THIS IS YOUR BRAIN ON SPACE

Architecture & Neuroscience

LITTLE
THINK ABOUT
how you feel
IN THE FOLLOWING
SETTINGS...
HOW WELL DO YOU really UNDERSTAND THE HUMAN BODY?
DO WE KNOW

enough

ABOUT WHO WE ARE

DESIGNING FOR?
THE HUMAN BRAIN IS A JAW-DROPPINGLY STUNNING THING
Can designed environments change our brains and behavior?
our goal
Design for a More Positive Impact
the senses

SIGHT
- BALANCE AND ACCELERATION
- TEMPERATURE
- KINESTHETIC SENSE
- PROPRIOCEPTION
- PAIN
- TIME

SOUND
- PULMONARY STRETCH RECEPTORS
- PERIPHERAL CHEMORECEPTORS
- CHEMORECEPTOR TRIGGER ZONE
- CUTANEOUS RECEPTORS
- GAS DISTENTION
- SENSORY RECEPTORS IN THE ESOPHAGUS
- SENSORY RECEPTORS IN THE PHARYNX
- SENSORY RECEPTORS IN THE URINARY BLADDER
- STRETCH SENSORS AND BLOOD VESSELS

SMELL

TASTE

TOUCH
proprioception

ONE’S OWN INDIVIDUAL PERCEPTION

“THE SENSE OF THE RELATIVE POSITION OF NEIGHBOURING PARTS OF THE BODY AND STRENGTH OF EFFORT BEING EMPLOYED IN MOVEMENT.”

MOSBY’S MEDICAL, NURSING AND ALLIED HEALTH DICTIONARY
egocentric predicament

A theoretical separation between the REAL WORLD and THE WORLD AS WE PERCEIVE AND KNOW IT

CHARLES SANDERS PEIRCE
the senses

SIGHT
SOUND
SMELL
TASTE
TOUCH
sight
sensory illusions
optical illusions
ENTASIS

The intentional slight convex curving of the vertical profile of a tapered column; used to overcome the optical illusion of concavity that characterizes straight-sided columns.

THE HAND
1. Superficial flexors of hand
2. Abductor of small or fifth finger
3. Flexor of fifth finger
4. Palmaris brevis
5. Ligamentum vaginale
6. First lumbricale
7. First dorsal interossei, or abductor of index finger
8. Adductor of thumb
9. Opponens pollicis, or flexor of first metacarpal
10. Short abductor of thumb
11. Tendon of palmaris longus

THE FOOT
1. Achilles tendon
2. Ribs
3. Os calcis (heel bone)
4. Peroneus brevis
5. Cuneiform bones
6. Extensor of foot
7. Tendon of long extensors
8. Tendons of flexor muscles
9. Long extensors of foot
L'OREILLE
Os lenticulaire
Fenêtre ovale
Canaux semi-circulaires
Vers le

Pavillon
Glandes à cérumen
Conduit auditif externe

TYMPAN
Lobule
Tympan
Enclume Marteau
Étrier
Fenêtre ronde
Vestibule

Oreille externe
Oreille moyenne
Oreille interne

sound
smell
LE GOUT

Amygdale

Voile du palais

Papilles du gout

Nerfs du gout

Pharynx

Muscles de la langue

Luette

Pharynx

Molaires

V. Lingual
MUCH OF EVOLUTION IS incremental
A VERY UGLY ICE CREAM CONE

a brief introduction to your brain
THE HUMAN BRAIN
With 100 billion cells and 500 trillion connections, this part of the brain allows us to solve difficult problems and navigate a very complex social world. It's also responsible for imagination, culture and the ability to figure out what other people are thinking based on social cues.

THE MOUSE BRAIN
An extra layer of brain provides more memory and a wider range of emotions. That allows mammals to do things like learn from their experiences and anticipate danger, rather than merely reacting to it.

THE LIZARD BRAIN
This ancient brain is all about survival. When danger appears, it decides whether to fight or flee.
four lobes

FRONTAL LOBE

PARIETAL LOBE

TEMPORAL LOBE

OCcipital LOBE
**Frontal Lobe**

**COMPLEX REASONING, SELF CONTROL, PLANNING, AND ABSTRACT THOUGHT.**
four lobes

- Frontal Lobe
- Parietal Lobe
- Occipital Lobe
- Temporal Lobe
Parietal Lobe

SENSORY INPUT, SPECIAL SENSE, NAVIGATION AND BODY ORIENTATION
four lobes

FRONTAL LOBE

PARietAL LOBE

occipital lobe

TEMPORAL LOBE
Occipital Lobe

VISUAL PROCESSING CENTER OF THE BRAIN
four lobes

- Frontal Lobe
- Parietal Lobe
- Occipital Lobe
- Temporal Lobe
Temporal Lobe

HEARING AND AUDITORY RECEPTION (BOTH WRITTEN AND SPOKEN SPEECH)
HYPOTHALAMUS

AMYGDALA

HIPPOCAMPUS

more important brain parts
ENRICHED ENVIRONMENTS / SALUTOGENIC DESIGN
you can't teach an old dog new tricks

OR CAN YOU?
neuroplasticity

STRENGTHENING OF NEURONS THROUGH ESTABLISHING NEW CONNECTIONS
15% increase in hippocampal neurons
Learning is improved in aged running mice

Old Sedentary

Old Runner
6 week exercise regimen
Movement in our environment, can effect our brain and cognition

Hippocampus-dependent

Hippocampus-independent

Learning (trial 1)
Learning (all-trial)
Recall (5 min)
Recall (90 min)
Delay Recog
Delay Source
Burn Calories, Not Electricity

Take the Stairs!
Walking up the stairs just 2 minutes a day helps prevent weight gain. It also helps the environment.

Learn more at www.nyc.gov or call 311.
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CHRONOBIOLOGY & CIRCADIAN RHYTHM
“HOW FAR THAT LITTLE CANDLE THROWS HIS BEAMS!”

William Shakespeare
artificial light = depression?
“IT’S THE PRIMORDIAL FLAME”

Thomas Edison
THE IMPORTANCE OF THE circadian rhythm
I. Spektren der Fixsterne und Nebelflecke,
verglichen mit dem Sonnenspektrum und den Spektren einiger Nichtmetalle.
AKA, YOUR internal clock
suprachiasmatic nucleus
shift work leads to higher rates of certain cancers, diabetes and disease
your eyes get
50% less light than
they need when
you hit 45
healthy eyes
IMPROVE YOUR
QUALITY OF LIFE
THE MANIPULATION OF lighting
LEDs in computer screens
LEDs in airplanes
THE AMAZINGLY

restorative

POWER OF LIGHT
IMMERSIVE ENVIRONMENTS / BIOPHILIC DESIGN
seeing vs. thinking
The Savannah Image Experiment
THE SAVANNAH IMAGE

the savannah image : evolutionary theory
SONOMA COUNTY JAIL INTAKE HUB

40-60 inmates are processed each day

12HRS typical wait time per inmate

HIGHEST incidence of suicide attempts

INMATES can be upset, mentally ill, under the influence
WAITING ROOM BEFORE
WAITING ROOM AFTER
the results

LOWER  HIGHER  FEWER

levels of fatigue and stress  scores on cognition tests  incidents in the intake hub
Biophilic Design

"The love of living things or system."
WE ARE WIRED FOR

survival
AND WE ARE REALLY GOOD AT
pattern recognition
where

DO YOU PREFER TO SIT IN A RESTAURANT?
trees or wood
BRING COHERENCE AND A QUIETING SENSE OF SCALE
THORNCROWN CHAPEL
water
IS CALMING AND
STRESS REDUCING
REFERENCE LIST:

Academy of Neuroscience for Architecture – www.anfarch.org


Farbstein, Jay & Farling, Melissa. (2012, October) Evidence-Based Design: Jail Booking Area Study. Presented at the Academy of Neuroscience for Architecture 2012 Conference, La Jolla, CA.


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any questions?