Unveiling aesthetic preferences: a Kansai engineering approach to rapport formats in home textiles

DOI: 10.35530/IT.076.06.2024170

UZUNER NIHAN CEYLAN ÖZGÜR

ABSTRACT – REZUMAT

Unveiling aesthetic preferences: a Kansai engineering approach to rapport formats in home textiles

Rapport formats, a fundamental element of textile design, significantly influence the aesthetic appeal of patterned fabrics. Despite their importance in shaping visual perception, limited research has systematically investigated the impact of different rapport formats on user preferences. This study addresses this gap by exploring the aesthetic preferences for various rapport formats applied to floral and geometric patterns in home textiles, employing a Kansei Engineering approach to understand and quantify user perceptions. The research investigates the impact of five commonly used rapport formats -straight, half-drop, diagonal half-drop, mirror, and turned- on both floral and geometric patterns. A survey of 115 participants, comprising textile industry professionals and design academics, was conducted to evaluate the designs. Participants rated the patterns on a semantic differential scale, assessing their emotional and aesthetic responses. Descriptive statistics and exploratory factor analysis were employed to analyse the collected data, revealing patterns and relationships between rapport formats and perceived aesthetic qualities. The findings indicate that straight and mirror rapports consistently emerged as the most preferred formats across both floral and geometric designs. This preference stemmed from their visual balance, simplicity, and modern appeal, suggesting a desire for order and clarity in textile patterns. In contrast, more complex rapports, such as turned and diagonal half-drop, while perceived as visually intriguing, lacked the same level of order and clarity favoured by participants. These findings provide textile designers with evidence-based guidance for selecting rapport formats that enhance the aesthetic appeal and user acceptance of their designs, ultimately contributing to more user-centred and appealing textile products.

Keywords: *textile pattern design, rapport formats, home textiles, aesthetic evaluation, Kansei engineering*

Dezvăluirea preferințelor estetice: o abordare a ingineriei Kansei asupra formatelor de raport în cazul textilelor de uz casnic

Formatele de raport, un element fundamental al designului textil, influențează în mod semnificativ atractivitatea estetică a materialelor textile imprimate. În ciuda importanței lor în modelarea percepției vizuale, puține cercetări au investigat în mod sistematic impactul diferitelor formate de raport asupra preferințelor utilizatorilor. Acest studiu abordează această lacună explorând preferințele estetice pentru diferite formate de raport aplicate modelelor florale și geometrice ale textilelor de uz casnic, utilizând o abordare a ingineriei Kansei pentru a înțelege și cuantifica percepțiile utilizatorilor. Cercetarea investighează impactul a cinci formate de raport utilizate în mod obișnuit - aliniat, cu decalare la jumătate, decalare diagonală la jumătate, în oglindă și rotit - atât pe modelele florale, cât și pe cele geometrice. A fost realizat un sondaj cu 115 participanți, cuprinzând profesioniști din industria textilă și academicieni din domeniul designului, pentru a evalua modelele. Participanții au evaluat modelele pe o scară diferențială semantică, evaluând răspunsurile lor emoționale și estetice. Statisticile descriptive și analiza factorială exploratorie au fost utilizate pentru a analiza datele colectate, revelând modele și relații între formatele de raport și calitățile estetice percepute. Rezultatele indică faptul că rapoartele aliniat și în oglindă au apărut în mod constant ca fiind preferate atât în cazul modelelor florale, cât și al celor geometrice. Această preferință a rezultat din echilibrul vizual, simplitatea și aspectul modern al acestora, sugerând o dorință de ordine și claritate în modelele textile. În schimb, formatele de raport mai complexe, cum ar fi modelele rotit și decalare diagonală la jumătate, deși percepute ca fiind interesante din punct de vedere vizual, nu aveau același nivel de ordine și claritate preferat de participanți. Aceste rezultate oferă designerilor de produse textile îndrumări bazate pe dovezi pentru selectarea formatelor de raport care sporesc atractivitatea estetică și acceptarea de către utilizatori a modelelor lor, contribuind în cele din urmă la produse textile mai atractive și mai centrate pe utilizator.

Cuvinte-cheie*: proiectarea modelelor textile, formate de raport, textile de uz casnic, evaluare estetică, inginerie Kansei*

INTRODUCTION

In the fiercely competitive home textile market, patterns have become a pivotal factor influencing consumer purchasing decisions, often superseding functionality. Patterns, especially in products like bedding, curtains, and upholstery, are essential for creating aesthetic appeal and imbuing living spaces with personality [1]. Among the most prominent and enduring pattern types are floral and geometric designs, both prized for their adaptability across diverse interior styles [2]. Recent advancements in digital printing have revolutionised pattern application, particularly in manipulating rapport (pattern repetition), a crucial element that significantly impacts a design's visual impact and the emotional response it evokes.

Rapport, or the method by which a pattern repeats across a fabric, can either elevate a simple motif or detract from a more complex one, depending on its application. The five most commonly used rapport formats include straight repeat (direct repetition along vertical and horizontal axes), half-drop repeat (staggered repetition with horizontal shifts), diagonal half-drop (a diagonal offset creating a dynamic, tessellated effect), mirror repeat (reflecting the motif for symmetry), and turned repeat (rotating the motif to introduce variation) [3, 4]. This study investigates how these five rapport formats influence aesthetic preferences, focusing specifically on floral and geometric patterns applied to home textile products. By applying these rapport formats to both pattern types, ten unique designs were generated and presented on plain white duvet cover mockups to isolate the impact of pattern and rapport, minimising other visual distractions.

While previous research has explored the effects of colour and motif in textile design [5–9], the influence of pattern repetition, or rapport, remains largely unexplored. This gap in the literature is significant, as understanding the impact of rapport on pattern perception is crucial for designers striving to meet the escalating consumer demand for personalised, visually appealing home textiles. This understanding can lead to the development of more desirable products, potentially boosting sales and consumer satisfaction, while also contributing to more efficient design practices by optimising pattern usage. This study aims to address this gap by employing Kansei Engineering, a human-centred design approach that captures emotional responses to visual stimuli [10].

Participants, comprising industry professionals and academic experts, evaluated each design using a seven-point semantic differential scale, assessing the patterns against ten pairs of opposing adjectives, such as “simple-complex” and “harmonious-chaotic”. These adjective pairs were carefully selected based on established Kansei Engineering literature from the field and industry best practices to reflect key aesthetic dimensions relevant to home textiles [11–14]. The resulting data were analysed using SPSS software to determine standard deviations, mean scores, and percentage distributions.

This research provides valuable data-driven insights into the influence of rapport on aesthetic perception, offering practical guidance for textile designers seeking to optimise the visual appeal of their creations in the increasingly competitive home textile market. By understanding how different rapport formats impact aesthetic preferences, designers can create products that resonate with modern consumer expectations and enhance the overall appeal of home textiles. As digital printing technologies continue to advance, enabling more intricate and personalised designs, these findings will become increasingly relevant for shaping design strategies and responding to evolving market trends.

METHOD

This study employs a quantitative research design, utilising a Kansei Engineering approach [10], to investigate the aesthetic impact of different rapport formats on floral and geometric patterns in home textiles. KE, a methodology that translates subjective impressions into objective design parameters, is particularly relevant as it allows for a structured analysis of how design elements influence emotional and visual responses [10]. This approach aligns with studies like [1] and [13] that utilise quantitative methods and semantic categorisation to assess preferences for visual textures and emotional responses to patterns. However, while these studies focused on general pattern perception, this research specifically investigates the impact of rapport formats, a less explored area, on aesthetic responses.

Participants

A purposive sampling technique was used to recruit 115 participants with expertise in textile design and aesthetics. The sample consisted of industry professionals (58%) working in textile firms and academics (42%) specialising in fashion and textile design, ensuring evaluations were grounded in practical and theoretical knowledge. Participants were recruited through professional networks and online platforms specialising in textile design, targeting individuals based in major textile manufacturing hubs and universities in Türkiye. To be eligible, participants were required to have at least one year of professional experience in textile design, demonstrated through their online profiles or CVs, familiarity with rapport techniques, and basic computer skills to complete the online survey.

Design stimuli

Two common home textile patterns, floral and geometric, were selected, reflecting a focus on widely used design elements in the industry and aligning with the pattern categories explored in related academic research [14]. However, unlike Zhou and Xu [14], who explored age-based preferences for plaid shirts, this study investigates a broader range of aesthetic responses across two distinct pattern categories. The selection of these patterns, as well as the subsequent design process, was guided by expert consultation to ensure the representativeness and applicability of the chosen patterns within contemporary textile design. Specifically, the pattern selection began with identifying two unit patterns (one floral, one geometric) based on expert recommendations and established design references. These patterns were deemed suitable for home textiles given their balanced composition and adaptability to different rapport formats. Five rapport formats (straight, half-drop, diagonal half-drop, mirror, and turned) were applied to each pattern, resulting in ten design variations (table 1). The placement and alignment of the patterns within each rapport format were carefully considered to maintain proportionality and avoid

unintentional distortions. Each variation was presented on a 200x220 cm duvet cover and 50x70 cm pillow mockups created using Adobe Photoshop CS6 (table 2). A neutral colour scheme (black and white tones) and a standardised unit pattern size of 40x40 cm, determined through expert consultation, were used to control for extraneous variables and focus participant attention on the rapport format. This structured approach to pattern selection and application ensured that the study focused solely on the impact of rapport formats, minimising potential confounding variables such as colour, texture, or material differences. By adhering to these methodological controls, the study aimed to provide a robust framework for analysing aesthetic preferences within home textile design.

Data Collection: Kansei engineering

Following the principles of KE [10], a 7-point semantic differential scale was used to capture participants' emotional and aesthetic responses to the design variations. Ten adjective pairs, informed by a comprehensive literature review of KE studies in textile design and validated through consultations with three experienced textile design professionals, were used. These pairs, such as "chaotic-orderly" and "innovative-traditional", were selected based on their relevance to established aesthetic dimensions in design theory (e.g., complexity, novelty) and their applicability to evaluating rapport formats in textile patterns. This approach aligns with the use of semantic scales in studies like Kodžoman et al. [13] to evaluate visual textures. The ten adjective pairs used in the semantic differential scale are listed in tables 3 and 4.

Pilot Study: Before the main data collection, a pilot study was conducted with 30 participants from the textile industry to assess the reliability of the questionnaire and gather feedback on the clarity of instructions and design stimuli. Data from the pilot study were analysed using Cronbach's Alpha, resulting in a reliability coefficient of 0.82, indicating high internal consistency. Feedback from the pilot led to minor revisions in the wording of two adjective pairs to improve clarity and ensure cross-cultural understanding. Additionally, the size of the design stimuli was slightly increased based on participant feedback to enhance visibility and facilitate evaluation.

Survey and evaluation procedure

Data collection was conducted through the Qualtrics online survey platform, chosen for its robust features in survey design, data management, and participant anonymity. Design variations were presented in randomised order to minimise sequence effects and reduce potential bias. Participants were instructed to evaluate designs based solely on the rapport format, disregarding controlled factors like colour and texture.

Data analysis

Data were analysed using IBM SPSS Statistics 22. Descriptive statistics (mean scores, standard deviations, percentage distributions) were calculated for each design and adjective pair.

To uncover the latent relationships between observed variables and reveal underlying dimensions of aesthetic perception, Exploratory Factor Analysis (EFA) was conducted guided by Kansei Engineering principles. This approach aligns with previous research using EFA to understand consumer preferences in design contexts [14]. EFA on participant responses to a semantic differential scale, rating floral and geometric rapport patterns on carefully selected adjective pairs [1]. These pairs captured a comprehensive range of aesthetic perceptions relevant to our research. Data were standardised using z-scores before analysis.

Table 1

UNIT PATTERNS AND RAPPORT FORMATS

Unit pattern		

Table 1 (continuation)

Straight		
Half-Drop		
Diagonal half-drop		

Table 1 (continuation)

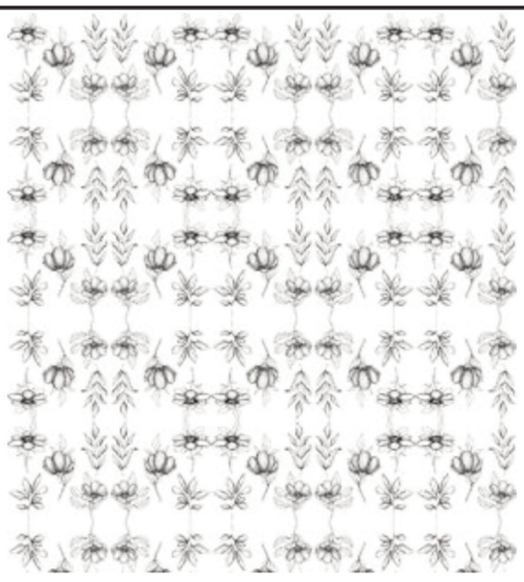
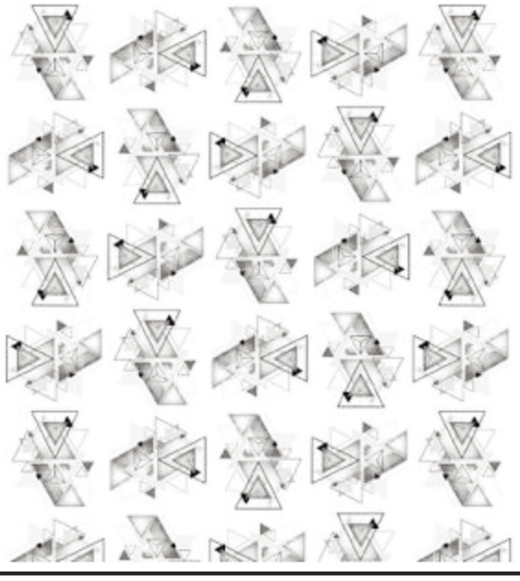
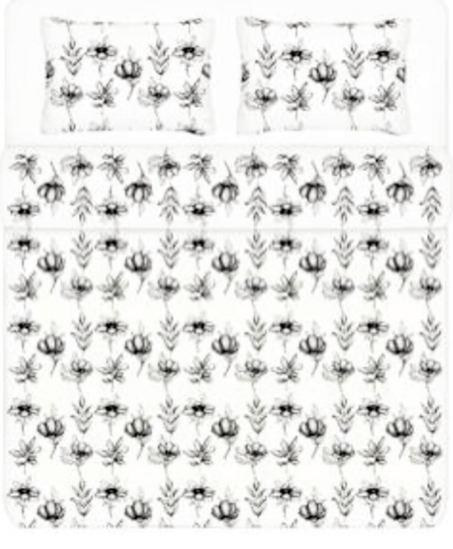
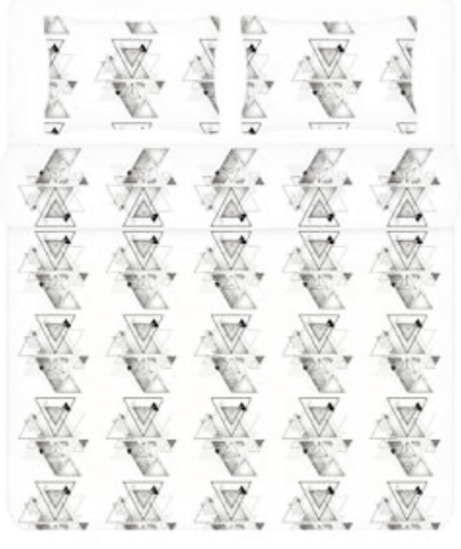
Mirror		
Turned		

Table 2

BEDDING MOCK-UP SAMPLE		
Straight		

Principal Axis Factoring was employed, and the number of factors was determined using the Kaiser criterion and scree plot, resulting in three factors for each pattern. No rotation was applied due to the initial factor structure's interpretability. Factor loadings were analysed to identify underlying dimensions, with high loadings (above 0.4 or below –0.4) indicating significant contributions to each factor. The interpretation considered both visual and emotional dimensions of perception. For example, one factor might reflect objective characteristics like 'complexity-simplicity', while another captures subjective feelings like 'sophistication-ordinariness', highlighting the need to address both in design optimisation.

RESULTS AND DISCUSSIONS

This study employed a quantitative research design and a Kansei Engineering approach to investigate participant preferences for various rapport formats applied to floral and geometric patterns. Descriptive statistics (tables 3 and 4) and exploratory factor analysis (table 5) were utilised to provide a comprehensive understanding of participant perceptions.

EFA revealed three primary factors influencing aesthetic judgments across both pattern types: Creativity and Engagement, Perceived Order and Simplicity, and Contemporary Appeal. Descriptive statistics further elucidated how each rapport format was evaluated on scales such as "chaotic-orderly" and "effective-ineffective".

Floral Patterns

The factor analysis for floral patterns yielded several key insights. Straight and mirror rapports were favoured for their Perceived Order and Simplicity, scoring highly on Factor 2, which reflects participant preferences for visually balanced and easily processed designs. The straight rapport consistently received high scores, particularly for the "chaotic-orderly" pair (5.41±1.67) and "pleasant-unpleasant" (5.03±1.74) scales, reflecting its predictable and visually pleasing structure. Mirror rapport also loaded significantly on Factor 3 for its modern appeal, reinforcing the perception of symmetry as both contemporary and appealing.

In contrast, diagonal half-drop and turned rapports exhibited higher loadings on Factor 1, reflecting their creative and dynamic nature. These rapports were perceived as less orderly. For instance, the diagonal half-drop rapport had a mean score of 3.29±1.83 on the "chaotic-orderly" scale, indicating higher complexity and less predictability. The turned rapport, which scored low for Perceived Order (4.06±1.61 on the "pleasant-unpleasant" scale), demonstrated that

Table 3

DESCRIPTIVE STATISTICS FOR FLORAL PATTERN RAPPORTS (MEAN ± SD)

Adjective Pair	Straight	Half-drop	Diagonal half-drop	Mirror	Turned
Chaotic-Orderly	5.41 ± 1.67	4.45 ± 1.87	3.29 ± 1.83	5.06 ± 2.04	4.49 ± 1.77
Effective-Ineffective	4.10 ± 1.70	4.29 ± 1.68	3.87 ± 1.76	4.50 ± 1.88	3.66 ± 1.71
Sequential-Disordered	2.33 ± 1.81	3.22 ± 1.77	3.88 ± 1.84	2.23 ± 1.54	3.49 ± 1.74
Traditional-Innovative	3.24 ± 1.67	3.63 ± 1.49	4.15 ± 1.45	3.40 ± 1.53	3.84 ± 1.48
Complex-Simple	4.62 ± 1.75	4.03 ± 1.73	3.30 ± 1.58	4.48 ± 1.78	4.23 ± 1.41
Unique-Common	5.38 ± 1.69	4.90 ± 1.56	4.37 ± 1.54	4.95 ± 1.49	4.47 ± 1.42
Trendy-Outdated	4.59 ± 1.69	4.37 ± 1.62	4.07 ± 1.58	4.68 ± 1.60	3.99 ± 1.45
Free-Restricted	5.03 ± 1.74	4.61 ± 1.59	3.97 ± 1.64	4.93 ± 1.61	4.01 ± 1.66
Pleasant-Unpleasant	3.84 ± 1.80	3.85 ± 1.63	4.06 ± 1.61	4.50 ± 1.82	3.65 ± 1.59
Different-Similar	5.37 ± 1.73	4.98 ± 1.64	4.07 ± 1.65	4.55 ± 1.76	4.25 ± 1.64

Table 4

DESCRIPTIVE STATISTICS FOR GEOMETRIC PATTERN RAPPORTS (MEAN ± SD)

Adjective Pair	Straight	Half-drop	Diagonal half-drop	Mirror	Turned
Chaotic-Orderly	5.37 ± 1.93	4.90 ± 2.01	3.54 ± 1.86	5.24 ± 1.78	5.12 ± 1.82
Effective-Ineffective	4.54 ± 1.92	4.27 ± 1.78	3.27 ± 1.57	4.35 ± 1.76	4.37 ± 1.76
Sequential-Disordered	1.88 ± 1.45	2.69 ± 1.73	3.79 ± 1.79	2.58 ± 1.61	2.59 ± 1.54
Traditional-Innovative	3.74 ± 2.03	4.03 ± 1.65	4.63 ± 1.59	3.97 ± 1.62	4.05 ± 3.17
Complex-Simple	4.96 ± 1.86	4.45 ± 1.77	3.50 ± 1.56	4.73 ± 1.61	4.59 ± 1.60
Unique-Common	4.96 ± 1.72	4.57 ± 1.57	3.73 ± 1.48	4.48 ± 1.58	4.66 ± 1.55
Trendy-Outdated	4.48 ± 1.67	4.18 ± 1.56	3.40 ± 1.44	4.26 ± 1.65	4.17 ± 1.62
Free-Restricted	4.73 ± 1.87	4.22 ± 1.75	3.28 ± 1.65	4.50 ± 1.67	4.32 ± 1.86
Pleasant-Unpleasant	4.38 ± 1.78	3.97 ± 1.75	3.40 ± 1.62	4.17 ± 1.85	4.05 ± 1.79
Different-Similar	4.59 ± 1.86	4.26 ± 1.83	3.27 ± 1.60	4.23 ± 1.67	4.51 ± 1.74

its complexity detracted from its overall appeal. Although floral designs often benefit from a degree of asymmetry and organic flow, the findings suggest that participants still valued rapport formats that offered visual stability. The diagonal half-drop rapport successfully combined creativity with a reasonable degree of order, making it more acceptable than the more chaotic turned rapport (high loading on Factor 1 but lower on Factor 2).

Geometric Patterns

The analysis of participant responses to geometric patterns revealed a marked preference for rapport formats that conveyed a clear sense of structure. The straight rapport emerged as the most favoured, consistently achieving high scores for Perceived Order and Simplicity (5.37 ± 1.93 on the "chaotic-orderly" scale). Participants gravitated toward designs that were easy to process visually, underscoring the importance of predictability and repetition in this design context. The mirror rapport was similarly well-received, with participants responding favorably to its balance and modern aesthetic, as evidenced by high scores on Contemporary Appeal.

Geometric patterns incorporating more complex rapport formats, such as diagonal half-drop and turned, were perceived as less appealing due to their lack of visual clarity. The diagonal half-drop rapport achieved a mean score of 3.54 ± 1.86 on the "chaotic-orderly" scale, reinforcing the observation that it introduced a level of visual complexity that participants found less structured. These formats loaded heavily on Factor 1, indicating they were perceived as innovative but less orderly. The turned rapport, with a low score of 3.26 ± 1.60 on the "different-similar" scale, was viewed as chaotic and unsuitable for geometric designs where regularity and symmetry are paramount.

Table 5

FACTOR LOADINGS FOR FLORAL GEOMETRIC PATTERNS BY RAPPORT TYPE

Rapport Type	Adjective pair	Creativity & Engagement		Perceived Order & Simplicity		Contemporary Appeal	
		Floral	Geometric	Floral	Geometric	Floral	Geometric
Straight	Chaotic-Orderly	–0.076	–0.205	–0.175	–0.636	–0.639	0.335
	Effective-Ineffective	–0.710	–0.792	–0.521	0.023	0.127	0.186
	Sequential-Non-seq.	0.159	0.118	0.047	0.175	0.493	–0.107
	Traditional-Innovative	0.438	0.571	–0.138	–0.249	0.028	–0.006
	Complex-Simple	–0.313	–0.518	–0.193	–0.553	–0.371	–0.004
	Unique-Ordinary	–0.741	–0.860	–0.019	–0.144	–0.053	–0.260
	Trendy-Outdated	–0.821	–0.859	0.183	0.161	0.045	0.118
	Free-Restrained	–0.825	–0.868	0.210	–0.017	–0.072	–0.079
	Pleasant-Unpleasant	–0.775	–0.822	0.136	0.216	0.241	0.197
	Different-Similar	–0.774	–0.875	0.151	0.028	–0.200	–0.045
Half-Drop	Chaotic-Orderly	–0.205	–0.205	–0.636	–0.636	0.335	0.335
	Effective-Ineffective	–0.792	–0.792	0.023	0.023	0.186	0.186
	Sequential-Non-seq.	0.118	0.118	0.175	0.175	–0.107	–0.107
	Traditional-Innovative	0.571	0.571	–0.249	–0.249	–0.006	–0.006
	Complex-Simple	–0.518	–0.518	–0.553	–0.553	–0.004	–0.004
	Unique-Ordinary	–0.860	–0.860	–0.144	–0.144	–0.260	–0.260
	Trendy-Outdated	–0.859	–0.859	0.161	0.161	0.118	0.118
	Free-Restrained	–0.868	–0.868	–0.017	–0.017	–0.079	–0.079
	Pleasant-Unpleasant	–0.822	–0.822	0.216	0.216	0.197	0.197
	Different-Similar	–0.875	–0.875	0.028	0.028	–0.045	–0.045
Diagonal Half-Drop	Chaotic-Orderly	0.118	0.118	0.175	–0.249	–0.107	–0.107
	Effective-Ineffective	–0.571	–0.571	–0.249	0.047	–0.006	–0.006
	Sequential-Non-seq.	0.159	0.159	0.047	–0.138	0.493	0.493
	Traditional-Innovative	0.438	0.438	–0.138	–0.193	0.028	0.028
	Complex-Simple	–0.313	–0.313	–0.193	–0.019	–0.371	–0.371
	Unique-Ordinary	–0.741	–0.741	–0.019	0.183	–0.053	–0.053
	Trendy-Outdated	–0.821	–0.821	0.183	0.210	0.045	0.045
	Free-Restrained	–0.825	–0.825	0.210	0.136	–0.072	–0.072
	Pleasant-Unpleasant	–0.775	–0.775	0.136	0.151	0.241	0.241
	Different-Similar	–0.774	–0.774	0.151	–0.249	–0.200	–0.200

Table 5 (continuation)

Rapport Type	Adjective pair	Creativity & Engagement		Perceived Order & Simplicity		Contemporary Appeal	
		Floral	Geometric	Floral	Geometric	Floral	Geometric
Mirror	Chaotic-Orderly	–0.518	–0.518	–0.553	–0.553	–0.004	–0.004
	Effective-Ineffective	–0.860	–0.860	–0.144	–0.144	–0.260	–0.260
	Sequential-Non-seq.	0.118	0.118	0.175	0.175	–0.107	–0.107
	Traditional-Innovative	0.571	0.571	–0.249	–0.249	–0.006	–0.006
	Complex-Simple	–0.518	–0.518	–0.553	–0.553	–0.004	–0.004
	Unique-Ordinary	–0.860	–0.860	–0.144	–0.144	–0.260	–0.260
	Trendy-Outdated	–0.859	–0.859	0.161	0.161	0.118	0.118
	Free-Restrained	–0.868	–0.868	–0.017	–0.017	–0.079	–0.079
	Pleasant-Unpleasant	–0.822	–0.822	0.216	0.216	0.197	0.197
	Different-Similar	–0.875	–0.875	0.028	0.028	–0.045	–0.045
Turned	Chaotic-Orderly	–0.859	–0.859	0.161	0.161	0.118	0.118
	Effective-Ineffective	–0.868	–0.868	–0.017	–0.017	–0.079	–0.079
	Sequential-Non-seq.	0.118	0.118	0.175	0.175	–0.107	–0.107
	Traditional-Innovative	0.571	0.571	–0.249	–0.249	–0.006	–0.006
	Complex-Simple	–0.518	–0.518	–0.553	–0.553	–0.004	–0.004
	Unique-Ordinary	–0.860	–0.860	–0.144	–0.144	–0.260	–0.260
	Trendy-Outdated	–0.859	–0.859	0.161	0.161	0.118	0.118
	Free-Restrained	–0.868	–0.868	–0.017	–0.017	–0.079	–0.079
	Pleasant-Unpleasant	–0.822	–0.822	0.216	0.216	0.197	0.197
	Different-Similar	–0.875	–0.875	0.028	0.028	–0.045	–0.045

General Insights and Implications

Across both floral and geometric patterns, participants consistently exhibited a preference for rapport formats that embodied balance, simplicity, and visual harmony. Straight and mirror rapports emerged as the most effective formats, as their structured repetition resonated with participants who valued orderliness and modernity. These preferences are reflected in the high scores on the "Chaotic-Orderly" scale for straight rapports across both floral and geometric patterns, and their high loadings on Factor 2.

This study also underscored the role of visual complexity in shaping aesthetic preferences. While simpler rapport formats were generally favoured, there was some appreciation for more dynamic designs that introduced an element of visual intrigue. The diagonal half-drop rapport, for instance, was perceived as a creative and engaging format (high loading on Factor 1: Creativity and Engagement) that still maintained a degree of order. However, more complex rapport formats, such as turned, were less favoured due to their perceived chaotic nature, particularly within geometric designs (high loading on Factor 3: Visual Complexity, but low on Factor 2: Order).

The findings of this study have important implications for designers working with repeating patterns. The consistent preference for straight and mirror rapports suggests that prioritising rapport formats that emphasise visual balance and clarity may be advantageous. However, incorporating more dynamic designs, such as diagonal half-drop, may be appropriate in contexts where the aim is to introduce subtle complexity without overwhelming the viewer. Furthermore, these findings extend beyond design aesthetics and have practical implications for the home textile industry. The preference for straight and mirror rapports aligns with market demand for structured and visually harmonious designs, potentially enhancing consumer satisfaction by providing a predictable and orderly aesthetic, thus reducing the likelihood of pattern rejection in commercial textile production. From a manufacturing perspective, the insights gained from this study can enrich design strategies for mass production. Straight and mirror rapports, being more structured and repetitive, are often easier to implement in both traditional and digital textile printing processes, minimising inconsistencies and facilitating seamless pattern alignment during production of bedding, curtains, and upholstery fabrics. Understanding consumer psychology and leveraging these preferences in product marketing and customisation strategies can further enhance product desirability. While simpler rapport formats appeal to a broader audience, incorporating dynamic rapport formats such as diagonal half-drop for niche markets (e.g., contemporary or avant-garde interior designs) may cater to consumers with a preference for unique and visually engaging textiles. Advancements in digital textile printing and customisation platforms offer opportunities to integrate these findings into design recommendation systems or AI-assisted pattern generators, potentially improving customer engagement and satisfaction. However, future research incorporating

consumer preference surveys, sales data, and behavioural analysis could further validate the commercial impact of these design choices and inform more effective design and marketing strategies.

CONCLUSIONS

This study investigated the influence of rapport formats on aesthetic preferences in floral and geometric pattern designs, employing a combination of descriptive statistics and exploratory factor analysis. The analysis revealed three primary factors that shaped participants' perceptions of different rapport formats: Creativity and Engagement, Perceived Order and Simplicity, and Contemporary Appeal.

Across both floral and geometric designs, a consistent preference for straight and mirror rapports was observed. These formats were associated with higher scores in Perceived Order and Simplicity and Contemporary Appeal, indicating that participants valued visual balance, predictability, and a modern aesthetic. These rapports were particularly favoured for their ability to maintain visual harmony and clarity, making them suitable choices for designs that prioritise structure and balance.

Conversely, more dynamic rapport formats, such as diagonal half-drop and turned, were associated with higher levels of Creativity and Engagement but lower scores for Perceived Order, particularly in geometric designs. While visually intriguing, the turned rapport consistently received lower ratings due to its perceived complexity and lack of coherence, especially in geometric patterns where precision and symmetry are highly valued.

These findings offer several implications for designers working with repeating patterns in textiles and other design fields. The preference for rapport formats that provide structure and balance suggests that straight and mirror rapports are highly effective in creating aesthetically pleasing designs. However, incorporating more dynamic rapports, such as diagonal half-drop, may be appropriate in contexts where a moderate level of visual complexity is desired.

This study offers valuable insights, but several limitations should be noted. The expert-driven evaluations, while insightful, lacked direct consumer input, potentially limiting generalizability. Future research should incorporate consumer perceptions to validate the findings from a market-driven perspective.

Methodologically, exploring additional pattern categories beyond the floral and geometric patterns used, such as abstract, ethnic, or nature-inspired patterns, could reveal whether rapport preferences vary by pattern type. Further, while the monochrome palette isolated rapport format effects, future work should consider the impact of colour and texture interactions on aesthetic perception. The primarily Turkish sample introduces potential cultural biases in design preferences, necessitating a geographically diverse sample in future studies. Finally, further validation of the industrial applications, including market research and consumer testing, is recommended for valuable insights into real-world acceptance and purchase behaviour. Future research should also investigate demographic influences such as age, gender, and educational background on pattern perception and explore multi-sensory interplay between rapport formats, textures, and colour schemes, particularly within digital textile printing applications.

In conclusion, this study underscores the importance of rapport formats in shaping the aesthetic appeal of repeating patterns. A deeper understanding of the relationship between design elements and emotional responses can empower designers to make more informed decisions that align with consumer preferences, ultimately leading to more effective and visually appealing design outcomes.

REFERENCES

[1] Yang, J., Zhang, Y., *Home Textile Pattern Emotion Labelling Using Deep Multi-View Feature Learning*, In: Frontiers in Psychology, 2021, 12:666074, 1–7, https://doi.org/10.3389/fpsyg.2021.666074

[2] Wilson, J., *Handbook of textile design: principles, processes and practice*, Cambridge, Woodhead Publishing, 2001

[3] Jackson, P., *How to make Repeat patterns: A Guide for Designers, Architects, and Artists*, Laurence King, 2018

[4] Blake, J., *Color and Pattern in the Home (A Design Centre book)*, London: A Design Centre Book Published, 1978

[5] Howell, K.A., *Color and Pattern: 50 Playful Exercises for Exploring Pattern Design*, USA: Rockport Publishers, 2015

[6] Takagi, M., Eckman, M., Tremblay, K., *Aesthetic preferences for textile colour and print pattern between us and Japanese consumers*, In: International Journal of Home Economics, 2012, 5, 1, 40–63

[7] Nassar, G.E., Nagham, M., Samar, H.N., Marwa, S.E., Ahmed, G.H., *Importance of colours in industrial design*, In: Journal of Textiles, Coloration and Polymer Science, 2024, 21, 2, 231–240

[8] Rahman, O., *The influence of visual and tactile inputs on denim jeans evaluation*, In: International Journal of Design, 2012, 6, 1, 11–25

[9] Ru, A., *Study on the color design for automobile interior textiles*, In: Research Journal of Textile and Apparel, 2006, 10, 2, 78–82

[10] Schütte, S.T., Eklund, J., Axelsson, J.R., Nagamachi, M., *Concepts, methods and tools in Kansei engineering*, In: Theoretical Issues in Ergonomics Science, 2004, 5, 3, 214–231

[11] Carvalho, C., Couceiro, M., Montagna, G., Morais, C., Mendonça, R., *Textiles in Architecture: Floors and Wall Coverings*, In: Advances in Industrial Design: Proceedings of the AHFE 2021 Virtual Conferences on Design for Inclusion, Affective and Pleasurable Design, Interdisciplinary Practice in Industrial Design, Kansei Engineering, and

Human Factors for Apparel and Textile Engineering, July 25–29, 2021, USA, Springer International Publishing, 632–637

[12] Li, X., Liu, K., Zhu, C., Lv, Z., *Collar style design of women's suit based on Kansei engineering*, In: Industria Textila, 2022, 73, 5, 530–536

[13] Kodžoman, D., Hladnik, A., Čuden, A.P., Čok, V., *Assessment and semantic categorization of fabric visual texture preferences*, In: AUTEX Research Journal, 2023, 23, 2, 279–291

[14] Zhou, X., Xu, H., *Understanding the preferences of males at different ages for plaid shirts*, In: International Journal of Clothing Science and Technology, 2020, 32, 1, 85–95

Authors:

UZUNER NIHAN, CEYLAN ÖZGÜR

Eskisehir Technical University, Faculty of Architecture and Design, Department of Textile and Fashion Design, İki Eylül Campus, 26555, Eskisehir, Turkiye

Corresponding author:

CEYLAN ÖZGÜR
e-mail: ozgurceylan@eskisehir.edu.tr