

Inference of coupling network of oscillatory systems using the circle map

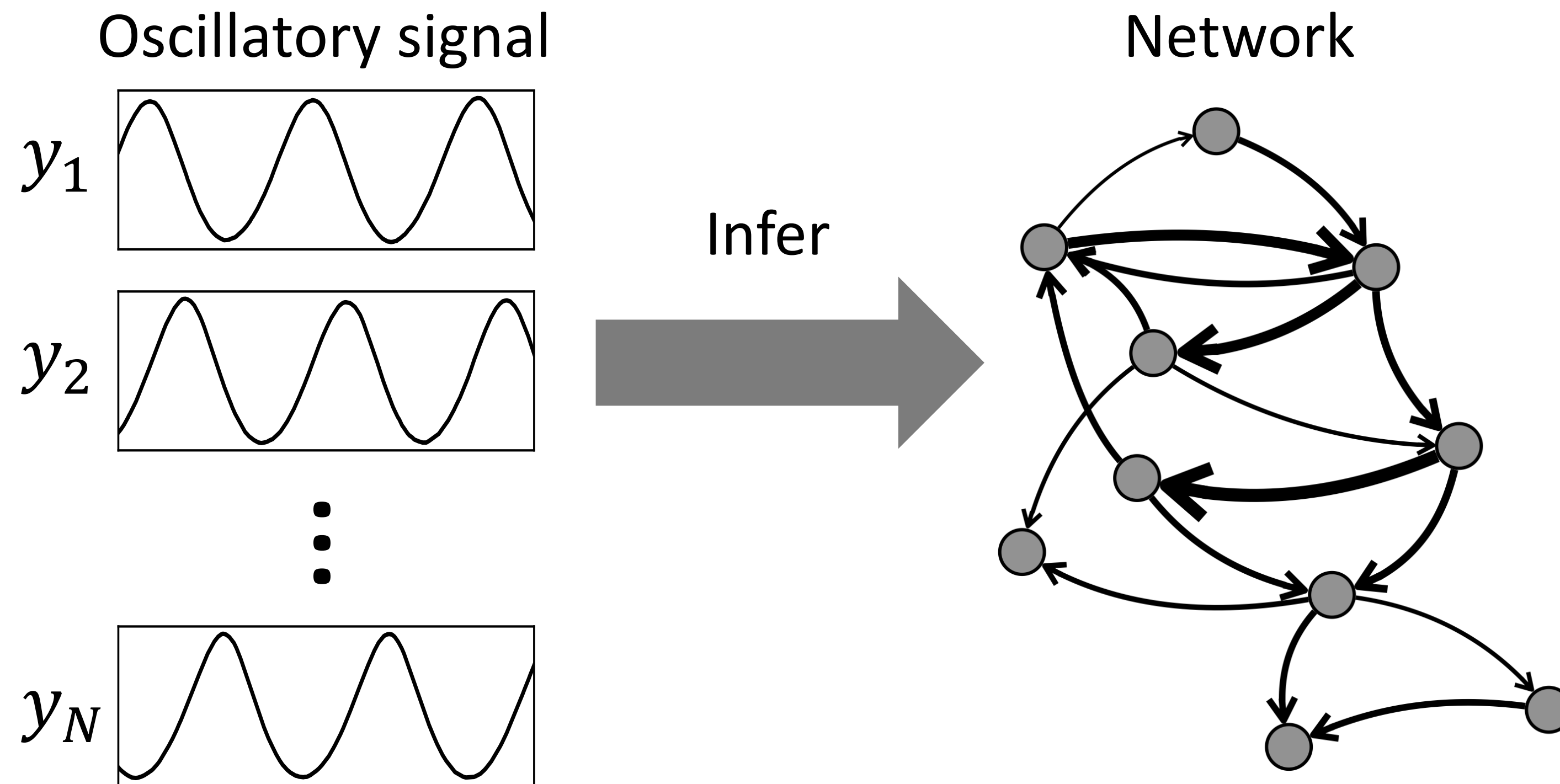
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We propose circle-map-based inference

We fit data to a phase model. Which model to use?

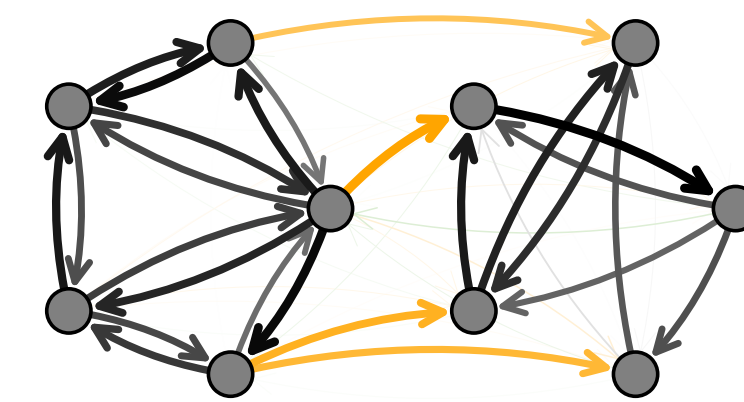
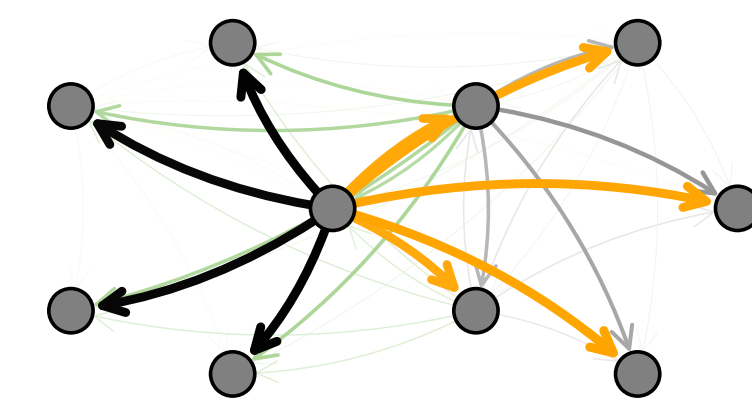
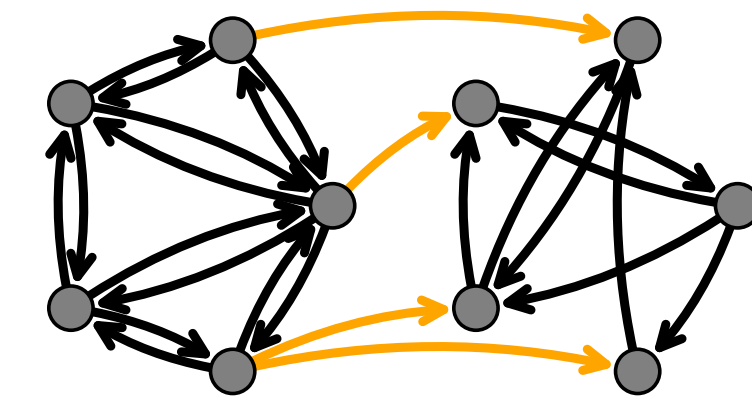
Naive: Kuramoto model

$$\dot{\phi}_i = \omega_i + \sum_{j=1}^N c_{ij} \sin(\phi_j - \phi_i + \alpha) + \xi_i(t)$$

Propose: Circle map

$$\frac{\phi_i(t+T) - \phi_i(t)}{T} = \omega_i + \sum_{j=1}^N c_{ij} \sin(\phi_j - \phi_i + \alpha) + \xi_i(t)$$

Clock cell network



Accurate!