

J.J. VAN DER PLAATS (Convener). **Old Alice in Wonderland: Environment steering behaviour.** *Gerontechnology* 2012;11(2):276; doi:10.4017/gt.2012.11.02.043.00 **Participants:** J.J. VAN DER PLAATS (Belgium), S. DE KONING (Netherlands), and E.J.A. SCHERDER (Netherlands). . **ISSUE** Persons with dementia feel unsafe and threatened by an unrecognizable world. Enriching the environment of dementia sufferers can change this so that their behaviour becomes more relaxed and normalized. **CONTENT** New knowledge from neuroscience indicates that in the process of dementia, subjects' ability to understand and plan their life with their own cognitive ability¹ diminishes. In the end only the emotional brain remains. In addition, persons with dementia lose their individuality. Their behaviour becomes generic, and increasingly determined by the environment². As their behaviour becomes more predictable it opens up the possibility to manipulate the environment in such a way that it leads to improved perception by persons with dementia. By using the neurological systematics, the environment can be analyzed per situation. It can be either favourable or unfavourable to the damaged brain. In unfavourable situations, advice is given for improvements. The method by which this is done is called the BEM (Brain Environment Methodology)³. Taking into account the abilities of the emotional brain, as well as the layout, decoration, sounds, and lighting, can make for a safer and more comprehensible environment. In other words, this environment will include both the way of caring, and the design, furnishing, and finishing of indoor and outdoor surroundings⁴. An enriched environment provides peace and brings unity of purpose in behaviour⁵. This is a variant of the person-environment fit described by Powell Lawton⁶. In brain-damaged persons the BEM results in a better fit that helps bring about more suitable behaviour. **STRUCTURE** Van der Plaats will focus on the behavioral consequences of changes in the brain of dementia sufferers as they become increasingly dependent on environmental stimuli. De Koning will first describe changes in the physical environment so as to better suit persons at different stages of dementia, and then show the effects of a more structured way of caring and relieving the sense of boredom common in places where dementia sufferers live. Scherder focuses on physical activities, such as walking, cycling, and relaxing in combination with virtual reality. All contributors use as their starting point the notion that quality of life can be greatly enhanced by using insights from the neurosciences. **CONCLUSION** Behaviour of persons with dementia can be steered by rearranging physical and psychological elements in their environment, creating a real wonderland for the affected person.

References

1. Plaats JJ van der. Luria and Fozard as founders for creating suitable environments for people with dementia. *Gerontechnology* 2010; 9(3):380-387; doi:10.4017/gt.2010.09.03.008.00
2. Cools AR. Manifestations of switching disorders in animals and men with dopamine deficit. In: Wolters EC, Scheltens P. Mental dysfunctions in Parkinson's disease. Amsterdam: Free University; 1993; pp 49-67
3. Plaats A van der, Verbraeck B. De wondere wereld van dementia [The miraculous world of dementia]. Maarssen: Elsevier Gezondheidszorg; 2008
4. Colombo M. Envisions and pitfalls in suitable environments for people with dementia. *Gerontechnology* 2011; 10(2):121-122; doi:10.4017/gt.2011.10.2.006.00
5. Powers WT. Behaviour, the control of perception. London: Aldine de Gruyter; 1973; pp 75-90
6. Lawton MP, Nahemow L. Ecology and the aging process. In: Eisdorfer C, Lawton MP, editors. The psychology of adult development and aging. Washington: American Psychological Association; 1973; pp 619-674

Keywords: dementia, neuroscience, person-environment fit, behaviour, virtual reality

Affiliation: Dementiewinkel, Wolfheze, Netherlands; E: aplaats@breincollectief.nl

J.J. VAN DER PLAATS. **Dementia: A progressive disease making the brain progressively dependent on environmental stimuli.** *Gerontechnology* 2012;11(2):276-277; doi:10.4017/gt.2012.11.02.131.00

Purpose The goal of this presentation is threefold. First, basic aspects of the cerebral organization of behaviour will be briefly presented: in principle the brain can be described as a non-linear hierarchy of negative feedback systems (*Figure 1*), allowing the individual to use stimuli received from (i) the brain, (ii) internal organs, (iii) muscles and glands, and (iv) the environment to direct its behaviour. Second, translational studies that illustrate the behavioural consequences of activating the involved brain regions will be presented. Finally, attention will be focused on

changes that occur in the brain of subjects with dementia: the subjects become decreasingly dependent on higher order mechanisms that allows them to organize their behaviour at their own volition, and they become increasingly dependent on external stimuli, whereby ultimately only dynamic instead of static stimuli can be used. **Method** The presentation is based on a review of studies published and/or presented in internationally highly qualified scientific studies/meetings¹⁻³. **Results & Discussion** Subjects with dementia slowly loose their capacity to organize their behaviour at their own volition and become increasingly dependent on dynamic, environmental stimuli.

References

1. Cools AR. Brain and Behaviour: hierarchy of feedback systems and control of input. In: Klopfer PH, Bateson P, editors. Perspectives in Ethology. New York: Plenum Press USA; 1985; pp 109-168
2. Cools AR, Berger HJC, Buytenhuijs EL, Horstink MWIM, Spaendonck KPM van. Manifestations of switching disorders in animals and man with dopamine deficits in A10 and/or A9 circuitries. In: Wolters, EC et al, editors. Mental dysfunction in Parkinsons’ disease. Amsterdam: Vrije Universiteit Amsterdam; 1993; pp 49-67
3. Cools AR. Moving and being moved. Lecture Radboud University 14 January: PAOG course: Back to normal, Nijmegen, Netherlands; 2011

Keywords: dementia, brain, stimulus-dependency

Address: Dementiewinkel, Culemborg, Netherlands; **E:** aplaats@breincollectief.nl

Full paper: No

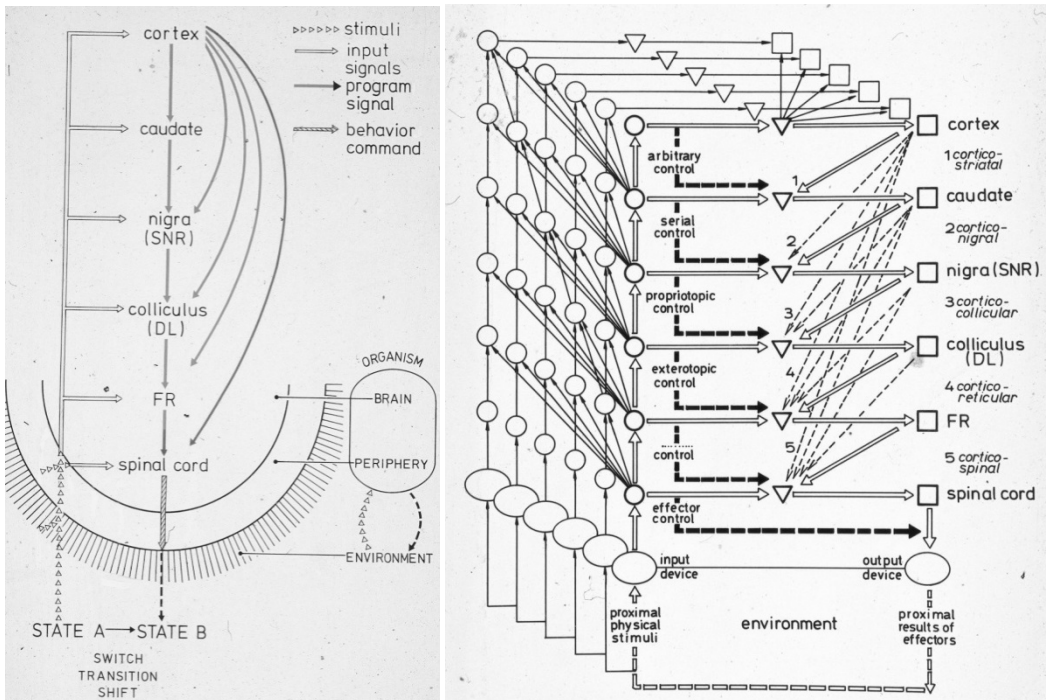


Figure 1. Greatly simplified two-dimensional (left) and three-dimensional (right) model of the brains as a nonlinear hierarchy of negative feedback systems.

S.J.M.M. DE KONING. **A well designed home for 'Old Alice'; The physical environment as storyteller for persons with dementia.** *Gerontechnology* 2012;11(2):277-278; doi:10.4017/gt. 2012.11.02.147.00

Purpose The purpose of this presentation is to explain the neurological principles on which the physical environment (building and interior design) for persons with dementia is based. In order to evoke deliberate behaviour, we need to design buildings that tell an obvious story and clarify the functions of each space. First, we have to prevent or eliminate too many ambiguous incentives that cannot be processed by the damaged brain. Every detail in the environment is related to the limited capacity to 'understand' and interpret these incentives. Everything needs its own

shape, colour, positioning, light, function, sound, and choice of materials. A home with attractive and recognisable incentives will facilitate persons with dementia to move through the building and use their daily living space automatically, without thinking. Neuroscience has given us new insights into the way information is processed in the upper (cognitive) and lower (emotional) part of the brain. The environment needs to be appealing to the lower (emotional) part of the brain to evoke a certain type of behaviour. Then perception is manipulated so the environment be-

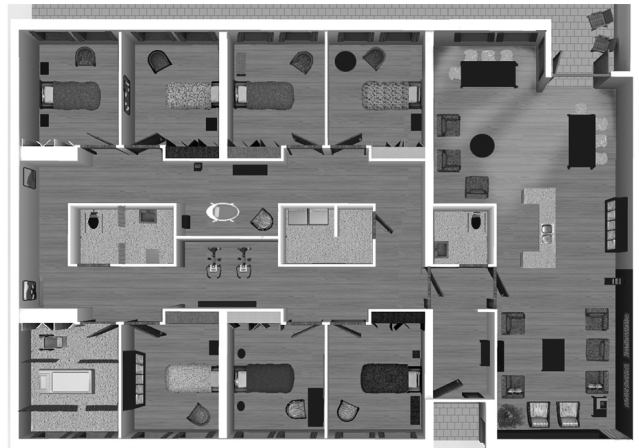


Figure 2. An example of a small group home in which principles of neuroscience have been integrated.

comes understandable to the lower part of the brain. An effective design deals with way-finding, recognition, what to do, how to do it, and how to respond to environmental incentives. Therefore, we need to integrate knowledge from neuroscience into the art of design¹. In the process of cognitive deterioration, persons with dementia become increasingly dependent on environmental stimuli. They cannot survive in a context without dynamic stimuli, such as movement and sound. By designing an enriched environment², persons with dementia will intuitively understand their surroundings. 'Old Alice' will know where she is and how to behave accordingly. **Method** In a short documentary of a small-scale living environment (Figure 2) we explain the 'evidence-based' (interior) design, based on neurological principles. These principles lead directly to choices such as positioning of active, and relaxing, areas, how to control sound and movement incentives and designing beautiful - experience - areas in the corridors. This enables persons with dementia to behave on a 'higher' level. By staging clear-cut scenes in every room the residents are given sensory information about the functions of the living area. Positive or negative stimuli in the environment will immediately lead to a sense of wellbeing or anxiety³. The building and its interior are manipulative storytellers in the sense that it conducts the behaviour of its residents. **Results & Discussion** Only when principles of neuroscience are incorporated at all levels of architecture and interior design can behaviour improve.

References

1. Elizabeth CB. Designing for Alzheimer's Disease. Hoboken: John Wiley; 1997
2. Plaats JJ van der. Luria en Fozard as founders for creating suitable environments for people with dementia. *Gerontechnology* 2010;9(3):380-387
3. Colombo M. Environs and pitfalls in suitable environments for people with dementia. *Gerontechnology* 2011;10(2):121-122

Keywords: architecture, interior design, dementia, brain, neuroscience, environment

Affiliation: De Koning Creaties, Arnhem, Netherlands; E: sylvia@dekoningsolcon.nl

Full paper: No

S.J.M.M. DE KONING. **The right stimuli, on the right time, on the right spot can make old Alice feel happy.** *Gerontechnology* 2012;11(2):278-279; doi:10.4017/gt.2012.11.02.149.00 **Purpose** This research aims to regulate the behaviour of people with dementia by controlling and manipulating the environment¹. The environment consists of three elements: building and furnishing, the way of caring or working and the activities, and the attitude of caregivers in institutional settings. In this lecture we focus on the second element. How do the people with dementia spend their time? And what kind of behaviour emerges in what kind of situation? Neuroscience tells us that the main way of steering the behaviour of people with brain-damage is to manipulate the context. **Method** In 24 facilities we observed and monitored the behaviour of caregivers as well as

the behaviour of the people with dementia. We developed a methodological way of describing every situation during the course of the day in terms of too many, too few, or sufficient stimuli. Too many stimuli cause chaos in the damaged brain, creating helplessness, fear, and wandering. We describe every situation in terms of too many, too few, or sufficient stimuli for the damaged brain. In case of too many stimuli we regulate the stimuli by designing a way of working according to the neurological principle. Only in the field of attention of the person with dementia should dynamic stimuli remain². On the other hand, in situations where there are no dynamic stimuli, persons with dementia tend to start obsessive movements like wandering, fiddling, scratching, screaming or tapping³. The ideal situation is a constant flow of dynamic stimuli from one source at a time (Table 1). **Results & Discussion**

We will show video fragments that are taken before and after we manipulated the environment.

References

1. Powers WT. Behaviour, the control of perception. London: Aldine de Gruyter; 1973; pp 75-90
2. Plaats JJ van der. Luria and Fozard as founders for creating suitable environments for people with dementia. Gerontechnology 2010; 9(3):380-387; doi:10.4017/gt.2010.09.03.008.00
3. Cools AR. Manifestations of switching disorders in animals and men with dopamine deficit. In: Wolters EC, Scheltens P. Mental dysfunctions in Parkinson's disease. Amsterdam: Free University;1993; pp 49-67

Keywords: dementia, problematic behaviour, non medical interventions, day-program

Affiliation: De Koning Creaties, Arnhem, Netherlands; *E:* sylvia@dekoningsolcon.nl

Full paper: No

Table 1. Observations, their explanation and advice for improvement under nursing home conditions for persons with dementia

Observation	Explanation	Advice
Some patients are longing to move or walk. Caregivers keep them in their seats by giving coffee and sweets. Caregivers want people with dementia to be quiet.	By moving and walking people with dementia become more alert and calm. Moreover when they have to sit all day, their ability to walk diminishes fast. So they will end in a wheelchair, which has many disadvantages like incontinence, no more independent eating and obsessive sleeping.	The corridors are unattractive. This implies that people with dementia are going to walk all the time and very fast. There is danger of falling. We have to create beautiful experience spots where they can walk to and take a rest.
Caregivers are coming in and out, talking and calling hello and good bye! They are using the two entrance doors, which is quite confusing for the people with dementia. Moreover the talking and waving provokes restlessness and the wish to go home. It is an unfavourable situation for the people with dementia.	People with dementia cannot look forward. So the sudden entrance of different caregivers can frighten and confuse them. Stimuli from behind give an ominous rumble in their heads. Some residents are sitting with their back to the door. Moreover the saying and waving goodbye, triggers them to want to go out themselves. And what are the caregivers doing by walking in and out? Are they working or just wandering?	All residents have to be able to see the entrance door. The grey one should be locked. And some chairs have to be replaced in a way that the person with dementia can see the other door. Caregivers should not come in and out aimlessly. If there is no work to be done immediately, please come in and take one of the game-boxes to play with the residents. And take care that when entering the room, you are quiet, stand still on the doorstep, look around and nod in acknowledgment to the residents who are looking. Wear soft shoes.

E.J.A. SCHERDER, J.J. VAN DER PLAATS. **Seducing old Alice to walk and bike.** Gerontechnology 2012;11(2):279-280; doi:10.4017/gt.2012.11.02.146.00 **Purpose**

The purpose of this paper is twofold. (i) To present a scientific investigation showing that muscle movements and exercises make people with dementia more alert and less helpless. Moreover they show more effective and appropriate behaviour¹. The conclusion of this investigation is that it would be beneficial to people with dementia if they moved more. (ii) To design and use a tool that is appealing to the damaged brain and results in more physical exercise. People with dementia cannot execute verbal commands; in fact they often perceive these commands as threatening. The tool must be attractive so

that they will use it spontaneously. Using the information from the neurosciences it is possible to formulate a suitable design². **Method** The investigation was done in nursing homes where similar groups of patients with dementia were compared, exercising or not exercising. Significant differences were observed in the state of mind of the two groups. Patients that exercised became more alert and their mood improved. These results triggered gerontechnologists to design a tool to stimulate exercising for persons with dementia. The design has to meet neurological principles that are mentioned in previous papers^{1,2}. The environment of the tool should contain familiar and attractive dynamic stimuli. The tool itself should have an old fashioned feel, such as, for example, bicycles. A person with dementia should be able to use the tool without the help of a professional physiotherapist. The tool should be compact. With this in mind we designed a virtual environment showing a cycle-tour in the country side. A huge half circle screen depicts a child cycling on a small road between meadows and woods. The child is meant to stimulate the movements that can be imitated by the demented person. In this is very attractive to persons with dementia and will stimulate them to use a home-trainer and start cycling. A family member can do the same on a second home trainer. We can thus use virtual reality to stimulate movements. **Results & Discussion** The results of Scherder's study are presented, as well as the designed technology that can stimulate cycling for people with dementia. We still have to do an investigation about the precise effects on the working of their brain. We can show a prototype of the design.

References

1. Scherder E. Exercise-exercise? Proceedings Symposia Brain Awareness Week 2010. Congres Vrije Universiteit Amsterdam, 24-03-2010
2. Plaats JJ van der. Luria en Fozard as founders for creating suitable environments for people with dementia. *Gerontechnology* 2010;9(3):380-387; doi:10.4017/gt.2010.09.03.008.00

Keywords: dementia, exercising, cycling

Affiliation: Vrije Universiteit, Amsterdam, Netherlands; E: eja.scherder@vu.nl

Full paper: No