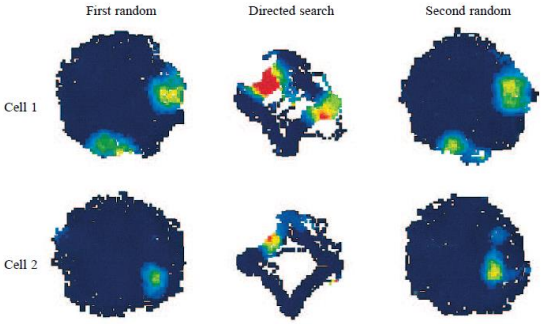
1. The question below is about spatial navigation. The figure below shows recordings from two simultaneously recorded cells from a brain region in rats. First column: Food is randomly scattered on the border. Second column: Food is placed at 4 equally spaced fixed points as the rat searches the room. Third column: same experiment as first column but after the directed search. Answer the following questions:

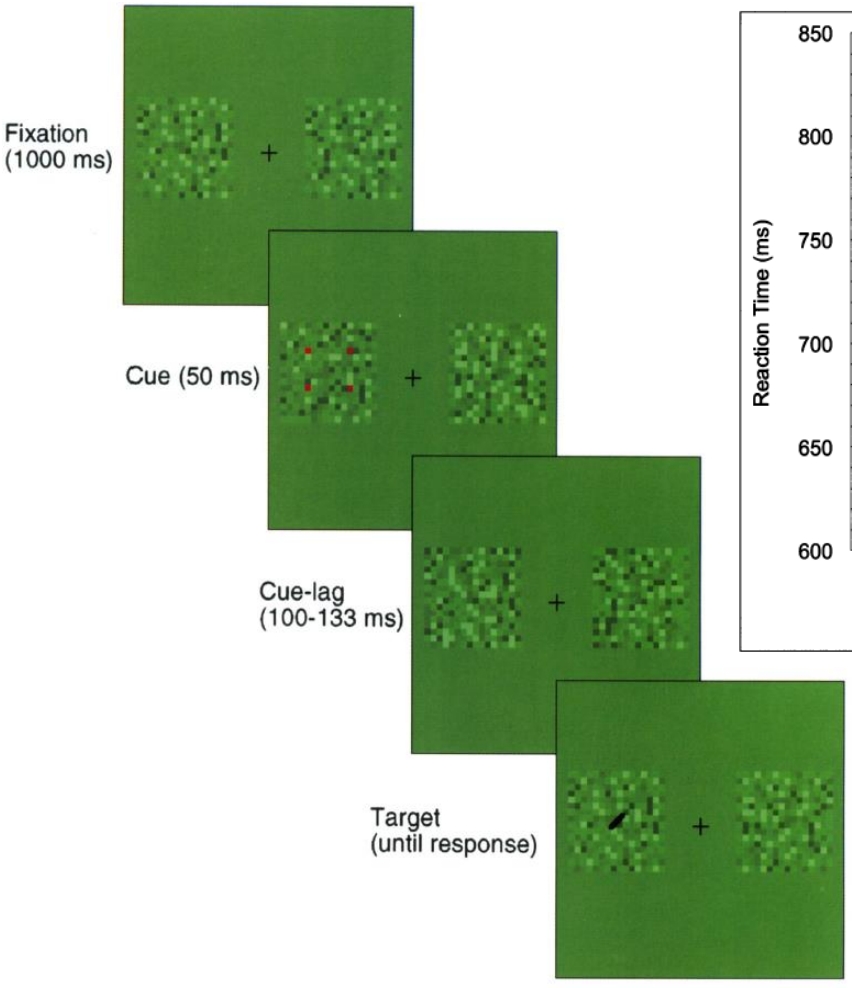


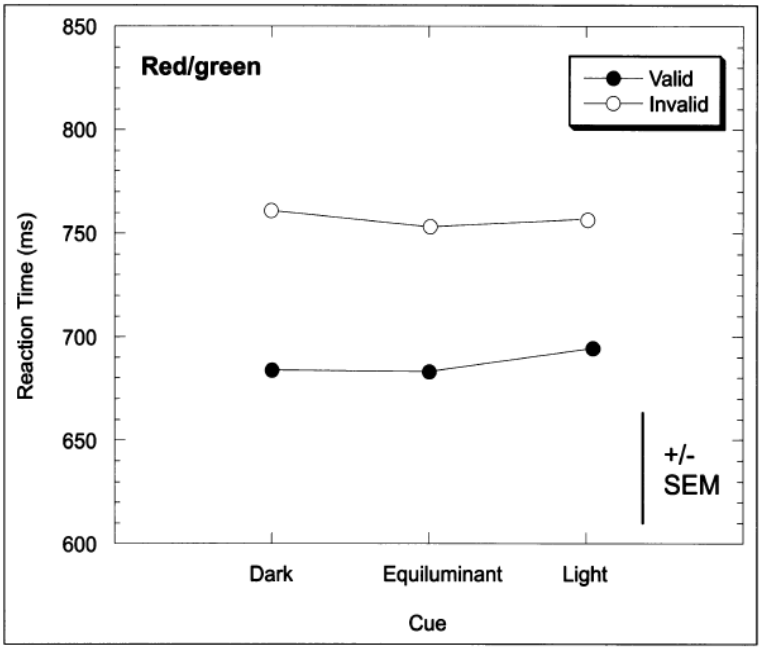
A. What kind of recording do you think is being used here? (1)
B. What area of the brain are the researchers recording from? Justify your answer (2)
C. What elementary computations are necessary to generate cells with these properties? (3)
D. Briefly, describe the neural circuit underlying these computations in the mammalian brain? (4)

2. The figure below shows an experiment (left figure) and the result (right). Answer the following two questions:

A. What phenomenon is being tested here? (5)

B. What are the possible neural mechanisms that might explain the tested phenomenon? (5)





3. The below is a categorization test. Amazingly authors were able to train monkeys to categorize random dot movement pattern in one of 12 directions into 2 categories as shown below.

A. **Diagram** and describe the experimental paradigm the authors might be employing. (5)

B. Which two areas in the cortex might be involved in this categorization task? **Diagram** the response pattern of neurons in your chosen area after the monkey's have learned the categorization. (5)