The goal for this week is to think about the neocortex at a very high level and to introduce some of the big questions concerning its function, development, and evolution. Is there any reason to think that the cortex might be, in some sense, a uniform structure? If so, what is its computational goal? Why is the cortex subdivided into many areas instead of just one big one? Why might having more areas be a good thing? During the first part of the lecture, I will give an overview of the multiplicity of cortical areas with an emphasis on the question of why there might be so many. A lot of this part of the talk is based on the excellent paper by Horace Barlow (see below). I will work towards the idea that these areas represent highly specialized and abstract maps that are designed to facilitate forming new associations (learning).

In the second half, I will introduce issues related to the development and evolution of the neocortex. Naively, one might think of there being two different kinds of processes that have allowed for the tremendous expansion of the primate cerebral cortex: 1) building a bigger sheet and 2) divvying it up into different cortical areas. I will present some evidence for these ideas. Identification of key molecules involved in the "divvying up" (referred to by some in the field as "arealization"—an awful word) has allowed for experiments that manipulate the size of individual areas and allow one to ask whether bigger is really better.

Prior to Wednesday's lecture, please read:

Because Monday is a holiday (Presidents' Day), we will not discuss a paper for this unit and there will be no homework assignment. However, these two optional papers would make excellent holiday reading, especially for those interested in the molecular control of cortical development:
