The Design Approach of Historical Product Stimulation in Modern Chair Design - Japanese Designers' Views on this Approach

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Abstract

Background Existing products can be seen as stimuli to generate modern design, and historical stimuli can serve as inspiration for famous modern chairs. The designers of these modern chairs referred to the main features of historical chairs to create modern versions of the chairs. But it is not clearly known how and why modern chair designers launched this design approach and whether it has practical value. To explore these issues, this article analyzed eleven famous modern chairs by Japanese designers.

Methods First, a literature review was conducted and eleven famous modern chairs were selected. Second, a qualitative investigation of interviews with professional Japanese designers was carried out. Third, a quantitative investigation was carried out via questionnaires given to the same Japanese designers.

Results Japanese designers thought that there were five decisive reasons to affect the historical chair stimulation design approach. They were technique (materials and manufacture), ergonomics(high-precision ergonomics), culture (aesthetic popularity), marketing (customer motivation), and space (environment harmonization). Meanwhile, Japanese designers were in favor of using the backrests of historical Scandinavian and German chairs as main reference simulation.

Conclusions Modern design stimulated by historical existing products is highlighted by many studies for positive benefits. Technique, culture, ergonomics, marketing and space are the five factors that can be viewed as driving forces for the design of modern chairs stimulated by historical chairs. This design approach value is characterized by the reference to historical features for the aim of promoting diverse modern design culture.

Keywords Historical Chair, Modern Chair, Stimulation, Reference, Japanese Designers

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1. Introduction

Designers' knowledge, skills and values lie in artificial techniques. These knowledge, skill and value are inherent in the artifacts of the artificial world, in their forms and configuration-knowledge that is used to reuse or draw from varying aspects of existing products (Cross Nigel, 2001). So when designers do design, they hardly ever start from scratch, but design by modifying existing products (Papanek, V. J. 1972). Many product development processes involve taking an existing product as a starting point for the development of a new version of the product. If the existing product has been successful historically, it is worthwhile to use the existing product's design specifications as a basis for establishing product design specifications for the product variant to be developed (Goldberg D., 2001). The value of previous existing products presents itself as stimuli to generate modern designs. Many studies highlight the positive outcomes and benefits of using existing stimuli during idea generation (e.g. Dugosh, Paulus, Roland, & Yang, 2000), (Vasconcelos, L. A., & Crilly, N.,2016). Stimuli coming from socio-cultural and historical products, arts and crafts, technological innovations can feed the innovation process (Cautela C., 2013). Designers are stimulated by and refer to a broad range of visual sources that guide their work. These sources may be drawn from almost any sphere, but commonly include similar products and historical products (e.g. cultural artifacts) (Crilly N., 2009). The relationship between history and modern times has always been a close one in modern design. Historical products will effect modern design in many aspects . This article researches how previous historical products serve as stimuli to influence modern designs. This historical product-stimulated design approach has already been applied by many designers in the 20thand 21stcentury. For example, Ludwig Mies van der Rohe and Lilly Reich designed the Barcelona Chair in 1929 after beingstimulated by Karl Friedrich Schinkel's Cast-Iron Garden Chair, 1825 (Vasconcelos, L. A., & Crilly N., 2016). Charles Ray Eames designed the Eames Lounge Chair after being stimulated by the traditional English club chair of the 1850s (Halstrom, P. L.,2016). TheseBarcelona Chair and Eames Lounge Chair examples of history-stimulated product designs illustrate how historical product design can serve as a catalyst for designing innovative products (Deserti A., & Rizzo F., 2014).

This research seeks to understand the relationship between historical products a modern products inspired by them. Investigating such a relationship is important for two reasons. Firstly, it contributes to our theoretical understanding of how historical products can be referenced to innovate modern products. Secondly, understanding the effects of historical products has considerable practical implications for future designers. They can apply this approach to the greater design field.

To explicate the concrete reasons and how modern designs have been inspired by historical products, this article selected eleven modern chairs which demonstrate the historical chair stimulation design approach as case studies for revealing this design approach discipline. The reason for choosing chairs as study cases for this research is that no other object of humans' daily environment has had greater enduring cultural significance than the ever-present chair; this object unconsciously yet forcefully shapes the physical and social dimensions of

humans' lives (Kim, E. J., & Self, J., 2013). Based on the relative literature review, the author interviewed eight professional Japanese designers for their views on what the reasons and motivation of this design approach in November 2017. Meanwhile, a questionnaire survey was carried out among the same Japanese designers to find out how they would apply the historical chair stimulation design approach if they were willing to practice this design approach.

2. Methods

This study applied three research methods. The first one was a literature review to select eleven famous chairs in the 20th and 21st centuries, all of which demonstrated the application of the historical chair stimulation design approach. The second was a qualitative investigation that involved interviews with eight Japanese designers to find out their views on the historical chair stimulation design approach. The final method was a quantitative investigation utilizing a Likert scale questionnaire for the same eight Japanese designers to get their opinions on how to implement the historical chair stimulation design approach. The interview and questionnaire methods can be described as ethnographic investigations. The author chose these three research methods because historical chair stimulation design is one type of modern chair design phenomena and approaches. Several famous chair designers applied this design method in the 20th and 21st centuries. Thus, such application of the method must not have been accidental; rather, there must be some commonalities and dissimilarities behind this design phenomenon. It may be easy to find some examples of historical chairs that inspired the design of modern chairs by studying related books and papers, such as in *History of Modern Design: Graphics and Products Since the Industrial Revolution*, written by David Raizman in 2003; here, it is pointed out that the Barcelona Chair was inspired by Karl Friedrich Schinkel's Cast-Iron Garden Chair because of Cast-Iron's graceful leg curve. In *Fifty Chairs that Changed the World*, it is argued that the Eames Lounge Chair's design was stimulated by the traditional English club chair as well as promoted by leather progress and ergonomics knowledge. But until now, there has been no comprehensive and recapitulative interpretation of this design phenomenon; nor do we know whether today's designers are willing to launch this design approach in their design process or not. So in this case, the author chose Japanese professional designers as samples to investigate their overall insights and perspectives of this design phenomenon (by interview investigation), and whether and how they would like to apply this design approach in their practice (by questionnaire investigation). That is to say, digging for the essential promotion reasons and evaluating the practical value of this approach nowadays are the main aims of this study; the study focused on the viewpoints of Japanese professional designers but not those of other countries' designers as they hold different views on this design approach.

So in essence, these three research methods are logically connected. For the literature review, this paper presented one design phenomenon. Then interviews were conducted on Japanese designers, and this paper summarized the comprehensive reasons of this design approach from Japanese designs' standpoints. Finally, by questionnaire, this paper investigated whether this design approach was valuable and practical according to Japanese designers. Figure 1 shows the methods this article applies.

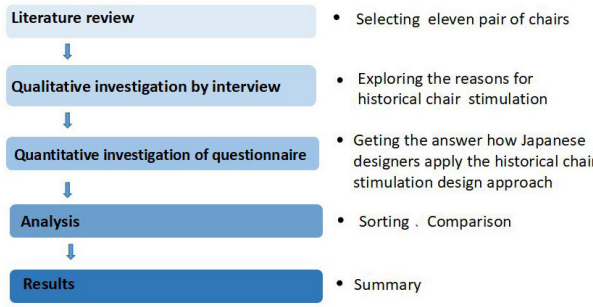

Figure 1 Research methods and procedures

3. Procedures

3. 1. Selection of chair pairs

In this study, following a literature review, the author selected eleven famous modern chairs and their corresponding historical chairs as pairs to discuss how this design approach was applied by modern designers. The detailed information about the eleven pairs of chairs is shown in Table 2. The reason for selecting these eleven famous chairs is because they were designed by different designers but all of them applied the same design approach of being stimulated by historical chairs. There must be some similarities and difference of how these modern chairs stimulated by historical chairs, which are the reason why this article chose them as case studies.

From Table 1, it can be seen that the span of eras and countries between the modern chairs and their corresponding stimulated historical chairs is huge. Some of the chairs are even more than two thousand years old; for example, the Oxford Sackler Library chair was designed in 2001 and the Ancient Greek Klimos chair was designed in 5th century B.C. When facing the huge change of an era's cultural background, how designers redesign historical chairs into modern versions requires designers to possess intelligent design talent and the courage to minimize the cultural conflicts between historical and modern chairs and redesign the historical designs for the 21st century. In the reference redesign process, designers maintained the main features of the original historical chairs and their essence on the one hand; on the other hand, they modified the original historical chairs flexibly to cater to 20th century chair marketing. The main aim of this study is to investigate how designers have referenced historical chairs for inspiration for modern chairs' designs. This design phenomenon will be discussed in the following paragraph. For a comprehensive understanding of the references to and modifications of historical chairs, Tables 2 and 3 list the details of the characteristics of modern chairs and historical chairs.

Table 1 Selection of eleven pairs of chairs

Pair	Modern chair	Information	Pair	Modern chair	Information	Pair	Modern chair	Information
1		Name：Barcelona Chair Designer：Ludwig Mies Van Der Rohe and Lilly Reich Year：1929 Country：Germany	2		Name：Eames Lounge Chair Designer：Charles Ray Eames Year：1956 Country：United States	3		Name：Sitzmaschine Chair Designer：Josef Hoffmann Year：1905 Country：Czech Republic
	Historical chair	**Information**		**Historical chair**	**Information**		**Historical chair**	**Information**
		Name：Cast-Iron Garden Chair Designer：Friedrich Schinkel Year：1825 Country：Germany			Name：English traditional club Chair Designer：Unknown Year：1850s Country：England			Name：Morris Chair Designer：Philip Webb Year：1866 Country：United Kingdom
Pair	**Modern chair**	**Information**	**Pair**	**Modern chair**	**Information**	**Pair**	**Modern chair**	**Information**
4		Name：Proust Chair Designer：Alessandro Mendini Year：1978 Country：Italy	5		Name：Louis Ghost Chair Designer：Philippe Starck Year：2002 Country：France	6		Name：The China Chair Designer：Hans J. Wegner Year：1944 Country：Denmark
	Historical chair	**Information**		**Historical chair**	**Information**		**Historical chair**	**Information**
		Name：Louis XV Rococo Chair Designer：Unknown Year：1750S Country：France			Name：Louis XVI Queen Chair Designer：Unknown Year：1780S Country：France			Name：Ming round-backed Armchair Designer：Unknown Year：1500S Country：China
Pair	**Modern chair**	**Information**	**Pair**	**Modern chair**	**Information**	**Pair**	**Modern chair**	**Information**
7		Name：Superleggera Chair Designer：Gio Ponti Year：1957 Country：Italy	8		Name：Vitra Pretzel Chair Designer：George Nelson Year：1957 Country：United States	9		Name：Robert Venturi's Chippendale Chair Designer：Robert Venturi Year：1984 Country：United States
	Historical chair	**Information**		**Historical chair**	**Information**		**Historical chair**	**Information**
		Name：Chiavari Chair Designer：Unknown Year：1807 Country：Italy			Name：Thonet 209 Chair Designer：Michael Thonet Year：1879 Country：Germany			Name：Chippendale Chair Designer：Chippendale Year：1754 Country：United Kingdom
Pair	**Modern chair**	**Information**	**Pair**	**Modern chair**	**Information**			
10		Name：MUJI Chair Designer：James Irvine Year：2008 Country：Japan	11		Name：Oxford Sackler Library Chair Designer：2001 Year：1956 Country：England			
	Historical chair	**Information**		**Historical chair**	**Information**			
		Name：Thonet 14 Designer：Michael Thonet Year：1859 Country：Moravia then Austria			Name：Ancient Greek klimos Chair Designer：Unknown Year：5th BC Country：Greece			

Table 2 describes which elements the designers of the modern chairs referred to historical chairs for by considering the historical chairs' backrests, armrests, seats, legs, materials, and colors, and exactly which modification was implemented in the redesigning process. Table 3 summarizes the frequency of the element reference of the eleven pairs of chairs. From these two tables, it can be seen that the backrest is the reference element most frequently referred to; all of the chair pairs refer to the backrest except for the Barcelona Chair. Modifications to the backrest include backrest size adjustment, curvature change and shape simplicity. The second most frequent reference elements are the legs and materials; seven pairs of chairs refer to historical chair legs and materials. The leg reference includes height adjustment and structure simplicity, as can be seen in the Vitra Pretzel Chair and MUJI chair; the designers removed the structure of leg strengthen circle fixation. Meanwhile, most of the modern chairs fell under the material category by changing the material type; for instance, in the Eames Lounge Chair, black leather and fabrics combined with plywood replaced the monotonous brown leather of its predecessor, the club chair.

Table 2 Historical chair reference elements and modification

Pairs / Reference	1	2	3	4	5	6
Reference element	Leg, Color	Backrest, Armrest, Material, Seat	Backrest, Armrest	Backrest, Leg, Seat, Material	Backrest, Armrest	Backrest, Armrest, Material, Color
Modification	Leg: Change curvature color	Backrest: Increase height and thinner thickness Armrest: Simplified Material: Changing the leather color and type Seat: Maintain soft touching surface	Backrest: Narrow shape, geometric pattern Armrest: Simplified shape and add geometric pattern	Backrest: Broaden shape, add fringe Leg: lower height Seat: Maintain soft touching surface Material: Change the fabric type	Backrest: Simplified Armrest: Simplified Leg: Higher height	Backrest: Change curvature Armrest: Change curvature Leg: Simplified shape Material: Change the wood type Color: Maintain wood yellow

Pairs / Reference	7	8	9	10	11
Reference element	Backrest, Leg Color, Material	Backrest, Armrest, Leg, Material	Backrest, Material	Backrest, Leg, Color, Material	Backrest, Leg, Color, Material
Modification	Backrest: Lower height, Widen space and simplified shape Leg: Simplified shape Material: Change the wood type Color: Maintain wood yellow	Backrest: Change Curvature Armrest: Change Curvature Leg: Compact and gather leg shape Material: Change the wood type	Backrest: Widen outline and simplified shape Material: Change the wood type	Backrest: Change curvature Leg: Simplified and straighten Material: Change the wood type Color: Maintain wood yellow color	Backrest: Change curvature Leg: Change Curvature Material: Change the wood type Color: Maintain wood yellow color

Table 3 Comparison of historical chair reference element

Pairs / Reference	1	2	3	4	5	6	7	8	9	10	11	Sum
1 Backrest		V	V	V	V	V	V	V	V	V	V	10
2 Armrest		V	V		V	V		V				5
3 Seat		V		V								2
4 Leg	V			V		V	V	V		V	V	7
5 Material		V		V			V	V	V	V	V	7
6 Color	V					V	V			V	V	5

Based on this basic analysis and understanding of how these eleven pairs of chairs referenced their corresponding historical chairs, some questions arose. For instance, why did modern chair designers adopt this design approach of adjusting and modifying historical chairs, and how did they fulfill this redesigning process? Even though some literature already explains partial reasons, the author wanted to investigate Japanese designers' views about this design approach. With these questions, the author visited eight professional Japanese designers to get their answers.

3. 2. Analysis of Japanese designers' interviews

In November 2017, the author conducted face-to-face interviews with eight professional Japanese furniture designers. All of them are highly specialized in the chair design field

(Table 4). Sakamoto is a particularly famous expert, The book he wrote in 2016, *The Secrets of Chairs*, inspired the rethinking of chair design in Europe and Japan. The other designers interviewed were from professional design or chair manufacturing companies.

For the first step of the interview, the designers were shown the eleven pairs of chairs, and then they were asked about the historical chair stimulation approach. Each interview lasted between one and two hours.

The eight designers displayed great passion and interest as they offered their opinions, and their viewpoints were diverse. This article analyzes their opinions about how the designers of these modern chairs were stimulated by and referred to historical chairs for the redesigning process into five aspects: 1) Technique, 2) Culture, 3) Ergonomics, 4) Marketing, and 5) Space. To understand their viewpoints intuitively, Table 5 showed the frequency occurrence of these five aspects in their interviews:

Table 4 Interview information

Designer	Work Company	Interview Time	Interview Place
1 Yusuke Umeda	LIXIL Link to Good Living Co., Ltd.	2017.11.16 (14:30–16:30)	Tokyo
2 Sakamoto	Sim Design company	2017.11.16 (18:00–21:30)	Tokyo
3 Nao Saito	Uni Design company	2017.11.17 (13:00–15:30)	Tokyo
4 Masashi Ito	Okamura Corporation company	2017.11.17 (18:00–20:00)	Tokyo
5 Fujitsu Genki	XXX	2017.11.18 (9:00–11:30)	Tokyo
6 Keita Kondo	XXX	2017.11.18 (12:00–14:30)	Tokyo
7 Fumihiko Seki	XXX	2017.11.24 (13:00–15:30)	Fukuoka
8 Amiyazato	XXX	2017.11.27 (10:00–12:30)	Fukuoka

Table 5 Occurrence frequency of explanation reasons

Pairs / Reference	1 Designer	2 Designer	3 Designer	4 Designer	5 Designer	6 Designer	7 Designer	8 Designer	Sum
Technique		V	V				V	V	4
Culture		V	V		V	V		V	5
Ergonomics		V	V	V					3
Marketing	V				V	V	V		4
Space	V			V			V		3

From Table 5, it can be seen that “culture” was the most frequently mentioned aspect, followed by “technique,”“marketing,”“ergonomics,” and “space” in that order. For interpreting these designers thoughts’ in detail, the author summarized their representative points of view in the following paragraph.

1) Technique

“Technical sophistication is the main motivation for refereed design; it is also to be a key determinant of customer appraisal,” Sakamoto says. He thinks the progress of technique progress was the significant pushing element of this design approach.

A. Designer (Sakamoto): Because of the progress made in manufacturing techniques, designers have more choices for achieving the complex shapes and structures of chairs. For example, the curved surface manufacturing process results in the change from two

dimensions to three dimensions. The backrest and armrest curve line in Hans J. Wegner's China chair is much more fluent and much smoother due to the heat curved wood processing technique. In the Superleggera chair, Gio Ponti reduced the triangular cross-section to a bare minimum, which contributed to the lightest weight but strong component structure. The other reason of reference modification redesign is the progress made in materials. In the Louis Ghost chair, Philippe Starck applied injection--moulded polycarbonate to build this totally transparent chair, which shows divergence from the Louis XVI Queen chair.

2) Culture

Culture is the soil of social growth, as it breeds the phenomena of aesthetic popularity, epidemic trend, and social status. These culture phenomena become the vane of design to influence how designers reference historical chairs.

A. Designer (Sakamoto): The guidance of aesthetic popularity in different eras impacts designers' intentions. There is some overlapping between historical popularity and modernist popularity. That is the reason that modern designers want to revive historical chairs. The Proust chair revives the prosperity of the classic Louis XV Rococo chair by exaggerating the post-modernist design for 1970s aesthetic popularity.

B. Designer (Fujitsu Genki): Every country possesses its own cultural characteristics; if designers reuse other countries' historical products, they must transform that original chair to reflect his own country's cultural characteristics. In this case, Robert Venturi injected his fun-loving, libidinous culture into his Chippendale chair while redesigning the historical Chippendale chair.

C. Designer (Keita Kondo): It is designers' passion to cater to populars trends. Customers living in different times form their own trends. The Pretzel chair, which was designed in 1957, is well-known for its elegant silhouette. In the US in the 1950s, streamlined designs were popular. George Nelson visualized this popular wave to redesign the classic Bentwood 209 chair into the Pretzel chair with elegant curves by utilizing a single wooden piece to create its streamlined shape. This kind of phenomenon also happened in the case of the Sitzmaschine chair, which was viewed as a machine for sitting. In around 1905 in the Czech Republic, machine aesthetics was fashionable, and the Sitzmaschine chair was the outcome of such an epidemic culture.

D. Designer (Amiyazato): Designers want to fulfill customers' desire for social status through chairs' extrinsic features. Ludwig Mies van der Rohe designed the Barcelona chair for the Spanish king and queen to sit in at the opening of the German section of the exposition at the 1928 Barcelona exhibition. To reflect the royal status of the king and queen, Mies was influenced by the scissor-shape design (known as a curule seat), which dates back to the Egyptian, Greek and Roman designs in 1500 B. C. and Karl Friedrich Schinkel's Cast-Iron Garden chair. This scissor shape has always been strongly connected with seats of power. So Mies made use of this shape to showcase the royal couple's power and status.

3) Ergonomics

Ergonomics is mainly about safe and comfortable chair structure design. Ergonomics is the rational factor for designers' stimulation and reference design.

A. Designer (Nao Saito): Many designers try to satisfy the customer's pursuit of chair usability maximally. Especially, comfortable seating becomes the most important influential factor

when purchasing a chair. In the Eames Lounge chair, Charles Ray Eames kept the traditional English club chair's soft and comfortable seating function by developing molded plywood and leather with a humanized backrest curve and reducing the chair's thickness. This change results in the Eames Lounge Chair offering a warm and receptive seating experience.

B. Designer (Masashi Ito): The emphasis of high-precision ergonomics along with the development of ergonomics knowledge promotes reference design. Designers carry out the design process in a precise way in order to tailor chairs to customers' physical body dimensions .Features are adjusted according to customers' postures and needs. In Hans J. Wegner's China chair, Wegner used "sculptural lines" to rebuild the backrest and armrest to provide a scientific seating experience taking into consideration the close curves of customers' bodies. This human-century design adjustment guarantees progress in the history of chair design.

4) Marketing

In the reference design process, marketing also plays a crucial role to help designers make decisions for modification. The specific marketing reasons here mainly include how to satisfy different targeting customers' need and the cost plan in the marketing process.

A. Designer (Yusuke Umeda): The reference redesign should satisfy the requirement of positioning marketing. Designers need to fulfill the demand of targeting customers as the direction of design guidance. The Thonet 14 chair is quite famous and popular owing to its utilization of strong types of graceful wood forms in history. James Irvine took advantage of this trait of the Thonet 14 chair to alter the two curves of its backrest into one simple curve and one straight line in the MUJI chair. This minimalist and simplistic style won huge popularity with young customers.

B. Designer (Sakamoto): Reasonable cost management requires designers to choose an economical way to mould chairs. The Superleggera chair used cheaper and durable natural ashwood. Its redesigned counterpart, the Chiavari Chair, utilized mahogany, fruitwood, and walnut for economical and sustainable design purposes.

C. Designer (Fumihiko Seki): Some chairs exist to delight target customers who seek unique chairs. In this case, designers will not only follow regular design rules, but select unique perspectives to embody designers' passion into designs to create special chairs for special customers. This kind of case is reflected in the Proust chair, which shows a huge departure from the normal orthodoxy seating of the Louis XV Rococo chair. Because of this feature, the Proust chair eventually became a highly valuable work of art in the eyes of collectors.

5) Space

Many designers consider harmony with space and buildings when they apply historical chair stimulation design.

A. Designer (Yusuke Umeda): The style of the chair should be consistent with space and buildings. The Oxford University Sackler Library chair was designed in an unfashionable architectural styleto match the classical public building of the Sackler Library in 2001. So Robert Adam selected the ancient Greek Klimos chair as a source of inspiration and modified the legs and backrest to be straighter, and Robert Adam didn't change other part of shape in the Greek Klimos chair. So the Greek Klimos chair was preserved for its classical style since the designer wanted to keep this classical style to match with the classical style of the library building.

From the analysis of the above-mentioned five aspects, it can be seen that each designer holds a distinctive viewpoint based on their professional experiences. For instance, Nao Saito, a female freelance designer, advocates the maximization of both comfortable physical function and enjoyable psychological function. She thinks the customer's pursuit of enjoyment extends far beyond the basic seating function. She also believes that a good chair should stand up to the test of time and ought to be used for more than 100 years, thus becoming a symbol of time. However, Fumihiko Seki thinks the chair design process is not just for functional creation, but also an artistic exploration process. Seki believes that sometimes a designer can create a novel artistic work, like the Proust chair and Robert Venturi's Chippendale chair.

Through in-depth conversations with eight Japanese designers, the author noted that all of them had a positive attitude about the historical chair stimulation design approach and viewed it as a meaningful and innovative design approach. To learn about how they will apply this approach in their realistic design processes, the author distributed a questionnaire about how these Japanese designers will apply this historical chair stimulation design approach at the end of the interview.

3. 3. Analysis of questionnaire

This questionnaire is about “designerly thinking” in the chair design process. “Designerly thinking” refers to the academic construction of the professional designer 's practice (Johansson-Sk· ldberg, U., 2013). Designerly thinking varies a lot according to designers’ various social backgrounds. In this case, the purpose of this questionnaire was to embody Japanese designers’ thoughts about the historical chair stimulation design approach based on Japanese social background.

The questionnaire consisted of two parts. One part is about the choice of country of for the historical chair stimulation resource, listed as follows: 1) Historical Chinese chair, 2) French Baroque chair, 3) French Rococo chair, 4) Ancient Greek chair, 5) Ancient Roman chair, 6) Ancient Egyptian chair, 7) Historical British chair, 8) Historical American chair, 9) Historical German chair and 10) Historical Scandinavian chair. The other part was about the element choice of historical chair stimulation. These elements included the 1) backrest, 2) armrest, 3) seat, 4) legs, 5) material and 6) color.
This questionnaire applied a seven-point Likert scale for the evaluation of scores from -3(disagree strongly), -2(disagree moderately), (formatting) -1(disagree slightly), 0(neither agree nor disagree), 1(agree slightly), 2(agree moderately) and 3(agree strongly). Table 6 showed the score that each designer gave to each item.

Table 6 Questionnaire data analysis results

Reference	Designer	1 Designer	2 Designer	3 Designer	4 Designer	5 Designer	6 Designer	7 Designer	8 Designer	*Sum*	*Mean*	*SD*
Country of Chair stimulation	1 Historical Chinese chair	1	1	0	−2	0	2	2	3	7	*0.875*	*1.55*
	2 French Baroque Chair	2	1	0	0	1	−1	0	2	5	*0.625*	*1.06*
	3 French Rococo chair	2	1	0	0	1	−1	1	1	5	*0.625*	*0.91*
	4 Ancient Greece chair	1	1	2	−2	0	0	−1	1	2	*0.25*	*1.29*
	5 Ancient Roman chair	1	1	0	−2	0	0	1	1	2	*0.25*	*1.03*
	6 Ancient Egypt chair	1	1	2	−2	0	0	2	1	5	*0.625*	*1.3*
	7 Historical British chair	2	2	0	−2	2	1	0	1	6	*0.75*	*1.39*
	8 Historical American chair	2	1	0	0	0	0	2	1	6	*0.75*	*0.88*
	9 Historical German chair	2	3	2	1	2	2	1	2	15	*1.875*	*0.65*
	10 Historical Scandinavian chair	3	2	3	2	2	2	2	2	18	*2.25*	*0.46*
Element of Chair Stimulation	1 Backrest	3	2	2	0	2	2	2	2	15	*1.875*	*0.85*
	2 Armrest	3	1	1	0	2	2	1	1	11	*1.375*	*0.92*
	3 Seat	2	0	0	0	2	1	−1	0	4	*0.5*	*1.1*
	4 Leg	1	1	1	1	2	1	0	1	8	*1*	*1*
	5 Material	2	1	0	2	3	−1	0	0	7	*0.875*	*1.35*
	6 Color	1	2	0	−1	0	0	1	0	3	*0.375*	*0.9*

Based on Table 6, it can be see that the highest score for the country resource choice was assigned to the historical Scandinavian chair (Sum=18; M=2.25; SD=0.46). The second one was the historical German chair (Sum=15; M=1.875; SD=0.65), The third one was the historical Chinese chair (Sum=7; M=0.875; SD=1.55). The lowest scores were assigned to the ancient Roman chair and the ancient Greek chair. The reason for the discrepancy choice was Japanese designers' preferences for the cultural chairs of different countries.

Meanwhile, according to Table 6, it can also be seen that the backrest received the highest score in element choice (Sum=15; M=1.875; SD=0.85), followed by the armrest, legs, material, seat, and color in that order. The reason that these eight Japanese designers chose the backrest as the most popular stimulation design element was because they thought backrest embodied the main feature of the chair. If the designer wanted to preserve the essence of the historical chair, they should begin by designing from backrest; then customers nowadays could recall and visualize the historical chair that inspired its more modern version.

4. Results

The first result of this research is concerned with the reasons the modern designers used the historical chair stimulation approach, and there are five main reasons:

1) Technique reason (progress of material techniques and manufacturing techniques); 2)

Culture reason (root growth in the variable aesthetic popularity socio cultural background); 3) Ergonomics reason (high-precision ergonomics knowledge); 4) Marketing reason (customer motivation); and 5) Space (harmonization with the environment).

The second result of this research is that the eight Japanese designers were willing to practice the historical chair stimulation design approach in their design reality. They selected the historical Scandinavian chair and the historical German chair as the main sources of stimulation and refereed resources. In the reference element part, the designers considered the backrest to receive priority consideration in reference design.

5. Discussion

In this article, eight Japanese designers shared their viewpoints about the historical chair stimulation design approach and how they would apply it in their own design processes. However, there are some limitations of this research. The intuitive interview can present designers' perceptive standpoints of this design phenomenon. However, if we need to identify the essential reasons of the promotion of this design approach and the correlations of these five promoting elements, we must apply more rigorous and logical research methods, such as the research method of contents analysis of the axial coding method. This method can reveal how these five elements influence and push chair design history forward; that is to say, we need to explore the cause-and-effect relationship of the historical product stimulation design approach strictly. So in this situation, this limitation should be considered when the author undertakes further study, which can contribute to the interpretation of product design revolution by looking at chair design as a case study.

In sum, the author's future research will continue to clarify how these five elements motivate the revolution of chair design, both individually and collectively. The author will explore whether a hierarchical relationship exists among these five elements when they promote the revolution of chair design through thorough coding and the contents analysis research method.

6. Conclusion

Modern design stimulated by historical existing products is highlighted by many studies for its positive benefits. Several famous chairs in the 20th and 21st centuries illustrate this design approach. This article selected eleven modern chairs to discuss the stimulation design process. A comparison of these chairs with their modern counterparts showed that the modern chairs referred to and modified some features of the historical chairs. The most common modification is the outshape simplified redesign due to changes to the curvature and components. Eight professional Japanese chair designers shared their views on why and how designers apply the historical chair stimulation design approach. They cited five reasons,

including technique, culture, ergonomics, marketing, and space. These reasons propel and shape the historical chair stimulation design approach jointly, and at the same time turn into tools and measures to modify and redesign historical chairs into modern chairs. By applying this design approach, modern designers can preserve the features of historical products and revision them into modern versions of the products. The eight designers expressed their passion for applying this design approach in their work, and they favored the historical Scandinavian chair and historical German chair as sources of inspiration.

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