EVALUATION OF AN INTERACTIVE EVOLUTIONARY COMPUTATION METHOD FOR DESIGN OF INTERIOR WORK BY RESIDENTS OF BEIJING

北京集合住宅居住者による対話型インタリアデザイン手法の評価実験

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This paper presents an evaluation of an interactive evolutionary computation (IEC) system for the design of interior work (IW) by residents of Beijing, China, and identifies practical problems with the system. The trial lasted 1 month, and 231 residents were interviewed. We concluded that the system is useful for residents who are not design professionals. We found that older participants, and those with lower education and family income levels, gave it better evaluations. Statistical analysis of the color data revealed that the system works well in interior design.

Keywords: Interior work (IW), Beijing, Apartment residents, Interactive evolutionary computation (IEC), Ray tracing algorithm

1. Introduction

1.1 Background

Sustained economic growth in China has resulted in vast housing production throughout the country. As a result of the improvements in living conditions and higher individual incomes, people have started to pay more attention to the physical and aesthetic characteristics of their living environment. When they move to a new apartment, the majority of residents perform interior work (IW) after the developer has completed essential construction work (Li et al., 1999)\(^1\). The residents design the interior space, purchase materials and furniture, and supervise any associated construction themselves, and the completed interior varies depending on their individual tastes and family demands.

A lack of professional knowledge and design ability, however, makes it difficult for most residents to visualize the interior aesthetics that they prefer and to perform high-quality interior design (ID) by themselves. Furthermore, the abundance of choice in the Chinese IW market permits numerous combinations of materials, which further complicates the choices that residents must make.

Genetic algorithms (GAs) are effective for searching through numerous possibilities to find optimal solutions by evolving groups of individuals according to an evaluation of their characteristics, while computer graphics (CG) have been widely used to display interior spaces before they are constructed. Huang (2006)\(^2\)

integrated the searching capability of a GA and the simulation ability of CG into an Interactive Evolutionary Computation (IEC) ID system that was intended to provide Chinese residents a way to perform IW design. The system allows effective consideration of a wide range of materials and visualization of the space, while at the same time guaranteeing the individuality of the resident.

Although successful commercial software products for interior design are available and some are not difficult for nonprofessional designers to use, the IEC ID system provides a different way for people to work interactively with a computer, in that the computer takes an active part in the design procedure. The system also makes ID easier, as even novices can use it simply by evaluating images.

1.2 Purpose

Although the IEC ID system developed by Huang (2006)\(^2\) was tentatively used by two Chinese students in Kyoto University, it is not clear whether it would work well for a large population of Chinese residents with ID problems. This paper presents a trial with residents of Beijing, China, to evaluate the validity of the system for actual design problems and identify any limitations. The study examined the following points:

1) Did the IEC-ID procedure effectively evolve residents’ designs?
2) How did the residents evaluate the IEC-ID results, in terms of

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quality, heuristic level, and practicability?

3) How did the residents feel about the IEC-ID procedure?

4) Were any differences among groups of people evident in the evaluations of the procedure and of the design results?

Since the participants searched for their preferred interior design using the IEC ID system, the trial could also be considered an investigation of residents’ preferences regarding interior design and of their problem-solving behaviors when supported by the system. Data related to the searching process and the results were collected for future analysis to establish rules in the design of IW and to identify ways to improve the system.

1.3. Past Studies

IEC method, which includes an interactive GA, has been successfully applied to many subjective problems. Aoki and Takagi (1997) applied an interactive GA to three-dimensional CG lighting design. They found that the method effectively helped amateur designers, especially those with limited experience or capabilities.

Huang and Matsushita (2006) applied IEC to the design of IW to help Chinese residents who were not design professionals to conduct ID themselves. Seven ID factors of a typical Chinese apartment living room, primarily related to color and texture, were selected as parameters for the IEC system. A previous trial with two Chinese students showed that they found the system helpful for ID; increasing the sample size allows the system to be improved by examining the results and presenting more options. The design evolution process was adjusted to allow for increase in the sample size.

Newsham and Richardson (2005) applied an interactive GA to an investigation of peoples’ preferences regarding surface luminance in office spaces. Forty participants viewed a series of grayscale images to find the ideal luminance combinations for six surfaces in a typical office space. The method effectively arrived at a participant’s preferred luminance combination. The results were similar to the choices of people in actual office spaces, and suggested that a person’s subjective evaluation of office spaces can be predicted, in part, from the luminance of the six surfaces.

To verify the possibility of evaluating architectural space lighting conditions via rendered images, Mahdavi and Eissa (2002) examined the extent to which subjective lighting evaluations of computationally rendered images of a space were consistent with subjective lighting evaluations of the actual space. Two groups of people were asked to evaluate several interior spaces; one group used actual locations and the other used computer-rendered images of the spaces displayed on a color monitor. A subjective lighting metric was used for the evaluation. The results showed that for the scenes and participants tested, the computer-rendered images could reliably represent certain aspects of the lighting conditions in the actual interiors.

The difference between the present research and the above-mentioned study is that we applied the IEC ID system developed by Huang (2006) to Beijing residents who wanted to perform IW, and further evaluated the validity and limitations of the system. The present study also investigated residents’ IW preferences and their IEC searching process.

2. Method

2.1. Trial site and participants

The Lize shop, an Oriental Home Construction and Ornamental Material chain store in Beijing, was selected as the trial site. The shop provides a wide range of materials and is typical of where many people purchase their materials for IW. We assumed that the majority of customers in the Lize shop had experience or an interest in ID. During the trial, some customers were interested in the IEC ID system and participated in the trial.

The trial took place from 23 February 2006 to 19 March 2006. During the 22 working days, 236 participants (an average of 10.7 participants per day) were interviewed; all of them were customers of the Lize shop. The data from 231 participants (94 males and 137 females) were included in the study. Their ages ranged from 18 to 74 years (average = 35.6 years), and the majority had a high school or college-level education, or a bachelor’s degree. Most had households consisting of two or three members and an income between 2,000 and 20,000 RMB per month (Fig. 1). In addition, a group of designers and people interested in IW do-it-yourself (DIY) were identified among the participants to provide a comparison in the analysis. 15 of the group were majored in design related specialty, and 7 of the group were interested in IW DIY or accomplished at painting or photography (10 males and 12 females). It should be point out that participants of this group were also customers in Lize shop.

![Distribution of participants (231 people)](image)

**Figure 1. Distribution of participants (231 people)**

2.2. The IEC ID system

The IEC ID system developed by Huang (2006) was employed. Figure 2 showed the interface of the system which displayed 16
images simultaneously for evaluation. At the beginning of the process, a set of interior scenes with random combination of ID factors was presented, and the user selected several scenes that he/she preferred. A GA was then used to generate new scenes based on the user’s selection, and then the user evaluated the scenes again. As this process continued, the results progressively approached the user’s preference. As a preliminary research, only still view from a certain angle was provided in this system. Future research may involve three-dimensional navigation technology.

The system of Huang (2006)\(^2\) was revised in the following ways:

**2.2.1 Design factors and material library**

The design objectives were living-room interiors typical of Beijing apartments. The factors involved in the IEC process (Table 1) are primarily material and color-related as these are assumed to be the main factors in interior aesthetics. Comparing to Huang (2006)\(^2\), number of factors was reduce to five. Images of materials were collected to construct a library of the materials available in the Chinese IW market. As lighting conditions affect the atmosphere of an interior space, rendered images of both day and night settings were provided for evaluation in the design process.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling</td>
<td>Material</td>
<td></td>
</tr>
<tr>
<td>Wall</td>
<td>Paint</td>
<td>60 colors</td>
</tr>
<tr>
<td>Wall paper</td>
<td>138 textures</td>
<td></td>
</tr>
<tr>
<td>Floor</td>
<td>Wood</td>
<td>103 textures</td>
</tr>
<tr>
<td>Ceramic tile</td>
<td>116 textures</td>
<td></td>
</tr>
<tr>
<td>Carpet</td>
<td>87 textures</td>
<td></td>
</tr>
<tr>
<td>Carpet (monochromatic)</td>
<td>99 textures</td>
<td></td>
</tr>
<tr>
<td>Door</td>
<td>Paint</td>
<td>64 colors</td>
</tr>
<tr>
<td>Sofa material</td>
<td>Textile</td>
<td>138 textures</td>
</tr>
<tr>
<td></td>
<td>Leather</td>
<td>96 textures</td>
</tr>
</tbody>
</table>

**2.2.2. IEC process flow**

It is difficult to arrive at a final solution using IEC because GAs are minimally effective in later generations and may converge into local solutions. This is a potential problem, as subjects may well become bored by repeatedly evaluating similar images. Consequently, IEC method is intended to be a heuristic approach to finding a user’s aesthetic preferences rather than a means of identifying an exact design solution. Increasing population size was proved can generate more possibilities and increase significantly the efficiency of IEC in Huang (2006)\(^2\), and similar IEC process flow was employed in this research (Fig. 3). The IEC process is intended to balance the trade-off between human fatigue and the quality of the results.

![IEC Process Flow Diagram](image-url)

**Figure 3. The IEC process flow**

**2.3 CG rendering**

Radiance\(^4\), \(^5\) highly accurate ray-tracing software, was used to handle complex interior lighting simulation and to provide dependable rendered images. In order to balance the trade-off between rendering accuracy and speed in this interactive process, 8 PCs were employed to perform rendering simultaneously. Suitable adjustment of the parameters allows the PCs to finish rendering 16 images with acceptable accuracy in about 30 seconds.

**2.4 Questionnaire**

The questionnaire contained the following: basic information on the participants; seven questions related to evaluation of the design results; eight questions related to evaluation of the IEC ID process (a five-degree semantic differential scale was used for question answers); 30 adjectives that residents could select to describe interior spaces when evaluating the design results; and comments made by the participants.
3. Trial
3.1. Trial procedure

Customers of the Lize shop in Beijing were asked to participate in the trial. As most of the customers were either performing or preparing for IW, either for new apartments or in the renovation of old apartments, they all had design goals. IEC was introduced to the participants as an evolutionary process that would gradually lead them to their preferred design. The results might then serve as a reference for the ID of their apartments. Interested customers participated in the trial.

During the trial, the investigator introduced the system and its operation to the participants, and then allowed them to use the IEC ID system alone (Fig.4). The trial consisted of the following steps:

![Figure 4. The investigation environment](image)

1) Each participant was asked to choose which one of twelve different living room images was the most similar to the living room of his/her apartment. Although the plans of apartments in Beijing vary, they can be divided into a few general types. Six models are shown in Figure 5, and the other six are their mirror images. These models have the same-sized room with different arrangements of the window opening, as it affects interior lighting conditions. The provision of a choice of models makes the system more practical.

2) Each participant was asked to choose which materials he/she might use in his/her apartment from among the available categories. This step can reduce the searching space and makes the IEC process more effective. Many participants did not choose carpeting, which is hard to keep clean in Beijing’s climate.

3) The IEC ID process began. The interface was displayed on an adjusted 19-inch cathode-ray tube color monitor at a resolution of 1024 x 768 pixels. To make the IEC process more effective, participants were asked to select three to five images in the first stage and two to three pairs of images for each step in the second stage. The participants worked on their own when evaluating images. The IEC processes of them generally took twelve steps, eight in the first stage and four in the second, as shown in Figure 2, and took approximately 20–35 min. While the images were being rendered, general information about the participant was collected.

4) After completing the IEC process, participants were asked to evaluate the results and the IEC process by completing a questionnaire and adding their comments.

3.2. Trial results

Participants were asked to rate their responses to the questionnaire using a 5-degree semantic scale. The degree terms were “very,” “fairly,” “moderate,” “fairly,” and “very” (Tables 2 and 3). The semantic scale was explained to the participants as being an even subjective scale. To compare the answers to different questions by different groups of people, numerical values from -2 to 2 were assigned to the five degrees of the semantic differential scale, and average values were calculated. Although the semantic scale is an ordinal scale, average values were considered sufficient to determine general trends in participants’ answers.

The seven questions used to evaluate the design results and the statistical values generated by their answers are shown in Table 2. Questions R1 and R2 were a general evaluation of the results, R3 and R4 evaluated the creativity of the final designs, R5 examined the accuracy of the system in determining participants' preferences, and R6 and R7 evaluated the feasibility of the design results. Table 2 shows that the participants' evaluations were generally favorable, especially with regard to questions R1, R2, and R5. The IEC ID system worked well in the trial. The lower mean score for R4 suggests that some of the participants found new ID ideas, while others did not. The participants gave fairly high evaluations in response to questions R6 and R7, but the scores for these questions were not as high as those for questions R1, R2, and R5. This suggests that the IEC design results were feasible, but not completely satisfactory to the participants.

![Figure 5. The living room plans and window-opening variations](image)
Table 2. Design results questions and answers (numbers in the bracket showed amounts of the participants)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1. How do you feel about this system of design?</td>
<td>bad</td>
<td>1.19</td>
</tr>
<tr>
<td>R2. Are you satisfied with the results?</td>
<td>very satisfied</td>
<td>1.23</td>
</tr>
<tr>
<td>R3. For you, the results are</td>
<td>new</td>
<td>1.01</td>
</tr>
<tr>
<td>R4. Have you ever imagined such interior color and material combinations?</td>
<td>unsatisfied</td>
<td>0.31</td>
</tr>
<tr>
<td>R5. Do you think the results match your taste/preference?</td>
<td>new</td>
<td>1.17</td>
</tr>
<tr>
<td>R6. Are the results practical for you?</td>
<td>negative</td>
<td>1.00</td>
</tr>
<tr>
<td>R7. Will you put them into practice?</td>
<td>negative</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Note: Adjectives in brackets show the two ends of the semantic differential scales.

The eight questions (Table 3) about the IEC process concerned the operation, heuristics, human fatigue, and a general evaluation of the process. The table shows that the participants were quite certain that the IEC system was easy to operate (P3), the design process was fun (P6), and the improvement of the designs was significant (P5). They considered the process interesting (P1) and heuristic (P2), and verified that choosing among the images was generally easy (P4). The majority of participants wanted to use the IEC ID system in their ID (P7). These results provide a good perspective on the IEC system in ID. The last question (P8) was designed to determine whether the IEC process had provided enough choices to the participants. The average score was low. Some participants complained that they had to make choices among similar images. This problem might be due to the disadvantages associated with later generations in the GA method, such as low efficiency and convergence on local answers.

Table 3. Questions on the IEC process and participants’ answers (numbers in the bracket showed amounts of the participants)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1. How did you feel about the process?</td>
<td>bored</td>
<td>1.23</td>
</tr>
<tr>
<td>P2. Do you think the process was heuristic?</td>
<td>negative</td>
<td>1.15</td>
</tr>
<tr>
<td>P3. Operation of the process was:</td>
<td>complex</td>
<td>1.52</td>
</tr>
<tr>
<td>P4. How did you feel about making choices among images?</td>
<td>difficult</td>
<td>1.06</td>
</tr>
<tr>
<td>P5. Were the final images greatly improved compared with those at the beginning?</td>
<td>negative</td>
<td>1.38</td>
</tr>
<tr>
<td>P6. Did you feel bored during the process?</td>
<td>tired</td>
<td>1.48</td>
</tr>
<tr>
<td>P7. Would you use this interior design system when performing ID?</td>
<td>negative</td>
<td>1.05</td>
</tr>
<tr>
<td>P8. What is your opinion of the material and color choices provided?</td>
<td>meager</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Note: Adjectives in brackets show the two ends of the semantic differential scales.

Aoki and Takagi (1997) found the IEC method more effective for non-professional designers than for professionals. In the present trial, the mean values of the answers of the group of professional designers and people interested in IW DIY were also shown in Tables 2 and 3 for comparison. They were found generally gave lower scores to the IEC process and the design results, in agreement with the findings of Aoki and Takagi (1997); in addition, females in the this group tended to give lower scores than did the males.

Figure 6. Comparison of answers by participants’ age, education level, and family income level (numbers in the bracket showed amounts of the participants).
Gender had little influence on the mean answers (tables 2 and 3). In contrast, age, education level, and family income level did influence mean values (Fig. 6). In general, older participants and those with lower education and family income levels gave the IEC ID system better evaluations, which suggest that the system can greatly assist these groups.

The participants' selection of the 30 adjectives is shown in Figure 7. Some adjectives were often chosen, such as “bright,” “blend,” “comfortable,” “quietly elegant,” and “clean.” As these adjectives are often used by residents to describe their interior preferences, we concluded that the IEC design results had satisfied certain aspects of the participants’ demands.

Some adjectives were rarely chosen, such as “passionate,” “hard,” and “impactive,” which can be explained by the fact that the majority of people prefer a comfortable and relaxing home environment rather than one with a strong impact. The adjectives “occidental” and “national” were also rarely chosen. The scenes provided in the IEC ID system are not complex, and the form of the sofa is fixed; therefore, it was hard for participants to find their style preferences. That few users selected “moderate” and “orthodox” might suggest that most residents want to express more personality in their IW.

Some of the participants made comments after they had used the IEC ID system. Some considered it quite useful, noting, for example, “The design system is very good, helpful.” Other participants pointed out some of its limitations: “There should be more room types, more view angles,” “I want to see more styles of sofa,” and “Not enough interior factors, still different from reality.” Some of them said “I wanted to change materials in the images by myself.” It appears that users wanted to participate more in the process. Some participants mentioned discomfort: “The images are similar, it is not easy to make choices” and “Visual fatigue.”

Comments by the professional designers were also collected. Some of them mentioned that “The design method is too restricted, and I cannot change materials by myself.” The system was not flexible enough for the professionals, and they were subsequently restricted in the use of their design abilities. Some of them also mentioned the limitations of the system, such as “It did not involve many factors of interior design.” Some professionals realized that the system was “useful for unprofessional residents, and it could be a method of communication between customers and designers.” Possible applications of IEC method were suggested.

4. Analysis of the correlation coefficients of colors in the evolution process

Although the questionnaires revealed that the majority of participants considered the IEC ID system useful, we note that this subjective evaluation may have been influenced by other factors, such as the participants’ expectations, their ability to evaluate aesthetic quality, and their mood at the time. Therefore, the trial data and the results were analyzed for additional evidence of the system’s validity.

A total of 231 participants selected 1307 designs (represented by image pairs of day and night settings) at the last generation. These designs were considered the final results. If the IEC system worked effectively, the combination of materials and colors should be pleasing or harmonious. Although color harmony is a complex problem, certain numerical relationships should exist between color parameters at each location in the scene.

Figure 8. The correlation coefficients between color values of each location of the final results (calculated by the person bivariation correlation of SPSS)
A correlation coefficient is a number from -1 to 1 that measures the degree to which two variables are linearly related; the larger the absolute value, the stronger the linear relation. Although the relationship expected between color parameters may not be linear, the correlation coefficient was employed in this study to reveal trends in color combinations.

The materials' color parameters (average red, green, and blue values of the texture image) were converted into hue saturation values and the CIE 1976 L*, a*, b* color space. These color systems were chosen because they are more closely related to human perception of colors, and they were expected to reveal tendencies in color combination. The participants' correlation coefficients for the material color parameters (H, S, V, L, a, and b) for all of the 1307 final results were calculated, as shown in Figure 8 (the background color indicates the magnitude of the value).

Although there were no strong correlations (the maximum value was 0.13), the analysis revealed significant color correlations. Because the sample size was 1307, in a two-tailed test a correlation coefficient over 0.054 was significant at the 0.05 level, while a coefficient over 0.071 was significant at the 0.01 level. These results might be explained by the fact that color harmony is too complex to express as a simple linear correlation, although correlations in the color combinations at various locations in the scenes were found.

A correlation analysis of the color parameters (H, S, V, L, a, and b) was also performed for all designs and for the selected designs (the preferred ones) of all of the 231 participants in each generation (please refer to Fig. 3), and the results are shown in Fig. 10. Numbers are not shown because of space limitations. Instead, magnitude is indicated by the shading of the cells (as in Fig. 10). The designs selected in the third generation were considered the final results, and the correlation coefficients were the same as in Figure 9.

The correlation coefficients in Figure 9 suggest a tendency toward greater correlation during the evolution process. There are no significant correlation coefficients for the designs in generation 0 because they were generated randomly. Once the participants have made their selection, weak correlations appear. These correlations are preserved through the crossover and mutation of the GA, and are transferred to the next generation. Then, when the participant selects again, the existing correlations are strengthened and new correlations appear. As the process continues, an evolutionary effect is clearly evident.

Since the pattern of correlation coefficients gradually strengthened through generations, it can be concluded that, although the correlation coefficients were not strong, this result was not by chance, and the system was successful in revealing the correlations of colors.

The evolution of the sums of the absolute values of the 36 correlation coefficients of the color values of a certain location vs. that of another location (see the six figures at the top right of Fig. 10), and the evolution of the summation of all these (bottom left in Fig. 10), were plotted. These figures reveal a general increase in the correlations between colors during the evolutionary process. To remove small correlation coefficients caused by sampling error, only figures with an absolute value over 0.05 were summed; the evolution figures are shown in Figure 11. They also reveal an

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Figure 9. Correlation coefficient of all images and selected images in each generation (color parameters were arranged in the same order as Fig. 9)

Figure 10. The evolution of the sum of all absolute values of correlation coefficients

Figure 11. The evolution of the sum of absolute values of correlation coefficients which were over 0.05
increasing tendency. Figure 11 also shows that the sums of the correlation coefficients for the door vs. other locations increased in later generations, which might suggest that a door located near the edge of a rendered image is not considered by participants at the start of the evolutionary process.

5. Conclusions

This trial of the IEC ID system with Beijing residents showed that the system was generally rated favorably and worked well in helping residents who were not design professionals to conduct ID. Older participants, and those with lower education and family income levels, tended to rate the IEC system more favorably. The trial also revealed that professional designers rated it less favorably than did nonprofessional residents.

Some professionals have suggested that the system could be used as “a method of communication between customers and designers.” As the system may help non-design professionals to reveal their preferences, it could be a direct and effective way for them to express their ideas.

The trial also showed that the system has limitations, such as its inability to handle many ID factors, inaccuracy in later generations, limits to user participation, and visual fatigue. Future research should investigate these problems.

In a comparison of color-value correlation coefficients during the evolution process, a numerical correlation between color values at each location was gradually established and strengthened. Although the correlation coefficients were not strong and no in-depth research was carried out for each correlation, we concluded that certain numerical rules operate in preferred color combinations, and that the IEC system is effective in revealing these rules.

Further research may focus on analyzing IEC data and the results collected from the trial, rules relating to the preferred interior color combinations of the residents, and the problem-solving behaviors of the residents when using the system.

Acknowledgments

We would like to express our thanks to the Lize shop of Oriental Home Constructional and Ornamental material Chain Store, Beijing for its kind providing the investigation site.

Notes

2. The HSV (Hue, Saturation, Value) model was created in 1978 by Alvy Ray Smith, which is similar to the way humans tend to perceive color. The HSV color wheel is often used as a valuable tool for determining harmonic color schemes like complementary, split complementary, triadic, and analogous colors.
3. The CIElab color space, developed by Commission Internationale d'Eclairage, is the most complete color model that used conventionally to describe all the colors visible to the human eye. The CIELab system is also an attempt to linearize the perceptibility of color differences.
4. Pearson’s correlation coefficient is a measure of the linear association between two variables that have been measured on interval or ratio scales.

References


和文要約

北東集合住宅居住者に対する室内デザイン手法の評価実験を行った。デザインの専門家でない中国人居住者が自ら室内デザインを行う場合の、C G を用いた対話型進化計算の有効性を確認した。そして対話型インテリアデザイン手法を実用化する際の問題点を明らかにした。現地実験は 1 ヶ月間で、231人の集合住宅居住者に対して行われた。実験結果の分析により、本論の対話型インテリアデザイン手法は、デザインの専門家でない集合住宅居住者にとっては有効であるが、より高いデザイン手法を持つの型について、遺伝的アルゴリズムオペレータに任せるだけでなく、自らデザインプロセスを意図的にコントロールしたいと思うため、手法に対してより低い評価を下すことが分かった。被験者、より高齢で、より低い教育水準で、より低い家計収入であるほど、対話型インテリアデザイン手法を高く評価する傾向があった。性別の影響は小さかった。多くの人はインテリアデザインに、強いインパクトや情熱よりも、快適やリラックスを求めていた。あるデザインの専門家は、顧客の嗜好がわかるので、顧客とデザイナーの間のコミュニケーションの道具として有効であるが、言語を用いた表現方法等のより直接的な方法も同時に有効であると言った。本手法の欠点としては、現実のインテリアに存在する数多くのデザイン要素を扱えるわけではない、現実空間を十分正確に再現していない点、倫理的観点では提示される案が類似点してくる点、視覚的効果が挙げられた。実験で生成された画像の解析の結果、案の進化の過程で、世代を超えて進む。インテリアの各部位の明暗の相関が大きく下る事が確かめられた。相関係数はあまり大きくないが、好みのインテリアの色の組み合わせについての規則性が発見的に生じることが、対話型インテリアデザイン手法の過程において明らかになった。

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