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What Makes Ikebana Beautiful? Expert and Novice Conceptions of Beauty in Japanese Flower Arrangement

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Expert and Novice Conceptions of Beauty in Japanese Flower Arrangement

Abstract

Ikebana, the Japanese art of flower arrangement, embodies aesthetic principles such as asymmetry, empty space, and a spiritual relationship with natural materials that differ from those of Western traditions usually studied in empirical aesthetics, yet its psychological dimensions remain largely unexplored. We compared how experts and novices conceptualized the beauty of Ikebana using qualitative content analysis and natural language processing of free-text responses from 245 Japanese novices and 46 certified experts. Responses were coded into 18 inductively derived aesthetic categories. Novices emphasized color and balance, whereas experts emphasized naturalness, vitality, self-expression, and practitioners' attitudes. The two groups did not differ in the number of categories mentioned per person, and category diversity (Shannon entropy) did not differ significantly between groups, although it was descriptively higher in experts. Instead, expertise was associated with a qualitative shift from perceptual surface features to process-oriented, relational, and spiritual dimensions. Computational analyses converged with these findings. The results provide a foundational taxonomy for studying Ikebana aesthetics and contribute to research on culturally situated art forms.

Keywords: Ikebana, empirical aesthetics, expertise, cross-cultural psychology, qualitative content analysis.

Ikebana, the Japanese art of flower arrangement, embodies aesthetic principles such as asymmetry, empty space (*ma*; the intentional use of negative space), and the spiritual relationship between the creator and natural materials (Figure 1). In Ikebana, empty space is not a mere absence, but an active compositional element that is regarded as equal in importance to the plant material itself (Sato, 2013). These principles differ fundamentally from Western traditions, on which empirical aesthetics have largely been built, and this divergence raises the question of whether the aesthetic appreciation of Ikebana can be understood through frameworks developed primarily from Western art.

This question reflects a foundational concern in the psychology of aesthetics. Jacobsen (2006) argued that the determinants of aesthetic processing differ across content domains and cautioned against culture-dependent psychological models, which are therefore not general. However, the field has predominantly examined Western art forms and perceivers, an instance of the broader WEIRD bias, leaving culturally situated traditions such as Ikebana largely unexplored.

Figure 1

The Aesthetics of Ikebana

The Ikebana's distinctive character Ikebana becomes clearer through its formal conventions. Instructional texts specify the proportions of principal branches in explicit terms, such as a 1:√2 ratio (Sasaoka, 2011), and the choice of vessel is treated as essential because the same material can be arranged in entirely different ways depending on the container and the creator's intention (Teshigawara, 2011). Its pervasive asymmetry contrasts with the symmetry valued in Western flower arrangements, with the basic *ten-chi-jin* (heaven-earth-human) structure linked to a syncretic Shinto-Buddhist environment rather than to a single central deity (Moriyama & Moriyama, 1999). The

aesthetic value of Ikebana has thus been described as irreducible to visual pleasure alone and bound to spirituality, a philosophical worldview, and a distinctly Japanese view of nature (Nakayama, 2018).

Despite this richness, the beauty of Ikebana has rarely been empirically examined. Watters et al. (2012), in an interview study of practitioners in Canada, found that Ikebana practice was associated with the development of aesthetic sensitivity and with physical and psychological well-being. Ikenobo et al. (2014) had experts and novices evaluate expert- and novice-made arrangements of adjective pairs and found that only experts could reliably discriminate between them in aesthetic terms. More recently, Hitsuwari and Jacobsen (2026) asked Japanese participants to rate Ikebana images and found that, contrary to its characterization as fundamentally asymmetric (Sasaoka, 2011), perceived symmetry was positively associated with beauty ratings, with this preference moderated by cultural expertise. This resonates with evidence that symmetry is not a universal determinant of beauty; art experts, unlike non-experts, found the asymmetrical patterns most beautiful (Leder et al., 2019). However, what people consider constitutive of Ikebana's beauty beyond perceptual dimensions, such as symmetry, has not been examined systematically.

Expertise in Empirical Aesthetics

Over its history, Ikebana developed from its seventh-century Buddhist origins into an independent art form by the fifteenth century, becoming increasingly refined as its formal features diversified, including placement angles and branch lengths (Moriyama & Moriyama, 1999). This accumulated refinement makes Ikebana a domain where the role of expertise becomes particularly salient. Expertise has long been a central topic in empirical aesthetics (Darda & Cross, 2022; Leder et al., 2012; Silvia, 2013). Within

Jacobsen's (2006) framework, experts are understood to possess more structured and complex domain knowledge that reshapes how they process aesthetic objects. Two contrasting accounts for this effect have been proposed. Silvia (2013) distinguished an *expert consensus* account, in which experts come to share aesthetic standards and show high agreement, from an *idiosyncratic expert* account, in which evaluation becomes freer and more individualized; his own work supported the consensus account. By contrast, Leder et al. (2012) found that in painting appreciation, greater expertise was associated with a more differentiated and individualized evaluative structure, supporting the idiosyncratic account. Thus, whether expertise renders aesthetic judgment more convergent or individualized remains an open question.

A second, a distinct question concerns whether experts converge in the features they attend to. Pihko et al. (2011) found that while viewing Western paintings, only non-experts lowered their aesthetic ratings as abstraction increased, and that experts explored the whole image more broadly and fixated further from its center. In the appreciation of haiku, Hitsuwari and Nomura (2024) found that practitioners with more than ten years of experience did not lower their evaluations of highly ambiguous works, and that the mediation from ambiguity through interest to liking was significant only among experts. Together, these lines of work suggest that expertise may reshape not only the consistency of aesthetic judgments but also the features treated as constitutive of beauty.

Objectives and Hypotheses

The present preregistered study addressed two questions regarding Ikebana by comparing how experts and novices describe what is important for its beauty, using qualitative content analysis and natural language processing (NLP). Following the descriptive, "aesthetics from below" tradition of building categories from the data rather

than imposing them in advance (Jacobsen, 2006), we developed the coding scheme inductively from participants' responses, which allows us to ask both whether experts draw on a greater number and diversity of aesthetic dimensions and whether the content of those dimensions differs qualitatively from that of novices. While the primary aim of this study was the exploratory extraction of aesthetic factors of Ikebana, we propose the following specific predictions regarding group differences:

H1: Experts will describe the beauty of Ikebana using a higher number of aesthetic categories per person than novices, reflecting greater individual cognitive complexity in the expert group.

Regarding the semantic structure of groups, we propose the following competing hypotheses.

H2a: The expert group will produce a wider variety of unique codes, reflecting a multifaceted appreciation of beauty.

H2b: Conversely, the expert group may show higher convergence on specific aesthetic principles (e.g., asymmetry, space), resulting in lower entropy than the novice group.

Method

Ethical Considerations and Open Science Declaration

This study adhered to the ethical guidelines established by [anonymous for review]. It falls under general ethical approval, covers non-invasive psychological research, and ensures compliance with the ethical standards for research involving human participants. This study was conducted in accordance with the principles of the Declaration of Helsinki of the World Medical Association. All participants provided

informed consent before participation.

In line with the Open Science practices, the study design, hypotheses, and data analysis plan were registered in the Open Science Framework (https://osf.io/fwyh5/overview?view_only=a5e4de44b3314b15865f4aeb3af642e3). Additionally, the raw data, processing/analysis scripts, questionnaires, and their English translations will be made publicly available in the Open Science Framework upon the completion of the study (https://osf.io/zuyr8/overview?view_only=77d17ce993d84d5690d29d822dad0956).

We preregistered Latent Dirichlet Allocation for topic modeling, but employed BERTopic instead, as it was better suited to the short responses in our data.

Participants

The participants comprised two distinct groups: novices and experts. The novice sample was drawn from a secondary analysis of a dataset by Hitsuwari and Jacobsen (2026). This group consisted of 245 Japanese participants (M_{age} = 43.76, SD = 9.64; 134 men, 109 women, 1 other, and 1 non-responder) recruited through CrowdWorks (https://crowdworks.jp/).

The expert group was recruited in November and December 2025. We initially compiled a contact list of 200 potential participants who were operating in Ikebana classrooms or seminars, based on publicly available online information. Survey invitations were distributed primarily via email, with 8 submitted via contact forms on recipients' websites. Of the 200 initial contact attempts, 14 failed due to invalid addresses or unknown users, leaving an initial contact pool of 186 experts. To reach a broader population, we employed a snowball sampling strategy, asking participants to forward a survey invitation to other qualified experts in their professional networks.

Eligibility for the expert group was limited to individuals holding a teaching certificate (e.g., 師範 [*Shihan*]) or having more than 10 years of experience in Ikebana practice. A total of 46 experts completed the survey (M_{age} = 59.6, *SD* = 15.6, range = 22–90; 8 men, 38 women). Most held *Shihan* qualifications (95.7%). Mean years of Ikebana experience was 37.1 years (*SD* = 14.8, range = 11–75), with a mean teaching experience of 21.5 years (*SD* = 21.5). Participants represented 8 different Ikebana schools, with *Sōgetsu-ryū* (41.3%), *Ikenobō* (21.7%), and *Ohara-ryū* (13.0%) being the most common. As an incentive, expert participants were informed that they would receive a summary of the research findings upon publication and could opt into a lottery to win one of the ten 1,000 JPY Amazon Gift Cards.

Procedure

Data were collected for both groups using the same online survey platform Unipark; https://ww3.unipark.de/). However, the context in which the open-ended questions were presented differed slightly between the groups. For the novice group, the question was administered through an online experiment conducted by Hitsuwari and Jacobsen (2026) in which participants performed aesthetic evaluations of Ikebana images.

For the expert group, the survey was administered as a stand-alone study. Upon accessing the survey link, participants were presented with an informed consent form explaining the study's purpose, anonymity, and data-handling procedures. After providing their consent, the experts answered the survey items.

Despite the differences in the survey context, participants in both groups answered the same open-ended question: “What do you think is important for the beauty of Ikebana?” For the expert group, the survey subsequently presented items regarding their Ikebana experience (e.g., years of practice, certification, and school) and

demographic information. The average completion time for the expert survey was approximately 3 to 5 minutes.

Coding Procedure

The coding process followed an inductive thematic analysis approach described by Braun and Clarke (2006). For the novice group, the first author initially reviewed all 245 responses to become familiar with the data, then coded a subset of 40 responses to generate a preliminary codebook. This codebook was refined through discussions with the third and fourth authors, resulting in the establishment of inclusion and exclusion criteria for each code. The final codebook comprised 18 aesthetic categories: Balance/Contrast, Color, Form/Shape, Arrangement/Structure, Asymmetry, Simplicity, Space/*Ma*, Background/Environment, Naturalness/Vitality, Flowers (Material), Seasonality, Vase/Container, Harmony, Quietness/Humility, Theme/Concept, Self-expression/Sensitivity, Attitude/Mindset, and Emotion/Impression (see Table S1 for full codebook with definitions and inclusion/exclusion criteria).

Following codebook development, the third and fourth authors independently coded 20 responses as pilots to clarify ambiguities. They then coded an additional 30 responses to assess initial reliability (mean $\kappa = .569$). After further calibration, both coders independently coded all 245 responses, achieving substantial inter-rater reliability (mean $\kappa = .733$). Any disagreements were resolved by the first author.

For the expert group, the third and fourth authors applied the same codebook to all 46 responses. The coders were instructed to note any responses that could not be captured by the existing code; however, no new categories emerged. After addressing inconsistencies in codes with lower agreement, the final inter-rater reliability reached $\kappa = .659$. Any disagreements were resolved by the first author.

Natural Language Processing Procedure

To complement the qualitative content analysis, we conducted computational text analyses of the raw free-text responses. Analyses were conducted using Python version. 3.12.12 (Python Software Foundation, 2025), using the *fugashi*, *networkx*, *prince*, and *BERTopic* packages.

Morphological analysis and feature extraction. The Japanese texts were tokenized using MeCab (Kudo et al., 2004) with the UniDic-lite dictionary to extract nouns and adjectives after removing stop words. To identify words uniquely associated with each group, we calculated log-odds ratios with an informative Dirichlet prior (Monroe et al., 2008), which yields z-scores indicating whether a word is significantly more characteristic of experts or novices.

Co-occurrence network analysis. We constructed co-occurrence networks for each group by counting the word pairs that appeared within the same response. Networks retained edges with co-occurrence counts ≥ 3 and the top 35 nodes by weighted degree. We computed the degree centrality to identify structurally important concepts in each group's semantic network.

Topic modeling. We applied BERTopic (Grootendorst, 2022) to identify the latent themes across all responses. Document embeddings were generated using the multilingual-e5-large sentence transformer (intfloat/multilingual-e5-large), reduced to seven dimensions with UMAP (n_neighbors = 10, min_dist = 0.0, cosine metric), and clustered with HDBSCAN (min_cluster_size = 10, min_samples = 2, cluster_selection_method = "eom"). Topic representations were derived via class-based TF-IDF (c-TF-IDF) over nouns and adjectives. Documents initially assigned as outliers were reassigned to the nearest topic based on the embedding similarity. The authors

assigned topic labels based on the representative documents for each topic.

Correspondence analysis. We also conducted correspondence analysis on the word × group frequency matrix using the *prince* package.

Data Analysis

A qualitative content analysis was conducted according to the coding procedure described above. For hypothesis testing, we compared the average number of codes per participant (H1: Complexity)using a Mann-Whitney U test with rank-biserial correlation as the effect size. To assess the diversity of aesthetic categories within each group (H2: Structure), we calculated the Shannon entropy and compared the groups using a bootstrap test with 10,000 iterations. Differences in specific category frequencies were examined using Fisher's exact test with odds ratios. These analyses were conducted in R version 4.4.2 (R Core Team, 2024) using the *tidyverse* (version 2.0.0; Wickham et al., 2019), *irr* (version 0.84.1; Gamer et al., 2019), and *effectsize* (version 1.0.0; Ben-Shachar et al., 2020) packages.

For the natural language processing analyses, statistical inference was based on z-scores derived from log-odds ratios using Dirichlet priors (Monroe et al., 2008). Degree centrality was computed descriptively without inferential tests.

Results

Qualitative Content Analysis

The frequency of aesthetic categories differed markedly between the groups (Figure 2; Table 1). Among novices, the most frequently mentioned categories were Color (48.2%) and Balance/Contrast (47.8%), followed by Flowers/Material (22.9%) and

Arrangement/Structure (20.4%). In contrast, experts most frequently mentioned Naturalness/Vitality (28.3%), followed by Flowers/Material (23.9%), Self-expression/Sensitivity (23.9%), and Form/Shape (19.6%).

Figure 2 & Table 1

Contrary to our prediction (H1), experts did not produce more aesthetic categories per response than novices. The mean number of codes per participant was 2.38 (SD = 1.30, Mdn = 2) for novices and 2.26 (SD = 1.25, Mdn = 2) for experts. The Mann-Whitney U test revealed no significant difference between the groups (W = 5959.5, p = .52, r = .06).

Shannon entropy was calculated to assess the diversity of the code distributions within each group. The expert responses showed higher entropy (H = 3.82) than the novice responses (H = 3.56), suggesting a more even distribution across categories. However, a bootstrap test (10,000 iterations) indicated that this difference did not reach statistical significance (ΔH = 0.26, 95% CI [−0.09, 0.38], p = .087). Thus, H2a (Diversity Hypothesis) was partially supported at the trend level, whereas H2b (Convergence Hypothesis) was not supported.

Fisher's exact test revealed significant differences in the frequencies of the categories between the groups (Table 1). The novices were significantly more likely to mention Balance/Contrast (47.8% vs. 8.7%, OR = 9.54, p < .001) and Color (48.2% vs. 17.4%, OR = 4.39, p < .001). Conversely, experts were significantly more likely to mention Self-expression/Sensitivity (5.7% vs. 23.9%, OR = 0.19, p < .001), Attitude/Mindset (1.2% vs. 17.4%, OR = 0.06, p < .001), Background/Environment (1.2% vs. 13.0%, OR = 0.08, p = .001), and Naturalness/Vitality (9.0% vs. 28.3%, OR = 0.25, p = .001).

Natural Language Processing

Feature word extraction. Log-odds ratio analysis with Dirichlet priors identified words distinctively associated with each group. Words with $z < -1.96$ were classified as novice-characteristic, and those with $z > 1.96$ as expert-characteristic (corresponding to $p < .05$, two-tailed). Table 2 presents the top 10 words for each group ranked by z-score magnitude.

Six words were significant for the novice group: balance (バランス [baransu]), flower (花 [hana]), color (色 [iro]), arrangement (配置 [haichi]), good (良い [yoi]), and shape (形 [katachi]). In contrast, ten words were significantly associated with the expert group, including nature (自然 [shizen]), work (作品 [sakuhin]), floral materials (花材 [kazai]), and line (線 [sen]).

These results converge with those of the qualitative content analysis. The novices' emphasis on Balance/Contrast and Color in the coding analysis was mirrored by the high frequency of balance and color in the NLP analysis. Similarly, experts' focus on Naturalness/Vitality and Self-expression/Sensitivity corresponded to their distinctive use of nature, self (自分 [jibun]), and work.

Co-occurrence network analysis. Co-occurrence networks were constructed for each group based on the word pairs appearing within the same response (Figure 3). The node size reflects the degree (number of connections), and the edge width reflects the co-occurrence frequency.

Table 2 & Figure 3

The two networks exhibited markedly different structures. The novice network was dominated by two central hubs: flower (花 [hana]; degree centrality = .97) and balance (バランス [baransu]; degree centrality = .91), with most other concepts connected through these nodes. In contrast, the expert network exhibited a more

distributed structure, with no single node exceeding a degree centrality of 0.59. Central concepts in the expert network included beautiful (美しい [utsukushii] .59), Ikebana (生け花 .50), flower (.50), space (空間 [kūkan] .41), and nature (自然 [shizen] .36).

This structural difference suggests that novices organize their aesthetic understanding around a few dominant concepts, primarily flowers and balance, whereas experts draw on a more diverse and interconnected set of aesthetic principles (see Table S2 for the degree centrality of the top 20 nodes in each group, and Figure S1 for a combined network of both groups).

Topic modeling. BERTopic extracted 10 topics whose group distributions converged with those from the preceding analyses (Figure 4; Table S3). The clearest contrast was the topic we labeled Artistry and Philosophy, which was a strong characteristic of experts (26.1% of experts vs. 2.0% of novices), whereas novices concentrated on color, form, and balance. A two-dimensional document map and hierarchical clustering of the topics are provided in Figures S2 and S3, which separate the topics of Evoked emotion, Aesthetic evaluation, and Artistry and philosophy from those concerning the perceptual features of color, form, and arrangement. The correspondence analysis of the word × group frequency matrix produced the same structure, as shown in Figure S4.

Figure 4

Discussion

Hypothesis Evaluation and the Structure of Expertise

The present study compared how experts and novices perceive beauty in Ikebana, asking whether experts draw on a greater number and wider variety of aesthetic

dimensions and whether the content of those dimensions differs qualitatively. Although the results regarding complexity diverged from our predictions, they still formed a theoretically coherent picture.

Contrary to the predictions of H1, experts did not mention more aesthetic categories per person than novices, and the two groups were indistinguishable in terms of the number of categories referenced. At the individual level, expertise was not associated with cognitive complexity, in the sense of attending to a broader range of features within a single response. However, the situation changed at the group level. Although only at the trend level, experts' responses showed higher Shannon entropy than novices' and were more evenly distributed across the aesthetic categories. The co-occurrence networks converged with this pattern: while novices organized their understanding around two dominant hubs ("flower" and "balance"), experts exhibited a more distributed structure in which no single concept stood out. These patterns are consistent with the diversity prediction (H2a) but provide no support for the convergence prediction (H2b). Rather than converging on a small set of normative principles such as asymmetry or space, experts were dispersed across the full range of categories.

The rejection of H1 and the group-level dispersion under H2a are not two unrelated findings, but two facets of the same phenomenon. The number of aesthetic dimensions each expert drew upon remained limited and was no different from that of the novices, yet the dimensions they emphasized varied substantially from one expert to another. Consequently, the group covered the category space more evenly. In other words, expertise in Ikebana manifested not as elaboration within individuals, but as differentiation between them. This gap between the individual and the group level supports the idiosyncratic experts account, one of the two accounts distinguished by Silvia (2013), under which expertise manifests not as convergence on shared standards of

beauty (the expert consensus account) but as a more personal and individualized character of evaluation, which aligns with the findings of Leder et al. (2012), who showed that in the appreciation of paintings, higher expertise is associated with a more differentiated and individualized evaluative structure. Because each practitioner's aesthetic sensibility settles around what that person has come to regard as essential, the diversity we observed at the group level can be interpreted as the aggregate manifestation of criteria that crystallize within individuals yet diverge from one another. The distributed expert network, which lacked the dominant hubs that organized novices' responses, may represent the structural counterpart of this individuation.

Two additional considerations support this interpretation. First, there was heterogeneity in the expert samples. Our experts were recruited from eight schools with differing orientations (for example, the formality associated with the Ikenobō lineage, the emphasis on nature and color in the Ohara school, and the freedom and creativity of the Sōgetsu school), which can be understood as a basis for the individual differences driving group-level dispersion. Second, the convergence of two methodologically independent approaches—qualitative content analysis and NLP-based network analysis—on the same structural conclusion lends additional weight to this pattern.

However, one finding is open to multiple interpretations. Asymmetry, frequently cited as a formal defining feature of Ikebana (Hitsuwari & Jacobsen, 2026; Sasaoka, 2011), was not mentioned by a single expert. This silence admits two markedly different conclusions that our data cannot adjudicate. This may indicate that practicing experts do not regard asymmetry as central to beauty or, conversely, that asymmetry is so thoroughly internalized as a taken-for-granted premise that it no longer warrants explicit mention. The same ambiguity applies more generally to surface features foregrounded by novices. The fact that the experts did not mention color or balance does not necessarily mean that

these are unimportant to them; rather, it may reflect that such considerations have become tacit.

Expertise and the Shift from Surface to Relational Dimensions

The aesthetic categories that distinguished the two groups drew a clear contrast between what experts and novices attended to regarding beauty. Novices focused on the color and perceptual attributes of balance/contrast available in the work itself. In contrast, experts emphasized self-expression/sensitivity and attitude/mindset. These categories locate beauty not on the visible surface but in the creator's engagement with the work and in the disposition of mind brought to its making. That is, while novices' attention is directed toward the perceptual surface of the finished work, experts' attention is directed toward the creator's engagement and the process behind it.

This contrast aligns with the patterns reported in studies on aesthetic appreciation in other domains. Pihko et al. (2011) reported that laypeople rated representational paintings as more beautiful and emotionally positive than abstract paintings, whereas experts' evaluations were unaffected by abstraction. Novices' appreciation is anchored on the depicted surface and declines when recognizable content is removed, whereas experts maintain their engagement regardless of the presence of such surface cues. Augustin and Leder (2006) shed light on what lies behind this difference. When classifying works, non-experts rely on criteria such as personal feelings and pictorial content, whereas experts organize their judgments around style and technique, attending not to what the work presents directly to the eye but to how it was made. Taken together, these findings suggest that the contrast between novices and experts is not merely a matter of preference but also of the level at which a work is processed (Leder et al., 2004)—a shift from the perceptible surface toward the principles and intentions behind it, consistent with the contrast that

emerged in the present study between novices' color and balance and experts' self-expression and mindset.

Limitations

This study had several limitations. First, the two groups differ in their recruitment methods and survey contexts. Novice data were collected as part of an experiment in which participants viewed actual Ikebana images and rated their beauty and symmetry (Hitsuwari & Jacobsen, 2026), which may have been influenced by this task, potentially emphasizing perceptual attributes such as color and balance. However, asymmetry, the dimension most directly tied to that task, appeared in only 2.9% of the novice responses, suggesting limited influence. Additionally, the expert sample size was relatively small ($n = 46$), which was an inherent constraint in accessing such a specialized population. This may be one reason why the between-group difference in entropy remained at the level of a trend. The findings regarding diversity require confirmation using a larger sample of experts.

Second, the experts spanned eight schools, which may have differed in aesthetic orientation. Because each school was represented by a few experts, we could not determine whether group-level diversity reflected individual differences or differences between schools. Thus, the schools warrant further attention in future studies.

Third, our coding captures the aesthetic dimensions mentioned by the participants, but cannot capture the possibility that experts and novices read different depths of meaning within the same category. For example, categories such as flowers/materials and form/shapes were mentioned to a similar degree by both groups; however, their substances may differ. Indeed, even when viewing the same representational content, experts have been shown to read higher levels of meaning and

make more attempts at interpretation than do laypeople (Bauer & Schwan, 2018). Examining the qualitative differences in meaning-making within each category beyond the taxonomy used here remains a task for future research.

Conclusion

The present study compared expert and novice perspectives on what constitutes beauty in Ikebana and clarified how expertise transforms aesthetic understanding. Experts did not, as individuals, mention more aesthetic dimensions than novices, but they differed qualitatively in what they attended to and were more diverse as a group. Whereas novices attended to the perceptual surface of the work, such as color and balance, experts emphasized the dimensions rooted in the relationships among creators, materials, and environments, such as self-expression, mindset, and naturalness. This shift indicates that expertise manifests not as a quantitative elaboration of evaluation, but as a qualitative change in the object of attention and individuation.

Our findings have several implications for future studies. Academically, the extracted perspectives can serve as a framework for empirical research on beauty in Ikebana. Beyond the perceptual dimensions traditionally addressed by empirical aesthetics, such as color and balance, dimensions emphasized by experts, such as naturalness and vitality, which are distinctive to Ikebana yet have not been systematically examined, can be developed as targets for future quantitative research. The taxonomy of the 18 aesthetic categories provided here can serve as a starting point for such studies.

Socially, this study faces the challenge of cultural transmission. The Japanese Ikebana community currently faces a shortage of successors and a decline in the number of new practitioners. According to the Survey on Time Use and Leisure Activities, the participation rate in flower arrangement (*kadō*) among individuals aged 15 and over fell

from 4.4% in 1996 to 1.3% in 2021, a decline to roughly one third over 25 years (Ministry of Internal Affairs and Communications, 1996, 2021). Moreover, the age-specific participation rates for 2021 show that the rate is only 0.4% among people in their 30s but reaches around 2% among those in their 60s, indicating that practitioners are concentrated in older age groups and that younger successors are scarce (Ministry of Internal Affairs and Communications, 2021). The practice of Ikebana has been reported to foster intergenerational connections (Watters et al., 2012), articulating and making visible how experts and novices perceive beauty, as this study does, may help organize the aesthetic richness of Ikebana and communicate its cultural appeal more widely. Clarifying what those who practice this art value may, in turn, help transmit its appeal to the next generation.

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Declaration of AI Use

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Conflict of Interests

The authors declare no conflict of interest.

Data Availability Statement

This study was approved by the Open Science Framework (https://osf.io/fwyh5/?view_only=a5e4de44b3314b15865f4aeb3af642e3). The data, analysis scripts, and questionnaires, along with their English translations that support the findings of this study, are openly available on the Open Science Framework (https://osf.io/zuyr8/?view_only=77d17ce993d84d5690d29d822dad0956).

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Table 1

Comparison of Aesthetic Category Frequencies Between Novices and Experts

Category	Novice (%)	Expert (%)	Difference	OR	*p*
Balance/Contrast	47.8	8.7	-39.1	9.54	< .001
Color	48.2	17.4	-30.8	4.39	< .001
Self-expression/Sensitivity	5.7	23.9	18.2	0.19	< .001
Attitude/Mindset	1.2	17.4	16.2	0.06	< .001
Background/Environment	1.2	13.0	11.8	0.08	0.001
Naturalness/Vitality	9.0	28.3	19.3	0.25	0.001
Space/Ma	9.0	19.6	10.6	0.41	.06
Emotion/Impression	7.3	15.2	7.9	0.44	.09
Arrangement/Structure	20.8	10.9	-9.9	2.15	.15
Harmony	13.9	6.5	-7.4	2.30	.23
Quietness/Humility	6.1	2.2	-3.9	2.93	.48
Vase/Container	8.2	4.3	-3.9	1.95	.55
Asymmetry	2.9	0.0	-2.9	-	.60
Form/Shape	16.7	19.6	2.9	0.83	.67
Theme/Concept	5.7	6.5	0.8	0.87	.74
Flowers (Material)	22.9	23.9	1	0.94	.85
Simplicity	6.1	4.3	-1.8	1.43	1.00
Seasonality	5.3	4.3	-1	1.23	1.00

Note. OR = odds ratio from Fisher's exact test. A positive difference indicated a higher frequency in the expert group. Dashes indicate undefined values due to zero cell counts.

Table 2

Top 10 Feature Words for Each Group Ranked by z-Score Magnitude for (a) Novices and (b) Experts

(a) Novice-characteristic words

word	tf (total)	tf (expert)	tf (novice)	log-odds	z
balance (バランス)	124	6	118	−2.17	−5.21
flower (花)	134	24	110	−0.67	−2.99
color (色)	49	5	44	−1.30	−2.77
arrangement (配置)	37	1	36	−2.70	−2.69
good (良い)	28	2	26	−1.68	−2.30
shape (形)	25	1	24	−2.29	−2.26
harmony (調和)	31	5	26	−0.76	−1.57
season (季節)	15	2	13	−0.98	−1.29
color (色彩)	23	4	19	−0.67	−1.22
impression (感)	27	5	22	−0.59	−1.20

(b) Expert-characteristic words

word	tf (total)	tf (expert)	tf (novice)	log-odds	z
nature (自然)	23	15	8	1.55	3.54
artwork (作品)	13	10	3	2.11	3.22
flower material (花材)	12	11	1	3.31	3.18
line (線)	12	9	3	2.01	3.01
ikebana (生け花)	17	11	6	1.52	2.99
beauty (美)	9	7	2	2.16	2.69

plant (植物)	24	13	11	1.08	2.64
person (人)	20	11	9	1.11	2.47
place (場)	6	5	1	2.51	2.29
self (自分)	5	4	1	2.29	2.05

Note. tf = term frequency (raw token count).

Figure 1

Examples of Ikebana



Note. Ikebana arrangement created and photographed by Yuki Okamoto, the 10th *iemoto* of the Hosokawa Mishō-ryū school. (Reproduced with permission).

Figure 2

Frequency of Aesthetic Categories by Expertise Level

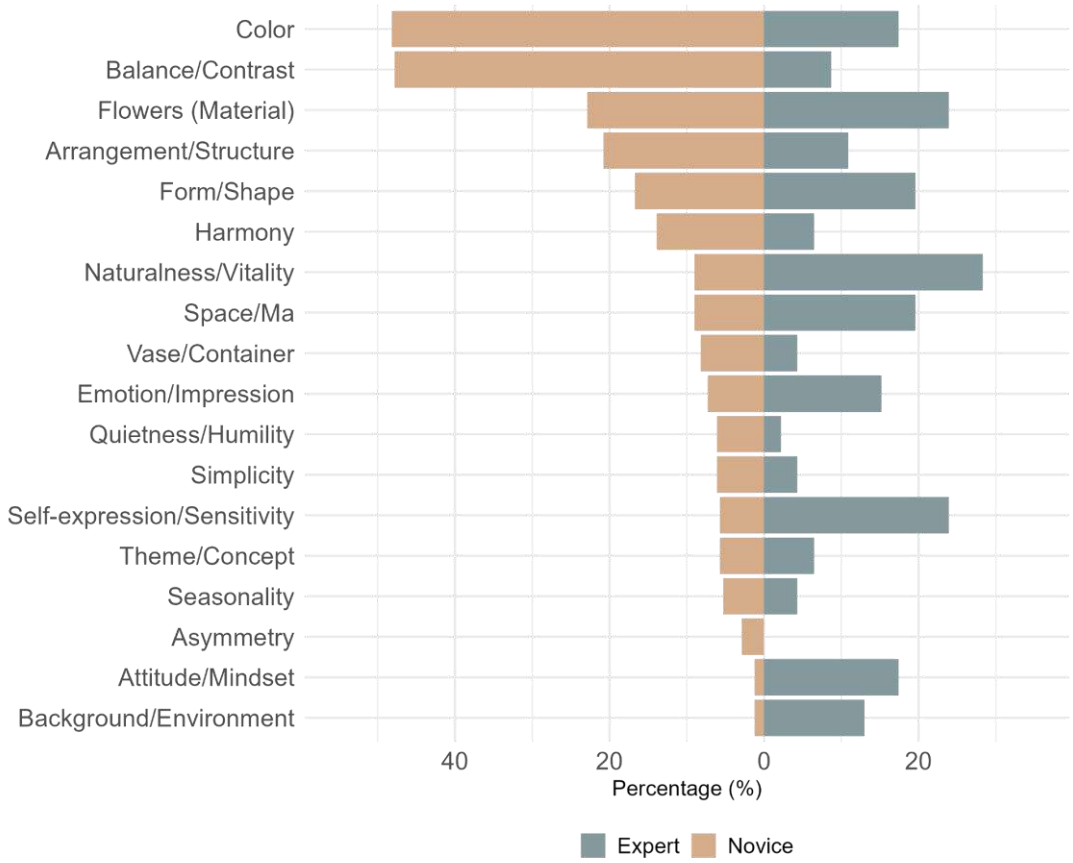


Figure 3

Co-occurrence Networks of Aesthetic Concepts for Novices (a) and Experts (b)

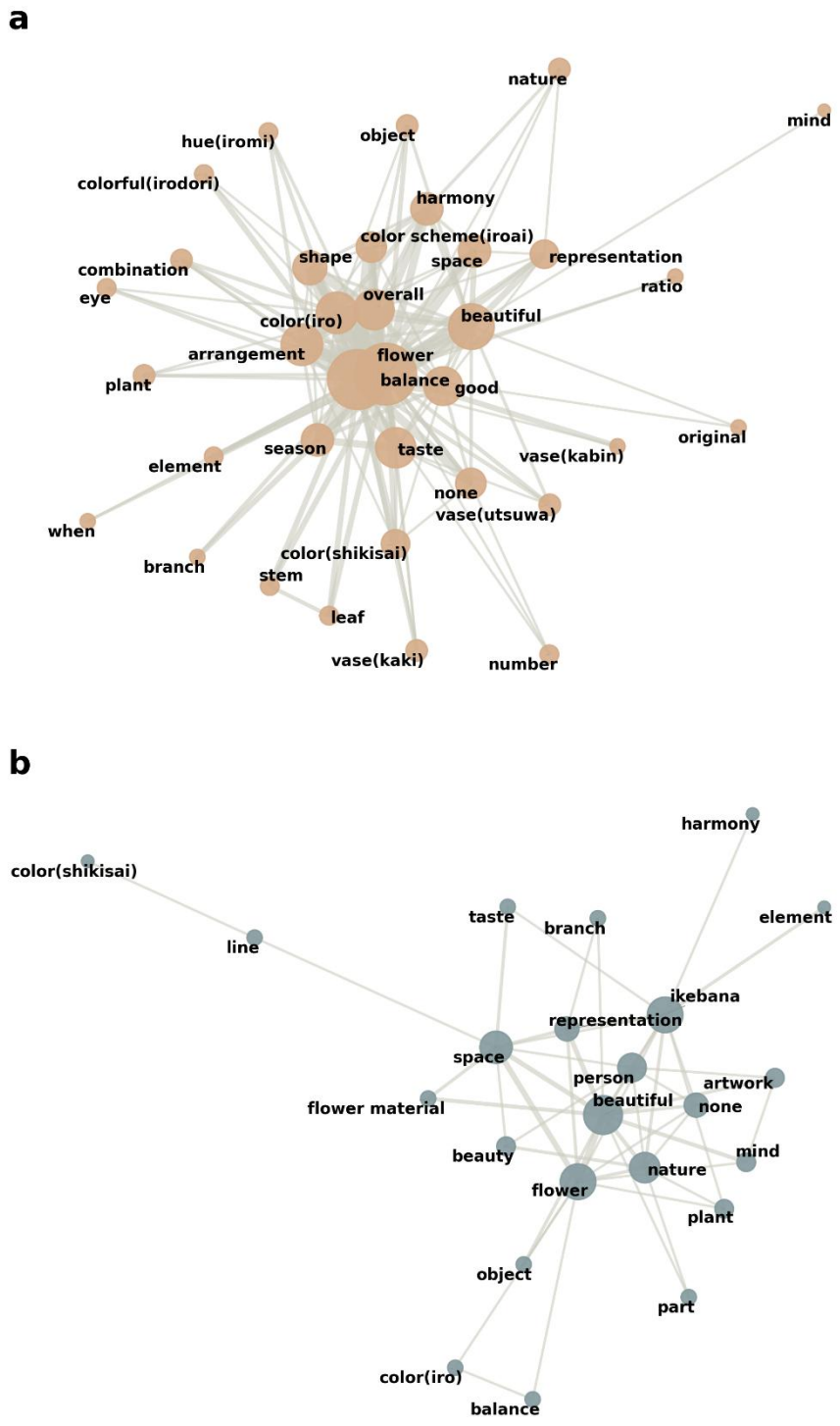
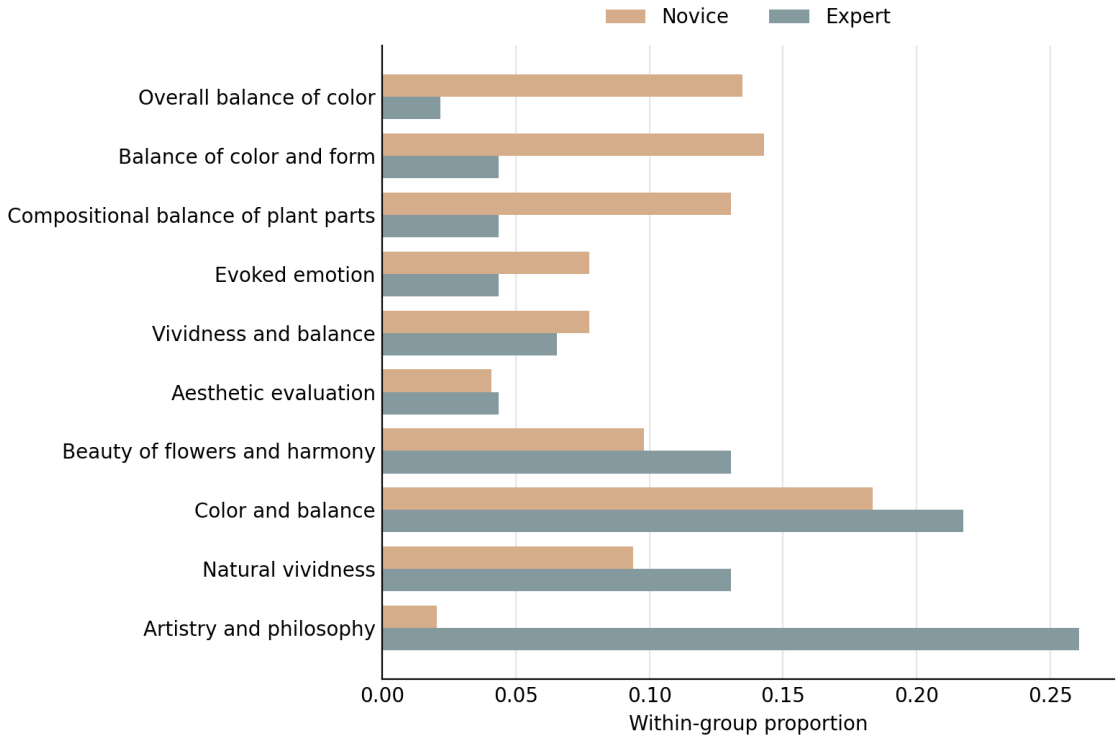


Figure 4

Within-group prevalence of BERTopic topics for novices and experts



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