

- The following is a list of starting questions related to the neuroengineering part of the class that you could be asked during the HHRI exam.
- Please note you could be asked more than one question and from more than one slide.

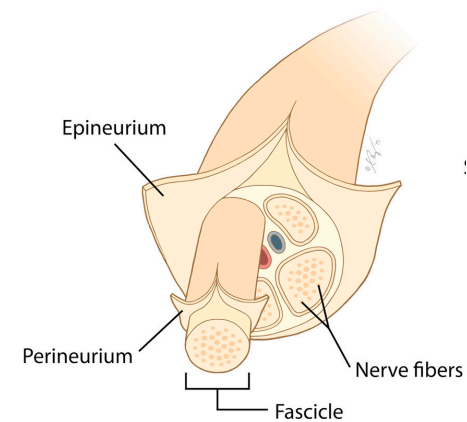
# Examples of exam questions

- This person is holding a cold cup of cold water; describe the sensory mechanisms involved in this task at the skin level



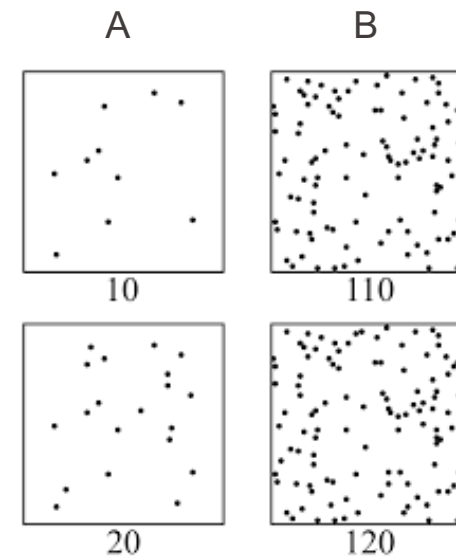
# Examples of exam questions

- On the following drawing, show where is a cuff electrode placed.
- What about an intrafascicular electrode?



# Examples of exam questions

Compare the A and B conditions on this image. In both cases, the lower figure has 10 dots more than the top one; however, it is much easier to detect the A case than the B case. Relate this effect to a law we have seen in the class and give an example related to haptics.



# Examples of exam questions

Describe one example of motor decoding via neural recoding with electrodes implanted in the primary motor cortex.

- What is a bidirectional brain-machine interface, and what problem does it solve?
- What is a firing rate?

# Examples of exam questions

- Give a full example of sensory substitution.
  - Compare it to an application using intrafascicular stimulation
- Describe the following haptic illusion (e.g., apparent movement), describe its mechanism, and how it could be used in a haptic device.
- What advantages and disadvantages do you see in using invasive versus non-invasive technology for restoring sensory feedback?

# Examples of exam questions

- Two needles spaced by 2mm placed on your fingertip will be perceived as 2 separate stimuli but 1 single point when placed on your back. Why?
- Placed 1cm apart on your arm, two vibrators will be perceived as 1 stimulus while two needles will be perceived as separate. Why?
- Give an example of sensory restoration using intracortical stimulation
  - In this example, imagine you want to find the minimum stimulation amplitude that a human subject can detect. Describe how you will design your experiment.

# Examples of exam questions

- Describe a simple 1 DoF grasp decoding via EMGs. Consider recording from the biceps.
- What is targeted muscle reinnervation? How is the control different from the first example (from the patient's perspective)?
- What is a HD-EMG, and what problem does it solve?