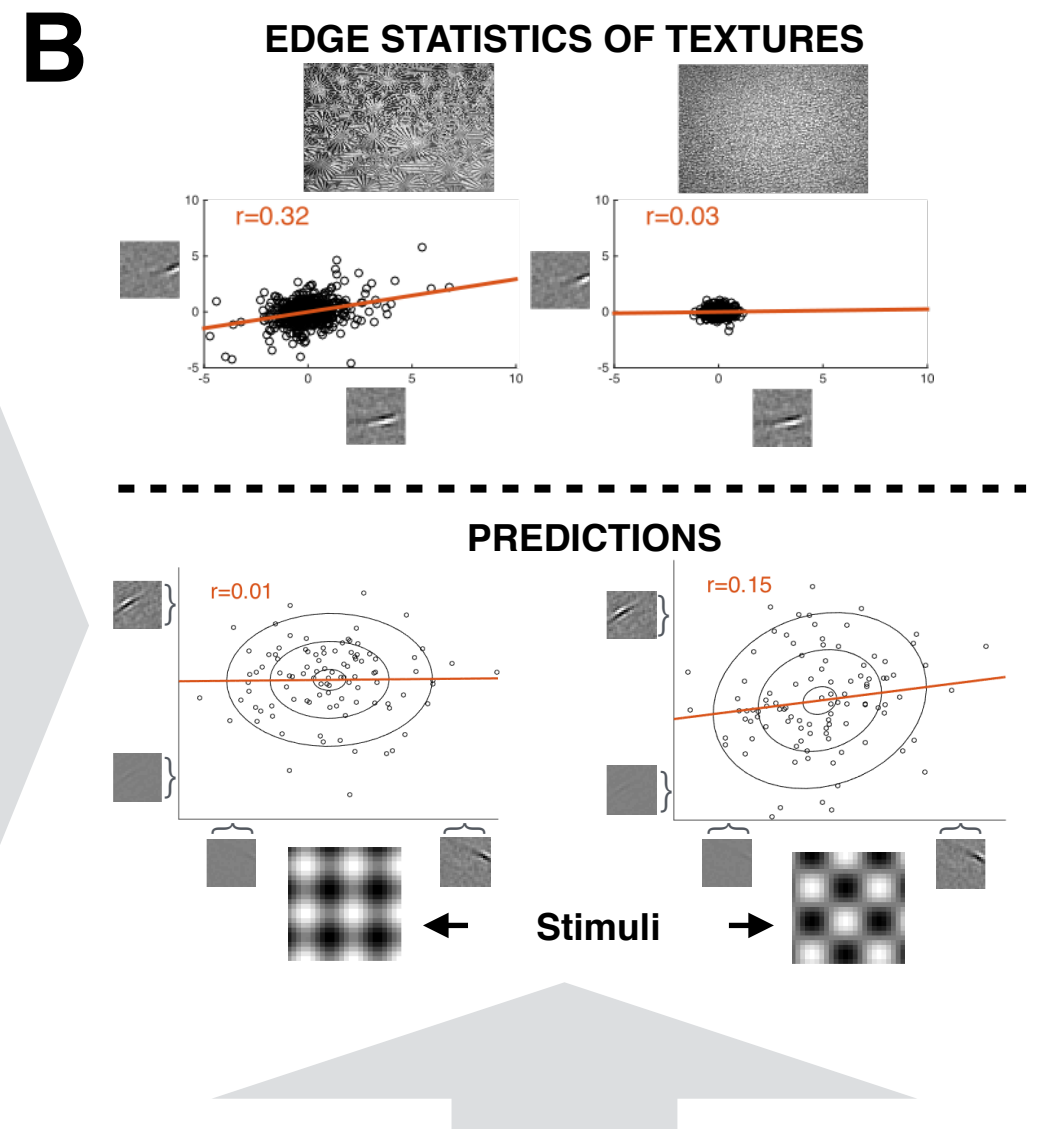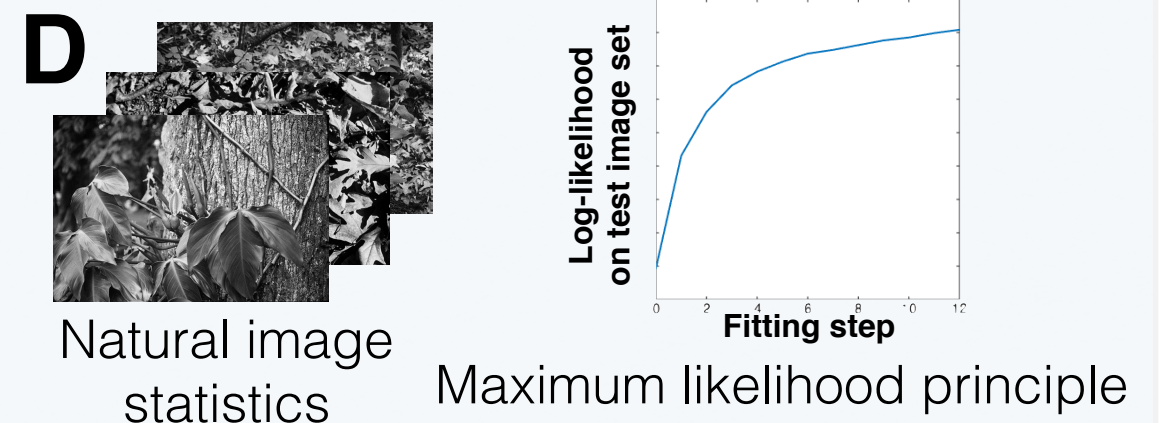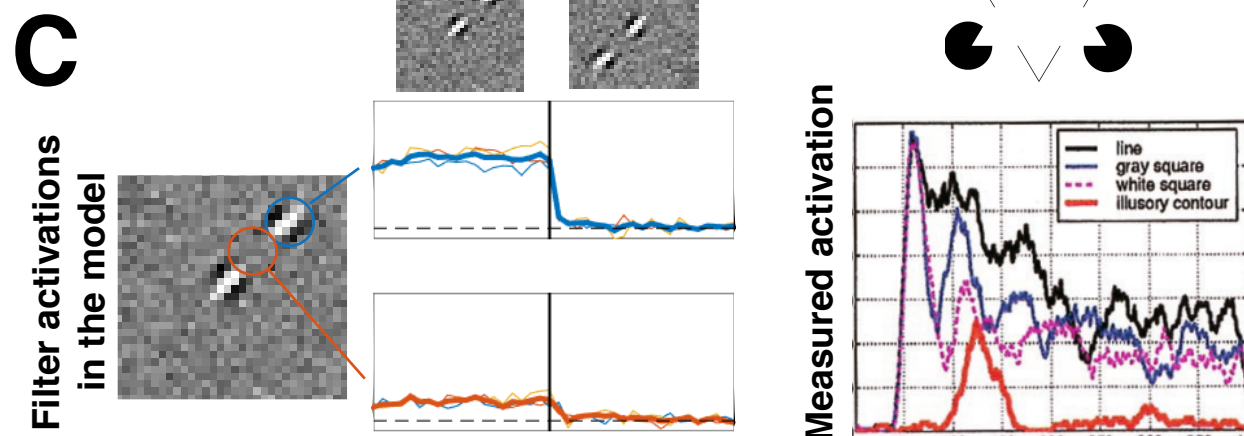(**A**) The generative model of natural images describes how are cell activations in the primary visual cortex determined by the interaction between the stimulus and learned regularities (**B**) The cells represent the value distribution of preceived quantities using samples. Correlations between edge filters (corresponding to receptive fields) differ by texture type. In a model with parameters fitted to natural image statistics, different stimuli imply different correlations between cell responses (**C**) The model reproduces experimentally measured responses to illusory contours (from Lee & Nguyen, 2001) (**D**) The parameters of the model are fitted to natural image statistics using a maximum likelihood learning algorithm