COGNITIVE AND AFFECTIVE DISORDERS IN THE ELDERLY

Editors:

DOMENICO CUCINOTTA
GIOVANNI RAVAGLIA
IMRE ZS.-NAGY

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DESIGNING FOR OLDER PEOPLE WITH COGNITIVE AND AFFECTIVE DISORDERS

P. VALLA and T. HARRINGTON[a]

Architecture Studio, Via Termopili 25, I-20127 Milano, Italy; [a]Institute for Gerontechnology, Centre for Biomedical and Healthcare Technology, Technical University of Eindhoven, Box 513, 5600MB Eindhoven, The Netherlands

SUMMARY

Knowledge of the design criteria for specific physical environments for elderly people with dementia, together with medical and pharmacological research studies is a very important scientific target with therapeutical implications for cognitive and affective disorders. Safety, comfort and utility are major concerns for the elderly, especially those who have developed perceptual or other mental deficits. Yet designing environments that are safe and respectful of them is a very complicated task. Here we approach that task simultaneously from two distinctly separate vantage points. The first is from the laboratory, involving the psychophysics of human performance, namely, the parameters of the senses, vision, touch and of cognitive and motor performance which can be used to predict accidents in specific settings. The second one is the accident reconstruction: after accidents occur, they are analyzed to find out which aspects of the person interacted with which aspects of the environment to cause the trip or fall or crash. Data from both of these sources can be used to elevate the standards of safety. Research on visual perception, motor activity, orientation and other relevant human functions often cannot be generalized to the field from the psychophysical laboratory. It is often necessary to perform the relevant experimentation in the field where the research setting is more representative of the lives of the patients and the dangers to them. It is necessary to develop standardized research settings such as the Alzheimer's garden. Such settings should, first, be mathematically modeled along the dimensions of interest in concert with the collection of data which can be used to test, validate and extend the model and thus the utility of the setting. Separate sub-models can eventually be combined into larger models.

Keywords: architectural design, Alzheimer's disease, therapeutical environment, care facilities, Alzheimer garden, wandering, visual perception, simulation

INTRODUCTION

In Italy, as in other Western countries, dementia is one of the main causes of admission to sheltered houses and nursing homes. The present situation in Italy is that the 80 % of Alzheimer patients lives at home assisted by relatives. Geriatric care staff and patients' families all agree that the institutional physical setting is inadequate: often behavioral problems are stirred up by stressed interaction between the patient and the physical environment. Designers thus need refined guidelines for designing suitable care facilities for elderly people with dementia. The typical behaviors more influenced by negative environments are: wandering, falling, escaping, temporal and spatial disorientation.

There is a close relationship between architecture and the perception of one's surroundings: for the Alzheimer patients this relationship gradually

changes. Vision can be assessed by simulation (Harrington and Quon, 1989; Harrington, 1997) The physical environment can be restructured to make up for sensorial and perceptual deficits by analyzing these deficits scientifically.

THE ALZHEIMER PLAN OF REGION LOMBARDY

The so-called "Alzheimer Plan" of the Region Lombardy for the years 1994-96 about extra-hospital residential care units for only 15-20 residents amid the nursing homes ("Nuclei Alzheimer") represented the first local public proposal of long term residential facilities for demented elders, similar to the Special Care Units in the USA, Canada and Europe. The Alzheimer Plan gives many useful suggestions on how to design a specific care unit with green outdoor spaces integrated.

An important therapeutical contribution which improves the quality of life of patients and relatives, and eases also the tasks of the medical staff, comes from the creation of green areas integrated with the care facilities and planned to allow the Alzheimer patients to move around without any danger of getting lost. This helps to satisfy his/her need to wander.

The Social Services Sector of the District of Milan accepted the challenge to create the "Garden of Eden", i.e., a garden for people with dementia. It was initiated by the Italian geriatrician Francesco Antonini as a place allowing freedom with control. Therefore, the Department of Planning of Architecture was asked to create a theoretical model: the "Alzheimer Garden" (AG) (Mori and Valla, 1995).

The wandering is controlled too often with sedative medicines which may accelerate the process of functional decline, meanwhile the movement should be a therapeutical activity stimulated by the environment and by the therapeutical programs.

A specific environment, conceived for the patients' needs may positively affect the behavior and slow down the functional and cognitive declines. Research on indoor and outdoor spaces, materials, colors, furnishings, technical systems, etc., must be exhaustive, in order to set up physical aids an support daily living activities and therapeutical programs (Bonati and Valla, 1997). The environment should offer different levels of sensory stimulation, improve attention, memory and orientation of the patients, reassuring them by increasing autonomy and dignity. The design of a suitable physical environment is a therapeutical goal, too, since it may have implications for cognitive disorders and functional abilities, and may have positive influences on the affective disorders as well. As a matter of fact, many studies describe the effects of sensory factors on patients with Alzheimer disease and their interaction with the psychological well-being of these patients.

GUIDELINES FOR DESIGNING

Through analysis of the literature on environmental design for people with dementia (Cohen and Weisman, 1991; Coon, 1991; Munson, 1991; Cohen and Day, 1993), some guidelines have been recommended for the construction of the care units. They should be small in size (6 - 15 patients), should avoid "hard architecture" and institutional corridors, they should eliminate environmental barriers, provide familiar places with a prosthetic environment; they should offer sensory stimulations without stress, maximize orientation in space and time, have simple plans of organization, a wandering area/path, individual spaces (alcoves), specific outdoor spaces, landmarks, private spaces, special lighting (day and night), specific use of colors, and special furnishings (Valla, 1997).

In the future, 2 possible extensions would be of value to tame the foregoing morass of complicated dangers to the older people who have decreased mental facility. One of them can be realized through situational research in standardized settings such as the AG. Standard psychophysical methods from the laboratory can be reformulated to work in such a setting. The data will be appropriate both for direct application to architectural design and as input to sophisticated mathematical models. In the development process of design it is necessary to reach the operating stage (creation and prototyping of facilities) followed by a multidimensional evaluation to improve the model and reiterate the experimentation. Some designing standards can be universal, but every country has to find its own model of care facilities.

MATHEMATICAL MODELS

The second approach of extension is the application of mathematical models. Computers have completely changed the meaning of "mathematical model", from formulae in dusty books that no one could understand, to vibrantly friendly computerized interfaces that can depict the scene of interest, e.g., the AG, analyze it in any way that the designer choses, tell us anything that we may want to know about it and its inhabitants, ranging from the safety of a specific person, to esthetic appeal to someone else. Based on experimental data, the actualized model can perform whatever actions on the real scene we want it to: dim the lights, change the music, resize and reshape the bench nicely to fit the specific person who is coming, blink the guiding arrow if someone "looks" confused (computers are beginning to perform more subtle things), warn the people who appear to need it, and so forth.

The ultimate model need not even be attempted initially. It is possible simply to develop small submodels based on experimental data, such as can come from the AG. These can then be combined to handle the full spectrum of accident causation, comfort and well-being later.

Developing models along a continuum of increasingly complex types of model is an enticing possibility. Simple didactic teaching models can be developed first. They do not need to be very accurate, and they require no underlying mathematics. They are only to demonstrate the principles of designing environments for the elderly. These can form the eventual bases of more complex models, but also can simply be used for communication between scientists in gerontechnology and architects, scientists, engineers and mathematicians who want to collaborate or they can be used for communicating with students, or with the patients' relatives, or with demented people themselves about the hazards in their worlds. From these simple beginnings, more elaborated didactic models can be made. They may incorporate movement to show complex interactions of the factors in given situations that contribute to the causation of accidents, disorientation or discomfort. These may begin to require a few equations. But they only need to be partly correct, they have to look right but they do not need to be right at this stage. Gradually, models that are entirely correct can be evolved to offer the full power of computerized mathematics to perform "what-if" and Monte Carlo simulations to gather data and test experimental hypotheses, to monitor, predict and control.

These efforts can be most effectively staged and carried out in a standardized in-the-field research setting such as the AG. And so we can expect the AG to evolve recursively based on the data which are generated by itself.

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