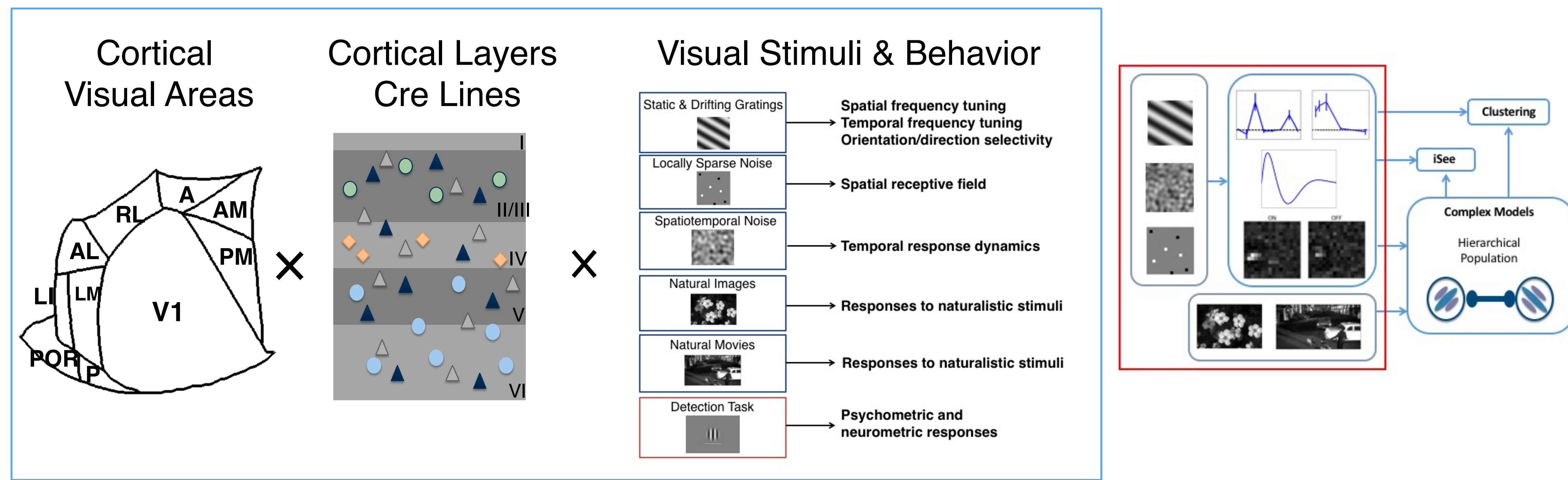


Michael Buice, Saskia de Vries, Amy Bernard, Brandon Rogers, Casey White, Chinh Dang, Pete Groblewski, Chris Lau, Cliff Slaughterbeck, Colin Farrell, Derric Williams, Jack Waters, Jed Perkins, Kate Roll, Leonard Kuan, Lydia Ng, Marina Garrett, Natalia Orlova, Shawn Olsen, Sissy Cross, Stefan Mihalas, Thomas Keenan, Wayne Wakeman, John Phillips, Christof Koch, Clay Reid
Allen Institute for Brain Science, Seattle, WA 98109

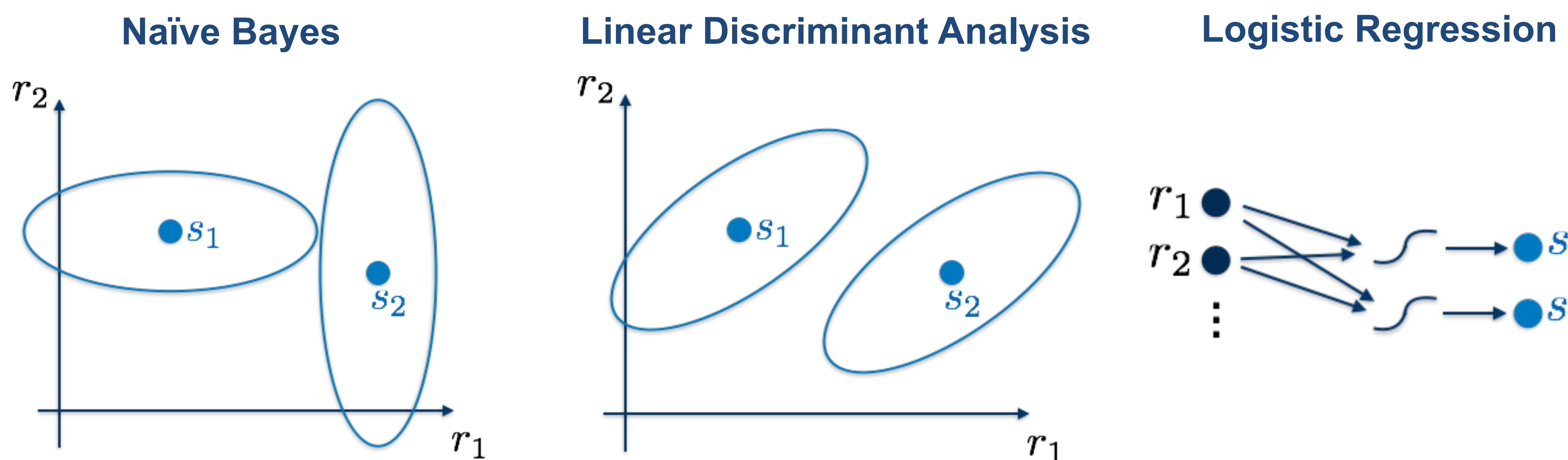
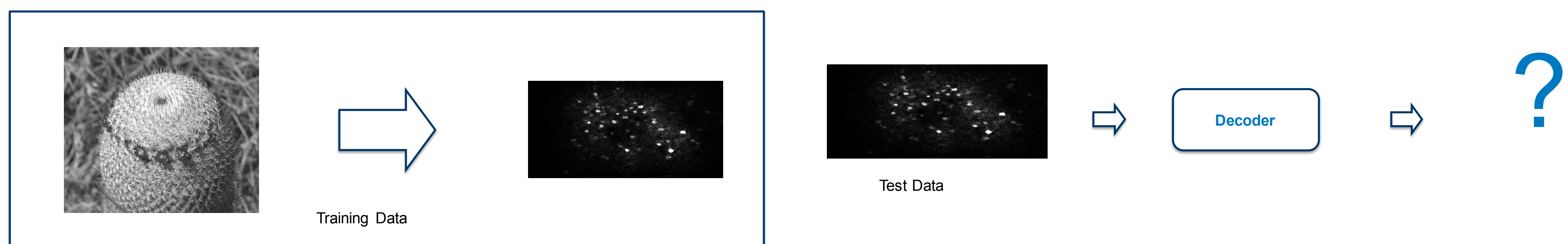
The Cortical Activity Map will provide neural responses from large sets of simultaneously recorded cells to a diverse set of visual stimuli from awake, behaving mice in multiple layers, regions, and cell types. This data set allows for unprecedented access to population responses and provides a unique opportunity to explore the collective characteristics of neural dynamics. The visual stimuli for CAM include gratings, sparse noise, spatio-temporal noise, simple objects, natural images, and natural movies. We demonstrate the power of this data set by exploring the nature of population coding in the visual system. To assess information processing across visual areas we develop decoders. We analyze and compare the performance of these decoders for each stimulus type. In particular, we compare the performance of correlation based decoders and those with functional connectivity to independent decoders. For more complex stimuli, we use these models as the basis for reconstruction of the visual stimulus. This set of analyses demonstrates that the Cortical Activity Map will be a powerful tool for exploring the joint activity of large populations of neurons.



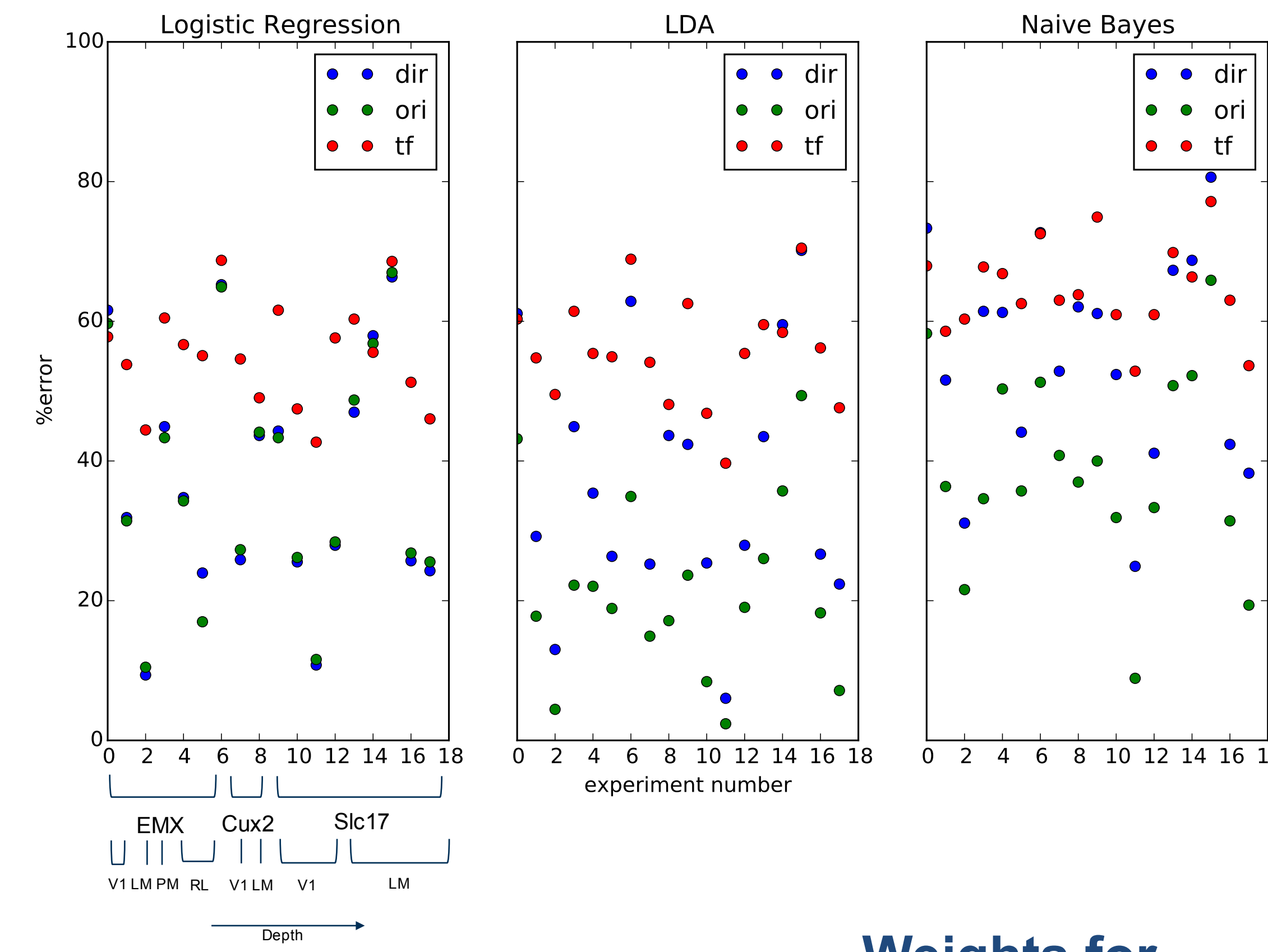
The Cortical Activity Map is a physiological atlas surveying neural responses to visual stimuli and behavioral tasks across multiple cortical visual areas, cortical layers and Cre lines. The data will not only characterize single cell responses to simplistic and naturalistic stimuli, but fuel surveys of population coding throughout the mouse cortical visual system.



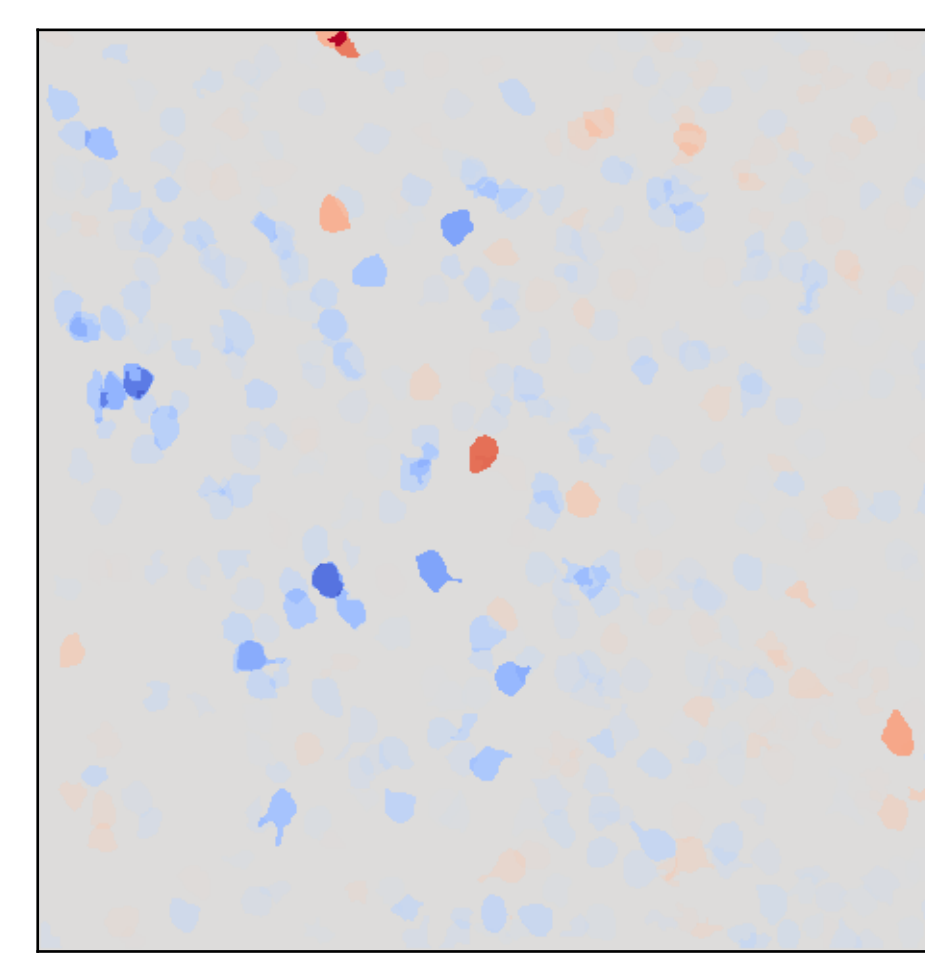
Testing models of population decoding



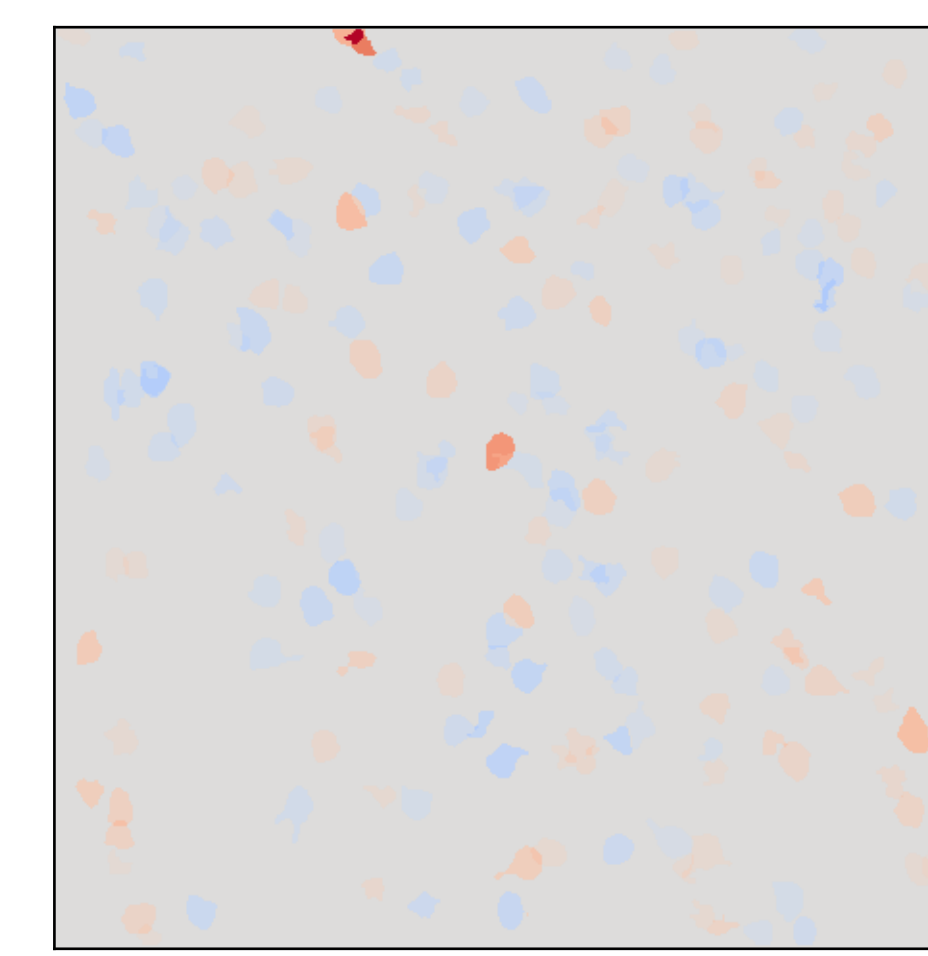
Performance of decoders across data sets



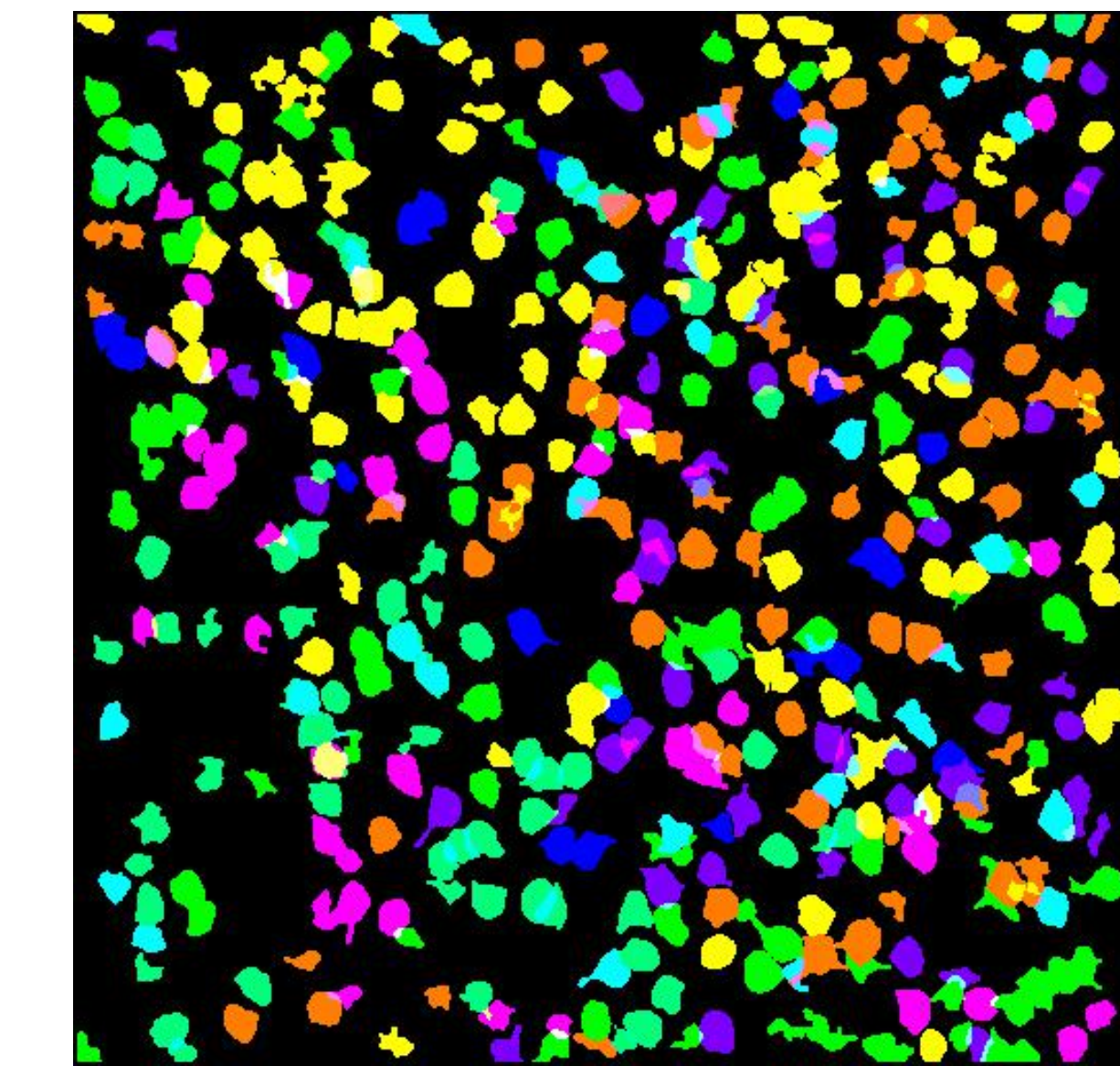
Response to 180°



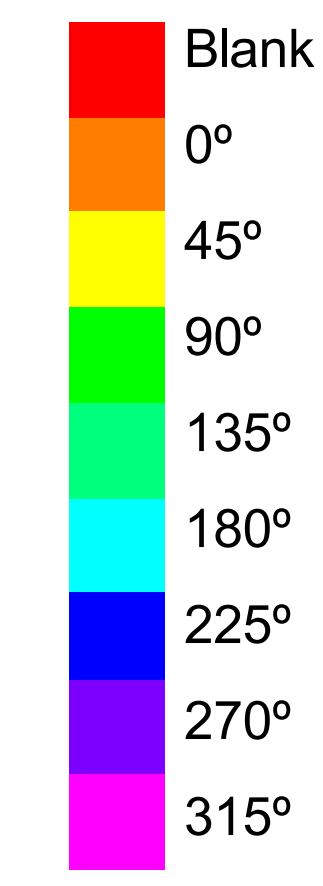
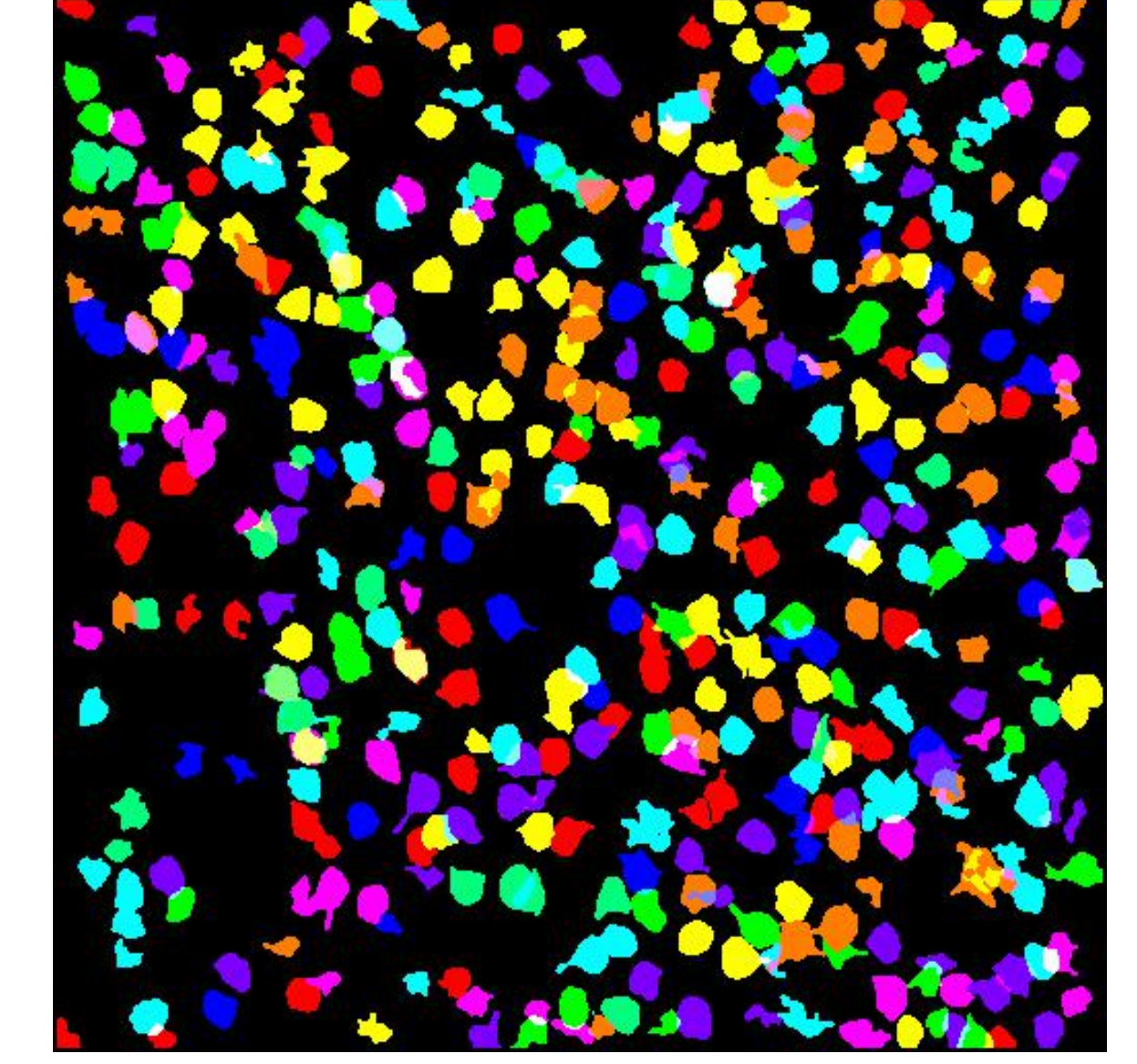
Weights for Predicting 180°



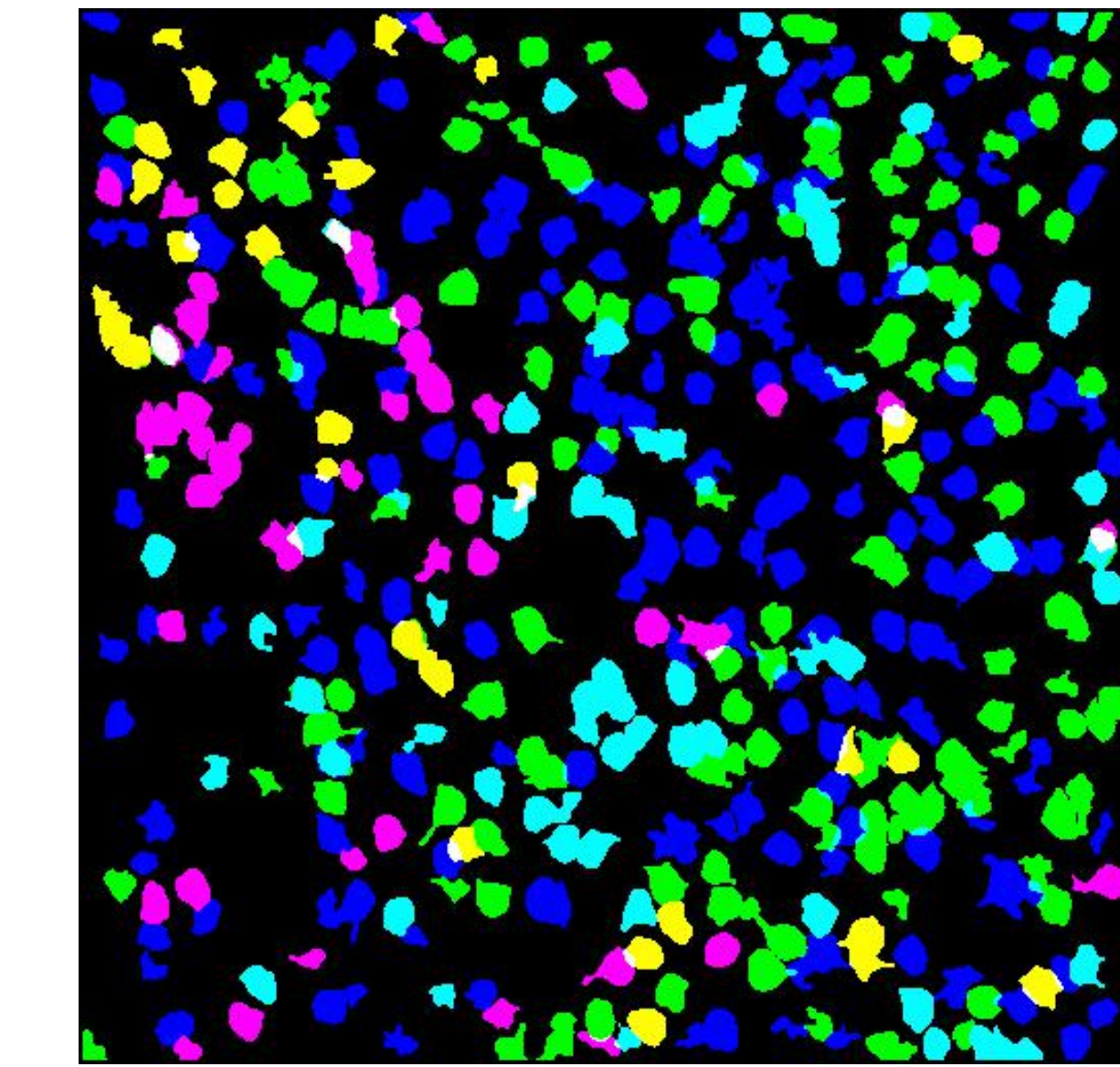
Max Tuning for Direction



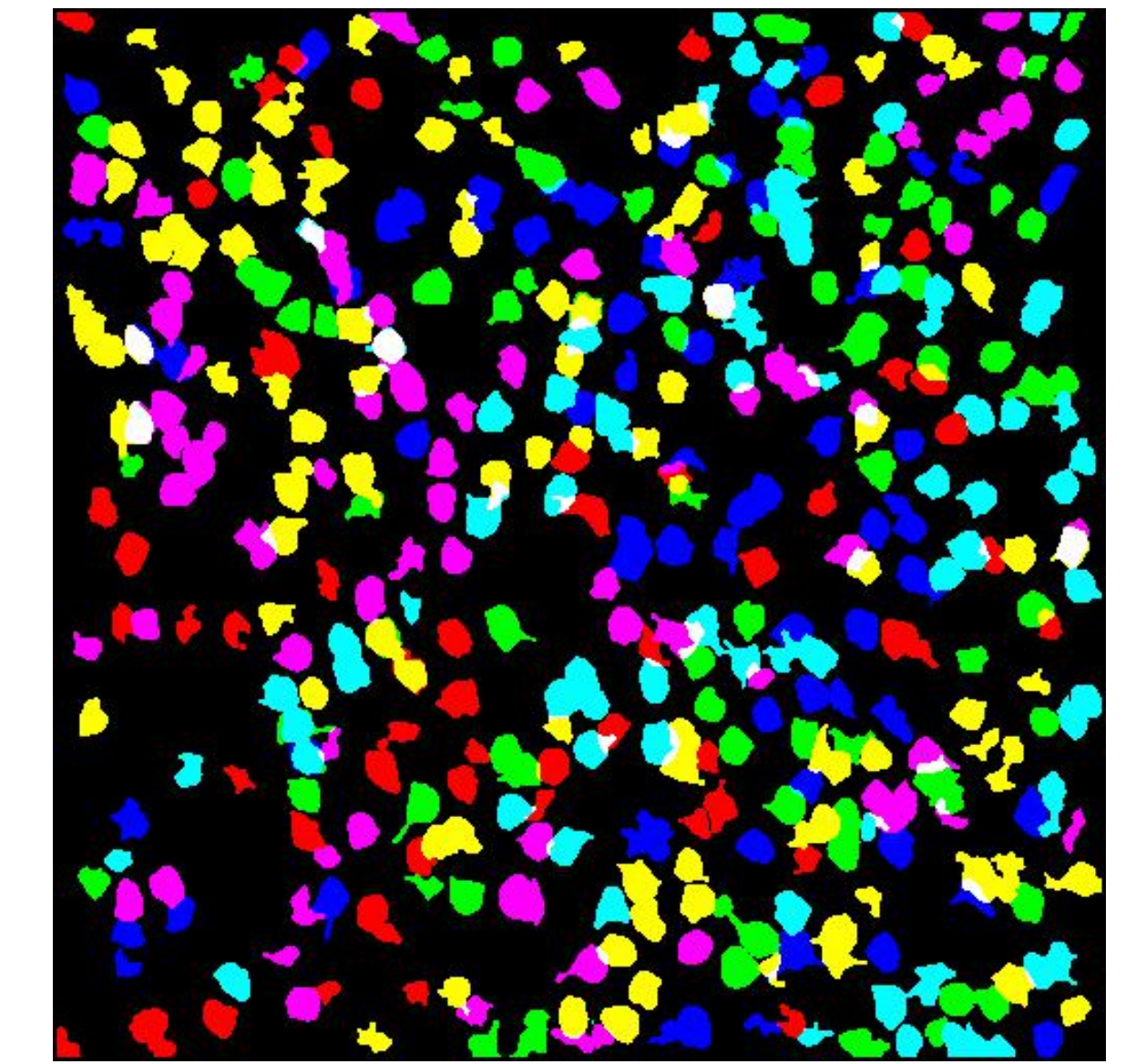
Max weight for decoding (LogReg)



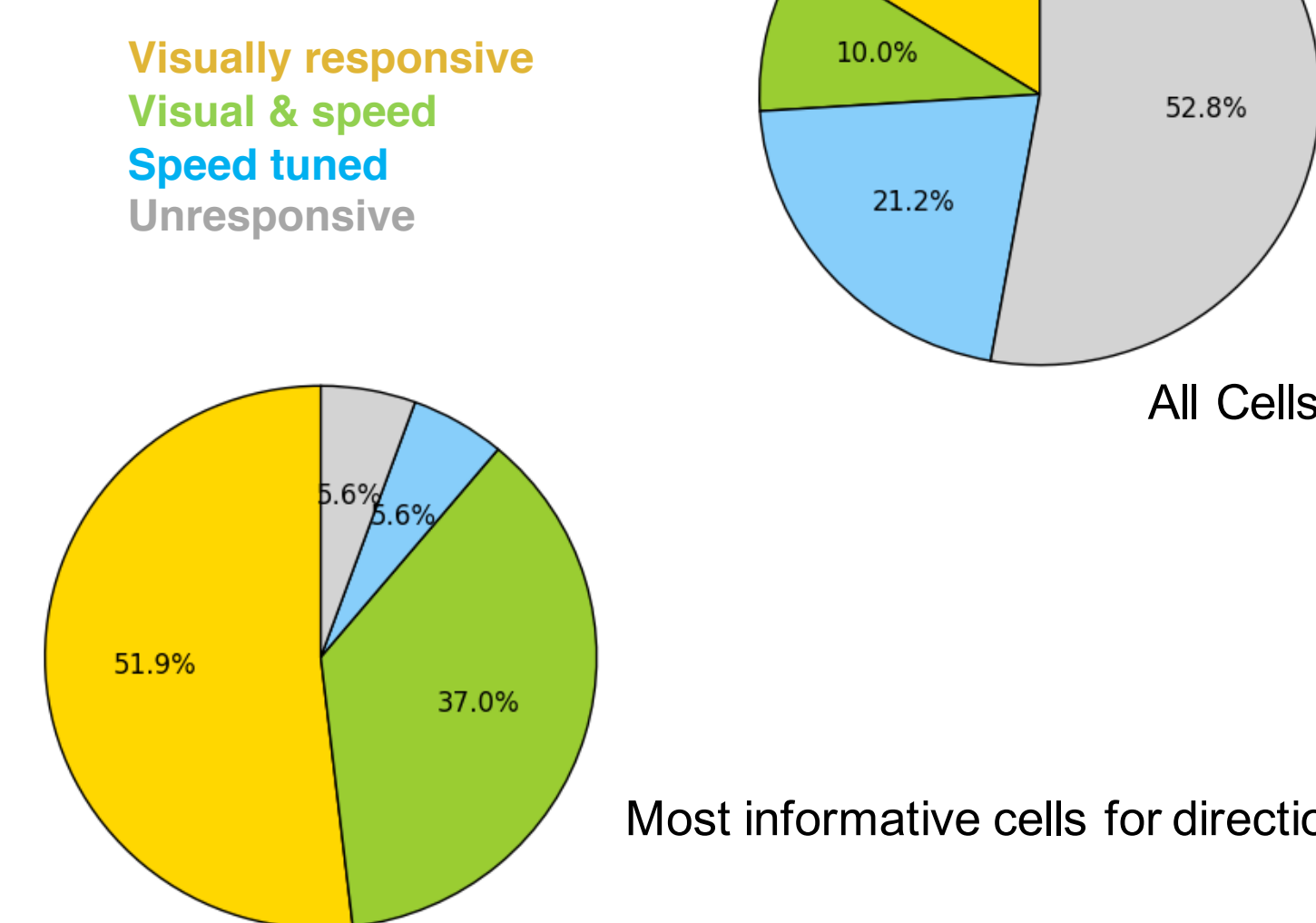
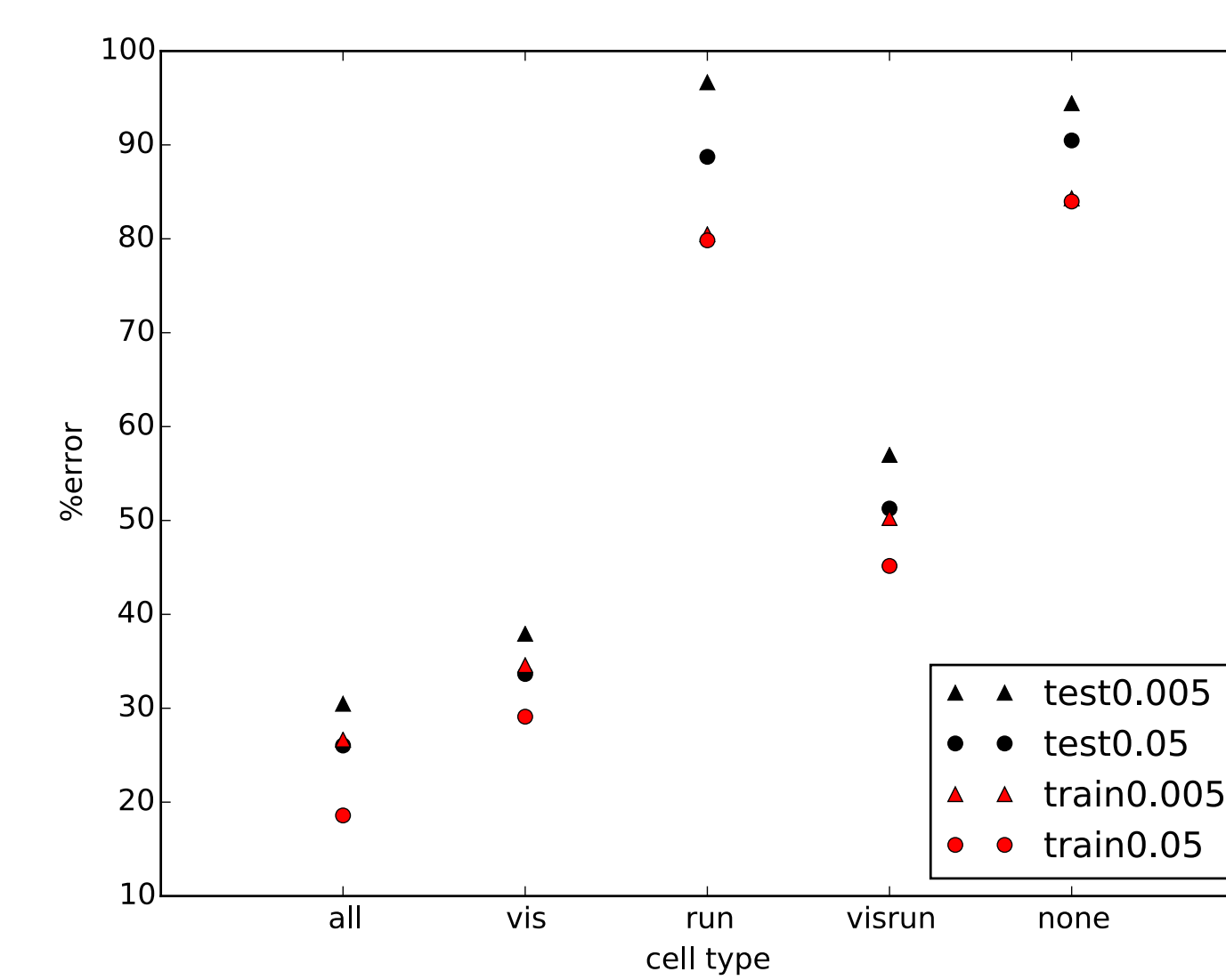
Max Tuning for Temporal Frequency



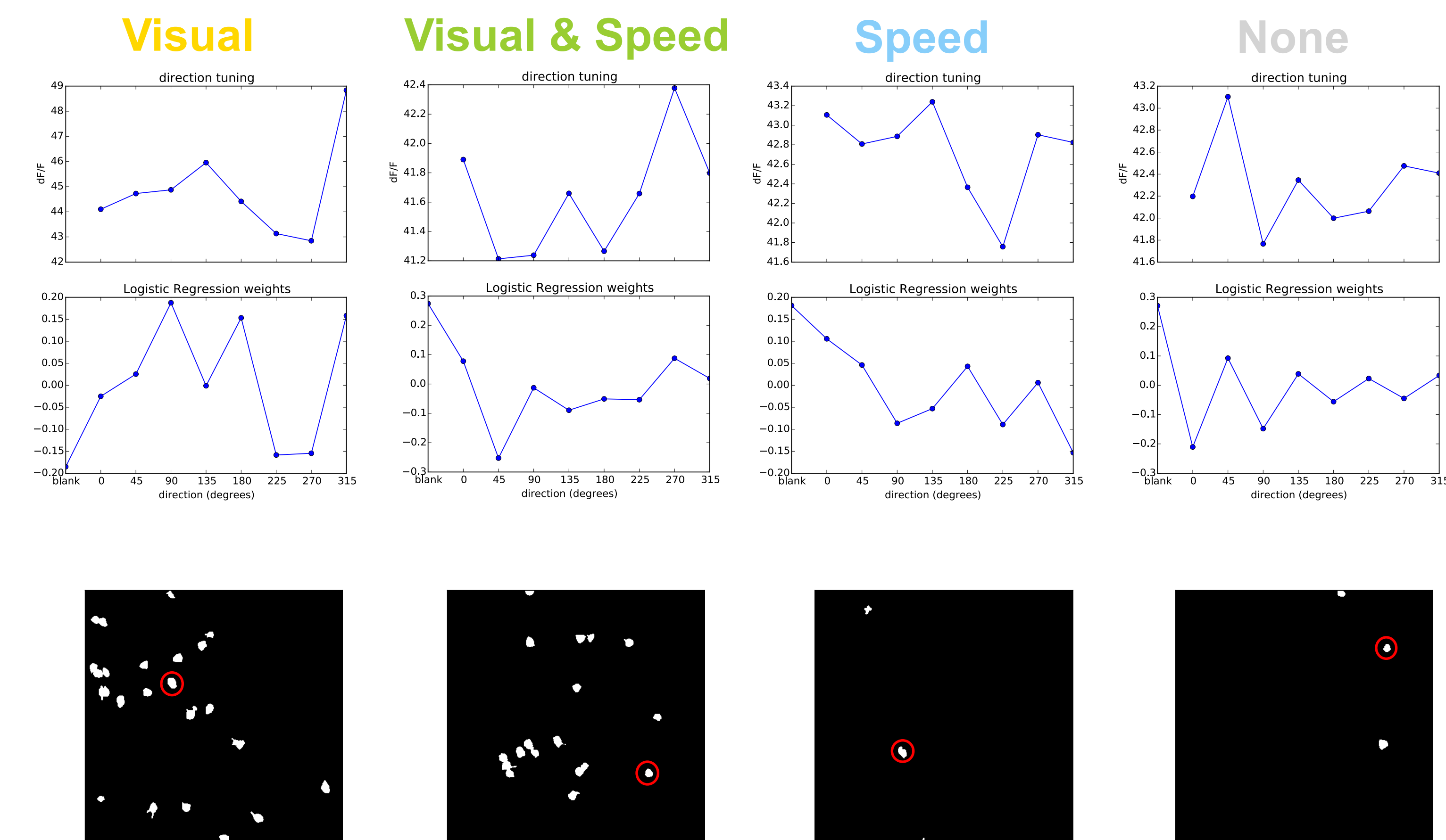
Max weight for decoding (LogReg)



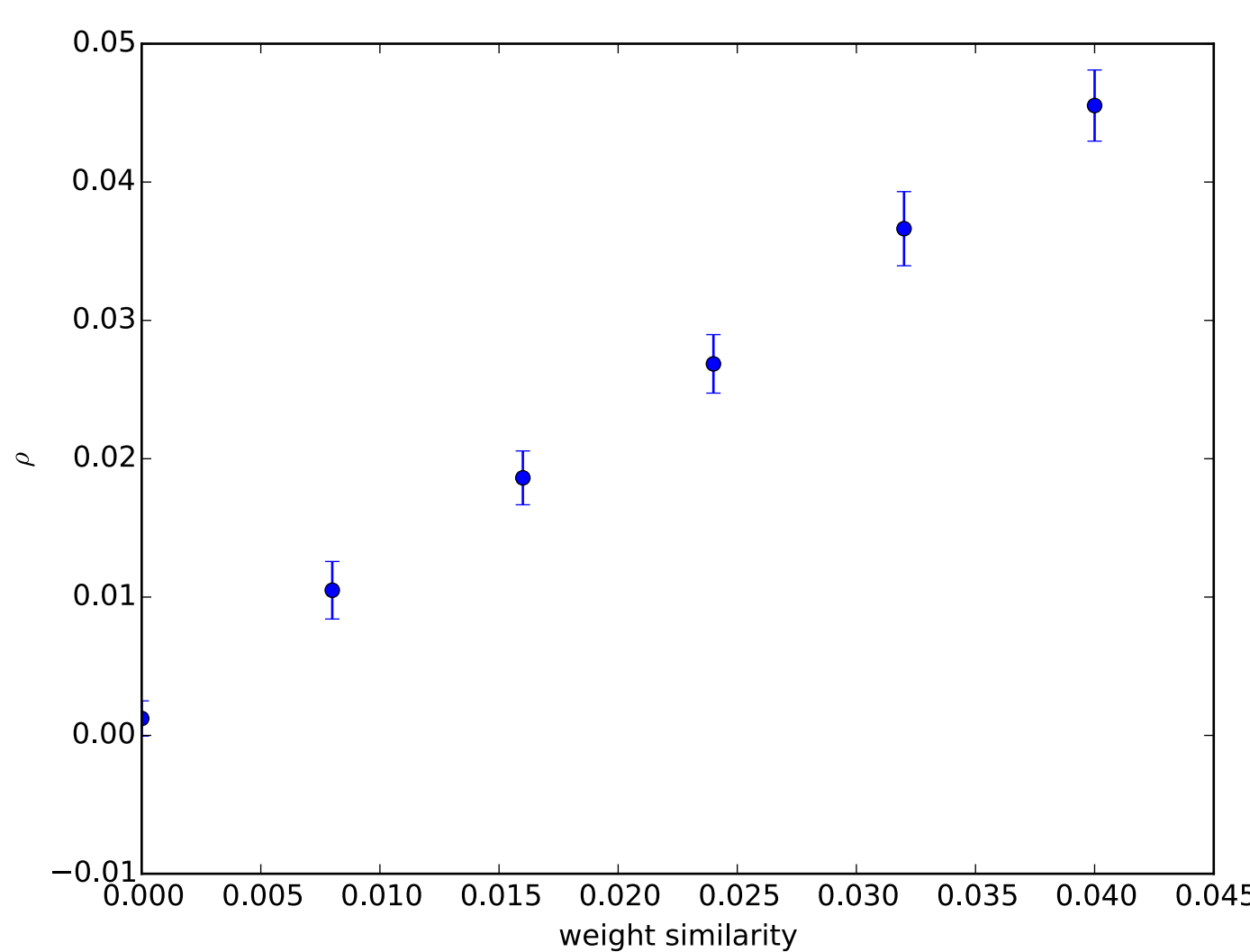
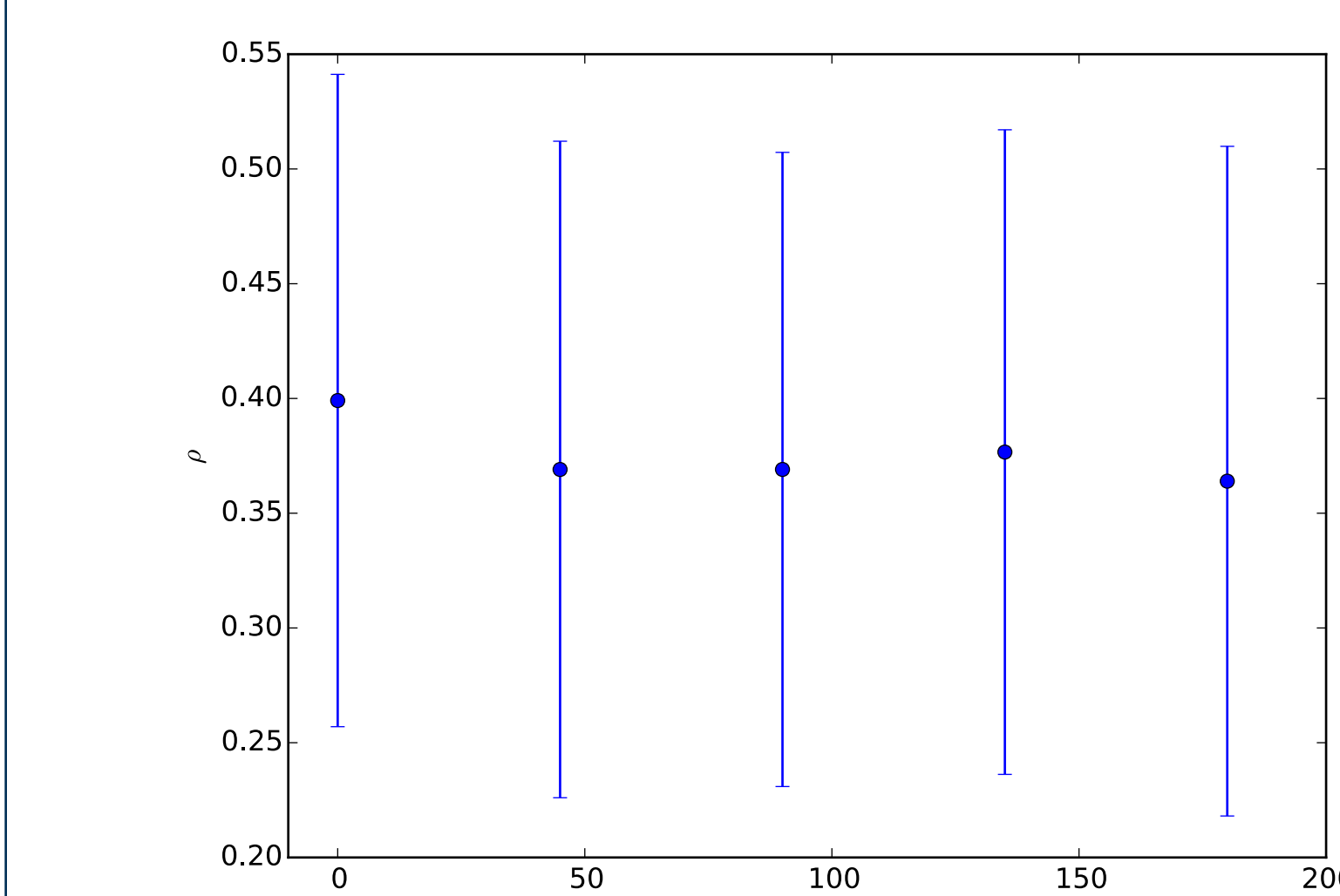
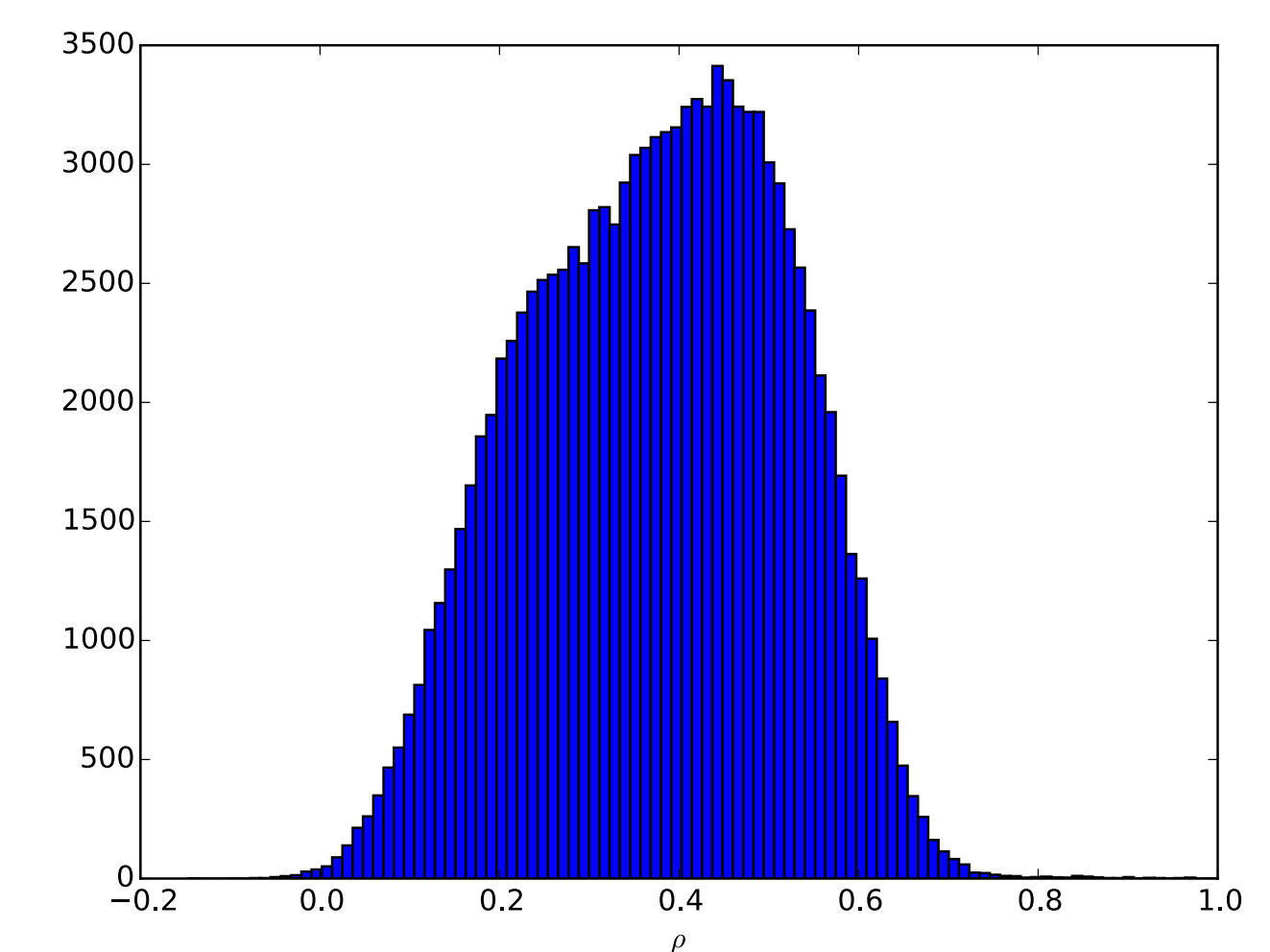
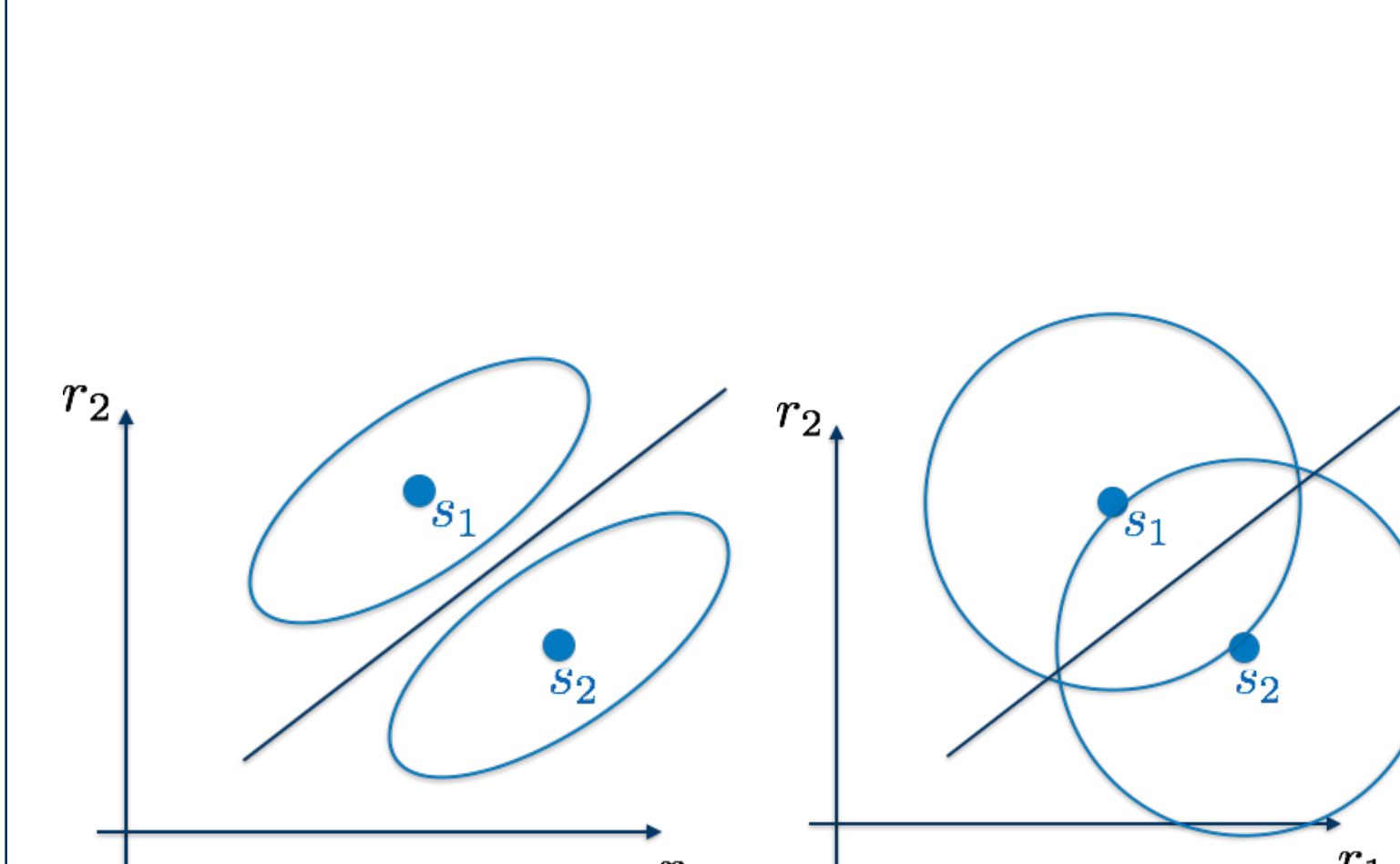
Performance of highest weight cells



Most informative cells for direction



Noise Correlations



Acknowledgments

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