

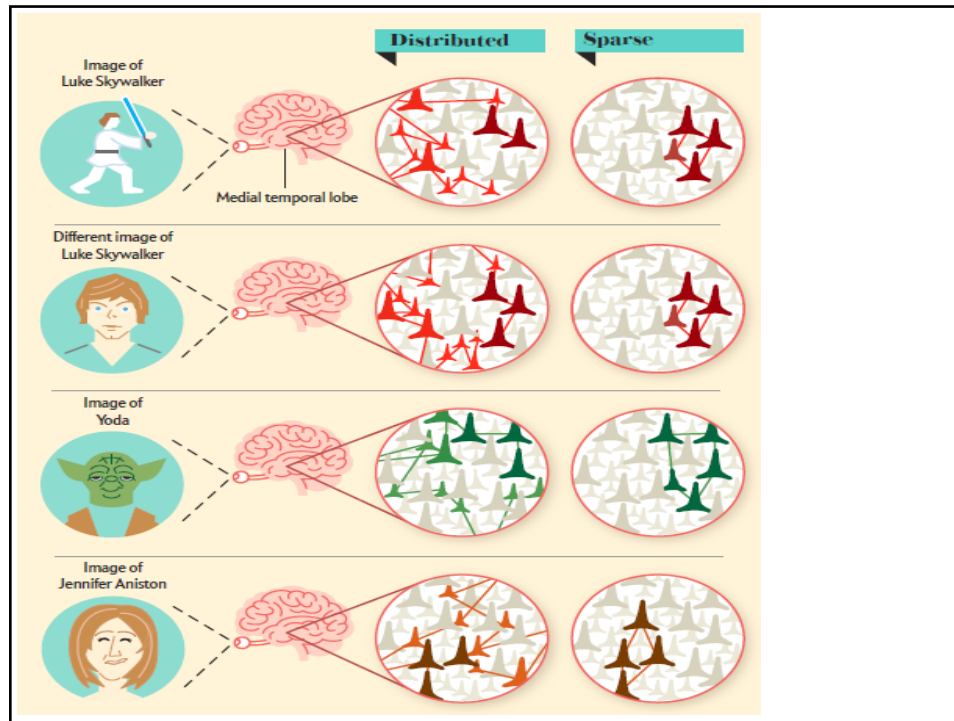
***Brain Cells for
Grandmother***

Each concept—each person or thing in our everyday experience—may have a set of corresponding neurons assigned to it

*By Rodrigo Quian Quiroga,
Itzhak Fried and Christof Koch*

Journal Club

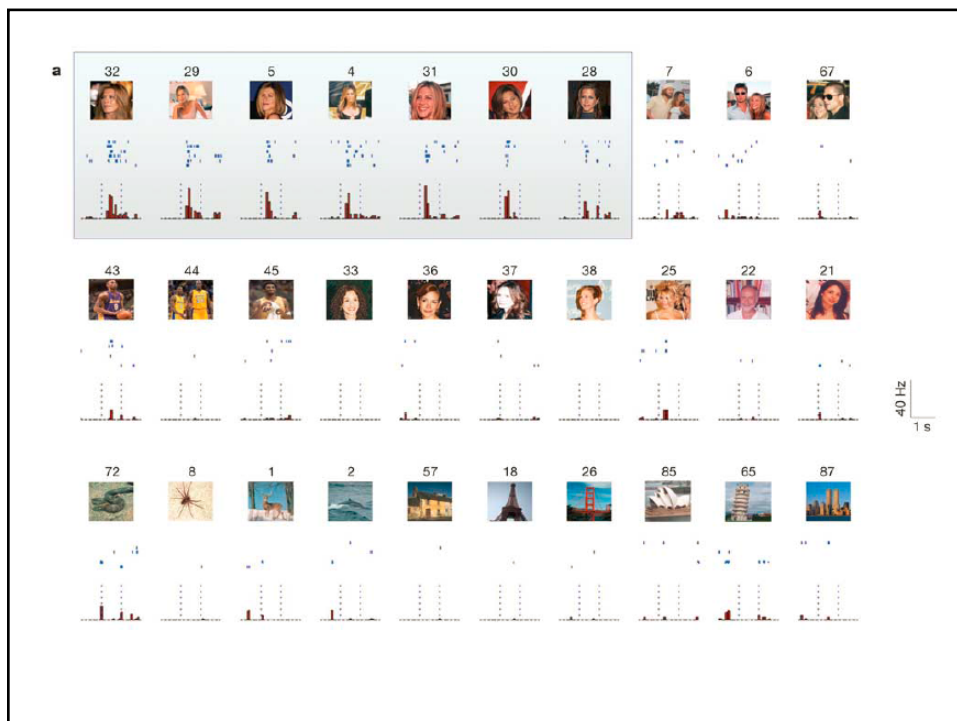
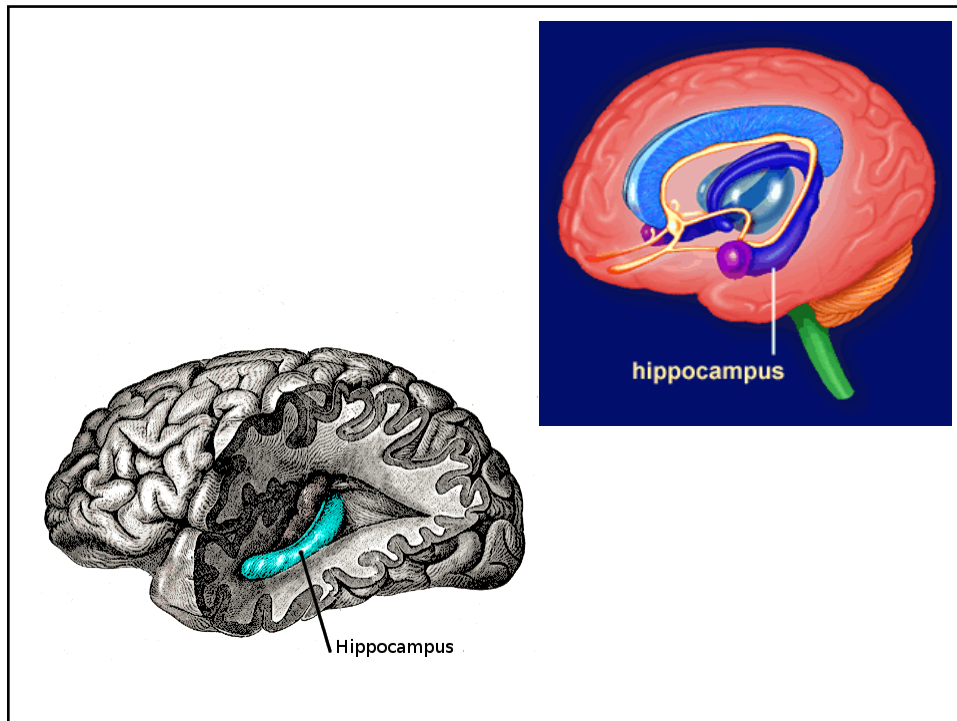
- Meet with Ellen and Mike before class
- Make slides of figures to point at
- Give some background, setup the question or hypothesis
- Step through main results/figures with questions or activities for the class
- Finish with conclusions and discussion about bigger picture, limitations, future directions

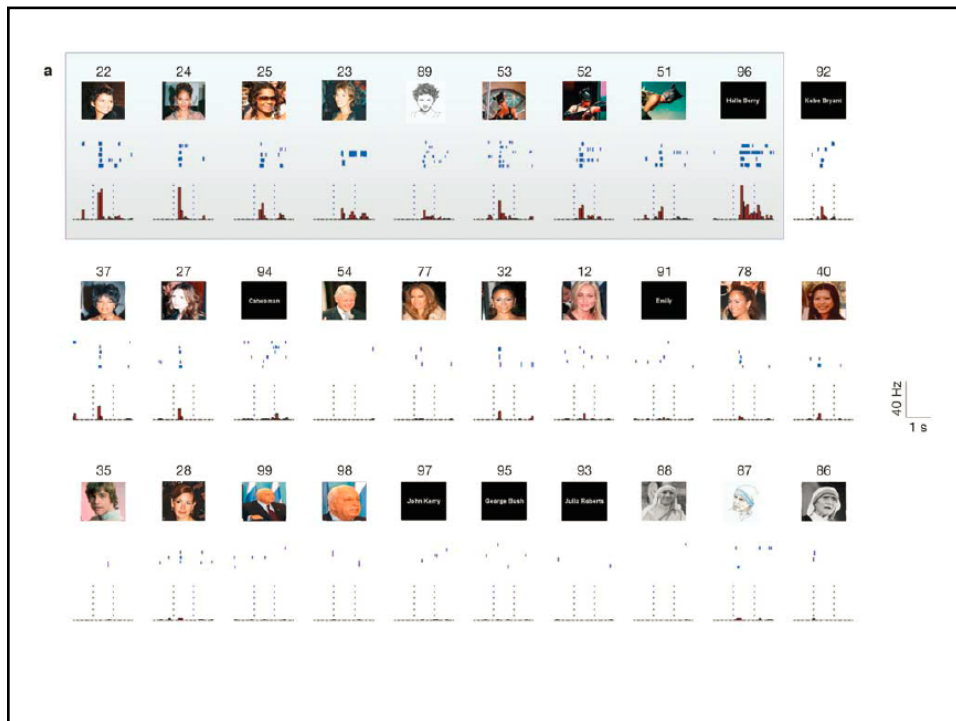
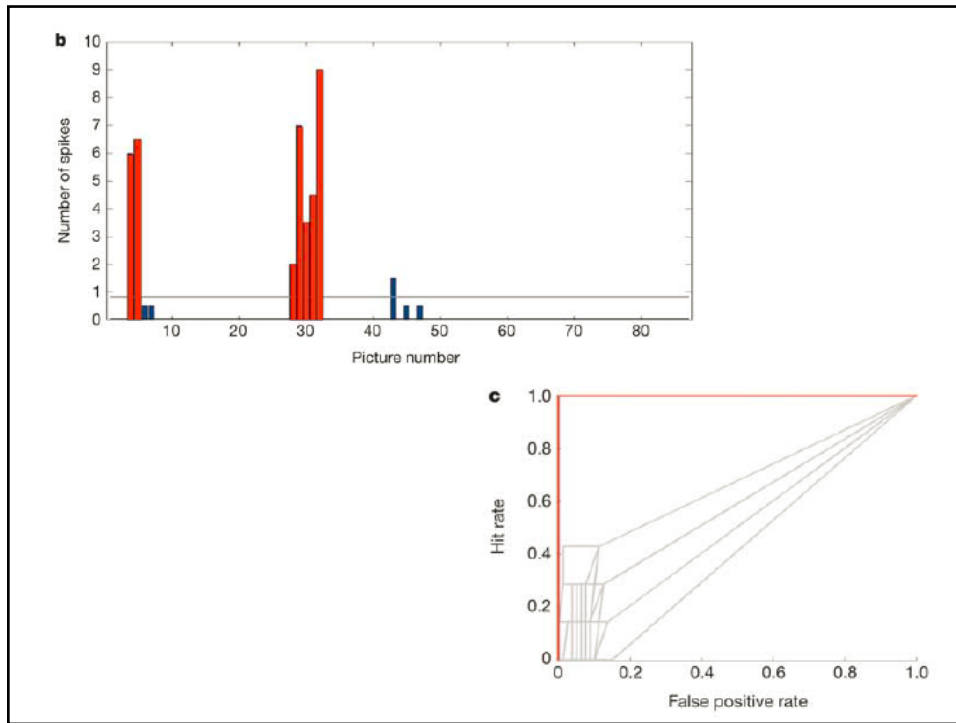


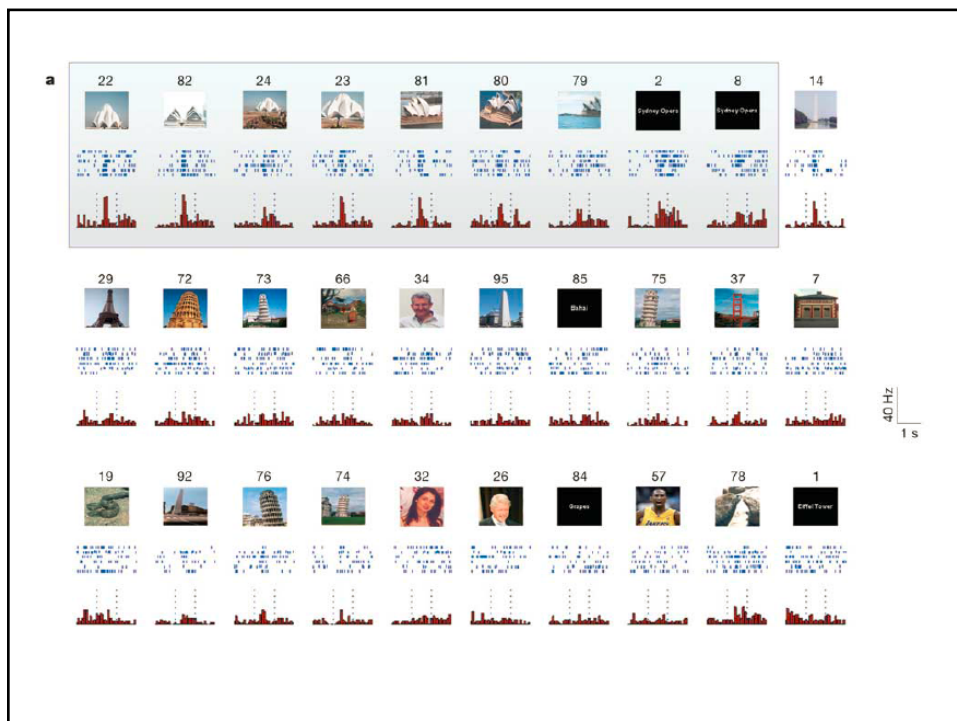
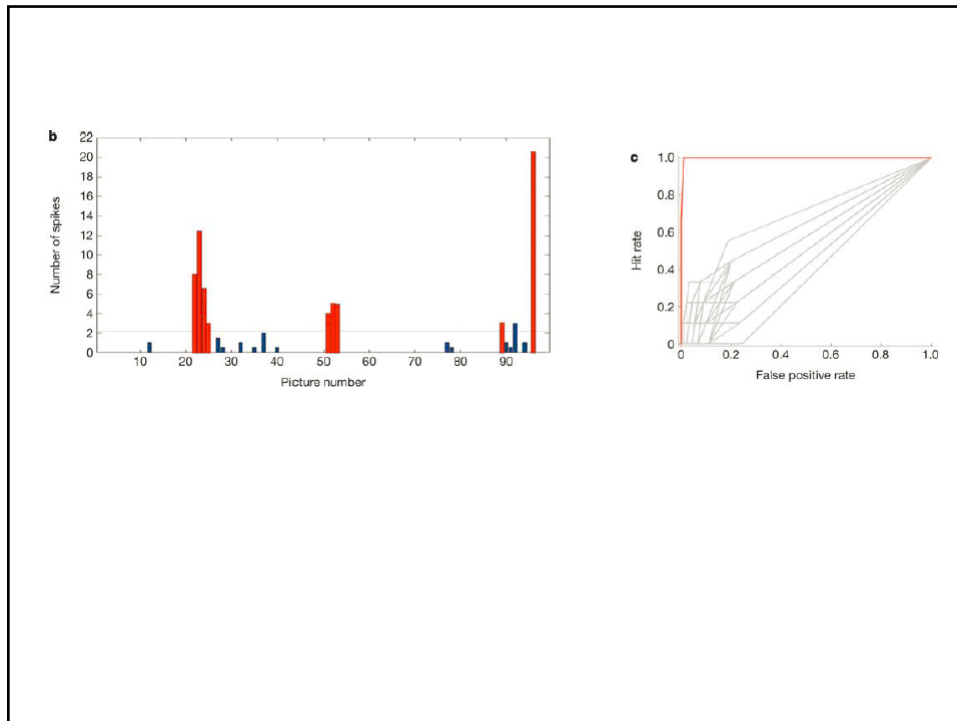
Invariant visual representation by single neurons in the human brain

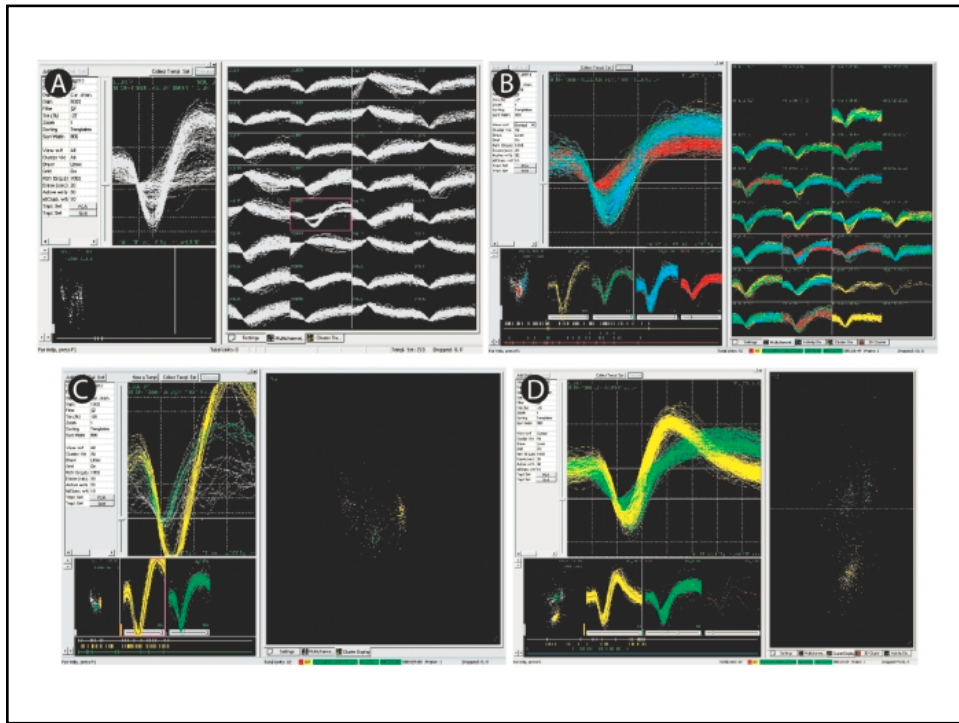
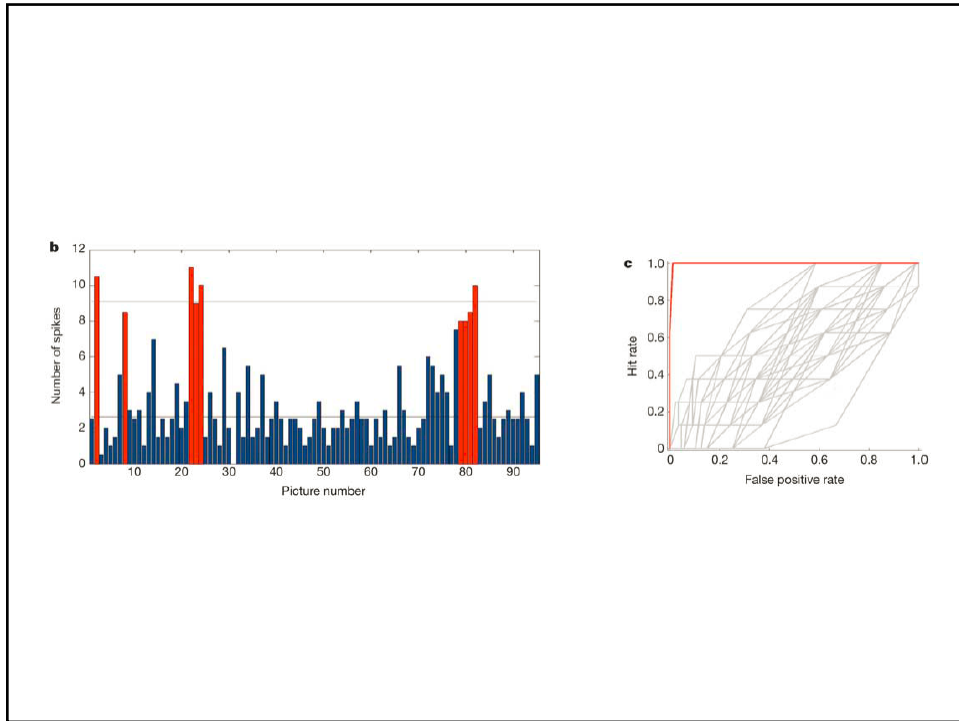
R. Quian Quiroga^{1,2,†}, L. Reddy¹, G. Kreiman³, C. Koch¹ & I. Fried^{2,4}

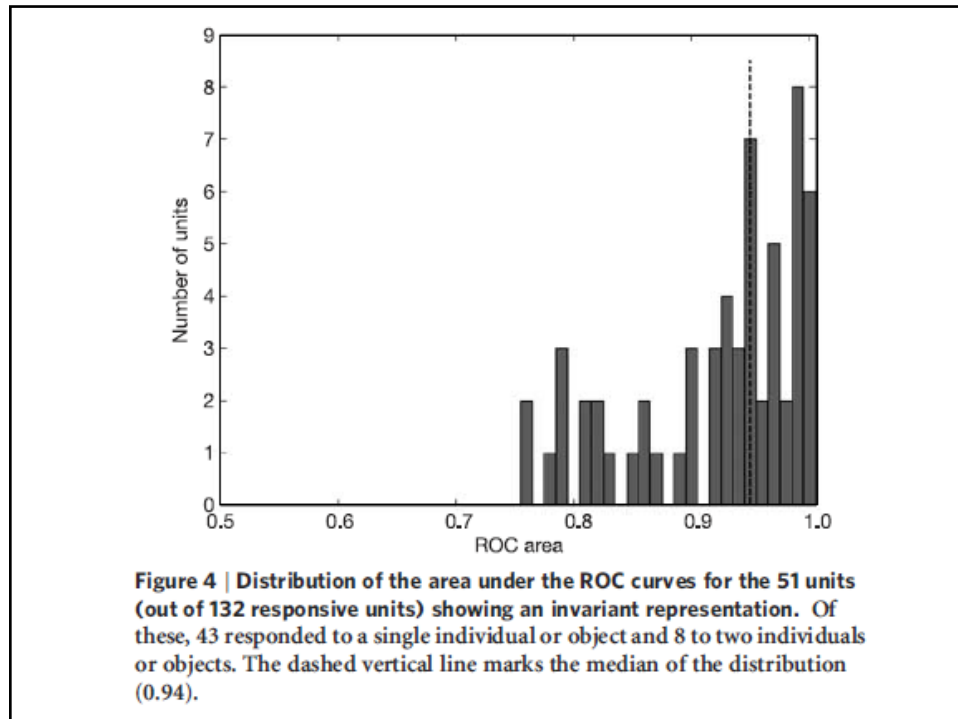
It takes a fraction of a second to recognize a person or an object even when seen under strikingly different conditions. How such a robust, high-level representation is achieved by neurons in the human brain is still unclear^{1–6}. In monkeys, neurons in the upper stages of the ventral visual pathway respond to complex images such as faces and objects and show some degree of invariance to metric properties such as the stimulus size, position and viewing angle^{2,4,7–12}. We have previously shown that neurons in the human medial temporal lobe (MTL) fire selectively to images of faces, animals, objects or scenes^{13,14}. Here we report on a remarkable subset of MTL neurons that are selectively activated by strikingly different pictures of given individuals, landmarks or objects and in some cases even by letter strings with their names. These results suggest an invariant, sparse and explicit code, which might be important in the transformation of complex visual percepts into long-term and more abstract memories.











Conclusions

- Some medial temporal lobe neurons exhibit responses to individuals, places, or objects that are
 - Sparse: few cells respond to any given image
 - Selective: each cell seems to respond to a specific concept or category
 - Invariant: these cells respond regardless of the current appearance of the individual
- Sparse conceptual (abstract) representations may facilitate encoding specific memories and associations

Limitations, doubts, questions

