

Digitales Design Archiv (dda)

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The “digital design archive” and its Polyhierarchical Thesaurus

1. Introduction

The "digital design archive" (dda) is a research-project of the Department of Design at Anhalt University of Applied Sciences, Dessau (www.dda-dessau.de). Inspired by concrete needs in research and teaching, the archive aims to serve students, teachers, and researchers likewise. The dda collects and archives digital image-material together with the associated textual information about objects, personalities, events, and cultural significance of design-history from 1850 to today. It covers items of everyday use, ranging over objects of industrial production as well as from artisan craft and applied arts, for example, arts-and-crafts. Interaction through the Internet is possible through various interfaces and search modules. Since flexibility was a major aspect for establishing the archive, a relational database resting on MySQL was chosen. This way, most content-material such as personalities, places, institutes, materials, technologies, and so on, are covered by separate tables. Mappings and associations between the data-fields is done individually. (Current state: about 4,300 objects, 4,400 images; the raw image material includes roughly 8,000 pictures.) The archive, tailored to allow for expansions and enhancements, is of interest for companies and collections focussing on German product-culture, but also encompasses communication design. The database, which is under construction, already features a wide variety of topics.

For satisfying results in database access a well-organized thesaurus is crucial. The dda has started work on theory and realization of a design-history thesaurus with a polyhierarchical structure, since the construction of the archive gives raise to the need. Currently, only one-dimensional lists of keywords are available for indexing.

The remainder of the paper is organized as follows: thesauri and the current state in the area of art-history, the categorizing of objects of design, first steps of realization and the impact of a polyhierarchical thesaurus of design-history and the future work.

2. A Thesaurus for design-history

2.1. The current state in the area of art-history

Thesauri, for long having been a core element of libraries, form within a documentation-system the fundamental aide for content-classification and locating documents (texts as well as images). According to the German institute for standardization (DIN) a thesaurus is *an organized compilation of notions and their terms serving to index, store, and locate within an area of documenting* (compare (DIN 1987)). The realm of design-history, peripheral area of the history of art, until now lacks a comprehensive thesaurus. Especially on the background of the ubiquitous digitalization of image-material in collections and archives the need grows urgent. So far, to allow research in diverse digital archives various thesauri were established, which target core areas of art-history such as painting, sculpture, and architecture, but only insufficiently include items of everyday use. Examples are the art-history thesaurus of the image database IMAGO, which mainly covers artwork and image-contents through keyword-lists (SCHLIEPER 2000), further the *Marburger Informations-, Dokumentations- und Administrationssystem* (MIDAS), which aims to document and develop the areas of art and architecture (HEUSINGER 2001). Both thesauri are constructed in single (mono-) hierarchy. The *Art and Architecture Thesaurus* (AAT) by the J. Paul Getty Trust is organized in an polyhierarchy, but its language is English (www.getty.edu/research/conducting_research/vocabularies/aat/).

The mentioned thesauri cannot be carried over into the area of design. This is due to their covered topics as well as to their structure. In design, in spite of some areas common with art such as furniture or fashion, the focus differs greatly. Artefacts of design are primarily objects of use, and in contrast to pure works of art they have to be understood as integral part of practical life. The indexing of an artefact in painting involves mainly iconographical aspects of content, while for the purpose-oriented development of an object of design the focus lies much more on the material, technological properties, and aspects of use. Indexing in design has to center on application, usefulness and aspects of functionality.

2.2. Categorizing objects of design

Before establishing a thesaurus it has to be clarified how terms can be formatted and categorized. The vast majority of design objects is of everyday use. In the attempt to classify these objects, two aspects are important: the relation human-object and varieties and variations of objects from manufacturing to use. The transition between them is seamless, they are interrelated on many tiers. This demonstrates the many dimensions design-history has to cover. Properties such as form and function of products as well as aspects of use and purpose with respect to their environment are only some of the building blocks under consideration. The product-group of chairs for example shares commonalities in the function of sitting. Therefore, the term chair can be categorized into the group of seats, and more generally speaking into the product-group furniture. Yet this one-dimensional hierarchy is insufficient, since there are many varieties of chairs. For example they can be differentiated according to functionalities, such as folding-chair, chair with rolls, or according to their use such as office chairs, lawn-chairs, or according to their shape, such a stools, three-legged chairs, four-legged chairs, one-legged chairs, and so forth.

Further, the vast variety of application areas has to be taken into account in constructing a thesaurus. For example a typewriter can be associated with the area of communication, but also to the area of work or office supply. Not only the visible product should be considered, but also its origin and genesis. Therefore, the production together with the technologies applied, the materials, as well as aspects of the production-process such as mass-production, limited edition, model, level of execution (prototype, unique object), and the relation between design and concept are relevant. Finally, specific properties such as the individual appearance of objects, which distinguishes them, should be mentioned. To illustrate this point note that the property which defines the significance of the traveler's typewriter "Valentine" by Ettore Sottsass from 1969 by the company Olivetti for design-history is its color: red - a new attribute in the office world of grey/green or black colored typewriters or rather office machines.

The examples above offer a small impression of the multiple facets of design-history. They demonstrate that a monohierarchical (linear) structure (chair-seat-furniture) is insufficient, and that a polyhierarchical construction is desirable. "Polyhierarchy" means

that a term can be associated with multiple more general terms. The different possible levels associated with design-objects, some of which have been mentioned, are covered to guarantee comprehensive indexing.

3. Realization: A Concept for Establishing a Polyhierarchic Thesaurus for Design History

Two properties have to hold for the thesaurus of design-history: a polyhierarchic structure combined with user-friendliness with a high level of objectivity.

The construction of the hierarchy first requires a look into the semantic network of the respective objects. A semantic network is a model consisting of nodes (terms) and edges (associations). Through abstraction (association to more general terms), specification (association to more specific terms), and through coverage of synonyms and homonyms, the relation of a term to others can be established.

The existing structure is organized as follows:

the term under consideration,

all possible general terms associated,

all possible specific terms associated, and

synonyms and related terms.

At the moment, the domain of communication-instruments is being realized. The term "typewriter" will serve as an illustration. Possible abstractions for "typewriter" are "office machine", "communication instrument", "writing utensil". Specifications include "typewriter, electrical", "typewriter, mechanic", "traveler's typewriter". The term "keyboard" is accessory of the typewriter and is covered in the fourth column. A synonym for "traveler's typewriter" is "typewriter, transportable".

The polyhierarchy is illustrated by the association with multiple abstractions or specifications. "Electrical" for example also forms a possible specification for "calculator". It receives the association through the respective entry into the table. Because the notion "communication instrument" also generalizes the terms "telephone", "fax-machine", and "radio", the semantic connections develop. This comparatively small number of terms already illustrates the strong interrelations. Once enough terms are captured, the necessary software to generate and visualize the associations will be implemented.

As previously noted a second aspect is important: the usability of the thesaurus. The user who employs the thesaurus for indexing will, intuitively speaking, enter at a more or less random point and start associating keywords from there. To continue with the previous example of the typewriter "Valentine", the user would select the term "typewriter, transportable" from the list of offered terms, thereby having the system automatically associate all generalizations and attributes such as "keyboard", as well as the synonym "traveler's typewriter". Thus, through these terms the typewriter "Valentine" could be located within dda. Since other typewriters or communication devices are indexed through the same scheme, search results can be tuned according to how specific the search terms are. This way, the level of objectivity remains high.

4. Impact of a Digital, Polyhierarchical, Thesaurus

With traditional, non-computer-aided, thesauri indexing is done following the template: "noun, adjective" (DIN standard), for example, "typewriter, electrical". The computer-based form introduces a significant change. Words which grammatically are adjectives can stand as single entries ("electrical", "mechanical"). In fact, they are -- analogous to the grammatical nouns -- used as attributes for the object. Intuitively a chair is captured as an object which has chair-property, a folding chair is an object with chair- and folding-property. Abstracting away from the -- somewhat random -- grammatical form of nouns versus adjectives imposed by the natural language enables various automatic processing technologies from information theory. Through the associations within the system the contents' interconnections are preserved. Additionally, this computer-aided

methodology offers diverse visualizations of interrelations with the potential of opening up novel research approaches. After sufficiently defining the notions, lists are comparatively easy to fill. Visualizations of the semantic network then are generated automatically. In addition, this methodology serves as foundation form new visualizations in interface-design.

5. Future Work

5.1 Development of dda into a permanent institution

Extension and improvement of the archived material are the short term goals in dda. Therefore, dda is looking for cooperation-partners who can provide material and participate in building the database. In return, dda offers various service-packs for prospective partners. For future development, dda seeks cooperation with universities, institutes, museums, and collections.

5.2. Long term goals for establishing the thesaurus

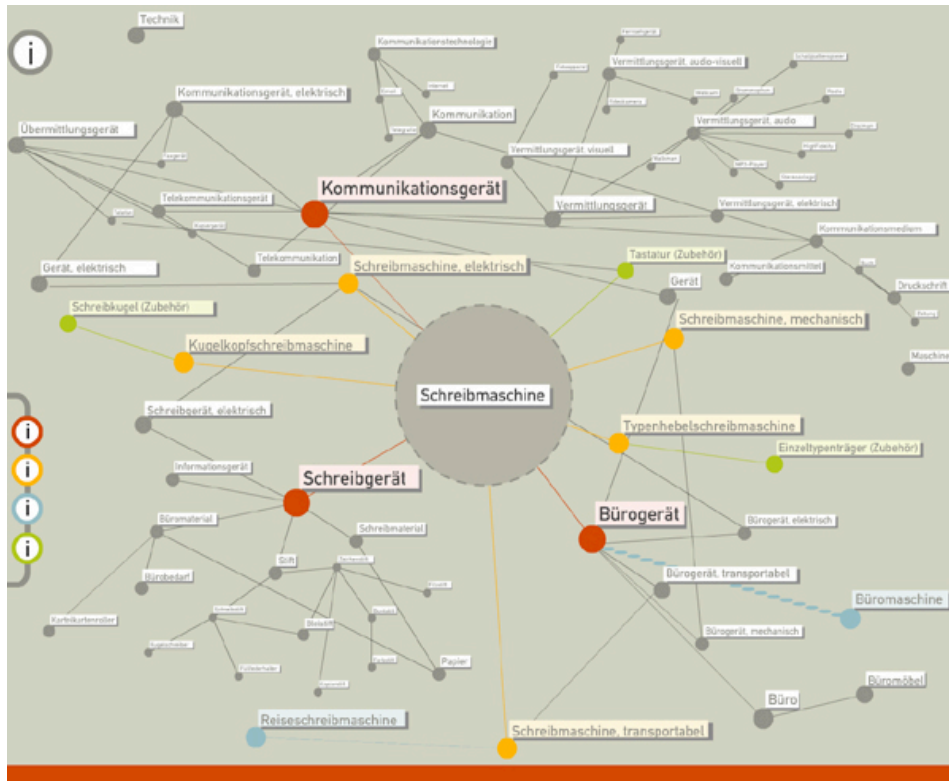
On one hand, the user-friendliness of the thesaurus for collecting organizations and archives focussing on design is a main goal. On the other hand, meta-data generated from visualizing interrelations will form the basis for discussion and novel approaches in design-history and design-theory. Additionally, the complexity and size of the data suggest to open various aspects to expert discourse for clarification. These discourses should focus on standardization of the technical terms to provide EU-wide basis for research. Last but not least, transfer into multiple languages is a major goal.

References

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- http://www.getty.edu/research/conducting_research/vocabularies/aat/ (february 2006)

Illustrations

A. Search-interface of the dda- (Expert-mode)



B. Visualization of Polyhierarchy (Schreibmaschine (typewriter))

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