

## Second Discussion Class

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### Discussion Question

You are a neuroscientist being confined to a desert island. Your captors allow you to take one research instrument to study the brains of the unusual creatures on that island. Which do you take?

- A. A device that allows you to make very controlled lesions
- B. A device that lets you stimulate in a very controlled way different parts of their brain
- C. A device that allows you to record activity in their brains with very high spatial resolution but poor temporal resolution
- D. A device that allows you to record activity in their brains with very high temporal resolution but poor spatial resolution

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### Discussion Question

fMRI studies don't directly measure neural activity but use bloodflow as a proxy. Because increased blood flow is a slow, sluggish response and not tightly localized, is fMRI more suspect than directly recording from neurons?

- A. No. It is actually an advantage since it avoids the noise in directly recording from neurons
- B. No. The proof is in the pudding. fMRI has provided a great deal of information about how neural systems work
- C. Yes. We might have to resort to it for moral reasons, but direct recordings from neurons would be much better
- D. Other

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## Discussion Question

Localizationists tend to assume that different neurons (or at least clusters of neurons) perform specialized tasks. Could it be that some neurons are generalists—they do whatever function is needed?

- A. Yes. In my computer the transistors in the CPU do whatever the operating system tells them to do
- B. Yes. Neurons are highly interconnected and can receive and respond to messages from any other neuron in just a few steps
- C. No. Neurons are primarily connected in local circuits that perform specific tasks; long distance connections only modify how they do so.
- D. Other

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## Discussion Question

Which is the best way to study activity in one neural system

- A. Constrain the animal so that it can only respond to the stimulus you give it
- B. Keep the animal in a limited environment and present stimuli, but leave it free to act as it will
- C. Track the neural activity as the animal goes about its life in the wild
- D. Let the animal live in its natural environment, but manipulate the brain to see how the animal's activity is altered
- E. Other

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## Discussion Question

You are interested in understanding how humans regulate how and when they eat. Which of the following organisms do you think would be most informative to study?

- A. Humans only
- B. Monkeys
- C. Mice
- D. *C. elegans* (worm)
- E. *E. coli* (bacterium)

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## Discussion Question

On which of the following organisms is it ethically acceptable to implant electrodes to record neural activity for experimental purposes?

- A. None
- B. Invertebrates (E. coli, jellyfish, fruit flies, etc.) only
- C. Invertebrates and non-mamallian vertebrates (e.g., birds)
- D. Invertebrates and vertebrates other than primates
- E. Any, including any human who consents

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## Discussion Questions

On which of the following organisms is it morally acceptable to do surgery to alter neural circuits for experimental purposes?

- A. None
- B. Invertebrates (E. coli, jellyfish, fruit flies, etc.) only
- C. Invertebrates and non-mamallian vertebrates (e.g., birds)
- D. Invertebrates and vertebrates other than primates
- E. Any, including any human who consents

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## Discussion Question

The President has appointed you to a panel to determine how to allocate \$25 Billion to advance our knowledge of the human brain. What would you advocate spending the money on?

- A. Developing new non-invasive techniques for recording activity in brains
- B. Developing new tools to map how neurons are connected by axons and dendrites
- C. Developing new tools to record from large numbers of neurons at once
- D. Developing new tools for understanding how neuromodulators work
- E. Other

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