

2003-PRM- 05
IDM Projet Multi-Disciplinaire

**Rapport final sur le développement des produits d'éclairage
pour améliorer le bien-être d'une population vieillissante et
des personnes atteintes de la maladie d'Alzheimer**

Final report on the development of lighting products for the aged, and
in particular for people with Alzheimer's and dementia

Soumis par / Submitted by

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Le 31 mars, 2005

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Magda Wesolkowska
Hans Samuelson
André Mallette

INTRODUCTION

This report summarizes the work done on the Research Project for the development of products for Alzheimer's patient's institutions. This research project is a multi-disciplinary project that evolved from an Opportunity Study with the collaboration of the Institute of Design of Montreal and the University of Montreal. This is the second part of the research project, which began with the Opportunity Study on the potential for lighting products for people with dementia and Alzheimer's, as funded by the Institute of Design of Montreal.

This project begins with the recommendations of the Opportunity study round table discussion in January of 2004, which was a round table of experts who recommended further study on the possible product development possible for Alzheimer's' patients' environments, if based on an evaluation of needs within actual physical settings. During that meeting, the proposal was put forth to look at the lighting conditions of an institutional space such as the Moe Levin Centre at the Douglas Hospital, to see how the patients were reacting to fluorescent and natural light under different conditions. The goal was to find out what effects light and the colour of light would have on the patients' well being. The idea was to study these effects in Phase I of the project, and then in Phase II to develop prototype examples of potential lighting design solutions. During Phase I, once observations could be made and conclusions could be drawn as to the real effects of light on the patients, the idea was to change the light conditions and observe them would help to clarify the lighting needs. Phase II would consist of bringing together industry partners to a round table to evolve specific lighting product ideas.

Research and Development preparation for the prototype development

IN the spring of 2004, research activities included researching the newest developments on these potential ideas about lighting and Alzheimer's, the references of which are at the end of this report, and in preparation for the research to be done on site. In June of 2004, the research team was created to conduct the first Phase of the lighting study, and met at the University of Montreal for two reasons. First, the team created a strategy for the phasing of the project. This would consist of the following:

Phase I: Lighting Research Phase

June – September, 2004: Preparation of Lighting Research Scientific Proposal for the Douglas Hospital Ethics Approval Committee

October – December, 2004: Observation of Existing Conditions by Douglas Hospital and M. Wesolkowska, University of Montreal

Phase II January, 2005:

Round Table and Lighting Product Development

In June, concurrent with the planning meeting, Magda organised an interactive conference with the Rensselaer Institute in Troy, New York. This on-line conference explored Lighting and Health, and featured the newest developments in this area. This will prove invaluable both for the observation studies to be done as well as the development of the presentation of ideas to the industry partners in the round table brainstorm session scheduled in Phase II.

The Research Proposal was created over the summer months and submitted in September of 2004. On September 23, 2004, Dr. Brack was informed that the proposal would have to be modified for approval in early November. Further revisions were requested three times by the Ethics Board of the Douglas Hospital, and the request to conduct research was given approval in late March of 2005. Unfortunately this was too late for the deadline imposed by the financial commitments of the IDM. The research team decided to revamp the choice of venue and began researching an alternative site for the study, still maintaining the intent of the research to study and evaluate existing conditions in the public spaces of an institution for people with Alzheimer's. In January of 2005 an alternative site allowed access to the researchers, who conducted a study of the existing conditions.

The choice was made to consider the alternative site the CHSLD in Saint Laurent, a similar controlled environment for the patients with dementia and Alzheimer's. With this new site in mind, the research team revised the schedule as follows:

Phase I: Lighting Research Phase

June – September, 2004: Preparation of Lighting Research Scientific Proposal for the Douglas Hospital Ethics Approval Committee

October – March, 2005: Approval Process from the Douglas Hospital
Observation of Existing Conditions by Douglas Hospital and M. Wesolkowska, University of Montreal

Phase II, 2005

January, 2005: Study of Existing Conditions at new site: The CHSLD, Saint-Laurent (two month study)

March 2005: Presentation of Site conditions and Brainstorming Session with Round Table and Lighting Product Development; Development of Prototype Ideas for Submission to IDM

End of March 2005: Submission of Research Report

Once the site conditions were evaluated, Phase II began with the creation of a Design Brainstorming session in early March, consisting of a small group of lighting and controls designers. This team studied the conditions of the second site, and were briefed on the generic issues of lighting, colour and spatial

orientation generic to both the Douglas Hospital site and the second CHSLD site. The group created several proposals, of which two were retained for prototype development. The results of this session are included herein as the Design Proposals for the research project.

The two research and design teams are listed as follows:

Phase I Research team

Principal Researchers:

Dr. Tiiu Poldma, University of Montreal

Dr. Dolly Dastoor, Moe Levin Centre, Douglas Hospital

Dr. Hildegard Brack, Moe Levin Centre, Douglas Hospital

Support team:

Magda Wesolkowska, doctoral student, University of Montreal

Robert Lanteigne, Lighting consultant

Jean-Sébastien Drouin, Eklipse lighting

Phase II Research Team

Principal Researcher:

Dr. Tiiu Poldma, University of Montreal

Design Research Consultants:

Hans Samuelson, Design + Communication

Cedric Sportes, Cedric Sportes Designer

Stéphane Martin, industrial designer

André Mallette, Artmatan

The design proposals are included at the end of this report.

RESEARCH PROJECT CONTEXT: THEORETICAL OVERVIEW

The following theoretical review summarizes the support issues and theoretical studies that constitute the basis for the development of the product ideas found herein.

Part A describes the current research worldwide exploring changing patterns in aging, the nature of Dementia and Alzheimer's' and the need for integration of design elements into the environmental well-being of Alzheimer's' patients in the institutional environment.

Part B considers the design criteria necessary for the positive integration of the colour and light as fundamental design factors contributing to the well-being and improved quality of life within Alzheimer's' patients.

Part A : The Needs of the Elderly and People with Alzheimer's Disease and Dementia—A Summary

Each year in Canada and the United States, the population is aging. Recently in design and architecture, issues include the following as stated recently in Azure:

'In Canada and the U.S., people over the age of 85 now constitute the fastest growing segment of the population. Consequently, the demand for long-term care facilities is increasing – and the people living in them are on average much older and frailer...' (Young, 2000, p.90)

Frailty in old age affects both the way we think about aging and the ways that we design institutions now and into the future. Advanced age and the increased aging population demand not only how we think about pharmacological interventions, but also how we think about institutional spaces as the homes of the people and the caregivers that support them. Light and colour are fundamental elements that are guided by the form and spatial orientation and these factors alone can hinder or help the aged. Until very recently, institutional living has been somewhat cold and hospital-like. Increasingly, as architects and designers are discovering, institutions prefer the homelike environment, as this helps the transition for the aged towards the more difficult life's challenges.

However, regardless of the type of environment, falls are a considerable risk in institutions for the aged. Falls are preventable with good light and appropriate color and material choices within the forms of both new and old institutions. BY considering the interior design of interior spaces as intimate places for the aged and by considering their complex and specific needs in the Alzheimer's' states, we must also consider the human affective aspects of these people and their responses within what they would consider a strange and hostile place.

Alzheimer's' care institutions must consider the hominess needed, the need for controlled stimulation and the provision of variety, all factors that help to stimulate and calm patients and thus help caregivers by alleviating their workload, and ultimately costs to the health care system both locally in Quebec and nationally in Canada.

The world's elderly population is growing rapidly as "baby boomers" are living longer in a world where there are fewer children being born. As the body and mind change with age, anyone entering the "Golden Years" wishes to age gracefully, physically and mentally: surrounded by caring individuals in an environment, home or institution, designed to suit their changing physical, cognitive and sensory needs.

Thus, predictions of an ageing population boom during the next thirty years have led designers and caregivers to become more interested in design issues aimed at better accommodating the changing cognitive, sensory and ambulatory functions of elderly people living at home or in long-term care facilities. One main area of research consists of issues surrounding design criteria used in the design of residential and particularly special care settings for a rapidly growing percentage of the population aged 65 and over afflicted with Alzheimer's disease and other related forms of dementia. People afflicted with this type of disorder need almost constant assistance, yet they also require a sense of autonomy and the need to use their remaining capabilities. As will be shown in this report, emerging research shows that several design criteria such as spaces for programmed activities, spatial cues for orientation and light, could increase positive emotions, improve self-confidence and reduce dependency and disability. This in turn provides the possibility of slowing down the onset of late stages of the illness, which means improved quality of life and dignified and enjoyable aging. Lighting design in particular seems to be a promising research field in what may be termed 'elder-care' design¹.

Design, the elderly and Alzheimer's

In the previous section, we have glimpsed at the relationship between treatment and environmental design in the context of Alzheimer care. In this section, this relationship will be explored further.

In the U.S., the U.K. and Canada, design fields – especially architecture, industrial design, and interior design – have been working closely with government and academic institutions to address design issues aimed at the elderly. This interest is not only due to the fact that this segment of the population

¹ Between March 2002 and January 2003, the Institut de Design de Montréal (IDM) conducted three think tanks on aging and design of general products for the elderly population. The ideas focused on universal or inclusive design, which accounts for the older market within the younger one. The result of these think tanks was an expanded opportunity study. One of its aims was to develop other opportunities, especially for multidisciplinary research, which included designers, private enterprise, manufacturers, psychologists, sociologists and ergonomists, and researchers from local universities, in order to develop some concrete design ideas. The lighting design for the elderly was one areas mentioned worth pursuing (Institut de Design de Montréal, 2002, 2003).

(with a disposable income) will become a large market for new or improved products, services and environments, but also because there is a genuine social concern for the wellbeing of those aging and the quality of life they will lead. Thus, there seem to be two parallel (not mutually exclusive) design trends targeting seniors: 1) to create inclusive or universal products, services and environments², and 2) to create adapted specialized products, services and environments.

On one hand, inclusive design's aim is to change the broader social attitude towards seniors, seeing them as healthy, active and productive people and therefore to account in the design of new products, services or environments for their particular needs, without aiming to design specifically for them. The idea is to create designs, which are inexpensive and easy to use by all age sectors. The emphasis is on the capacity to utilize technological or material advantage to improve or develop a product's functioning. On the other hand, adapted or assistive design seeks to modify or adapt a standard product to better fit it to someone's capabilities (Coleman, 2002). This is motivated by the fact that many seniors will eventually develop some type of long-term disability. This means they will form a very specific group, with specialized needs, in long-term care settings.

Although the first approach can be useful in new product/service/environment design for able seniors as it forces a change in social attitude towards elderly people, the second one is better suited when the desire is to modify existing designs in order to suit the reality of a growing population with 'specialized' disabilities such as Alzheimer's, and their daily necessity for assistance and special care³. However, no matter what design approach is chosen, the fact remains that the main goal of design interventions for elderly people is to reduce disability and dependency, to extend disability-free life and therefore to improve their quality of life. There is no doubt either that this will lead to reductions in economic, social and psychological costs (Coleman, 2002). As Coleman (2002) notes, "design can improve the way new technologies are implemented, encourage the lifestyle changes that will improve people's general health and vitality, and facilitate local networks of support and friendship". This is certainly true of environmental and interior design, which take the entire living space with all of its features (ex. lighting, furniture, pathways, rooms, alcoves, etc) as their canvas.

² This subject has been treated in many books and papers. See for example works by Coleman as part of the i-design research project (1997; Coleman & Pullinger, 1993), Haigh (1993), Laslett (1996), and Presier and Ostroff (2002) among others. Also as mentioned, IDM produced a series of think tanks, whose cornerstone was inclusive design (Institut de Design de Montréal, 2002, 2003). The most prominent research groups and institutions include ID-Studio (<http://studiolab.io.tudelft.nl/research/>), Ageless Design (<http://www.agelessdesign.com/>), MIT Age Lab (<http://web.mit.edu/agelab/>), Think Cycle (<http://www.thinkcycle.org/>), Design for 21st Century (<http://www.designfor21st.org/pg.cfm?nid=5&l=en>), and the Center for Design (<http://www.centerofdesign.org/about.html>).

³ For example, the IDEAS Institute's mission is to provide solutions that improve the life of older adults through the conduct of rigorous applied research. See for example papers by Calkins and visit <http://www.ideasinstitute.org/>.

As Zeisel (2000) writes,

The environment has what Donald Norman calls “natural mapping” in which the environment itself contains the knowledge necessary for its correct use, rather than relying on knowledge held in the head of the user. Design adaptations and enhancements work by reducing demands on the person’s already challenged perception, thus dramatically improving levels of functioning. More importantly, by promoting feelings of security, mastery and belonging, they lessen the frustrations that often result in behavioral outbursts. The physical environment of care provides the setting for the simultaneous application of treatment in each of these domains.

The design of environments is quite complex, as it requires the inclusion of a number of features in order to be deemed ‘good design’, and various books exist, which discuss the tightly woven relationship between environment, design and care as well as give guidelines for appropriate design of long-term care settings for people with dementia (ex. Bennett & Knopman, 1994; Brawley, 1997, 2003; Calkins, 2001; Cohen & Day, 1993; Cohen & Weisman, 1991; Danford & Seinfeld, 1998; Grant, 1989; Grant & Sommers, 1998; Howell, 1998; Jean, 1998; Karlinsky & Sutherland, 1990; Lawton, 1984; Luxenberg, 1997; Schiff, 1990; Weisman et al., 1994, 1990). A few studies looked at how particular environmental criteria could be used as a way to reduce challenging behaviours due to AD and the decline of seniors’ quality of life (ex, Brawley, 2001; Cohen-Mansfield, 2001; Cohen-Mansfield & Werner, 1998; Day et al., 2000; Eriksson, 2000; Gottlieb-Tanaka, 2004; Hebert et al., 2001; Kittur & Ruskin, 1999; Korczyn & Davidson, 1999; Lawton, 1983, 1994, 1996; Lawton et al., 1997; Zeisel, 2000; Zeisel & Raia, 2000; Zeisel et al., 2003). But much of this information is not empirically based, but rather practice-based. How can research help to produce valid data in order to demonstrate that particular design features do have a demonstrable beneficial effect on quality of life? Empirical data is even scarcer. when addressing a specific design criterion such as lighting and its effect on quality of life of the residents

Part B: Design Criteria for the Consideration of Light and Colour for Patients with Dementia and Alzheimer’s

In integrating design factors, the emphasis here is the intimate human nature of people living in an institutional environment. With the research work done by Magda Wesolkowska and Tiiu Poldma on this subject, it is becoming evident that quality of life and hominess of the living environment is crucial to helping combat issues of social isolation, abandonment, and a sense of loss and disorientation often experienced by the elderly as they enter into long-term care institutions. This being said, the effects of Alzheimer’s’ are accentuated within these institutional environments. Environmental factors such as the light and colour

Have shown to contribute to the improved mood, diminished bouts of sun downing, and, when integrated with pharmacological intervention and programmed activities, help to delay late onset Alzheimer's'.

In considering environmental factors such as colour and light, first a theoretical review is necessary to situate specific environmental factors that contribute to spatial disorientation, panic and depression in the aged and specifically those with diminished or affected visual or psychological capacities.

The environmental factors that affect the aged and those with dementia and Alzheimer's' include both physical elements of the building architecture and circulation patterns, as well as the specific elements of design such as material choices, colour contrasts, lighting system choices and placement, and the lack of so-called 'homey' elements within the design concepts.

Colour and light elements affect directly the capacity of Alzheimer's' patients, and this is compounded by the effects of old age on the eye in general. Vision of the aged is affected by a multitude of conditions and this creates a multitude of ways of seeing not experienced at a younger age. Different ways of seeing and increasingly lower levels of vision are affected by both a decrease in the blue spectrum readings combined with an increase in over-reaction and panic to yellow spectrum in light (Brawley 1997). The impact is increased implications both psychological and socio-psychological.

RESEARCH PROJECT PARAMETERS

Light and Product Development for Alzheimer's' environments

In considering the needs of Alzheimer's' patients, the first IDM Research project on the subject explored the impact of this type of light on the potential for product development in Quebec. Consultation with experts from the medical and industrial design fields both in this project and in the previous round table discussions has revealed that not only is product development crucial in Quebec, but also relevant product development. This can be achieved for the following purposes:

- Provide adequate and appropriate incandescent lighting for way-finding in the institutional environment
- Provide appropriate variable task lighting for both reading and personal spaces
- Allow for the potential of developing appropriate task and general lighting products for home and institution that appeals to the mainstream population concurrently

Project Parameters

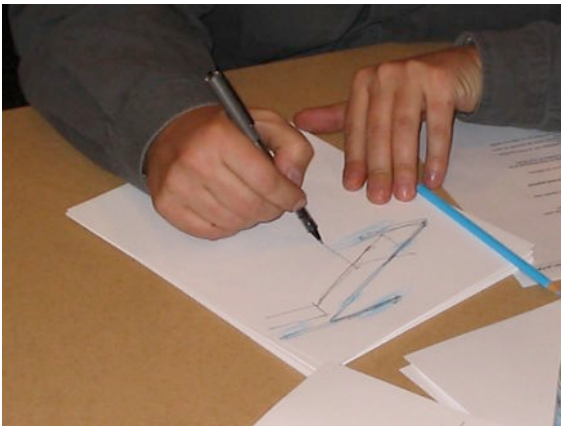
The research team assembled for the Brainstorming session was given the mandate to design prototypes for the typical corridor and dining areas of an institutional controlled ward with Alzheimer's' patients as full time residents.

The Brainstorming Session and Design Proposal Development

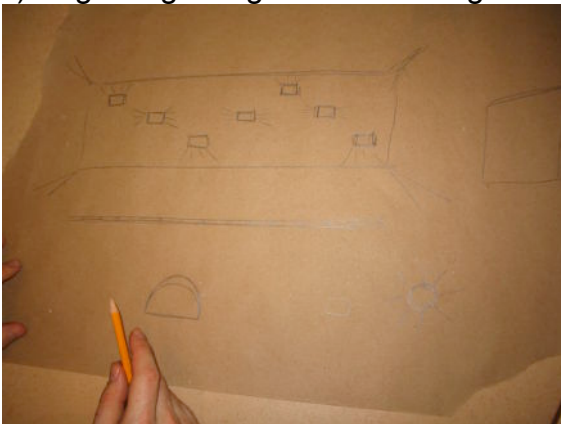
In March of 2004, the design team was assembled to review the site and consider possible design solutions for the users and the institutional setting for Alzheimer's' patients.

The team worked in a collaborative research and design project in an intense work session, first understanding the issues and then exploring possible idea. The summary in pictures showing the stages of the design process is as follows:

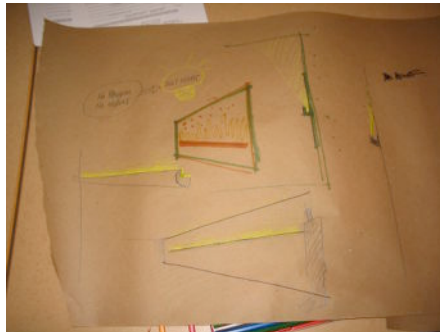
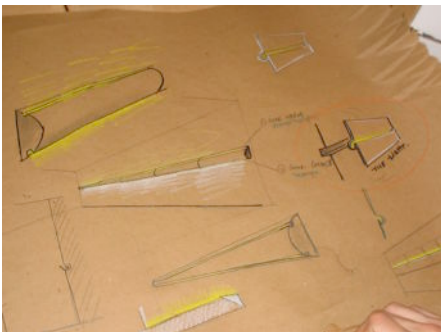
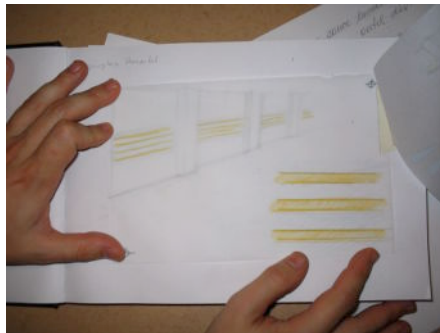
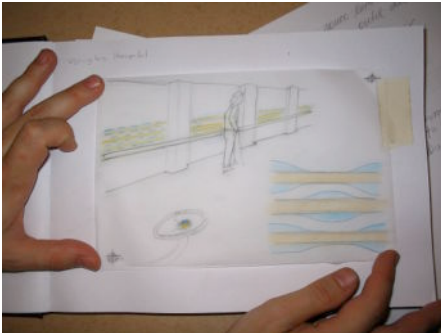
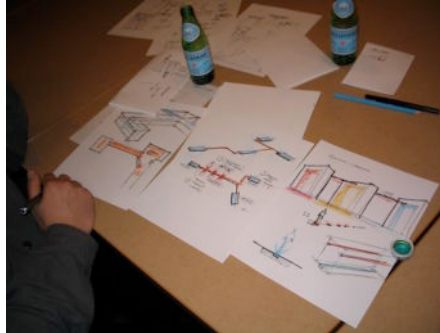
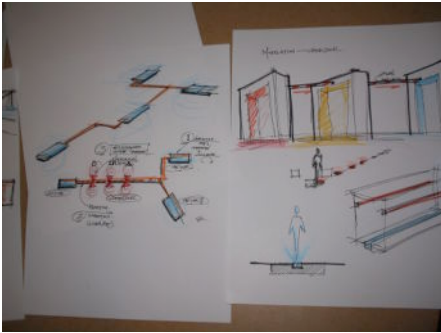
i) Starting to design ideas for the corridor:



ii) Beginning design brainstorming and exploring first ideas:



iii) Design ideas for consideration:



Several considerations included the need for light not to be direct, to have modulation and to be an interactive element to guide patients within the corridor as a way finding method. Here we see the design team considering proposals:



Each design was critiqued in terms of the following issues:

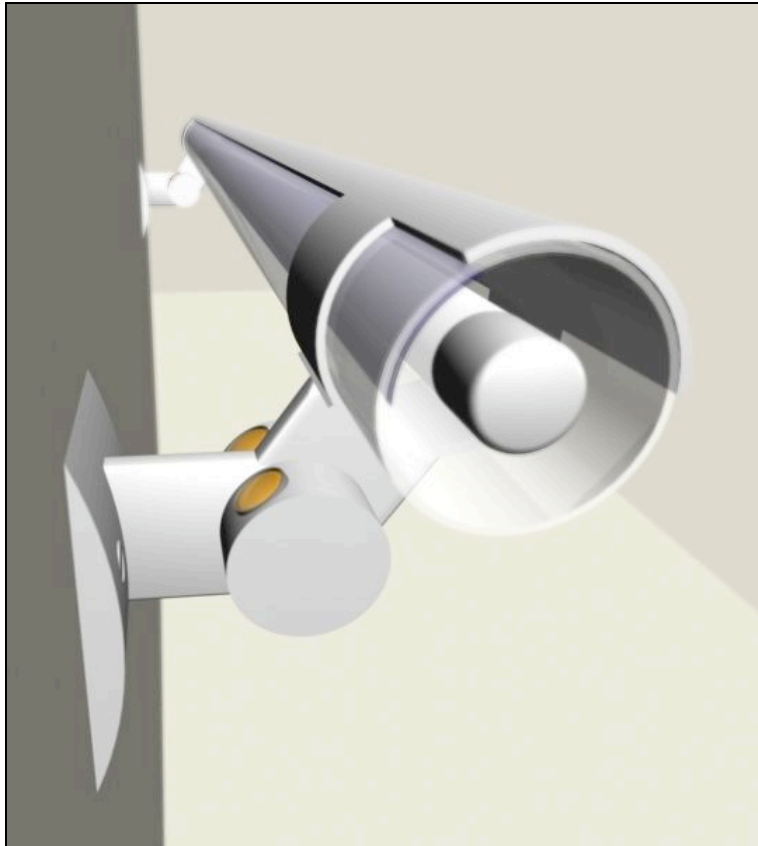
- suitability for the user context and age group
- flexibility to provide quality light and interactive way-finding

Following this evaluation of the design proposals produced, two ideas were selected for further development.

DESIGN PROPOSALS

Concept 1: Light Courante

The first concept makes use of fluorescent lighting integrated into the handrails with additional LED accent lights built into the support brackets. The concept provides both functional down lighting and decorative uplighting; as seen in the images on the following pages, the uplighting is filtered to produce a blue light which could have potential therapeutic use in offsetting the effects of sun downing.



Technical detail of **Light Courante** luminaire concept.

The combination of three different lighting effects creates a lively and vibrant atmosphere, which could easily be made more dynamic with subtle variations in the color or intensity of the LED sources. This also offers possibilities for nighttime lighting, as it would provide a soothing but functionally effective light that would draw attention to the handrail and clearly light the wall and floor without creating glare.



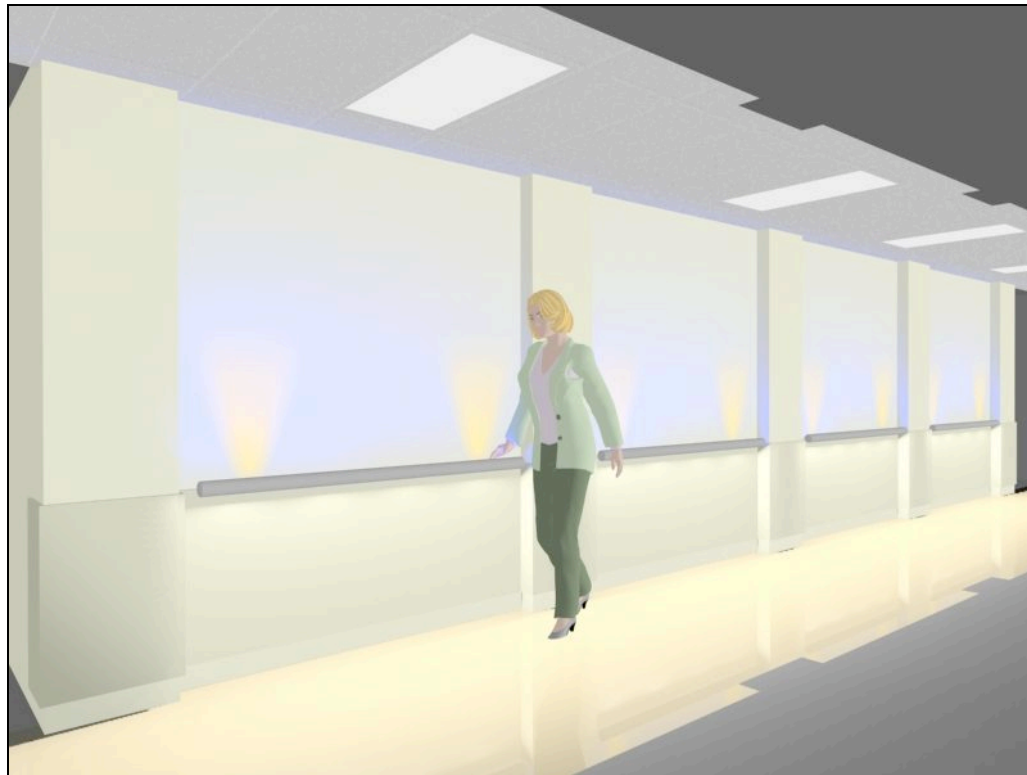
View of typical corridor without lighting.



View of typical corridor with uplighting and downlighting.



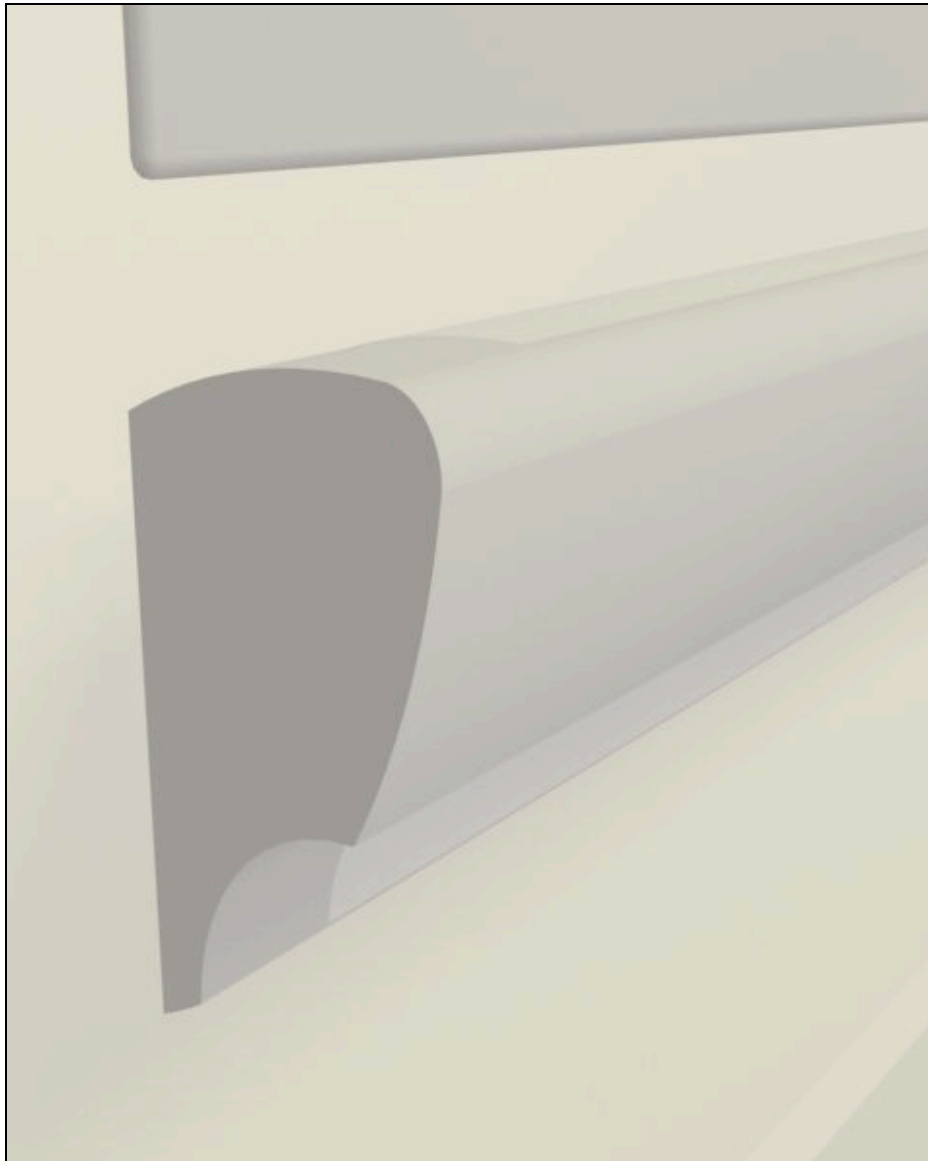
View of typical corridor without lighting



View of typical corridor with uplighting, downlighting, and detail lighting.

Concept 2: TableauRGB

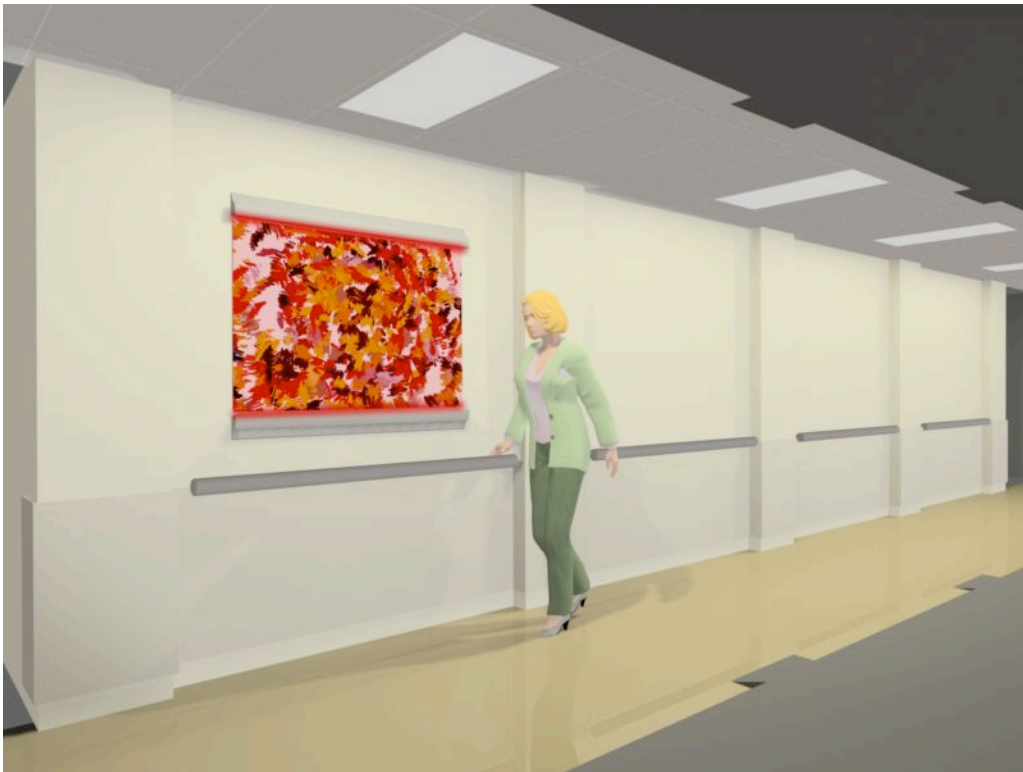
The second concept is a decorative light designed to create a dynamic and energetic atmosphere through the use of low-maintenance, non-intrusive technologies. Two RGB color changing luminaires, mounted above and below a specially designed artwork, generate light of specific colors that create different effects within a single painting or print. Both the speed of color change and the particular nature of the artwork contribute to the overall luminous effect.



Detail of **TableauRGB** luminaire concept.



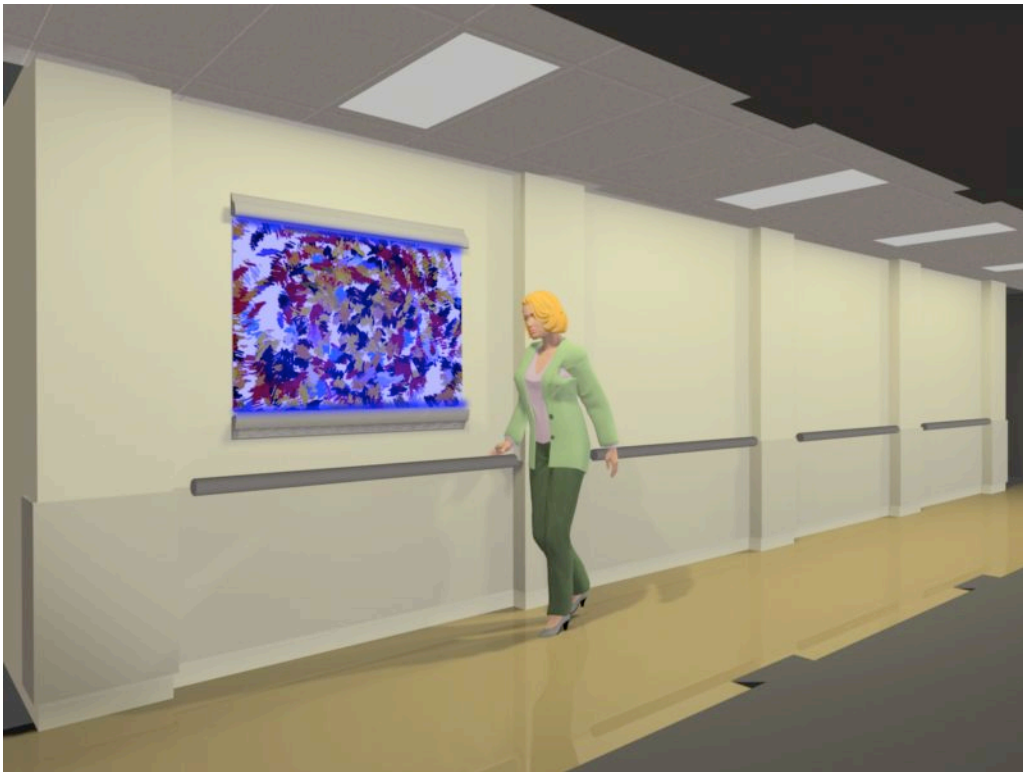
View of typical corridor without illuminated artwork



View of typical corridor with artwork lit in red



View of typical corridor without illuminated artwork



View of typical corridor with artwork lit in blue

CONCLUSION AND FUTURE POSSIBILITIES

The design prototypes produced herein can be brought to industry for development. Future possibilities include how hits could also be considered for both the Alzheimer's' as well as for the mainstream institutional designs, aimed at both rehabilitation and other types of institutions where well-being and way finding are at issue.

Further research will include re-establishing the Research Study at the Douglas Hospital and testing these ideas within the medical community. The scientific evaluation of the Douglas Hospital environment will be carried upon final approval from the Ethics Board.

There is still a lot of research work to be done on this relatively unknown factor in the well-being of Alzheimer's' patients, and we are excited at the prototype development for this research project and the results obtained.

ANNEX A:
PRÉPARATION POUR LE BRAINSTORMING IDM—
EXTRAIT DU RAPPORT DU PROJET « ÉCLAIRAGE ET ALZHEIMER'S »

DÉVELOPPEMENT DES PRODUITS D'ÉCLAIRAGE CONSIDÉRANT LA POPULATION
VEILLISANTE AVEC DES DIMINUTION DES CAPACITÉS VISUELLES

GROUPE DE RECHERCHE GRID

Tiiu Poldma, PhD

Hans Samuelson, Design + Communication

Préparation pour le développement du prototype potentiel pour éclairage
Halle d'institution pour les personnes atteintes avec **démence et Alzheimers'**

CLIENTÈLE

- personnes de 75-85 en institution avec démence ou les atteintes Alzheimers'
- leurs accompagnants
- besoins assez ponctuels concernant les réactions psychologiques et de sun-downing dans les environnements mal éclairés ou trop hautes contrastes

LES ENJEUX

- créer des zones interactives dans les passages des corridors combiné avec une éclairage indirect du plafond
- créer de l'animation visuel et/ou interactive durant les périodes de repos ou quand il n'y a pas d'autre activités
- créer une deuxième éclairage accent aux murs qui va créer une variété avec une éclairage indirect au plafond

POSSIBILITÉS

- luminaire indirect murale; luminaire LED interactif
- panneau ou autre élément décoratif qui amène les corridors
- support luminescente pour les halles sociaux ou les salles à diner

SUPPORT ARCHITECTURALE

- couleurs doux et chaudes mais pas trop des contrastes (voir exemple des propositions par T.Poldma pour CHSLD)
- changements visuels par l'éclairage dans les changements des usages dans les couloirs/zones plus sociaux
- créer le feeling de chez soi avec la lumière et les interventions 'design'

FACTEURS MAJEURS à considérer

- **ORIENTATION SPATIALE ET CONTRASTES**
 - Manque des éblouissements aux surfaces
 - Les aspects potentiels de lumière en mouvement comme sensoriel positive
 - La couleur pur et mélange RGB de LED comme élément de design potentiel
-

ANNEX B :

EXTRAIT DU PRÉSENTATION AU SALON D'HABITATION 22 MARS 2005

Une préoccupation : aménager l'intérieur d'un bâtiment pour les personnes âgées- les besoins d'une population vieillissante

Les critères de design qui répond aux problèmes environnementales des chutes : couleur, lumière, aspects macro et micro :

La couleur et la lumière

- important de considérer comment une approche intégrée de la couleur et la lumière aide à acheminer un environnement pour le bien-être
- plusieurs facteurs de la couleur et la lumière qui aide à établir un confort et sécurité dans un environnement, qui aide à l'équilibre de l'individu
- Comment les choix de couleur aide à stabiliser un sens visuel

Les choix en lumière doit considérer les aspects actuels des âgées

- La réduction en cognition et dextérité physique
- Les patients sont incapables de varier leurs environnements pour le confort
- Généralement les niveaux d'éclairage sont inadéquats
- Les âgées restent sensibilisés au melatonin, les effets de la lumière brillante ; une raison pour lequel ils se trouvent souvent au sud durant l'hiver, pour se sentir mieux; ceci implique l'impacte majeur de la lumière (Brawley)
- Les âgées retiennent leur capacité de réguler leur température du corps avec la lumière

Mais il ne faut pas oublier non plus les effets de la lumière sur l'agitation et comment la lumière

- Affectent la démence et l'agitation durant la fin de la journée
- Que les yeux vieux doivent prendre du temps pour ajuster aux changements des niveaux de la lumière
- Que la vision âgée est aussi affectée par les problèmes de âge, et la perte de la vision périphérique et de détail

Alors c'est important de faire la distinction entre la lumière plus élevée et comment c'est affecté par

- Composition de la couleur de la lumière artificielle
- Changement et contraste entre l'éclairage naturel et l'éclairage artificiel

Un deuxième aspect est la notion du temps (when and how light levels are provided)

- L'exposition au éclairage naturel TIMED right
- Quand les patients sont exposés devant la lumière; par exemple, l'exposition le soir est bénéfique pour améliorer la qualité du sommeil
- Selected light levels can help alleviate sundowning in Alzheimer's patients

La lumière naturelle et les effets sur le corps (circadian rhythm)

- Aide à maintenir un niveau élevé de la santé
- Devient une source d'information sur l'environnement spatial et comment les espaces sont accueillants(positive) ou non-accueillants(négative)

Le rythme circadien

- Le corps fait un cycle de 24 heures par jour
- Les interrelations biologiques et les processus par lequel les températures du corps sont réglées, la libération de hormones qui régulent la pression artérielle, le cycle sommeil-éveil, et le rythme cardiaque

Comment ?

- ❑ Positive effects on body clock when exposed to light
- ❑ Bright light regulates body clock
- ❑ Rhythmic disorders such as dementia, Alzheimers, schizophrenia, and epilepsy are regulated when light exposure is higher and circadian rhythms are considered

Couleur

La couleur aide à diminuer les chutes quand c'est considéré en fonction de l'état physique de l'espace, la quantité et qualité de la lumière impliquée, et la façon que la couleur est choisie dans l'ensemble des espaces affecté par l'utilisateur.

Faire la distinction entre les aspects environnementaux institutionnel

- ❑ La différence entre résidentiel et institutionnel
- ❑ Les aspects de chez soi, ex. chambre, toilette
- ❑ Les aspects sociaux, ex. dîner, salon, repos, activité

Couleur et l'Âge

- ❑ Vision affecté par l'âge, et comment les âgées perçoivent les espaces
- ❑ Avec l'avancement de l'âge : la différenciation de la couleur et manque de profondeur

Les études démontrent (Brawley)

- ❑ Les âgées sont capables de différencier haute saturation en couleurs plus chaudes, comme ex. les rouges, les oranges et les jaunes
- ❑ Plus difficile à voir : bleu, les tons pastels et les couleurs plus pâles

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ANNEX C: LIGHTING STUDY, MOE LEVIN CENTRE OF DOUGLAS HOSPITAL: THE RESEARCH PROPOSAL

By Dr. Tiiu Poldma, University of Montreal
Dr. Dolly Dastoor, Douglas Hospital
Dr. Hildegard Brack, Douglas Hospital

Preliminary Observation Study of the Effects of Light on Behaviour and Wellbeing of People with
Dementia in a Specialized Institutional Environment

INTRODUCTION

This study aims to investigate the impact of environmental conditions such as light and how these are an influential element on the well-being of the patient in an institutional setting. The study is exploratory in that the qualitative responses of patients to the lit environment will be studied, to see how choices in the colour of light and the surrounding environment might be environmental factors that when prudently chosen, might help to improve well-being, and allow for engaging with patients in a comfortable environment, and help to reduce agitation and sun-downing, through the choice of colour and light.

Although in its early stages, the literature review and report included in Annex C outline recent research which indicates, for example, that research already done in the United States and overseas show that these effects are positive and that the choice of light and colour in the institutional environment does affect both the patient and caregiver well-being (1) Zeisel et al, 2003; (2) Zeisel & Raia, 2000. The enclosed references, list some pilot and completed studies (3) Baker et al, 2001; (4) Baker et al 2003, and this study is one of the first in Quebec situated in an inter-disciplinary context of medical and environmental disciplines.

The purpose of the study and the research on the relationship of psychological well-being and environmental factors to date

In the research report in Annex A, Dr. Tiiu Poldma, professor at the University of Montreal, did an inter-disciplinary opportunity - research study exploring the impact of the environment on patients in institutional settings with Alzheimer Disease or a related dementia. In this study, nurses and doctors from the Institute de Geriatrie and Douglas Hospital in Montreal, and several experts from the United States, including Dr. Elizabeth Brawley, Dr. Paul Raia and Dr. John Zeisel, presented arguments for further study into the effects of different aspects of the environment on increasing the well-being of patients with dementia (5) Vaikla-Poldma & Wesolkowska, 2004.

In the following excerpt, Dr. Poldma (2004) outlines the importance of integrating psychological and environmental studies within a unit such as at the Moe Levin Center:

Psychological studies have shown that a person's moods and emotions (both positive and negative) remain virtually intact until the very last stages of the dementing process; some are even exacerbated by the cognitive deterioration. Furthermore, similarly, the long-term memory is not fully affected until the last stages of the illness. A person's inability to cope with their various cognitive impairments is usually observed in their display of negative emotions, which become translated into challenging behaviours such as anxiety, depression, social withdrawal or aggression. Medication (with side effects) and restraints have been traditionally used to counter these. Thus the aim of non-pharmacological treatment, such as program development, staff development, and environmental design (Grant & Sommers, 1998), has been to lessen negative emotions and distressing antisocial behaviours of people with dementia, and to induce positive emotions for as long as possible, hence contribute towards improving their quality of life (Brawley, 2001; Eriksson, 2000; Lawton, 1996; Martin et al., 1998; Zeisel, 2000; J. Zeisel & Raia, 2000; Zeisel et al., 2003). This type of treatment paradigm is called "habilitation" therapy:

The term reflects the realization that the brain of a person with dementia and its function cannot be restored to its prior condition – hence therapy is not “re” habilitative. The term also implies that effective treatment aims to help people “live and work through every day life “; namely, is “habilitative”. (...) “using mood to bring about a person’s ability to live and work their full potential” is a central feature (Zeisel & Raia: 2000, p.336).

Overall, the goals of present care of Alzheimer’s disease, is to combine pharmacological and non-pharmacological treatment modalities, in order to keep the individual functioning and maximize independence; reduce disability due to lost mental functions; reorganize routines so as to maximize use of the retained functions; minimize impaired behaviours such as anxiety and depression; and provide support to families (World Health Organization, 2001).

In the excerpt in Annex A, and in the full report, the research and groundwork has been laid for this research proposal.

The Context of the Proposal and the Phases of the Work

This proposal is the first phase of a two-phase study exploring the effects of light and the colour of light on the behaviour and well-being of patients with dementia on the Moe Levin Unit in the Moe Levin Center of the Douglas Hospital. This application is for approval of the first phase of this two-phase study.

The main research objectives for both phases of the proposal are as follows:

A To determine how lighting in an institutional environment impacts on the behaviour and well-being of patients with dementia. The lighting conditions will be studied in the dining room of the Moe Levin Unit to determine how the spectral qualities of the light affect the wellbeing of these patients

B To understand how changing the light conditions will affect the well-being and what this means in terms of affecting the mood of the patient positively

THE PROPOSAL PHASES

The project proposal will be studied in two phases:

Phase I: Study of the existing lighting conditions of the dining room and the activities done by patients in the Moe Levin unit for recreation and pleasure. What are the existing light effects and how do the patients respond?

Phase II: Study of the activities in the dining room under changes in the lighting conditions only. The lighting quality will be improved to see what happens to patients engaged in the same activities, and how they respond.

The primary research questions that will be asked in each phase are further defined as follows:

PHASE I

1. What changes can be observed in an institutional setting when artificial lighting with full spectrum colour is used, instead of fluorescent light fixtures.
2. How can exposure of patients to daylight be studied?
3. What are the patients’ responses to artificial light conditions when combined with natural daylight in an institutional activity space?
4. How do these types of lighting affect well-being?
5. Is there a change in the patients’ responses under artificial and daylight conditions?

PHASE II

- 1 What happens when lighting conditions are changed?
- 2 How do these lighting types affect well-being?
- 3 Is there a change in the patients' responses under the artificial and daylight conditions, and under different types of fluorescent light?

PROPOSAL DESIGN FOR PHASE I

THE LIGHTING STUDY OF EXISTING CONDITIONS

The first phase will take place for a period of four weeks after approval of the proposal. The second phase will take place upon approval of a separate application for Phase II, once the first study (Phase I) is complete.

THE SETTING

The study will be undertaken on the Moe Levin Unit of the Moe Levin Centre of the Douglas Hospital. The Moe Levin Unit has 18 beds and is part of the Program for Dementia with Psychiatric Co-morbidity.

The study will take place in the open-concept kitchen and dining area of the unit. The dining area contains tables and chairs and it serves in addition to being used during meal-times as a place for individual activities (e.g. reading of newspaper) or group activities. The room has three windows and one door with a window leading out to a spacious porch that is protected by a roof. Wall-lights are lit all day long, as the roof reduces the amount of day-light in the dining area.

SUBJECTS AND RECRUITMENT

The subjects will be the patients in the Moe Levin Unit of the Moe Levin Centre of the Douglas Hospital. There is no recruitment in this study as the participants are all patients in the Center.

The outline of patient characteristics are as follows:

- Number:
Each patient on the unit can participate in the study, provided that consent has been obtained.
- Sample characteristics:
Participants are treated for psychiatric symptoms and/or behaviour problems associated with dementia (Alzheimer disease or a related disorder). The objective of their treatment is stabilization of these symptoms and/or problems and return back to live in the community, either at home, in residential homes or in nursing homes after their condition has improved provided that appropriate living arrangements are available. The stage of dementia is usually moderate to severe. However, at times, patients present with mild dementia. Female and male subjects are accepted to participate in the study. The age of subjects is usually ranging from the mid-fifties to mid-eighties.

There will be no chart review of the patient.

RESEARCH METHODOLOGY AND TOOLS

The research methodology will include two components: The Environmental Study Component and the Clinical Study Component:

A. Environmental Study Component

Qualitative Environmental Study (using the EPST measuring Tool, Bodgan & Biklin method):

Part A : On-Site Observation

1. On-site observations during the four week period, looking at how the patients react to the light and to the activities;
2. Recording of observations (journal entries) of the patient reactions to the activities and the lighting conditions with artificial light and daylight

Part B: Analysis of the Data (coded and categorized data analysis):

1. Coding and categorizing the data using the method used by Bogdan & Biklin(1982)
2. Developing hypotheses for Phase II

CLINICAL STUDY COMPONENT

- Pre-study and post-study evaluation:
The CMAI (Cohen-Mansfield Agitation Inventory) (6) and NPI (Neuropsychiatric Inventory) (7) will be used before the beginning of the study and after the termination of the study. The CMAI is used to assess agitation and aggression. The NPI will be used to evaluate psychosis, depression, anxiety, apathy and irritability.
- Direct observations:
During the group sessions, subjects will be observed and rated with the Quality of Participation and Satisfaction Tool. The QPST addresses categories, such as initiative, motivation, engagement, endurance, collaboration, interaction, mood and satisfaction. Direct observation will be carried out shortly before, during and after the activity and notes taken. The Quality of Participation and Satisfaction Tool (QPST) will be filled for each participant after the activity.

INFORMED CONSENT OF THE SUBJECTS

The Consent form will be filled in by the patient or their legal representative. At the Moe Levin Unit, the patients are identified as to their capacity (competency) of giving informed consent prior to their admission.

ROLE OF THE CAREGIVER

The caregiver will be informed of all the steps of the research process and a copy of the protocol will be given to the caregiver.

ACTIVITIES

The study will be exploratory, in that activities will be offered in the dining area under the current light conditions. These activities will be the usual ones offered in the unit.

A familiar domestic task and a recreational activity well-liked by many elderly people will be offered.

- Activity 1: Folding of towels, face cloths, napkins etc.
- Activity 2: Bingo.

GROUPS

- Frequency of sessions:
Two sessions of each activity are held weekly.
- Duration of sessions:
Activity 1 is up to 30 minutes.
Activity 2 is up to 60 minutes.
- Time of sessions:
Activity 1 is held in the morning (between 10 and 12 o'clock)
Activity 2 is held in the afternoon (between 2 and 4 o'clock)
- Group leader:
One staff member of the unit animates the activities.

EVALUATION OF SUBJECTS

- Pre-study and post-study evaluation:
The (6) CMAI (Cohen-Mansfield Agitation Inventory) and (7) NPI (Neuropsychiatric Inventory) will be used before the beginning of the study and after the termination of the study. The CMAI is used to assess agitation and aggression. The NPI will be used to evaluate psychosis, depression, anxiety, apathy and irritability.

- During group sessions:
During the sessions, subjects will be observed and rated with the Quality of Participation and Satisfaction Tool. The QPST addresses categories, such as initiative, motivation, engagement, endurance, collaboration, interaction, mood and satisfaction.
There will also be direct observation of the patients.
- Direct observation:
Direct observation will be carried out shortly before, during and after the activity and notes will be taken. The Quality of Participation and Satisfaction Tool (QPST) will be filled for each participant after the activity by a staff member.

INVESTIGATORS

The study will be conducted by a team of investigators, composed of the principal investigator, Dr. Tiiu Poldma, assistant professor with the Faculty of Environmental Planning at the University of Montreal, and her assistant, PhD student Magdalena Wesolkowska, also with the Faculty of Environmental Planning at the University of Montreal. Co-investigators are Dr. Dolly Dastoor and Dr. Hildegard Brack of the Douglas Hospital.

DURATION OF THE STUDY

The study will begin upon approval by the Douglas Hospital Research Ethics Board. It is anticipated that the phase 1 of the study will begin two weeks after approval, with a preparatory week, and run for three weeks.

ETHICAL AND CONFIDENTIALITY CONSIDERATIONS

The ethical conditions of the project will be in conformity with the application process as cited in the Douglas Hospital Application for Research Ethics Board Approval for a Research Protocol Involving Human Subjects. The data will be kept in locked cabinets with the researchers at the Douglas Hospital and in secure, private cabinets with the researchers at the University of Montreal Interior Design Research Lab.

FUNDING

The co-investigators are receiving funding from a grant agency, the Institut de Design de Montréal, under the research project aimed for multi-disciplinary studies. There are no drug companies involved.

CONFLICTS OF INTEREST

There are no investigators receiving any personal remuneration or other personal benefits for taking part in this study. There are no relationships with employers, supervisors or teachers involved. The co-investigators do not see conflicts of interest, but should any arise, the co-investigators would bring them immediately to the attention of the principal researcher and they would be resolved so as not to interfere with the patients' right to privacy and/or well-being.

DRUGS

As this is an observational and environmental factors study, there are no drugs involved, other than what is prescribed to patients as part of their treatment plan on the Moe Levin Unit.

CONCLUSION

Please refer to consent form protocol and consent form procedures. The research team will provide a summary report to the Douglas Hospital for internal use, and will publish the results through the Institute of Design of Montreal and the University of Montreal

Our aim is to create a potential framework for understanding how the prudent choice of colour and lighting can help enhance the well-being of patients with dementia and reduce agitation and behaviours related to sun-downing.

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Sample of Observation Form to be used for clinical study:
**QUALITY OF PARTICIPATION AND SATISFACTION TOOL
(QPST)**

Initiative:

**Subject comes to dining area to participate in activity on his/her own.
YES/NO**

Motivation:

**Subject exhibits interest in participating in activity.
YES/NO**

Engagement:

**Subject is actively engaged in activity.
YES/NO**

Endurance:

**Subject remains actively engaged throughout the activity.
YES/NO**

Collaboration:

**Subject collaborates with group leader and co-participants.
YES/NO**

Communication:

**Subject communicates verbally with group leader and co-participants.
YES/NO**

Satisfaction:

**Subject expresses contentment (verbally and non-verbally) with the activity.
YES/NO**

Mood:

Subject is happy ()

sad ()

anxious ()

angry (frustrated) ()

most of the time while the activity is going on.

H. Brack, Ph.D., 13.8.2004

Sample of Form used and questions asked for the environmental study:
**ENVIRONMENTAL QUALITY AND SATISFACTION TOOL
(EQST)**

- A. Room qualities**
- B. Lighting conditions**
- C. Patients reactions**
- D. Personal observations**

A. Room qualities:

- type of dining area
- type of activity

B. Lighting conditions (read with plan)

- daylight conditions
 - orientation towards sun
 - time of day of activity
- existing artificial light conditions : fluorescent, incandescent
 - where located
 - layout

C. Activity and patient reactions

- type of activity observed
- patient reactions to the activity

Engagement:

Questions asked:

- How are you?
- Do you like doing?
- Is there enough light for you?
- What do you like to do?

D. Motivation observed:

- Subject exhibits interest in participating in activity.
YES/NO
 - how do the subjects react to the activity; do they stay engaged?
 - Are they blinking or reacting to the light in any way?
 - What are they focussed on while in the spae?

By Dr. Tiiu Poldma



LIGHTING STUDY AT THE MOE LEVIN CENTRE OF DOUGLAS HOSPITAL PHASE 1

Preliminary Observation Study of the Effects of Lighting on the Behaviour and Well-Being of People with Dementia in a Specialized Institutional Environment

Investigators: Dr. Tiiu Poldma, Ph.D.
Dr. Dolly Dastoor, Ph.D.
Dr. Hildegard Brack, Ph.D.

CONSENT FORM

We are inviting you the patient, on the Moe Levin Unit, to participate in an exploratory study that will be conducted at the Moe Levin Centre of Douglas Hospital. The investigators are Dr. Poldma, assistant professor at the Université de Montréal, Dr. Dolly Dastoor, Clinical-Administrative Chief of the Moe Levin Centre and assistant professor in the Department of Psychiatry of McGill University, and Dr. Brack, psychologist at the Douglas Hospital and lecturer in the Department of Psychiatry of McGill University.

This study aims to investigate the effects of lighting conditions on the behaviour and well-being of people with dementia in a specialized institutional environment. Phase 1, the preliminary part of the study, is exploratory, in that the participants will be observed in their usual environment under the current lighting conditions. More specifically, the existing lighting conditions will be studied and patients and their reactions to activities will be observed under the existing daylight and fluorescent lighting as it exists in the dining room. Based on observations in Phase I, lighting conditions will be changed in Phase II.

Who can participate in this study

Participants are individuals with dementia who are treated on the Moe Levin Unit at the Moe Levin Centre of the Douglas Hospital. Their age is usually ranging from the mid-fifties to the mid-eighties.

Informed Consent

Prior to participating in the study you or your legal representative will have to sign a written consent. You can withdraw your consent and from the activity at any time. This will not affect your treatment on the unit.

Study protocol of Phase 1

The study will start in the winter of 2005 with Phase 1 being carried out in January. For three weeks, the researchers will observe how participants take part in activities, such as folding of towels, face cloths, napkins etc. and bingo. Two sessions of each activity will be held weekly. They last about 20 minutes up to a maximum of 60 minutes.

Risks and benefits

There are no additional risks than those to which patients on the unit are exposed to by living temporarily on the Moe Levin Unit. Participants in the study will take part in activities that are usually offered on the unit, which are a familiar domestic task and a recreational activity well-liked by many elderly people. No participant will be pressured into doing things he/she is not willing to do.

Who can I talk to if I have any questions about this protocol?

You or your representative can contact one of the investigators involved in this project, Dr. Poldma, Dr. Dastoor or Dr. Brack. Their contact numbers are as follows:

Dr. Poldma: Tel. (514) 343-6111, extension 5077

Dr. Dastoor: Tel. (514) 761-6131, extension 2165

Dr. Brack: Tel. (514) 761-6131, extension 2188

For questions regarding patient rights as a research subject, the Ombudsman of the Douglas Hospital can be reached at 761-6131, extension 3287.

CONSENT FORM

The aims and procedures of this study in which I have been asked to participate have been explained to me by Dr _____ and my questions have been answered to my satisfaction. I agree to participate in this study

I understand that participation in the study is voluntary and that I may withdraw at any time of my own accord, and this will not affect my care on the unit.

NAME OF PATIENT _____

SIGNATURE _____

DATE _____

NAME OF LEGAL REPRESENTATIVE OR MANDATOR / PUBLIC CURATOR

SIGNATURE _____

DATE _____

I confirm that I have explained the procedure of the above study to the above named Patient/ Legal Representative or Mandatory /Public Curator

NAME OF CLINICIAN _____

SIGNATURE _____

DATE _____