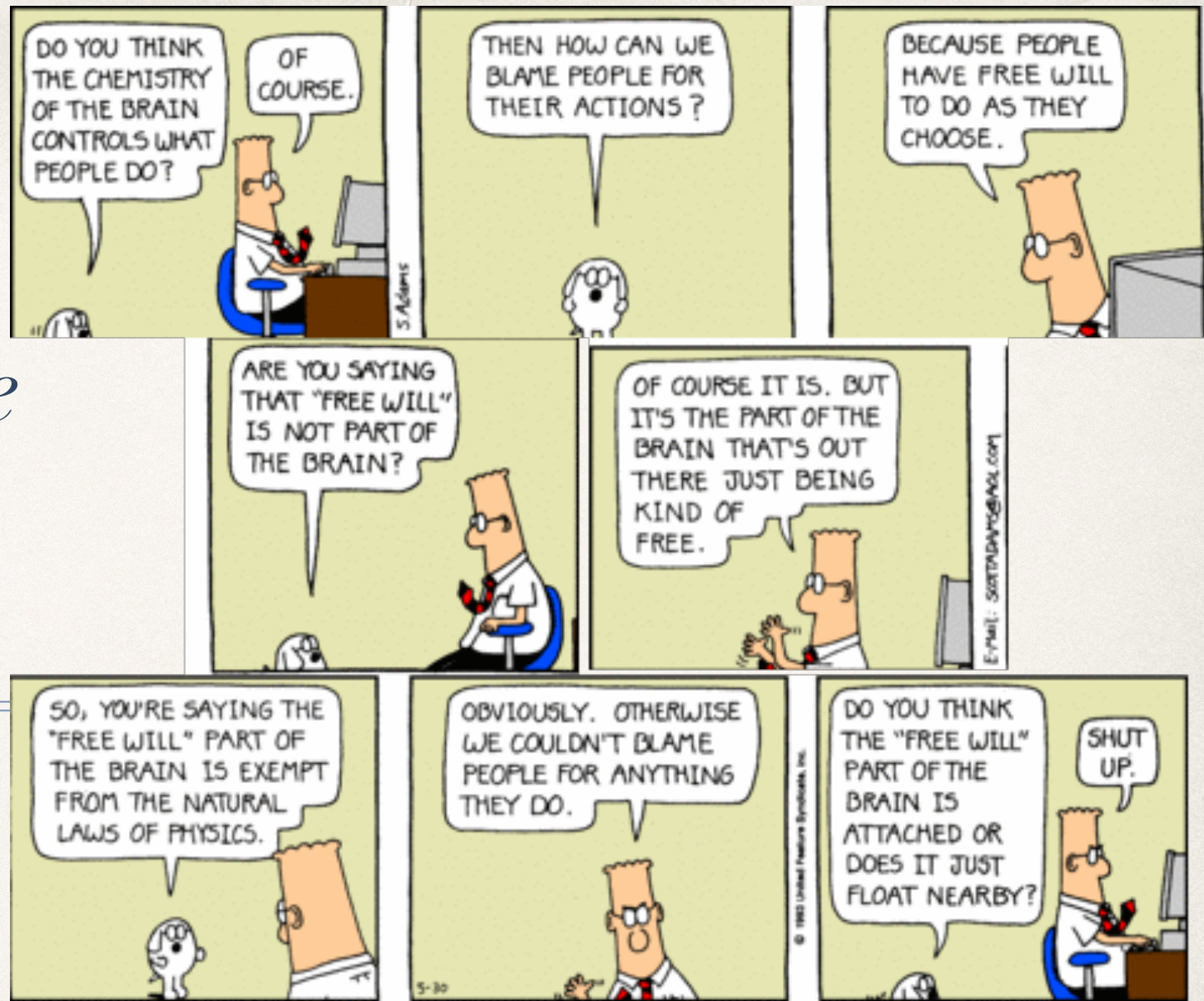


# *Does Neuroscience Disprove Free Will?*

Marcello Di Bello

Lehman College CUNY

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## *Are Determinism and Free Will Compatible?*



# From Last Monday—Neuroscience and the Warrior Gene in the Courtroom

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2009 Tennessee. Bradley Waldroup was accused of murder but the jury convicted him of a less severe crime because experts for the defense testified that Waldroup, *first*, had the warrior gene, and *second*, was abused as a child.

*But can we let pedophiles, rapists and murderers off the hook because they have the warrior gene and grew up in a violent environment?*

“Do Our Genes Excuse Immoral Behavior?”

<http://www.youtube.com/watch?v=4JldJFUgWyw>



# Four Issues to Keep Distinct

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1. Whether the **future is predetermined**
2. Whether we have **free will** to act and choose
3. Whether we can be held **legally accountable** for our actions in a court of law
4. Whether we should be **punished** if we break the law



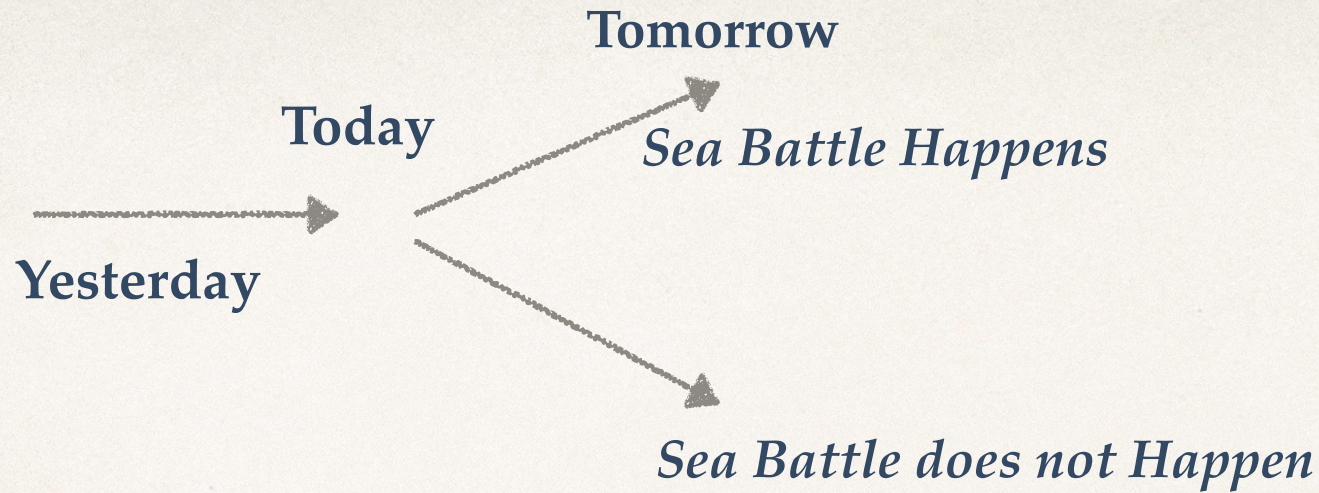
# Last Monday We Examined Two Arguments for the Conclusion that the Future is Predetermined

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Aristotle's sea battle argument

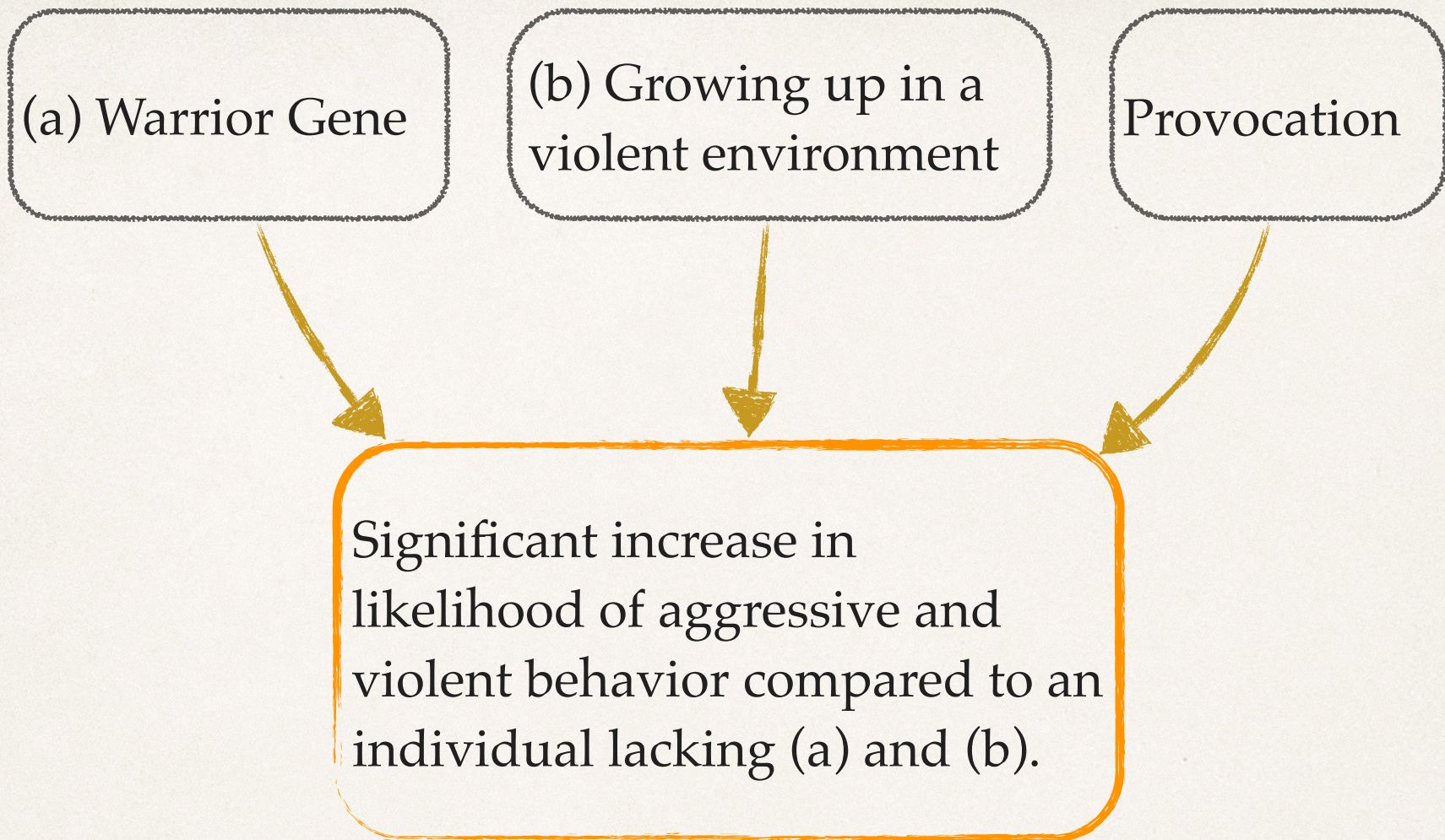
Findings from genetics and neuroscience





- ❖ If the sea battle happens tomorrow, it is inevitable that it will happen.
- ❖ If the sea battle does not happen tomorrow, it is inevitable that it will *not* happen.
- ❖ Either way, what will happen or not happen tomorrow is inevitable. *Hence, the future is predetermined.*





"Monoamine oxidase A gene (MAOA) predicts behavioral aggression following provocation" by McDermotta, Tingleyb, Cowdenc, Frazzettod and Johnstone in Proceeding of the National Academy of Science of USA, 2009



Findings from genetic, neuroscience, and behavioral studies *do not completely eliminate* the role of free will in our choices and actions, but...

## OLD PICTURE

Physical  
constraints

Free  
will

Actions

## NEW PICTURE

Physical  
constraints

Free  
will

Brain  
activity

Genetics

Social  
environment

Actions

Since free will is one factor among many others, its role is less central in influencing our choices and actions than we might have thought.



From the question

*whether the future is predetermined*

to the question

*whether we have free will*

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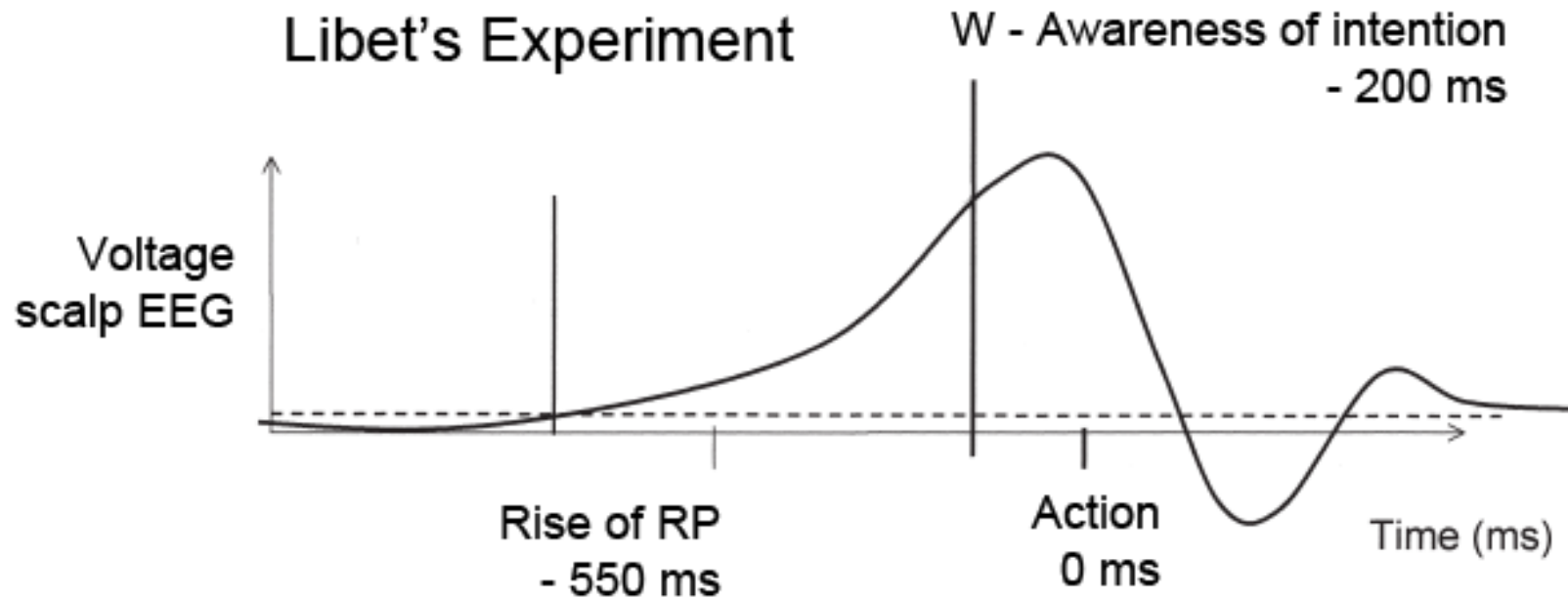


# What Does Neuroscience Tell us About Free Will Specifically?

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# Libet's Experiment in the 1980's



Brain activity in the form of the *Readiness Potential* starts 550 ms before the action, although the conscious intention to act occurs only 200 ms before the action. *Brain activity precedes our intention to act.*



# How the Experiment Was Conducted

## Box 1 | Measuring conscious intention

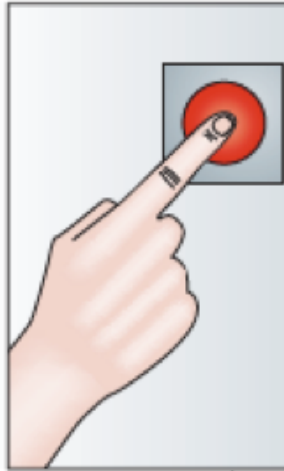
1 Observe clock



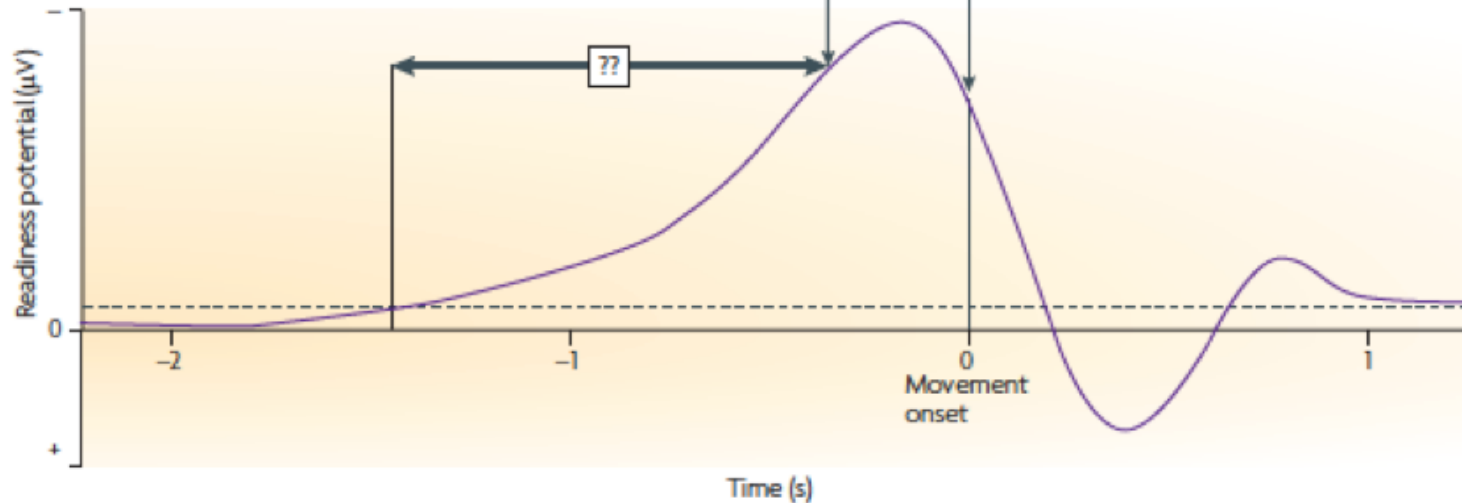
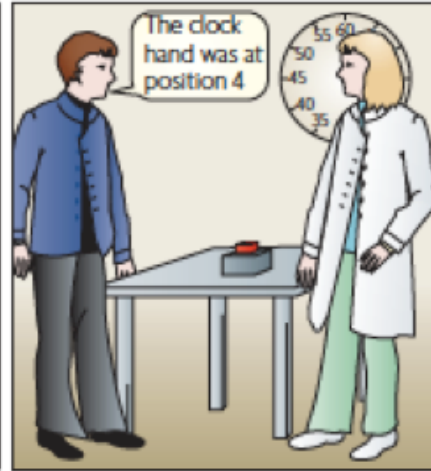
2 Note clock position at time of conscious intention (urge to act)



3 Perform action



4 Report clock position at time of conscious intention



Subjects were asked to report when they felt the intention to act by looking at a clock. The clock was not a normal clock but allowed greater precision.

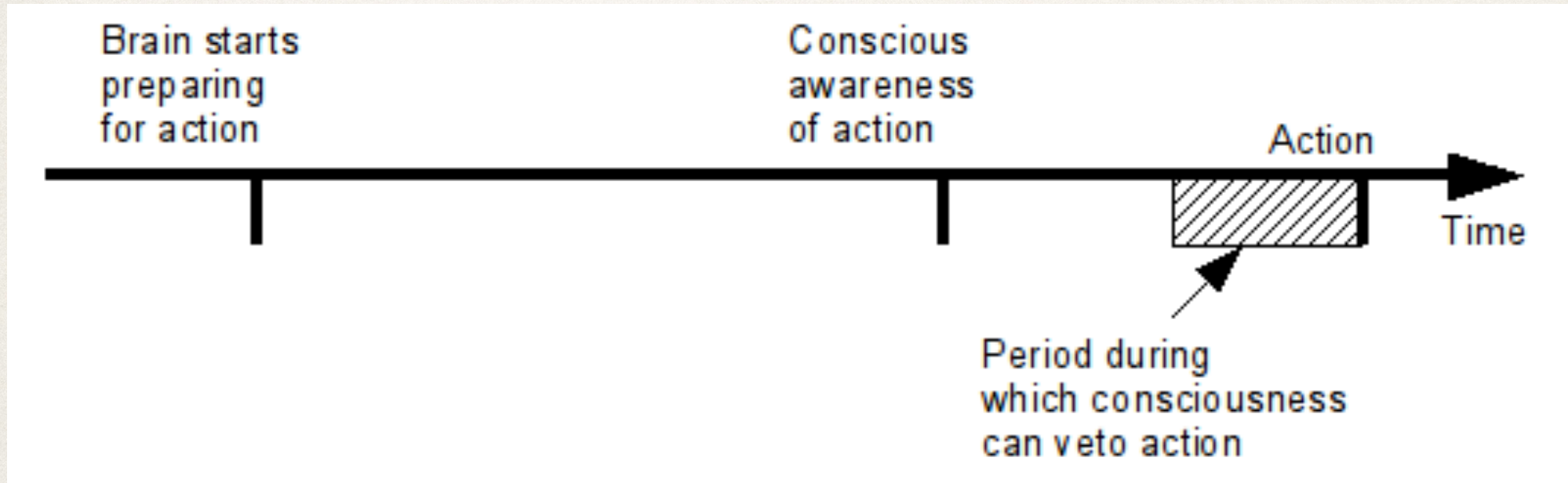


# Does Libet's Experiment Disprove Free Will?

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# Free Will as “Veto Power”



Although the brain activity starts well before the conscious intention to act, it is still possible for us to veto the action and refrain from acting.

Libet himself believed that his experiment did not disprove the existence of free will. Rather, he thought that his experiment showed that we should think of free will differently, namely as a “veto power”.



# Another Experiment

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John-Dylan Haynes from the Bernstein Center for Computational Neuroscience in Berlin conducted an experiment that shook his view of life. In the experiment, subjects were put into a brain scanner and shown a series of random letters. The subjects were free to press a button with either their left or right index fingers whenever they felt the urge, but were told to note the letter showing when they made this decision.

... the *conscious decision* to press a button occurred about a **second before** the act was performed.

....the observation of *patterns of brain activity* seemed to be able to predict the decision up to **seven seconds in advance**.

Unconscious determinants of free decisions in the human brain.

Soon CS, Brass M, Heinze HJ, Haynes JD.

Published in Nat Neurosci. 2008 May;11(5):543-5.



The issues on the table so far

- Whether the **future is predetermined**
- Whether we have **free will** to act and choose

Question about the  
*relationship* between free  
will and determinism

- If the future is predetermined, can we have free will?



# Possible Positions

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**The future is predetermined**

We have  
free will

We don't  
have free will

*Where do you stand?*



# What Does it Mean that The Future is Predetermined?

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## **Determinism**

Every event is caused by another event which in turn is caused by yet another event and so on.

The causal chain that leads to the occurrence of an event is such that the event in question will *inevitably* happen.



# What Does it Mean To Have Free Will?

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## **Free Will**

This is the power to act and do otherwise. It is the power to have made a choice other than the choice one actually made.



# Is Determinism Compatible With Free Will? *It seems Not*

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An argument that determinism is incompatible with free will:

If all events —including our own actions — happen inevitably because they are caused by previous events, then we do not have the power to change them and act otherwise. *So, if determinism is true, we do not have free will.*



# van Inwagen's Argument For Incompatibilism

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- ❖ Suppose (1) Judge J did not raise his hand, so the defendant was put to death.
- ❖ Suppose (2) determinism is true. For van Inwagen, determinism means that every event follows from the past according to the causal laws of nature.
- ❖ Could J have acted otherwise, given (1) and (2)? No, because...
  - ❖ If J had the power to raise his hand, then J had the power to change the current state of the world.
  - ❖ If J had the power to change the current state of the world, then J had the power to change the past of the world or the laws of nature, since the current state of the world follows from the laws of nature and the past of the world.
  - ❖ But J cannot have the power to change the past of the world nor can he have the power to change the laws of nature.
  - ❖ So, if J cannot change the past or the laws of nature, he cannot change the present state of the world either.
  - ❖ If John cannot change the present state of the world, then J does not have the power to raise his hand, so J could not have acted otherwise.