

*The mission of Open Spaces, Sacred Places and the TKF Foundation:  
“to provide the opportunity for a deeper human  
experience by supporting the creation of public  
greenspaces that offer a temporary place of sanctuary,  
encourage reflection, provide solace, and engender  
peace.”*

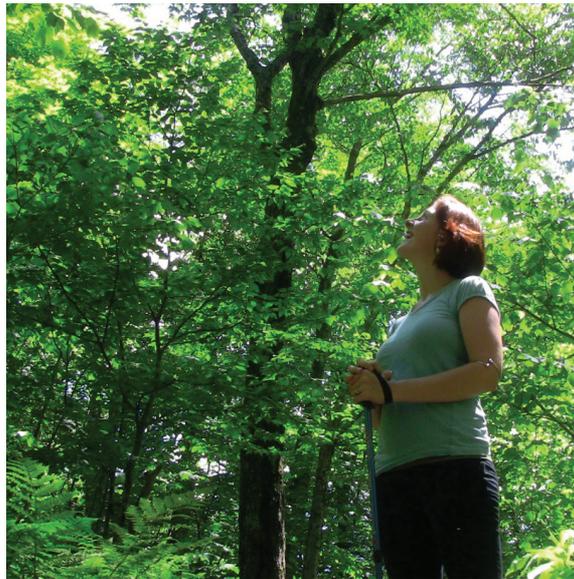


VIEWS OF  
AND EXPOSURE TO  
GREEN SPACE  
HAVE BEEN SHOWN  
TO AFFECT:  
MOOD/EMOTION  
COGNITION  
BEHAVIOR  
PHYSIOLOGICAL  
AND PHYSICAL  
HEALTH



## EXPOSURE TO GREEN SPACES HAS BEEN SHOWN TO INCREASE POSITIVE EMOTIONS

### MOOD/EMOTION



Pretty et al. (2005)

Hartig, T., M. Mang, and G. W. Evans.  
“Restorative Effects of Natural  
Environment Experiences.”  
Environment and Behavior 23.1  
(1991): 3-26.

Larson et al. (1998)

Stiles (1995)

- Green exercise has been found to improve self-esteem and overall physical fitness; have positive effect on feelings of anger, confusion, depression, fatigue, tension, and vigour; and help people achieve

more than the recommended amounts of weekly physical activity.

- Long-term happiness is improved after a wilderness experience - “restorative experiences may also have productive effects, preparing people to better cope with the stress and strain of daily life.”

- “indoor office workers’ emotions were more positive when real plants were present than when no plants were present.”

- “patients perceived the waiting room with plants [as compared to without indoor plants] as significantly more relaxing, welcoming, and cheerful and less stressful.”

# ACADEMIC ACHIEVEMENT AND MENTAL PROCESSES ARE BETTER AMONGST THOSE WHO LIVE IN GREENER PLACES

## COGNITION



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Hung and Chang (2002)  
Kuo and Sullivan (2001b)  
Kuo (2001)  
Ottosson and Grahn (2005)  
Wells (2000)

*“children’s behavior at a kindergarten in Taiwan and found that the vegetation in the classroom increased the children’s attention and reduced distraction.”*

*among the 145 innercity residents of a Chicago public housing area, those who lived in green conditions had higher scores on a cognitive test than their counterparts living in more barren settings.”*

*15 elderly residents (average age 86) of a geriatric care center in Sweden performed better on cognitive tasks after visiting a nearby garden than after resting in their rooms*

*“college students whose dorms look out onto natural settings performed better on attention-demanding tasks.” - Kaplan et. al. (1998)*

*“...Individuals returning from a wilderness trip are better at proofreading than members of a control group” - Kaplan et. al. (1998)*

*low-income children with green views have higher attention and students have higher academic achievement*

# THERE IS MEASURED BEHAVIOR IMPROVEMENT AMONGST THOSE FROM KIDS TO SENIORS WHO LIVE WITH NEARBY NATURE

## BEHAVIOR



Faber-Taylor, Wiley, Kuo, and Sullivan (1998)

Kuo and Sullivan (2001)

Mooney and Nicell (1992)

Faber-Taylor, Kuo, & Sullivan (2001)

- children who played in green courtyards had higher levels of creative play than those in comparatively barren outdoor spaces
- where the apartments have more surrounding nature, residents report fewer property and violent crimes to the police

- residents who lived in apartments with more nature nearby reported less aggression and violence against their family members than those who lived in comparatively barren buildings, as indicated by a self-report scale

- Comparing Alzheimer residents at Canadian healthcare facilities with and without gardens: as indicated by the nurses' records, the rate of violence and behavioral incidents were decreased in the institutions with gardens, whereas they increased considerably in the institutions

without gardens.

- Children with attention deficit disorder (ADD) have improved attention retention abilities when exposed to green play spaces

# CHEMICAL AND OTHER PHYSICAL CHANGES TAKE PLACE IN THE BODY WHEN AN INDIVIDUAL VIEWS NATURE OR BEAUTIFUL SCENES

## PHYSIOLOGICAL



Chang and Chen (2005)

Lohr et al. (1996)

Ulrich 1981

Orsega-Smith, Mowen, Payne, and Godbey  
(2004)

- Taiwanese college students exposed to views of nature were less nervous, as indicated by the objective measure of blood volume pulse and the subjective measure of state anxiety
- College students had lower systolic blood pressure readings when indoor plants were present in a

computer lab than when they were not present

- Open alpha results show that subjects felt more wakefully relaxed when viewing nature scenes than urban ones

- *“Professor Irving Biederman at the University of Southern California in Los Angeles has found that when people view scenes that are universally preferred - a beautiful vista, a sunset, a grove of trees - the nerve cells in that opiate-rich pathway become active. It is as if*

*when you’re looking at a beautiful scene, your own brain gives you a morphine high!” -Esther Sternberg (2009)*

- “those who stayed in the parks longer had lower systolic blood pressure as measured by an electric sphygmomanometer and that this relationship was independent of daily stress level.”

## REPORTED ILLNESS DECREASES AMONG THOSE WITH ACCESS TO OR A VIEW OF NEARBY NATURE

### PHYSICAL HEALTH



Moore's (1982)

West (1985)

Takano, Nakamura, & Watanabe (2002)

Maas, Jolanda, Robert A. Verheij, Peter P. Groenewegen, Sjerp De Vries, and Peter Spreeuwenberg. "Green Space, Urbanity, and Health: How Strong Is the Relation?" *Journal of Epidemiology & Community Health* 60.7 (2006): 587-92.

- prisoners whose windows looked out on nearby farmlands and forests reported fewer sick calls than those whose window views looked out on the prison courtyard

- prisoners having window views of natural settings had fewer stress-related physical symptoms, such

as headaches and indigestion, than the prisoners having window views restricted to other prison buildings

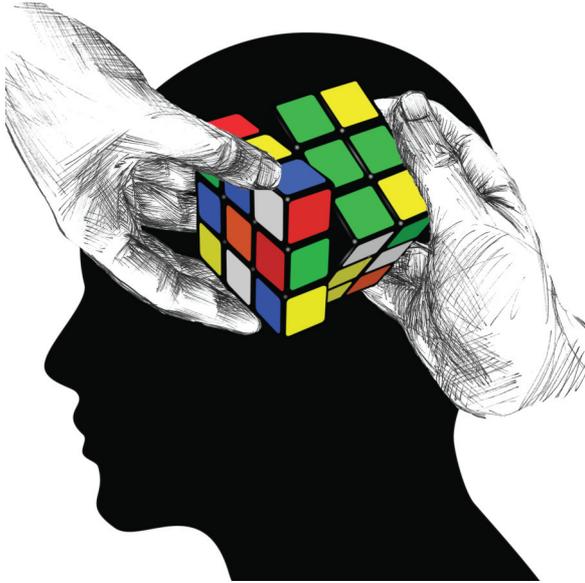
- The 5 year survival rate independent of SES of senior citizens in Tokyo was significantly higher of those who had green spaces nearby compared to those who did not

- Surgery patients with a view of trees out their window (as opposed to a brick wall) heal faster and require less pain medication

- Residents of Dutch

neighborhoods with abundant green space tend, on average, to enjoy better general health, especially among the elderly, housewives, and people from lower socioeconomic groups

## MENTAL FATIGUE



"[THE KAPLANS] FOUND THAT NATURE WORKS ITS SPECIFIC RESTORATIVE MAGIC BY EASING A CONDITION PSYCHOLOGISTS CALL 'MENTAL FATIGUE.' THIS FORM OF INNER WEARINESS AND INABILITY TO FOCUS SETS IN AFTER A FEW HOURS, OR MONTHS, OF HARD WORK THAT DEMANDS CONCENTRATED ATTENTION; AMONG ITS SYMPTOMS IS MAKING THE KIND OF DUMB MISTAKES OFTEN LABELED 'HUMAN ERROR,' AS WELL AS IRRITABILITY AND UNSOCIABILITY."  
-GALLAGHER (2007)

## SEASONAL AFFECTIVE DISORDER



"THE BRAIN'S CLOCK CENTER [THE PINEAL GLAND WHICH REGULATES CIRCADIAN RHYTHMS] AND STRESS CENTER ARE LIKEWISE RESET IN CLINICAL DEPRESSION. IN SAD THEY ARE SET TOO LOW, AND THE RHYTHM FLATTENS. IN THE MORE COMMON FORM OF DEPRESSION CALLED MELANCHOLIC DEPRESSION, THEY ARE SET TOO HIGH AND KICK IN TOO EARLY IN THE NIGHT."  
-ESTHER STERNBERG (2009)

## CIRCADIAN RHYTHMS



## STRESS



# SOCIAL SUPPORT



- The greener the outdoor open spaces were, the larger and more mixed were the groups of residents that used them
- Greener environments engender more socializing or neighborly activities in nearby residents
- Full immersion in natural environments can have humanizing effects, fostering greater authenticity and connectedness, causing higher valuing of others versus self gratifying aspirations and makes people more generous towards others

Coley, Kuo, & Sullivan, 1997

Kuo, Sullivan, Coley, & Brunson, 1998b

Kweon, Sullivan, & Wiley, 1998

Sullivan, Kuo, & DePooter, 2004

Weinstein, N., A. K. Przybylski, and R. M. Ryan. "Can Nature Make Us More Caring? Effects of Immersion in Nature on Intrinsic Aspirations and Generosity." *Personality and Social Psychology Bulletin* 35.10 (2009): 1315-329.

# PERCEPTION OF FACES

*"In the 1950s, Dr. Abraham H. Maslow... and Dr. Norbett L. Mintz... conducted one of the first known experiments on the effect of beautiful surroundings on human mental functioning.... Volunteers*

## SETTING IMPACTS OUR JUDGEMENT OF OTHER PEOPLE

*were told that they were studying photographs of people to see whether the faces displayed "energy" and "well-being...." The results showed that people found energy and well-being in faces when they looked at them in the beautiful room and found fatigue and sickness in the same faces when viewed in the ugly room; setting had a real impact on judgement." -Tony Hiss (1990)*



STUDIES OF SPECIFIC  
DESIGN INTERVENTION VARIABLES  
TO PAY ATTENTION TO WHEN CREATING  
A SACRED AND RESTORATIVE SPACE,  
AN OASIS, A SANCTUARY, A PLACE OF WELLNESS



## PROSPECT/REFUGE



BALANCING TWO  
DESIRES FOR  
OPPERTUNITY AND  
SAFETY

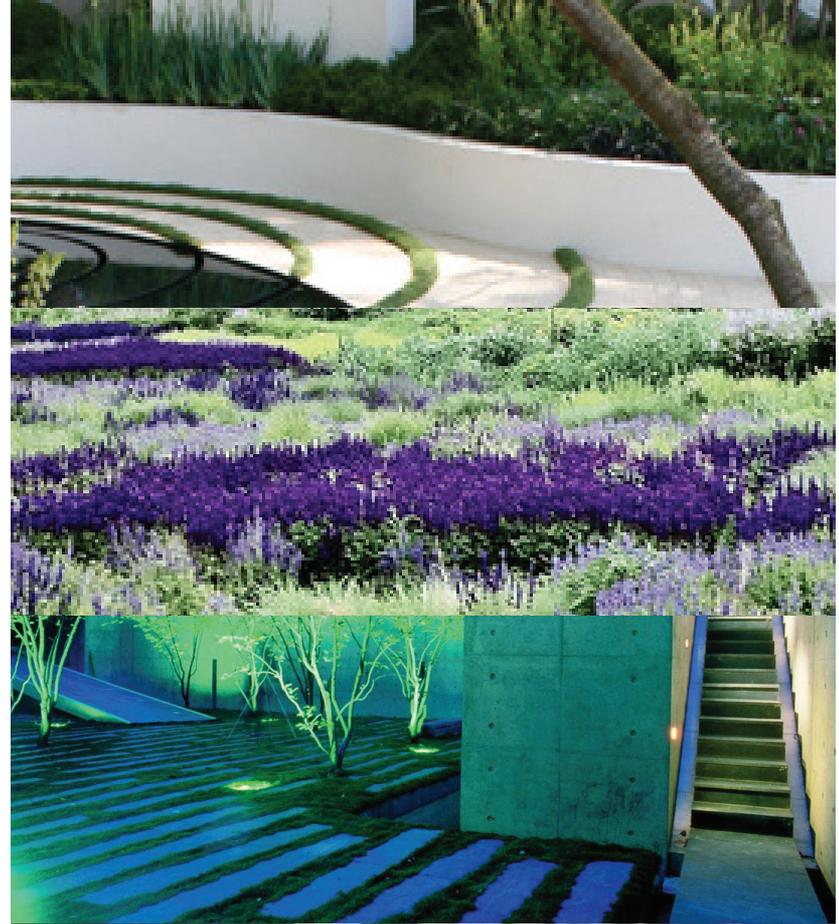
JAY APPLETON (1975)

THE KAPLANS SHOW  
THAT PEOPLE PREFER  
LANDSCAPES THAT

HAVE:

COHERENCE  
COMPLEXITY  
LEGIBILITY  
MYSTERY

KAPLANS (1998)



## VIEWS OF NATURE



SURGERY PATIENTS  
WITH A VIEW OF TREES  
OUT THEIR WINDOW  
(AS OPPOSED TO A  
BRICK WALL) HEAL  
FASTER AND REQUIRE  
LESS PAIN MEDICATION

ULRICH (1984)

DEPRESSED PATIENTS  
IN WELL DAY-LIT  
OR EAST-FACING  
HOSPITAL ROOMS ARE  
DISCHARGED SEVERAL  
DAYS EARLIER

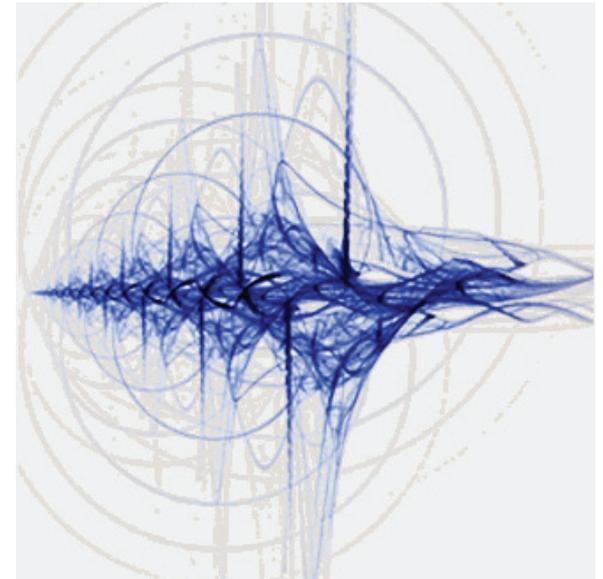
(EDMONTON, CANADA, 1996); MILAN, ITALY  
(2001)

-ESTHER STERNBERG (2009)

## SUNLIGHT



## SOUND AND NOISE



MUSIC TURNS YOUR  
BRAIN ON BOTH  
ELECTRALLY AND  
CHEMICALLY, IT  
AFFECTS EMOTIONS  
AND PHYSIOLOGICAL  
RESPONSE, SUCH AS  
HEART RHYTHMS,  
TOWARDS A  
PARASYMPATHETIC  
RELAXATION RESPONSE

LEVITIN AND THAYER

-ESTHER STERNBERG (2009)

## COLOR THERAPY



“THE COLOR BUBBLE  
GUM PINK SUPPRESSES  
AGGRESSION AND  
INDUCES CALM”  
- TONY HISS (1990)

## FRACTAL PATTERNS

MAY BE  
INTRINSICALLY  
SATISFYING TO THE  
HUMAN MIND.  
ART GOLDBERGER, HARVARD MED



## AROMATHERAPY



AROMA COMPOUNDS  
PROLONGE SLEEP AND  
ELECTRICAL BRAIN  
ACTIVITY CHANGES  
WHEN A SENSE OF  
SMELL WAS INTACT  
- ESTHER STERNBERG (2009)

## GATEWAY / ENTRY



## WINDING PATH



## DEPTH

VIEWING NATURE,  
ESPECIALLY WATER HAS A  
BENEFICIAL INFLUENCE ON  
PSYCHOLOGICAL STATE  
WHEN COMPARED TO  
VIEWING URBAN SCENES  
ULRICH (1981)

## WATER

DEPTH OF LAYERS  
SPACES RELIEVES THE  
PSYCHOLOGICAL DISTRESS  
ASSOCIATED WITH  
CROWDING