Neural Spike Sorting in the Primary Somatosensory Cortex

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The recording of neuronal action potentials from multiple neurons in humans has been a notable advancement for better understanding the nervous system. When our sensory nerves are activated, either via touching an object or stimulating the nerve using peripheral nerve stimulation (PNS), we feel a sensation. This sensation is caused by a signal in the form of action potentials being relayed from our fingers to our brain. When an 8x8 microelectrode array is placed in the primary somatosensory cortex (S1), each electrode can record when nearby neurons fire an action potential in response to the stimuli. However, since electrodes may receive feedback from more than one neuron, it is difficult to determine the behavior of individual neurons. A technique known as spike sorting is used to cluster neuronal spikes depending on their shape to determine which neurons they were recorded from. Multi-unit recordings from an experiment where PNS was delivered were collected and sorted using a spike sorting interface. Automatic sorting and manual inspection was performed to attain single-unit activity from the recordings. After being sorted, the single units were visually inspected to determine if their firing pattern resembled the behavior of different somatosensory fibers. Having this information helps with understanding how the brain processes sensation elicited by PNS.

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