Exercise 08:
Principal Component Analysis

Theoretical Neuroscience II

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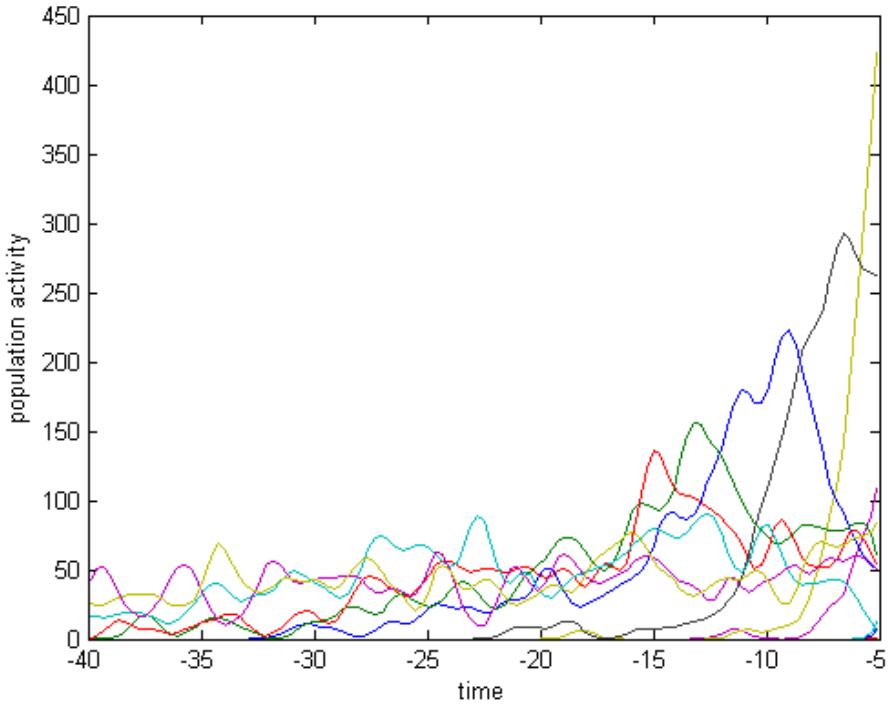

Figure 1: Activity of all populations over time, averaged over all recordings.

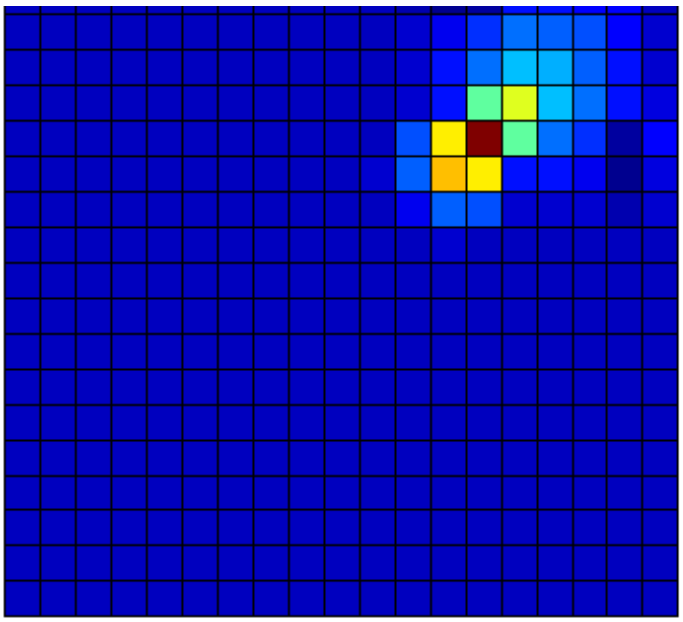

Figure 2: Covariance matrix of neuron populations.

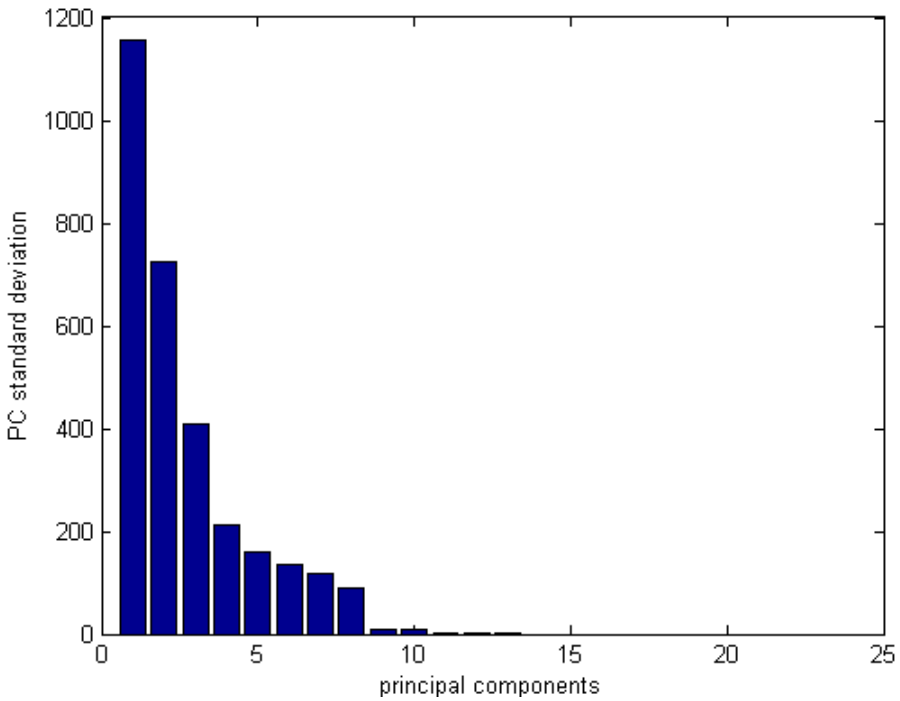

Figure 3: Standard deviation of the principal components. Three principal components have a medium to high standard deviation. Five further components have a low standard deviation and the remaining components have almost zero variance.

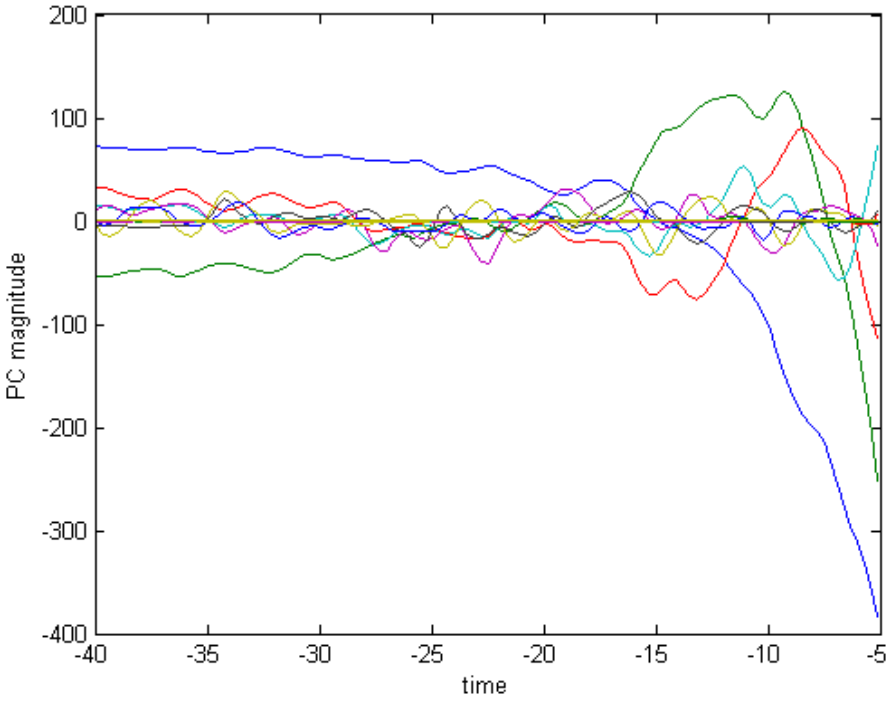

Figure 4: Magnitude of principal components over time.

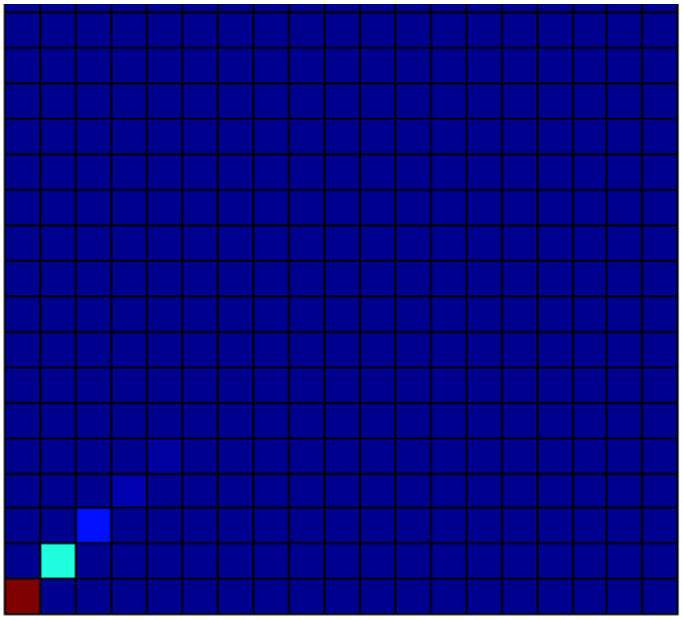

Figure 5: Covariance matrix of the principal components. As expected, only the diagonal elements are non-zero.

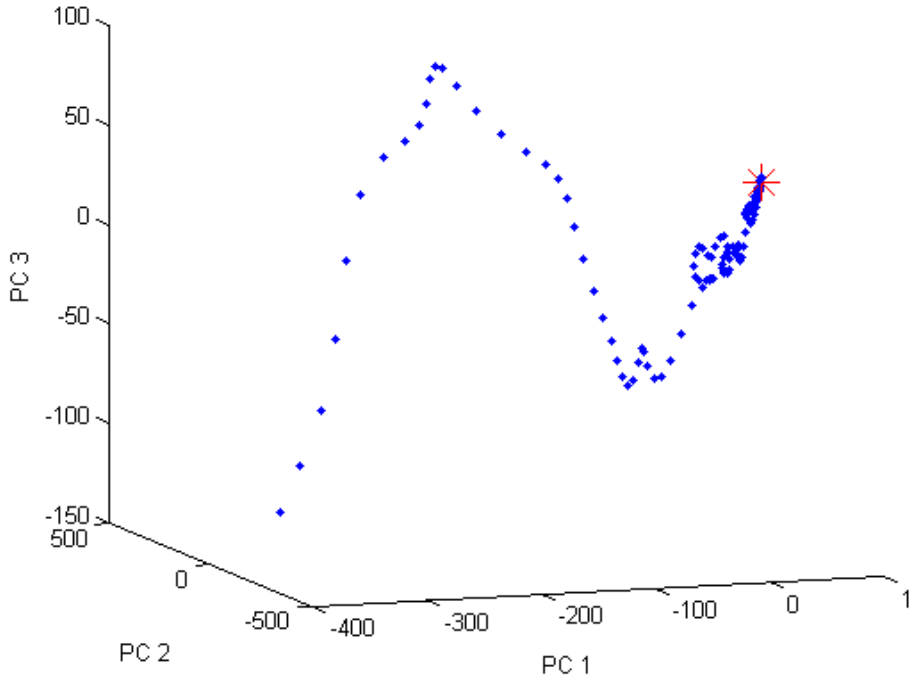

Figure 6: Trajectory through the space of the first three principal components, averaged over all recordings. The red star indicates the start state.

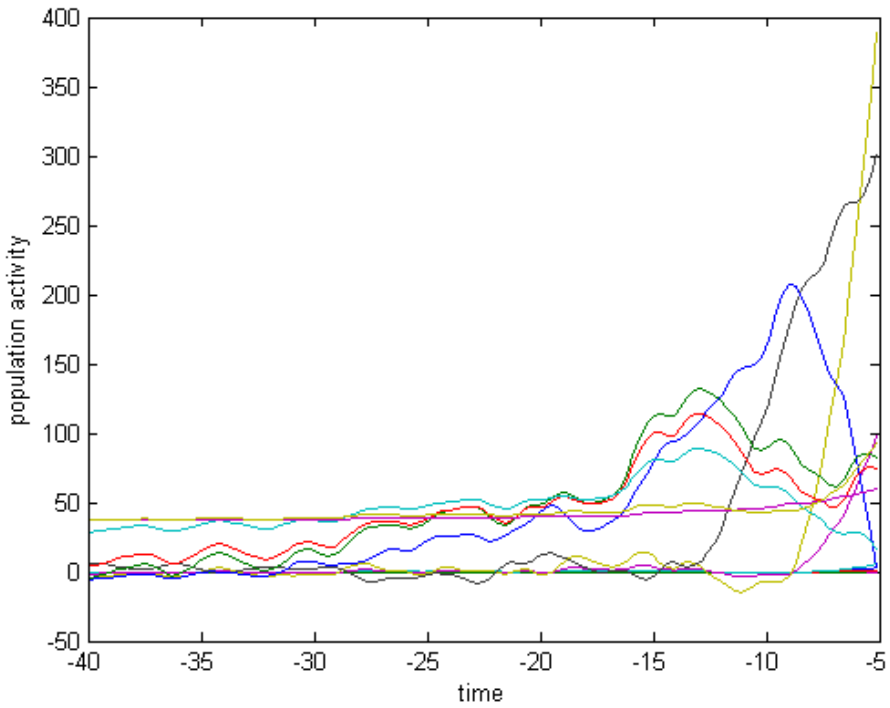

Figure 7: The first three principal components projected back into the original space, averaged over all recordings. We can see that a burst is typically preceded by moderate synchronous activity of three populations, sequentially followed by increasingly higher activity of three further populations.

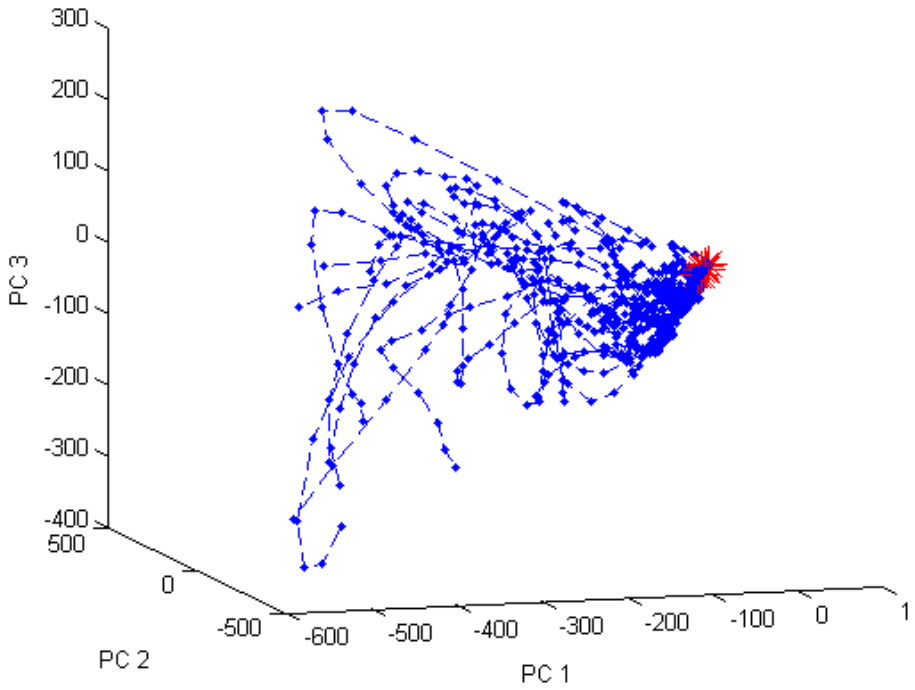

Figure 8: Trajectory through the space of the first three principal components for all recordings. The red stars indicate the start state.