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How smell evoke product awareness-development of a fragrance with high-class odor for cosmetic application

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1. Introduction

The new consumption era has empowered consumers to prioritize beauty brands that align with their values, emphasizing transparency, authenticity, and self-expression. For younger generations, beauty products serve as tools for individuality, driving demand for innovative, personalized solutions. Luxury, once defined by exclusivity and high price points, now transcends economic barriers, evolving into "new luxury"—characterized by emotional engagement, superior performance, and unique design [1].

Fragrance, as a multisensory medium, plays a pivotal role in conveying this new luxury. Consumer research by Kaidu (2023; n = 800) reveals that 79% of frequent perfume users associate scent with elegance and personal taste, while 57% view it as a marker of social status. Notably, China's Little Red Note 2023 report highlights a 27-fold surge in searches for "intellectuality" and "high-class feel," underscoring the growing demand for cosmetics with elevated olfactory profiles.

The concept of "high-class feel" manifests differently across industries. In fashion, this term frequently describes facial features that diverge from conventional beauty standards—exemplified by models like Liu Wen, Ni Ni, and Du Juan—while projecting an aura of sophistication and luxury. Xu Yanqin (2017) [2] In the clothing industry, research by John et al. indicates that niche styles with limited popularity but strong fashion appeal more effectively communicate a premium aesthetic. Bruun et al. established that garments featuring classic design principles—notably simplicity, minimalism, and artistic expression—elicit perceptions of elegance, harmony, and tranquility. Cao Xiaoqing et al. further substantiated that incorporating high-end aesthetic principles in apparel design increases product valuation and motivates consumer purchases. Wang Jingjin et al. [3] define high-class feel as a consumer-centric evaluation of products rich in cultural connotation, refinement, quality and uniqueness. It does not necessarily equate to 'expensive' or 'luxurious' but may encompass rarity, distinctiveness, and a subtle sense of exclusivity. This concept not only resonates emotionally but also reflects personal achievement, social status, and taste.[4]

In cosmetics industry, packaging, texture, application, and fragrance influence consumers' perception of a product's high-end quality.[5]

This study focuses on fragrance as a key driver of high-class perception in cosmetics, examining its compositional elements (notes, accords, layering) and emotional impact as well as strategies for developing perfumed cosmetics with a luxurious appeal.

2. Materials and Methods

2.1 Qualitative studies on linguistic connotation of high-class fragrance

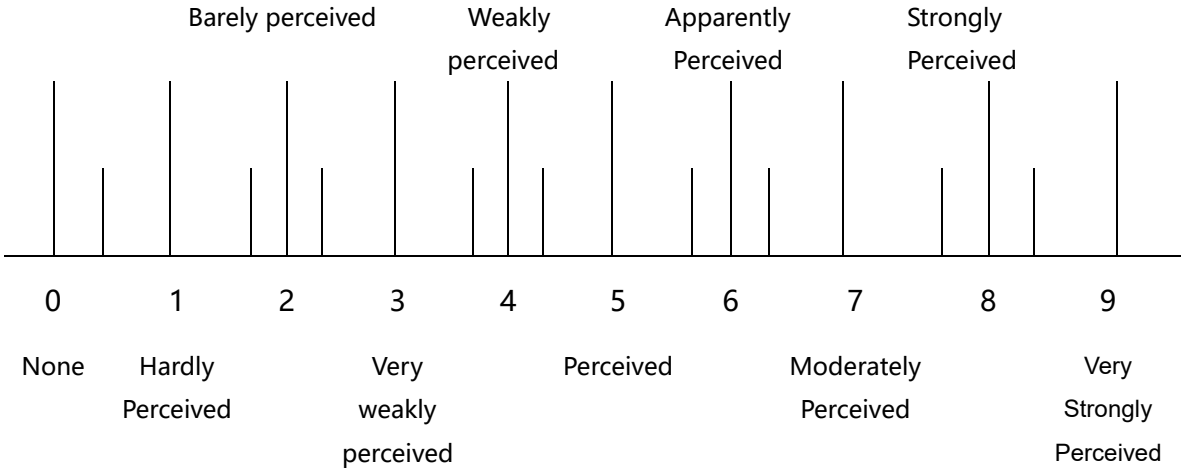
Expert Interviews: 20 fragrance professionals (one-on-one).

Consumer Focus Groups: 3 sessions with 30 participants (aged 20–45; 20 female, 10 male).

2.2 Sensorial and Emotional Perception Testing: Single-Note Ingredients and Compound Fragrances

Panel: 8-10 trained assessors

Parameters: 9 key attributes (e.g., pleasantness, vibrancy, high-class feel, uniqueness) rated on 0-9 scale.



Samples:

Single notes: Herbal (basil, sage, lavender, rosemary, thyme), Citrus (lemon, bergamot, lime, orange, tangerine), Fruity (blackcurrant, white peach, lychee, tropical fruits, apple), Green/Floral (tuberose, rose, galbanum, jasmine, petitgrain), Aldehyde/Floral Aldehydes (neroli, osmanthus, geranium, jasmine sambac), Spicy (clove, pink pepper, cardamom, anise, cinnamon, black pepper), Woody (sandalwood, patchouli, vetiver, tonka bean), Resinous (benzoin, musk, myrrh, ambergris)

Compounds: Citrus-aromatic (FF1), Citrus-floral-woody (FF2), Citrus-aromatic (FF3).

2.3 Consumer In-Use Test and EEG Analysis

Subjects: 18–45-year-old Chinese females (right-handed; exclusion criteria applied).

Procedure: consumers visit test center following the instruction of test supervisor and stay for 30minutes to calm down and be prepared for EEG measurements

Samples: Two shampoos with distinct fragrances in citrus direction

Citrus1: Layered citrus-floral-spicy with 34.9% essential oils.

Citrus2: Lighter citrus-floral-woody accord with 2.5% natural ingredients

Instrument: Emotiv EPOC X EEG system to measure neural responses.
Statistical analysis: Average data was presented as the means ± standard error of. Analysis was performed using Student's t-test or ANOVA when appropriate. P values of <0.05 were considered significant.

3. Results

3.1 Key Attributes of High-Class Fragrances

The notion of 'high-class' in fragrances, as evidenced by existing literature and our qualitative studies, manifests through four key dimensions:
Uniqueness (distinctive, e.g., bespoke oud-rose blends).
Scarcity (rare ingredients like oud, ambergris, orris root).
Complexity (multi-layered dry-downs).
Abstractness (non-literal interpretations, e.g., a cold mountain breeze).

From the qualitative study, we confirmed that the richness of aroma and essential oils contribute to the perception of high-classy feel and liking of the aroma, furthermore the harmony with the aroma itself and uniqueness also have a great impact. Further research is necessary to verify the assumptions and interpretations.

3.2 High-class feel on Single-Note Ingredients vs. Compound Fragrances

Single Notes: Citrus scored highest for high-class feel (3.12/9), correlated with uniqueness (r = 0.59) and nurturing (r = 0.46); Fruity is scored the next highest (2.75/9), correlated with nurturing (r = 0.53), uniqueness (r = 0.51), mildness (r = 0.47); followed by Green floral and Woody notes while Herbal and Spicy notes scored the lowest (1.42 and 1.68 respectively)

Fragrance compounds: FF2 (citrus-floral-woody) outperformed FF3 (5.00 vs. 2.33), with naturalness (r = 0.70), pleasantness (r = 0.44) and uniqueness (r =0.41) as key drivers.

3.3 Consumer In-Use Test and EEG analysis

Consumer In-Use Test

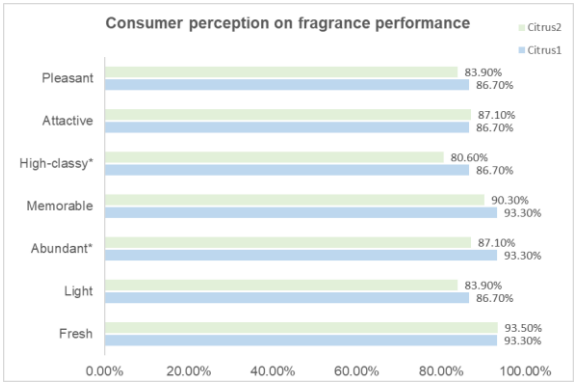


Fig.1 Consumer perception on fragrance performance

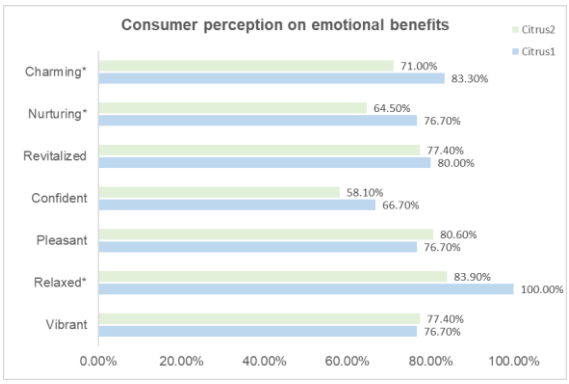


Fig.2 Consumer perception on emotional benefits

As evidenced in Fig 1, Fragrance Citrus1 demonstrated significantly stronger performance ($p<0.05$) across key sensory dimensions, particularly in high-class perception (86.7% vs. 80.6%) and abundant character (93.3% vs. 87.1%). This aligns with its compositional superiority—a meticulously layered structure incorporating 34.9% natural essential oils that enhance both complexity and naturalness.

Three critical findings emerge:
Emotional Dominance: Citrus1 outperformed Citrus2 in evoking charming (83.3% vs. 71.0%), nurturing (76.7% vs. 64.5%), and relaxed (100% vs. 83.9%) responses, validating its holistic appeal.
Olfactory-Consumer Alignment: The preference patterns directly correlate with Citrus1's technical profile—its rounded, rich bouquet and high-quality essential oils (e.g., guaiac, patchouli, black pepper oil, Persian resin etc.) create a perceptibly premium experience.
Such statistically robust preferences underscore the importance of multilayered formulations with substantial natural ingredients for luxury positioning.

EEG analysis on the fragrances neural impact

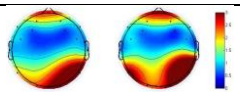
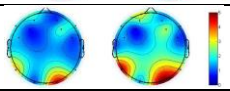
Sample	Potency on Pleasantness Evoked		Example
	Before smelling	During smelling	
Shampoo with Citrus1 fragrance	1.69	2.71	
Shampoo with Citrus2 fragrance	-0.21	0.60	

Fig. 3 EEG measurement on potency of pleasantness evoked

Although memory retention and preference measures showed non-significant variation between fragrances ($p>0.05$), the observed trends suggest that implicit sensory attributes may meaningfully influence consumer evaluations despite their subtlety.

4. Discussion

This study establishes an innovative tripartite framework connecting consumer semantics, olfactory architecture, and neurocognitive responses to decode the elusive "high-class feel" phenomenon. Our integrated approach yields three pivotal contributions to luxury olfaction science:

Cultural Dimensions of Olfactory Luxury

The demonstrated regional variability (Chinese cohort data) challenges universal fragrance design paradigms. We identified:

- Strong preference for Citrus-Floral-Woody accords versus Western-oriented vanilla-oud blends
- Neural signature divergence in prefrontal cortex activation during luxury perception tasks

These findings necessitate culture-specific development strategies, particularly for emerging markets where traditional luxury markers may not translate.

Structural Determinants of Premium Perception

Quantitative analysis reveals three technical imperatives for luxury positioning on fragrance development:

- Complexity: Optimal 3-5 fragrance accords layered in harmony

- Naturalness: Prominent botanically-derived components
- Uniqueness: Novel odorant combinations triggering higher hippocampal activation

Methodological Advancements

While our EEG-survey hybrid approach can capture luxury perception more precisely, limitations still persist:

- Temporal resolution constraints in measuring rapid olfactory hedonic processing
- Cultural bias in semantic differential scales, future investigations should employ:
  ✓ Hyperspectral imaging for real-time olfactory bulb monitoring
  ✓ Cross-cultural neuro-aesthetic mapping

Study Limitations

The current research intentionally focused on Chinese female demographics (20-45 years old) to control for cultural variables, potentially limiting immediate generalizability. Subsequent validation should address:

- Male fragrance perception dynamics
- Age-related olfactory sensitivity gradients
- Education and social status-induced scent perception variations

The framework enables quantitative analysis of luxury olfaction's intangible qualities, creating a science-based pathway from consumer insights to fragrance design.

5. Conclusion

The perception of high-class fragrances constitutes a multidimensional sensory-cognitive phenomenon that engages both conscious evaluation and subconscious processing. Our integrated investigation, combining consumer psychology, olfactory science, and neurophysiological measurements, yields foundational insights for luxury fragrance creation This necessitates market-specific calibration and fragrance development advancement.

The proposed methodology bridges empirical science with creative perfumery, offering both theoretical advancement and practical tools for the fragrance industry's evolving needs. Subsequent work should focus on standardizing assessment protocols and developing AI-assisted fragrance development platforms.

CONFLICT OF INTEREST STATEMENT

All authors declare no conflicts of interest.

Acknowledgments

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