance industry expands, Western fragrance design often overlooks East Asian emotional preferences. This study applies Miryoku Engineering to identify the psychological drivers of scent attractiveness among Taiwanese consumers. The Evaluation Grid Method (EGM) analyzed 44 fragrance brands, followed by a questionnaire with 62 experienced users. Results showed that fragrance is mainly used in private or work spaces for relaxation (70.3%) and spatial transformation (52.7%), with woody scents (56.8%) being most preferred. Quantification Theory Type I and the Pleasure–Arousal (P-A) model revealed that Relaxation had the highest explanatory power (R = 0.524), driven by moist moss notes and label–scent consistency. These findings indicate a preference for high-pleasure, low-arousal experiences and provide a Kansei design framework for developing nature-inspired fragrances for smart homes and wellness environments.

*Keywords: Kansei Engineering, Miryoku Engineering, Olfactory Attractiveness, Cross-Cultural Affect*

## 1 INTRODUCTION

In the contemporary landscape of sensory marketing, fragrance products have evolved beyond their functional role to become important media for emotional regulation and the creation of domestic spatial experiences. As the global fragrance market continues to expand, Western fragrance brands have become dominant in product development and branding strategies. These products often emphasize individualistic expression, novelty, and high-arousal sensory stimulation. In contrast, East Asian consumers tend to value harmony, restraint, and emotional balance, suggesting that fragrance perception is shaped not only by physiological responses but also by cultural values and lived experiences. Previous studies have demonstrated that the familiarity and pleasantness of scents vary according to environmental, seasonal, and cultural contexts (Seo et al., 2009). Likewise, Ideal Affect Theory proposes that Eastern cultures generally prefer low-arousal positive emotions, whereas Western cultures favor high-arousal positive emotions (Tsai, 2007). These cultural differences imply that fragrance attractiveness should be understood within its cultural context rather than through universal sensory principles alone.

Previous fragrance research has primarily focused on chemical composition, odor classification, and physiological or emotional responses to scent (Thiboud, 1991; Kiecolt-Glaser et al., 2008).

Although these studies explain how fragrances influence human perception and mood, they provide limited guidance for translating users' subjective emotional preferences into practical product design strategies. Within Kansei Engineering, existing studies have successfully quantified relationships between product attributes and emotional responses across various product categories. However, relatively few studies have investigated how fragrance attractiveness can be systematically transformed into actionable design attributes under different cultural contexts. In particular, research integrating cross-cultural affective theory with fragrance-oriented Kansei Engineering remains limited.

To address this gap, this study adopts Miryoku Engineering, an extension of Kansei Engineering that focuses on revealing the hierarchical cognitive structure underlying product attractiveness. Unlike conventional Kansei Engineering, which primarily establishes direct relationships between product attributes and Kansei responses, Miryoku Engineering employs the Evaluation Grid Method (EGM) to identify the psychological hierarchy linking abstract emotional values, evaluation criteria, and concrete design attributes (Sanui, 1996; Ujigawa, 1997; Nagamachi, 2002). This hierarchical approach is particularly suitable for fragrance design because olfactory attractiveness is highly subjective, experience-dependent, and culturally constructed. By uncovering why users perceive certain fragrances as attractive, Miryoku Engineering provides richer design knowledge than emotion mapping alone.

Accordingly, this study investigates the olfactory attractiveness of Western fragrance candles among Taiwanese consumers by integrating Miryoku Engineering with the Pleasure–Arousal (P–A) model (Russell, 1980). First, the Evaluation Grid Method is employed to construct the hierarchical structure of fragrance attractiveness. Subsequently, Quantification Theory Type I is applied to identify the concrete fragrance attributes that contribute to different affective dimensions, and the results are mapped onto the Pleasure–Arousal space to examine their cultural affective characteristics. The findings contribute to Kansei Engineering by providing a systematic framework for translating culturally specific fragrance preferences into actionable design guidelines, thereby supporting fragrance product development, wellness-oriented environments, and cross-cultural sensory design.

## 2 LITERATURE REVIEW

### 2.1 Kansei Engineering and Miryoku Engineering

Kansei Engineering is a human-centered design methodology that translates users' emotional responses into product design elements, enabling designers to systematically connect subjective perceptions with objective design attributes (Nagamachi, 2002). It has been widely applied in product design, packaging, architecture, and consumer products to establish quantitative relationships between product features and users' affective evaluations.

However, conventional Kansei Engineering primarily focuses on identifying direct relationships between design attributes and emotional responses, offering limited insight into the cognitive process through which users construct perceptions of product attractiveness. To overcome this limitation, Miryoku Engineering was proposed as an extension of Kansei Engineering that

emphasizes the psychological structure of "Miryoku" (attractiveness or charm) rather than emotional evaluation alone (Ujigawa, 1997). Its core tool, the Evaluation Grid Method (EGM), organizes user evaluations into three levels through laddering interviews: upper-level (affective values), middle-level (evaluation items), and lower-level (product attributes). This hierarchical approach reveals not only what users prefer but also why specific attributes evoke particular emotions, making it especially suitable for culturally influenced and experience-based products such as fragrances.

### 2.2 The Relationship Between Olfaction and Emotion

Scents directly influence the limbic system, including the amygdala and hippocampus, thereby affecting emotions, moods, and physiological responses (Kiecolt-Glaser et al., 2008). Chiu (2010) further demonstrated that fragrance characteristics are closely associated with affective responses, indicating that different scent attributes evoke distinct emotional experiences during product use.

Based on these findings, Kansei Engineering has been applied to fragrance research to examine the relationships between scent characteristics and emotional perceptions, including pleasantness, relaxation, freshness, and the Pleasure–Arousal (P–A) dimensions (Chiu, 2010). However, most studies focus on evaluating predefined fragrance attributes, while limited attention has been given to the hierarchical construction of fragrance attractiveness and the influence of cultural differences. This limitation highlights the need to integrate cross-cultural perspectives into fragrance design, which is discussed in the following section.

### 2.3 Ideal Affect Theory and Cross-Cultural Differences

The Circumplex Model of Affect, proposed by Russell (1980), is the cornerstone of contemporary emotional psychology. This model defines human emotions along two orthogonal axes:

1. Pleasure (P-axis): The degree of positive or negative valence.
2. Arousal (A-axis): The degree of physiological and psychological activation.

Stanford Professor Jeanne Tsai's "Ideal Affect Theory" indicates that different cultures have distinct preferences for the "ideal position" within these emotional coordinates. Western individualistic cultures tend to favor "High Arousal Positive (HAP)" states, such as excitement and enthusiasm, corresponding to the first quadrant of the Pleasure-Arousal (P-A) matrix. In contrast, East Asian collectivistic cultures prefer "Low Arousal Positive (LAP)" states, such as calmness and harmony, corresponding to the fourth quadrant. This study hypothesizes that the perception of "charm" in fragrance products among East Asian audiences will shift toward the low-arousal quadrant.

# 3 RESEARCH METHODOLOGY

## 3.1 Conversion of Secondary Data into EGM

This study conducted text analysis and netnographic observation using scented candle semantic data shared by two prominent East Asian fragrance YouTubers, Perfume Fanatic (香水有毒) and Sherry (雪莉波波貓). A focus group of three experts in Kansei Engineering and industrial design translated the semantic descriptions into the Evaluation Grid Method (EGM) hierarchy. Through consensus, similar expressions were merged, duplicates removed, and descriptors classified into upper-level affective values, middle-level evaluation items, and lower-level fragrance attributes, establishing a standardized and reliable EGM framework for subsequent quantitative analysis.

The data corpus consists of 20 videos from each expert, released on their respective platforms between 2020 and 2025. Collectively, 44 Western fragrance candle brands were identified and analyzed.

**Table 1**. Statistics of Fragrance Candle Brands

| Country | Number of brands | Name of brands |
|---|---|---|
| America | 13 | VOLUSPA, PADDYWAX, AYDRY. CO, Bath and body works, P.F. CANDLE, Aspen Bay Candle, Brooklyn Candle Studio, NEST, MALIN+GOETZ, Aquiesse, Tocca, Boy Smells, Nomad Noe |
| France | 8 | Diptyque, CIRE TRUDON, carrière freres, Atelier Cologne, Maison Louis Marie, MAISON MARGIELA, MAISON FRANCIS KURKDJIAN, Éditions de Parfums Frédéric Malle |
| Australia | 7 | Wavertree & London, LUMIRA, CIRCA, GLASSHOUSE, Natio, BULY , Aesop |
| the UK | 7 | Jo Malone, True grace, OSKIA, Ted Baker, NEOM, EARL OF EAST, Bamford London |
| Switzerland | 3 | IKEA, H & M, Byredo |
| Italy | 2 | CULTI MILANO, ACQUA DI PARMA |
| Spain | 1 | ZARA |
| Denmark | 1 | SKANDINAVISK |
| Israel | 1 | Sabon |
| New Zealand | 1 | The Aromatherapy Company |

The upper, middle, and lower-level levels mentioned by both YouTubers were aggregated, and the terminology was standardized. Based on the original contextual meaning, atmospheric descriptions were categorized as middle-level items (Evaluation Items), while scent descriptions were categorized as lower-level items (Concrete Features). After statistical analysis, five upper-level factors were identified as the core affective dimensions: Freshness, Warmth, Security, Pleasure, and Relaxation.




**Figure 1**. The EGM Hierarchical Structure of Fragrance Candle Perception.

### 3.2 Transforming EGM into a Questionnaire

Following the established questionnaire methodology of Miryoku Engineering, the upper-level factors identified from the EGM analysis served as the primary question dimensions. For each section, the corresponding middle-level items were evaluated using a 5-point Likert scale to measure their perceived importance. Additionally, respondents were required to select the most significant lower-level option (concrete feature) associated with each middle-level item.

Concurrently, the questionnaire collected demographic and behavioral data from the participants, including gender, age, scent profile preferences, purchase channels for fragrance candles, usage frequency, and duration of experience.

# 4 RESULTS

## 4.1 Data Collection and Descriptive Statistics

To ensure the reliability of the findings within a specific cultural context, a total of 71 questionnaire responses were collected through an anonymous survey distributed to Taiwanese participants. This research was conducted with strict adherence to ethical standards, including obtaining informed consent and ensuring data privacy for all respondents. After filtering for participants with prior experience in using fragrance candles, 62 valid responses were identified. The sample consisted of 42 female and 20 male respondents. In terms of age distribution, 56.3% of the participants were aged 21 to 30, followed by 25.4% aged 31 to 40, indicating that the respondents are predominantly young adults.

Regarding usage context, 62.2% of respondents primarily use fragrance candles in the bedroom, while 37.8% use them in study or workspaces. The primary motivations for use were relaxation (70.3%) and spatial scent transformation (52.7%). In terms of subjective scent preferences, woody notes were the most favored (56.8%), followed by floral notes (50%).

## 4.2 Analytical Framework: Quantification Theory Type I

The analysis was segmented based on the five upper-level affective appeals. Quantification Theory Type I was employed to identify the relationship between affective perceptions and physical features:

- Dependent Variable (Y): The average preference scores of the middle-level evaluation items.
- Independent Variables (X): The encoded lower-level concrete features (scent characteristics).

By performing this analysis, the study quantifies the impact of specific scent characteristics on the overall "charm" of the product. The results are detailed in the following sections.

**Table 2**. Relationship between Upper-level Kansei Values and Key Fragrance Attributes

| Attractiveness Construct (Upper) | Multiple Correlation (R) | Key Concrete Feature (Lower) | The score of Key Concrete Feature | Corresponding middle-level of the top-scoring category |
|---|---|---|---|---|
| Relaxation | 0.524 | Moist Moss Scent | 0.395 | Forest greenery ambiance |
| Freshness | 0.447 | Mossy Scent | 0.464 | Natural greenery ambiance |
| Pleasure | 0.424 | Fig Scent | 0.162 | Sweet Ambiance |
| Warmth | 0.381 | Christmas dessert Scent | 0.421 | Cozy domestic ambiance |
| Security | 0.301 | Scent profiles that faithfully reflect product labeling | 0.199 | Unpretentious Natural Ambiance |

The explanatory power of each model was evaluated using the multiple correlation coefficient (R). The obtained R values ranged from 0.301 to 0.524, suggesting meaningful relationships between the upper-level affective constructs and the encoded lower-level fragrance attributes. Based on the category scores generated by Quantification Theory Type I, the lower-level attribute with the highest score for each upper-level construct was identified as its key design attribute, as summarized in Table 2.

# 5 DISCUSSION

## 5.1 Analysis of High Pleasure and High Arousal (HAP) Dimensions

According to Russell's Pleasure–Arousal (P–A) model, Freshness and Pleasure are positioned within the High Pleasure–High Arousal (HAP) quadrant. Within the Miryoku Engineering framework, these dimensions represent affective values that are supported by specific evaluation items and concrete fragrance attributes. The following sections discuss how these hierarchical relationships can be translated into fragrance design knowledge.

### 5.1.1 Freshness

The Quantification Theory Type I analysis identified “Freshness” as the second strongest affective construct (R = 0.447). The highest-scoring lower-level attribute was “Moss Scent”, which contributed most strongly to the middle-level evaluation item of “Natural Greenery Ambiance”. This hierarchical relationship suggests that Taiwanese consumers interpret freshness not merely as an olfactory sensation but as an environmental experience closely connected with nature.

Previous studies associated freshness with green, citrus, and marine notes (Zarzo, 2013). Müller (1992) further reported regional differences in freshness perception. In contrast, Taiwanese participants associated freshness with moss-related scents, suggesting that freshness is interpreted through ecological familiarity rather than sensory stimulation. These findings suggest that the emotional perception of freshness is shaped by culturally specific cognitive associations, in which the abstract affective value of freshness is supported by the evaluation of natural greenery and ultimately translated into moss-related fragrance attributes.

### 5.1.2 Pleasure

Pleasure obtained a multiple correlation coefficient of R = 0.424. The highest-scoring lower-level attribute was “Fig Scent”, corresponding to the middle-level evaluation item “Sweet Ambiance”. This result suggests that pleasant fragrances are associated with mild sweetness rather than intense sensory stimulation. The lactone components in fig scents provide a "milky" aroma that triggers maternal nursing memories, potentially inducing the brain to secrete oxytocin, which results in a sense of stable happiness. In fragrance design and marketing, fig notes are frequently blended with warm wood or mild fruits to cultivate a comfortable and joyful atmosphere. Schicber et al. (2025) noted that fruity scents consistently trigger feelings of pleasure and are widely utilized in Western cosmetics. However, a cross-cultural contrast emerges regarding spatial fragrances: for East Asian users, while fruity scents induce pleasure, they are not the primary consideration when selecting a fragrance for their environment. This

contrasts with Western consumers, who place a higher premium on high-pleasure, high-arousal fragrance profiles.

## 5.2 Analysis of High Pleasure and Low Arousal (LAP) Dimensions

Based on Russell's Pleasure-Arousal (P-A) matrix, the emotional states of Relaxation, Warmth, and Security are categorized within the High Pleasure and Low Arousal (LAP) area. This quadrant represents states of tranquility and emotional restoration, which are highly valued in East Asian "ideal affect" profiles.

### 5.2.1 Relaxation

The results identified "Relaxation" as the most influential Kansei construct (R = 0.524), indicating that emotional restoration constitutes the primary psychological value underlying fragrance attractiveness among Taiwanese users. Within the EGM hierarchy, "Forest Greenery Ambiance" served as the middle-level evaluation item, while "Moist Moss Scent" was identified as the dominant lower-level attribute. This hierarchical structure demonstrates how abstract emotional expectations are translated into concrete fragrance characteristics.

Natural scents have been shown to reduce stress (Taufer et al., 2025). In Taiwan, moss is culturally associated with silence and nature through Wabi-sabi aesthetics, explaining why Relaxation emerged as the strongest Kansei construct.

### 5.2.2 Warmth

Warmth (R = 0.381) was primarily supported by the middle-level evaluation item "Cozy Domestic Ambiance", with "Christmas Dessert Scent" identified as the dominant lower-level attribute. According to Reid et al. (2014), such nostalgic scents trigger the hippocampus within the limbic system, evoking positive memories associated with family and festivities. This psychological "Social Connectedness" translates into a perception of mental warmth, compensating for a sense of coldness or isolation in the physical environment.

While Christmas culture originates in the West, globalization has integrated these celebrations into Eastern life. Furthermore, while Westerners associate cinnamon and cloves with the holidays (Seo et al., 2009), these ingredients hold a parallel significance in Eastern culture as "warming" medicinal herbs (TCM) used in winter. Traditional Eastern desserts consumed during the Lunar New Year also feature sugary and spiced notes, triggering memories of "Reunion" (闔家團圓). Thus, "Warmth" in the East Asian context is a synthesis of globalized festive symbols and traditional culinary nostalgia.

### 5.2.3 Security

The EGM results reveal that the concrete features (lower level) associated with Security focus more on product descriptions than on specific olfactory notes. Most respondents believe that for a scent to provide security, it must faithfully represent product labeling.

Doris Schicker et al. pointed out that due to the interaction between olfactory and verbal processing regions in the brain, scents that align with their labels influence product perception more positively than labels alone. This semantic congruence—the relationship between the

linguistic descriptor and the scent itself—alters the consumer's psychological interpretation and evaluation (Iseki et al., 2021). In East Asian markets, reducing the gap between olfactory perception and the brand's narrative is crucial for enhancing "Security" and, consequently, increasing purchase intention.

Unlike the other affective constructs, Security is supported primarily by semantic consistency rather than by a specific fragrance note. This finding suggests that Kansei perception is influenced not only by sensory characteristics but also by the congruence between product communication and olfactory experience. Therefore, fragrance design should integrate scent development with packaging narratives and product descriptions to strengthen users' psychological trust.

## 6 CONCLUSION

This study demonstrates that integrating Miryoku Engineering with Quantification Theory Type I and the Pleasure–Arousal model provides a systematic framework for translating culturally specific fragrance perceptions into actionable design knowledge. While "Freshness" (HAP) enhances environmental invigoration, "Relaxation" (LAP) is the primary consumer preference, supported by "Wabi-sabi" aesthetics and nature-inspired scents. "Warmth" and "Security" are further shaped by cultural nostalgia and scent–label congruence.

Table 3 translates the hierarchical relationships identified through Miryoku Engineering into actionable fragrance design guidelines. Designers can use the identified lower-level fragrance attributes to support targeted Kansei values during product development. These findings provide a foundation for a systematic Kansei Design Framework linking subjective scent perception with product development. Future studies may extend the proposed framework to multisensory Kansei design by incorporating visual and tactile attributes.

**Table 3**. Design Guideline Matrix

| Kansei Value | Evaluation Item | Fragrance Attribute | Design Recommendation |
|---|---|---|---|
| Freshness | Natural greenery | Moss | Botanical green accords |
| Pleasure | Sweet ambiance | Fig | Mild fruity fragrance |
| Relaxation | Forest greenery | Moist moss | Earthy green fragrance for bedrooms |
| Warmth | Cozy home | Christmas dessert | Vanilla + cinnamon notes |
| Security | Unpretentious natural ambiance | Scent profiles that faithfully reflect product labeling | Maintain scent–label consistency |

## REFERENCES

1. Chiu, T.-P. (2010). The study of emotion between scents and representational character of product design (Master's thesis, National Cheng Kung University). Institutional Repository.
2. Kiecolt-Glaser, J. K., Graham, J. E., Malarkey, W. B., Porter, K., Lemeshow, S., & Glaser, R. (2008). Olfactory influences on mood and autonomic, endocrine, and immune function.

Psychoneuroendocrinology, 33(3), 328–339. https://doi.org/10.1016/j.psyneuen.2007.11.015

3. Müller, J. (1992). The H&R book of perfume: Understanding fragrance—Origins, history, development; Guide to fragrance ingredients (1st ed., pp. 66–74). Glöss Verlag.
4. Nagamachi, M. (2002). Kansei engineering as a powerful consumer-oriented technology for product development. Applied Ergonomics, 33(3), 289–294. https://doi.org/10.1016/S0003-6870(02)00019-4
5. Reid, C. A., Green, J. D., Wildschut, T., Sedikides, C., & Parsons, E. (2015). Scent-evoked nostalgia. Memory, 23(2), 157–166. https://doi.org/10.1080/09658211.2013.876048
6. Russell, J. A. (1980). A circumplex model of affect. Journal of Personality and Social Psychology, 39(6), 1161–1178. https://doi.org/10.1037/h0077714
7. Sanui, J. (1996). Visualization of users' requirements: Introduction of the evaluation grid method. In Proceedings of the 3rd Design & Decision Support Systems in Architecture and Urban Planning Conference (pp. 365–374).
8. Schicker, D., Xie, Y., Springer, A., Karacan, B., & Freiherr, J. (2025). Smell the label: Odors influence label perception and their neural processing. Journal of Neuroscience, 45(14), e1159242024. https://doi.org/10.1523/JNEUROSCI.1159-24.202
9. Seo, H.-S., Buschhüter, D., & Hummel, T. (2009). Odor attributes change in relation to the time of the year: Cinnamon odor is more familiar and pleasant during the Christmas season than summertime. Appetite, 53(2), 222–225. https://doi.org/10.1016/j.appet.2009.06.011
10. Taufer, F., Cortese, L., Cattaneo, A., et al. (2025). Psychological and physiological responses to smells from nature: Potential health benefits for urban dwellers. npj Urban Sustainability, 5(1), Article 27. https://doi.org/10.1038/s42949-025-00274-0
11. Thiboud, M. (1991). Empirical classification of odors. In P. M. Müller & D. Lamparsky (Eds.), Perfumes: Art, science, and technology (pp. 253–286). Elsevier.
12. Tsai, J. L. (2007). Ideal affect: Cultural causes and behavioral consequences. Perspectives on Psychological Science, 2(3), 242–259. https://doi.org/10.1111/j.1745-6916.2007.00043.x
13. Ujigawa, M. (1997). The practice of Miryoku engineering. Kaibundo.
14. Zarzo, M. (2013). What is a fresh scent in perfumery? Perceptual freshness is correlated with substantivity. Sensors, 13(1), 463–483. https://doi.org/10.3390/s130100463