幸福的景觀療癒
2022 休閒農業的浪漫與幸福學術研討會

張俊彥 Chun-Yen Chang

Dept. of Horticulture and Landscape Architecture

National Taiwan University

Hedonic v Eudaimonic

https://www.perfectpotion.com.au/blog/the-scent-of-happiness.html

العربية 中文 English Français Русский Español

World Health Organization

About us Health topics News Countries Emergencies

Home / News / Fact sheets / Detail

Ageing and health

5 February 2018

العربية 中文 Français Español

Key facts

- Between 2015 and 2050, the proportion of the world's population over 60 years will nearly doubl 12% to 22%.
- By 2020, the number of people aged 60 years and older will outnumber children younger than 5
- In 2050, 80% of older people will be living in low- and middle-income countries.
- The pace of population ageing is much faster than in the past.
- All countries face major challenges to ensure that their health and social systems are ready to r the most of this demographic shift.

العربية 中文 English Français Русский Español

World Health Organization

About us Health topics News Countries Emergencies

Home / News / Fact sheets / Detail

Depression

22 March 2018

العربية 中文 Français Русский Español

Key facts

- Depression is a common mental disorder. Globally, more than 300 million people of all ages suffer from depression.
- Depression is the leading cause of disability worldwide, and is a major contributor to the overall global burden of disease.
- More women are affected by depression than men.
- At its worst, depression can lead to suicide.
- There are effective psychological and pharmacological treatments for depression.

العربية 中文 English Français Русский Español

World Health Organization

About us Health topics News Countries Emergencies

Home / News / Fact sheets / Detail

Dementia

12 December 2017

العربية 中文 Français Русский Español

Key facts

- Dementia is a syndrome in which there is deterioration in memory, thinking, behaviour and the a to perform everyday activities.
- Although dementia mainly affects older people, it is not a normal part of ageing.
- Worldwide, around 50 million people have dementia, and there are nearly 10 million new cases e year.
- Alzheimer's disease is the most common form of dementia and may contribute to 60–70% of cas
- Dementia is one of the major causes of disability and dependency among older people worldwid
- Dementia has a physical, psychological, social, and economical impact, not only on people with dementia, but also on their carers, families and society at large.

العربية 中文 English Français Русский Español

World Health Organization

About us Health topics News Countries Emergencies

Home / News / Fact sheets / Detail

Mental disorders

9 April 2018

العربية 中文 Français Русский Español

Key facts

- There are many different mental disorders, with different presentations. They are generally characterized by a combination of abnormal thoughts, perceptions, emotions, behaviour and relationships with others.
- Mental disorders include: depression, bipolar affective disorder, schizophrenia and other psychoses, dementia, intellectual disabilities and developmental disorders including autism.
- There are effective strategies for preventing mental disorders such as depression.
- There are effective treatments for mental disorders and ways to alleviate the suffering caused by them.
- Access to health care and social services capable of providing treatment and social support is key.

Frederick Law Olmsted

The Father of Landscape Architecture

1822-1903

Richard Louv

Last Child in the Woods:

Saving Our Children From Nature-Deficit Disorder | 2005

1949

1817-1862

Henry David Thoreau

Walden | 1854

1887-1948

Aldo Leopold

A Sand County Almanac | 1949

- 1854 Henry Thoreau: Nature is but a Name for Health

- 1863 Frederick Olmsted: Gradually and silently the charm comes over us; we know not exactly where or how

- 1949 Aldo Leopold: Environmental protection lies in the feeling of beauty

1960

Environmental Aesthetics via Urban Design (EA-Urban)
城市意象
(Lynch,1960)

1975

Prospect and Refuge Theory
眺望藏匿理論
(Appleton,1975)

1976

Environmental Aesthetics (EA)
環境美學
(Carlson,1976)

Scenic and Landscape Aesthetics Theories (S-LA)
自然美學評估
(Daniel & Boster,1976)

1982

Information Processing Theory
訊息處理理論
(Kaplan & Kaplan,1982)
(Kaplan & Kaplan, 1989)

Savannah Hypothesis
稀樹草原假說
(Balling & Falk,1982)

1983

Affective Theory
情感理論
(Ulrich,1983)

1984

Biophilia Hypothesis
親生命假說
(Wilson,1984)

Stress Recovery Theory (SRT)
壓力削減理論
(Ulrich,1984)

1987-1989

Attention Restoration Theory (ART)
注意力恢復理論
(Kaplan & Kaplan, 1989)

Landscape Preferences
景觀偏好
(Kaplan,1987)
(Kaplan & Kaplan, 1989)

1992

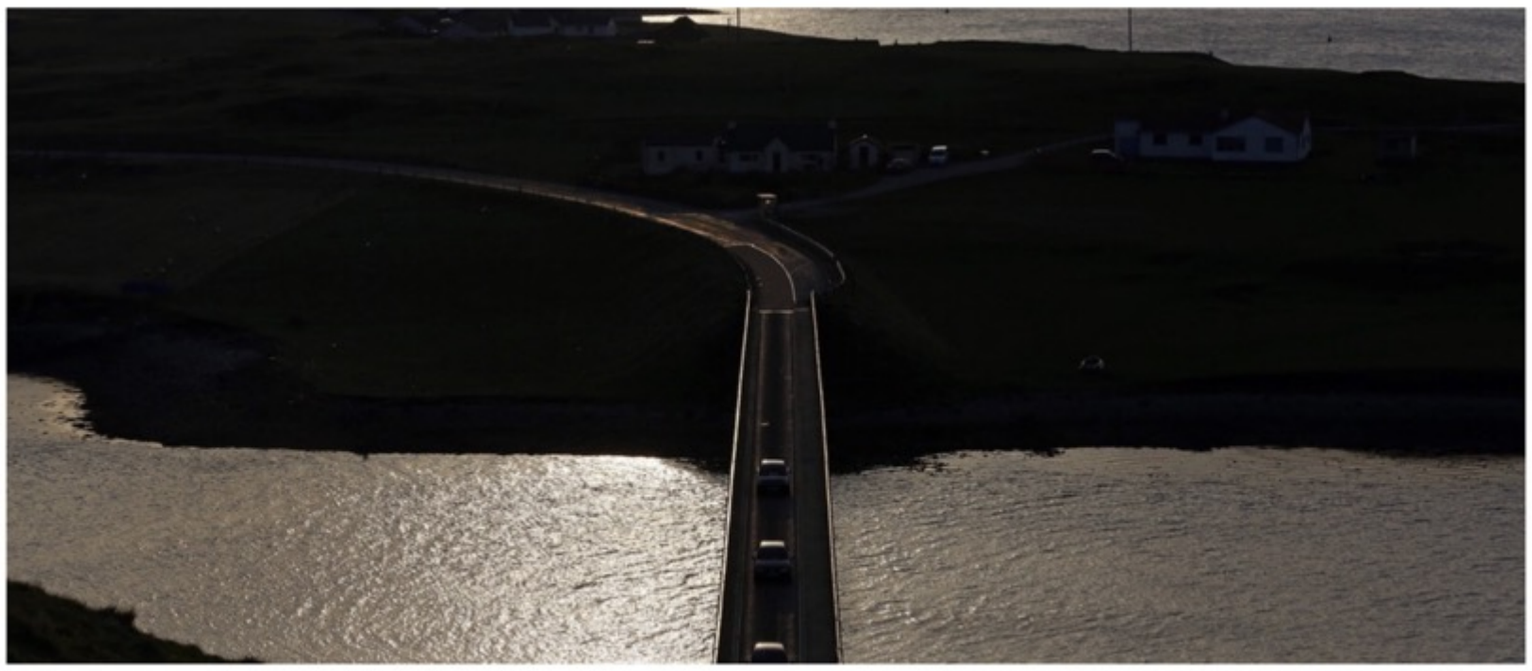
Habitat Selection Theory
棲地選擇理論
(Orians & Heerwagen,1992)

2009

Reasonable Person Model (RPM)
理性人類模型理論
(Kaplan & Kaplan, 2009)

Global Health | Mental Health

Doctors in Scotland can now prescribe nature



Take a walk, 5 times day.

Image: REUTERS/Cathal McNaughton

This article was originally published by
Big Think

15 Oct 2018

Evan Fleischer
Writer, Big Think

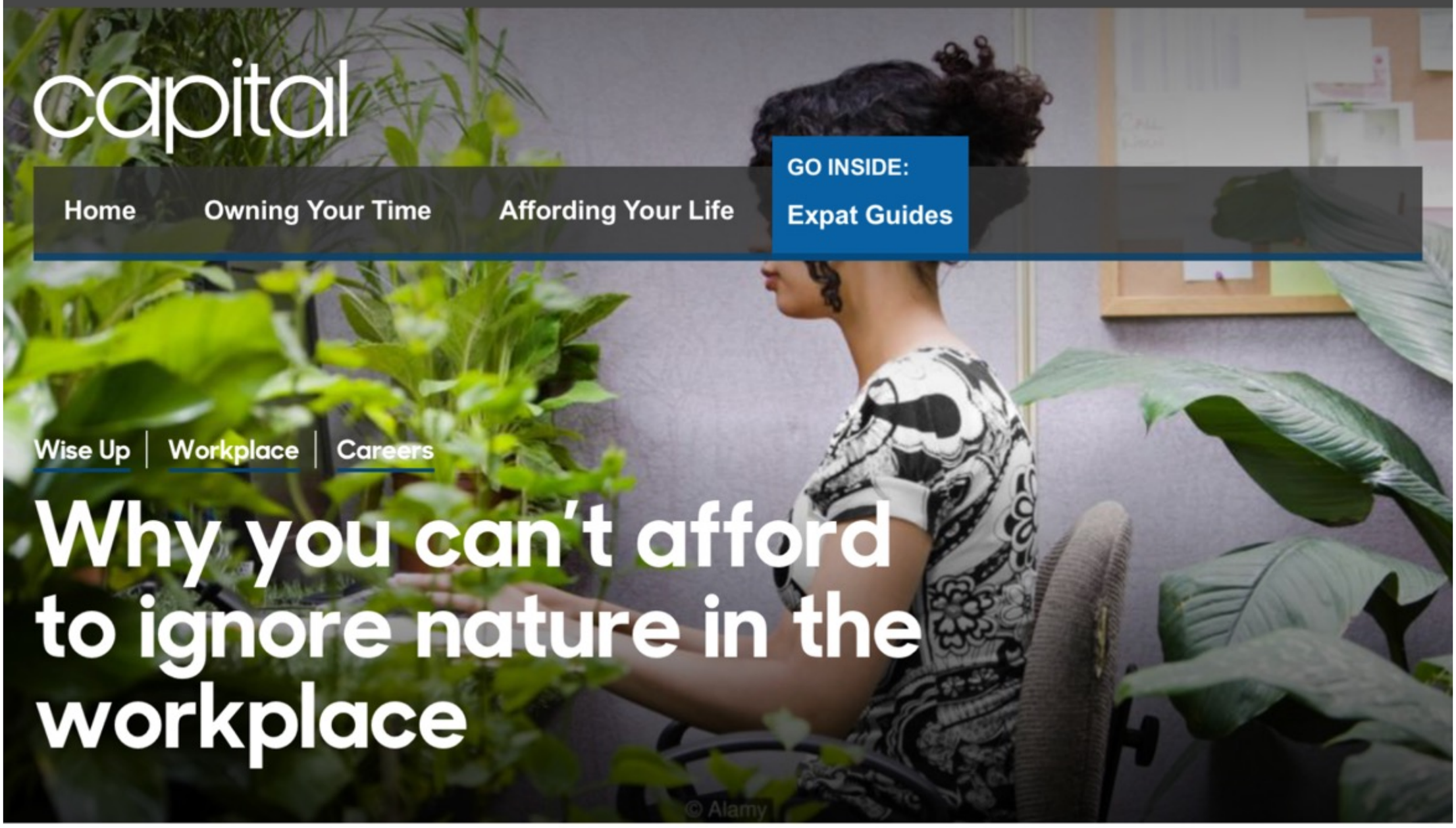
- Doctors in Shetland can now prescribe a walk in nature
- It's believed to be the first program of its kind in the U.K.
- The health benefits of engaging with nature are numerous.

Since October 5, doctors in Shetland, Scotland have been authorized to prescribe nature to their patients. It's thought to be the first program of its kind in the U.K., and seeks to reduce blood pressure, anxiety, and increase happiness for those with diabetes, a mental illness, stress, heart disease, and more.

World Economic Forum ·
13h ·

Doctors in the UK are prescribing time near water to improve well-being

266 10 Comments 106 Shares 10.8K Views



Why you can't afford to ignore nature in the workplace

Time to put a plant on your desk? Science shows incorporating nature in the workplace improves everything from worker happiness and creativity to the bottom line.

10.02.17 | WORLD CHANGING IDEAS

Cities Should Think About Trees As Public Health Infrastructure

Planting trees is an incredibly cheap and simple way to improve the well-being of people in a city. A novel idea: Public health institutions should be financing urban greenery to support well-being and air quality.

"It's not enough to just talk about why trees are important for health." [Photo: Claudel Rheault/Unsplash]

BY EILLIE ANZILOTTI 4 MINUTE READ

Think of a tree-lined street in the midst of a busy city. It feels like something of a treasure: hushed, cool, and sheltered from noise and sidewalk glare.

These leafy streets cannot afford to be seen as a luxury, argues a new

Landscape and Urban Planning 211 (2021) 104084

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research Paper

Species richness is positively related to mental health – A study for Germany

Joel Methorst [a,*], Aletta Bonn [b], Melissa Marselle [b], Katrin Böhning-Gaese [c], Katrin Rehdanz [d]

[a] German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Senckenberg Biodiversity and Climate Research Centre (SBiK-F) & Goethe University Frankfurt am Main, Frankfurt am Main, Germany
[b] Helmholtz-Centre for Environmental Research – UFZ, Friedrich Schiller University Jena & German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Leipzig, Germany
[c] Senckenberg Biodiversity and Climate Research Centre (SBiK-F), Goethe University Frankfurt am Main & German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Frankfurt am Main, Germany
[d] Department of Economics, Kiel University, Kiel, Germany

HIGHLIGHTS

- National epidemiological study on relationship between biodiversity and human health.
- Plant and bird species richness are positively related to mental health.
- No relationship between plant nor bird species and physical health.
- Access to local green space improves both mental and physical health.
- Species diversity could be a salutogenic (health promoting) nature characteristic.

ARTICLE INFO

Keywords:
Nature contributions to people
Ecosystem services
Biodiversity
Birds
Plants
Human health

ABSTRACT

Nature benefits human health. To date, however, little is known whether biodiversity relates to human health. While some local and city level studies show that species diversity, as a measure of biodiversity, can have positive effects, there is a lack of studies about the relationship between different species diversity measures and human health, especially at larger spatial scales. Here, we conduct cross-sectional analyses of the association between species diversity and human health across Germany, while controlling for socio-economic factors and other nature characteristics. As indicators for human health, we use the mental (MCS) and physical health (PCS) component scales of the German Socio-Economic Panel (SOEP, Short Form Health Questionnaire – SF12). For species diversity, we use species richness and abundance estimates of two species groups: plants and birds. We phrase the following hypotheses: plant and bird species are positively associated with mental and physical health (H1 & H3); bird abundance is positively related to mental health (H2). Our results demonstrate a significant positive relationship between plant and bird species richness and mental health across all model variations controlling for a multitude of other factors. These results highlight the importance for species diversity for people's mental health and well-being. Therefore, policy makers, landscape planners and greenspace managers on the local and national level should consider supporting biodiverse environments to promote mental health and wellbeing. For this purpose, we propose to use species diversity measures as indicators for salutogenic (health promoting) characteristics of nature, landscape and urban green space.

1. Introduction

A large number of studies has examined the beneficial effects of nature for human health (Gascon et al., 2015; Kondo et al., 2018; Sandifer et al., 2015). Nature positively influences multiple aspects of human health, ranging from mental to physical health. For example, it

* Corresponding author.
E-mail addresses: joel.methorst@senckenberg.de (J. Methorst), aletta.bonn@idiv.de (A. Bonn), melissa.marselle@idiv.de (M. Marselle), katrin.boehning-gaese@senckenberg.de (K. Böhning-Gaese), rehdanz@economics.uni-kiel.de (K. Rehdanz).

https://doi.org/10.1016/j.landurbplan.2021.104084
Received 3 July 2020; Received in revised form 2 March 2021; Accepted 4 March 2021
Available online 25 March 2021

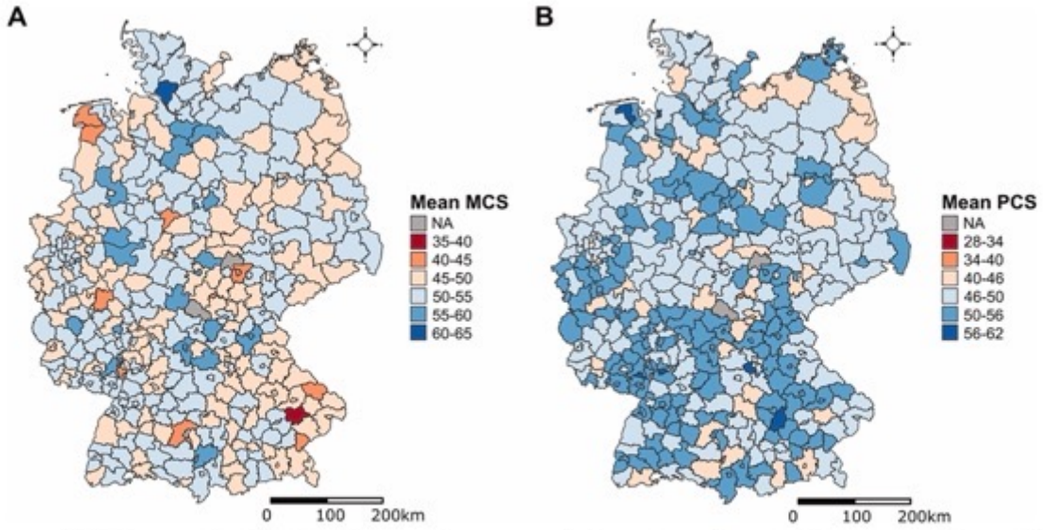


Fig. 1. Mental health (A, mean MCS) and physical health (B, mean PCS) scores on county level across Germany from 2008. Higher mean MCS and PCS scores indicate better mental or physical health. Shown are values for 394 counties based on SOEP (Socio-Economic Panel Germany) survey data (n = 13,328). Data for some counties was not available due to missing data. The number of observations per county ranges from 1 to 480 (median = 25). MCS = Mental Health Component Scale. PCS = Physical Health Component Scale. For more information see Methods section.

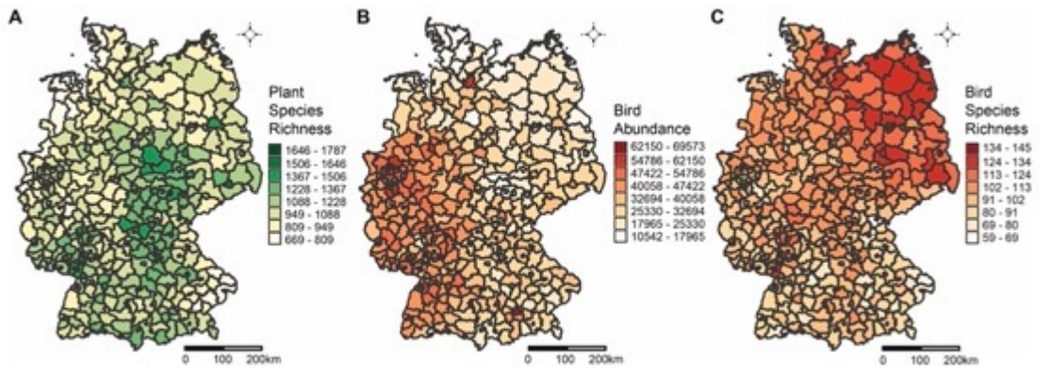


Fig. 2. Species diversity measures on county level across Germany. Shown are area weighted mean plant species richness (A), bird abundance (B) and bird species richness (C). Species richness was measured as the number of species and abundances are based on numbers of bird breeding pairs.

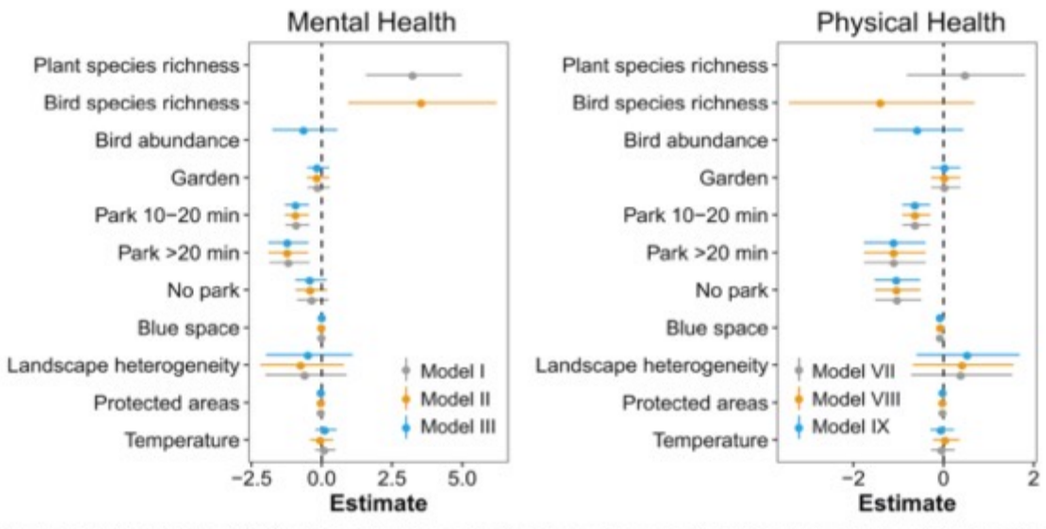


Fig. 3. Selected model coefficients with 95% confidence intervals for species diversity, access to a garden & parks (measured in minutes walking distance), nature characteristics and climate. Shown are all models from Table 2 with mental health and physical health as dependent variables (model names in the legend correspond to the OLS models form Table 2 and 3). Detailed results for all models and independent variables are presented in the Appendix A, Tables A.7 & A.8.

www.nature.com/scientificreports

SCIENTIFIC REPORTS

OPEN

Received: 10 April 2017
Accepted: 22 August 2017
Published online: 20 September 2017

In search of features that constitute an "enriched environment" in humans: Associations between geographical properties and brain structure

Simone Kühn[1,2], Sandra Düzel[1], Peter Eibich[3,4], Christian Krekel[3,7,8], Henry Wüstemann[6], Jens Kolbe[5], Johan Martensson[1], Jan Goebel[3], Jürgen Gallinat[2], Gert G. Wagner[1,4,5] & Ulman Lindenberger[1,9]

Enriched environments elicit brain plasticity in animals. In humans it is unclear which environment is enriching. Living in a city has been associated with increased amygdala activity in a stress paradigm, and being brought up in a city with increased pregenual anterior cingulate cortex (pACC) activity. We set out to identify geographical characteristics that constitute an enriched environment affecting the human brain. We used structural equation modelling on 341 older adults to establish three latent brain factors (amygdala, pACC and dorsolateral prefrontal cortex (DLPFC)) to test the effects of forest, urban green, water and wasteland around the home address. Our results reveal a significant positive association between the coverage of forest and amygdala integrity. We conclude that forests may have salutogenic effects on the integrity of the amygdala. Since cross-sectional data does not allow causal inference it could also be that individuals with high structural integrity choose to live closer to forest.

Research on brain plasticity supports the notion that our environment can shape brain structure as well as function[1,2]. In rodents experience-dependent alterations of the brain in the form of adult neurogenesis and synaptic plasticity has mostly been investigated using so-called "enriched environments"[3]. Donald Hebb in 1947 was one of the first to use an experimental paradigm comparing rats that could roam freely with those held in standard housing conditions[4]. These standard housing conditions usually consist of cages with access to food, water and bedding. The environmental enrichment condition in contrast varies between laboratories but usually comprises the provision of running wheels and toys and larger cages or rearing in larger groups of conspecifics[5,6]. Although the exact conditions are not yet defined key aspects that are repeatedly highlighted seem to be environmental complexity and novelty that offer a higher degree of stimulation, which in turn facilitates brain plasticity as revealed by histological studies measuring morphological features of neurons[7]. Unfortunately, it is unclear whether the typical laboratory housing conditions of animals that lack features of the natural habitat actually reflect a normal state or rather one of deprivation which is then compensated by the "enriched environment"

[1]Max Planck Institute for Human Development, Center for Lifespan Psychology, Lentzeallee 94, 14195, Berlin, Germany. [2]University Clinic Hamburg-Eppendorf, Clinic and Policlinic for Psychiatry and Psychotherapy, Martinistraße 52, 20246, Hamburg, Germany. [3]German Institute for Economic Research, Mohrenstrasse 58, 10117, Berlin, Germany. [4]University of Oxfor The Health Economics Research Centre (HERC) Old Road Campus, Headington, Oxford, OX3 7LF, UK. [5]Technical University Berlin, Institute for Economics and Business Law, Econometrics and Business Statistics, Straße des 17. Juni 135, 10623, Berlin, Germany. [6]Technical University Berlin, Institute for Landscape Architecture and Environmental Planning Landscape Economics, Straße des 17. Juni 145, 10623, Berlin, Germany. [7]Paris School of Ecoß 48 Boulevard Jourdan, 75014, Paris, France. [8]Centre for Economic Performance, London School of Economics, Houghton Street, London, WC2A 2AE, UK. [9]European University Institute San Domenico, Fiesole, Italy. Correspondence and requests for materials should be addressed to S.K. (email: kuehn@mpib-berlin.mpg.de)

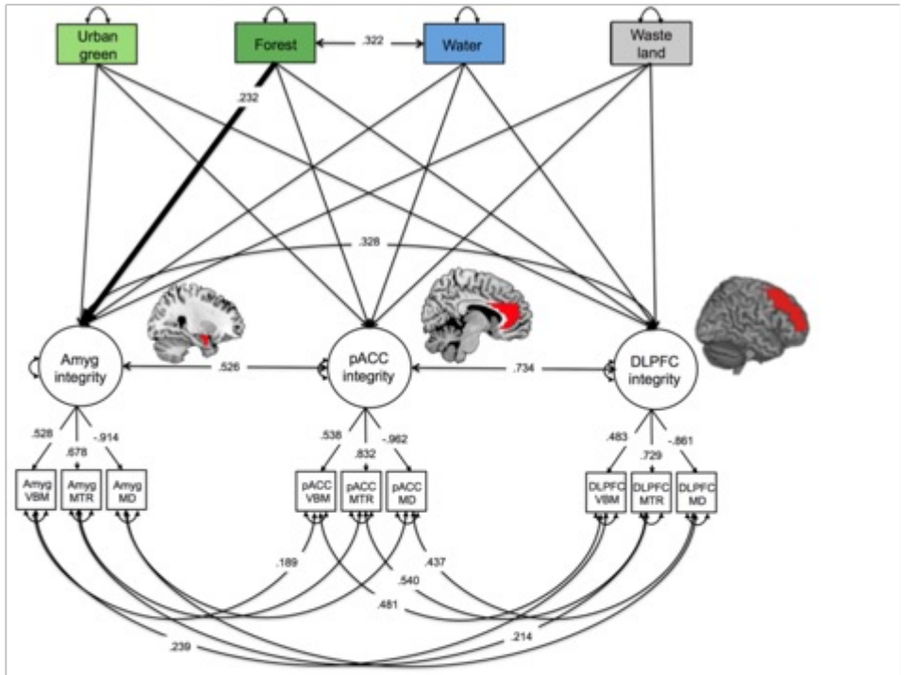


Figure 2. Depiction of the structural equation model with urban land use with in the radius of 1,000 metres around the individuals' households. Squares represent observed variables and circles represent latent variables. Single headed arrows represent directional effects (the numbers next to it are the standardized regression coefficients), the single headed arrows from latent factors to manifest variables are an exception and represent factor loadings, double headed arrows between latent or manifest variables represent covariances between the variables and double-headed arrows with both heads pointing on a manifest variable represent the variance

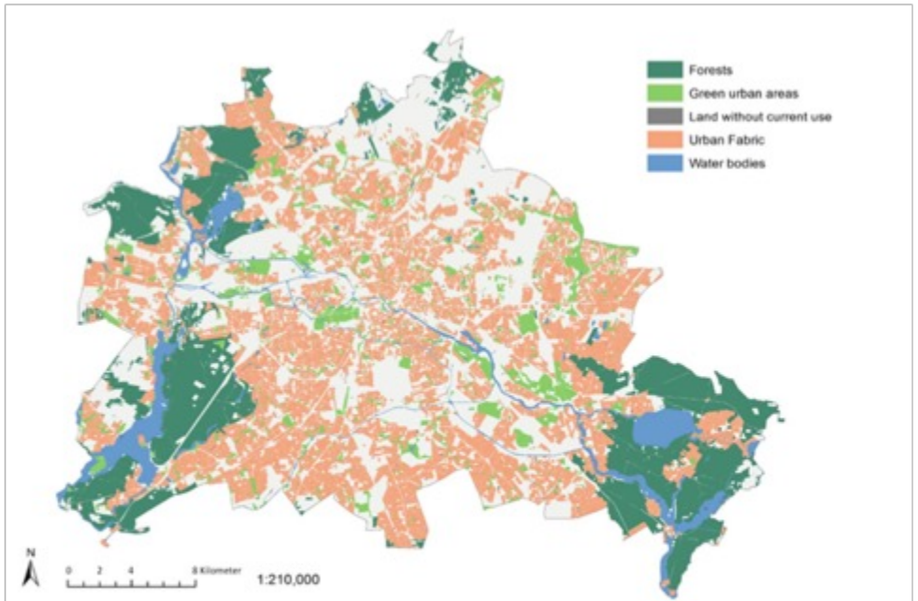


Figure 1. Spatial distribution of land use categories in the city of Berlin, Germany. Data taken from the Urban Atlas Land Use Data 2012 (European Environment Agency) created by means of the GIS software package Esri ArcGIS Desktop 10.3 (https://www.esri.de/support-de/produkte).

341 older adults aged 61–82 years

, H., Kolbe, J., et al. (2017). In search of features that constitute an "enriched environment" in humans: Associations between geographical properties and brain structure. Scientific Reports, 7(

Effect of exposure to natural environment on health inequalities: an observational population study

Richard Mitchell, Frank Popham

Summary

Background Studies have shown that exposure to the natural environment, or so-called green space, has an independent effect on health and health-related behaviours. We postulated that income-related inequality in health would be less pronounced in populations with greater exposure to green space, since access to such areas can modify pathways through which low socioeconomic position can lead to disease.

Methods We classified the population of England at younger than retirement age (n=40 813 236) into groups on the basis of income deprivation and exposure to green space. We obtained individual mortality records (n=366 348) to establish whether the association between income deprivation, all-cause mortality, and cause-specific mortality (circulatory disease, lung cancer, and intentional self-harm) in 2001–05, varied by exposure to green space measured in 2001, with control for potential confounding factors. We used stratified models to identify the nature of this variation.

Findings The association between income deprivation and mortality differed significantly across the groups of exposure to green space for mortality from all causes (p<0·0001) and circulatory disease (p=0·0212), but not from lung cancer or intentional self-harm. Health inequalities related to income deprivation in all-cause mortality and mortality from circulatory diseases were lower in populations living in the greenest areas. The incidence rate ratio (IRR) for all-cause mortality for the most income deprived quartile compared with the least deprived was 1·93 (95% CI 1·86–2·01) in the least green areas, whereas it was 1·43 (1·34–1·53) in the most green. For circulatory diseases, the IRR was 2·19 (2·04–2·34) in the least green areas and 1·54 (1·38–1·73) in the most green. There was no effect for causes of death unlikely to be affected by green space, such as lung cancer and intentional self-harm.

Interpretation Populations that are exposed to the greenest environments also have lowest levels of health inequality related to income deprivation. Physical environments that promote good health might be important to reduce socioeconomic health inequalities.

Funding None.

Lancet 2008; 372: 1655–60

See Comment page 1614

Public Health and Health Policy, University of Glasgow, Glasgow, UK (R Mitchell PhD); **and School of Geography and Geosciences, University of St Andrews, St Andrews, UK** (F Popham PhD)

Correspondence to:
Dr Richard Mitchell, Public Health and Health Policy, University of Glasgow, 1 Lilybank Gardens, Glasgow G12 8RZ, UK
r.mitchell@clinmed.gla.ac.uk

Introduction

The persistence and growth of socioeconomic health inequalities continues to command the attention of researchers, clinicians, and politicians.[1–4] Several studies have investigated how socioeconomic inequalities in health vary between societies, to try to establish what types of social and economic policies might reduce health inequalities.[5–8] Elsewhere in public-health research, interest is growing in how social and physical environments might interact to affect health, both in a salutogenic (ie, health improving) and pathogenic sense.[9,10] In this Article, we combine these strands of research.

How natural environments, or so-called green spaces, might affect health and health-related behaviour has received substantial attention from a range of disciplines, including epidemiology and psychology.[11–18] Green spaces are defined as "open, undeveloped land with natural vegetation"[19] and include parks, forests, playing fields, and river corridors, for example. Evidence suggests that contact with such environments has independent salutogenic effects[20]—eg, green spaces independently promote physical activity.[17,21] Importantly, physical activity in such environments might have greater psychological and physiological benefits than might physical activity in other settings.[22,23] However, the effect of green space is not solely based on promotion or enhancement of physical activity. Several studies have shown that contact (either by presence or visual) with green spaces can be psychologically and physiologically restorative, reducing blood pressure and stress levels,[13,22] and possibly promoting faster healing in patients after surgical intervention.[24]

Although many studies show that natural e
enhance health or encourage healthy behav
few examine variation in these effects by so
status,[11,15,18] the potential for access to green e
to affect socioeconomic inequality in health w
tions has, as far as we are aware, received no

We postulated that socioeconomic inequali
will be less pronounced in people with greate
green space than in those with less exposure
for this hypothesis is that some pathways, th
lower socioeconomic position might lead to
are potentially modified by exposure to gre
know, for example, that people with low socioeconomic status are less likely to exercise[25] than are those with high socioeconomic status, partly because the environments in which they live are less conducive to it.[26] Indeed, evidence for the relations between socioeconomic status and green

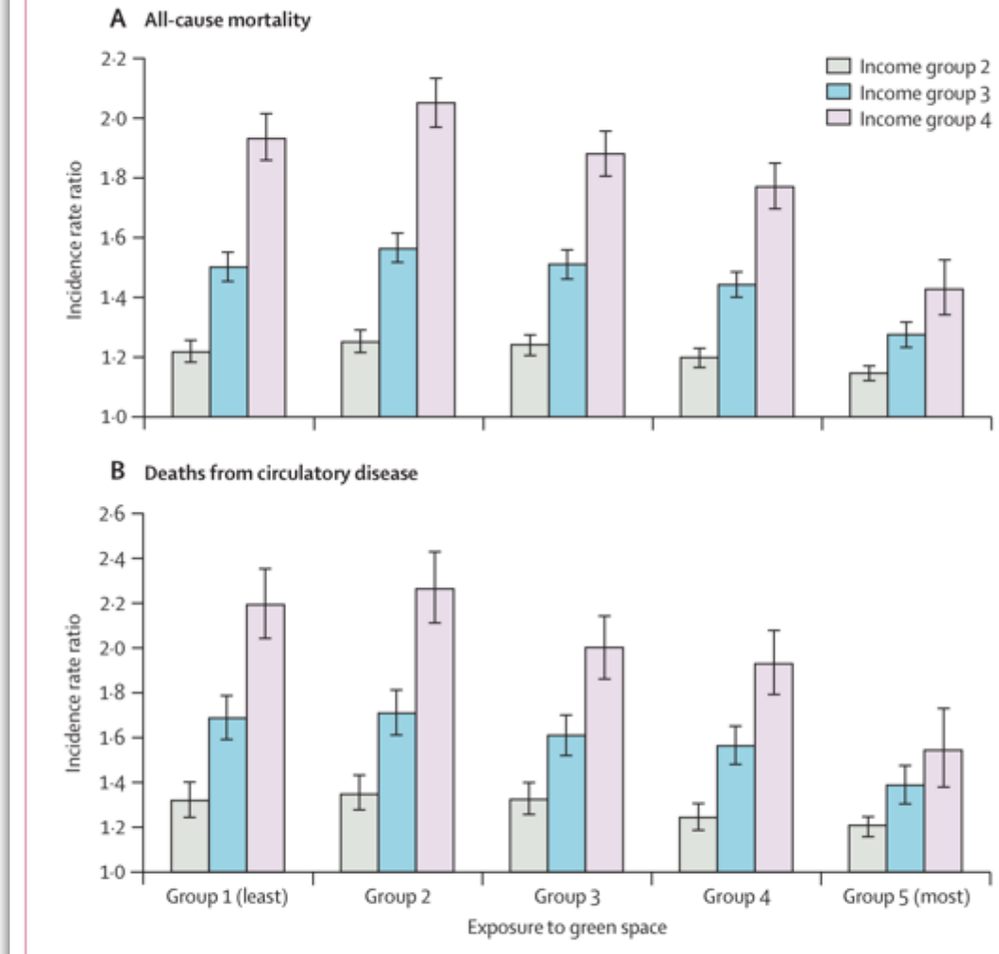


Figure 2: **Incidence rate ratios for all-cause mortality (A) and deaths from circulatory disease (B) in income-deprivation quartiles 2–4, relative to income deprivation quartile 1 (least deprived), stratified by exposure to green space**

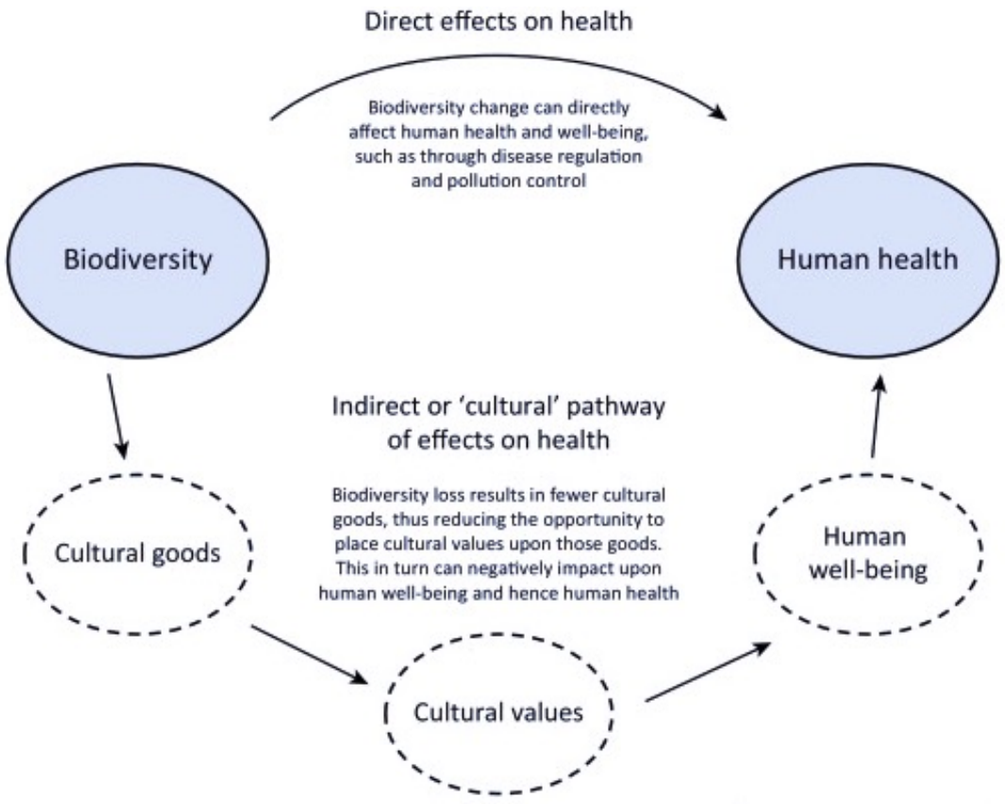
	Groups of exposure to green space					Total
	1 (least exposed)	2	3	4	5 (most exposed)	
Income-deprivation group 1 (least deprived)	1 497 663	1 512 733	1 756 134	2 503 755	3 716 717	10 987 002
Income-deprivation group 2	1 757 904	1 617 400	1 720 964	2 080 000	2 891 637	10 067 905
Income-deprivation group 3	2 291 828	2 033 620	2 025 834	1 821 320	1 161 087	9 333 689
Income-deprivation group 4 (most deprived)	2 797 692	2 983 898	2 591 694	1 654 367	396 989	10 424 640
Total	8 345 088	8 147 653	8 094 629	8 059 446	8 166 435	40 813 236

Table: **Study population size, stratified by exposure to green space and by income deprivation**

Total study population was 40813236, with 366348 deaths

Effect of exposure to natural environment on health inequalities: an observational population study. Lancet (London, England), 372(9650), 1655–1660. http://doi.org/

Ecosystem Services and Human Health



Clark, N. E., Lovell, R., Wheeler, B. W., Higgins, S. L., Depledge, M. H., & Norris, K. (2014). Biodiversity, cultural pathways, and human health: a framework. *Trends in Ecology & Evolution, 29*(4), 198-204.

	Naturalness	Complexity	Structural coherence	structural form	depth cues	Openness	Information gathering support	Access	Safety	Engagement
Biophilia theory (BT)	X	X								
Habitat: prospect-refuge theory (PRT)	X				X	X	X	X	X	
Savanna theory (ST)	X			X	X	X	X	X	X	
Stress recovery theory (SRT)	X	X	X	X	X		X	X	X	X
Environmental information processing theory (EIPT)	X	X	X	X	X			X	X	X
Attention restoration theory (ART)	X								X	X
Environmental aesthetics (EA)	X	X	X	X		X	X		X	X
Environ. aesthetics via urban design (EA/Urban)		X	X	X	X	X	X	X	X	X
Scenic or landscape aesthetics (S/LA)	X	X	X	X	X	X		X	X	X
Design principles (DP)	X	X	X	X	X	X	X	X	X	X
Frequency of concurrence	9	7	6	7	7	6	6	7	9	7

Hunter, M. R., & Askarinejad, A. (2015). Designer's approach for scene selection in tests of preference and restoration along a continuum of natural to manmade environments. Frontiers in Psychology, 6, 1228. http://doi.org/10.3389/fpsyg.2015.01228

(un)Awareness Street Trees on Attention

FIGURE 1 | Streetscape images. (Upper row, streetscape with no greenery; Lower row, streetscape with simulated greenery).

frontiers in PSYCHOLOGY

ORIGINAL RESEARCH ARTICLE
published: 15 August 2014
doi: 10.3389/fpsyg.2014.00906

Does awareness effect the restorative function and perception of street trees?

*Ying-Hsuan Lin[1], Chih-Chang Tsai[2], William C. Sullivan[3], Po-Ju Chang[4] and Chun-Yen Chang[1]**

[1] Laboratory of Healthy Landscape and Healthy People, Department of Horticulture and Landscape Architecture, National Taiwan University, Taipei, Taiwan
[2] Landscape Section, Urban and Rural Development Bureau, Taoyuan County Government, Taoyuan, Taiwan
[3] Department of Landscape Architecture, University of Illinois at Urbana-Champaign, Champaign, IL, USA
[4] Program of Landscape and Recreation, National Chung Hsing University, Taichung, Taiwan

Edited by:
Marc Glenn Berman, The University of South Carolina, USA

Reviewed by:
Marc Glenn Berman, The University of South Carolina, USA
Jason Duvall, University of Michigan, USA

***Correspondence:**
Chun-Yen Chang, Laboratory of Healthy Landscape Healthy People, Department of Horticulture and Landscape Architecture, National Taiwan University, R204, 138, Sec. 4, Keelung Rd., Taipei, 10673, Taiwan
e-mail: cycmail@ntu.edu.tw

Urban streetscapes are outdoor areas in which the general public can appreciate green landscapes and engage in outdoor activities along the street. This study tested the extent to which the degree of awareness of urban street trees impacts attention restoration and perceived restorativeness. We manipulated the degree of awareness of street trees. Participants were placed into four groups and shown different images: (a) streetscapes with absolutely no trees; (b) streetscapes with flashes of trees in which participants had minimal awareness of the content; (c) streetscapes with trees; and (d) streetscapes with trees to which participants were told to pay attention. We compared the performance of 138 individuals on measures of attention and their evaluations of perceived restorativeness. Two main findings emerged. First, streetscapes with trees improved the performance of participants on attentional tests even without their awareness of the trees. Second, participants who had raised awareness of street trees performed best on the attentional test and rated the streetscapes as being more restorative. These findings enhance our knowledge about the role of an individual's awareness of restorative elements and have implications for designers and individuals who are at risk of attentional fatigue.

Keywords: DSBT, attention restoration, perceived restorativeness, manipulation on awareness degree

"心不在焉，視而不見，聽而不聞，食而不知其味。"
《禮記•大學》

"When one is absent-minded, he looks but sees nothing, hears but pays no attention, and eats but has no taste for it."
(The Great Learning, Classic of Rites)

INTRODUCTION

Elements in the natural environment improve psychological well-being by reducing stress, restoring attention, and increasing positive emotions and esthetic values (Ulrich, 1984; Ulrich et al., 1991; Korpela et al., 2002; Groenewegen et al., 2006; Abraham et al., 2010; Bowler et al., 2010; Kaplan and Kaplan, 2011). Studies have demonstrated that increasing natural elements in an urban environment improved individuals' well-being (Kaplan, 2007; Chang et al., 2008; Korpela et al., 2010; Martens et al., 2011). In particular, natural elements in urban landscapes can help people pay attention or restore their capacity to pay attention. Kaplan and Kaplan's Attention Restoration Theory (ART) proposes that individuals' directed attention has limited capacity which becomes depleted when processing non-fascinating information about one's environment or performing attentionally demanding tasks (Kaplan and Kaplan, 1989).

Because directed attention is also needed for executive functioning and self-regulation (Korpela et al., 2001; Kaplan and Berman, 2010), directed attention fatigue can lead to a variety of negative consequences such as inability to concentrate, irritability, and even violent behavior (Kuo and Sullivan, 2001; Taylor and Kuo, 2009). Exposure to natural environments and to built environments that include natural elements such as trees have been shown to enhance an individuals' ability to recover from directed attention fatigue (Herzog et al., 2003; Laumann et al., 2003; Berto, 2005; Berman et al., 2008; Staats et al., 2010). Thus, understanding nature's ability to restore directed attention is useful in preventing the negative consequences of directed attention fatigue.

Do natural environments benefit individuals even when they are not aware of their surroundings? Kaplan (2001) argued that these restorative effects could happen without awareness. However, some studies used ART as a theoretical framework to discuss restorative environmental characteristics via self-rating questionnaires (e.g., Hartig et al., 1997, 2003; Chang et al., 2008), which requires participants to think back on their experience, hinting that restorative outcomes require awareness. Therefore, these studies implicitly assume positive environmental characteristics were consciously, not subconsciously, noticed by people. In one study, self-rated restorativeness was correlated with directed attention restoration (Berto, 2005). In spite of these associations, few previous studies have manipulated levels of awareness of natural elements and then examined the resulting impacts on attentional functioning. By manipulating people's awareness of natural elements, this study helps fill a gap in our knowledge regarding the extent to which awareness of natural elements in the landscape enhances one's restorative experience.

Table 1 | Mean directed attention score before and after treatment.

Group	DSBT pre-test	DSPT post-test	*T*
No tree ($n = 34$)	7.12 (1.45)	6.53 (1.38)	2.385*
Minimal Awareness ($n = 31$)	6.45 (1.55)	7.06 (1.44)	−2.31*
Moderate Awareness ($n = 36$)	6.28 (1.50)	6.83 (1.44)	−2.28*
Heightened Awareness ($n = 37$)	6.57 (1.56)	8.05 (1.53)	−5.68**

Standard deviations are in the parentheses.
*Note: *$p \leqq 0.05$, **$p \leqq 0.001$.*

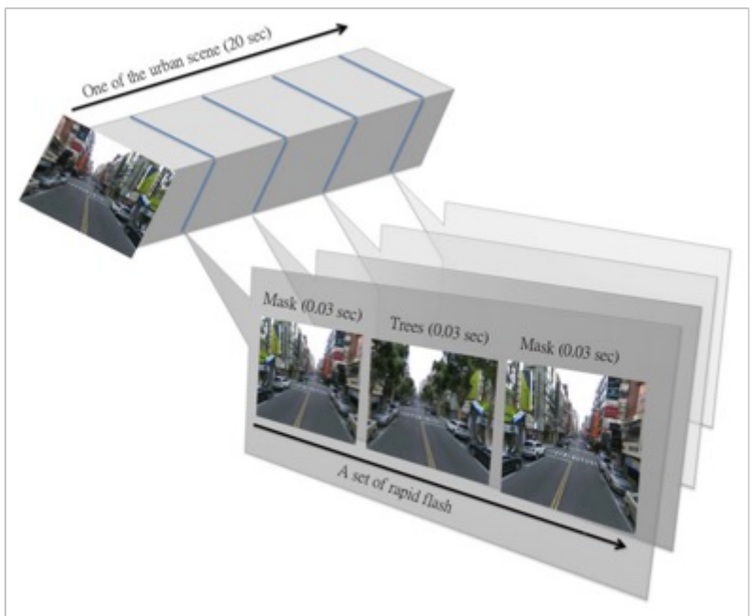
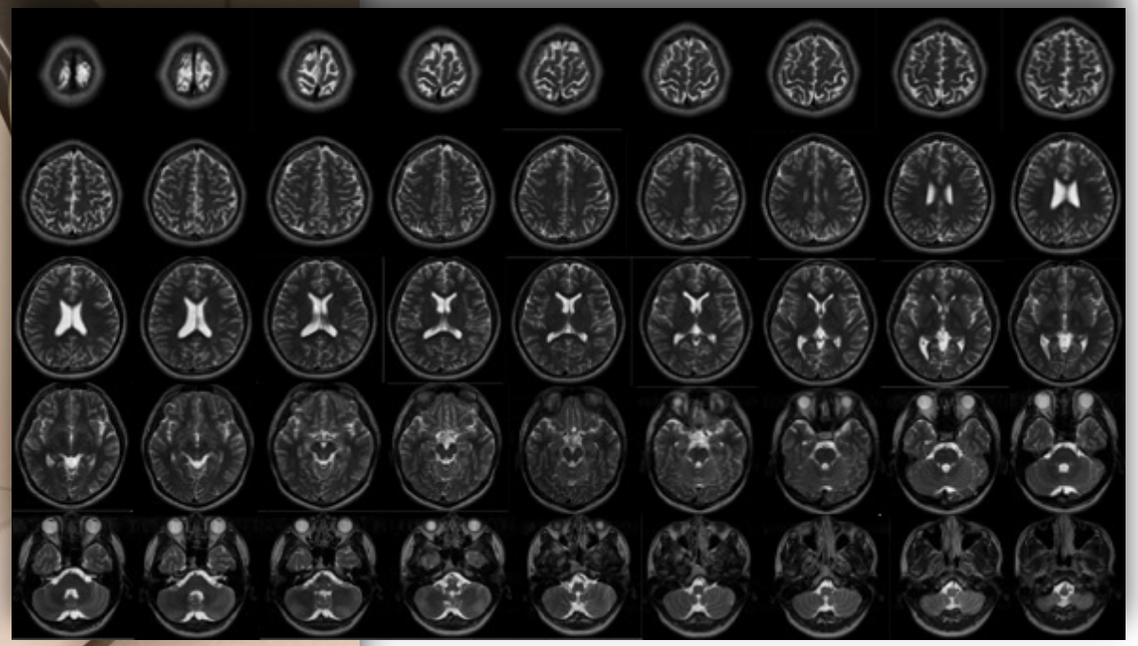


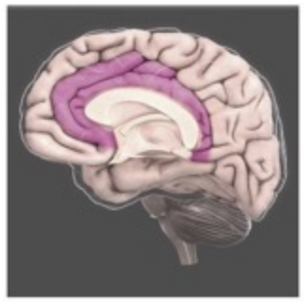
FIGURE 2 | How the rapid flashed of street trees were flashed in. (Note: A mask is the horizontally flipped image of the streetscape being played).


SIEMENS
MAGNETOM Prisma



Landscape Types on Brain Activities

Cingulate Gyrus



Overview

An important part of the limbic system, the cingulate gyrus helps regulate emotions and pain. The cingulate gyrus is thought to directly drive the body's conscious response to unpleasant experiences. In addition, it is involved in fear and the prediction (and avoidance) of negative consequences and can help orient the body away from negative stimuli. Learning to avoid negative consequences is an important feature of memory.

Case study

In an intriguing study, Nente and colleagues (20
anterior cingulate lesion. During hospitalization,
previously known many of the hospital personn
childhood in a rural village. These symptoms re
recovery.

Associated functions

- pain processing
- emotion
- memory
- self–regulation

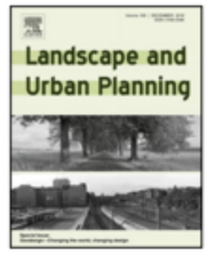
.org

Landscape and Urban Planning 162 (2017) 137–144

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan



Research Paper

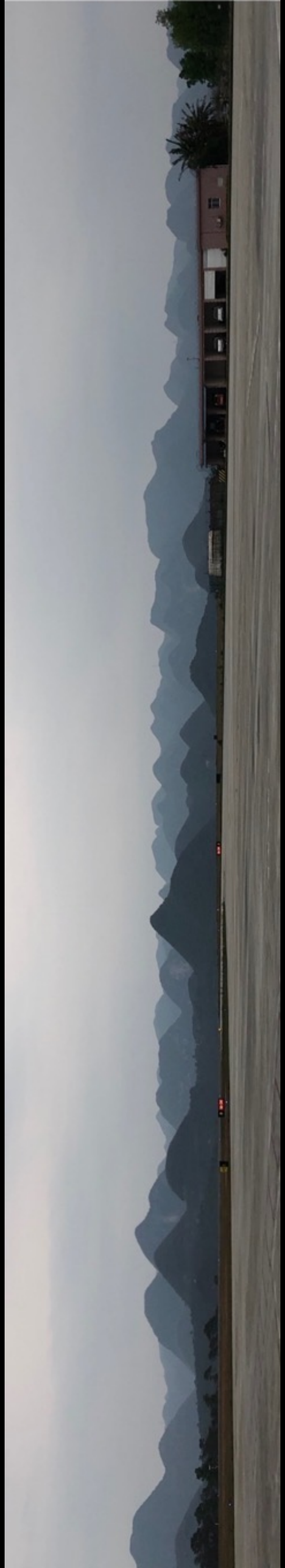
Using functional Magnetic Resonance Imaging (fMRI) to analyze brain region activity when viewing landscapes

I-Chun Tang [a,1], Yu-Ping Tsai [b,1], Ying-Ju Lin [b], Jyh-Horng Chen [c], Chao-Hsien Hsieh [c], Shih-Han Hung [b], William C. Sullivan [d], Hsing-Fen Tang [e], Chun-Yen Chang [b,*]

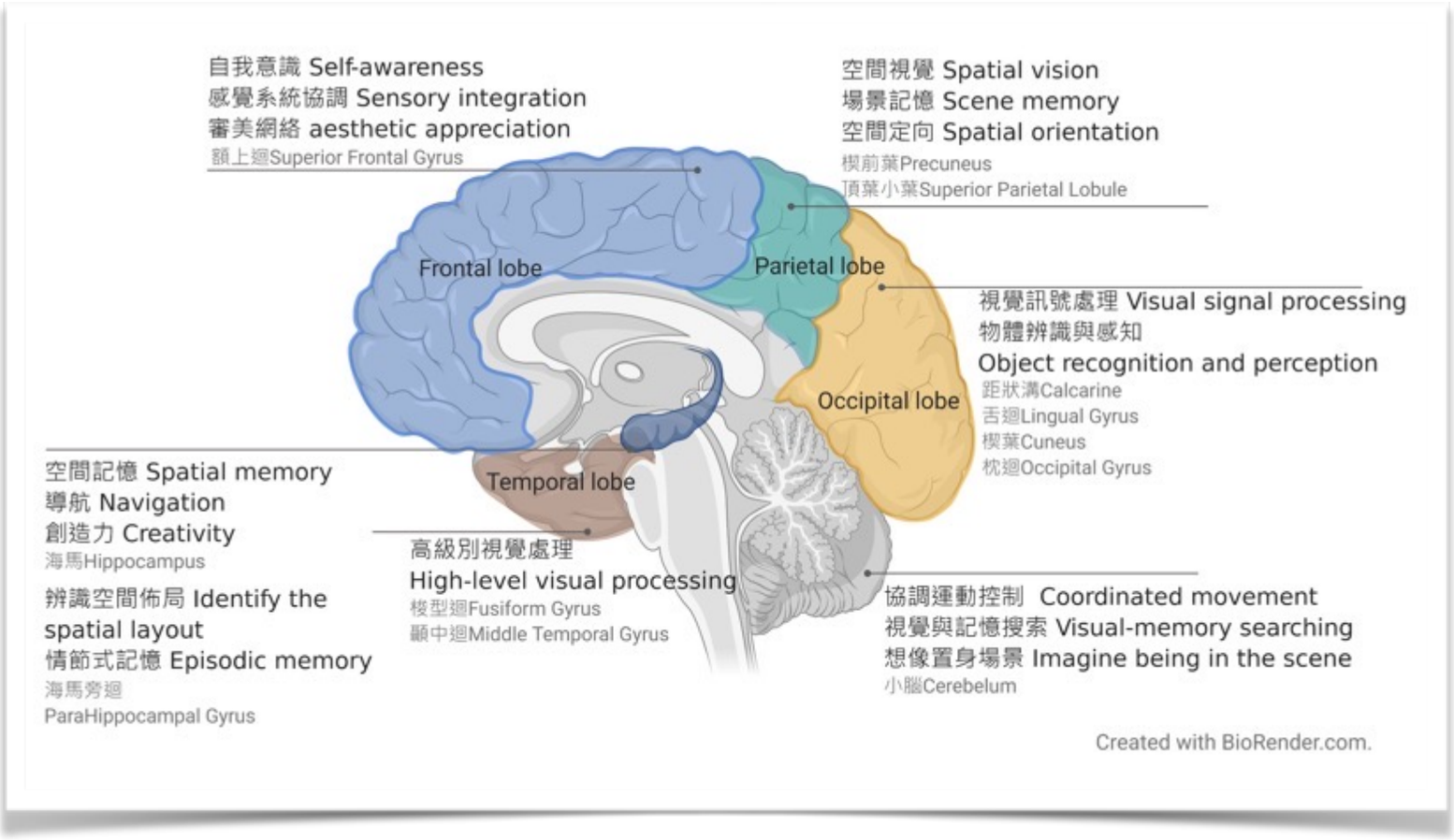
[a] General Education Center, Chang Jung Christian University, Tainan, Taiwan
[b] Department of Horticulture and Landscape Architecture, National Taiwan University, Taipei, Taiwan
[c] Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan
[d] Department of Landscape Architecture, University of Illinois at Urbana-Champaign, Champaign, IL, USA
[e] Department of Leisure Industry and Health Promotion, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan

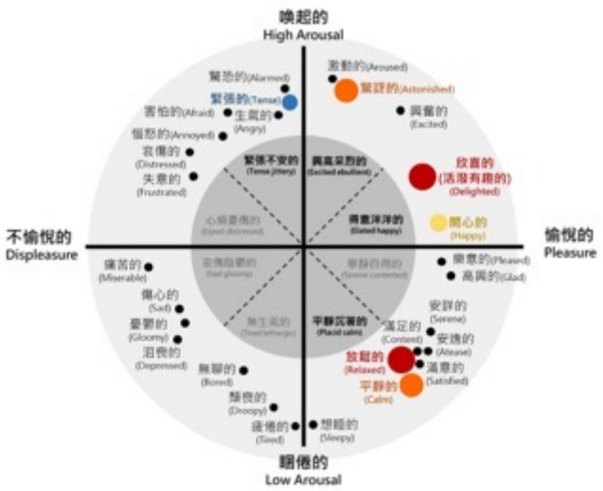
HIGHLIGHTS

- A new neuroscience approach using functional magnetic resonance imaging (fMRI) in landscape evaluation is proposed.
- Urban and nature landscape effect differently not only in attention restorative measuring scale but also in brain activities.
- Brain activated differently with urban and other nature landscapes, especially water.

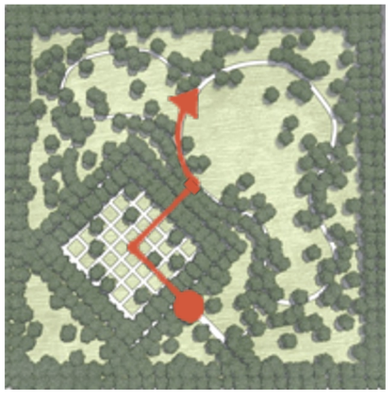


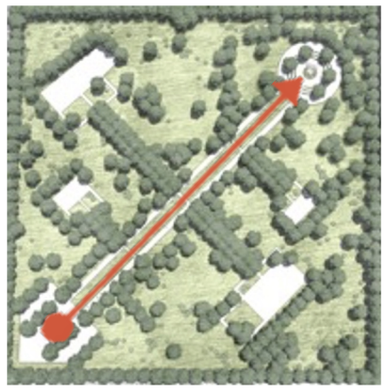
Permeable - Hierarchical Design on Mental and Brain

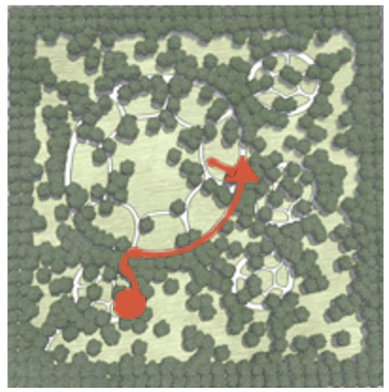


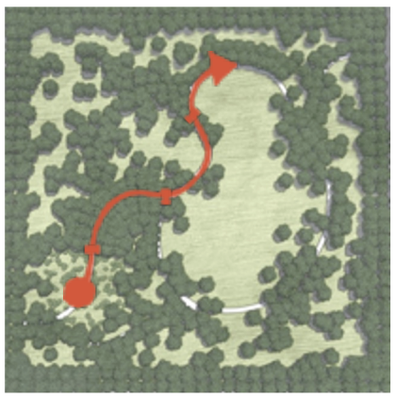


Influence of Ordering Principles in Landscape Spatial Design on Brain and Psychological Responses









Visual Processing

Spatial Perception

Place Memory

Emotional Perception

Brainareas	Axis	Symmetry	Hierarchy	Rhythm	Datum
	(R / L)	(R / L)	(R / L)	(R / L)	(R / L)
Lingual Gyrus	·/·	·/·	·/·	·/·	·/·
Calcarine	·/	·/·	·/·	·/·	·/
Fusiform Gyrus	·/·	·/·	·/·	·/·	·/·
Middle Temporal Gyrus	·/·	·/·	·/·	·/·	·/·
Precuneus	·/·	·/·	·/·	·/·	·/
SupraMarginal Gyrus				·/	
Hippocampus	·/·	·/·	/·	·/·	/·
Parahippocampal Gyrus	·/·	·/·	·/·	·/·	·/·
Posterior Cingulate Cortex	·/·	·/·	·/·	·/·	·/·
Thalamus	·/·	·/	·/·	·/·	·/·
Middle Cingulate Cortex	·/·	·/·	·/·	·/·	·/·
Middle Frontal Gyrus	/·	·/	·/·	/·	/·

n=49；uncorrected $p<.001$；cluster size >15；extent threshold $p<.05$

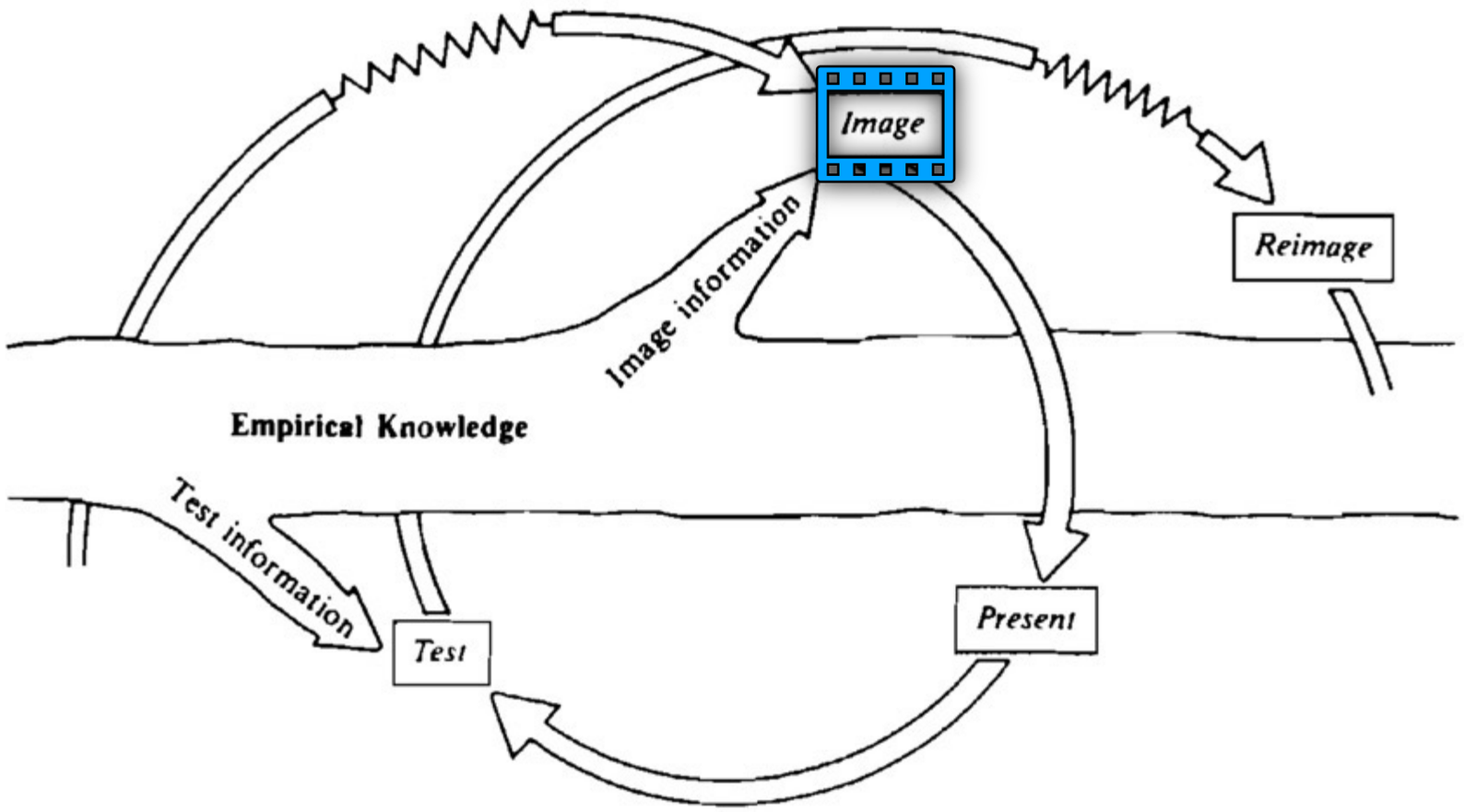
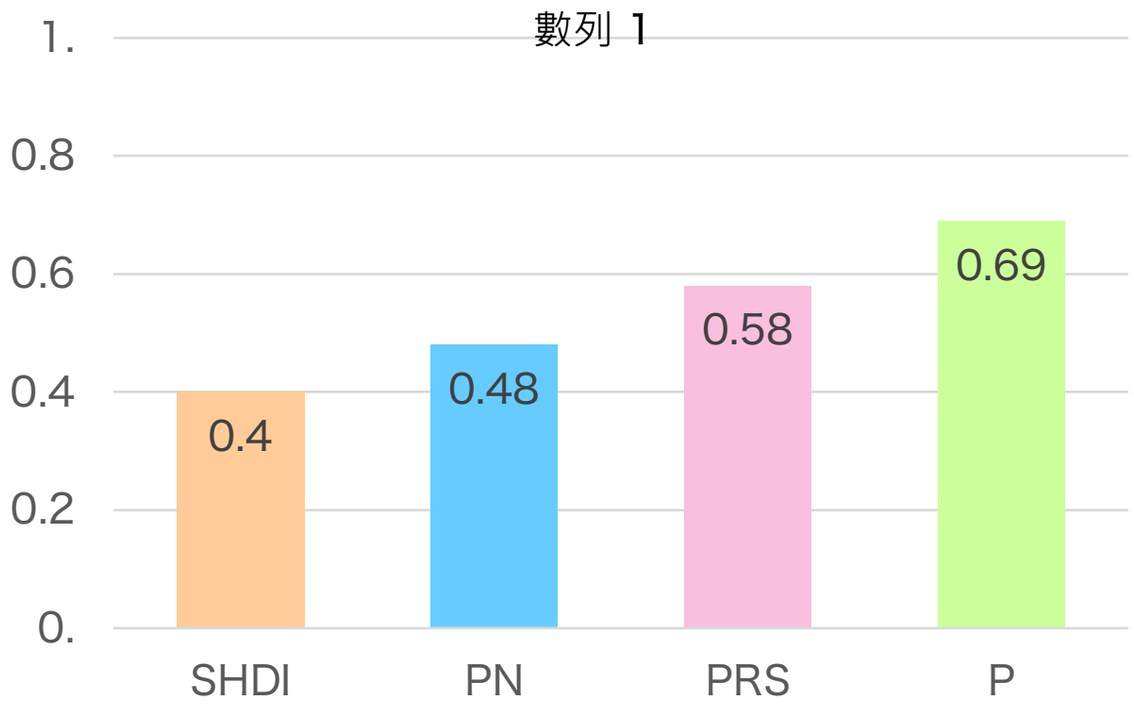


Image
Reimage
Image information
Empirical Knowledge
Test information
Test
Present



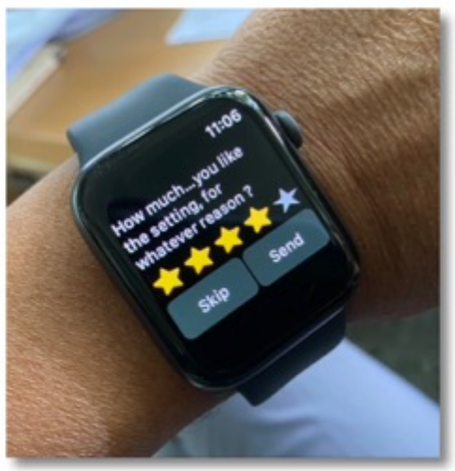
SHDI: Shannon-Wiener Diversity Index

PN: Perceived Naturalness

PRS: Perceived Restorativeness Scale

P: Preference

HealthCloud



iPhone w HealthCloud

Apple Watch

Health

Physiological

HR/minute
- HRV
- Blood Oxygen Level

Psychological

Attention (Stroop test)
Questionnaire
- Preference
- Restorativeness
- Emotion
- Stress
- ...

Environment

Map System

GPS
Elevation
Google Street View
Aerophoto

Voices

Sound Db
Voices

Weather

Weather
Temperature
Humidity
Wind Speed
Wind Degree

Images

Photo on request

Health Cloud

Browser >

Dashboard

Browser

Analysis

Google Api

Admin

Configuration

Set Fields

User Management

yezasir@voltaer.com

Logout

Time: 2019-12-18 00:00 ~

Field: select a field

Tester ID: 00007

Search

Export CSV

December 2019

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

Dat	eat	Elevation	HRV	GPS:Latitude	GPS:Longitude	Distance	Weather	Sound Db	Stroop	Quiz Id	Pop Quiz	Photos	Voices
201		17.17045021057129	36	25.013631	121.540086	784.0648624165857	Clear-clear sky						
201		16.975339889526367	37	25.013660	121.540147	777.1448183844524	Clear-clear sky						
201		16.92401885											
201		16.94147872											
201		16.93401908											
201		16.92607688											
201		16.96109771											
2019-12-16	19:29:43	NTU	00007	61		16.93465805							
2019-12-16	19:28:43	NTU	00007	60		16.94016265							
2019-12-16	19:27:43	NTU	00007	62		16.96450042							
2019-12-16	19:26:43	NTU	00007	61		16.94170761							
2019-12-16	19:25:43	NTU	00007	59		16.93356513							
2019-12-16	19:24:43	NTU	00007	62		16.99951171							
2019-12-16	19:23:43	NTU	00007	65		16.94378280							
2019-12-16	19:22:43	NTU	00007	59		16.97039604							
2019-12-16	19:21:44	NTU	00007	59		16.94743919							
2019-12-16	19:20:43	NTU	00007	72		16.92477226							
2019-12-16	19:19:43	NTU	00007	60		16.99932479							
2019-12-16	19:18:43	NTU	00007	54		16.93714141							
2019-12-16	19:17:43	NTU	00007	57		16.95633316							
2019-12-16	19:16:43	NTU	00007	56		16.99898147							
2019-12-16	19:15:43	NTU	00007	59		16.95037078							

Health Cloud

Dashboard >

Dashboard

Browser

User Management

204projects@gmail.com

Logout

Display All: off

Please select a field

Update

Map Satellite

Test ID: 0827002 82

Test ID: 0001 111

Test ID: 886001 71

Kazakhstan Mongolia Afghanistan Iraq Iran Pakistan India Thailand Indonesia Papua New Guinea Madagascar Indian Ocean New Zealand North Pacific Ocean United States Mexico North Atlantic Ocean Venezuela Colombia Peru Brazil Bolivia Chile Argentina South Pacific Ocean

Google

Map data ©2019 Terms of Use


12:00:00 AM
Urbana-Champaign,
Illinios Statie, USA
Heart Rate (Beats/min)
HeartBeat (最大)
21.02
133.76

描圖 Copying

描圖>看圖．描圖>發想(蔡宇平,2015)
Copying>Seeing, Copying>Thinking(Tsai, Y. P. ,2015).
描圖>看圖(王怡茹,2017)
Copying>Seeing(Wang, Y. J., 2017)
描圖>看圖(葉昱辰,2018)
Copying>Seeing(Yeh, Y. C., 2018)
描圖>看圖．描圖>對照組定案(施均穎,2020)
Line tracing> Line seeing; Line tracing>Non ST draw final
(Shih, C. Y.,2020)

空間秩序-位階(獨特感)

(Pan, M. C., 2020)

描圖 Copying

描圖>看圖(蔡宇平,2015)
Copying>Seeing(Tsai, Y. P. ,2015).
描圖>對照組定案(施均穎,2020)
Line tracing>Non ST draw final(Shih, C. Y.,2020)

發散 Divergence

景觀設計>描圖(王怡茹,2017)
Landscape architecture design>Copying(Wang, Y. J., 2017)
發散>描圖．發散>精煉(葉昱辰,2018)
Divergence>Copying, Divergence>Refining(Yeh, Y. C., 2018)
手繪發想>描圖．手繪發想>手繪定案(施均穎,2020)
Sketch thinking>Line tracing, Sketch thinking>ST draw final(Shih, C. Y.,2020)

都市 Urban

觀看都市>控制組(Tang, I. C., et. al, 2017)
Viewing urban>control group
都市>森林．都市-低頻率(李欣恬, 2017)
Urban>Forest, Urban- Low spatial frequency(Huang, C. Y., 2017)

景觀空間 Landscape space

軸線/對稱/位階/韻律/基律空間>低視覺處理．
軸線與和諧性呈負相關(潘敏琪, 2020)
Axis/Symmetry/Hierarchy/Rhythm/Datum space>Low vision process image, Axis negatively correlated with harmony(Pan, M. C., 2020)
體驗滲透與層次/藏與露/引導與暗示空間>低視覺處理
(梁心怡, 2020)
Experiencing the permeable and hierarchical/the hidden and revealed/the guided and suggested space>Low vision process image(Liang, S. Y. ,2020)

發散 Divergence

景觀設計>描圖(王怡茹,2017)
Landscape architecture design>Copying(Wang, Y. J., 2017)
發散>描圖．發散>精煉(葉昱辰,2018)
Divergence>Copying, Divergence>Refining(Yeh, Y. C., 2018)
手繪發想>不動手發想．手繪發想>描圖．
手繪發想>手繪定案(施均穎,2020)
Sketch thinking>Non sketch thinking, Sketch thinking>Line tracing,Sketch thinking>ST draw final(Shih, C. Y.,2020)

恢復力 Restoration

魅力性>控制組．相容性>控制組
(Tang, I. C., et. al, 2017)
Fascination>control group, Compatibility>control group.

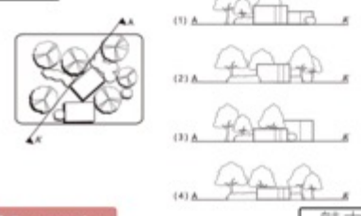
景觀空間 Landscape space

軸線/對稱/位階/韻律/基律空間>低視覺處理．
軸線與和諧性呈負相關．對稱與錯綜複雜感呈正相關．
位階與獨特感呈正相關．韻律與錯綜複雜感呈負相關．
基律與放鬆舒服感呈正相關．基律與錯綜複雜感呈正相關(潘敏琪, 2020)
Axis/Symmetry/Hierarchy/Rhythm/Datum space>Low vision process image, Axis negatively correlated with harmony, Symmetry positively correlated with intricacy, Hierarchy positively correlated with uniqueness, Rhythm negatively correlated with intricacy, Datum positively correlated with intricacy, Datum positively correlated with relax and comfortable. (Pan, M. C., 2020)
體驗滲透與層次空間>低視覺處理 (梁心怡, 2020)
Experiencing the permeable and hierarchical space>Low vision process image(Liang, S. Y. ,2020)

園藝不同階段 Different stages of Horticulture

整地播種>未參與階段和STG/ACC具連結．
收成>未參與和STG/ACC具連結(賴沛瑄,2020)
Related with STG and ACC in the stage of site preparation and sowing, related with STG and ACC in the stage of harvest. (Lai, P. H., 2020)

景觀空間感



精煉 Convergence

精煉>描圖(蔡宇平,2015)
Refining>Copying(Tsai, Y. P. ,2015).
手繪定案>對照組定案；手繪定案>描圖
(施均穎,2020)
ST draw final> Non ST draw final; ST draw final>Line tracing
(Shih, C. Y.,2020)

高/低分群 High/ Low score groups

高分群>低分群．低分群>高分群(黃嘉儀,2015)
High>Low score groups, Low>High score groups
(Huang, C. Y., 2015)

都市 Urban

都市>海岸(李欣恬, 2017)
Urbant>Coast(Huang, C. Y., 2017)

恢復力 Restoration

魅力性>控制組
Fascination>control group(Tang, I. C., et. al, 2017)

都市 Urban

都市>海岸(李欣恬, 2017)
Urbant>Coast(Huang, C. Y., 2017)
都市>綠地(許瑜芸,2017)
Urban>Green landscape(Hsu, Y. Y., 2017)

景觀空間 Landscape space

軸線/對稱/位階/韻律/基律空間>低視覺處理．
軸線與和諧性呈負相關．
位階與獨特感呈正相關(潘敏琪, 2020)
Axis/Symmetry/Hierarchy/Rhythm/Datum space>Low vision process image, Axis negatively correlated with harmony, Hierarchy positively correlated with uniqueness. (Pan, M. C., 2020)
體驗滲透與層次空間>低視覺處理 (梁心怡, 2020)
Experiencing the permeable and hierarchical space>Low vision process image(Liang, S. Y. ,2020)

園藝不同階段 Different stages of Horticulture

整地播種>未參與和IFG具連結．除草施肥>未參與和ACC具連結．
收成>未參與和ACC/IFG具連結(賴沛瑄,2020)
Related with IFG in the stage of site preparation and sowing, related with ACC in the stage of fertilizaton and weeding, related with ACC and IFG in the stage of harvest. (Lai, P. H., 2020)

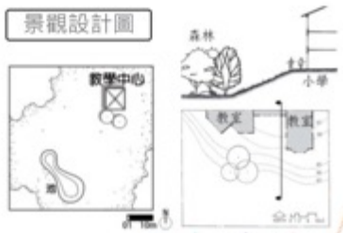
園藝不同階段 Different stages of Horticulture

整地播種>未參與和ACC/IFG具連結．
收成>未參與和STG/ACC/IFG具連結(賴沛瑄,2020)
Related with ACC and IFG in the stage of site preparation and sowing, related with STG, ACC and IFG in the stage of harvest. (Lai, P. H., 2020)

描圖 Copying

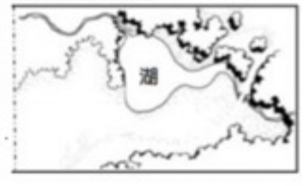
描圖>看圖．描圖>發想(蔡宇平,2015)
Copying>Seeing, Copying>Thinking(Tsai, Y. P. ,2015).
描圖>看圖(葉昱辰,2018)
Copying>Seeing(Yeh, Y. C., 2018)
描圖>看圖;描圖>對照組定案(施均穎,2020)
Line tracing> Line seeing; Line tracing>Non ST draw final
(Shih, C. Y.,2020)

景觀設計圖



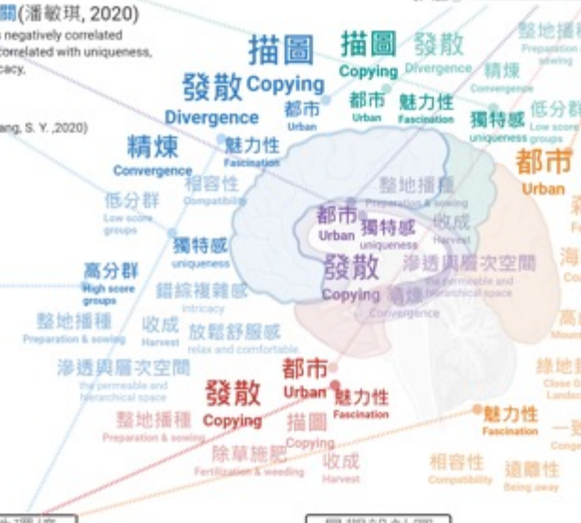
魅力性環境

景觀設計圖



精煉 Convergence

手繪定案>對照組定案(施均穎,2020)
ST draw final> Non ST draw final(Shih, C. Y.,2020)



發散 Divergence

發散>描圖．發散>精煉(葉昱辰,2018)
Divergence>Copying, Divergence>Refining(Yeh, Y. C., 2018)
手繪發想>不動手發想．手繪發想>手繪定案
(施均穎,2020)
Sketch thinking>Non sketch thinking, Sketch thinking>
ST draw final(Shih, C. Y.,2020)

都市 Urban

觀看都市>控制組(Tang, I. C., et. al, 2017)
Viewing urban>control group

觀看都市圖

園藝不同階段 Different stages of Horticulture

整地播種>未參與和IFG具連結．
收成>未參與和STG具連結(賴沛瑄,2020)
Related with IFG in the stage of site preparation and sowing, related with STG in the stage of harvest. (Lai, P. H., 2020)

都市/高山/水體/森林/海岸 Urban/Mountains/Waterbody/Forests/Coast

觀看高山/水體>控制組(Tang, I. C., et. al, 2017)
Viewing mountains/waterbody>control group
海岸、森林、都市-注意力前後．都市>森林．
森林>海岸．高頻率與低頻率注意力前後．海岸、
森林、都市-高/低頻率(李欣恬, 2017)
Coast, Forest, Urban- pre-post SART, Urban>Forest, Forest>Coast, High/Low spatial frequency pre-post SART, Coast, Forest, Urban- High/Low spatial frequency(Huang, C. Y., 2017)
都市>綠地．都市>水體(許瑜芸,2017)
Urban>Green landscape, Urban>Waterbody(Hsu, Y. Y., 2017)

環境特性 Environmental Features

綠地封閉>開闊(許瑜芸,2017)
Close>Open Green landscape(Hsu, Y. Y., 2017)

恢復力 Restoration

遠離性/魅力性/一致性/相容性>控制組(Tang, I. C., et. al, 2017)
Being away/Fascination/ Congerence/ Compatibility >control group

園藝不同階段 Different stages of Horticulture

整地播種>未參與和IFG具連結．除草施肥>未參與和ACC具連結．收成>未參與和ACC/IFG具連結(賴沛瑄,2020)
Related with IFG in the stage of site preparation and sowing, related with ACC in the stage of fertilizaton and weeding, related with ACC and IFG in the stage of harvest. (Lai, P. H., 2020)

發散 Divergence

景觀設計>描圖(王怡茹,2017)
Landscape architecture design>Copying(Wang, Y. J., 2017)
發散>描圖．發散>精煉(葉昱辰,2018)
Divergence>Copying, Divergence>Refining(Yeh, Y. C., 2018)
手繪發想>描圖．手繪發想>手繪定案(施均穎,2020)
Sketch thinking>Line tracing, Sketch thinking>ST draw final (Shih, C. Y.,2020)

精煉 Convergence

手繪定案>對照組定案(施均穎,2020)
ST draw final> Non ST draw final(Shih, C. Y.,2020)

低分群 Low score groups

低分群>高分群(黃嘉儀,2015)
Low>High score groups,(Huang, C. Y., 2015)

恢復力 Restoration

魅力性>控制組(Tang, I. C., et. al, 2017)
Fascination>control group

景觀空間 Landscape space

軸線/對稱/位階/韻律/基律空間>低視覺處理．
軸線與和諧性呈負相關．位階與獨特感呈正相關
(潘敏琪, 2020)
Axis/Symmetry/Hierarchy/Rhythm/Datum space>Low vision process image, Axis negatively correlated with harmony, Hierarchy positively correlated with uniqueness. (Pan, M. C., 2020)
體驗滲透與層次/藏與露/引導與暗示空間>低視覺處理
(梁心怡, 2020)
Experiencing the permeable and hierarchical/the hidden and revealed/the guided and suggested space>Low vision process image(Liang, S. Y. ,2020)

低分群 Low score groups

低分群>高分群(黃嘉儀,2015)
Low>High score groups,(Huang, C. Y., 2015)

描圖 Copying

描圖>發想(蔡宇平,2015)
Copying>Thinking(Tsai, Y. P. ,2015).
描圖>對照組定案(施均穎,2020)
Line tracing>Non ST draw final(Shih, C. Y.,2020)

發散 Divergence

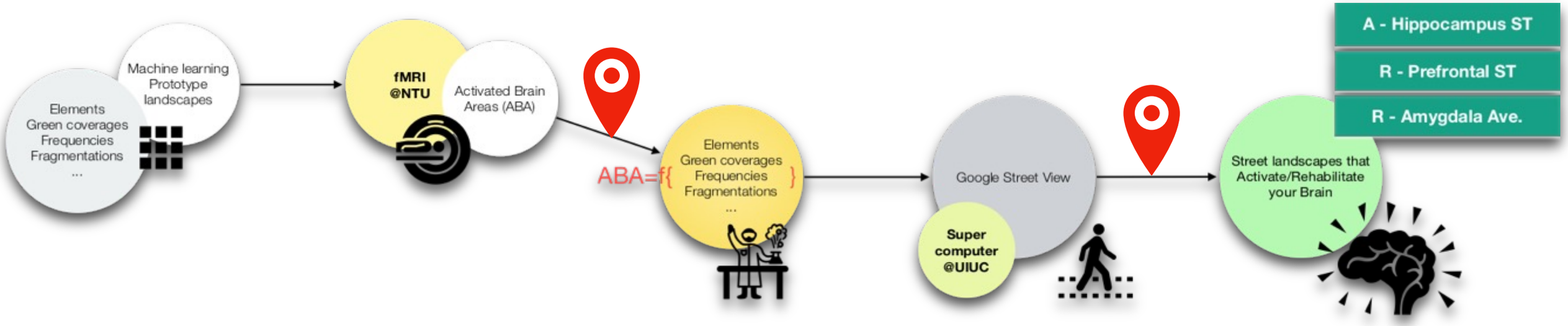
景觀設計>描圖(王怡茹,2017)
Landscape architecture design>Copying(Wang, Y. J., 2017)
發散>描圖．發散>精煉(葉昱辰,2018)
Divergence>Copying, Divergence>Refining(Yeh, Y. C., 2018)
手繪發想>描圖．手繪發想>手繪定案
(施均穎,2020)
Sketch thinking>Line tracing, Sketch thinking>ST draw final
(Shih, C. Y.,2020)

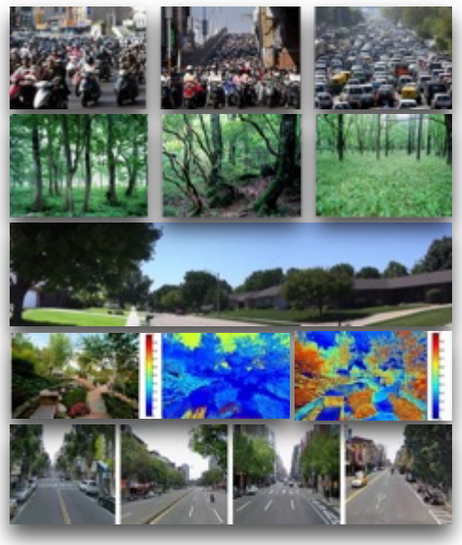
景觀空間 Landscape space

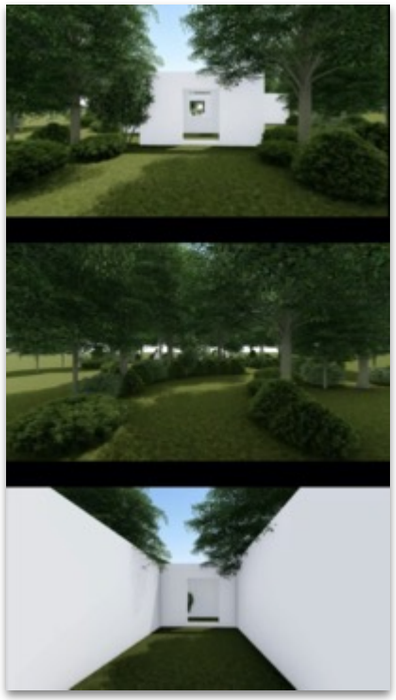
軸線/對稱/位階/韻律/基律空間>低視覺處理．
軸線與和諧性呈負相關(潘敏琪, 2020)
Axis/Symmetry/Hierarchy/Rhythm/Datum space>Low vision process image, Negatively correlated with harmony(Pan, M. C., 202)體驗滲透與層次/藏與露/引導與暗示空間>
低視覺處理 (梁心怡, 2020)
Experiencing the permeable and hierarchical/the hidden and revealed/the guided and suggested space>Low vision process image(Liang, S. Y. ,2020)

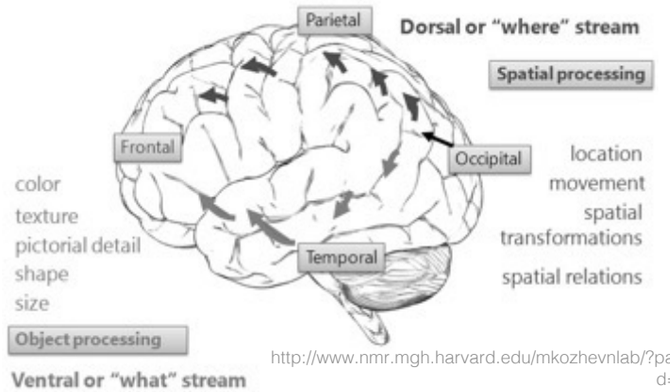
聞鮮花 Smelling fragrant plants

聞鮮花(玫瑰、茉莉、百合)腦區反應(吳彥君,2019)
Smelling landscape common fragrant plants(rose, jasmine and lily)
(Wu, Y. C., 2019)

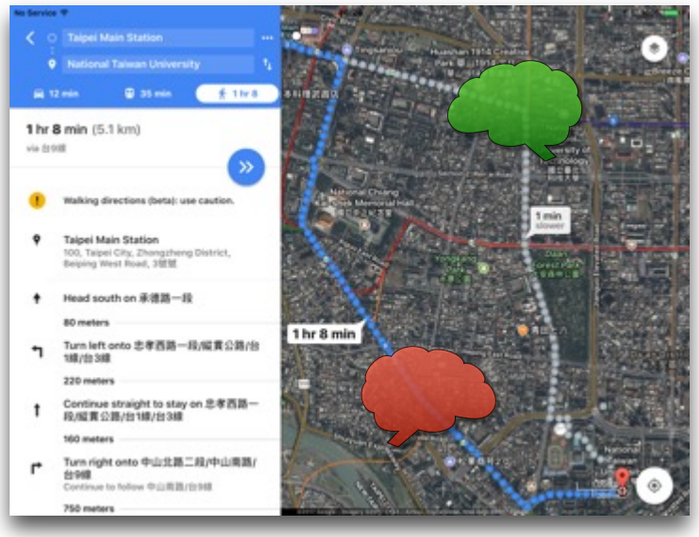








http://www.nmr.mgh.harvard.edu/mkozhevnlab/?page_id=663



We are what we see, We are what we act

Thank you