Understanding the Bases of Design Impressions of Natural or Artificial Products

Survey of Cognition in Different Regions

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Abstract: 自然物と人工物から生じる印象は、これらのオブジェクトに対して生じる人間の認識を規定していると考えられる。したがって、これらの印象は、新たにデザインされるプロダクトの有用性を示唆すると思われる。本研究は、自然物と人工物から受ける印象の基本的な違いについて検討した。アンケートにより、オブジェクトの印象が、その素材、構造および地域性に基づいて形成されることが確認された。自然物として評価されたオブジェクトから生じた印象は、より多様であり、緻密な構造を持っていた。人口密度の高い地域では、自然物と人工物間の違いが大きかった。自然物と人工物から受ける印象の特性の中に、新しいオブジェクトをデザインする上での人間の創造性の手がかりを得ることができる。

Keywords: In-depth impressions, Regional differences, Product design

1. Cognition of Natural or Artificial Products of Design
Humans tend to prefer natural or natural materials-made products over the artificial such. The human cognition of natural product design is contributing to its success. The cognition as natural leads to success of newly designed products, attachments to such products and their sustainable use. The category-specific distinction between natural and artificial (man-made) products primary depends on the visual recognition [1]. Until now, the human judgments on the categories of natural and artificial have been found difficult to analyze [2]. Moreover, what is in the basis of such cognition (and consequently preferences) is not clarified yet. On the other hand, people living in different regions are exposed to different natural or artificial products. Therefore, the following research question arises: What are the bases for the difference between the cognition of products judged as natural or artificial in terms of regions? Thus, the aim of this study is to investigate the basic regional differences of understanding natural or artificial products of design, in order to provide hints for design of new products. For that purpose, this research surveys and investigates the bases of the differences in cognition, paying attention to cognition of natural or artificial products, from different regions in Japan, in order to clarify the above question.

2. Methods
To address this aim, this study first applies method of data collection based on survey by questionnaires [3] to collect the participants’ freely written impressions from sample natural and artificial products of design. Furthermore, to analyze the bases of human cognition in these cases, we apply a method of analysis based on identification of underlying associative layer of in-depth impressions, behind the freely written impressions [4].

3. Survey of Cognition in Different Regions
We conducted a web-based survey by questionnaires to collect freely written impressions and evaluations of 8 different products of design (from A to H) selected with different natural or artificial appearance and materials (examples are provided as part of Figure 1). The questionnaire had the following structure: (1) inquiries of freely written impressions from the samples; (2) and evaluations on 7 steps semantic differential scales (scales of Artificial – Not Artificial and Natural – Not Natural). The first inquiry required the participants to write freely their impressions from the products stimuli. The evaluation scales were chosen on the basis of idea of providing simple evaluations of natural and artificial characteristics. Furthermore, answers from different regions of Japan have been collected – the highly populated capital and other less populated regions that have different cultural life. We selected 6 representative regions comprising of 55 participants - Hokkaido (8 participants), Chiba (13), Tokyo (8), Toyama (9), Kyoto (11) and Hiroshima (6). The participants were 20-77 years (mean age 37.9).

4. Analysis with Associative Concept Networks
The two pairs of most different products, in terms of natural and artificial evaluations from the questionnaire (respectively products E and D (natural); products H and C (artificial)), were selected and further analyzed (Figure 1). All the words from the answers are grouped as per regions and analyzed for in-depth impressions based on associative connections between the words [5]. The underlying in-depth impressions are detected as the words initiating highest number of connections to the free impressions [4]. The associative concept networks are constructed for the data as per groups of people from the same region (e.g. Hokkaido) and as per sample (e.g. H). Graph visualizations are made with Pajek 2.04 [6], using out-degree centrality in two-mode networks, which was found to be particularly suitable for analysis of the in-depth impressions [4]; the networks were visualized reduced and then balanced by energy layout using Fruchterman Reingold algorithm with factor 2 [6]. Sample results with typical structural differences of cognition are shown on Figure 2. The concept networks of most natural evaluated (E) and most artificial evaluated (H) samples are shown. The number of detected in-depth impressions and example list of them (with highest number of connections) is also shown.

![Figure 1. Products evaluated as the most natural and artificial with SD scales](image-url)
5. Findings about Regions, Impressions, and Materials

The findings show that from the associative concept networks we can observe significant differences in the underlying in-depth impressions from products that are evaluated by the participants as artificial or natural. Moreover, considerable difference can be observed in regions with different cultural life. For example, sparse structure underlies cognition from sample H in Tokyo region (highly populated). The sample H was evaluated as artificial and non-natural from the evaluations (Figure 1). The concept network representing human cognition of product evaluated as artificial is more sparse (not dense), while the concept network representing human cognition of product evaluated as natural is more dense, coherent and have more underlying in-depth impressions in it. The region of Tokyo exhibits much more in-depth impressions from natural (139) and fewer in-depth impressions from artificial products (20) (Figure 3). Focusing on the qualities of the in-depth impressions, for sample E, forest is one of the strongest in-depth impressions behind the cognition of natural product in all regions, instead of Tokyo, where it is pushed down by ‘fruit’ or ‘garden’, indicating qualitatively different base for cognition of natural product. The structures of cognition from this highly populated region are the most simple from artificial products, and the most complex from natural products. This indicates that human cognition and cognition from natural materials is based on more, thus, diverse in-depth impressions. Particular attention can be put also on groups of materials. For example, natural-evaluated products with wood-like materials (e.g. E or D) have generally more dense networks than artificial-evaluated ones from metal or plastic (H or C). These findings can be used as hints in creative design of new products, providing natural impressions customized for regions.

6. Conclusion

This study investigated the basic differences between cognition of natural or artificial design products and found that natural-evaluated products exhibit more complex structures of impressions than those evaluated as artificial. The effect of natural products in terms of impressions is greater in highly populated regions. Future research will focus on qualitative investigations of impressions for design creativity. Important hints for creative design of new products can be found in the structural characteristics and quality of the underlying impressions from natural or artificial, towards design of more natural environment.

Acknowledgements

This work was supported by the Sasakawa Scientific Research Grant from The Japan Science Society.

References