Environment-behavior Studies and Design Research.

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1. DESCRIPTION OF THE RESEARCH GROUP

Environment-behavior studies has been one of the main topics in research and teaching at the Department of Philosophy and Social Sciences, TUE, from about 1980. We are mainly interested in the interaction between users and their built or natural environment. Interest in design processes comes therefore through the fact that most environments are designed by architects or environmental planners. More specifically we have always been interested in communicating with designers about the results of environment-behavior research. Hamel has started the first substantial research project on this subject, which eventually has led to his dissertation in 1990 about a cognitive psychological description of the architectural design process (Hamel, 1990). Using protocol analysis of design activities of a number of practicing architects, Hamel was able to test empirically his model of the architectural design process.

From then on essentially two lines of research were followed:

On the one hand the use of Alexander's patterns as a form of communicating research results to architects in a number of practical studies by staff members and/or MA-students, such as on nursing homes (van Wagenberg, Dellaert, Waalwijk, 1989), the role of doorsteps in housing (van Andel, Bruls, Jaartsveld, 1990), environments for users with cognitive disfunctions (van Vree, van Andel, Venselaar, 1992), houses for the elderly (Christmas, 1994), environments for visually impaired elderly (de Kort, 1993), and offices (van Dorst, 1992). Most of these studies were done in cooperation with colleagues from Bax's Design Methods Group at the Department of Architecture, TUE, especially with Boekholt and Dinjens, who maintains a growing database of Alexander-type patterns on a variety of issues and environments. At present this database contains about 1900 different patterns from about 50 different sources.

On the other hand we have focused on the role of both visual and graphical information, and on the role of computer support in transferring information from research to designers, culminating in the use of hypermedia systems. A major study on this subject is the recently completed PhD work of de Vries (1994) on the cognitive aspects of designing as problem solving and the role of external information with different structures. The goal of the designer in using the information system happened to be important, especially distinguishing browsing (for new information) and searching (for specific answers). The structure of the information was studied as well, comparing hierarchical, network, and mixed structures. (See also: de Vries, 1993; de Vries, van Andel, de Jong, 1992[a] and 1992[b];

and de Vries, de Jong & van Andel, in preparation). Related to this subject two MA-theses were finished, one of which was about hypertext-based information on the environmental impact of different materials and procedures in the design of consumer products (Bor, 1992). The other MA-project studied the role of image-based information, using mainly pictures with minimal textual information, in communicating with architectural designers of children's playgrounds (Burger, 1993; Burger & van Andel, in preparation).

In the meantime, collaboration with the Department of Industrial Design, TU Delft resulted in a study of the role of user-centered design information in relation to design projects at the department. Here again the role of visually presented information was studied together with the phenomenon of "design-fixation" (Christiaans & van Andel, 1993). Recently, the results of a study in cooperation with the Department of Architecture, UC Berkeley have been published (van Andel, 1994). In this study the effects of three types of presentation of a behavior mapping study were compared. Students completed the task of redesigning a school playground with the use of research data either in graphical, or in a table, or in a combined form. Finally, the combination and interaction of researching and designing were studied introspectively by a MA student. His analysis shows clearly both the differences and the mutual reinforcement of these two activities (Boer, 1994; Boer & van Andel, in preparation).

2. OBJECTIVES AND INTERESTS

To summarize the main objective of our group in design research:
To study the use of a specific type of information (user related knowledge) and the role of the form of presentation (through patterns; using graphical information and visual images; computer supported through hypermedia) in a specific design context (environmental, architectural, and product design).

3. ACTIVITIES

Some of our current and planned activities are:
-        Staff- and MA-students' research on environment-behavior concepts that are relevant and useful for architectural designers such as affordances and patterns.
-        Joint research project with Dept. of Product Design, TUDelft on the function of adaptable knowledge bases for designers.
-        Possible joint research project with Design Methods Group, Dept. of Architecture, TUE, on the actual use by designers, and the effects of pattern language on the design process and the design product.
-        Possible evaluation study in cooperation with Calibre, TUE, on the effects of various computer-based presentation techniques in design practice such as virtual reality; hypermedia, and the WorldWideWeb.

4. PUBLICATIONS

Andel, J. van (1994) Behaviour mapping and urban design: Graphic versus non-graphic information about environment-behaviour relations, in: S.J. Neary, M.S. Symes, F.E. Brown (eds.). *The urban experience. A people-environment perspective. Proceedings IAPS 13.* E & FN Spon, London.

Andel, J. van (1988) Expert systems in environmental psychology, in H. van Hoogdalem, N.L. Prak, T.J.M. v.d. Voordt, H.B.R. v. Wegen (eds.). *Looking back to the future. Proceedings IAPS 10.* Delft University Press, Delft.

Andel, J. van; Bruls, P.W.M.; Jaartsveld, R.F.M. (1990) *Functie en constructie van drempels in de woning. (Function and construction of doorsteps in houses).* Stichting Consument en Veiligheid, Amsterdam.

Andel, J. van & Burger, J. (in preparation) The tranfer of information to designers using an image bank. *Design Studies.*

Boer, F. (1994) *Speelplaats voor onbevangenen. Een onderzoek naar exploratiemogelijkheden in de Dommelzone in het centrum van Eindhoven. (Playground for open-minded people. A study on possibilities for exploration).* MA Thesis. TUE/TEMA, Eindhoven.

Boer, F.; van Andel, J.van (in preparation) Thinking in an integrated design and research process: A non-linear approach. *Design Studies.*

Bor, A. (1992) *Recyclingwijzer voor produktontwerpers. De ontwikkeling van een informatiesysteem voor recyclinggericht produktontwerpen. (The development of an information-system for recycling in product design)*. MA Thesis. TUE/TEMA, Eindhoven.

Burger, J. (1993) *Computer ondersteunde inspiratie. Overdracht van informatie aan ontwerpers door middel van realistische beelden. (Information transfer to designers by realistic images)*. MA Thesis.TUE/TEMA: Eindhoven.

Christiaans, H. & Andel, J. van (1993) The effects of examples on the use of knowledge in a student design activity: the case of the Flying Dutchman, *Design Studies*, **14**, 58-74

Christmas, D.A.E. (1994) *Methodisch programmeren van eisen voor ouderenhuisvesting. (Programming housing for elderly people)*. MA Thesis. TUE/TEMA: Eindhoven.

Dorst, M. van (1992) *Op weg naar de optimale kantoorwerkplek. (Patterns for optimal offices.)* MA Thesis. TUE/TEMA, Eindhoven.

Hamel, R. (1990) *Over het denken van de architect (On designing by architects)*. PhD Dissertation UvA, AHA Books, Amsterdam.

Kort, Y. de (1993) *Onderzoek naar en patronen voor bejaardenoorden voor visueel gehandicapten. (Patterns for nursing homes for visually impaired elderly)*. MA Thesis. TUE/TEMA, Eindhoven.

Vree, F. van; Andel, J. van; Venselaar, K. (1992) De gebouwde omgeving voor mensen met cognitieve functiestoornissen. (Built environments for people with cognitvie function disorders). *Tijdschrift voor Ergonomie, **17***, 9-13.

Vries, E. de (1994) *Structuring information for design problem solving.* PhD Dissertation, TUE Eindhoven.

Vries, E. de; Andel, J. van; Jong, T. de (1992[a]) *Computer-aided transfer of information on environment and behavior: Network versus hierarchical structures.* Paper EDRA 23 Conference, March 1992, Boulder.

Vries, E. de; Andel, J. van; Jong, T. de (1992[b]) *Effects of different structures of knowledge on computer-aided transfer of information on environment and behavior.* Paper DDSS-conference, July 1992, Mierlo.

Vries, E. de (1993) The role of case based reasoning in architectural design: Stretching the design problem space, in: W. Visser (ed.) *Proceedings of the Workshop on Re-use of Designs of the 13th International Joint Conference on Artificial Intelligence,* Chambéry: France, pp. 28-40.

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Wagenberg, A.F. van; Dellaert, B.G.C.; Waalwijk, W.R.G. (1989). *Het gebruik van omgevingstechnologische patronen bij het ontwikkelen van programma's van eisen voor verpleegafdelingen van verpleeghuizen (Patterns for programming nursing homes),* TUE/NZI, Eindhoven/Utrecht.