

**SESSION: Healthcare Design**

**Design  
& Health**  
International Academy for Design and Health

Milano, Italy 11-14 April 2024

**Design & Health**

13TH WORLD CONGRESS & EXHIBITION

**REVITALIZING HEALTH BY SALUTOGENIC DESIGN**

Healthy environment | Healthy people

**Embreathtment, Embodiment, Environmental Enrichment  
In Improved Oncology Outcomes**

in Israel's Newest Cancer Centre Title of the presentation

**Tye Farrow**

Farrow Partners



**POLITECNICO  
MILANO 1863**

DIPARTIMENTO DI ARCHITETTURA,  
INGEGNERIA DELLE COSTRUZIONI  
E AMBIENTE COSTRUITO

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13TH World Congress of the International Academy Design and Health  
Politecnico di Milano

Tye Farrow

Farrow Partners

April 12, 2024

Milano, Italy

# Embreatment, Embodiment, Environmental Enrichment

In Improved Oncology Outcomes in Israel's Newest Cancer Centre



explore:

**medical spaces need to surpass mere technical  
medical treatments & enhance the entire  
human experience**

meaning

**we should view architecture not by *what it is***

*but by what it does*

# causes health

scientifically-grounded, multi-sensory, neuro-wellness interventions





Helmsley Cancer Centre, Jerusalem Israel, Farrow Partners & Rubinstein Ofer



# high performance buildings

# human performance buildings

**stimulate learning, memory,  
enhance creativity, perception, empathy**

**stimulate learning, memory,  
enhance creativity, perception, empathy  
& improved medical outcomes**



scientifically-grounded, multi-sensory, neuro-wellness interventions  
Helmsley Cancer Centre - Israel's newest flagship centre  
collaboration - Farrow Partners & Rubinstein Ofer

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environmental enrichment

environmental enrichment  
embodiment



environmental enrichment  
embodiment  
embreathment





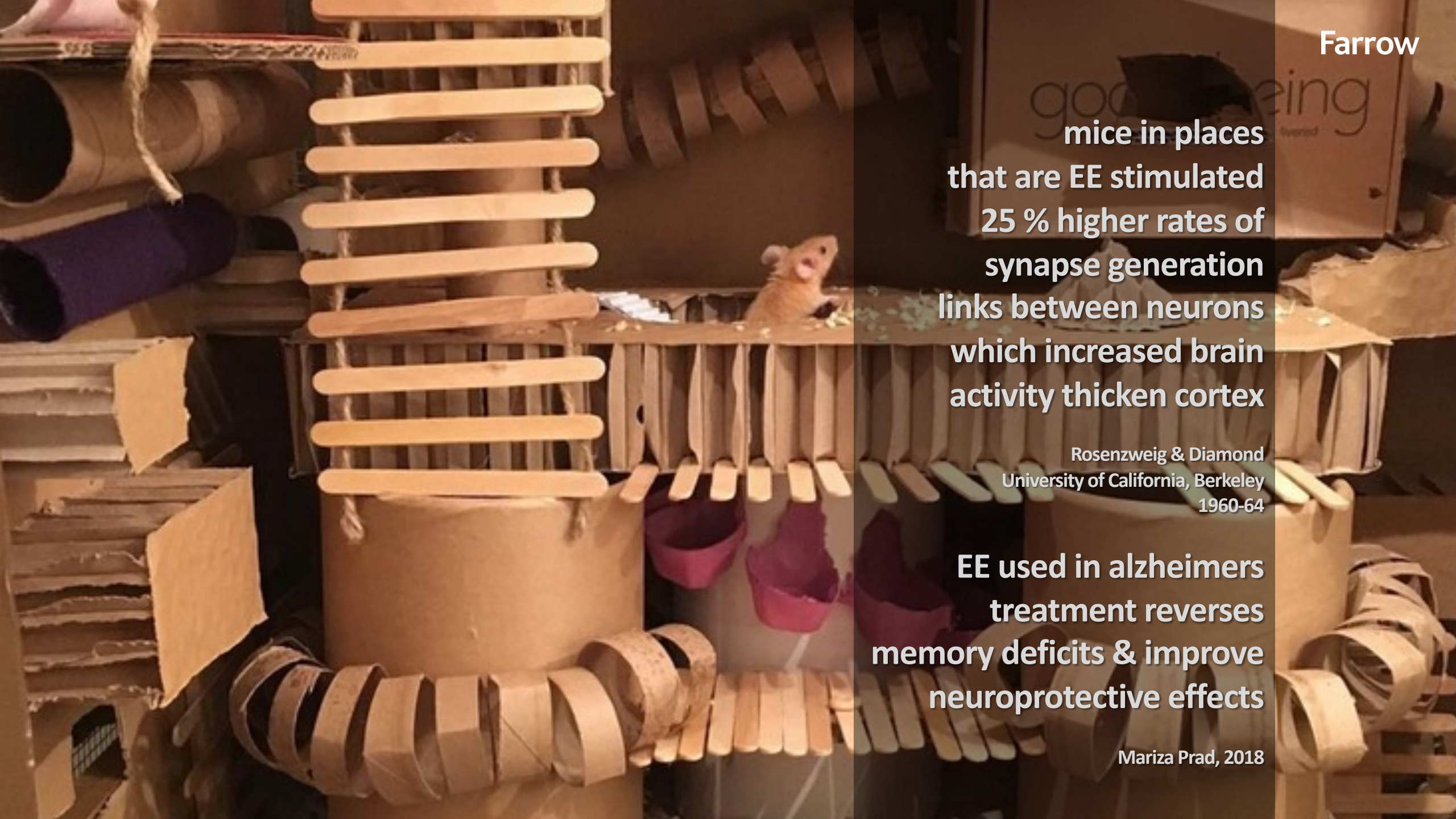
**environmental enrichment**

environmental enrichment (EE)

mice raised as pets  
with richer stimuli  
lived longer  
had fewer behavioral issues  
were physically healthier  
& performed better on  
problem solving tests  
than lab mice raised in cages

Donald O. Hebb 1947





mice in places  
that are EE stimulated  
25 % higher rates of  
synapse generation  
links between neurons  
which increased brain  
activity thicken cortex

Rosenzweig & Diamond  
University of California, Berkeley  
1960-64

EE used in alzheimers  
treatment reverses  
memory deficits & improve  
neuroprotective effects

research also has shown  
that lack of optimal stimulation  
impairs cognitive development  
speeds cognitive decline  
aging & dementia

Karin Volkers et al. 2011

known as *impoverished* environments



Robert King  
part of 'Angola Three'

spent 29 years

solitary confinement

23 hours a day

windowless prison cell

virtually no human contact

damaged hippocampus

memory, spatial orientation & emotion regulation

lost ability to navigate, unable to recognize faces

areas of his brain not being used whither



'white room torture'

# environmental enrichment



**cognitive ↔ pre-cognitive**

physiological ↔ psychological

neuroscience & architecture



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neuroscience & architecture

**how environments enhance neurogenesis  
process of forming neurons  
occurs throughout our lives  
allows us to learn & adapt**



on a neurobiological level, positive stimulating physical surroundings

**reduces cortisol levels (stress/anxiety hormone)**

**decreasing blood pressure/heart issues**

**enhances immune system**

**increases memory & learning**

**strengthening neural networks**

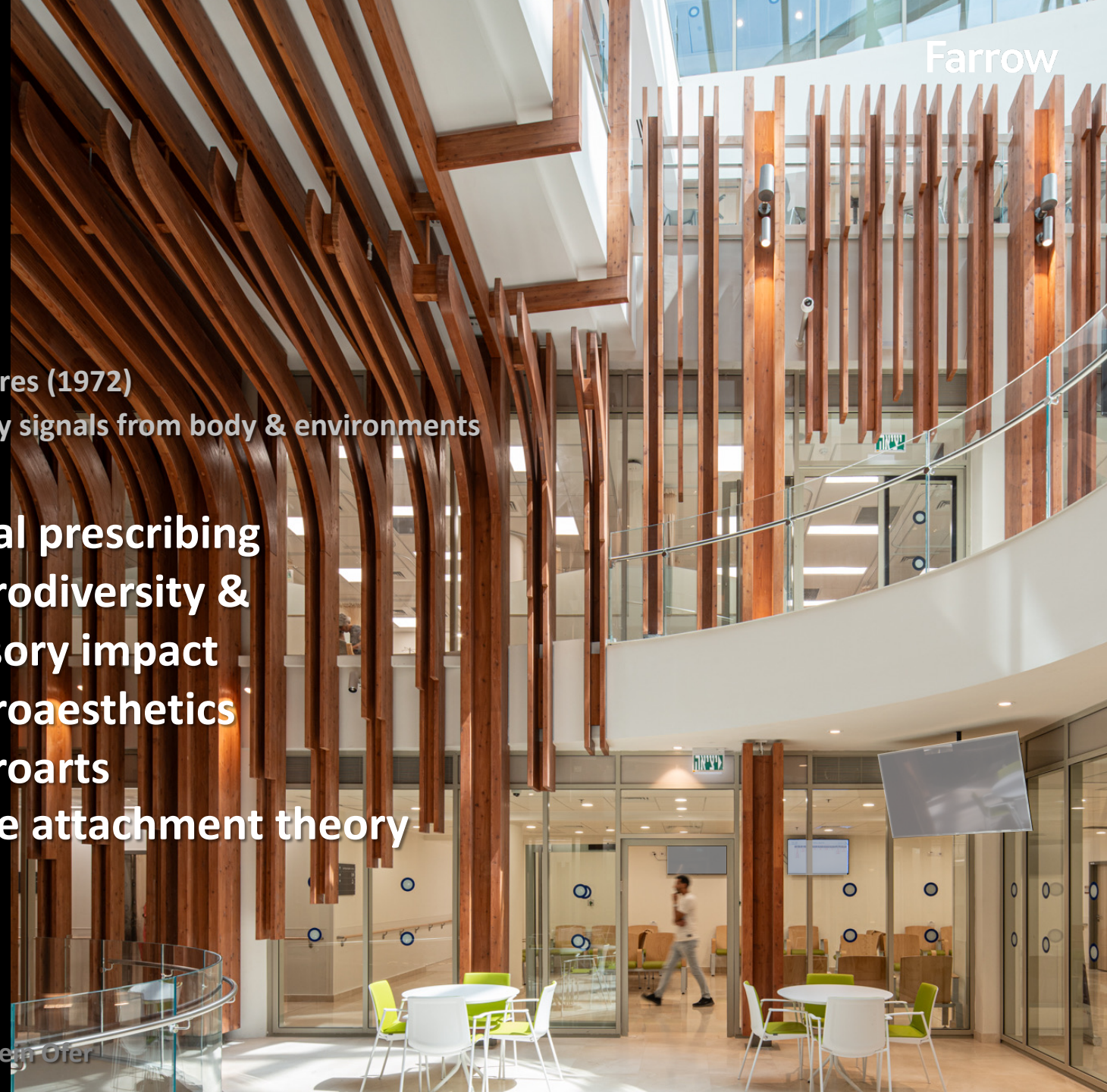




**sensory integration theory** Dr Jean Ayres (1972)  
how brain receives, processes and integrates sensory signals from body & environments

**environmental psychology**  
**occupational psychology**  
**human factor psychology**  
**experimental psychology & cognitive neuroscience**  
**biophilia**

**social prescribing**  
**neurodiversity & sensory impact**  
**neuroaesthetics**  
**neuroarts**  
**place attachment theory**





on a neurobiological level, environmental enrichment seen as a:

**non-invasive therapeutic treatment**





**embodiment**

embodiment:

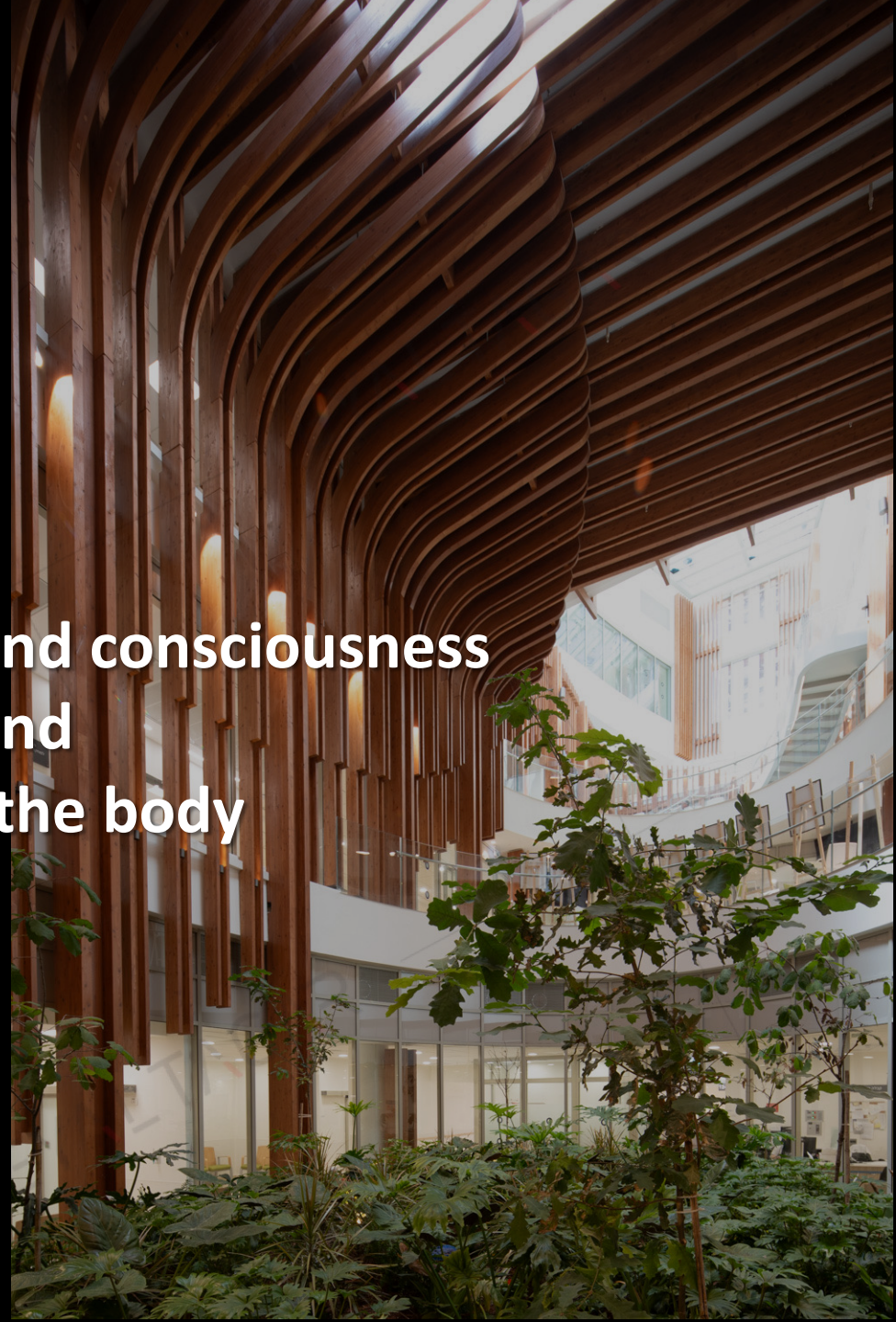
**neurophenomenology**

**study of how experience, the mind, and consciousness**

**are related through the embodied mind**

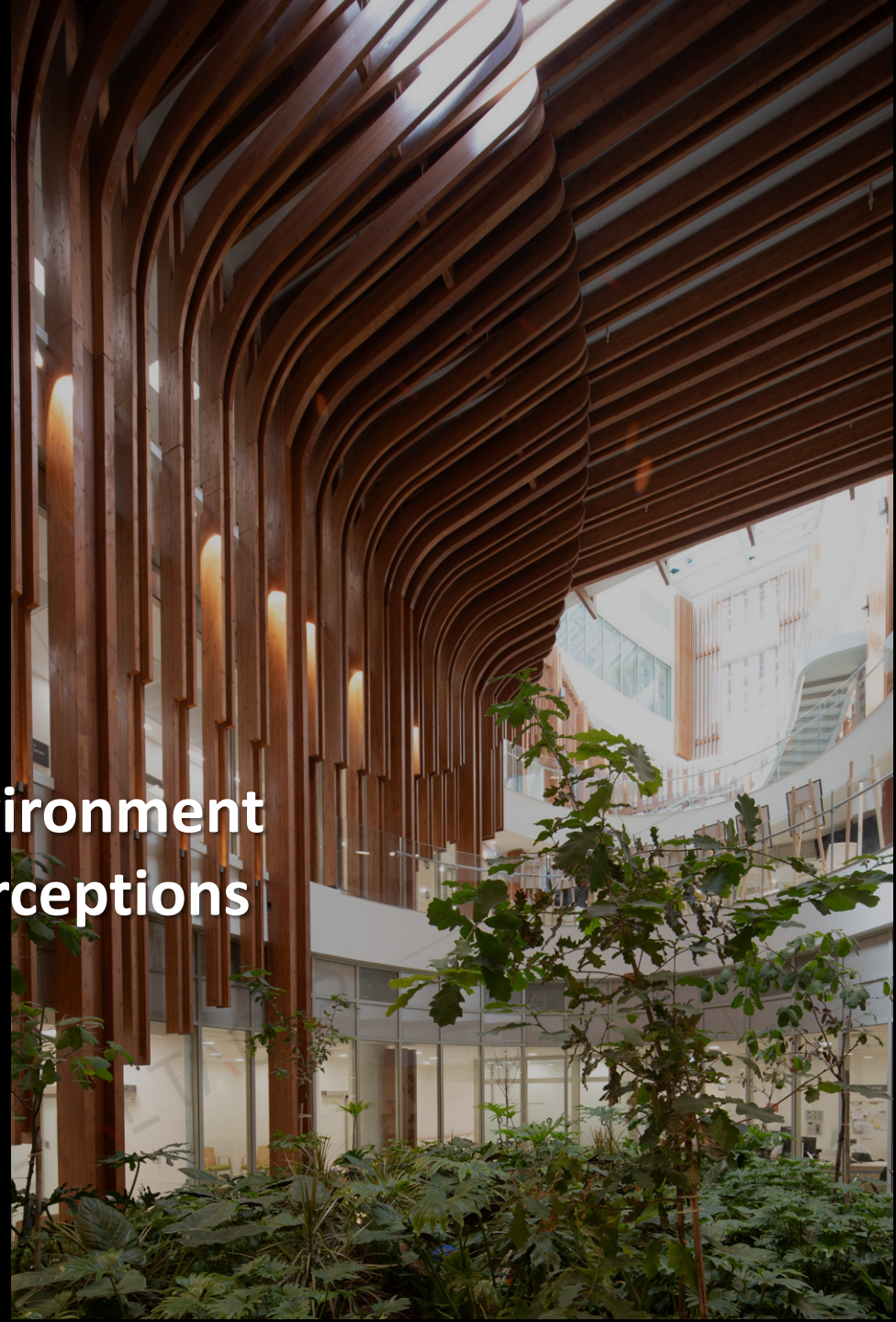
**where the mind extends throughout the body**

**to the surrounding environment**



embodiment:

**Andy Clark and David Chalmers  
“The Extended Mind” thesis  
proposed “an active externalism”  
based on the dynamic role of the environment  
in driving cognitive processes and perceptions**





embodiment:

**we don't just think / experience in our heads  
we do it through our bodies  
by internalizing our social interactions  
and the surrounding built environment**

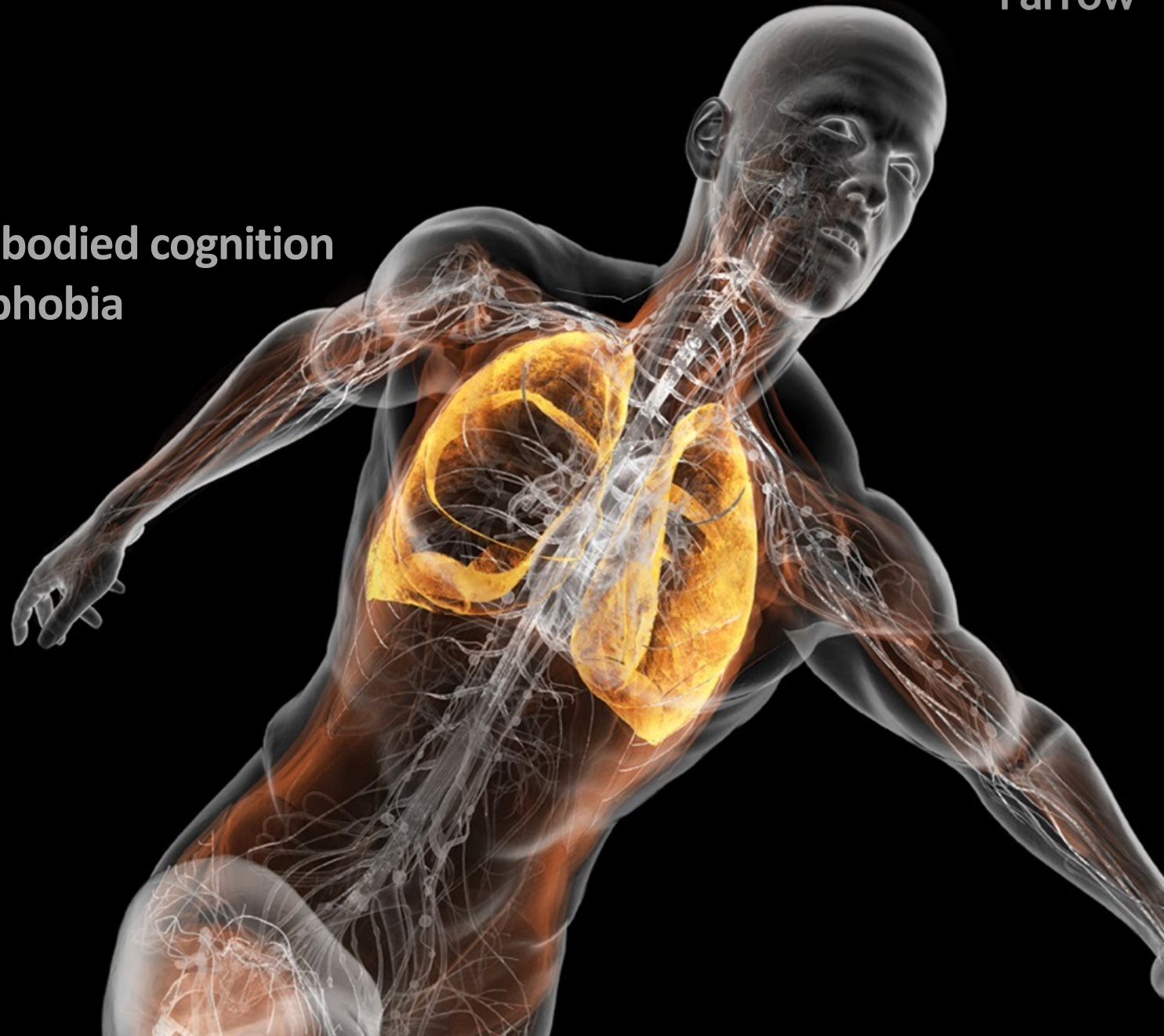


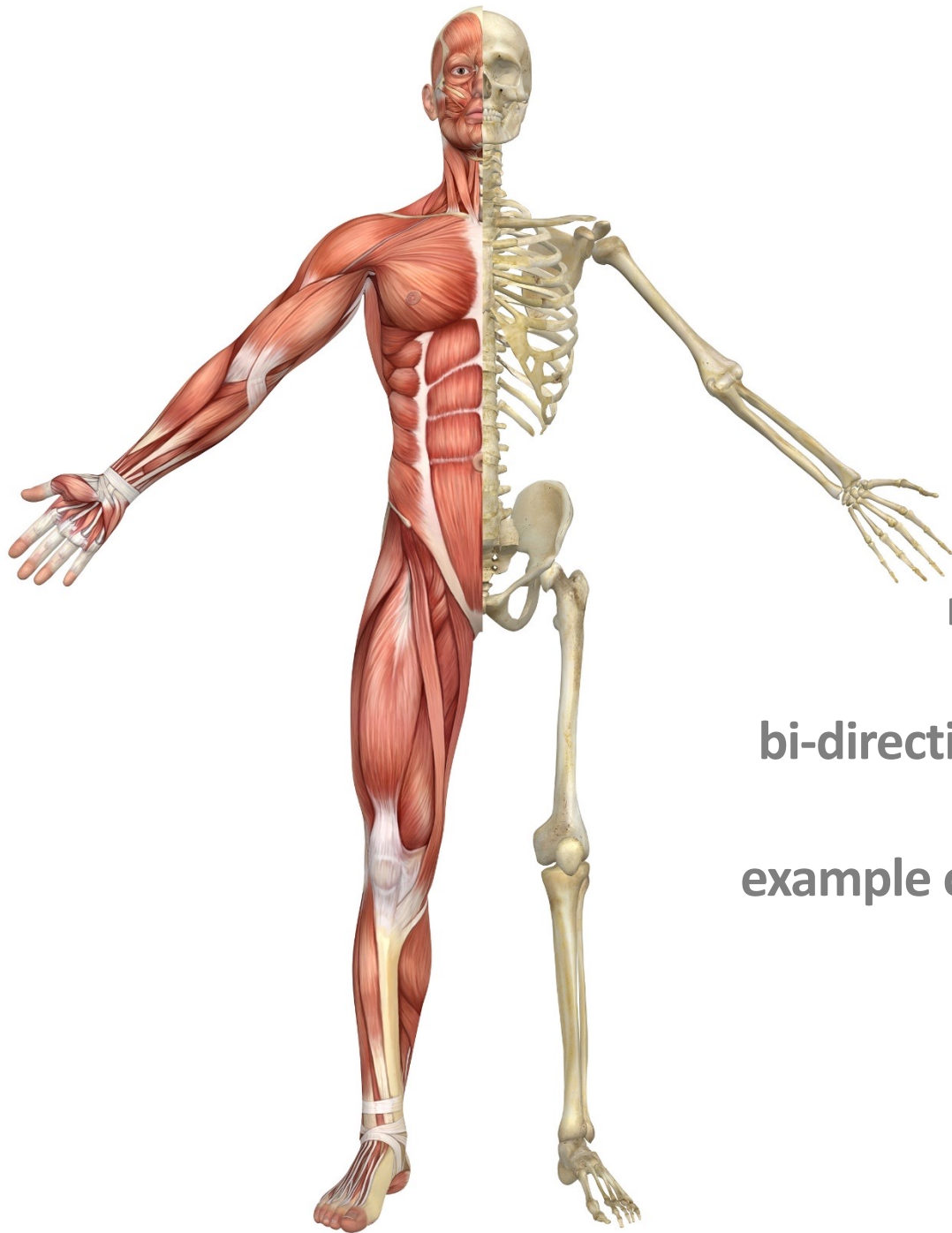


**embreathment**

## embreathment

emerging concept in embodied cognition  
used to reduce claustrophobia  
feelings of restriction  
enhancing agency





recent neuroscientific breakthrough  
new insights into the senses  
bi-directional effect of the mind on the body  
top-down & bottom-up  
example one's perception of pain or pleasure

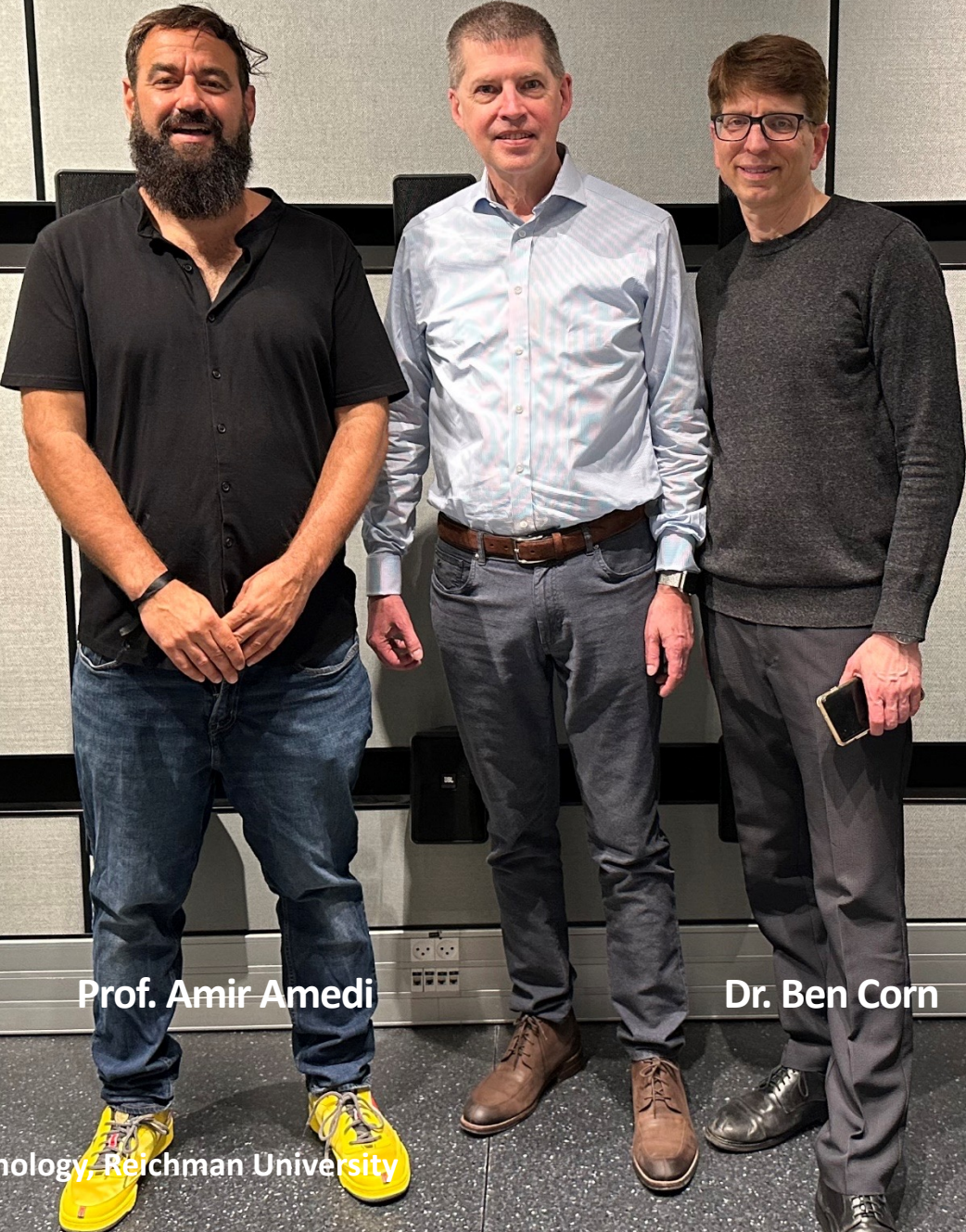




scientifically-grounded multi-sensory, neuro-wellness interventions  
hearing, vision, touch

shown to reduce claustrophobia in MRI suite / CT simulator room





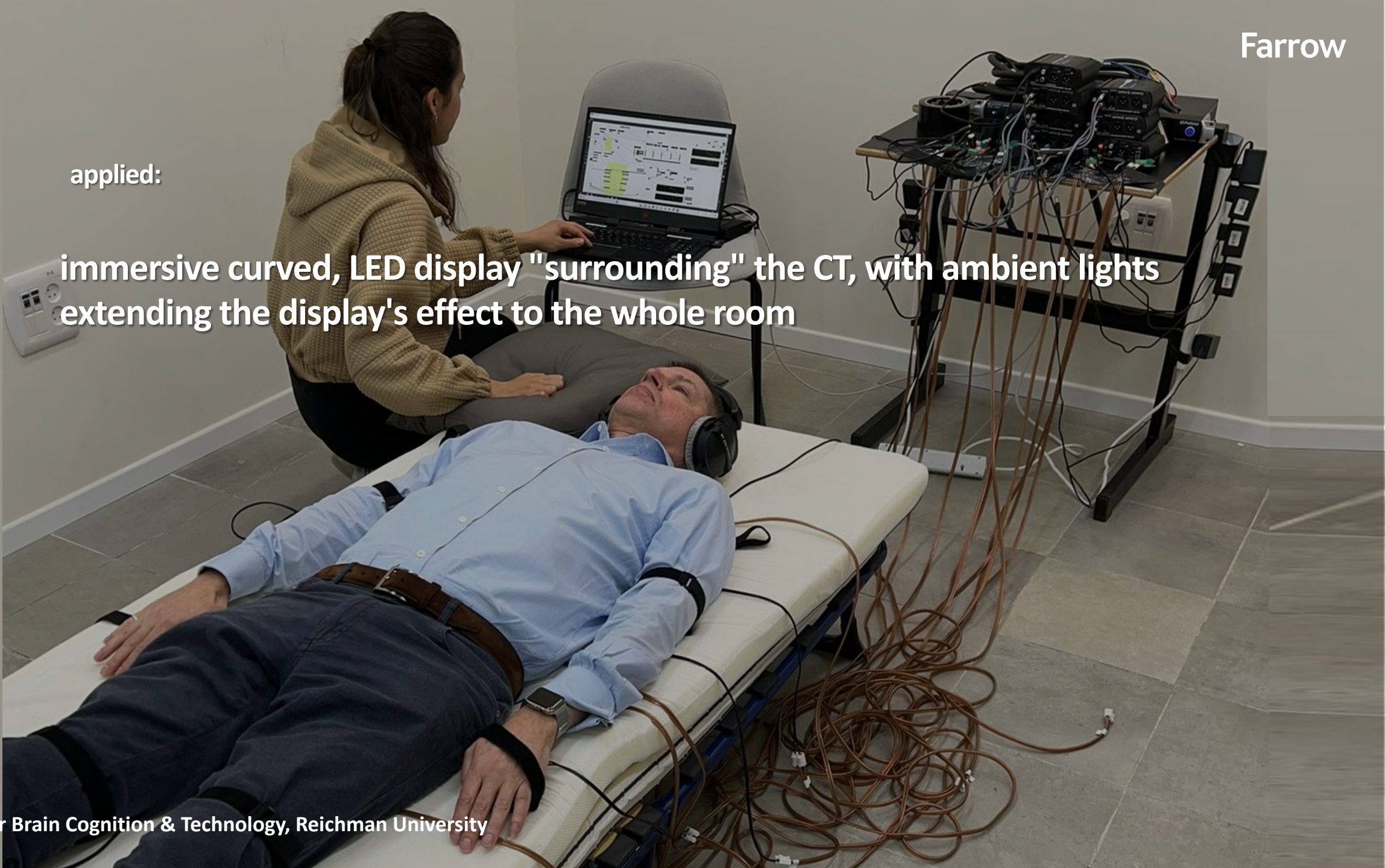
Prof. Amir Amedi

Dr. Ben Corn



applied:

immersive curved, LED display "surrounding" the CT, with ambient lights extending the display's effect to the whole room



applied:

immersive curved, LED display "surrounding" the CT, with ambient lights extending the display's effect to the whole room.

ambisonic audio system consisting of nine speakers allows for applying algorithms to localize sounds in space

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immersive curved, LED display "surrounding" the CT, with ambient lights extending the display's effect to the whole room.

ambisonic audio system consisting of nine speakers allows for applying algorithms to localize sounds in space,

haptic interfaces on the bed creating interactive, dynamic interactions responding to one's physiological signals, providing a personalized experience

scaling up:

- applied to the entire range of the patient experience
- beginning with car park
- public plaza approach
- move through the main lobby
- circulate vertically or horizontally
- public and semi-private areas
- treatment rooms, waiting areas, and staff lounges

hearing, vision, touch

environmental enrichment  
embodiment  
embreathment

Helmsley Cancer Centre, Jerusalem Israel, Farrow Partners & Robinson Oriel





Helmsley Cancer Centre, Jerusalem Israel, Farrow Partner: Huberman Ofer







Helmsley Cancer Centre, Jerusalem Israel, Farrow Partners & Rubinstein Ofer



Helmsley Cancer Centre, Jerusalem Israel, Farrow Partners of Rubinfeld Ofer



Helmsley Cancer Centre, Jerusalem, Israel. Farrow Partners & Rubinstein Oley



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Helmsley Cancer Centre, Jerusalem Israel, Farrow Partners & Rubinstein Ofer



library garden

main atrium



garden reception

garden reception

radiation treatment garden



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Radiation Treatment



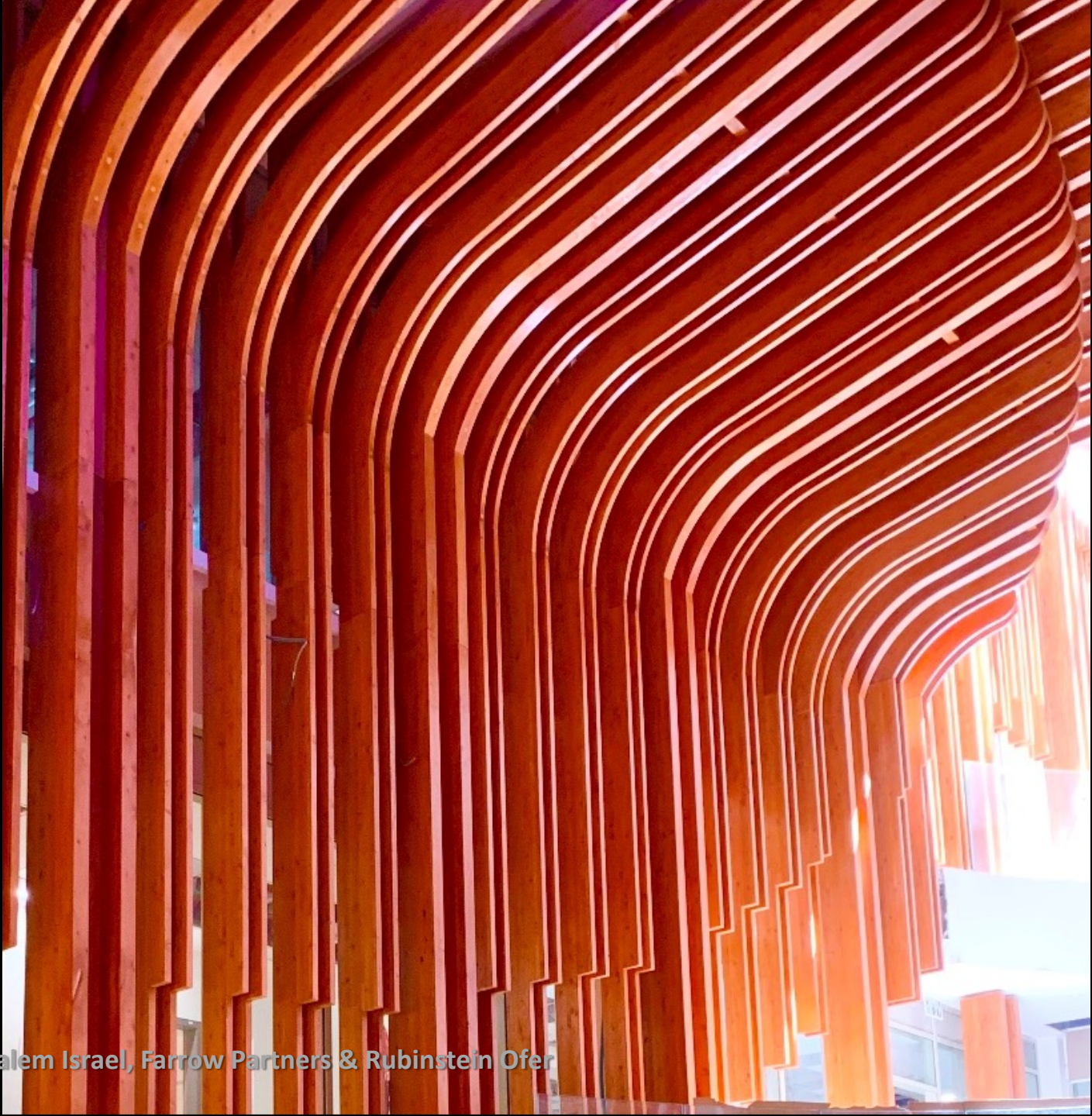
Radiation Treatment





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scientifically-grounded, multi-sensory, neuro-wellness interventions

**non-invasive therapeutic treatment**

why?



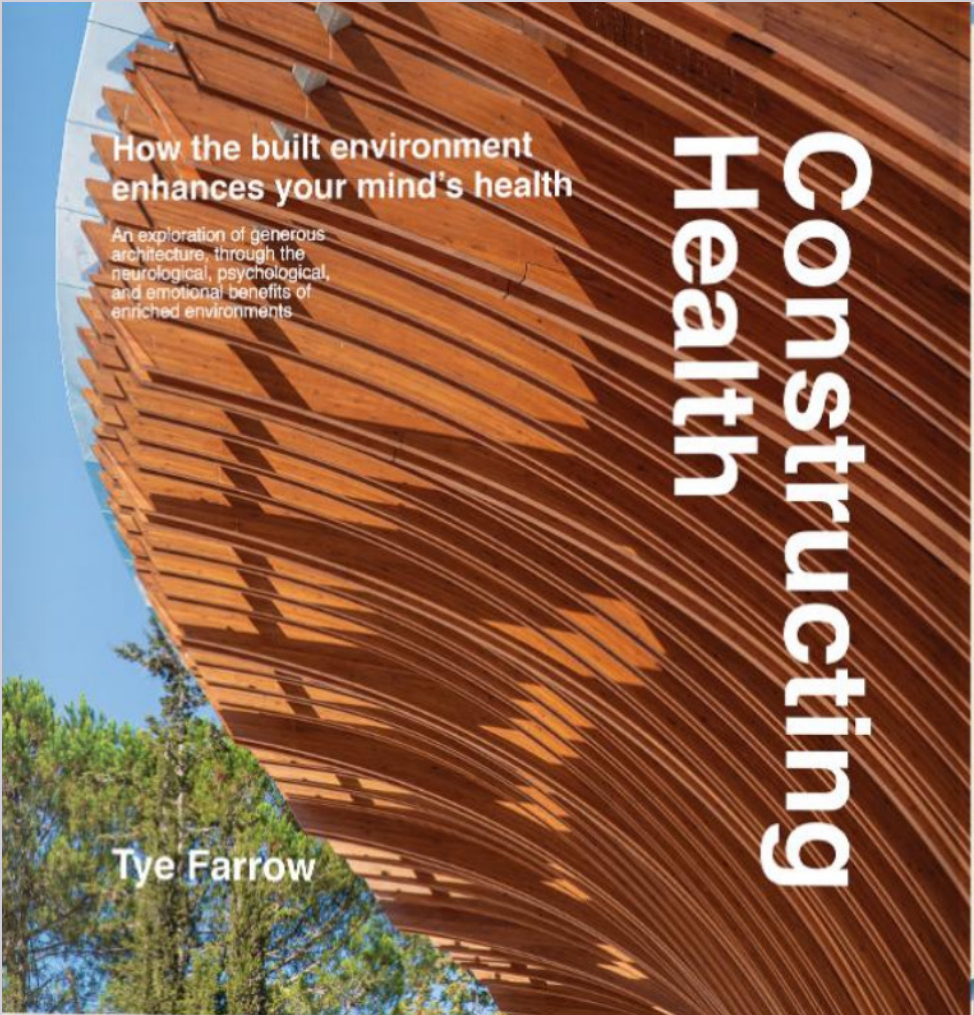
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flourish









80,000 words  
300 pages  
420 photographs, illustrations & diagrams  
11 inches square large format