The Relationship Between Ming-Style Chair Form Attributes and GenY Emotion by Kansei Engineering in China

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Abstract. With the increasing national self-confidence in China and advancements in artificial intelligence technology, there is a growing emphasis on the country's unique culture and consumer emotions. This study aims to investigate the relationship between the form attributes of Ming-style chairs and the consumption emotions of Generation Y. A total of 198 GenY consumers aged 23–42 participated in the study, providing evaluations of representative Ming-style chair samples using a semantic differential 5-point scale across six groups of Kansei words. The relationship between the shape of Ming-style chairs and consumer emotions was explored using multiple linear regression analysis in SPSS26 to establish innovative design principles for these chairs. The findings reveal a direct correlation between the form attributes of Ming-style chairs and the emotions of Generation Y consumers. Specifically, the Danao section, armrest panel surface, and stretcher style of Ming-style chairs factors significantly influenced the "Simplicity," "Sturdiness," and "Style Spectrum" of consumers' emotions. Consequently, developing new chair forms should be guided by consumer emotions and based on Ming-style chair form merits to meet their needs.

Keywords: Ming-style Chair · GenY Emotion · Kansei Engineering · China

1 Introduction

With Chinese national self-confidence growing, greater attention will be paid to their unique culture [1], which provides an opportunity for Ming-style chairs. Ming-style furniture (MF), as a representative artistic style, serves as a portrayal of a country, offering a glimpse into a facet of its cultural identity. It mirrors the artistic preferences of a nation [2] Ming-style chairs (MC) are the concentrated embodiment of Ming-style furniture culture [3] and are often presented by their visual shapes consumers at first sight [4].

In recent years, artificial intelligence has developed rapidly, and understanding consumers' emotions and emotions has become a top duty and task [5] products with product

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experience, emotion, and social value have become more attractive to consumers [6]. Among them, GenY (millennial) consumers show strong shopping patterns, and their greater motivation is to focus on the emotional recognition of brands [7] and a sense of participation [8]. IFirst, many studies only study the MF itself and do not touch on the current consumer lifestyle, resulting in design strategies that cannot adapt to changing needs. Niu & Zhao [9] clarified the key principles of the relevant forms and spatial aspects of Ming-style furniture but lacked a comprehensive understanding of how these principles align with the preferences and lifestyles of younger consumers. Yu [10] also highlighted that the consumption of furniture products has evolved from solely fulfilling functional needs to encompass cultural and emotional preferences as well. Second, the exploration of Ming-style chairs in Kansei Engineering (KE) is still in its preliminary stages, most of the research focused on semiotics and literature analysis, but lacked strong objective quantitative data, resulting in subjective narratives [11–13] Therefore, this study wants to answer the following two research questions (RQ): RQ1: What are the emotional demands of GenY consumers regarding innovation in Ming-style chairs? RQ2: What are the relationships between the form attributes of Ming-style chairs and GenY emotion by KE?

The study was conducted to explore new designs for Ming-style chairs that would appeal to GenY consumers' emotions, particularly by using the semantic difference method to understand their Kansei needs. The significance of the study lies in its ability to provide detailed insights into the design of Ming-style chairs that balance traditional elements with contemporary preferences, while also enhancing the overall consumer experience with innovative designs.

2 Literature Review

2.1 The Concept of Kansei Engineering

"Kansei" is a branch of cognitive science, originally developed as a philosophical term. The term "Kansei" was first used by Japanese philosopher Nishi Amane [14]. In the psychological definition, Kansei refers to the state of mind where knowledge, emotion, and passion are harmonized; "people with rich Kansei" are full of emotion and passion, and able to react adaptively and sensitively to anything [15]. Moreover, at the beginning of the 1970s, the concept of Kansei Engineering (KE) was introduced in Japan [16, 17], KE is a technology that focuses on the consumer for product development, based on the principles of ergonomics, which uses advanced computer technology to translate the consumer's emotions about the product into design elements. The process aims to connect the explicit design parameters with the implicit customer psychology [18]. KE was classified into 6 categories [19] and category classification (TypeI) is used in this study—Identifying the design elements of the product to be developed, translated from consumer‘s emotions.

2.2 Generation Y Consumers in China

In China, the population of Generation Y is 315 million (RMB), with a consumption scale reaching 6.68 trillion (RMB) [20]. Due to their potential spending power, trendsetting abilities, and adoption of new products, Millennials have distinct decision patterns and emphasize emotional factors, and social influence [21]. However, some consumers with ethnocentric tendencies exhibit stronger intentions to purchase domestic products in the emotional, cognitive and behavioral dimensions compared to foreign products [22]. Generation Y is also increasingly inclined towards design innovation to achieve integration with modern living spaces and aesthetics and inherit Eastern literati aesthetics [23].

2.3 Consumer Emotion

Consumer research has demonstrated that emotions play an important role in decision-making [24] prompting marketers to strategically target consumers' emotions which are the specific emotional responses elicited during product usage or consumption experiences [25]. In consumer behavior, emotions are not a straightforward, easily observable phenomenon [26]. Emotions shape behaviors and perceptions, emotional variables contribute most significantly to the establishment of dedicated and close customer relationships and are significant in distinguishing relationship types within the consumer market [27].

2.4 The Form Attributes of Ming-Style Chair

The exploration of Ming-style furniture intricately weaves considerations of form, spatial aesthetics, and cultural influences. The study [28] begins with a meticulous analysis of the impact of form and space, examining the visual dynamics in both two and three-dimensional spaces and evaluating the position, form, composition, and distance of each furniture element. The integration of Gestalt psychology establishes a connection between furniture and the viewer's emotions influenced by spatial relationships. This connection is a key element in understanding the profound impact of Ming-style furniture on its observers, as it is not merely a utilitarian object but an artistic expression that engages the viewer on a psychological level. Niu [29] further explores how the frame design of Ming-style chairs, as mentioned, influences the perception and associations of viewers, enhancing the overall aesthetic experience. Simultaneously, some researchers [29–32] explore the interdependence of curves and straight lines, the coexistence of squareness and roundness, and the generation of space through emptiness and solidity. This dual perspective provides a comprehensive understanding of Ming-style furniture by integrating both practical considerations and spatial aesthetics. The interplay between curves and straight lines, for instance, is not just a formal design principle but a manifestation of the Ming style's intrinsic beauty, representing a harmonious balance between opposing elements. The design of Ming-style furniture is deeply rooted in traditional Chinese craftsmanship and art, and the appreciation of form is not separated from its historical and cultural context.

2.5 Conceptual Framework

Through the analysis of the research question and the review of the literature, we identified the main issue of the study, which is to explore the experiences of Chinese Generation

Y consumers' emotions under the form of Ming-style chairs. We constructed a conceptual framework (Fig. 1), clarifying the relationships between independent variables (The form attributes of Ming-style chairs) and the dependent variable (Consumer emotion) to comprehensively understand these influencing mechanisms.

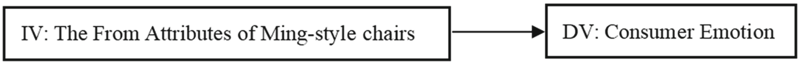


Fig. 1. Conceptual framework

3 Methodology

3.1 Study Design

We will use KE type I which is a mixed-method approach that combines qualitative and quantitative data to conduct a comprehensive analysis of research questions [33]. We have broken down the research process into six steps: (1) Choosing the product domain; (2) Spanning the Semantic space; (3) Spanning the space of Ming-style chair properties; (4) Kansei imagery cognition experiment about the form attributes of Ming-style chair; (5) Test of validity; (6) Model building.

Here, the population is sampled by simple random sampling and primarily conducted in China through snowball data collection by Google form, adopting the birth years of 1981 [34–36] to 2000 [35, 37, 38] for Gen Y. The total number of participants in the survey was 256. After excluding individuals below 23 years old and above 42 years old, there were 198 valid questionnaires. The demographic variables are described in Table 1.

Table 1. Demographic variable description (N = 198)

Variables	Category	Frequency	Percent (%)
Gender	Male	87	43.9
	Female	111	56.1
Age	23–33(years old)	150	75.8
	33–43(years old)	48	24.2
Educational background	Junior high school or below	18	9.0
	Bachelor	90	45.5
	Master	55	27.8
	PhD	35	17.7
Professional field	Engaged in professions related to furniture, art, design, and collecting	98	49.5
	Other fields	100	50.5

3.2 Semantic Difference

Osgood [39] developed a method of measuring the emotional content of a word more objectively, called the 'Semantic Differential Technique'. This technique involves using adjectives to measure subjective feelings toward certain things. This is because people typically express their evaluations of things through oral or written adjectives. Since most adjectives are contrasting words, such as (bright and dark), using these opposing adjectives can construct an evaluative tool or scale [40]. It is a method specifically designed for studying the psychological images of the subjects, serving as the cornerstone of sensory image research and one of the main tools in this study. The questionnaire uses the Osgood Semantic Differential 5-point scale (ranging from −2 to 2), where "−2" represents the negative emotional term, "2" represents the positive emotional term, and "0" indicates neutral emotion, for example (Fig. 2).

		-2	-1	0	1	2	
Sample 1	Classical	☐	☐	☐	☐	☐	Fashionable

Fig. 2. Osgood Semantic Differential 5-point scale

3.3 Quantification I Theory

Quantification I Theory involves studying the relationship between a set of qualitative variables (independent variable x) and a set of quantitative variables (dependent variable y). Through multiple regression analysis, a mathematical model is established to predict the dependent variable y based on the independent variable x, facilitating the prediction of y through mathematical modeling. The perceptual image evaluation scale of Ming-style chairs is translated into an engineering scale. This involves further quantifying the form attributes of representative samples of Ming-style chairs into an editable data format based on qualitative encoding. The specific procedure is as follows: when the mth stylistic element of the kth chair sample is qualitatively encoded as the nth category, it is represented as $dk = 1$; otherwise, $dk = 0$. Here, m refers to the stylistic element, n is the category, and dk (m, n) is the reflection of the nth category for the mth stylistic element in the kth sample. For example, if the encoding for the cranial shape of a chair sample is represented as curve a1, the data transformation would be $a1 = 1$, $a2 = 0$, $a3 = 0$, $a4 = 0$, $a5 = 0$. Similarly, if the encoding for the side profile of the backrest is S-shape b3, the data would be $b1 = 0$, $b2 = 0$, $b3 = 1$, $b4 = 0$, and so on.

4 Procedures Design of Ming-Style Chair Based on Kansei Engineering Type I Method

4.1 Choosing the Product Domain

This study categorizes the product field into Ming-style chairs, including round-backed chairs, hanging lamp chairs, official hat chairs (including Northern and Southern official hat chairs, rose chairs, and Zen chairs), and folding armchairs.

4.2 Spanning the Semantic Space

By extensively reviewing relevant literature, books, magazines, websites, and papers in the furniture field, as well as product brochures in the furniture market, and considering the demands, ideas, and visions of experienced users [41]. Ultimately, based on the collection process, the number of Kansei words typically falls within the range of 50 to 600. It is essential to exhaustively gather existing vocabulary to ensure the validity of the results [42]. Through the elimination of synonymous and similar words, a selection of 20 pairs of vocabulary has been filtered (Table 2). Subsequently, 44 consumers ultimately participated in the selection of words, with over one-third of the chosen sensory imagery words considered to represent the consumers' expectations for furniture. Finally, six pairs of representative Kansei word pairs were selected, as shown in Table 3.

Table 2. The average values of emotional words' statistics (N = 44)

Order	Kansei word pairs	Mean
1	Traditional - Modern	0.55
2	Classical - Fashionable	0.64
3	Simple - Gorgeous	0.73
4	Elegant - Vulgar	0.73
5	Natural - Artificial	0.45
6	Low-key - Luxurious	0.45
7	Minimalist - Elaborate	0.64
8	Unified - Varied	0.27
9	Rhythmic - Static	0.55
10	Sturdy - Soft	0.73
11	Fluent - Stagnant	0.45
12	Clumsy—Light	0.64
13	Ethereal - Congested	0.55
14	Fresh - Murky	0.27
15	Practical - Decorative	0.55
16	Lively - Stiff	0.18
17	Affectionate - Indifferent	0
18	Comfortable - Uncomfortable	0.36
19	Curved - Straight	0.55
20	Unique - Ordinary	0.18

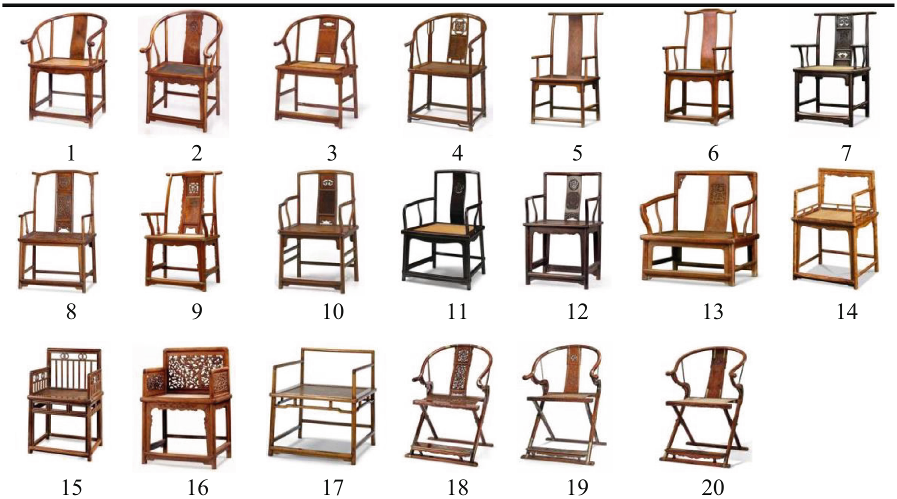
Table 3. Representative Kansei word pairs

Order	1	2	3	4	5	6
Kansei words	Classical—Fashionable	Simple—Gorgeous	Elegant—Vulgar	Minimalist—Elaborate	Sturdy—Soft	Clumsy—Light

4.3 Collection of Ming-Style Chair Samples

The spanning of the space of product properties is similar to the semantic space. One underlying idea is that there is an existing vector space depicting the domain's properties. The task in this part is to collect all the attributes representing the domain chosen select those which have the largest impact on the consumer's Kansei, and choose Ming-style chairs representing the chosen properties before the data is compiled for the following synthesis phase [42]. The subjects of this experiment are Ming-style chairs. Sample collection was conducted through various paths, including relevant literature, historical records, image collections, museum websites, Yachang Art Network, on-site investigations at antique furniture stores, and participation in auctions. A systematic collection of Ming-style chairs was carried out through these channels. Through an assessment by three experts, 20 representative samples were selected (Table 4).

Table 4. Representative Ming-style chairs samples



According to the principles of morphological analysis, the explicit chair is deconstructed in terms of its form. The overall form is broken down into several independent components, referred to as design items, including Danao, backrest, armrests, board between legs, and Stretcher. Each design item is further analyzed into various design elements or items based on their distinct forms (Table 5). For instance, the backrest can be categorized into different forms such as no openings, partial openings, and full openings; carving styles like through-carving, relief carving, and plain panels; surface types such as grating and solid panels; and segmented styles like two-section and three-section designs. Utilizing the theory of Quantity I, the final analysis results are systematically coded (Table 6), due to space limitations, not all are listed.

Table 5. Various design elements or items

Element	Project	Items
Danao	Danao Section a	Integrated Type a_1, Segmented Type a_2
	Head Protrusion b	Protruding b_1, Non-Protruding b_2
Backrest	Backrest Section c	Single-section c1, Two-section c2, Three-section c3, Four-section c4
	Backrest Cutout Form d	Partial Cutout d_1, Full Cutout d_2
	Backrest Side Profile e	Curved e_1, Straight e_2
	Backrest Carving Style f	No Carving f_1, Relief Carving f_2, Openwork Carving f_3
	Backrest Surface g	Blank g_1, Grid g_2, Partial Panel g_3, Full Panel g_4
Armrest	Armrest Protrusion h	Protruding h_1, Non-Protruding h_2
	Armrest Side Profile i	Curved i_1, Straight i_2
	Armrest Surface j	Blank j_1, Grid j_2, One Line j_3, Full Panel j_4
Board Between legs	Board Front Profile k	Curved k1, Straight k2
	Board Front Carving Style l	No Carving l_1, Relief Carving l_2
	Board Front Surface m	Grid m_1, Full Panel m_2
Stretcher	Stretcher style n	Step-by-Step High Stretcher n_1, X-Stretcher n_2

The Backrest side profile describes the left-view profile; the Armrest Side Profile describes the top-view profile

4.4 Semantic Difference Experiment About the Form Attributes of Ming-Style Chair

The selected participants were instructed to rate symbols (words) representing objects on a bipolar scale. These scales comprised contrasting adjectives, with participants marking positions that best represented the direction and intensity according to their perspective [33]. A Semantic Difference Experiment was conducted to survey the form attributes of Ming-style chairs through a questionnaire, which garnered evaluations from 198 Gen Y

Table 6. Form attributes elements encoding table of samples

Sample	a1	a2	b1	b2	c1	c2	…	l1	l2	m1	m2	n1	n2
1	1	0	1	0	1	0	…	1	0	0	1	1	0
2	1	0	1	0	1	0	…	0	1	0	1	1	0
3	1	0	1	0	0	0	…	1	0	0	1	1	0
4	1	0	1	0	0	0	…	0	1	0	1	1	0
…	…	…	…	…	…	…	…	…	…	…	…	…	…

consumers for 20 samples. The mean values of Kansei for 20 representative samples of Ming-style chairs were obtained (Table 7).

Table 7. Kansei mean evaluation table of 20 representative samples

Sample	Classical–Fashionable	Simplel–Gorgeous	Elegantl–Vulgar	Minimalistl–Elaborate	Sturdyl–Soft	Clumsyl–Light
1	−0.93	−0.82	−0.84	−0.85	0.38	0.48
2	−1.00	0.01	−0.68	−0.14	0.18	0.10
3	−0.73	−0.65	−0.66	−0.70	0.17	0.38
4	−0.80	−0.35	−0.62	−0.30	0.13	0.32
5	−0.61	−0.80	−0.64	−0.93	−0.36	0.61
6	−0.73	−0.66	−0.61	−0.62	−0.08	0.31
7	−0.81	0.00	−0.60	0.01	−0.50	−0.05
8	−0.82	0.23	−0.43	0.31	−0.21	0.02
9	−0.74	−0.01	−0.33	0.20	−0.35	−0.34
10	−0.65	−0.57	−0.47	−0.46	0.02	0.18
11	−0.37	−0.38	−0.58	−0.52	−0.13	0.14
12	−0.74	−0.10	−0.54	0.01	−0.35	−0.11
13	−0.55	−0.28	−0.40	−0.20	−0.18	−0.28
14	−0.58	−0.42	−0.25	−0.38	−0.15	0.08
15	−0.67	−0.34	−0.24	0.11	−0.39	−0.20
16	−0.84	0.44	−0.29	0.84	−0.25	−0.65
17	−0.24	−0.75	−0.60	−1.00	−0.16	0.79
18	−0.36	0.44	−0.46	0.51	0.36	0.36
19	−0.41	0.17	−0.28	0.27	0.38	0.35
20	−0.37	−0.11	−0.32	−0.02	0.32	0.34

Table 8. Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.045	50.747	50.747	3.045	50.747	50.747	2.834	47.229	47.229
2	1.423	23.713	74.460	1.423	23.713	74.460	1.403	23.382	70.611
3	1.054	17.570	92.030	1.054	17.570	92.030	1.285	21.419	92.030
4	0.330	5.503	97.534						
5	0.130	2.168	99.702						
6	0.018	0.298	100.000						

Extraction Method: Principal Component Analysis

Table 9. Rotated component Matrix[a]

	Component		
	1	2	3
Classical—Fashionable			0.957
Simple—Gorgeous	0.951		
Elegant—Vulgar	0.678		0.542
Minimalist—Elaborate	0.987		
Sturdy—Soft		0.960	
Clumsy—Light	−0.698	0.586	

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 5 iterations

The data table containing scores for Kansei word pairs was imported into the SPSS software, and factor analysis was utilized to reduce the dimensionality of the Kansei words. Prior to conducting factor analysis, both the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's sphericity test were executed to evaluate the structural validity and interrelationships of the factors. The experimental results revealed a KMO value of 0.505. As KMO is greater than 0.5, the data is deemed suitable for factor analysis. Additionally, Bartlett's sphericity test yielded an approximate chi-square value of 91.364 with 15 degrees of freedom, indicating significant differences ($p < 0.05$). Overall, both the KMO and Bartlett's sphericity test confirmed the suitability of the data for factor analysis (Tables 8 and 9).

In the explanation of total variance (Table 6), it is highlighted that the cumulative contribution rate of the first three indicators was 92.030%, exceeding the threshold of 90%. This indicates that the six groups of emotional vocabulary items could be condensed into three main factors. Using the normalized maximum variance method, the emotional vocabulary items in the measurement table were orthogonally rotated to extract two main factors. The rotated component matrix is presented in Table 7. To enhance clarity and minimize visual interference, blanks were utilized to denote factor loadings with absolute values less than 0.5, while negative values indicated negative correlations between indicators. Within the extracted three main factors, the first factor comprised the indicators "Simple—Gorgeous, Elegant—Vulgar, Minimalist—Elaborate, and Clumsy—Light" and was labeled as the "Simplicity Factor". The second factor encompassed the indicators "Sturdy—Soft" and "Clumsy—Light" and was termed the "Sturdiness Factor". Lastly, the third factor included the indicators "Classical—Fashionable" and "Elegant—Vulgar", designated as the "Style Spectrum Factor". The factor values for the three principal components are provided in Table 10.

Table 10. Factor values for the three principal components

Sample	Simplicity Factor	Sturdiness Factor	Style Spectrum Factor
1	−1.29855	1.42697	−1.70735
2	0.32342	0.99761	−1.87597
3	−0.93158	0.68823	−0.56911
4	−0.27126	0.72857	−0.79468
5	−1.70207	−0.71395	0.23417
6	−0.93565	−0.10787	−0.40126
7	0.14615	−1.035	−0.9094
8	0.92692	−0.18876	−0.63728
9	0.80234	−1.17812	−0.15821
10	−0.46961	−0.02365	0.10866
11	−0.56591	−0.25903	0.85069
12	0.22106	−0.83709	−0.53471
13	0.19446	−0.85899	0.43088
14	−0.08276	−0.7553	0.91527
15	0.40986	−1.50507	0.48629
16	2.02365	−0.80925	−0.73523
17	−1.70589	−0.04271	1.69394
18	1.30172	1.86915	0.92724
19	1.09576	1.48151	1.28998
20	0.51794	1.12276	1.38607

4.5 Test of Validity and Iterations

The results are elucidated using regression analysis, and given that the independent variables are binary categories, there is no necessity to draw a scatter plot. In the table, the model summary serves as a crucial indicator for assessing the linear relationship between the variables, as well as reflecting the regression's fitting degree. With an Adjusted R

Square value of 0.746, it is evident that the “independent variable” explains approximately 74.6% of the variation in the “Simplicity Factor”. The Durbin-Watson test result of 1.924 (between 0 and 4) suggests that the data can be considered independent (Table 11).

The distribution state of the standardized residuals is observed through a histogram. It is noted that the residuals conform to a normal distribution. Furthermore, the standardized residual plot from the scatterplot exhibits a distribution around the 0 value, demonstrating symmetry both above and below. This distribution characteristic remains consistent regardless of the increase in predicted values, indicating that the data meet the conditions of homogeneity of variance and independence.

Table 11. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.966a	0.933	0.746	0.50425900	1.924

a. Predictors: (Constant), n2, j4, g2, c4, g1, j1, c3, a2, l1, k2, h2, f1, i2, m2
b. Dependent Variable: Simplicity Factor

Since collinearity was observed in the independent variables f2 and f3, Coefficients in Table 12 were generated after filtering them out. The linear relationship among the dependent variables in the Simplicity Factor is represented by f1 and j4, with significance values of 0.05 and 0.067 ($p < 0.1$) respectively, indicating a significant influence. This suggests that whether the chair back is carved and whether the armrests are full panels have a notable impact on the Simplicity Factor.

Since there was collinearity among the independent variables f1 and f3 in the “Sturdiness Factor”, Table 13 was obtained after filtering them out. The linear relationship among the dependent variables “Sturdiness Factor” is represented by a2, with the significance values of 0.024 ($p < 0.1$), indicating a significant relationship. Furthermore, in the dependent variable “Style Spectrum Factor”, the collinear f1 and f3 were excluded, and the final analysis focused on a2 and n2. The significance values obtained were 0.072 ($p < 0.1$) and 0.013 ($p < 0.1$) respectively, suggesting a significant influence (Table 14).

Table 12. Coefficients about "Simplicity Factor"

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	90.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	0.785	1.237		0.635	0.553	−1.707	3.278		
	a2	0.141	0.407	0.069	0.346	0.743	−0.679	0.960	0.338	2.960
	c3	0.547	0.422	0.275	1.298	0.251	−0.302	1.397	0.298	3.354
	c4	0.117	0.834	0.026	0.140	0.894	−1.564	1.798	0.385	2.599
	f1	−1.333	0.519	−0.627	−2.570	0.050	−2.378	−0.288	0.225	4.442
	g1	−0.208	0.779	−0.064	−0.267	0.800	−1.777	1.361	0.233	4.293
	g2	1.234	1.424	0.276	0.867	0.426	−1.634	4.103	0.132	7.571
	h2	−0.763	0.447	−0.383	−1.708	0.148	−1.663	0.137	0.266	3.765
	i2	0.497	0.685	0.234	0.726	0.500	−0.883	1.877	0.129	7.748
	j1	−0.465	0.691	−0.170	−0.673	0.531	−1.857	0.927	0.209	4.786
	j4	2.107	0.905	0.471	2.328	0.067	0.283	3.932	0.327	3.062
	k2	−0.361	0.438	−0.182	−0.825	0.447	−1.244	0.521	0.276	3.621
	l1	0.209	0.447	0.105	0.467	0.660	−0.691	1.109	0.266	3.765
	m2	−0.745	1.141	−0.229	−0.653	0.543	−3.043	1.554	0.109	9.208
	n2	0.927	0.490	0.340	1.892	0.117	−0.060	1.915	0.415	2.410

a. Dependent Variable: Simplicity Factor

Table 13. Coefficients about "Sturdiness Factor"

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	90.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.325	0.930		1.425	0.213	−0.549	3.198		
	a2	−1.248	0.389	−0.611	−3.208	0.024	−2.032	−0.464	0.328	3.051
	c1	0.493	0.373	0.253	1.320	0.244	−0.260	1.245	0.324	3.087
	c4	−0.540	0.640	−0.121	−0.844	0.437	−1.830	0.749	0.580	1.724
	d1	−0.872	0.535	−0.269	−1.630	0.164	−1.951	0.206	0.438	2.284
	h2	0.107	0.405	0.054	0.266	0.801	−0.708	0.923	0.287	3.481
	i2	−0.858	0.637	−0.404	−1.347	0.236	−2.142	0.426	0.132	7.556
	j1	−0.319	0.538	−0.117	−0.593	0.579	−1.404	0.766	0.305	3.274
	j2	−0.416	0.647	−0.128	−0.643	0.548	−1.721	0.888	0.299	3.341
	j4	0.223	0.859	0.050	0.259	0.806	−1.508	1.954	0.322	3.106
	k2	0.458	0.416	0.230	1.102	0.321	−0.380	1.296	0.272	3.677
	l2	−0.181	0.435	−0.088	−0.416	0.695	−1.057	0.695	0.263	3.808
	n2	0.634	0.512	0.232	1.239	0.270	−0.397	1.666	0.338	2.962
	m2	0.203	0.559	0.062	0.363	0.732	−0.924	1.329	0.401	2.493
	f2	−0.360	0.344	−0.181	−1.045	0.344	−1.054	0.334	0.396	2.523

a. Dependent Variable: Sturdiness Factor

Table 14. Coefficients about "Style Spectrum Factor"

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	90.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	−2.107	1.797		−1.173	0.294	−5.727	1.514		
	a2	1.083	0.477	0.530	2.272	0.072	0.122	2.044	0.328	3.051
	c3	−0.231	0.457	−0.116	−0.505	0.635	−1.153	0.691	0.337	2.964
	c4	−0.883	0.926	−0.197	−0.954	0.384	−2.748	0.982	0.417	2.401
	f2	0.051	0.422	0.026	0.122	0.908	−0.799	0.902	0.396	2.523
	g1	0.983	0.911	0.303	1.080	0.330	−0.852	2.818	0.227	4.404
	g2	0.599	1.603	0.134	0.374	0.724	−2.631	3.829	0.139	7.201
	h2	0.635	0.496	0.319	1.280	0.257	−0.364	1.634	0.287	3.481
	i1	0.288	0.781	0.136	0.369	0.727	−1.285	1.862	0.132	7.556
	j1	0.712	0.660	0.261	1.079	0.330	−0.618	2.041	0.305	3.274
	j4	−0.727	1.053	−0.163	−0.691	0.520	−2.849	1.394	0.322	3.106
	k2	0.388	0.510	0.195	0.761	0.481	−0.639	1.415	0.272	3.677
	l1	−0.112	0.533	−0.056	−0.210	0.842	−1.185	0.962	0.249	4.018
	m2	0.381	1.310	0.117	0.291	0.783	−2.259	3.021	0.110	9.113
	n2	2.370	0.628	0.868	3.777	0.013	1.106	3.635	0.338	2.962

a. Dependent Variable: Style Spectrum Factor

4.6 Model Building

When the validity tests give satisfactory results, the data collected from synthesis can be presented as a model. These models are functions that depend on product properties and are used to predict the emotional scores for specific words. In model building, a relationship model is established with Kansei evaluation as the dependent variable and Ming-style chair form attribute as the independent variables:

$$y_{kansei} = x_{Ming-style\ chair\ form\ attribute}$$

So, the models are $y_{\text{Simplicity Factor}} = -1.333f_1 + 2.107j_4 + 0.78$; $y_{\text{Sturdiness Factor}} = -1.248a_2 + 1.325$; $y_{\text{Style Spectrum Factor}} = 1.083a_2 + 2.370n_2 - 2.107$.

5 Conclusion

In conclusion, it is evident that the simplicity factor of the Ming-style chair correlates with the carving on the front and back of the chair and whether the armrests are full panels. Meanwhile, the sturdiness factor is associated with whether Danao is segmented, and the style spectrum factor is linked to whether Danao is segmented and the leg shape is X. However, there exists an overarching issue of collinearity, indicating a need for improvement in the independent variables in subsequent stages. Additionally, the limited number of significant independent variables may be attributed to the questionnaire's quality and the model's fit. Based on the results of the Semantic Difference Experiment and the evaluations from Gen Y consumers regarding the form attributes of Ming-style chairs, designers can gain valuable insights into the elements that resonate with consumers' emotions, designers can innovate and create new chair designs that meet the emotional demands of consumers. This finding ensures that the new chair designs not only incorporate the traditional Ming-style elements but also resonate with the emotional preferences of contemporary consumers, thus increasing the likelihood of acceptance and success in the market.

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