

A defense of the soul from a practicing neuroscientist



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Physics

Acknowledgements

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Acknowledgements



...and God



Disclaimer

Our sponsors have funded our research, but the opinions I am expressing today should not be assumed to represent their views on the soul!

In addition, the philosophical views that I am expressing today are not necessarily supported by the scientists whose work I cite here. The vast majority of neuroscientists are physicalists, although some might be dualists.

In short, the views I am expressing today are my own. Please do not make any assumptions about the views of others.

Outline

- Physicalism or dualism?
- Modern neuroscience: Physicalism
- Common sense and religion: Dualism
- What's at stake

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What is the Biblical view?

- “Today you will be with me in paradise.” -Luke 23:43
- “Do not be afraid of those who kill the body but are not able to kill the soul; rather be afraid of the One who is able to destroy soul as well as body in hell.” –Matt 10:28
- “I desire to depart and be with Christ, which is better by far.” -Phil 1:23

The opposing view

- “All that you touch and all that you see is all your life will ever be.” –Pink Floyd
- “Out, out, brief candle! Life's but a walking shadow, a poor player that struts and frets his hour upon the stage and then is heard no more: it is a tale told by an idiot, full of sound and fury, signifying nothing.”
Macbeth (Act V, Scene V).

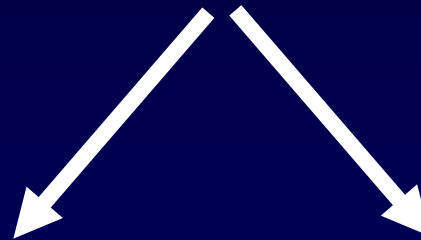
The opposing view

- “The astonishing hypothesis is that ‘You,’ your joys and sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules. As Lewis Carroll’s Alice might have phrased it: ‘You’re nothing but a pack of neurons.’” -Francis Crick

The mind/body problem

Physicalism

Dualism



Property dualism

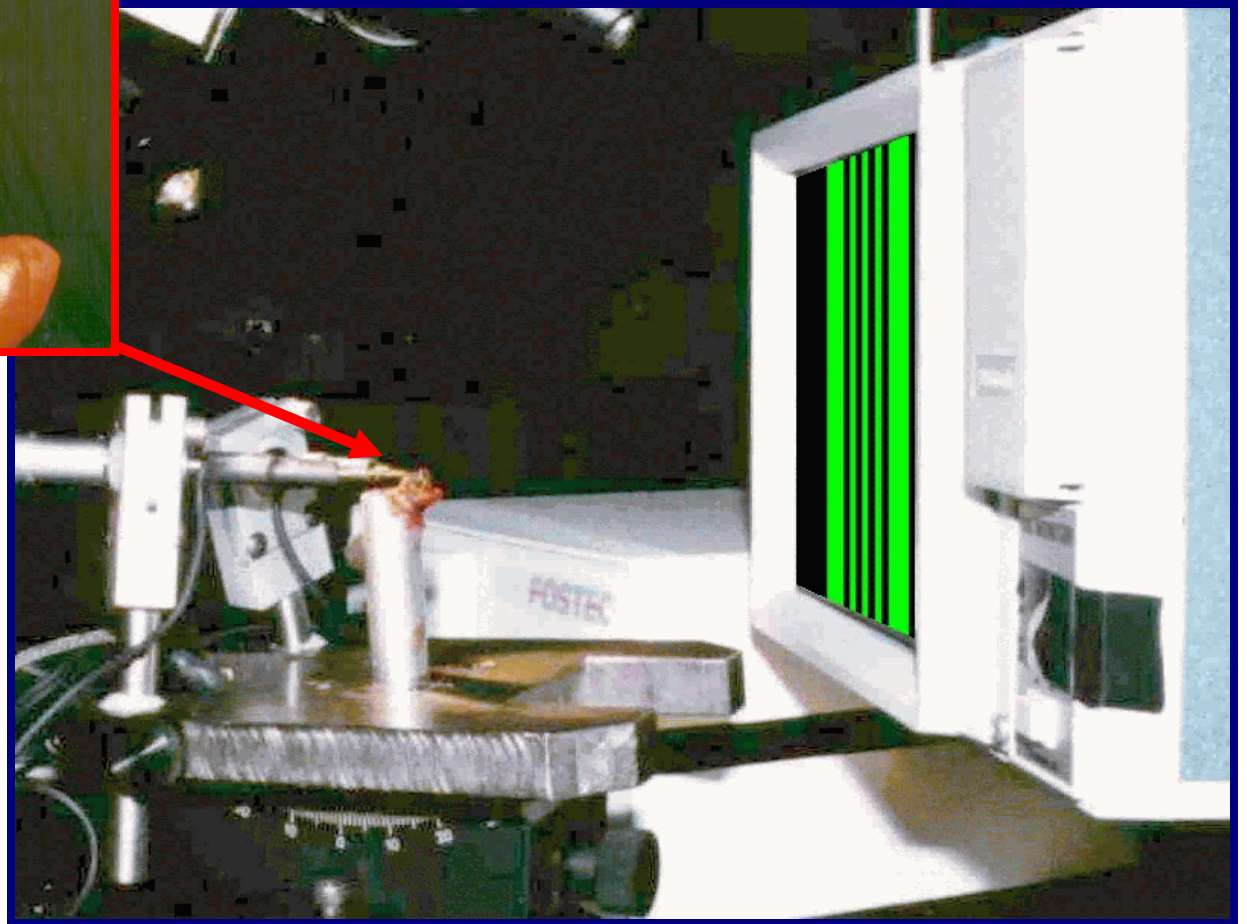
Substance dualism

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Can we explain sensation in physical terms?

Typical laboratory experimental setup



From the lab of Rob de Ruyter, Indiana University

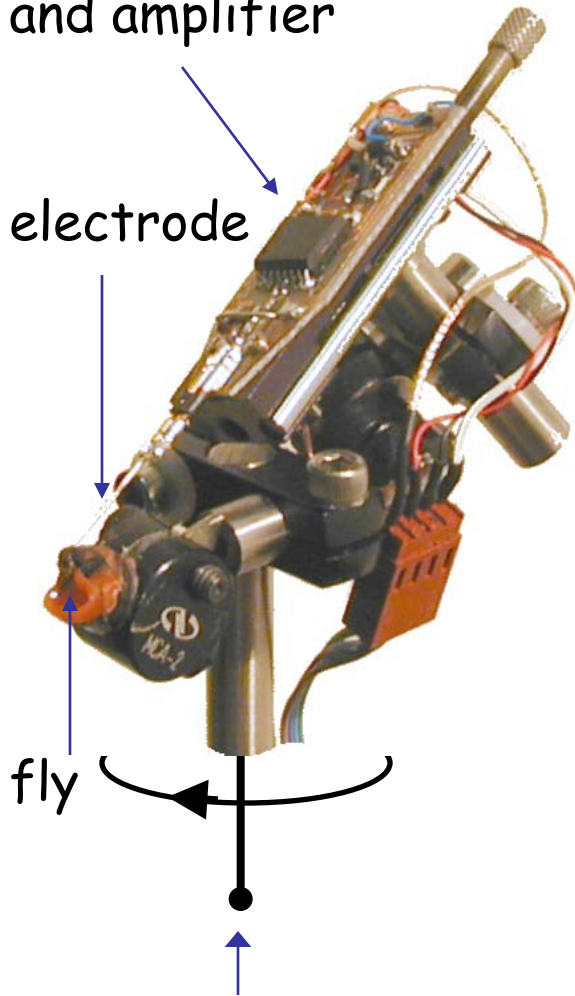
Setup for outdoor experiment

electrode holder
and amplifier

electrode

fly

rotation axis



mounted on stepper motor



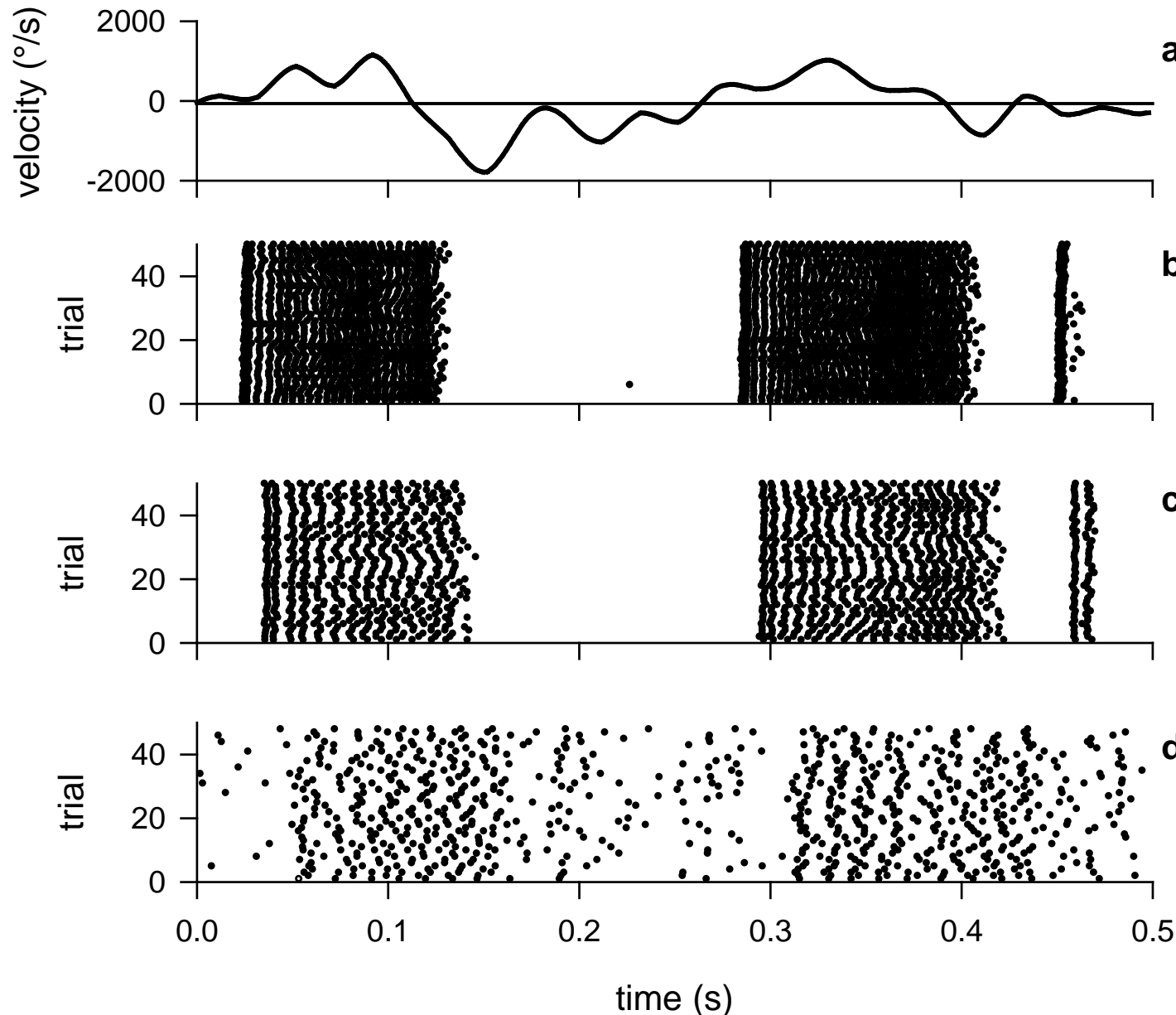
From the lab of Rob de Ruyter, Indiana University



OutdoorsPanoramaAndSound

From the lab of Rob de Ruyter, Indiana University

Detecting motion throughout the day: Photon shot noise limits vision in natural conditions



noon

30 min before
sunset

30 min after
sunset

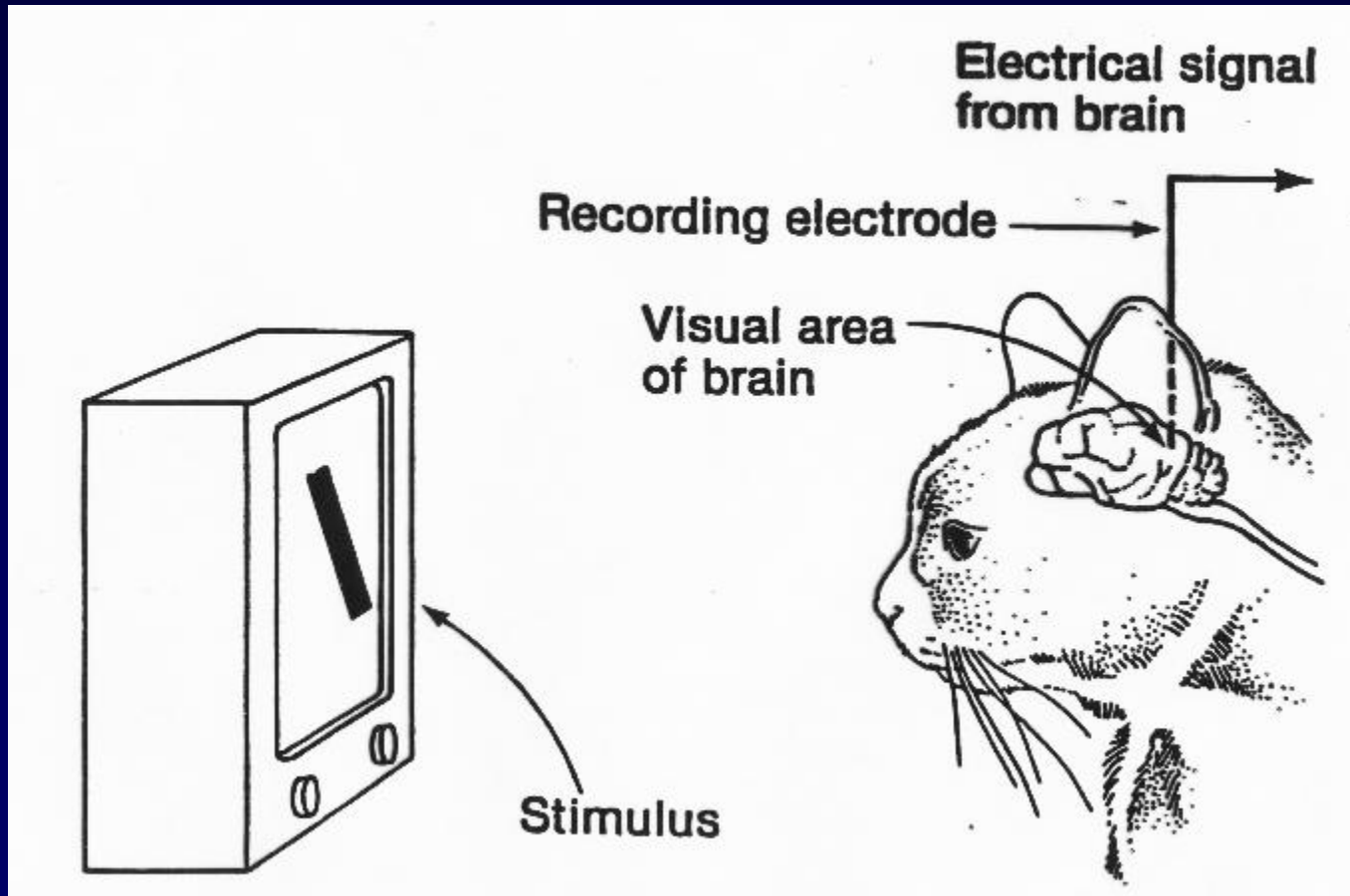
But does it work in mammals?



Figure 3.4

David Hubel (left) and Torsten Wiesel (right), who won the 1981 Nobel prize in physiology and medicine for their research on the physiology of vision. The results of their research established the groundwork for much of our knowledge of visual physiology.

Recording from a cat

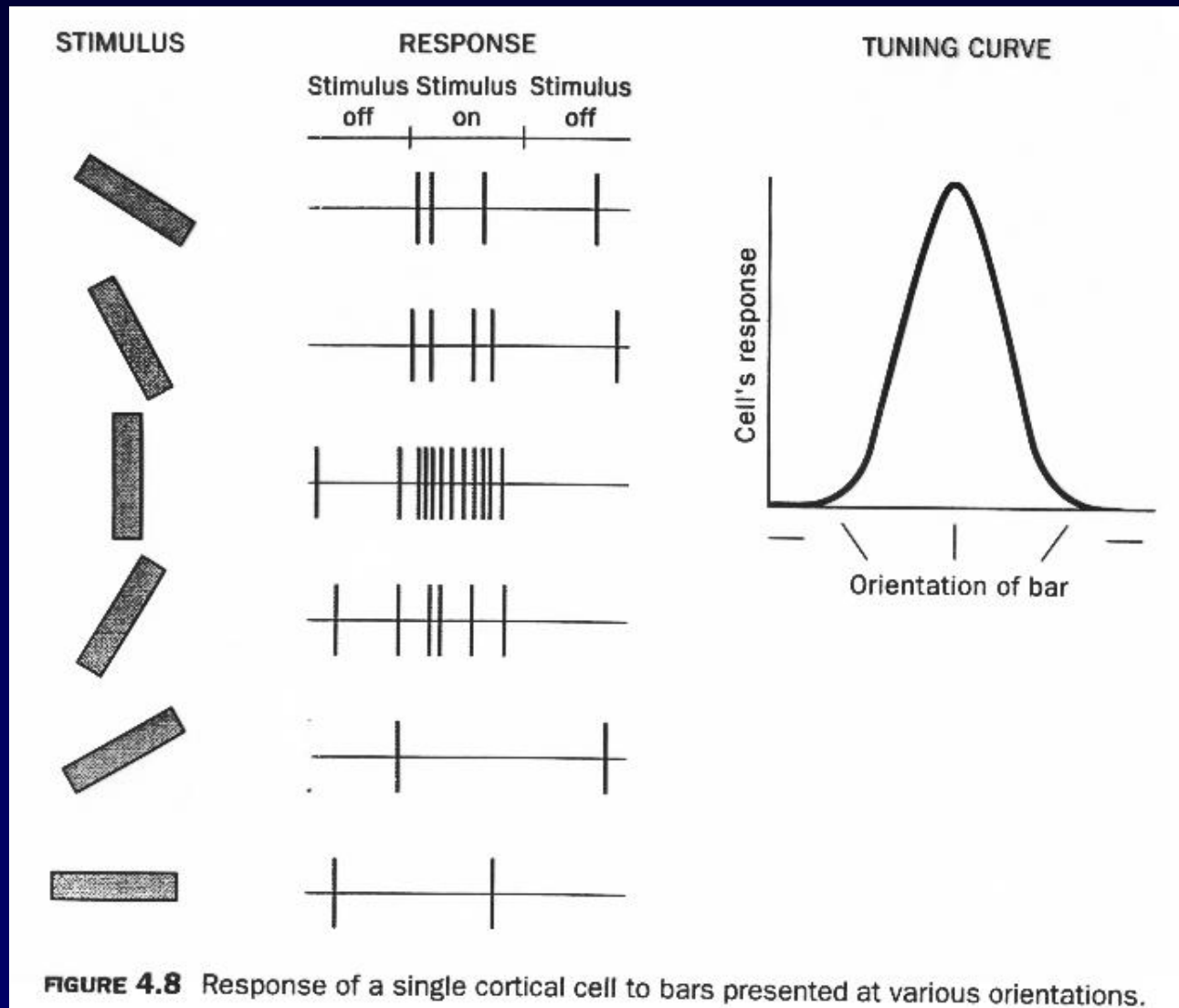


Regular Spiking Pyramidal Cell: Visual Response

rs_vis1

From the lab of David McCormick, Yale University

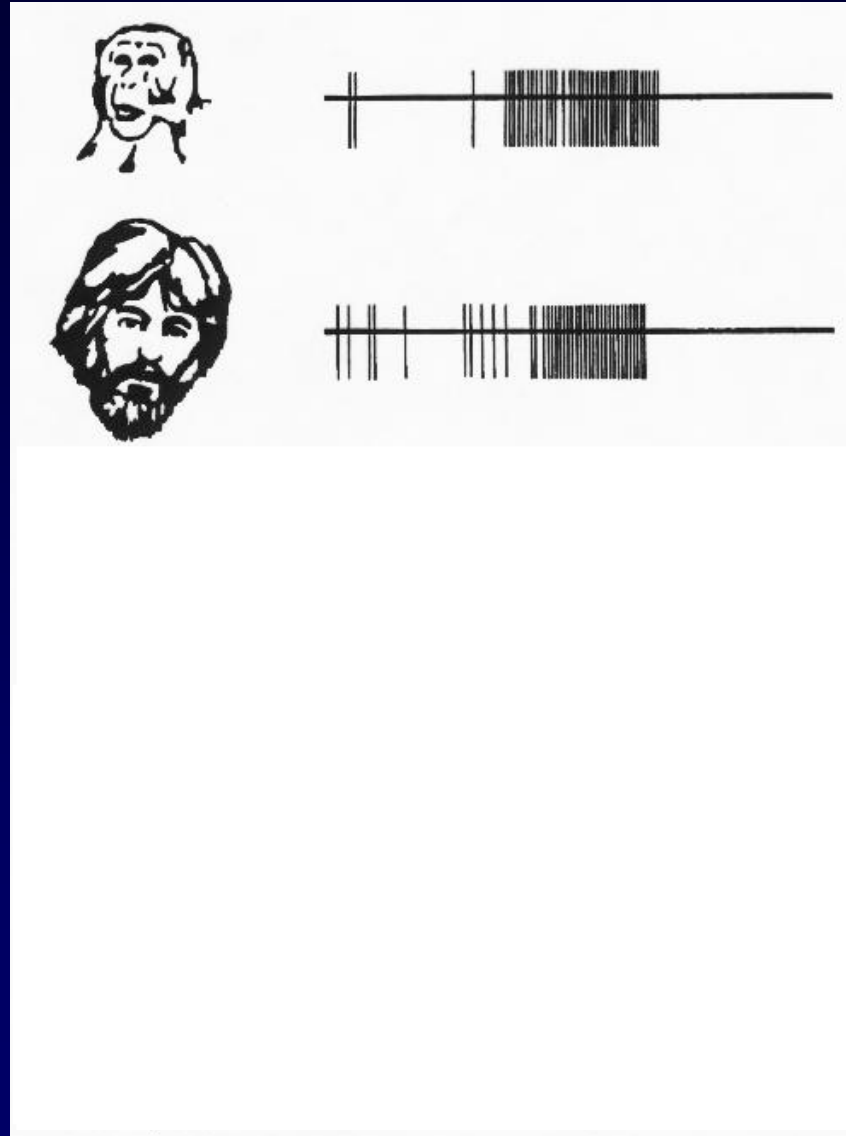
Cells respond to specific orientation



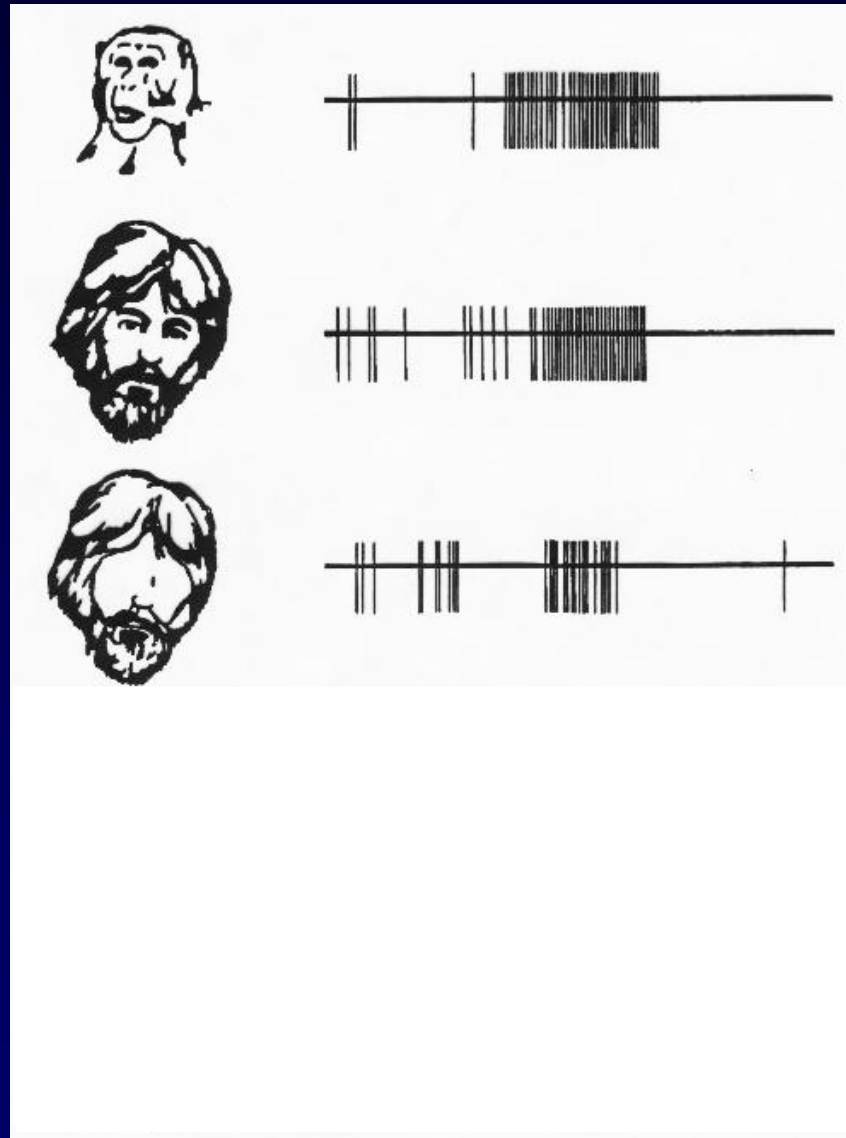
Even more interesting responses...



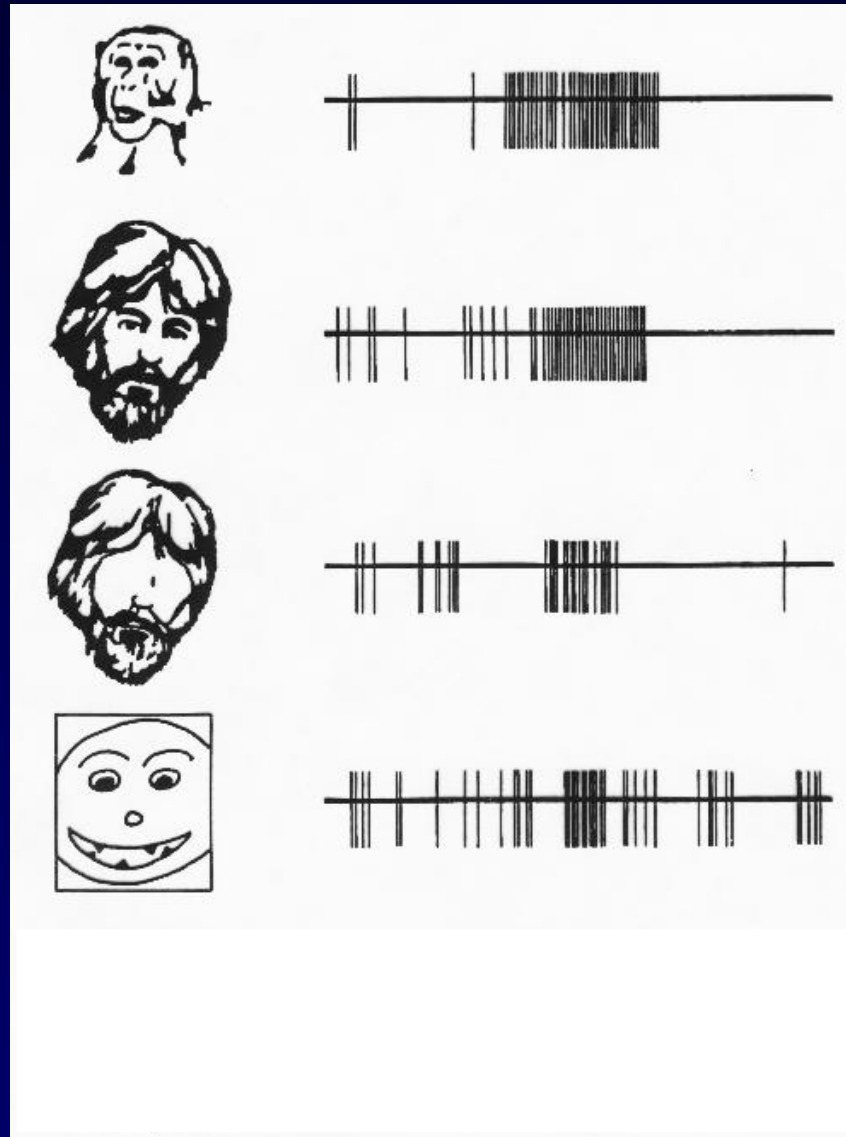
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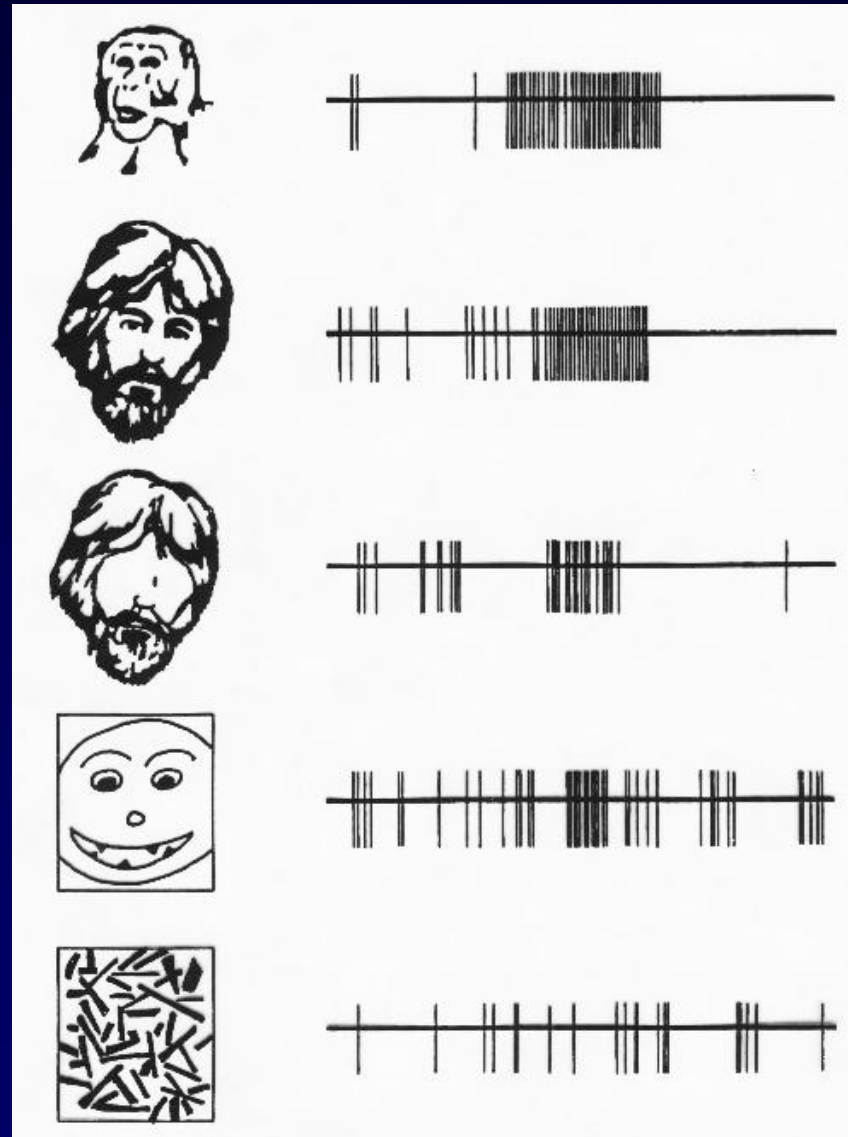
Even more interesting responses...



Even more interesting responses...



Even more interesting responses...



Similar explanations for audition,
olfaction, gustation, touch

Can movement be explained?

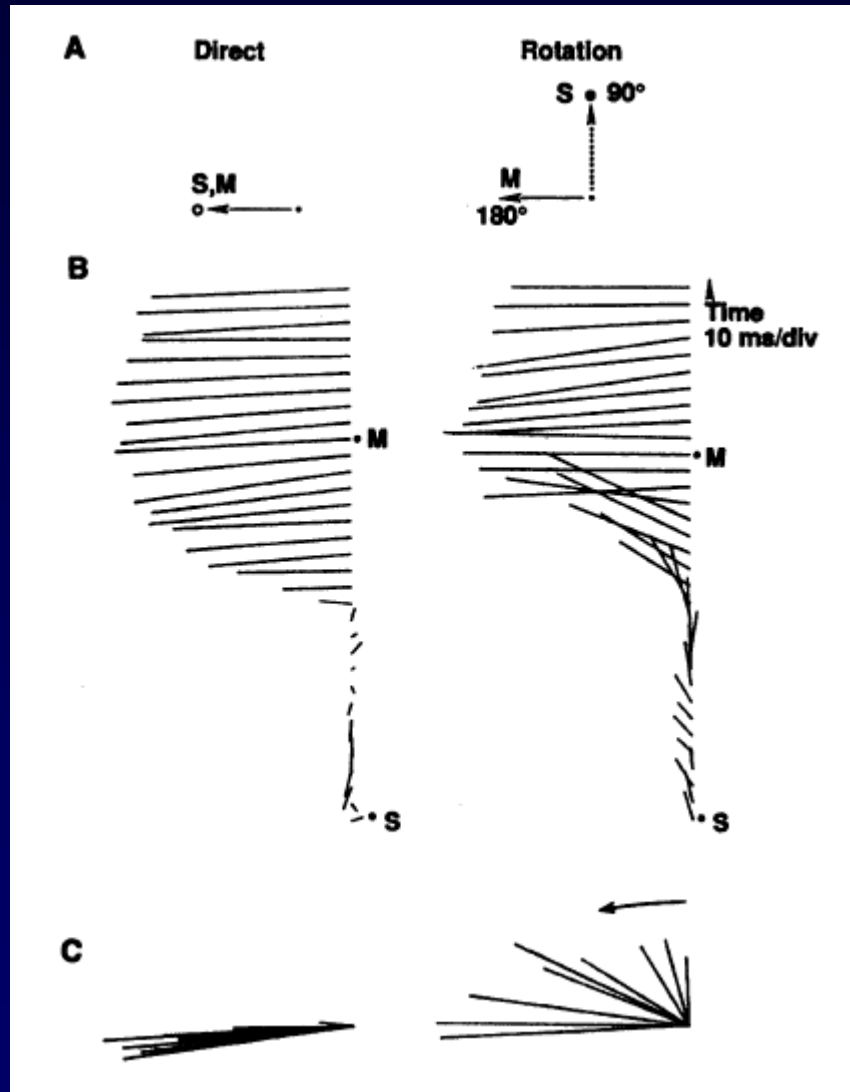
Mental Rotation of the Neuronal Population Vector

APOSTOLOS P. GEORGOPOULOS,* JOSEPH T. LURITO,
MICHAEL PETRIDES, ANDREW B. SCHWARTZ, JOE T. MASSEY

13 JANUARY 1989

SCIENCE, VOL. 243

Can movement be explained?



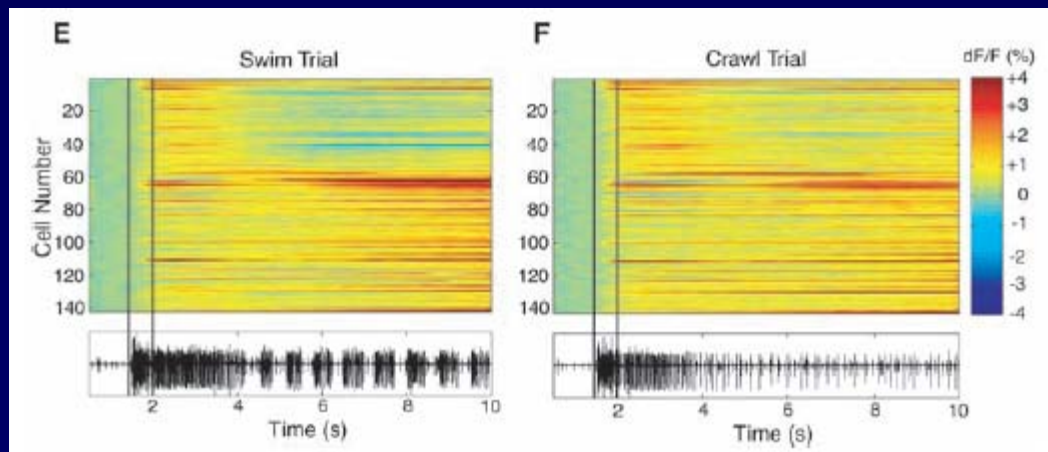
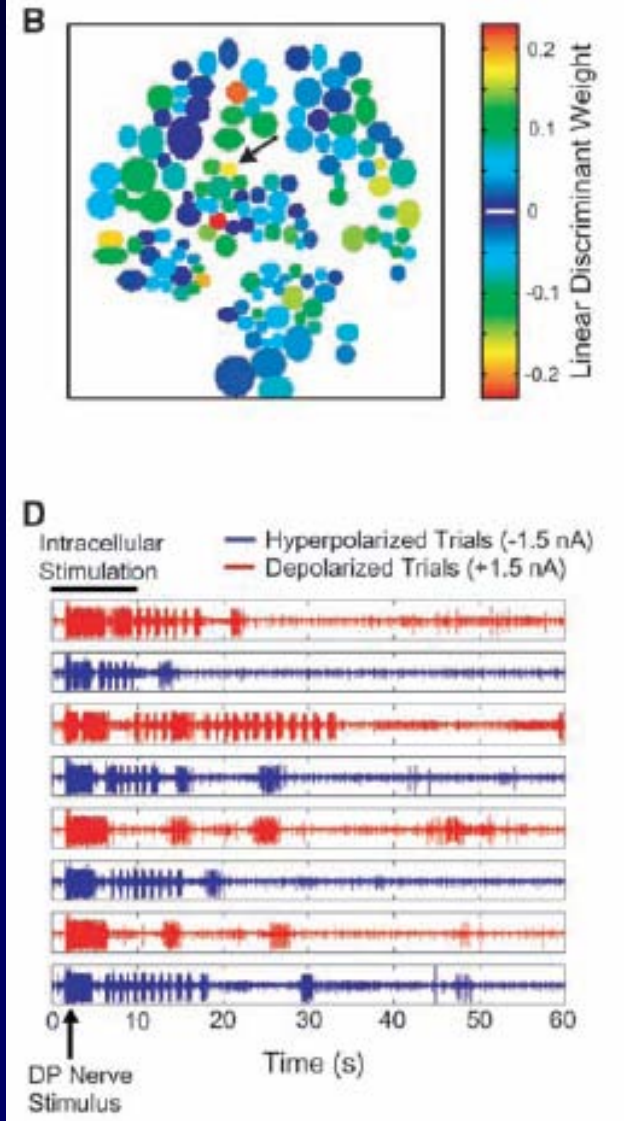
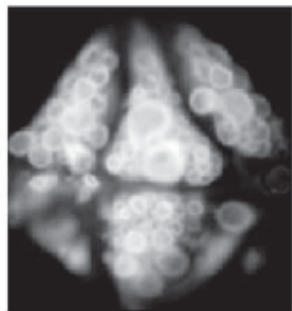
What about decisions?

Influencing decisions in a leech

Optical Imaging of Neuronal Populations During Decision-Making

K. L. Briggman,¹ H. D. I. Abarbanel,^{2,3} W. B. Kristan Jr.^{1*}

11 FEBRUARY 2005 VOL 307 SCIENCE www.sciencemag.org



Influencing decisions in a primate

[View random dot drift movies](#)

What about memory?

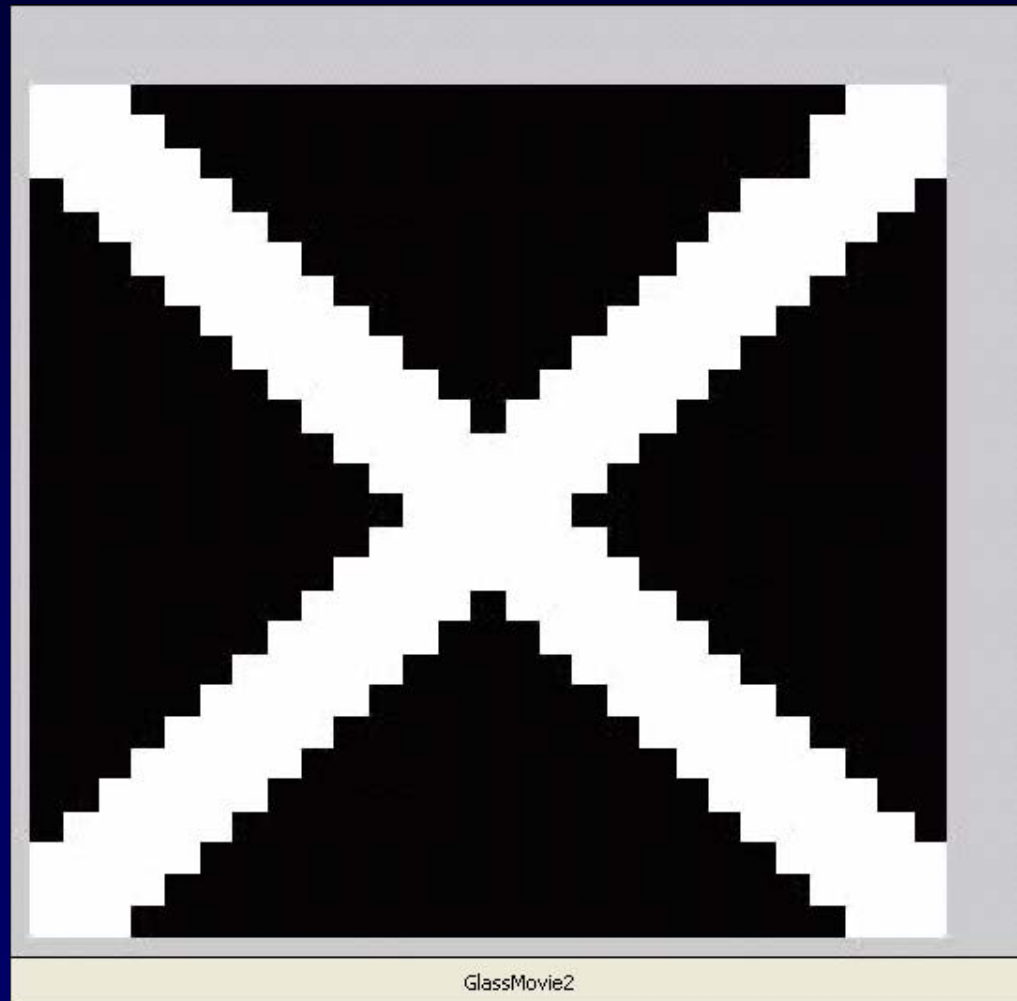
Show video from Fried lab

How can cells store memories?

For this, we need emergent properties

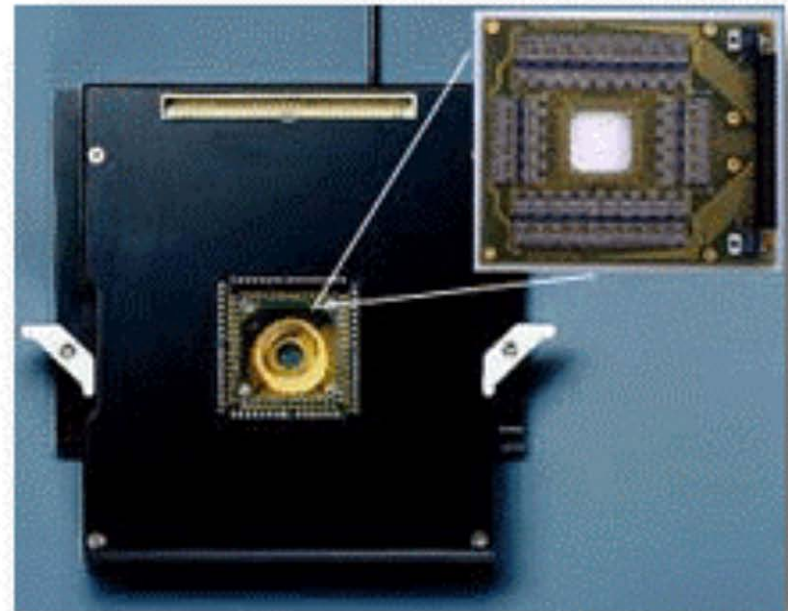
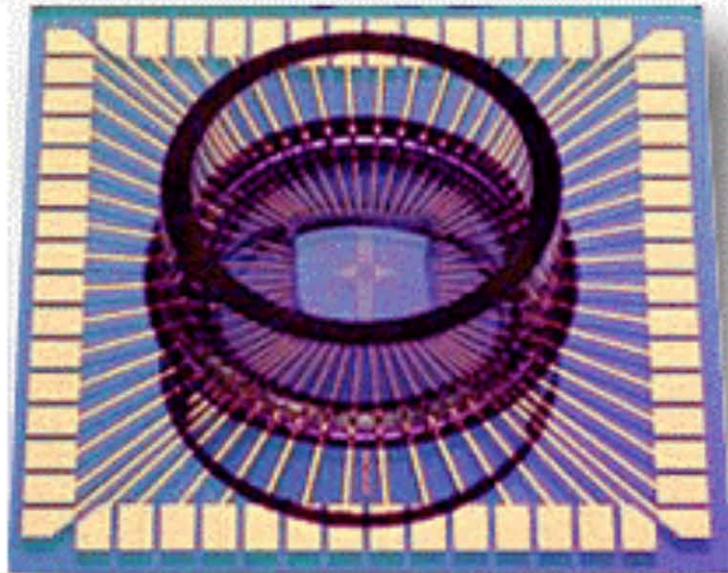
Conway's game of life is an example

Recalling an embedded pattern with collective activity

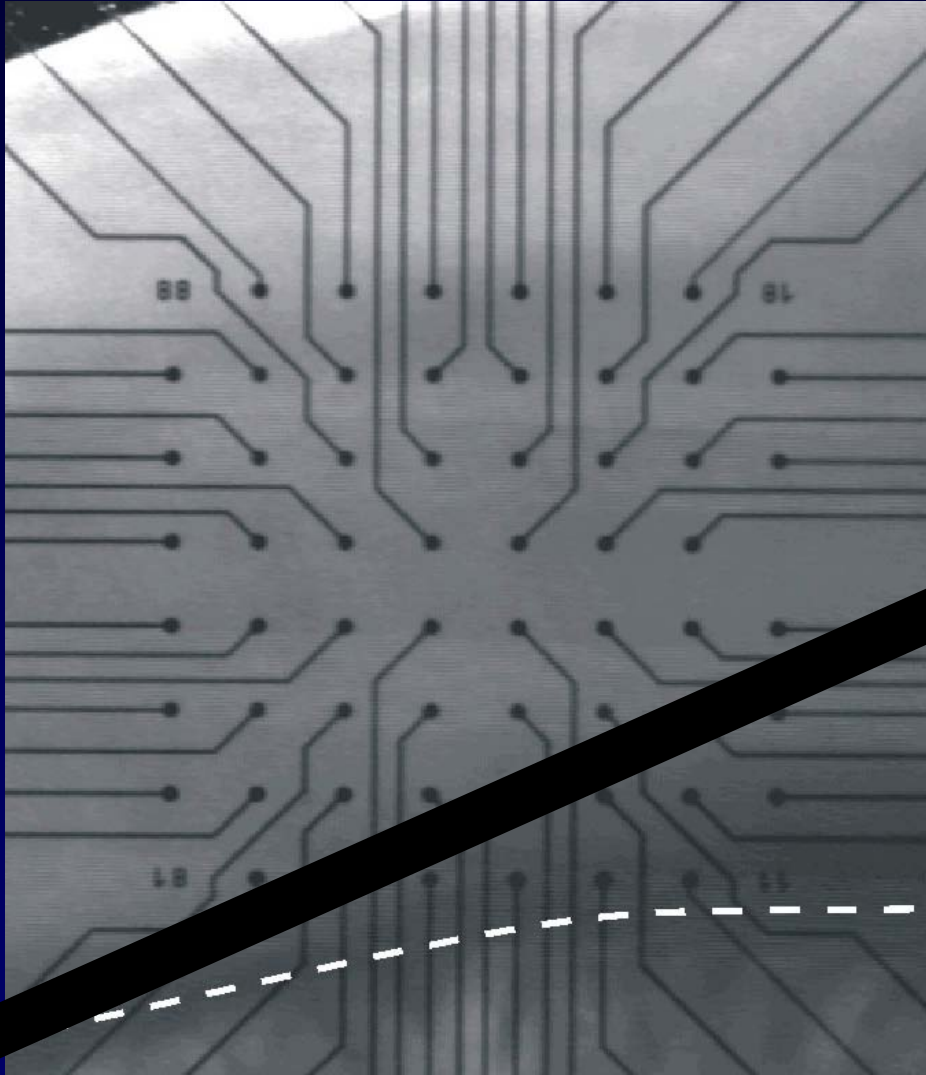


Is there evidence for emergent properties at the network level?

We can eavesdrop on neural networks

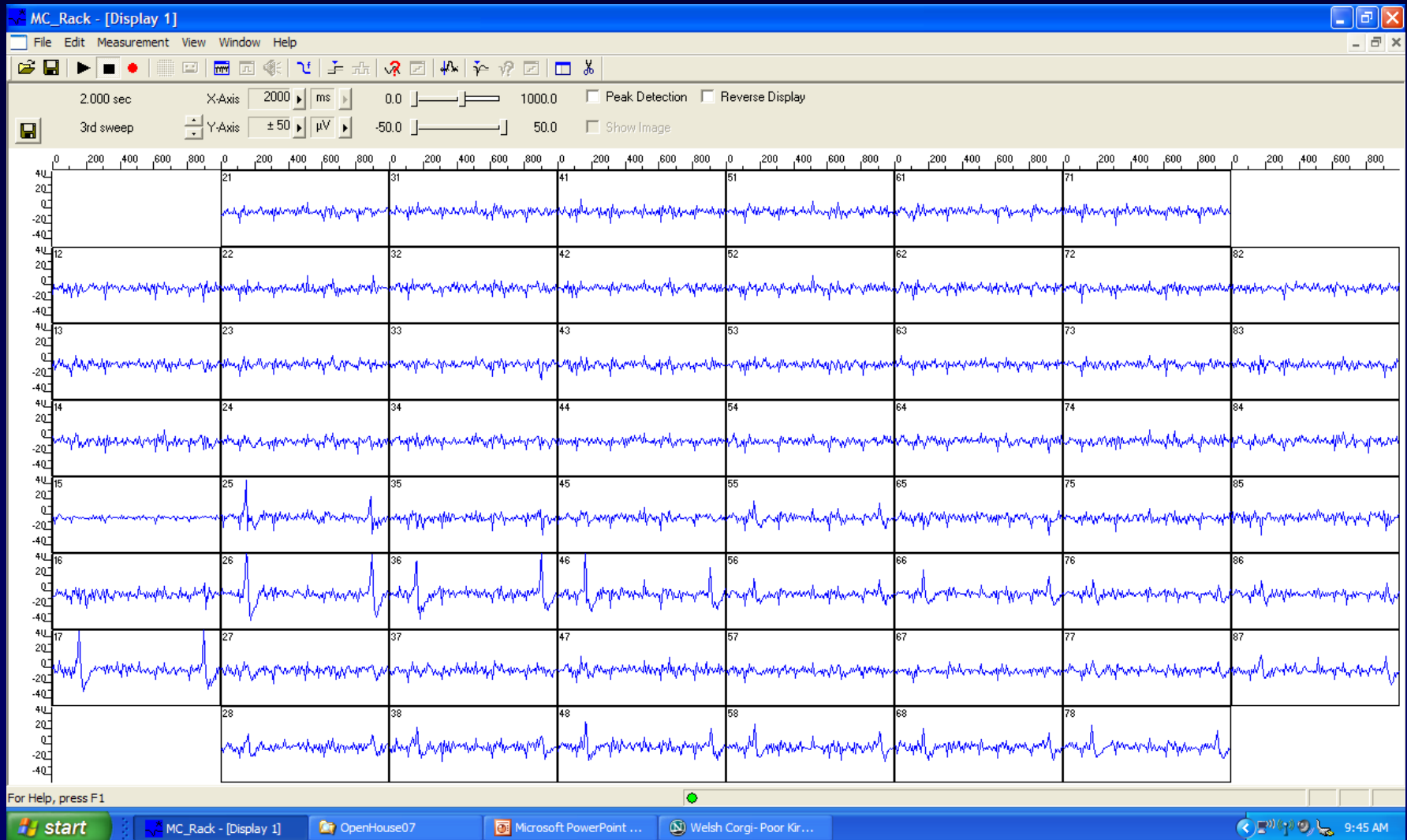


Sixty microelectrodes

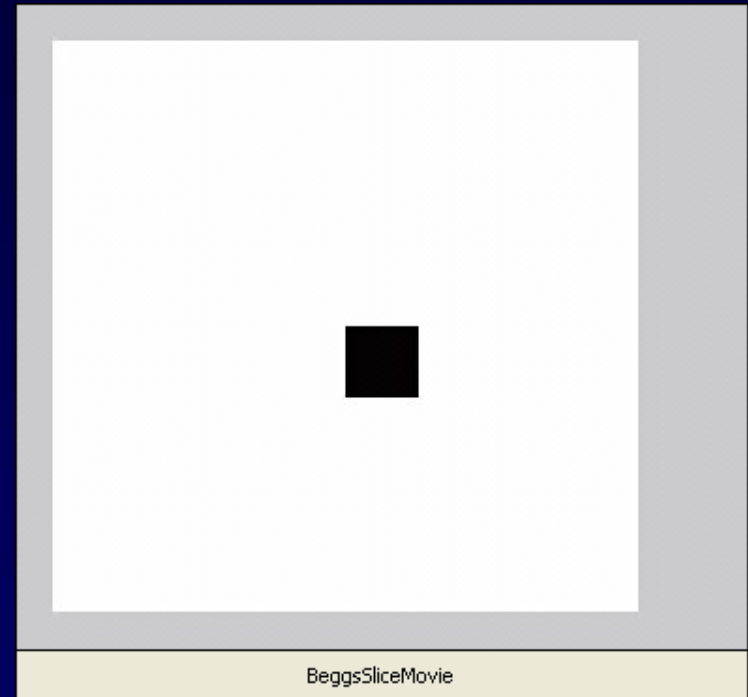
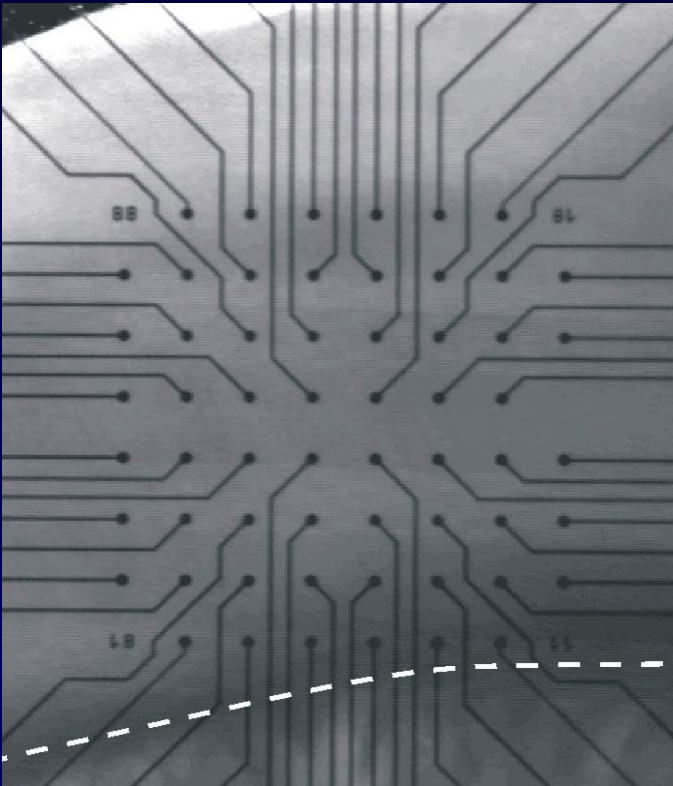


Width of human
hair

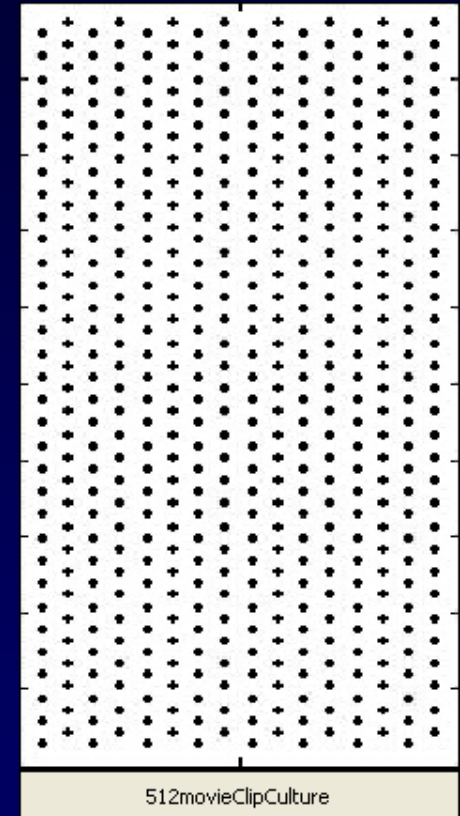
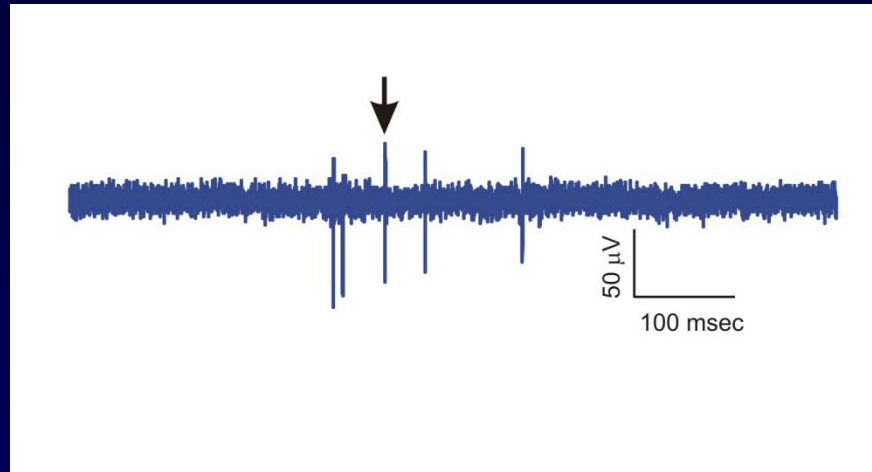
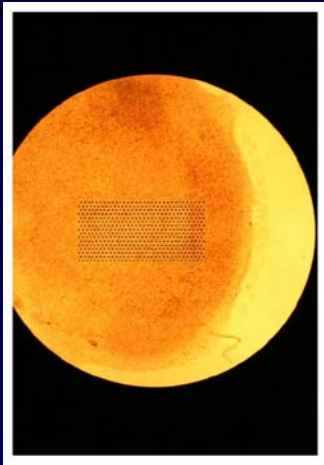
Activity from 60 wires



Electrical network activity

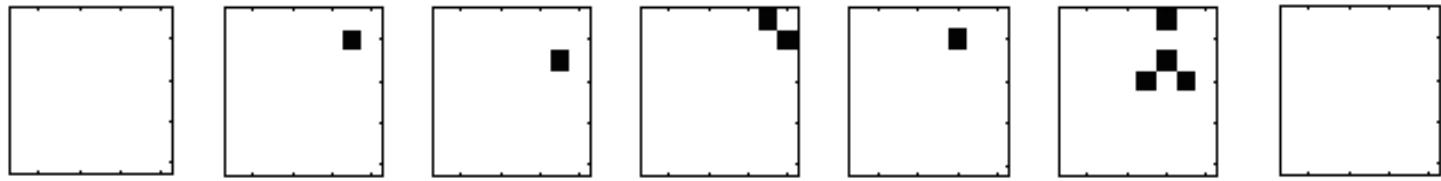


Now with 512 electrodes



In collaboration with Alan Litke, UC Santa Cruz

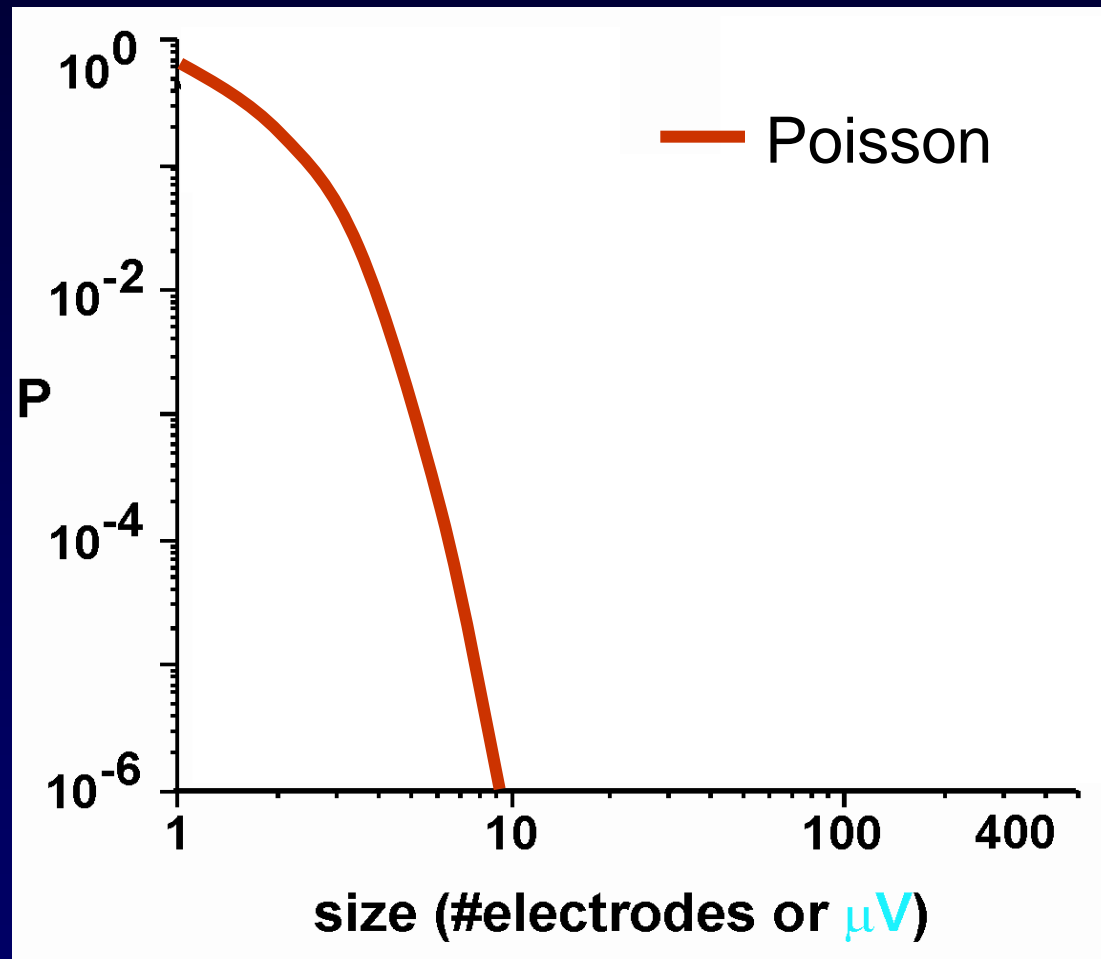
A sequence



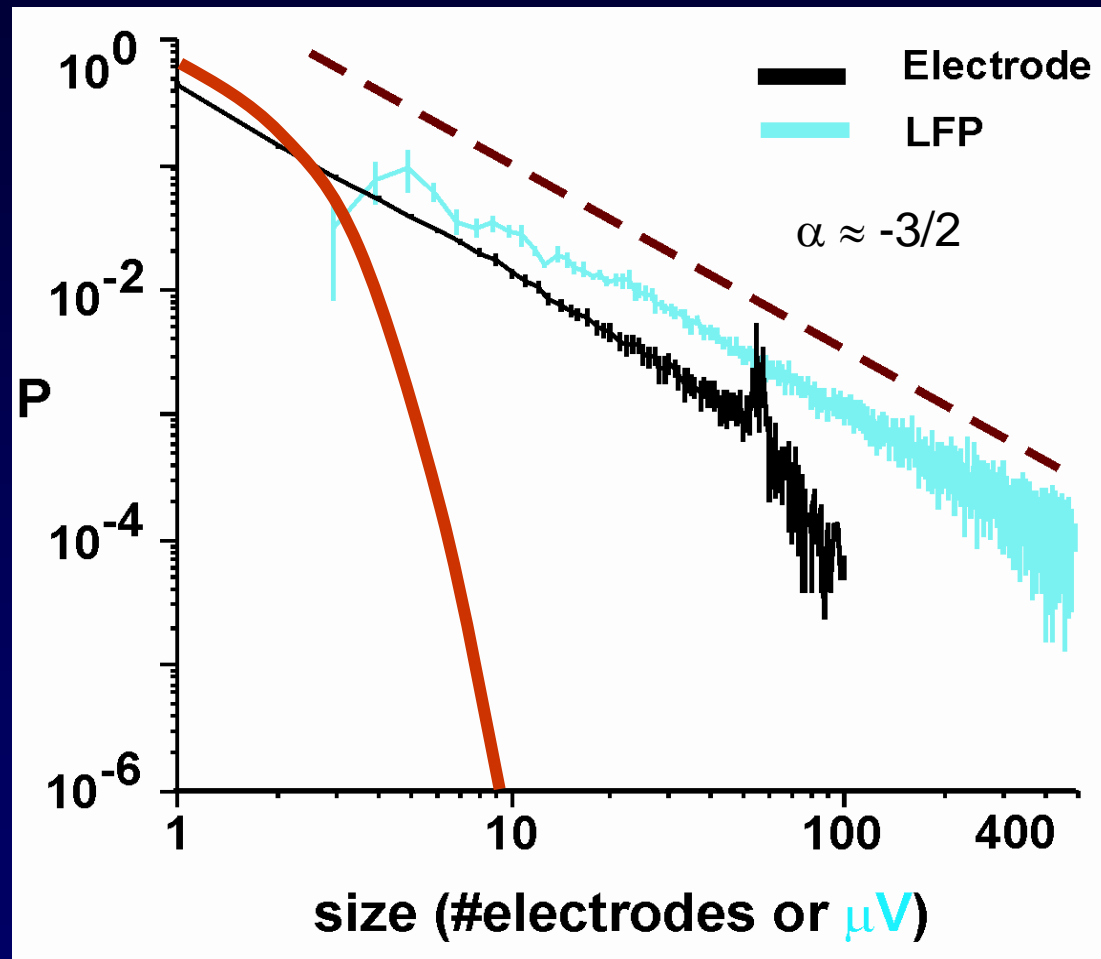
time (4 ms frames) →

Size: 9 electrodes activated

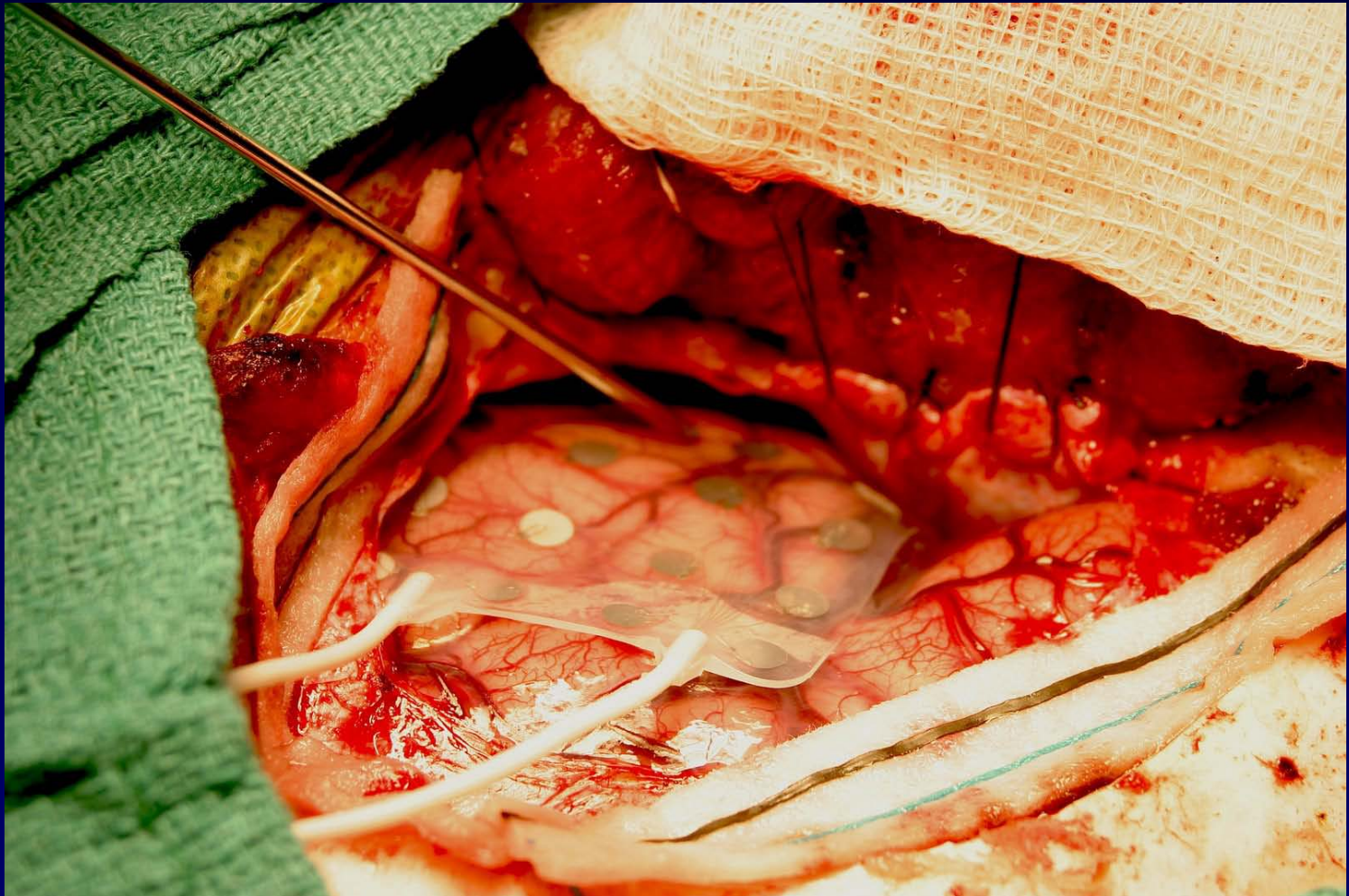
Do these sequences occur randomly?



Highly structured, emergent activations



Similar patterns in human tissue

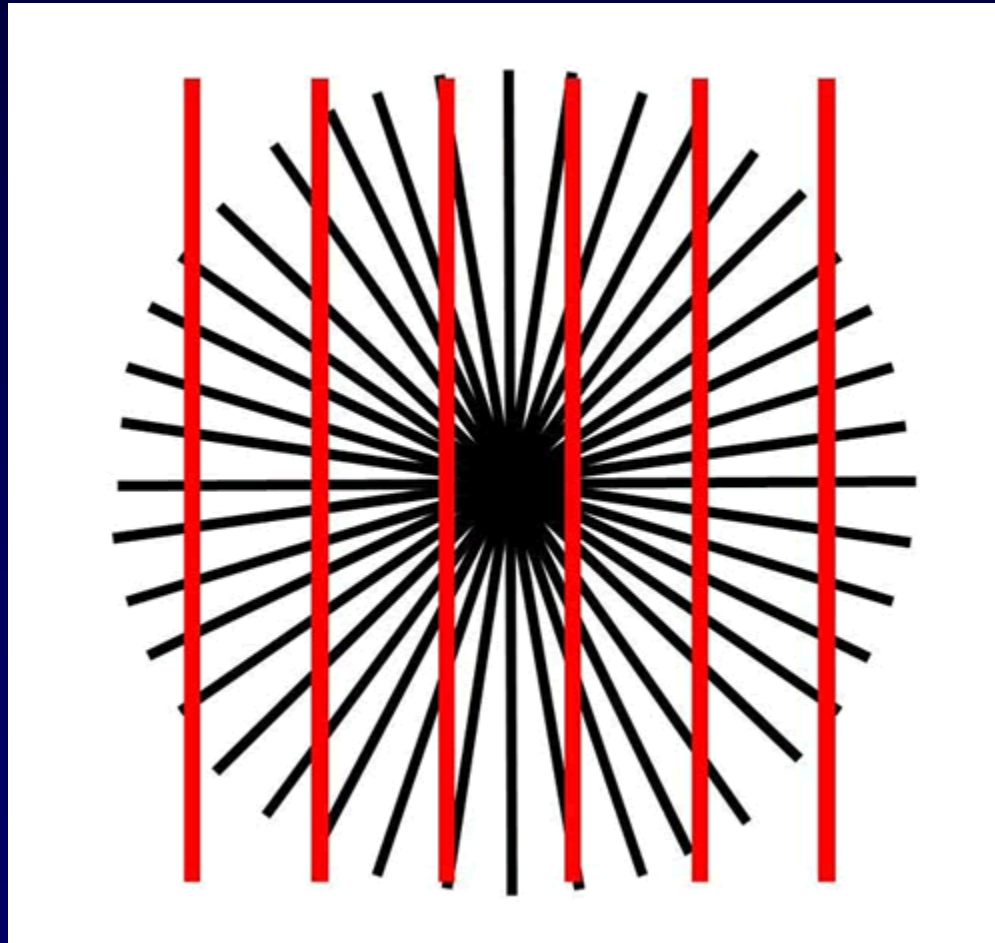


In collaboration with Jodi L. Smith, IUPUI

So, modern neuroscience can explain sensation, action, decisions, memory.

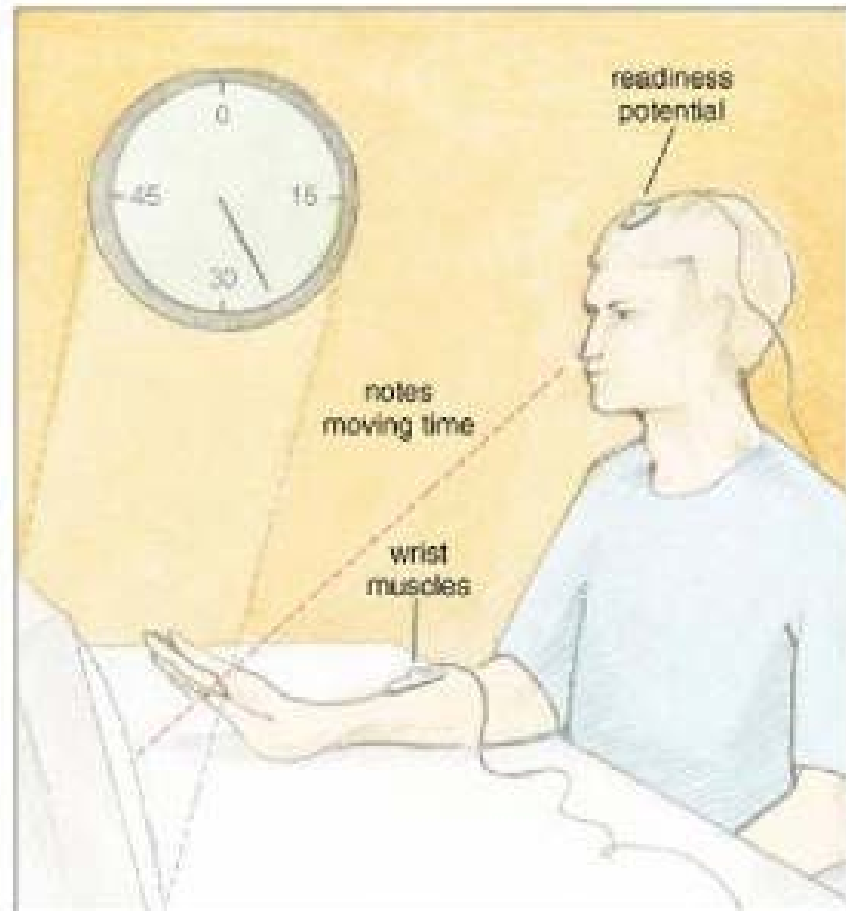
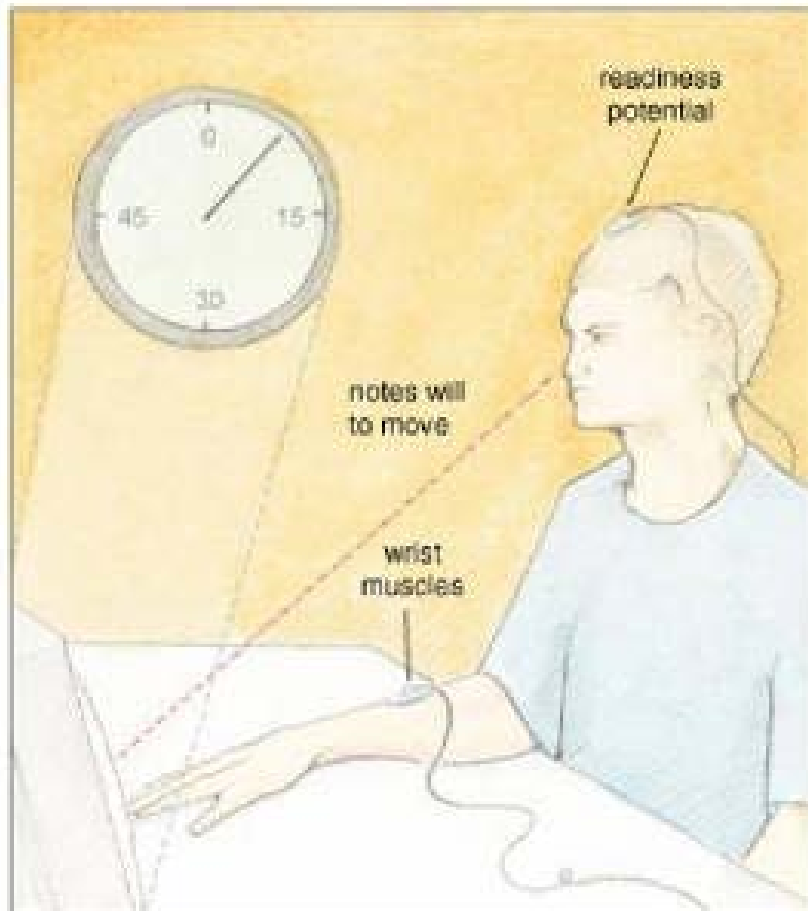
All that is left is that silly little feeling of subjective self. It is almost certainly an emergent property. This 'You' is only an illusion. (e.g. Daniel Dennett, see: <http://www.youtube.com/watch?v=Tb2ok2-owh4>)

The bars are straight, but appear curved



Free will is an illusion

Benjamin Libet's experiment



Readiness potential precedes will to move

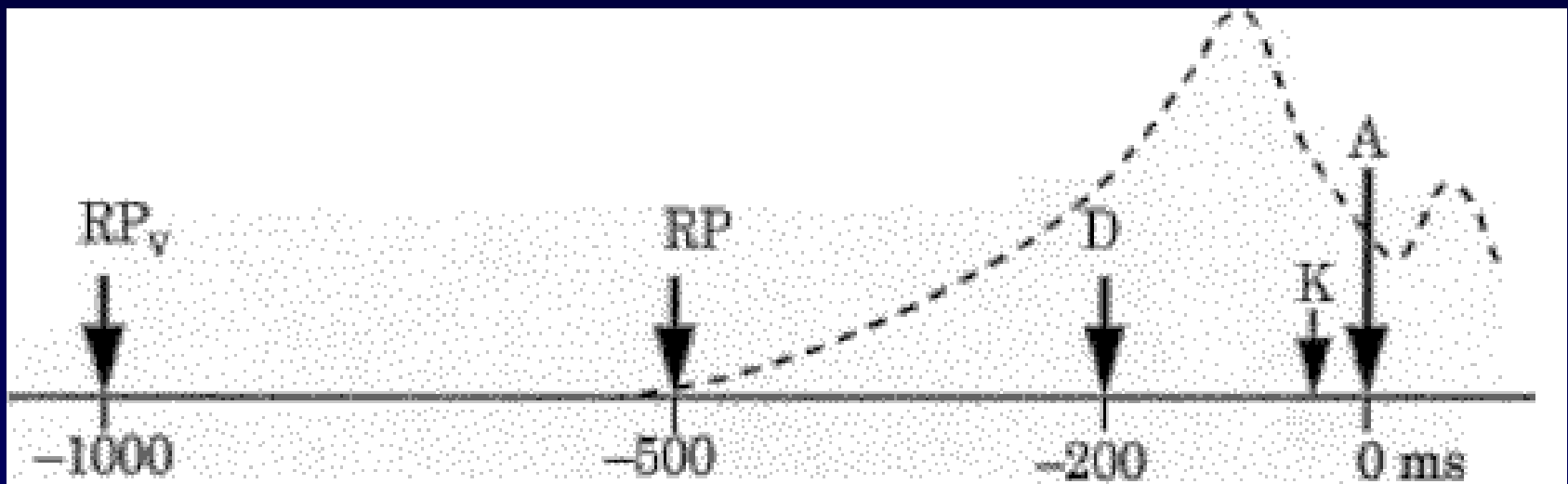


Fig. 1: Sequence of readiness potential (RP), volitional decision (D), and onset of action (A), as well as the control stimulus on the skin (K). If the action is planned ahead, the readiness potential starts already at time RP_v . After Libet (1985).

God is an illusion

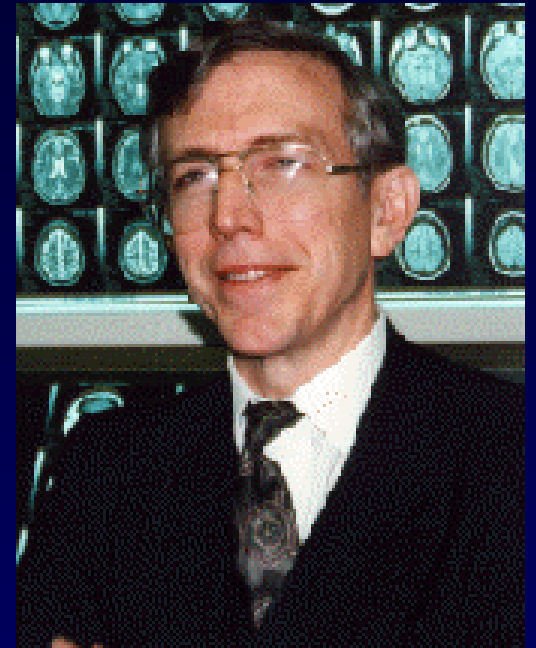
Temporal lobe epilepsy (TE)

There are...recent examples [of TE], like one of the founders of the Seventh Day Adventist Movement, Ellen White. Born in 1827, she suffered a brain injury aged 9 that totally changed her personality. She also began to have powerful religious visions.

Disruptions of this general area may also lead to increased ritual behavior.

Michael Persinger

80% of Dr Michael Persinger's experimental subjects report that an artificial magnetic field focused on ...[left temporal lobe] brain areas gives them a feeling of 'not being alone'. Some of them describe it as a religious sensation.





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Shiva is the **manufacturer's recommended** system for psychic work.

Is there any hope for the soul?

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- Physicalism or dualism?
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I think, therefore I am



Rene Descartes

Reply to Dennett

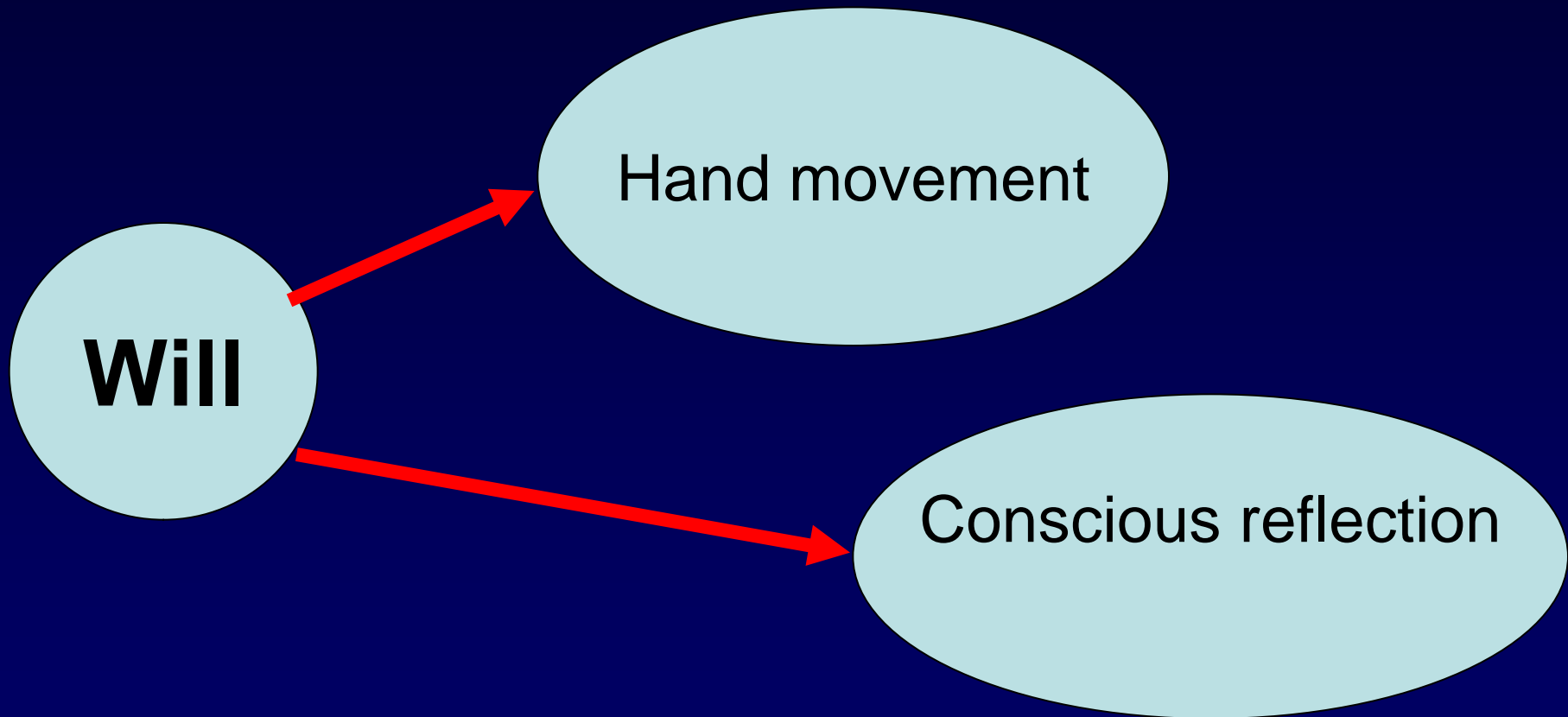
It is granted that I can be fooled by optical illusions.



Daniel Dennett

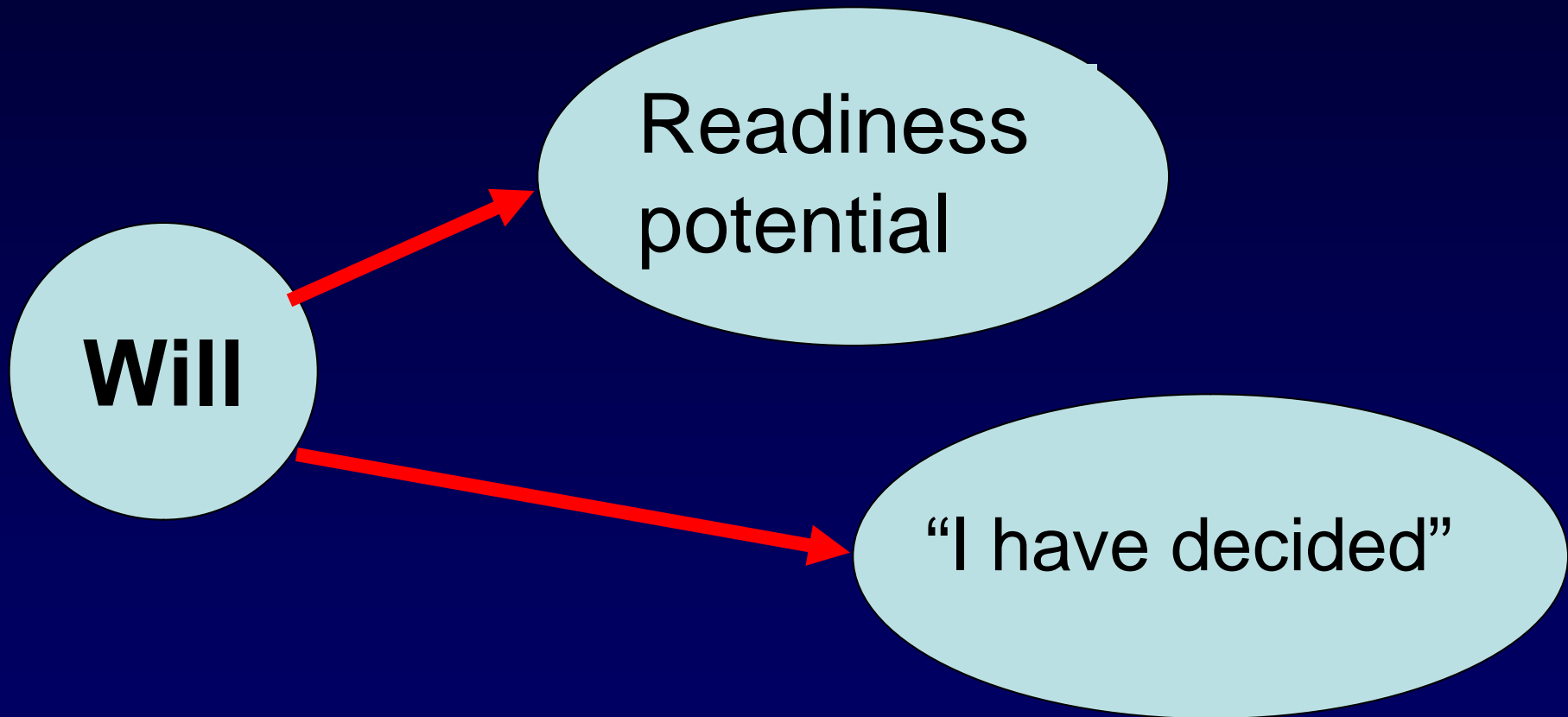
Response to Libet's experiments

Response to Libet's experiments

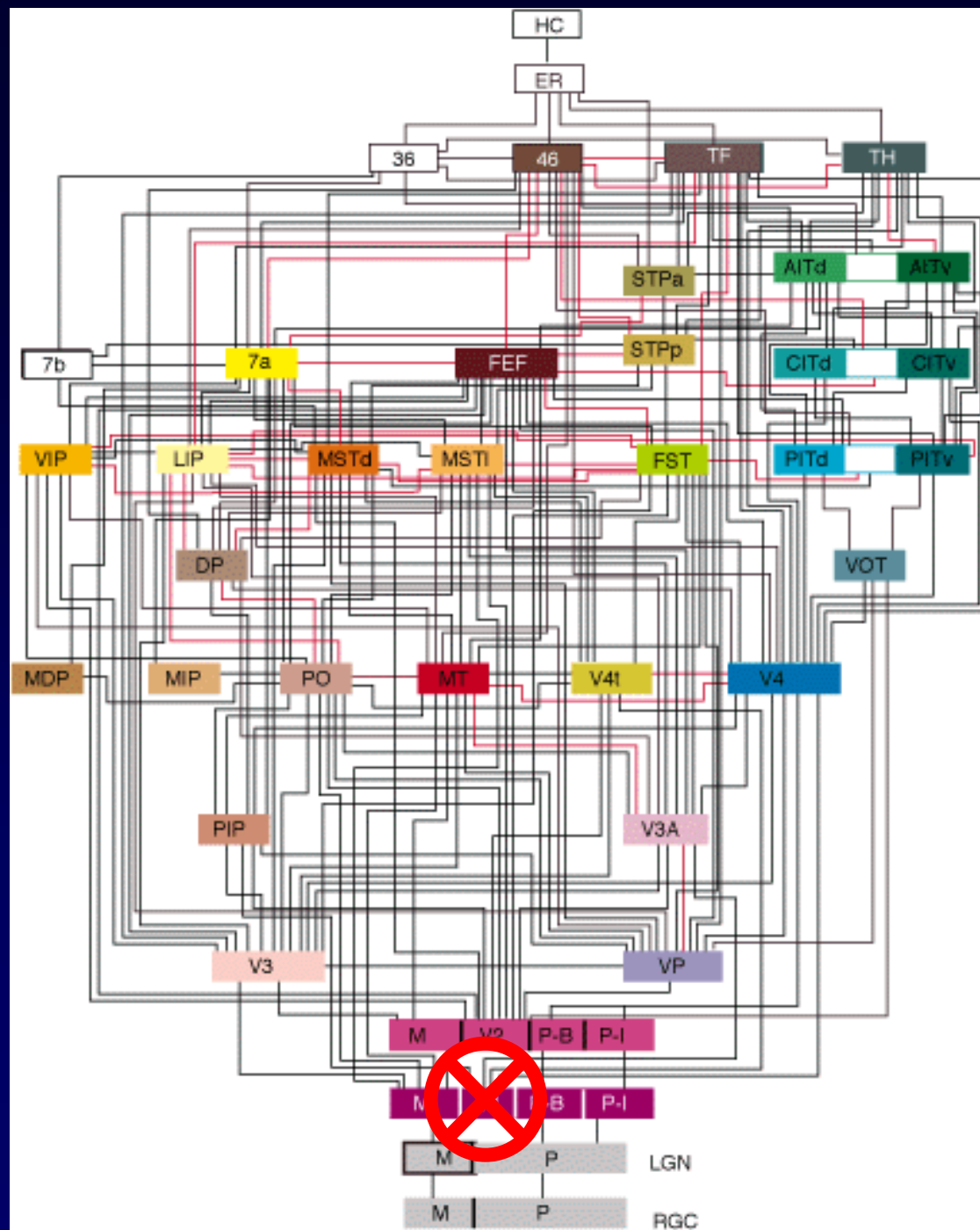


Are there any examples of our awareness “lagging behind”?

Response to Libet's experiments



Are there any examples of our awareness “lagging behind”?



So, conscious awareness can
come after recognition

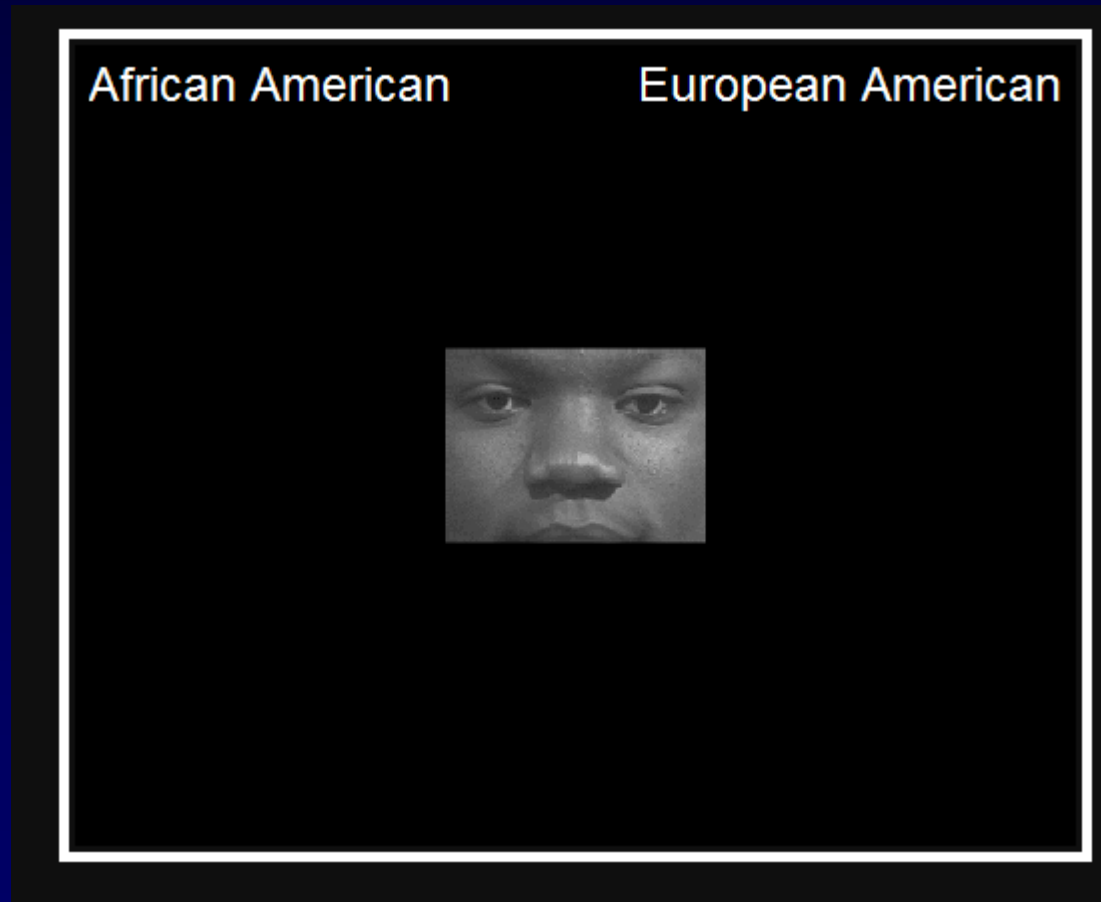
Also...

Low-level processes are often automatic: I can tie my shoes without thinking about it; I can drive home in my sleep. I have subconscious biases in my thoughts.

Do these low-level processes truly reflect my will, or do they just reflect my tendencies?

Implicit Association Test (IAT)

<https://implicit.harvard.edu/implicit/>



Implicit Association Test (IAT)

<https://implicit.harvard.edu/implicit/>



So...

My tendencies could be detected by electrodes, or by questions that you ask me.

But I do not necessarily act on all my tendencies.

Example: I may be angry at someone, but I may chose to forgive them.

Which takes more “willpower”: anger or forgiveness?

Free Will

- Free will may be a new type of process, as yet not fully understood.

Free Will

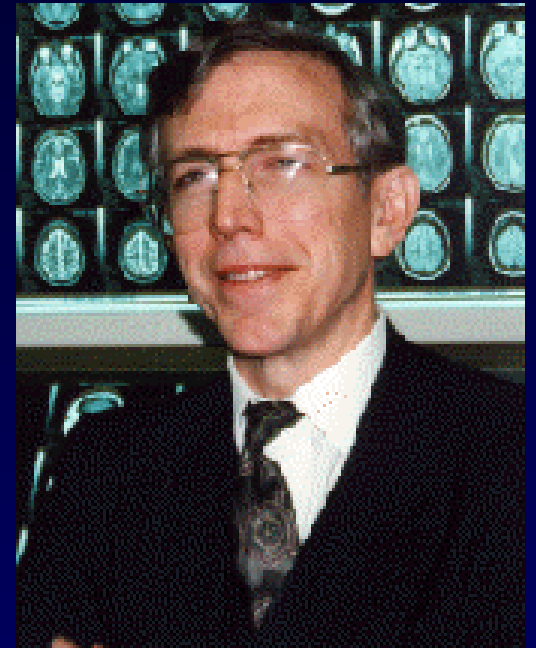
- Free will may be a new type of process, as yet not fully understood.
- Signals of my intentions may come before my sensed decision. But my choice may actually come before both.

Free Will

- Free will may be a new type of process, as yet not fully understood.
- Signals of my intentions may come before my sensed decision. But my choice may actually come before both.
- We have many strong automatic tendencies, but these are often overruled by our will.

Reply to Persinger

I can also create the illusion of spirals by giving people LSD. Does this mean that all spirals are just figments of the mind? No real spirals exist?



If free will is an illusion, then there is no moral responsibility



Shooting someone is never wrong if you could not have done otherwise.
The view that there is no moral responsibility is so contrary to intuition that there should be strong evidence before we overturn it.

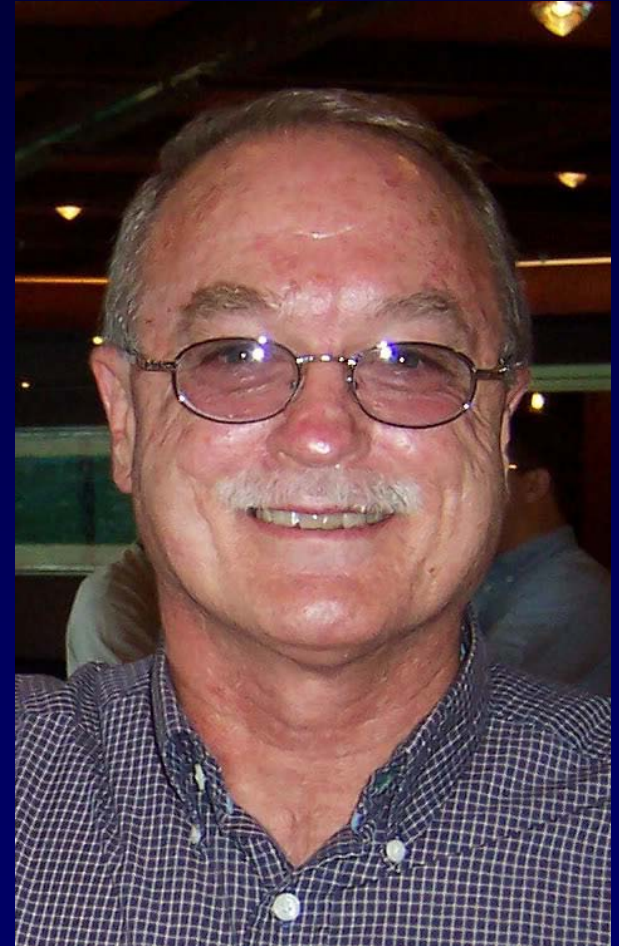
Yet, telling people that there is no free will actually makes them more likely to behave in an unkind way!

Argument based on reason

I can reason based on evidence and arguments.

But if my thoughts are just the effects of physical causes, then they are not the effects of reason.

If this is true, then I have no way of reasoning about anything, including skepticism of the soul.
(self defeating)



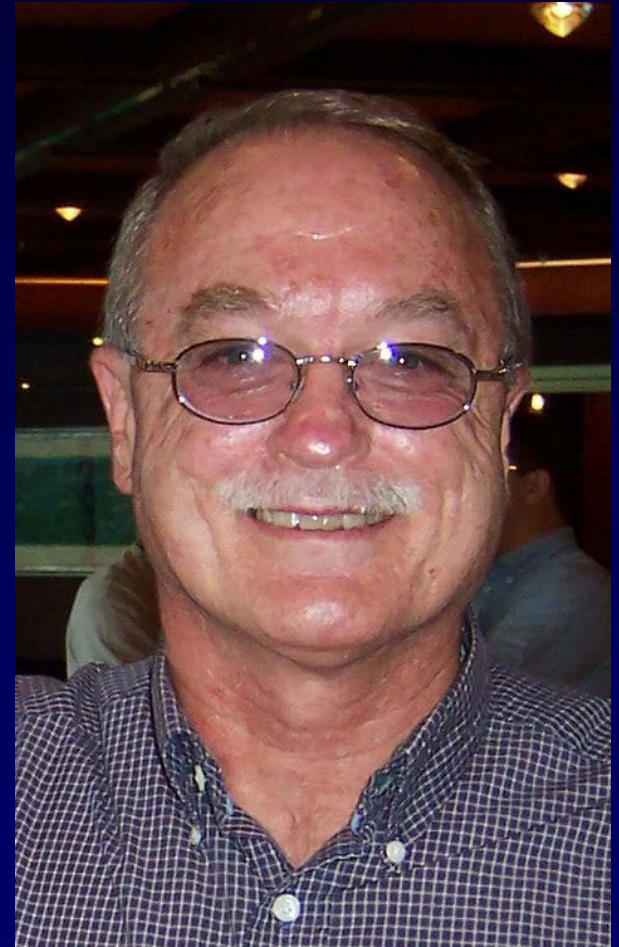
JP Moreland

Mental events have different properties than physical events

Objects have mass and length and color...

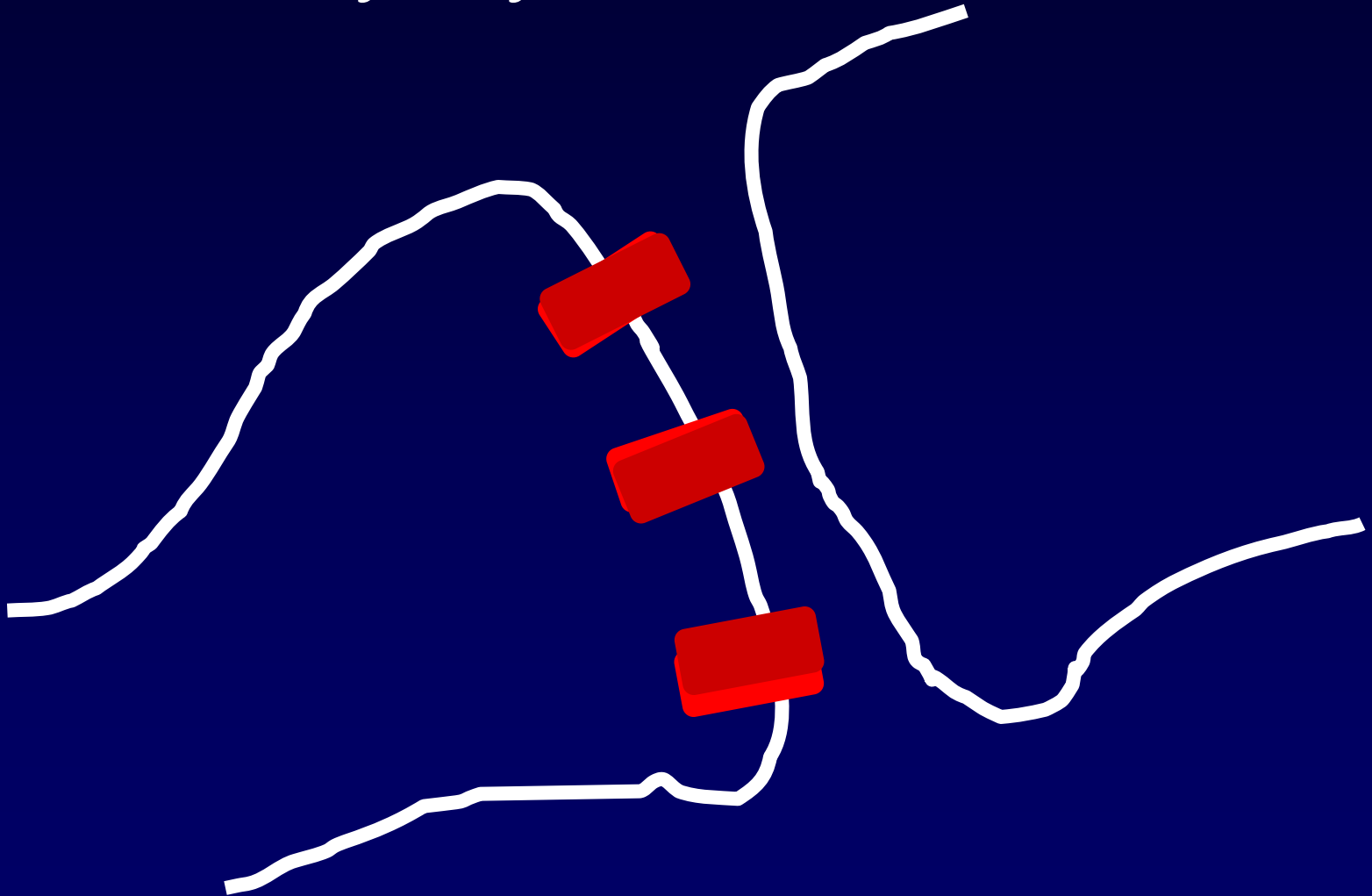
my ideas and feelings do not.

Mental events, consciousness, my soul, could all be made out of a different “substance.”



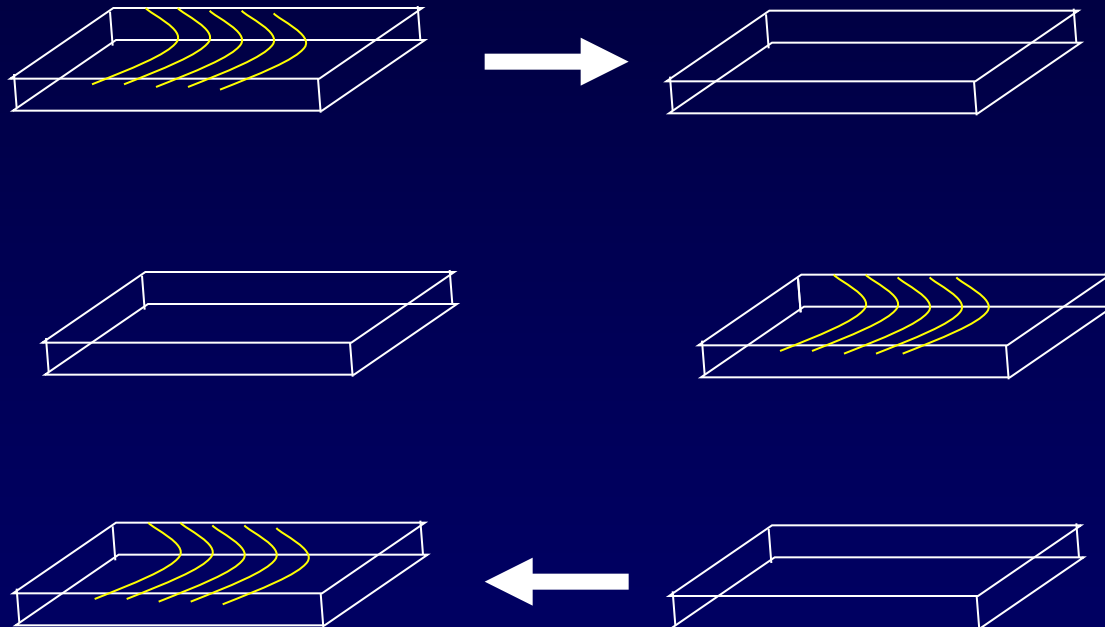
JP Moreland

Synaptic proteins completely turn over every 7 yrs



Therefore 'You' can not be equivalent to your brain

Wave in tank



Could our minds move in a similar way?

Many common-sense arguments show that pure physicalism is self-contradictory.

Common-sense notions of experience and morality should not be overturned lightly.

“Scientific” claims that we now understand the brain are overstated.

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If there is a soul

- “...there has been a connection both historically and theologically between the existence of a substantial soul and the supernatural realm. If the soul exists, then this is very good reason to think that a personal, self-aware being – God – exists.” -J.P.Moreland

If there is no soul

- “These [embryos] are microscopic groupings of a few differentiated cells. There is nothing human about them except potential – and, if you chose to believe it, a soul.”
–Michael Kinsley, Time magazine, June 25, 2001 (from J.P. Moreland)

But does philosophy have any impact on real-world events?

John Locke – American revolution

Karl Marx – Russian revolution

Mind/Body debate – Euthanasia, abortion, value of human life, how we treat each other, empathy, war, whether people accept God or not...

“God is spirit, and his worshippers must worship him in spirit and in truth.” — John 4:24

“You don't have a soul. You are a
Soul. You have a body.”

-C.S. Lewis

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Thanks!