



Insights into Human Behavior from Neuroscience

Kellogg School of Management, 2013

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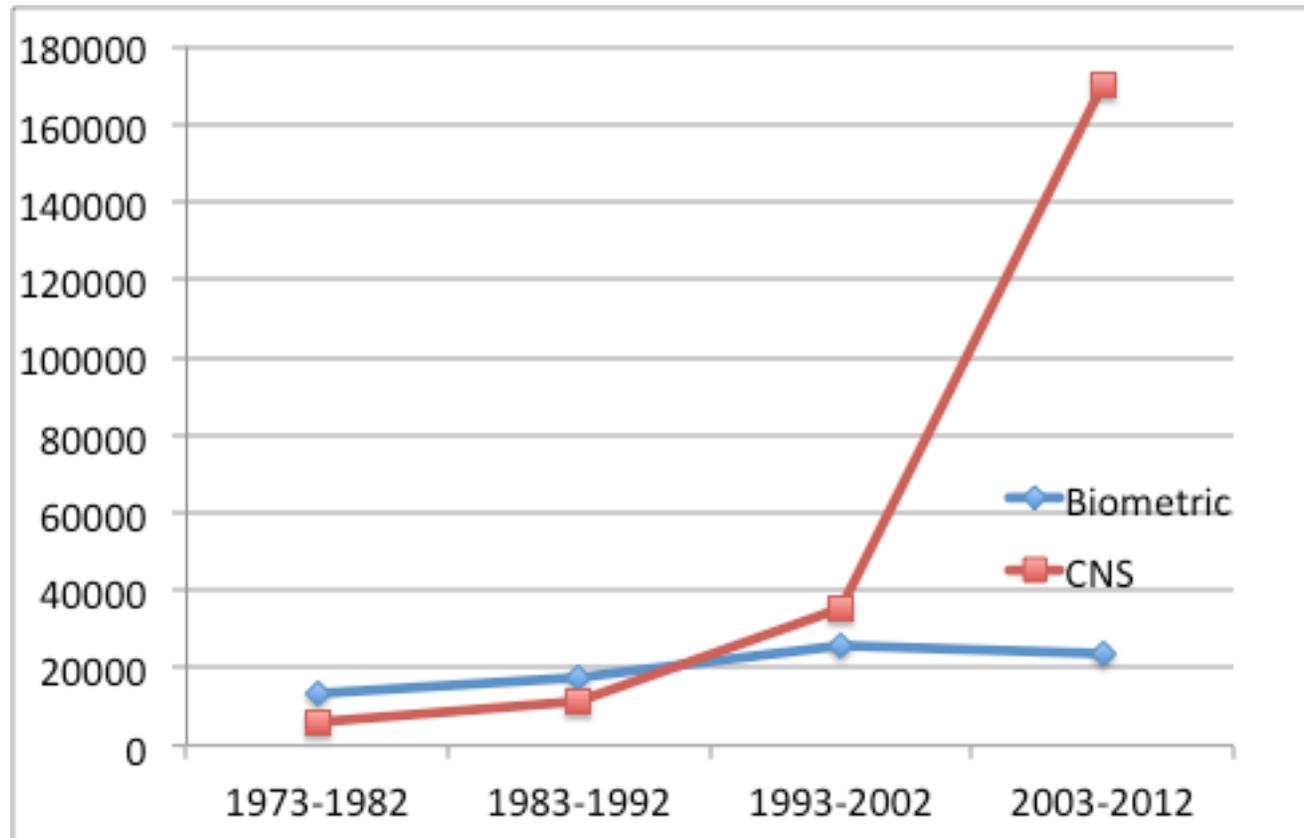


8-time Wimbledon champion
1925-1933



Attention

Scientific Citations

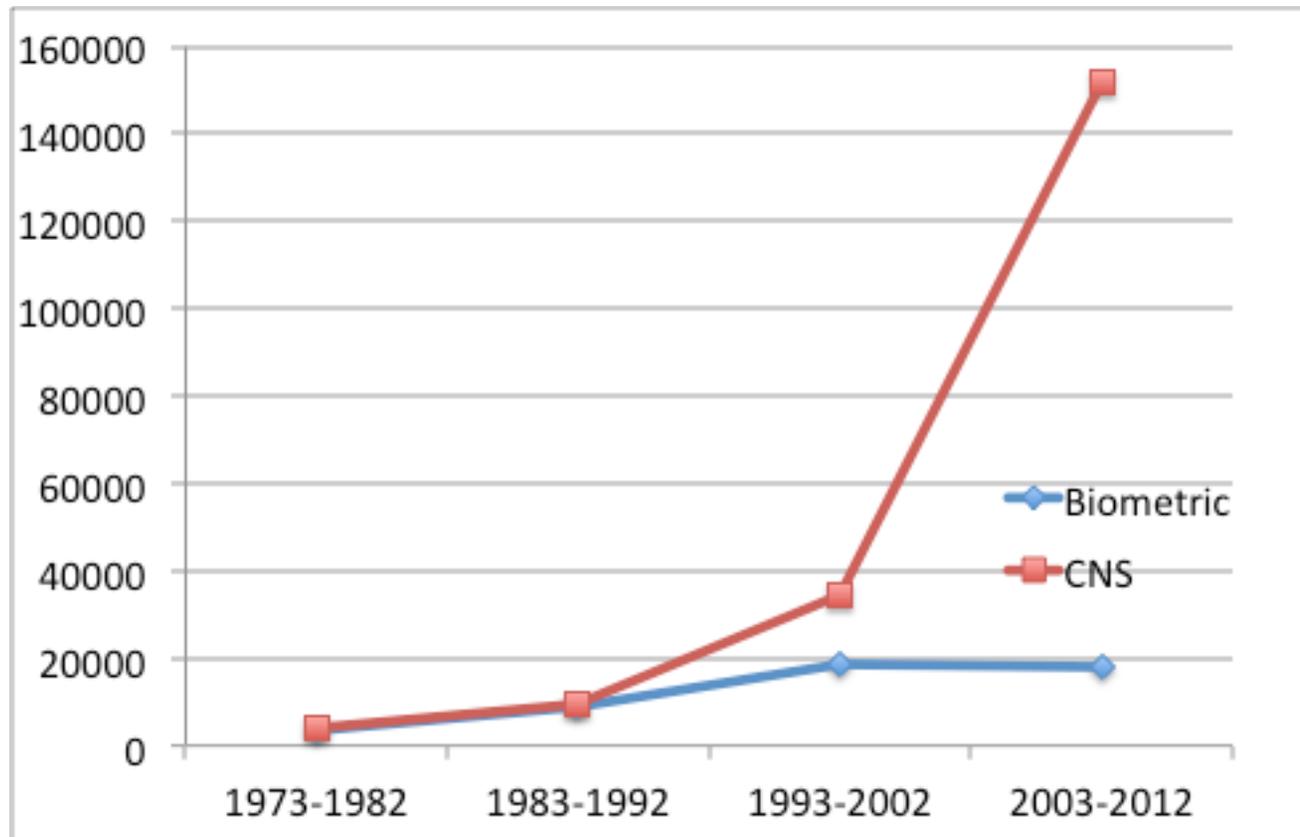


CNS: EEG, ERP, fMRI

Biometric: heart rate, skin conductance, respiration

Memory

Scientific Citations

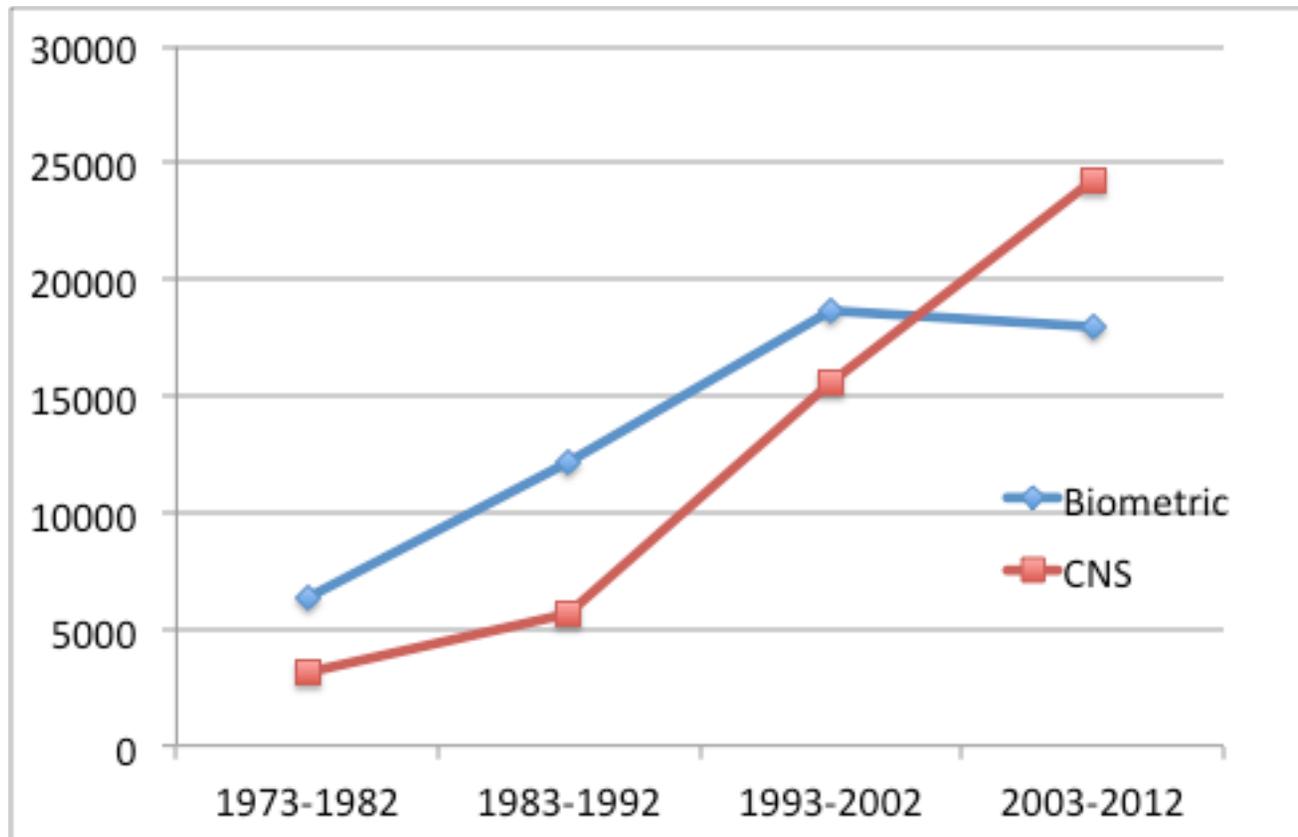


CNS: EEG, ERP, fMRI

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Emotion

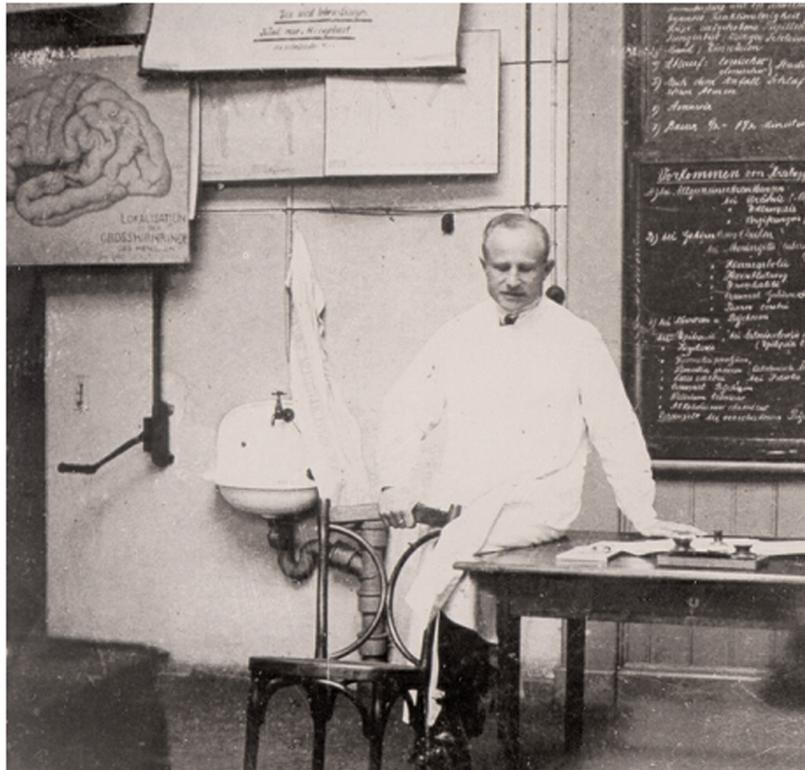
Scientific Citations



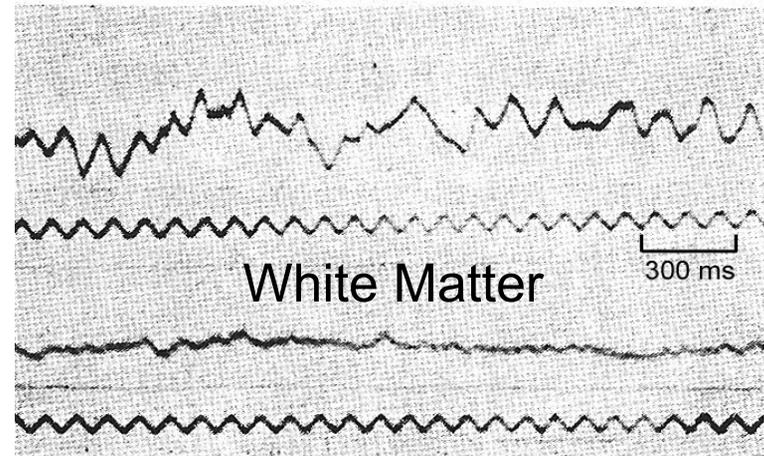
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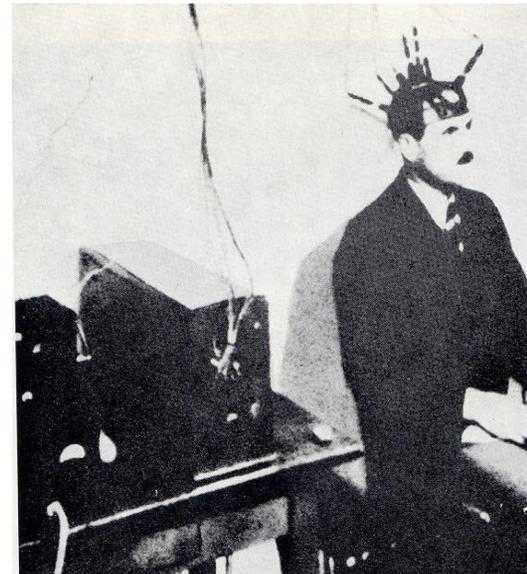
Hans Berger Discovers the EEG



Grey Matter



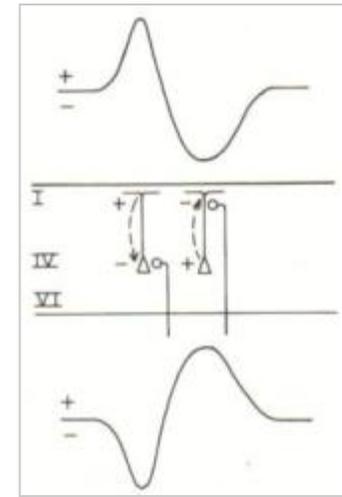
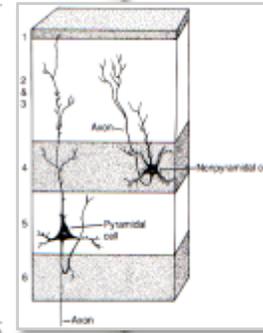
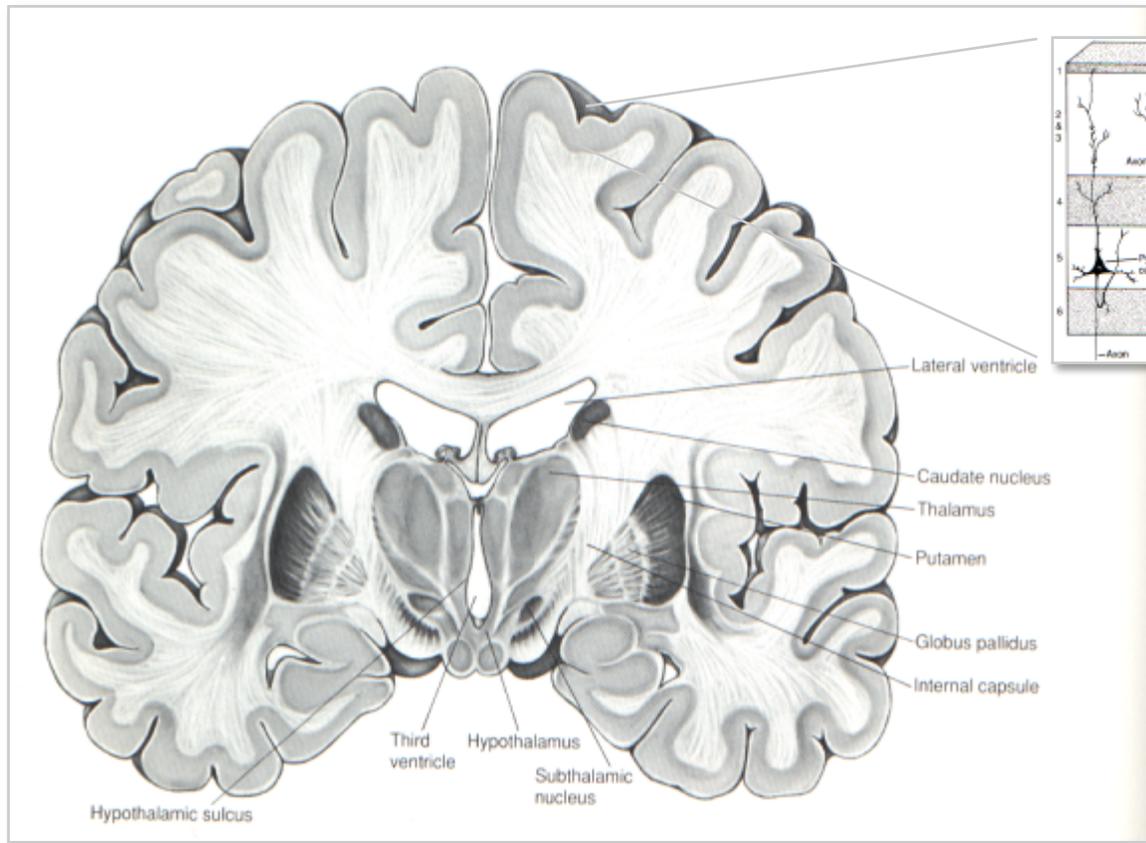
University of Jena, Germany 1929



A 1929 picture of the first EEG of a human (Berger).

Brain Waves

Measuring Brain Activity at the Scalp



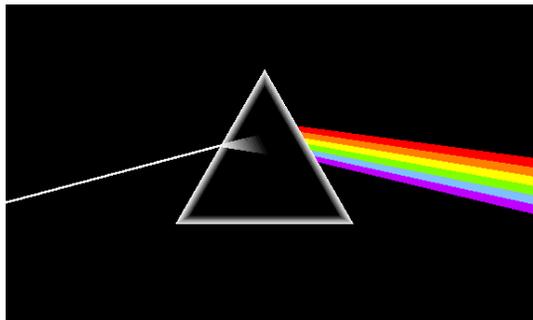
Voltage changes over time based on activation

The EEG measures voltage changes that vary msec-by-msec when ions flow into and out of brain cells in the cortex -- the outer layer of the brain

When enough cells are co-active the changes add-up and can be recorded at the surface of the head



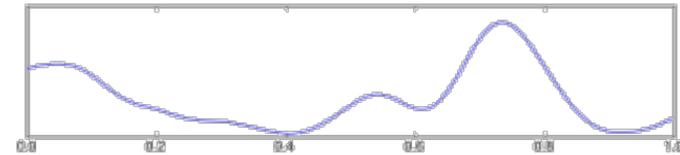
Josef Fourier
1768-1830



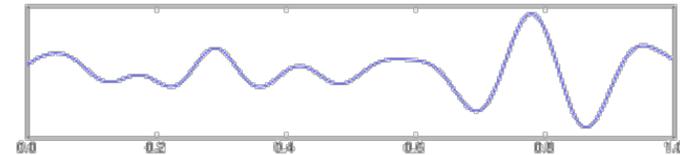
**Fourier analysis
decomposes EEG signal
into different frequencies**

Spectral Analysis of EEG “Fourier Analysis”

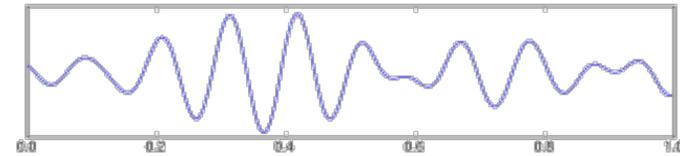
Delta



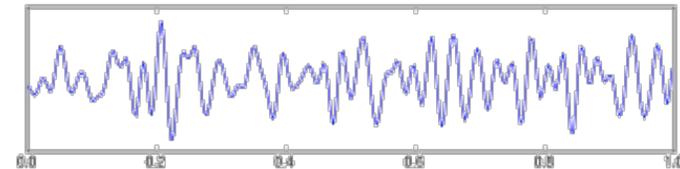
Theta



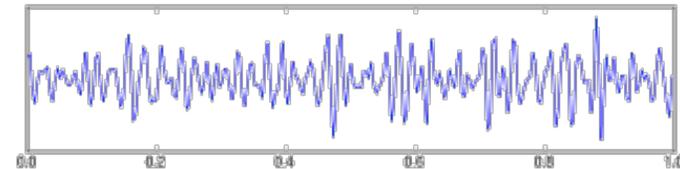
Alpha



Beta



Gamma

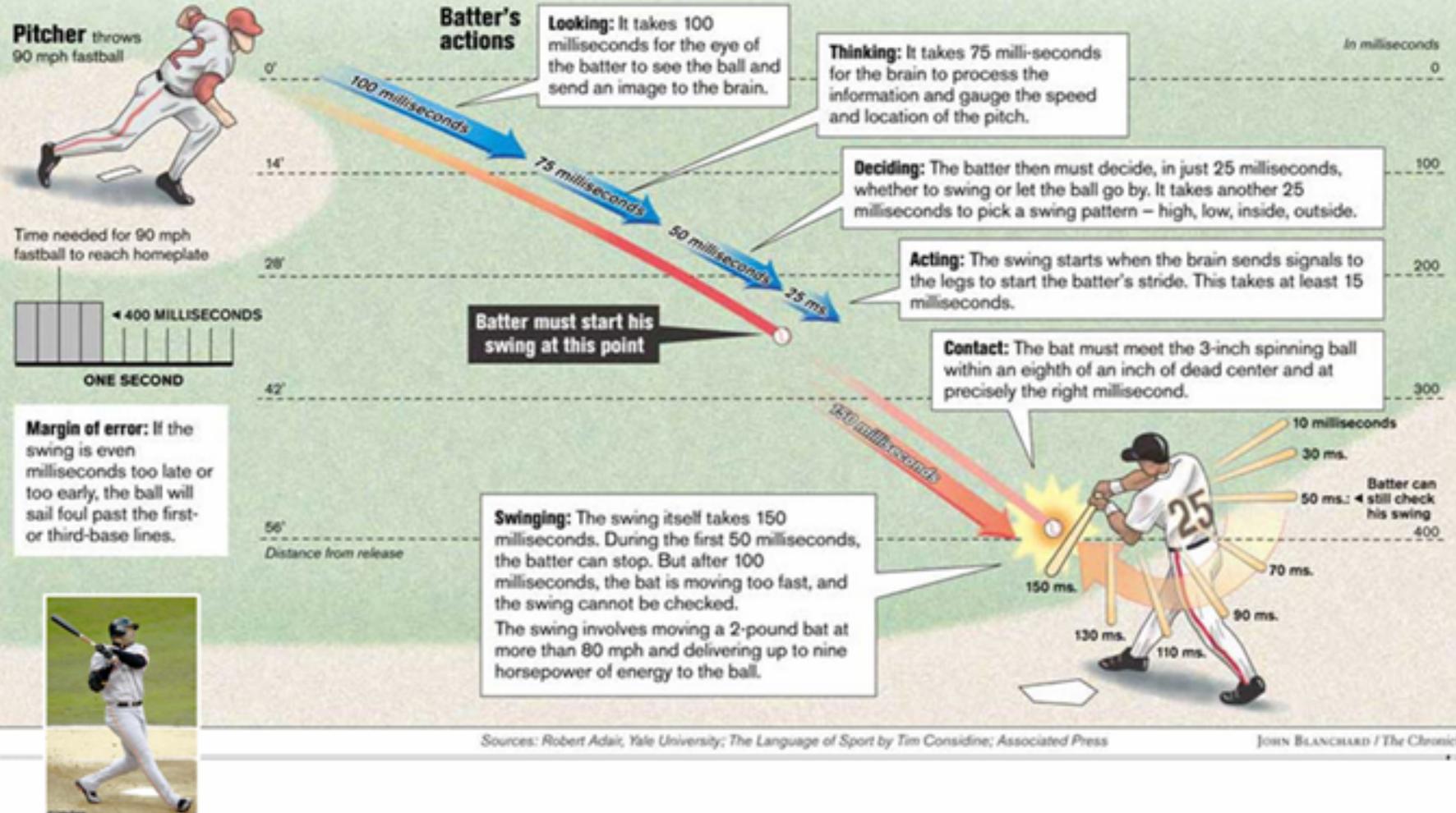


SPEED COUNTS!

The science of the swing

When a big league pitcher throws a 90 mph fastball, a batter has less than a quarter second to see the pitch, judge its speed and location, decide what to do, then start to swing. The bat must meet the ball within an eighth of an inch of dead center and at precisely the right millisecond as the 3-inch spinning sphere whizzes by.

It is a superhuman feat that is "clearly impossible," said Robert Adair, a Yale physicist who has studied the science of baseball.



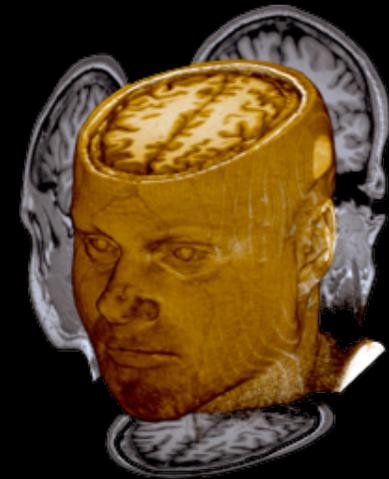
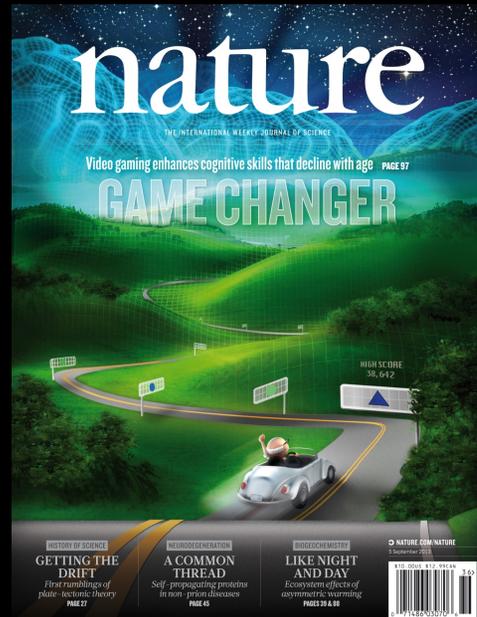
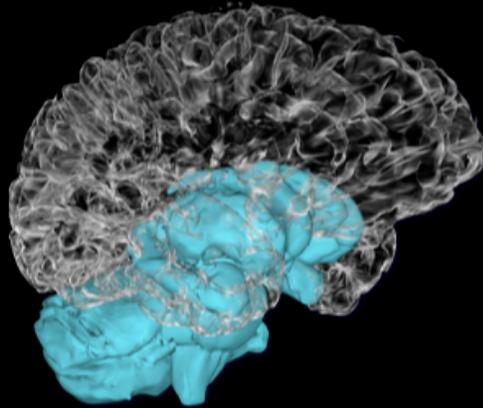
Sources: Robert Adair, Yale University; The Language of Sport by Tim Considine; Associated Press

JOHN BLANCHARD / The Chronicle

11 METERS TOO CLOSE for the BRAIN to DECIDE



EEG and NeuroPlasticity in Aging

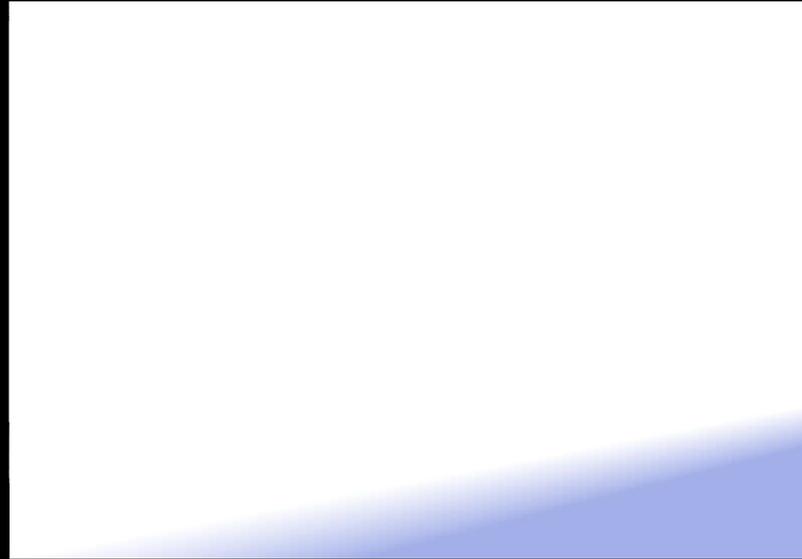


Anguera et al. *Nature* 2013

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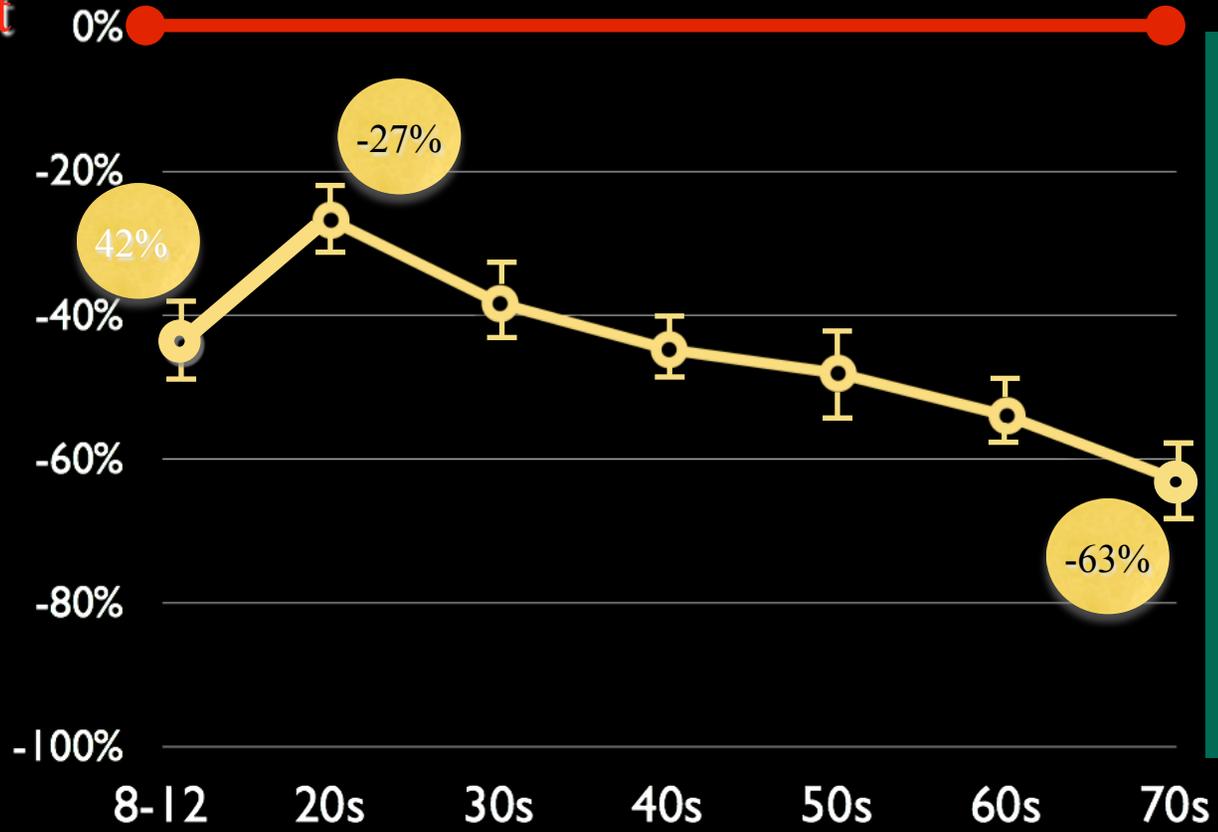
Neuroracer





12 hours

No Cost



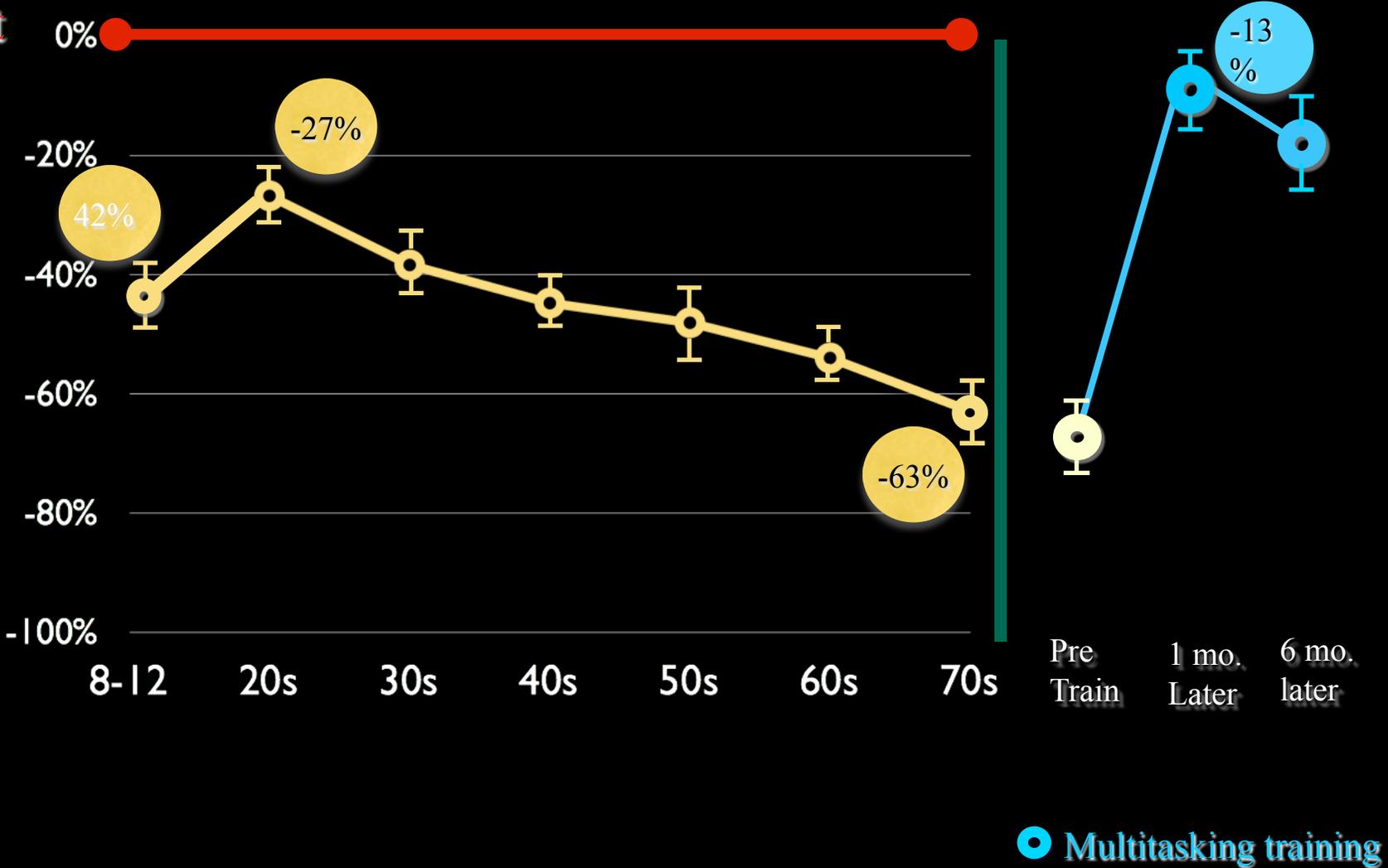
Pre Train 1 mo. Later 6 mo. later

● Multitasking training



12 hours

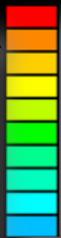
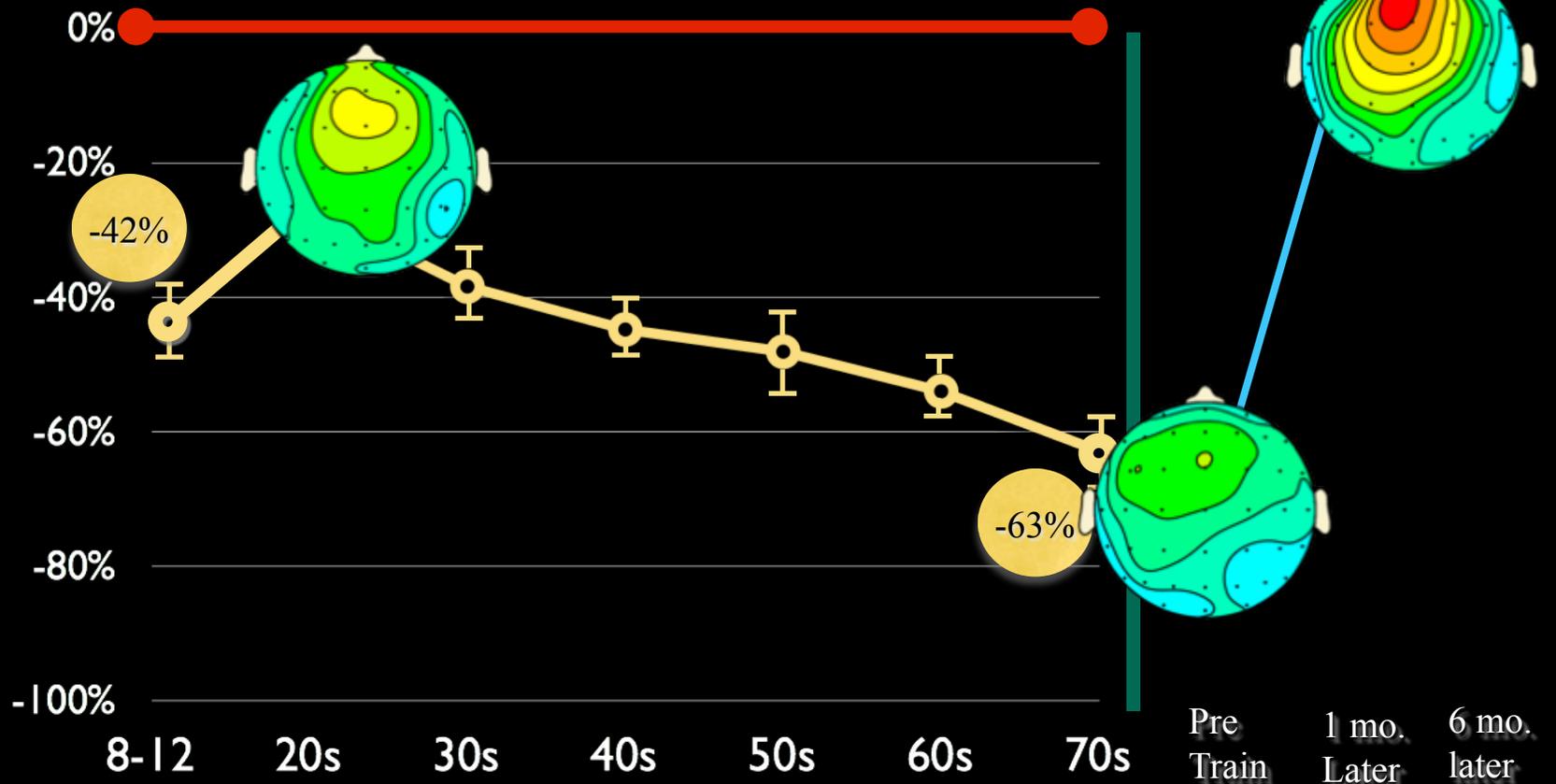
No Cost



● Multitasking training



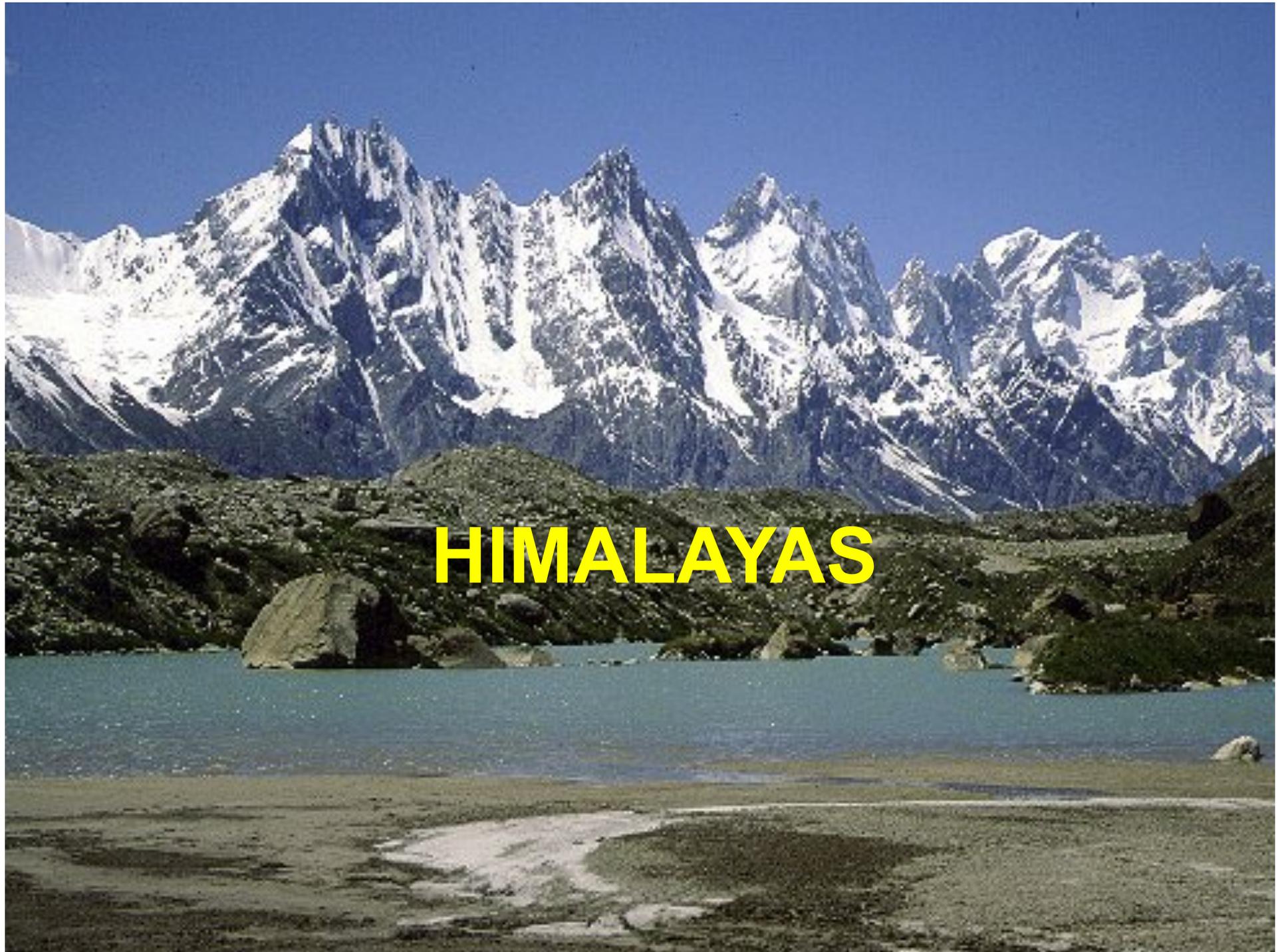
Frontal Theta



● Multitasking training



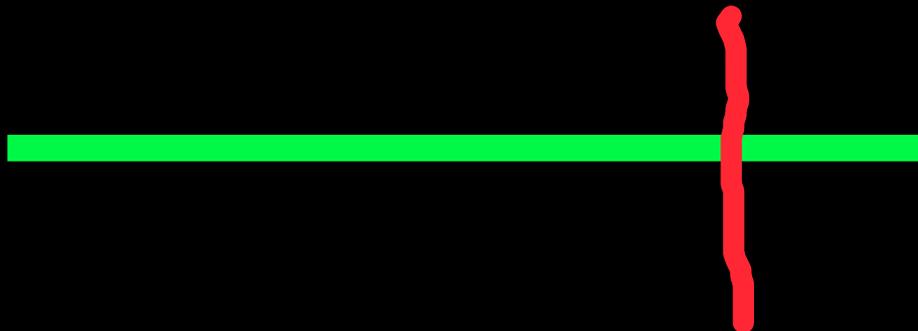
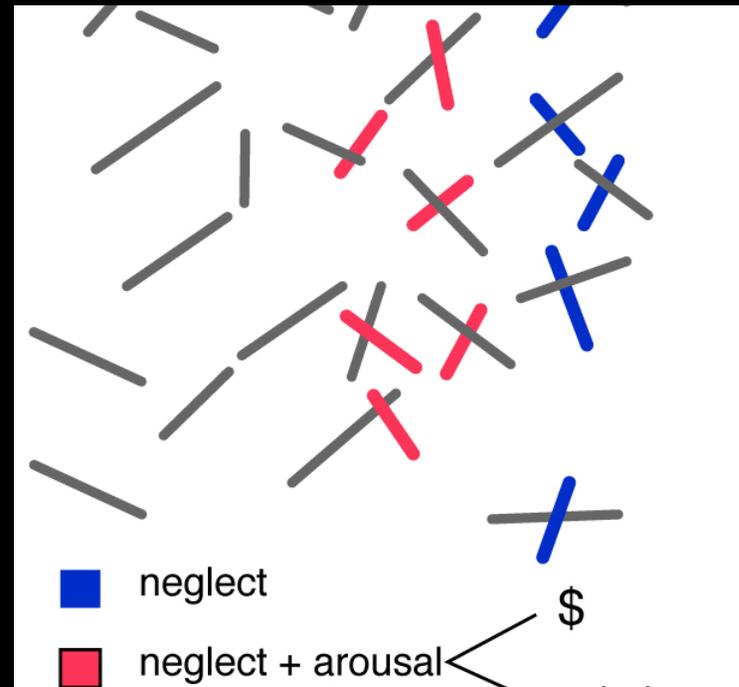
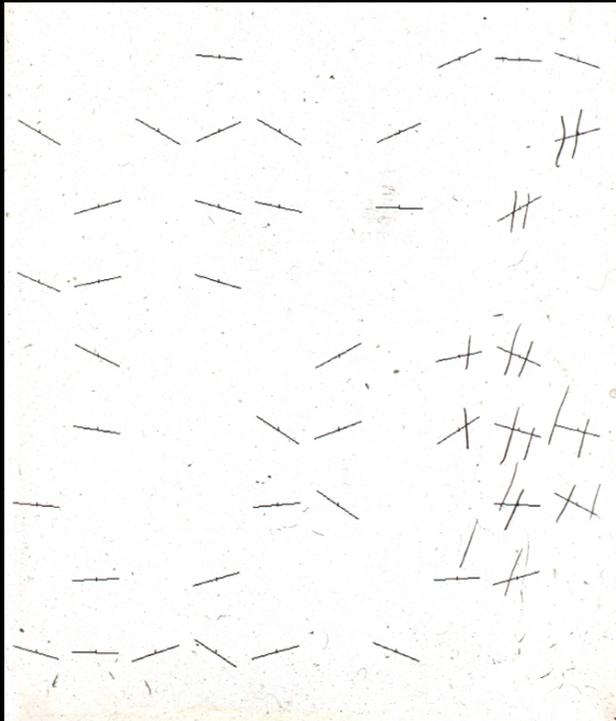
WHAT IS THIS?



HIMALAYAS

- 
- **2-5 % of Brain Energy is Devoted to conscious, Explicit Behavior**
 - **2-5% of Brain Energy is devoted to unconscious, implicit behavior**
 - **The remaining energy consumption is comprised of “housekeeping” keeping the brain ready for explicit and implicit processing**

HEMI-SPATIAL NEGLECT

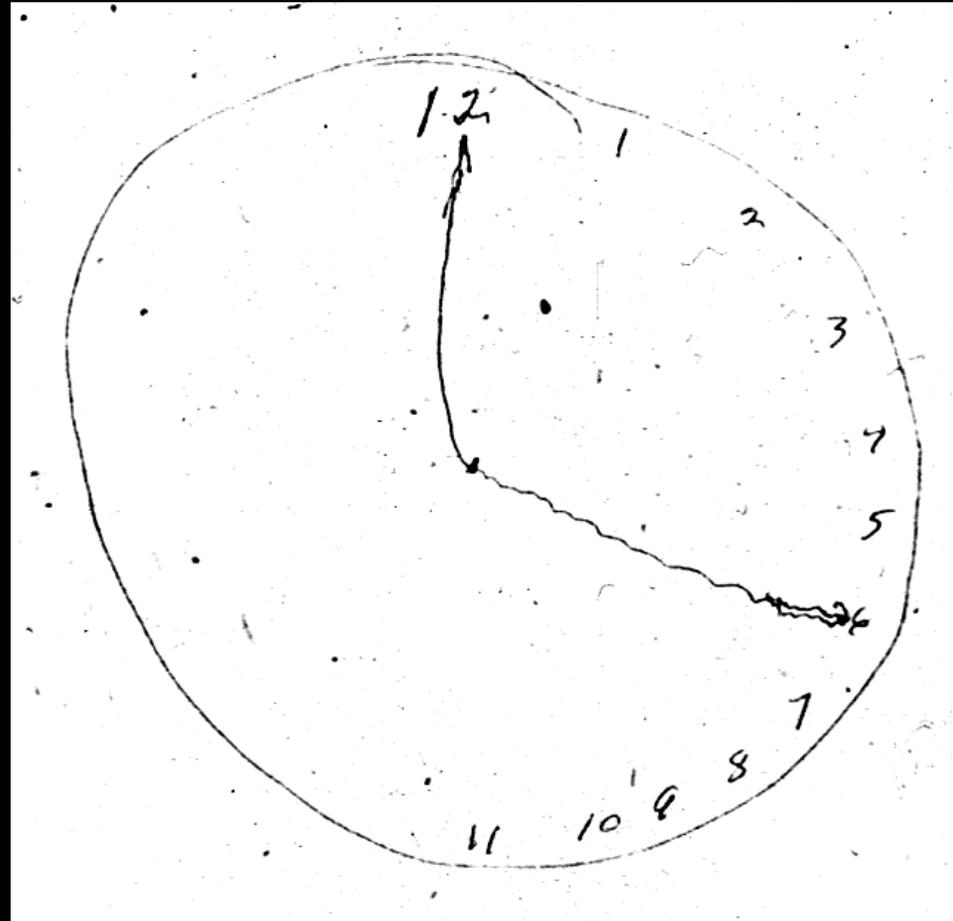


LINE BISECTION

The Left Side of Space Does not Exist

HISTORY SHEET

to me but no results were discussed with
me either as to findings or practical
measures. I am left hanging in the
air with little or no knowledge of
my condition its implications as
to mortality or to life
methods. This is an extremely
serious omission of good
medical procedures
and does not speak well
for a major medical
institution & therefore
has serious qualifications
as to both the
administration and medical
efficiency of this
institution and the
particular section. I
was refused medical
assistance. I think
note in part in
that the resident Miss
Dexelle saw me
briefly and then
left before I could
question her as to



Set the Time to Six

BOTH SPATIAL and OBJECT NEGLECT

