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The role of usual life imagination in tactile experience of materials

ゲオルギエフ　ゲオルギ　V.[†]，永井 由佳里[†]
Georgi V. Georgiev, Yukari Nagai

[†] 北陸先端科学技術大学院大学　知識科学研究科
School of Knowledge Science, Japan Advanced Institute of Science and Technology
georgiev@jaist.ac.jp, ynagai@jaist.ac.jp

Abstract

This study aims to identify the role of usual life imagination from the view of tactile experience with materials which form the man-made environment. To detect usual life imagination this study focuses on the association process. We carried out an experimental study to capture imagination from different materials. We analyzed the association process with method that makes use of semantic networks. On the basis of the results, the identified typology of the associations of expressed semantics explained the role of human usual life imagination during a tactile experience of materials.

Keywords — design, tactile experience with materials, human imagination, association process

1. Introduction

In order to form better environment for human, it is necessary to pay attention to imagination, as this imagination influences the feeling and evaluations of the man-made objects in this environment. We approach the bases of this issue and pay particular attention to the imagination with respect to tactile experience of materials which form the man-made environment.

We define '*usual life imagination*' as the *association process* on close tactile experience between human and material. The usual life imagination is formed inexplicitly and is not normally expressed.

The context of this association process—the tactile experience—places one into a scenario in which experience is the foundation of knowledge [1]. People need to touch to know and understand the man-made objects, to grasp their meaning. The tactile experience can be considered as a kind of specification activity that consists of constructing representations of the artifact – a cognitive artifact [2]. Humans construct such representations which reflect in experiences, likes or dislike of materials and artifacts. Our view is that these representations can be judged on the basis of inexplicit foundations of human expressed semantics on tactile experience.

Thus, the main issue is related to examination and understanding the role of human usual life imagination. In design, we have to understand how human imagination of materials and representations (cognitive artifacts) are formed. The ultimate goal is to provide artifacts friendly to humans' usual life. In this research, we bridge the issue of identifying human usual life imagination and design and examine the tactile experience based on human associations behind the expressed semantics.

We make the following clarifications. *'Associations of expressed semantics'* comprise an inner associative base of human expressed semantics. As such, associations of expressed semantics underpin explicit and, however, superficial expressed semantics. '*Expressed semantics'* are the commonly expressed human imagination through verbalization upon experience of material or artifact.

Personally held associations affect the imagination that humans derive from materials; in this way, associations form certain meanings for those individuals. Materials are interpreted by usual life imagination, manifest feelings and contribute to evaluations of materials.

2. Aim and method

The *aim* of the study is to identify what is the role of usual life imagination in tactile experience. To address this aim, we examine: (1a) human expressed semantics of materials; (1b) explicit imagination of artifacts from these materials; and (2) tactile and feeling evaluations in experience with materials.

To detect and identify associations of expressed semantics, this study makes use of *method* that analyze semantic networks. In practical terms, associations of expressed semantics can be considered nodes that initiate higher numbers of connections in these semantic networks. The numbers of connections can be assigned as weights. Thus, in the networks, associations of expressed semantics can be identified as highly weighted associations.

After the human expressed semantics on tactile experience with a material are collected, the steps involved in identifying associations of expressed semantics are as follows:

Step 1. Expressed semantics is thought to be associated from certain associative words

Step 2. All common pairs of such words (from associative to expressed) are detected using a tool

Step 3. Case-specific semantic networks based on all the detected pairs are created

Step 4. Highly weighted associative words are identified as associations of expressed semantics

Step 5. The list of associations of expressed semantics is analyzed

In this way, this study identifies associations of expressed semantics that are based on associative cores, which are the basis of each of the expressed semantics evoked by the person interacting with the material (associations are the stimulus words used to evoke the expressed ones).

To detect associations of expressed semantics, a universally applicable associative analysis tool (i.e. associative concept dictionary) was used – the 'University of South Florida Free Association, Rhyme, and Word Fragment Norms' database [3, 4]. The associations of expressed semantics are quantitatively and qualitatively analyzed to derive a greater understanding of the characteristics of human experience. For the purpose of qualitative analysis, a universally applicable semantic hierarchy analysis tool (i.e. concept dictionary) was used – the WordNet database [5].

The lexical hierarchy of WordNet represents hypernym connections where each hypernym leads to more generic hypernym [5] (p. 25). The WordNet noun taxonomy has many of the qualities needed if it is to provide basic taxonomic knowledge for the purpose of classifications in English language.

3. Experimental study

To collect human freely expressed semantics and evaluations, we conducted an experiment that involved seven material samples. The following were collected from human individuals:

- Freely expressed semantics upon tactile experience with each of seven common material samples (aluminum, cork, glass, rubber, steel net, plastic, and wood)
- Explicit imagination of artifacts comprised

from these material samples

- Tactile and feeling evaluations of the seven material samples (7-point scales from low evaluation to high evaluation)

Eleven subjects participated in this study. All the words from the protocols of the verbally expressed semantics were recorded, further transcribed into files, and used in the analysis.

4. Analysis and results

After the steps 1 to 3 of the outlined method, to detect associations of expressed semantics, the highly weighted associative words in the semantic networks were considered (Step 4). The weighting limit was approximately set to the upper half of the word groups, based on the number of connections they initiated. With this method we detected number of associations of expressed semantics for all seven materials.

For the purpose of classifying the associations of expressed semantics (Step 5 of the method), we used a conceptual hierarchy of the concept dictionary database WordNet to identify their types. After examining all the identified associations of expressed semantics, we identified the following categories as appropriate to our case: (A) Artifact; (B) Abstraction; (C) Others and not classified. The categories of (A) Artifact and (B) Abstraction serve our purpose to investigate the role usual life imagination.

Figure 1 show stacked bar graphs of associations of expressed semantics classified into these types. For example, associations of expressed semantics of artifact type were words such as 'bud', 'screen', or 'pool', while an abstraction type were words like 'influence', 'confidence', or 'power'.

The observed correlations between types of associations of expressed semantics and evaluations are shown in Table 1.

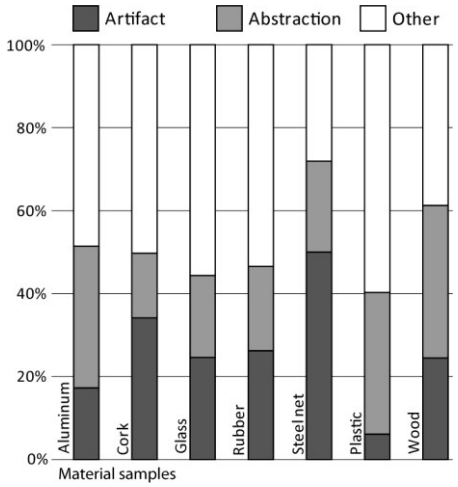

Figure 1 Typology of the associations of expressed semantics

Table 1 Correlations between the associations of expressed semantics and observed variables

		(2) Variable	Correlations 2-tailed sign.
(1b) Number of imagined artifacts		Feeling evaluation	0.881, p=0.009<0.01
(1a) Associations of expressed semantics (number)		Feeling evaluation	–0.538 n.s. p=0.212
(1a) Associations of expressed semantics by type	Artifact (number)	Tactile evaluation	–0.559 n.s. p=0.192
	Abstraction (number)	Tactile evaluation	0.645 n.s. p=0.118

5. Discussion

The identified associations of expressed semantics are connected with evaluations during a tactile experience with materials. The observed connection between the evaluations and the number of imagined artifacts, identified associations of expressed semantics (typology) explains the role of human usual life imagination during a tactile experience with product materials.

In order to achieve a high feeling evaluation for a material, a material's experience need to be associated with fewer associations of expressed semantics (i.e. connected via associations and previous human experiences) and have to contribute to a rich imagination of

artifacts. In order for a product material to be highly evaluated in tactile terms, the associations of expressed semantics have to be of the abstraction type. However materials also have to be associated with fewer associations of expressed semantics of the artifact type.

Thus the artifact and abstraction-based associations of expressed semantics play opposite roles in experiencing new materials and human tactile evaluations. Moreover, the findings show that when human associations of expressed semantics are related to artifacts—i.e. associated with the result of previous experiences with such materials—tactile evaluation is lower. In contrast, if a human's imagination of artifacts is richer, their feeling evaluation is higher. This finding contributes to our understanding of human tactile experience as a dynamic process and as an issue that needs to be better recognized in design.

However, the human tactile evaluations of materials were connected to fewer numbers of artifact-based associations of expressed semantics from the product materials. The feeling evaluation tended to be lower in cases where there were more associations of expressed semantics. The probable reason behind this finding is that more associations of expressed semantics create incoherent feelings towards the product materials.

Thus, from the human's viewpoint, a 'successful' cognitive artifact based on material experience should involve fewer affective abstraction-associating—even though, not artifact-associating—associations of expressed semantics and a diverse usual life imagination.

6. Conclusions

This study tried to clarify the ways in which human imagination of materials is formed. We applied semantic network method to analyze expressed semantics. The original analysis method seeks to identify association behind expressed semantics within the context of a study involving seven material samples. In the analysis, consideration was given to the ways in which human feeling and tactile evaluations were influenced by associations of expressed semantics, towards creating a cognitive artifact from the material. According to the findings, the generation of abstraction-based (however, not artifact-based) associations of expressed semantics produces high-preference evaluations and gives rise to diverse interpretations (number of imagined artifacts) with respect to a material. As for implications in design, creating a cognitive artifact with tactile experience, satisfying such conditions, should be the target of designers.

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