

WORLD VIEWS AND MODERN NEUROSCIENCE

John Beggs

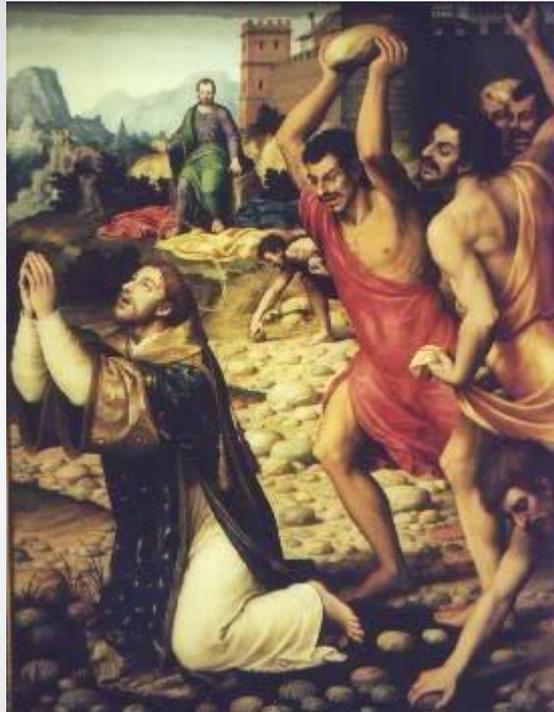
WORLD VIEWS: NEUROSCIENCE

- Criminal minds
- A look inside
- Trapped against your will
- Escape from reductionism

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CRIMINAL MINDS



I want to do the things that are good, but I do not [*or* cannot] do them.
¹⁹ [^LFor] I do not do the good things I want to do, but I do the bad [evil] things I do not want to do. ²⁰ So if I do things I do not want to do, then I am not the one doing them. It is sin living in me that does those things.
-Romans 7

CRIMINAL MINDS

Right orbitofrontal tumor [82]. The neurology literature contains a case report of an unidentified 40-year-old male who developed an increasing interest in child pornography and was eventually convicted of sexually molesting his step-daughter. The trial judge ordered the patient to undergo inpatient rehabilitation in a program for sexual offenders or face incarceration; however the patient was unable to restrain his sexual impulses while in the program and was ejected. The evening before his prison sentence was to begin, the patient was transported to a medical center with a headache, and neurology consultation revealed multiple focal neurologic signs. MRI revealed an enhancing anterior fossa skull-based mass that displaced the **right orbitofrontal lobe**

CRIMINAL MINDS



Thief, liar, selfishly ambitious, lustful, unforgiving, ungrateful, unkind, cruel, prideful, abuser of drugs and alcohol, vengeful, scheming...

BIBLICAL WORLD VIEW

This day I call heaven and earth as witnesses against you that I have set before you life and death, blessings and curses. Now choose life...

-Deuteronomy 30:19

BIBLICAL WORLD VIEW

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We are freely acting agents that have moral responsibility!

CRIMINAL MINDS

To what extent are we responsible for our actions?

Can we say “my brain made me do it?”

CRIMINAL MINDS

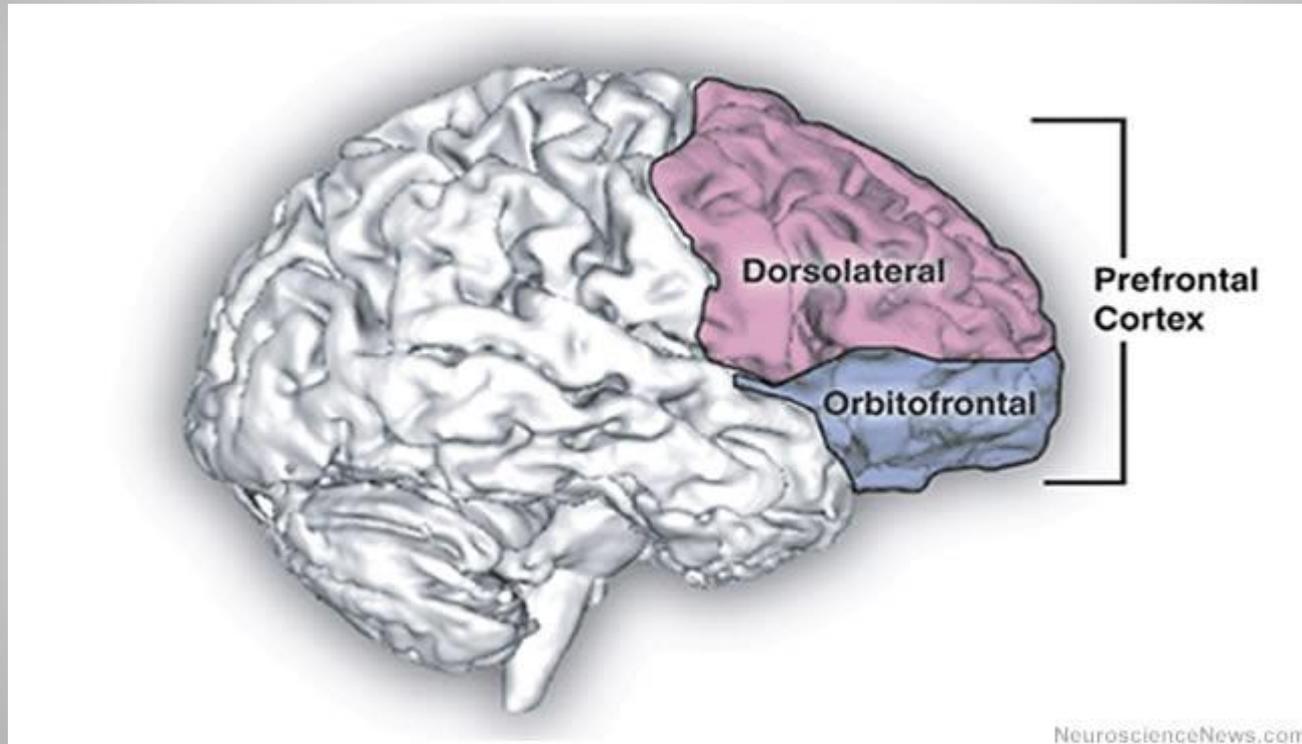
A definition of free will (Raymond Tallis):

We must start by characterizing the freedom that we are concerned with. First, if I am truly free, I am the *origin* of those events I deem to be my actions. Consequently, I am *accountable* for them: I have ownership of them; I own up to them. Second, they are *expressive* of me, in the sense that they cannot be separated from that which I feel myself to be. In this regard, they are connected with my motives, feelings, and expressed aims. My actions can be made sense of biographically.

WORLD VIEWS: NEUROSCIENCE

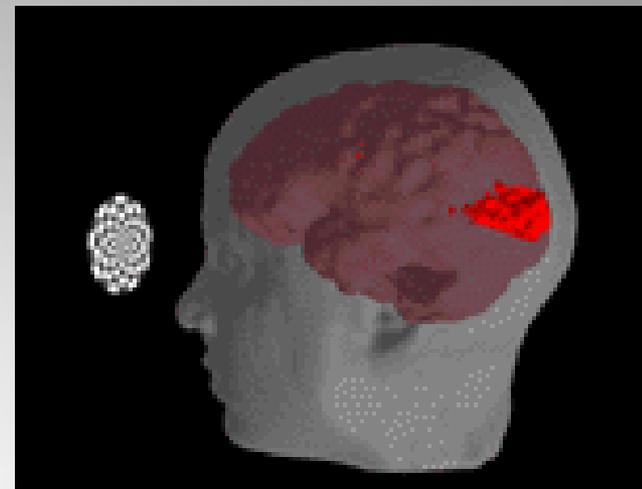
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A LOOK INSIDE

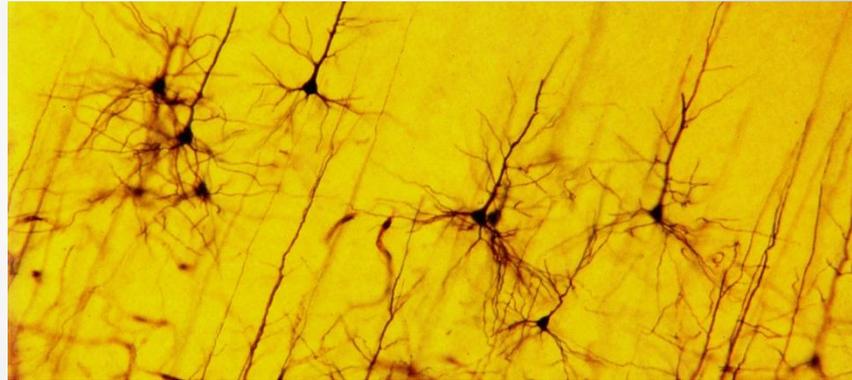


A LOOK INSIDE

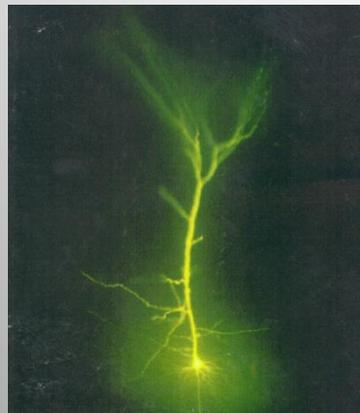
macroscopic



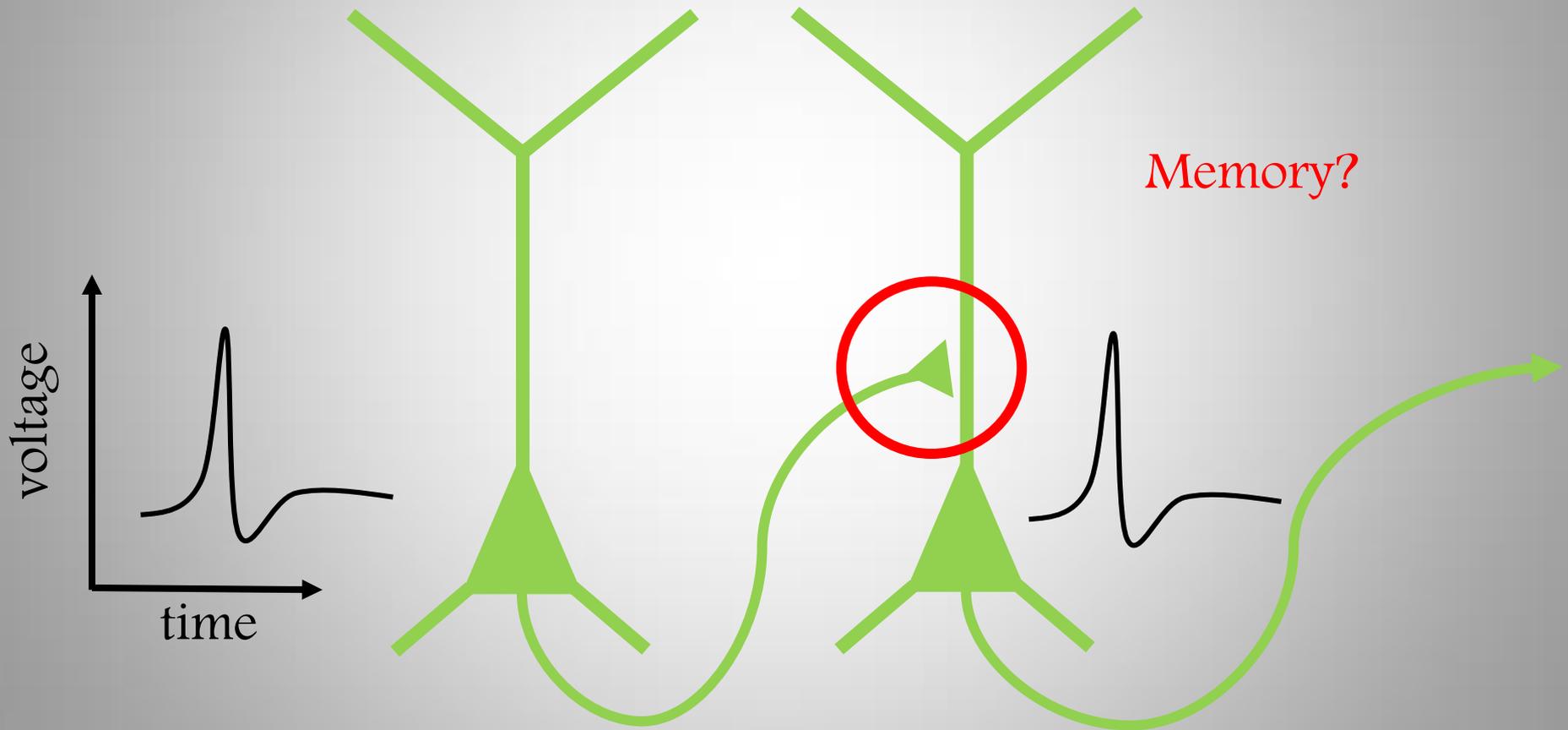
mesoscopic



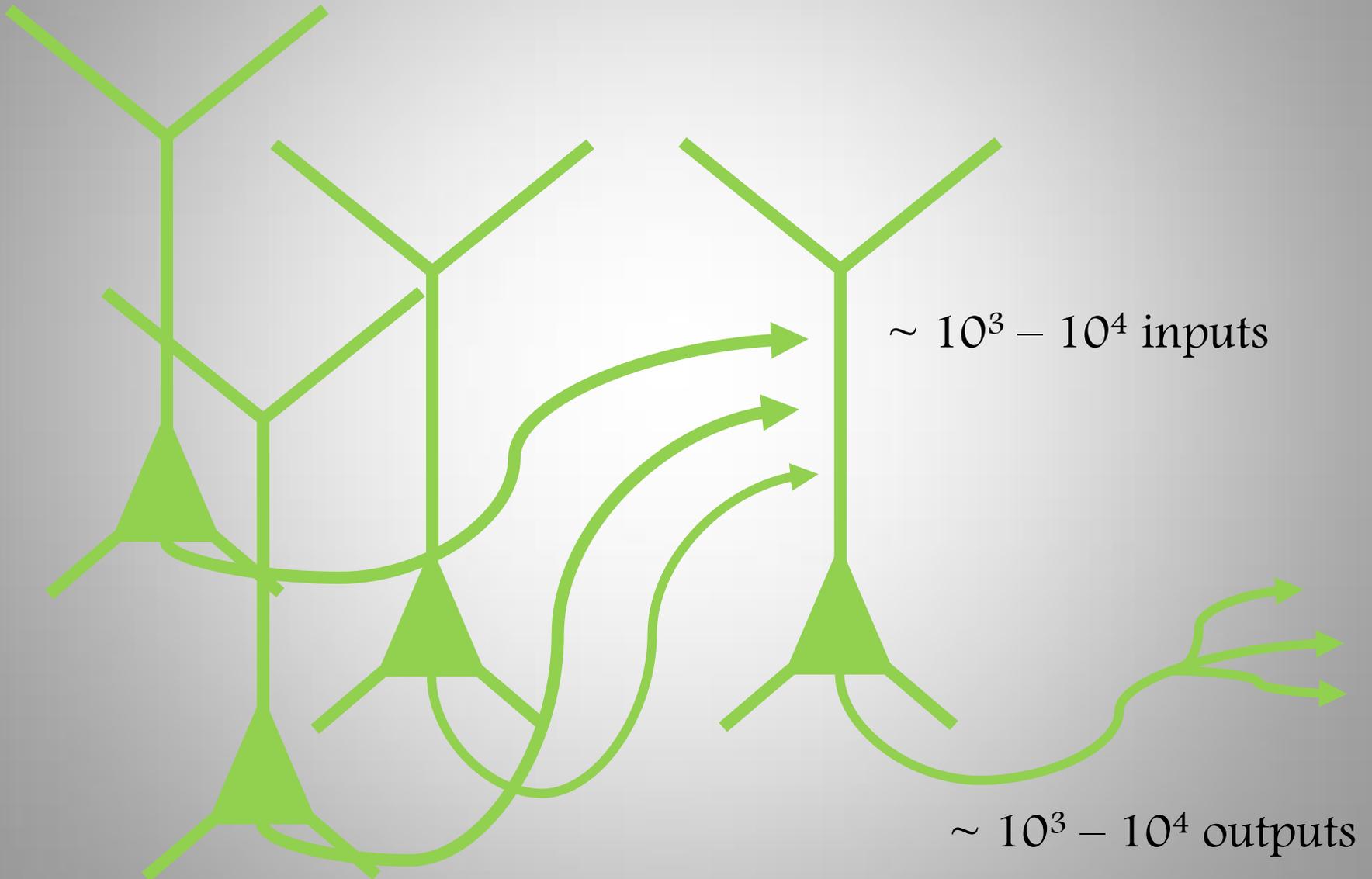
microscopic



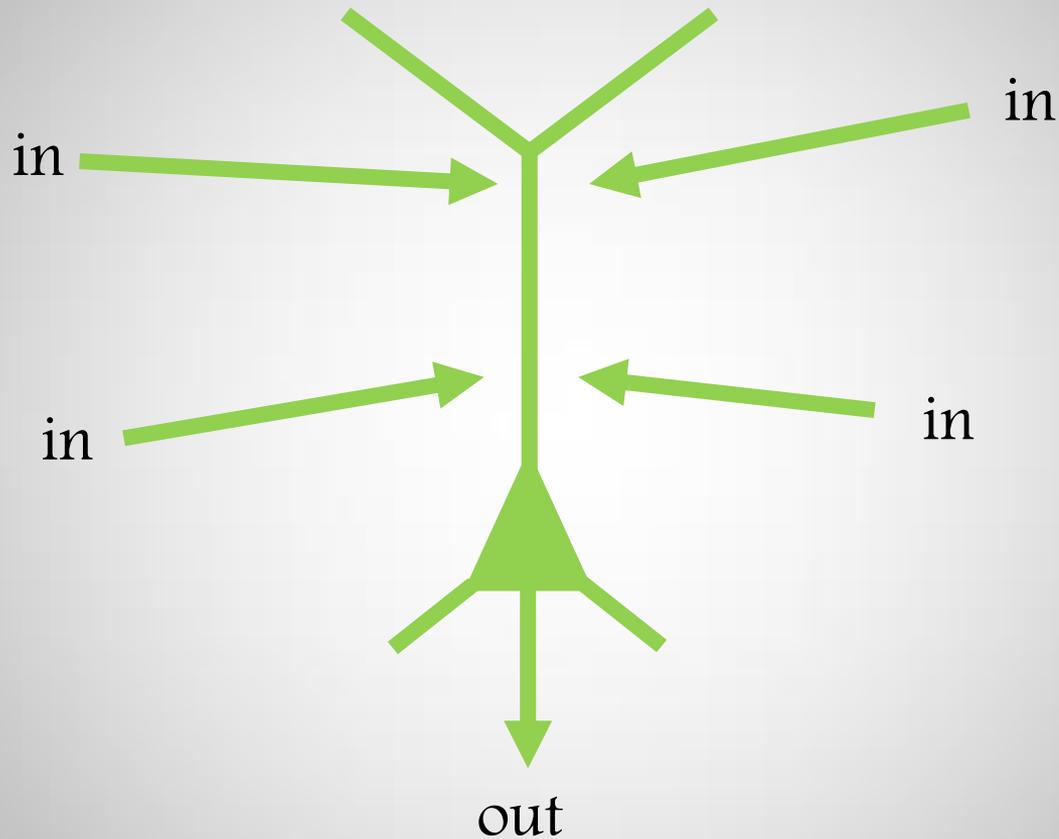
A LOOK INSIDE



A LOOK INSIDE

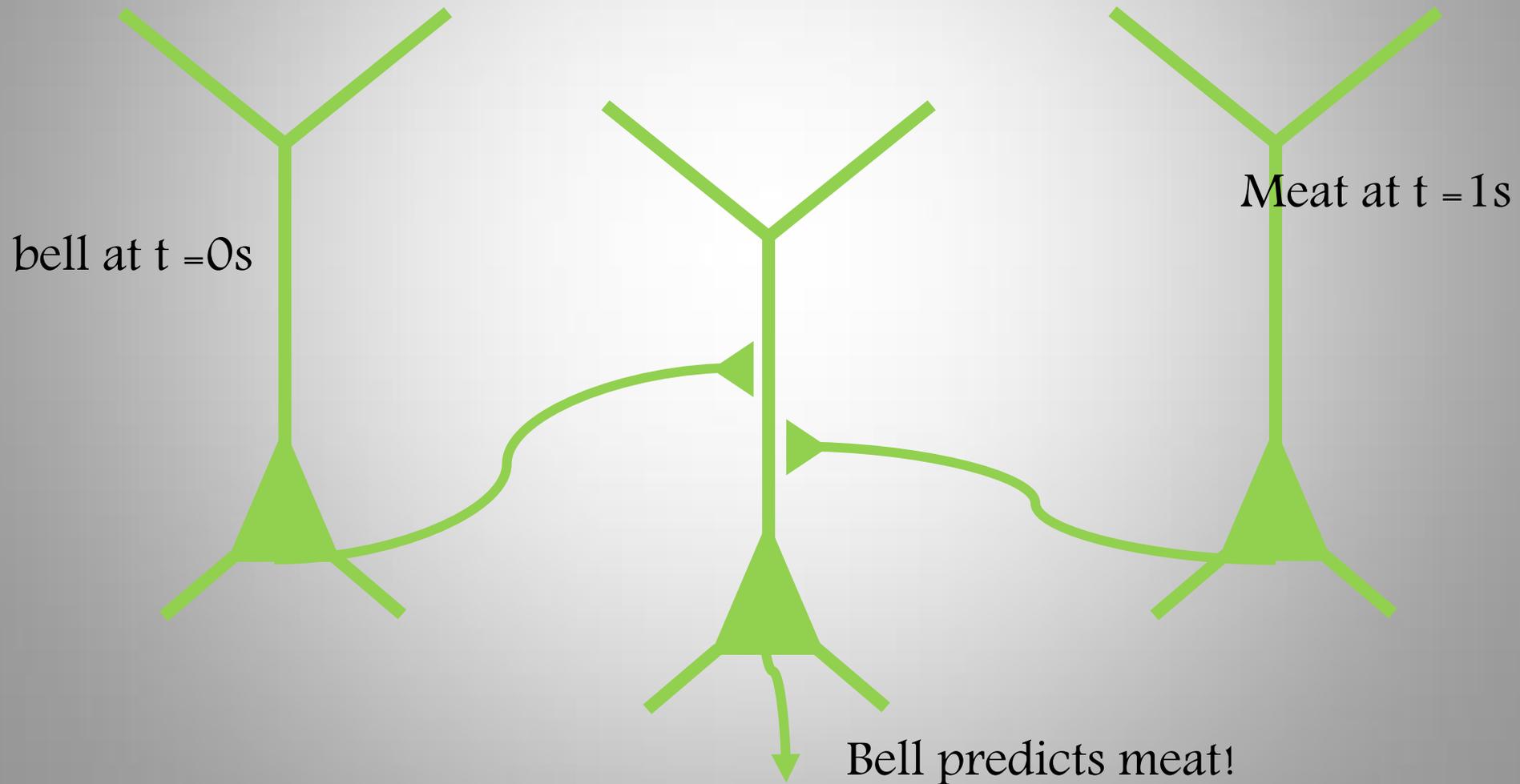


A LOOK INSIDE



If all the inputs exceed a threshold, the neuron will “fire.” Otherwise, it won’t.

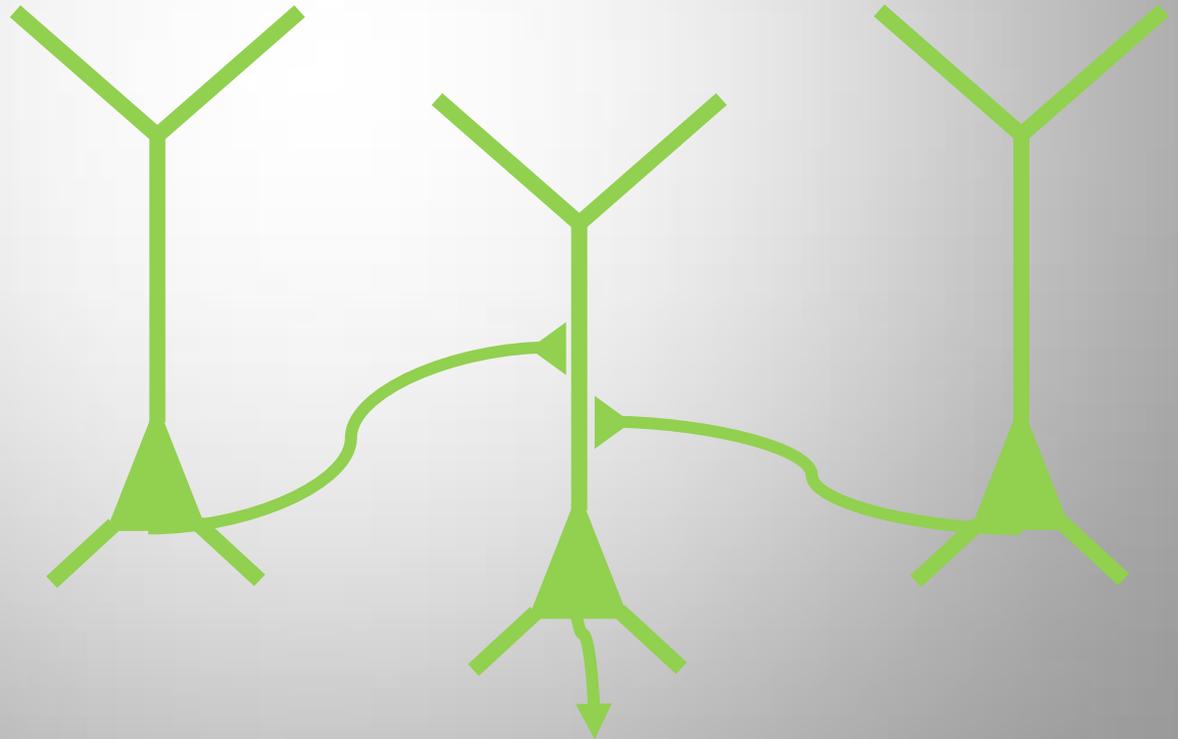
A LOOK INSIDE



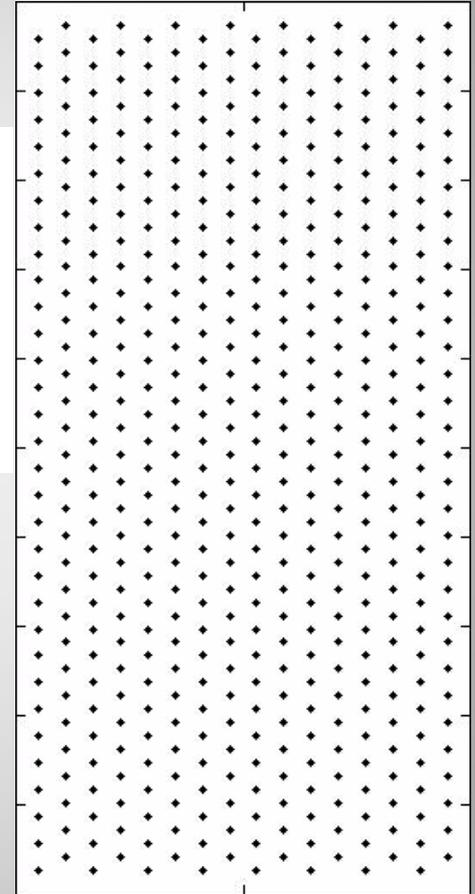
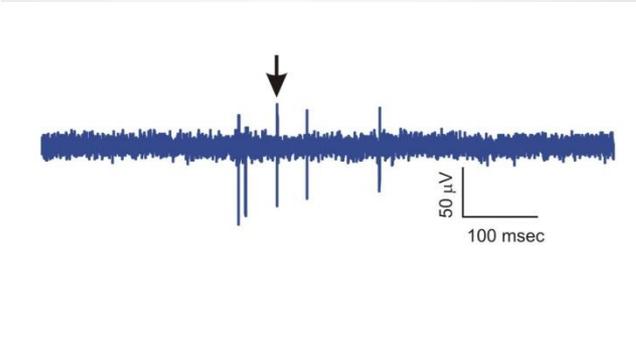
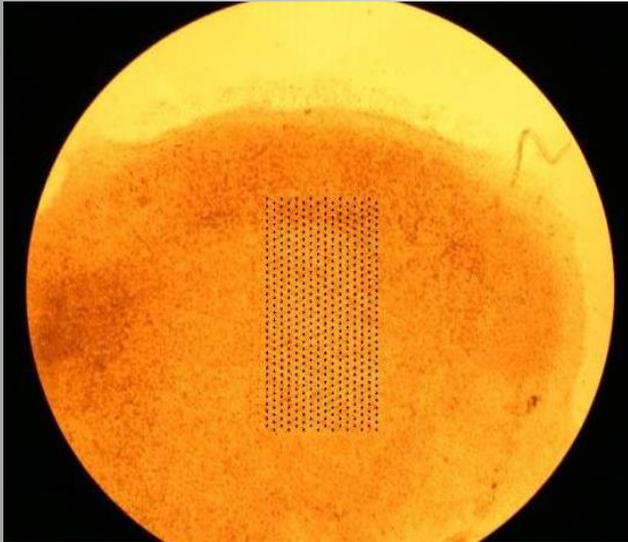
A LOOK INSIDE



Hebb's rule:
Cells that fire together
wire together



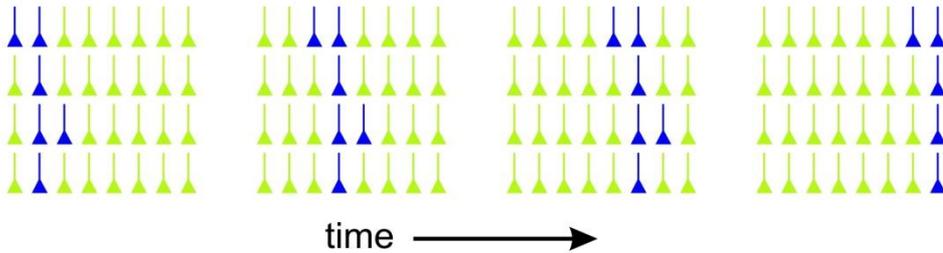
A LOOK INSIDE



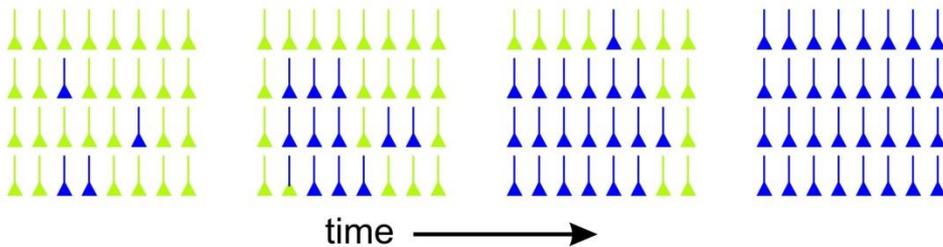
In collaboration with Alan Litke, UC Santa Cruz

A LOOK INSIDE

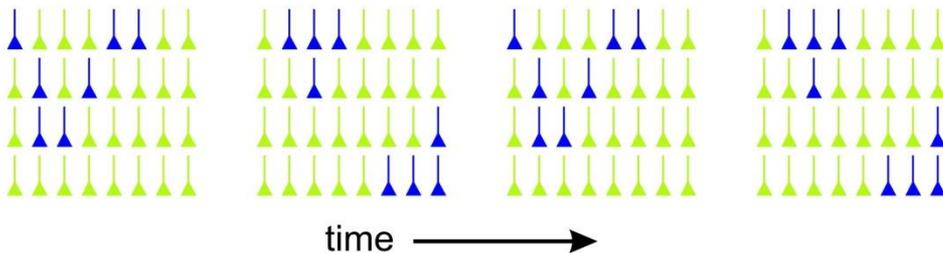
Wave



Seizure



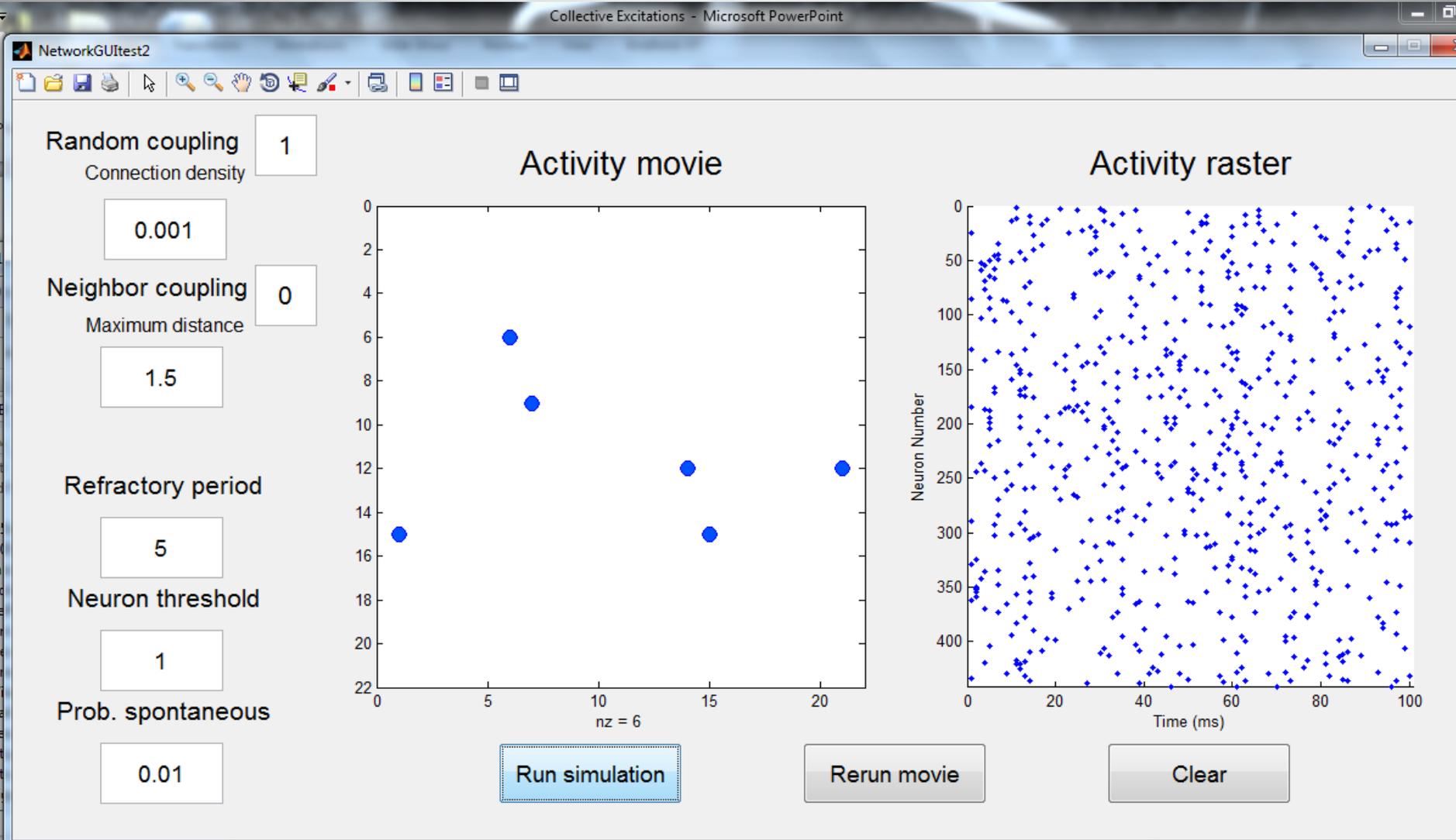
Oscillation



Structured activity patterns can emerge when neurons interact

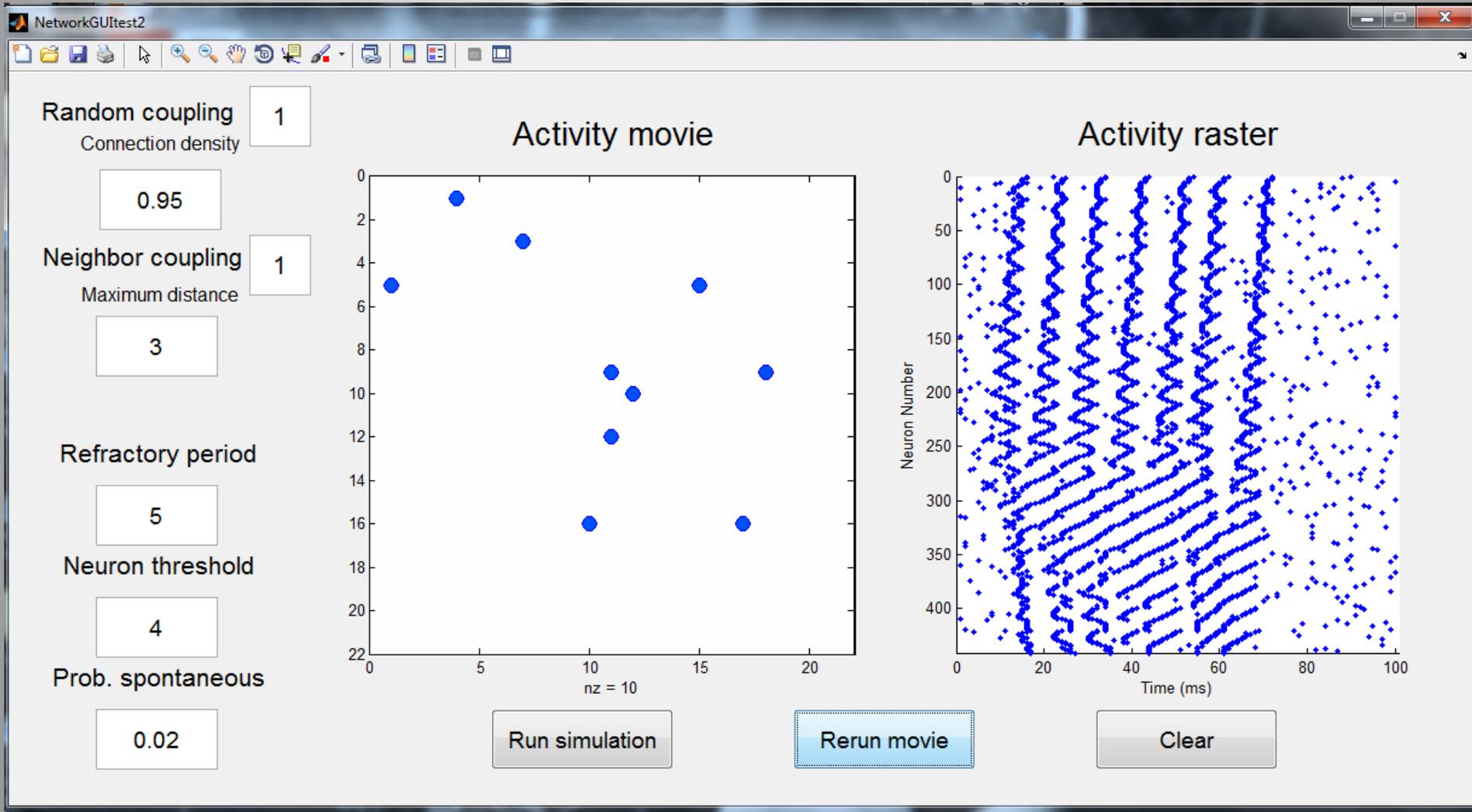
A LOOK INSIDE

Random



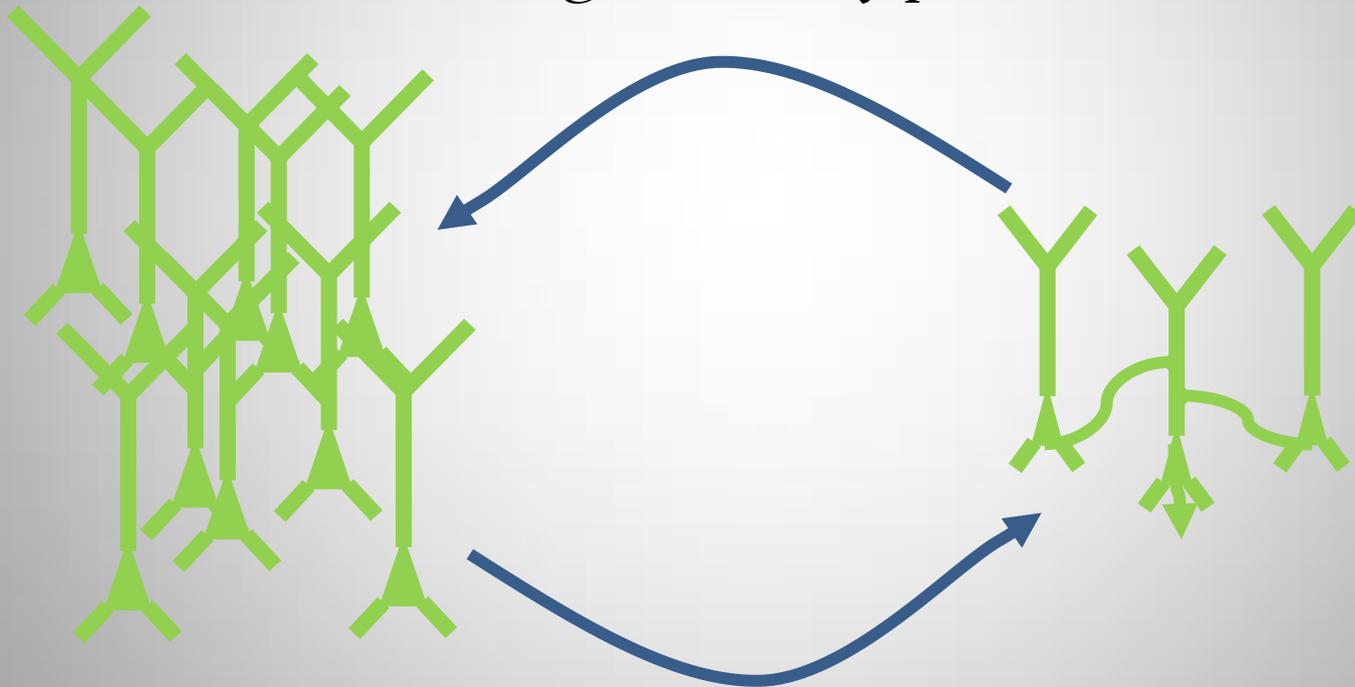
A LOOK INSIDE

Spirals



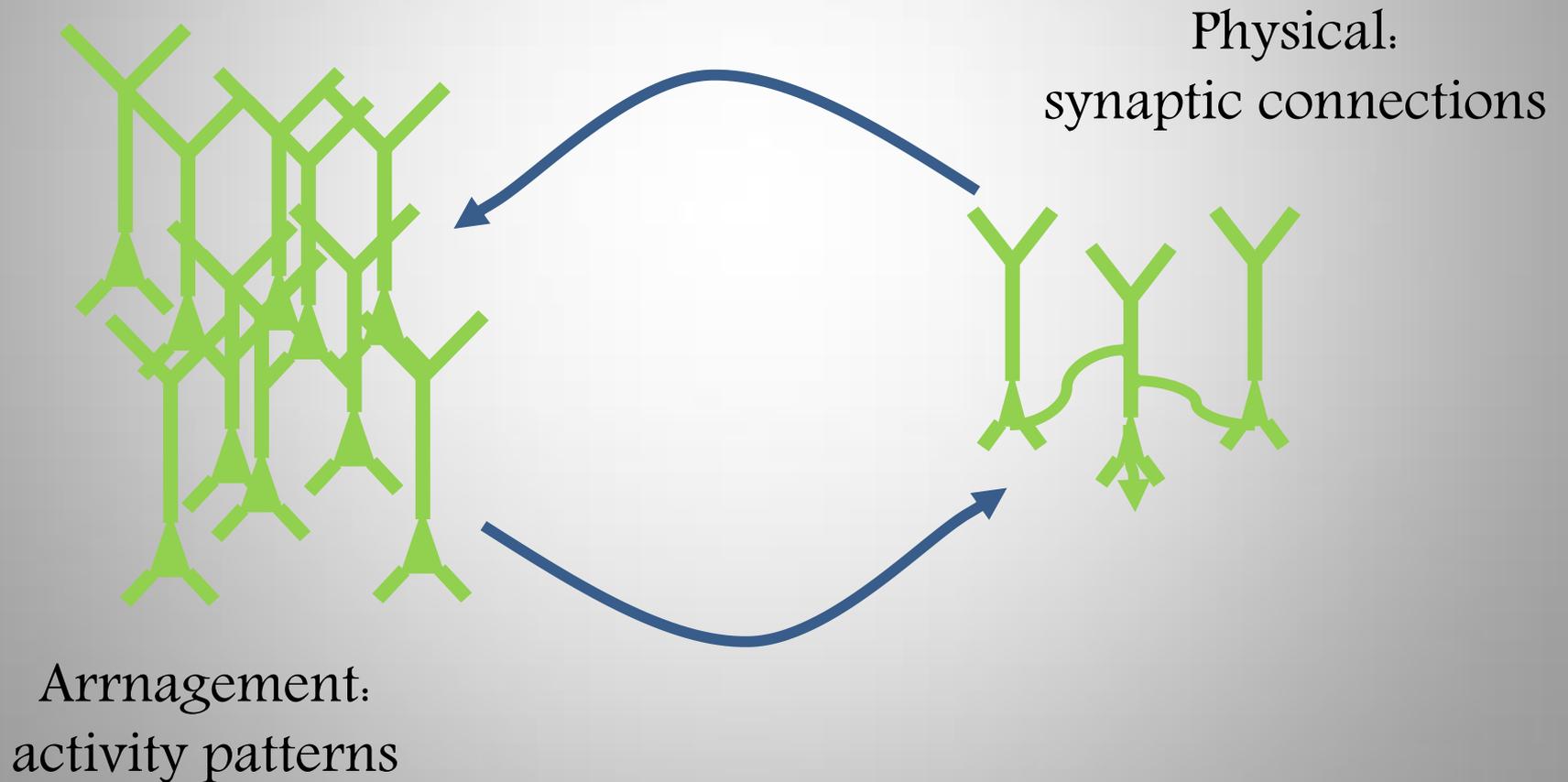
A LOOK INSIDE

New synaptic connections change
emergent activity patterns



Emergent activity patterns
change synaptic connections

A LOOK INSIDE



A LOOK INSIDE

Neuronal “avalanches”

Repeating memory patterns

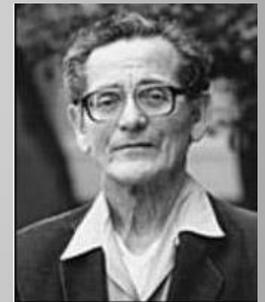
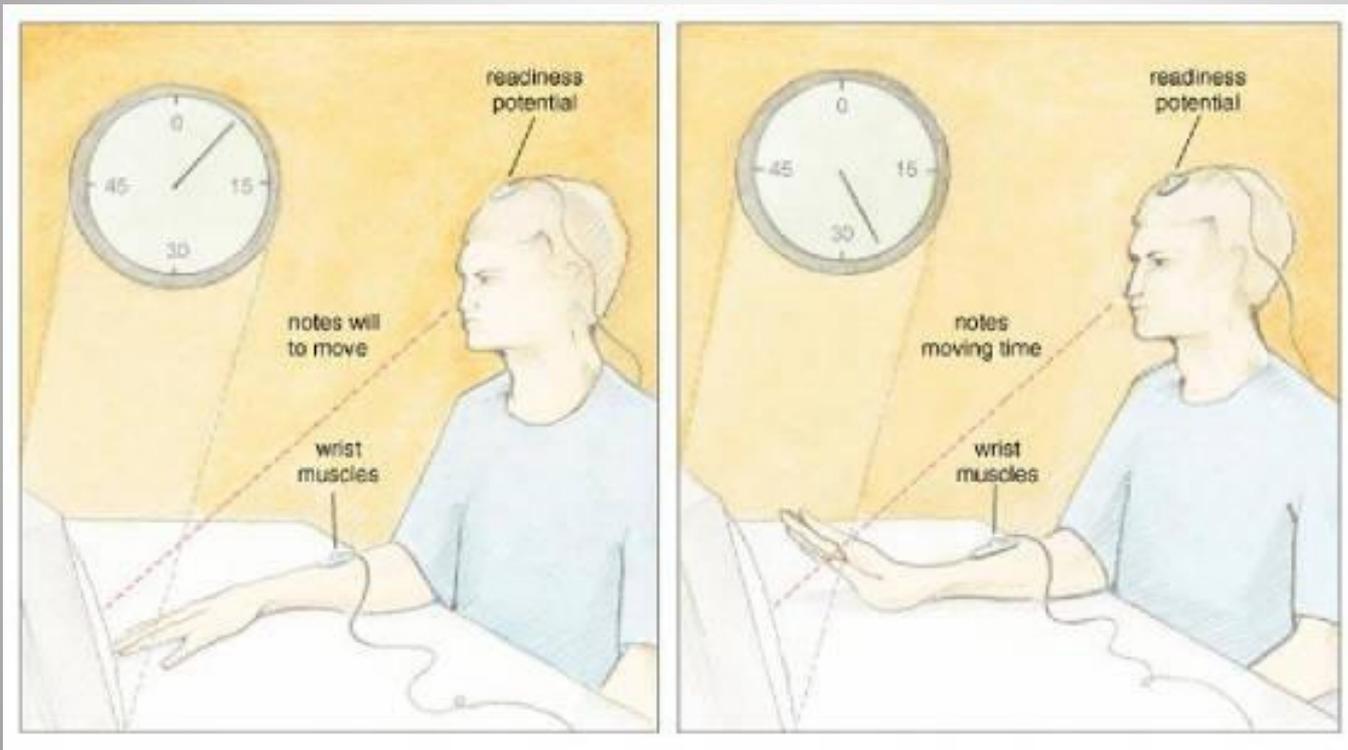
Waves

Spirals

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TRAPPED AGAINST YOUR WILL



Benjamin Libet's experiment

TRAPPED AGAINST YOUR WILL

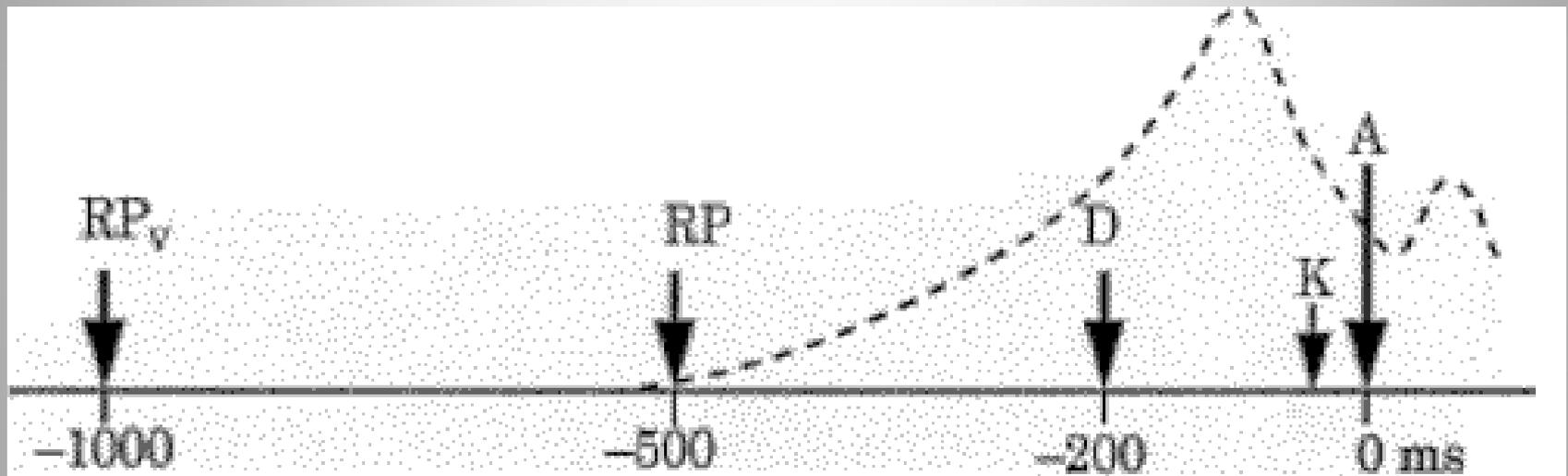
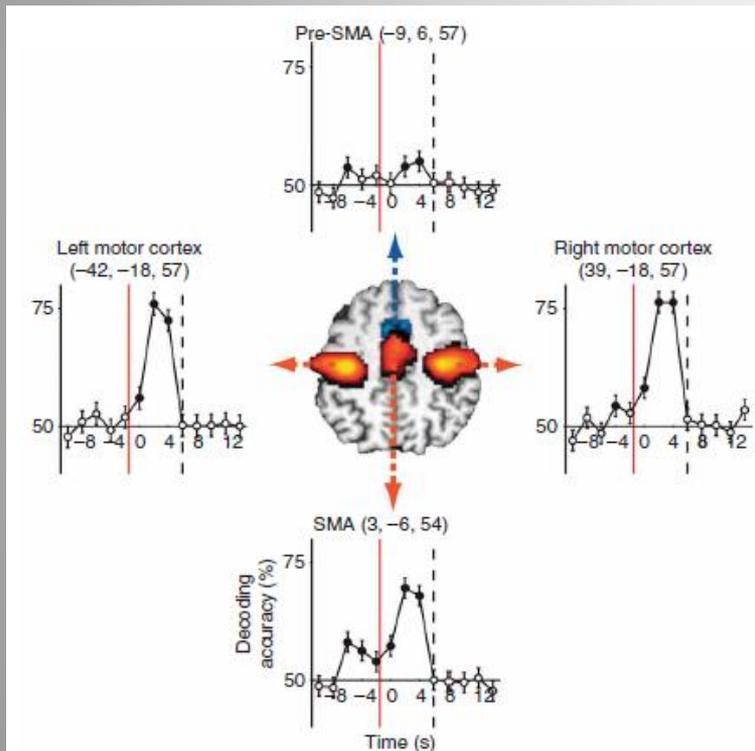


Fig. 1: Sequence of readiness potential (RP), volitional decision (D), and onset of action (A), as well as the control stimulus on the skin (K). If the action is planned ahead, the readiness potential starts already at time RP_v . After Libet (1985).

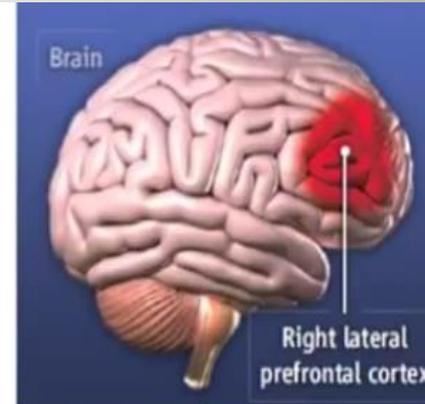
TRAPPED AGAINST YOUR WILL



Soon, C. S. *et al.* Unconscious determinants of free decisions in the human brain. *Nature Neurosci.* **11**, 543–545 (2008).

Participants in this study chose between making a right or a left hand action while undergoing an MRI scan. Using a novel pattern-classification algorithm, the authors identified areas in the prefrontal cortex that predicted which hand would be used up to 8 seconds before the action was made. This paper suggests how long-range intentions ('prospective memory') may connect to intention-in-action.

TRAPPED AGAINST YOUR WILL



NEUROSCIENCE

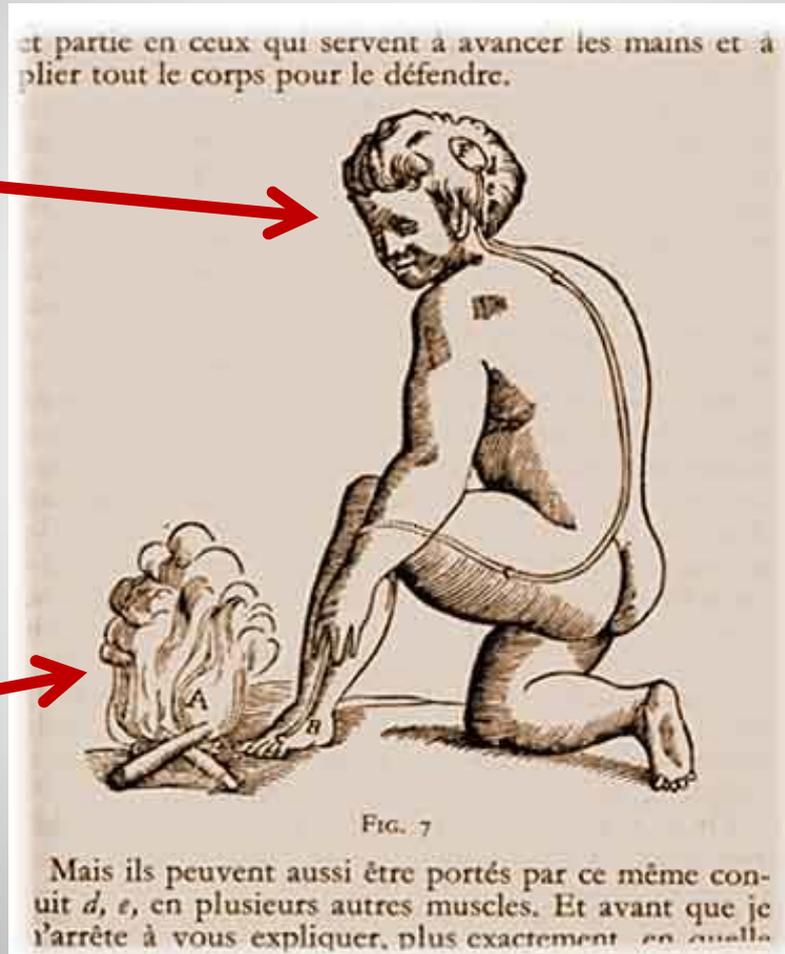
Brain Stimulation Sparks 'Machiavellian' Choices

Culotta 2013 Science 342: 25

As people make choices, the brain weighs competing factors, Fehr explains. "It's a conflict—your self-interest is to keep more money, but your moral instinct is to give more away, and to obey the social norm." He speculates that "the brain stimulation changes the weights of the different motives." Neuro

Although manipulating their rLPFC apparently affected their decisions, the participants were unaware of this. Their conscious evaluations of the game, measured through questions such as how much anger Player B might feel at a certain response, remained the same as during sham stimulation. "It's a little scary," Fehr says.

TRAPPED AGAINST YOUR WILL



Noise

Sensory input

Output

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ESCAPE FROM REDUCTIONISM

- Common sense rebuttal
- Potential flaws in Libet-type experiments
- The poverty of reductionism

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ESCAPE FROM REDUCTIONISM

Research Article

The Value of Believing in Free Will

Encouraging a Belief in Determinism Increases Cheating

Kathleen D. Vohs¹ and Jonathan W. Schooler²

¹Department of Marketing, Carlson School of Management, University of Minnesota, and ²Department of Psychology, University of British Columbia

ESCAPE FROM REDUCTIONISM

ABSTRACT—*Does moral behavior draw on a belief in free will? Two experiments examined whether inducing participants to believe that human behavior is predetermined would encourage cheating. In Experiment 1, participants read either text that encouraged a belief in determinism (i.e., that portrayed behavior as the consequence of environmental and genetic factors) or neutral text. Exposure to the deterministic message increased cheating on a task in which participants could passively allow a flawed computer program to reveal answers to mathematical problems that they had been instructed to solve themselves. Moreover, increased cheating behavior was mediated by decreased belief in free will. In Experiment 2, participants who read deterministic statements cheated by overpaying themselves for performance on a cognitive task; participants who read statements endorsing free will did not. These findings suggest that the debate over free will has societal, as well as scientific and theoretical, implications.*

ESCAPE FROM REDUCTIONISM

Personal Philosophy and Personnel Achievement: Belief in Free Will Predicts Better Job Performance

Social Psychological and
Personality Science

1(1) 43-50

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DOI: 10.1177/1948550609351600

<http://spps.sagepub.com>



Tyler F. Stillman¹, Roy F. Baumeister¹, Kathleen D. Vohs², Nathaniel M. Lambert¹, Frank D. Fincham¹, and Lauren E. Brewer¹

Abstract

Do philosophic views affect job performance? The authors found that possessing a belief in free will predicted better career attitudes and actual job performance. The effect of free will beliefs on job performance indicators were over and above well-established predictors such as conscientiousness, locus of control, and Protestant work ethic. In Study 1, stronger belief in free will corresponded to more positive attitudes about expected career success. In Study 2, job performance was evaluated objectively and independently by a supervisor. Results indicated that employees who espoused free will beliefs were given better work performance evaluations than those who disbelieve in free will, presumably because belief in free will facilitates exerting control over one's actions.

ESCAPE FROM REDUCTIONISM

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- The poverty of reductionism

ESCAPE FROM REDUCTIONISM

frontiers in
HUMAN NEUROSCIENCE

REVIEW ARTICLE

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Timing and awareness of movement decisions: does consciousness really come too late?

Adrian G. Guggisberg* and Anaïs Mottaz

Division of Neurorehabilitation, Department of Clinical Neurosciences, University Hospital of Geneva, Geneva, Switzerland

ESCAPE FROM REDUCTIONISM

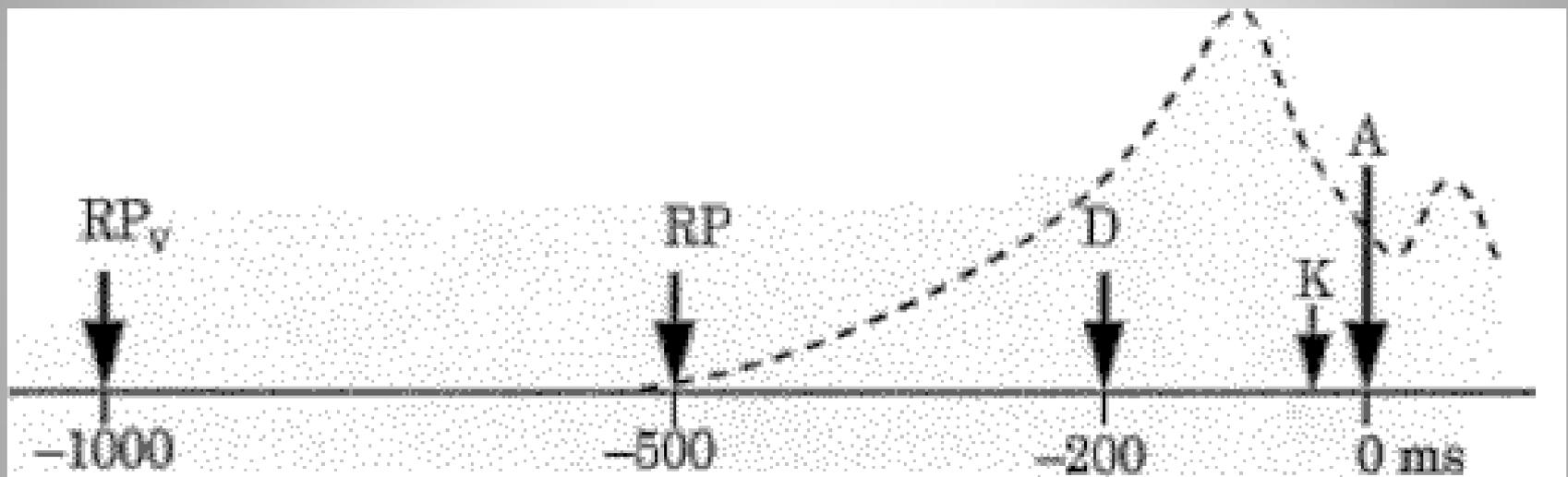


Fig. 1: Sequence of readiness potential (RP), volitional decision (D), and onset of action (A), as well as the control stimulus on the skin (K). If the action is planned ahead, the readiness potential starts already at time RP_v . After Libet (1985).

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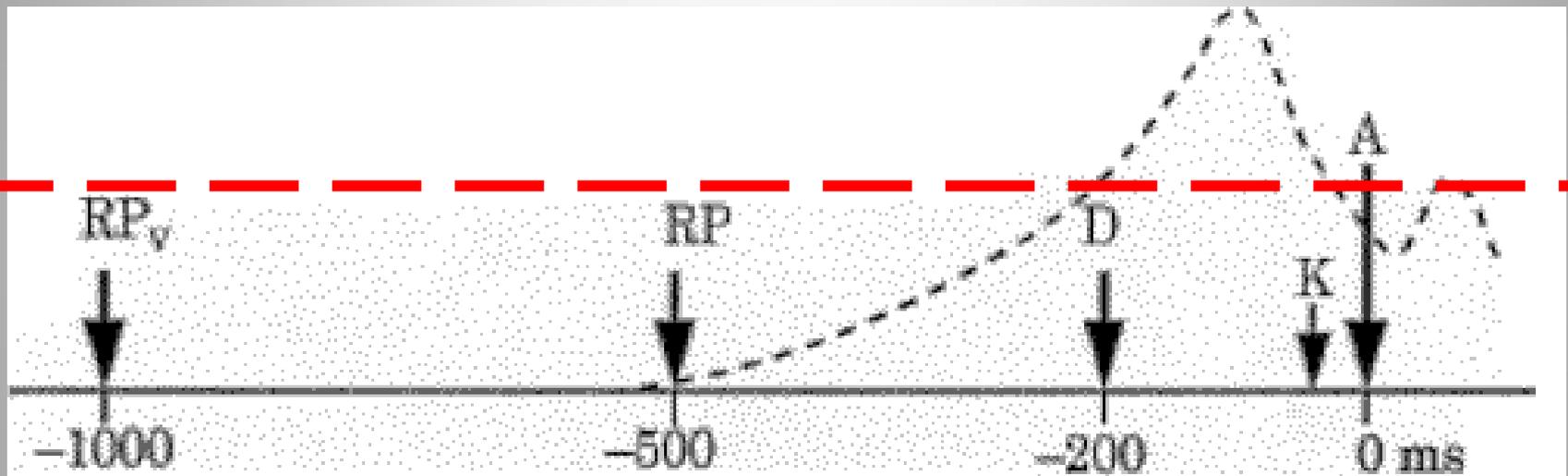


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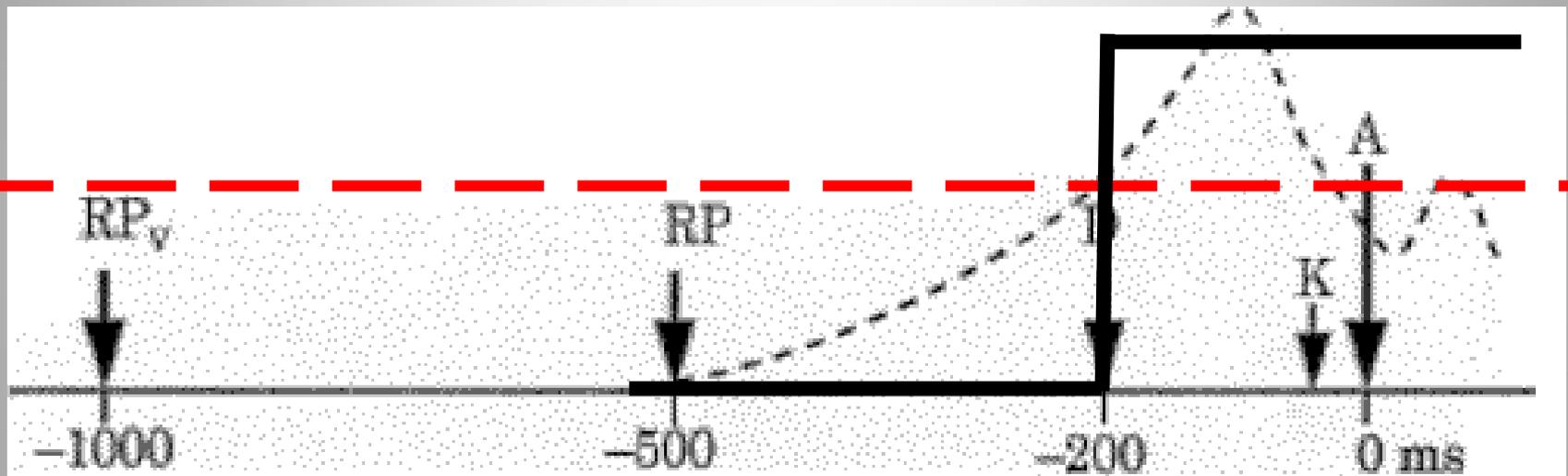


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ESCAPE FROM REDUCTIONISM

Why is precedence given to the smallest scale?

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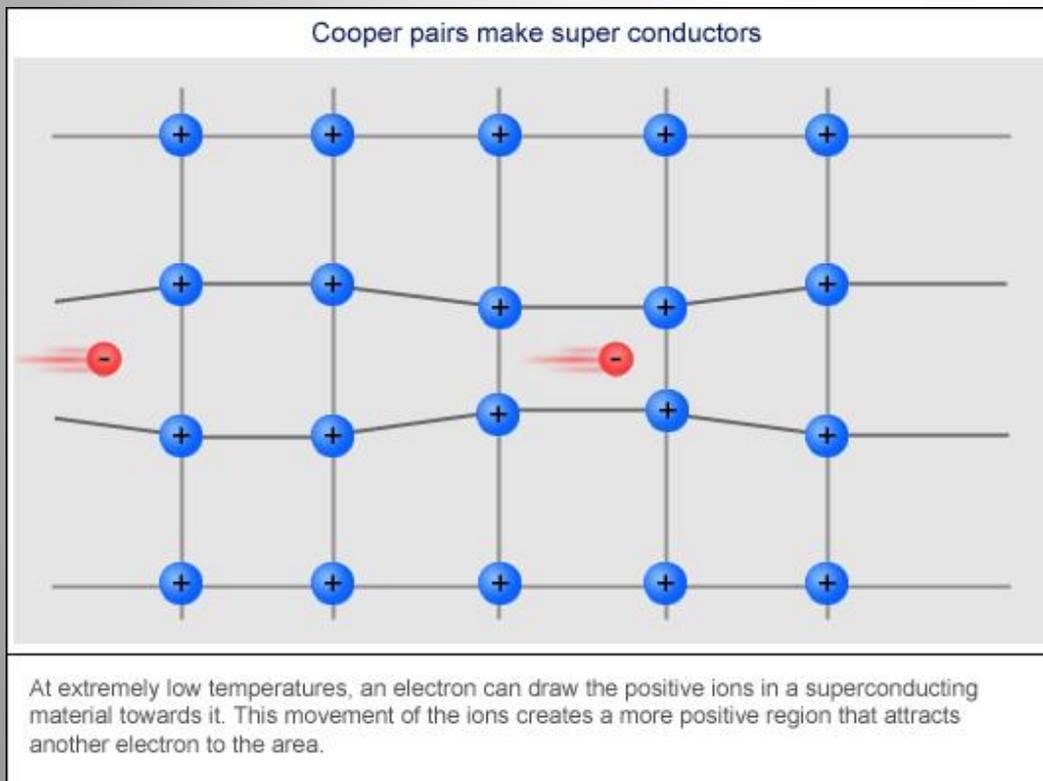


“The rest is chemistry”

– J.J. Thomson, after discovering the electron

ESCAPE FROM REDUCTIONISM

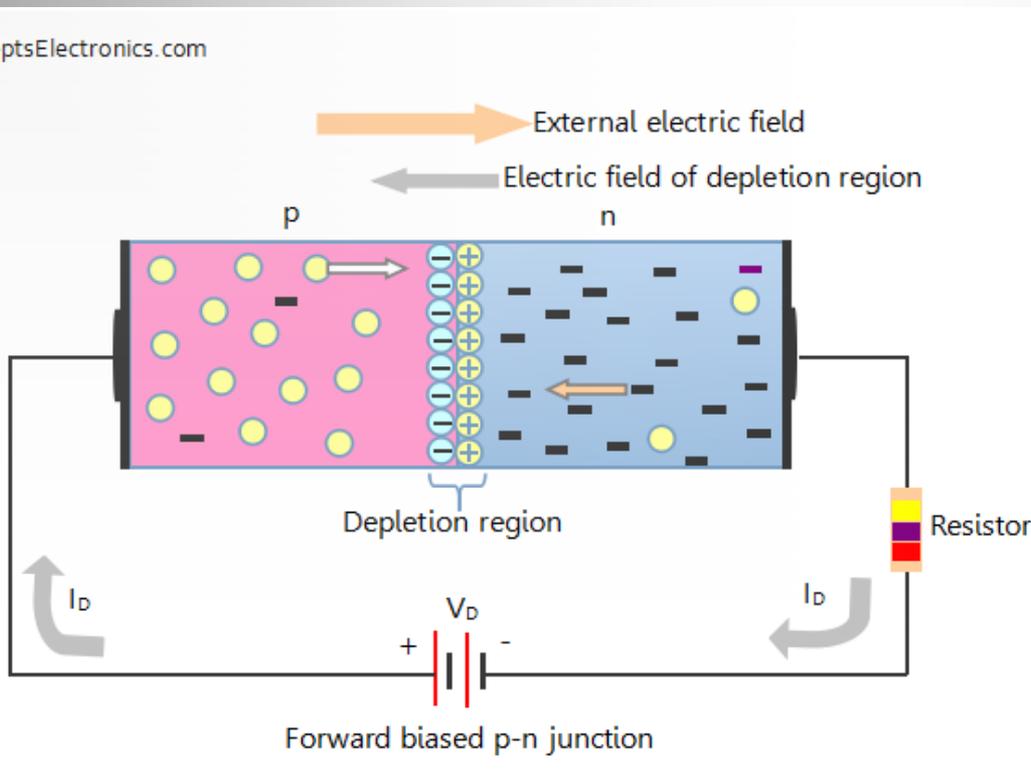
Why is precedence given to the smallest scale?



A “Cooper pair” is a higher-level Interaction between two electrons and the lattice that underlies a form of superconductivity

ESCAPE FROM REDUCTIONISM

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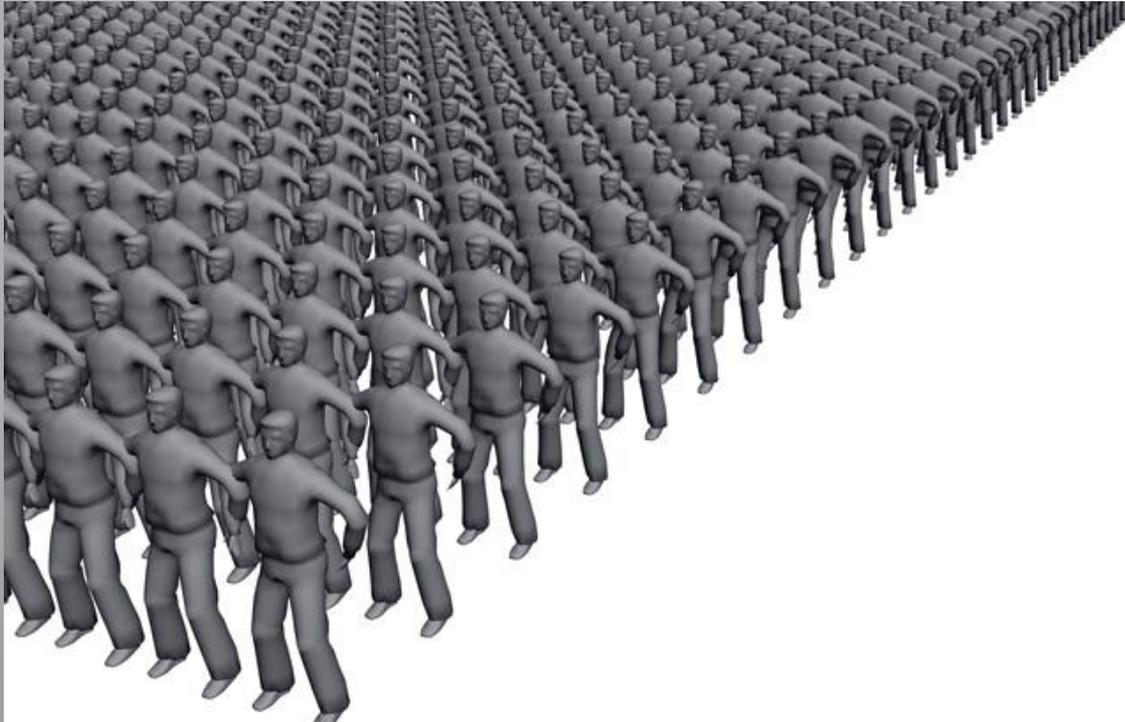
Electron “holes” in a silicon lattice involve the absence of many electrons. These underlie the properties of diodes and transistors.

ESCAPE FROM REDUCTIONISM

Why are non-material causes considered less important?

ESCAPE FROM REDUCTIONISM

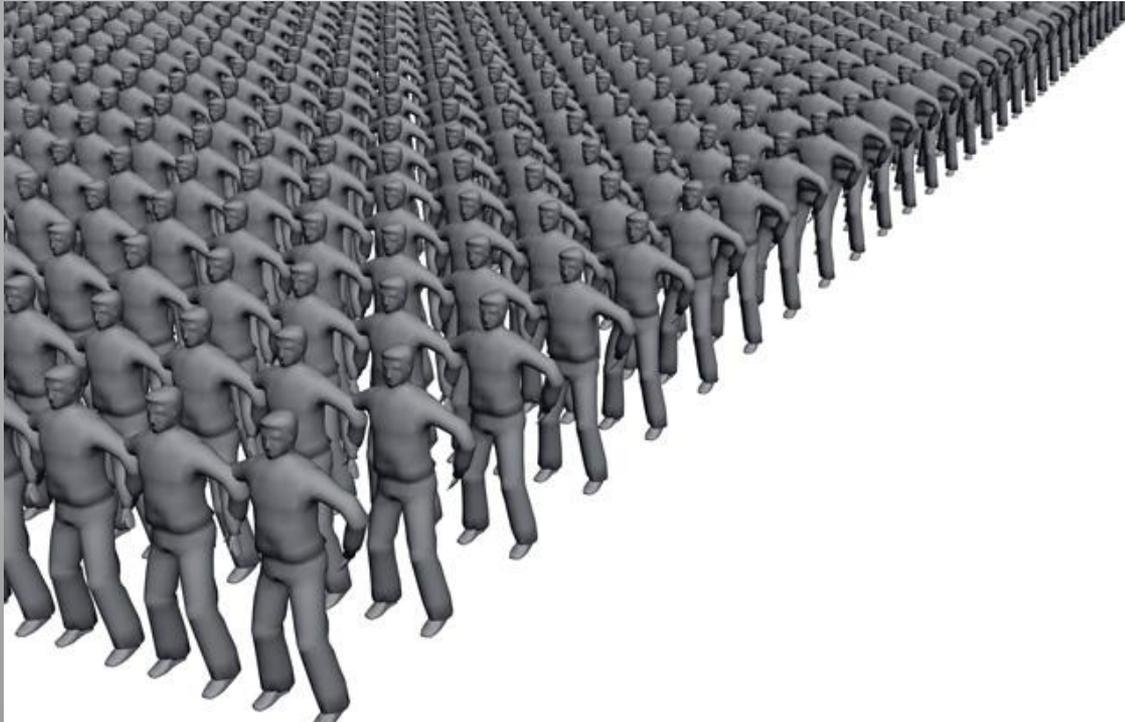
Why are non-material causes considered less important?



We can measure the size and speed of “the wave.”

ESCAPE FROM REDUCTIONISM

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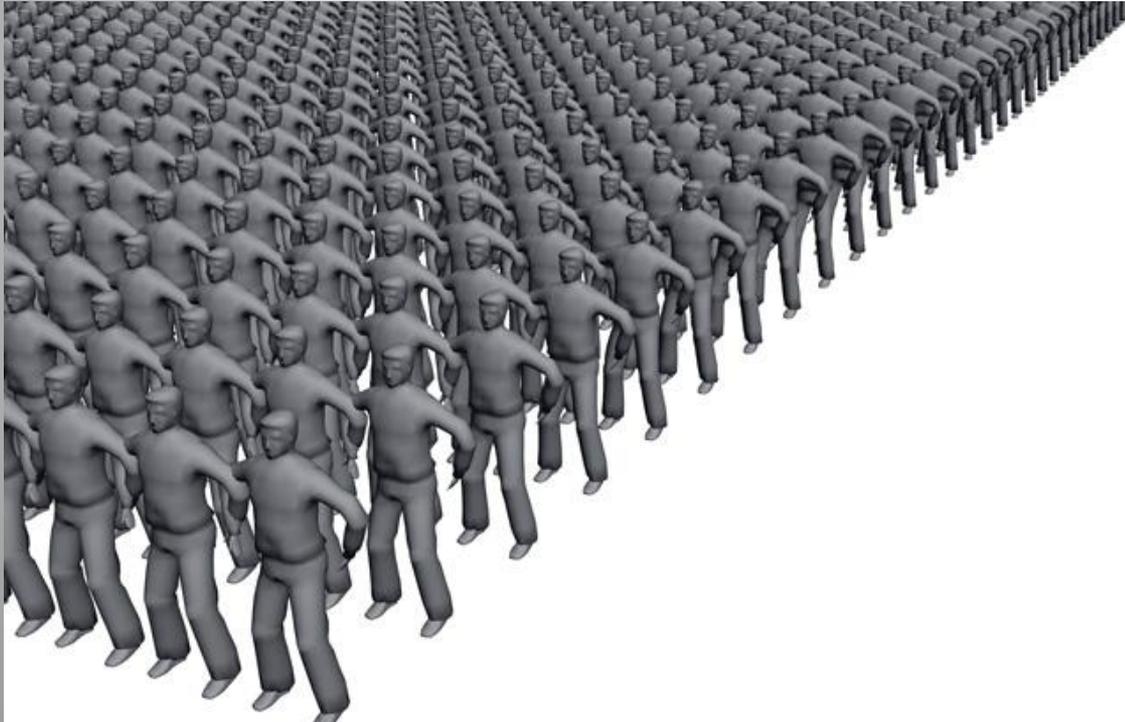


We can measure the size and speed of “the wave.”

But what is its mass?

ESCAPE FROM REDUCTIONISM

Why are non-material causes considered less important?



We can measure the size and speed of “the wave.”

But what is its mass?

Can this “massless” thing act on people who have mass?

ESCAPE FROM REDUCTIONISM

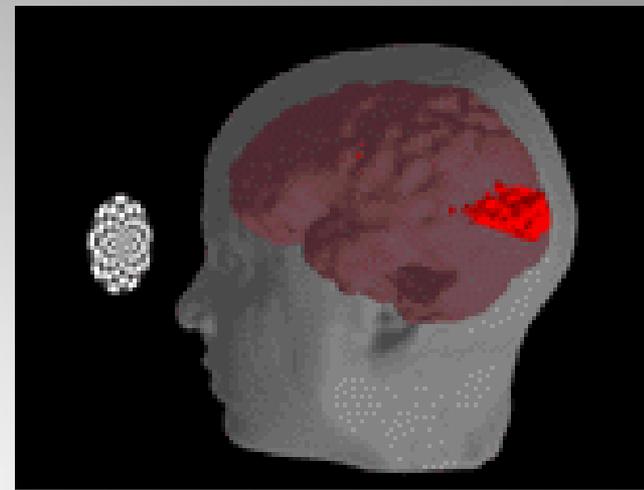
Why are non-material causes considered less important?

If my mental processes are determined wholly by the motions of the atoms in my brain, I have no reason to suppose that my beliefs are true...and hence I have no reason for supposing my brain to be composed of atoms.

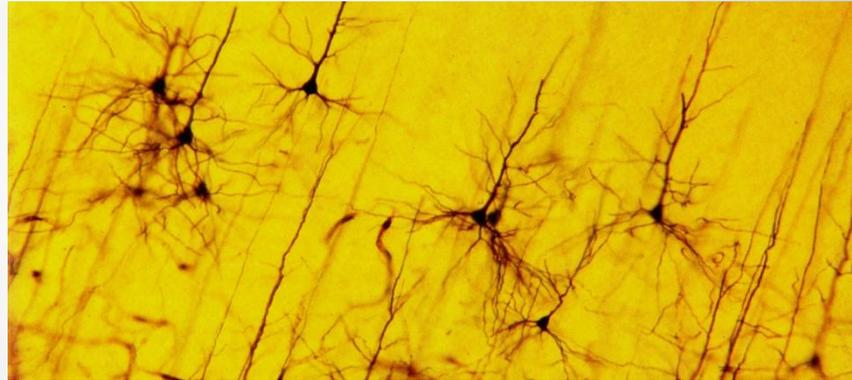
—JBS Haldane

ESCAPE FROM REDUCTIONISM

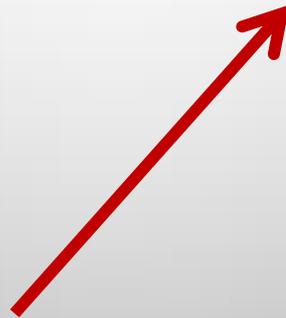
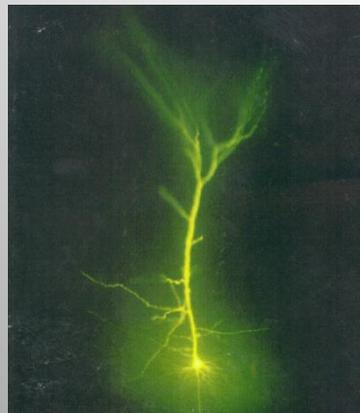
macroscopic



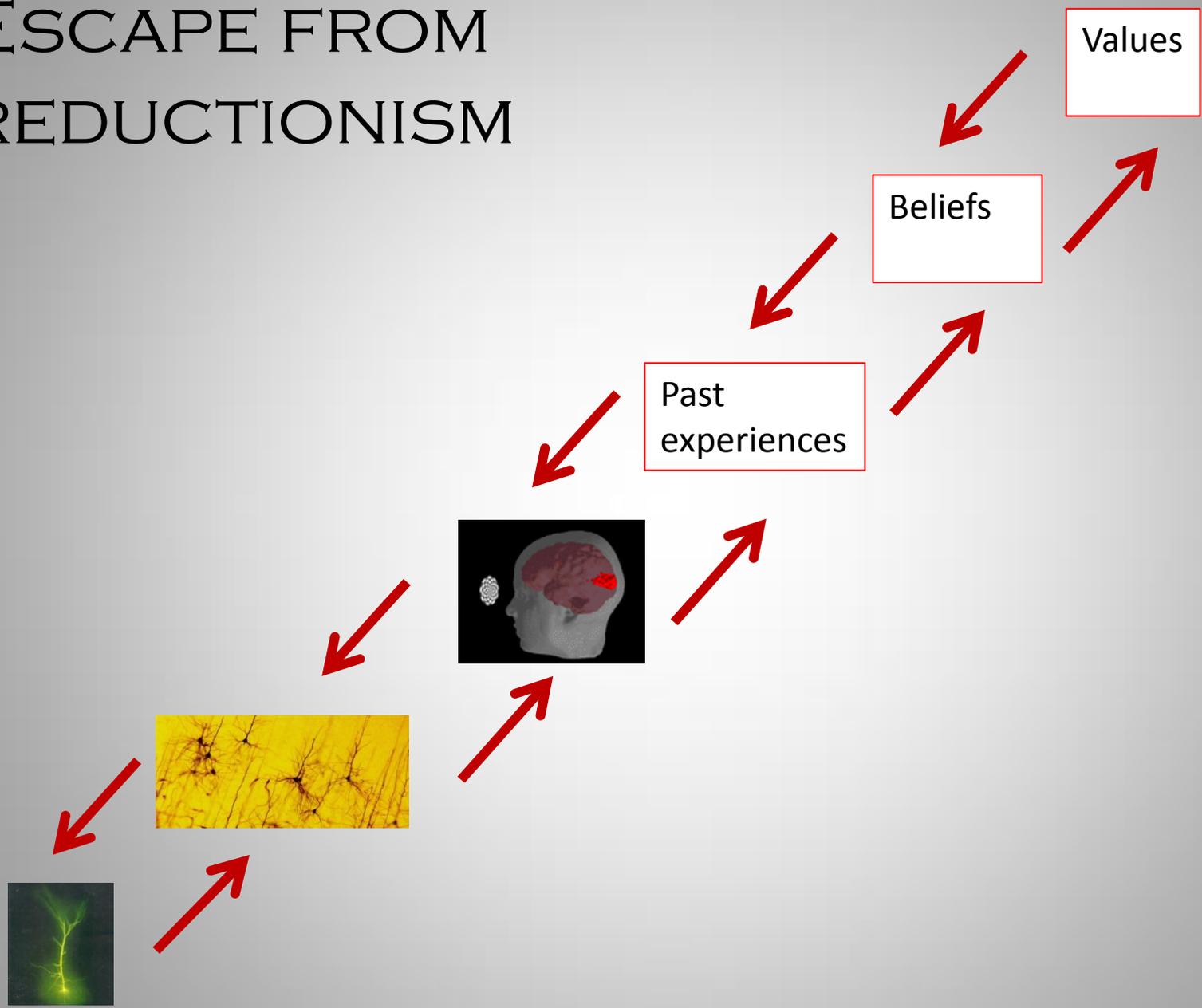
mesoscopic



microscopic



ESCAPE FROM REDUCTIONISM



ESCAPE FROM REDUCTIONISM



Thomas Nagel
(atheist)

Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False

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CONCLUSIONS

Modern neuroscience is skeptical of free will. Yet this actually leads to less moral behavior.

This materialistic, reductionist view often fails to appreciate emergent properties like consciousness and value.

This conflict will persist as long as people idolize science and think that it provides the only way of knowing.