Project 9: Population coding model of working memory

1) Implement the population coding model of working memory described by Bays (2014) and show that it accounts for the pattern of human recall errors shown in Figure 2.

2) How do the predictions change when you alter the width and gain parameters?

3) Schizophrenia is associated with decreased GABAergic transmission. Assuming this results in less divisive normalization (Yoon et al., 2010), what does the model predict will be the effect on working memory performance? Discuss this prediction in relation to experimental data (Starc et al., 2017).

References:

Bays, P.M. (2014). Noise in neural populations accounts for errors in working memory. *Journal of Neuroscience, 34*, 3632–3645.

Yoon, J.H., Maddock, R.J., Rokem, A., Silver, M.A., Minzenberg, M.J., Ragland, J.D., & Carter, C.S. (2010) GABA concentration is reduced in visual cortex in schizophrenia and correlates with orientation-specific surround suppression. *Journal of Neuroscience, 30*, 3777–3781.

Starc, M., Murray, J. D., Santamauro, N., Savic, A., Diehl, C., Cho, Y. T., ... & Anticevic, A. (2017). Schizophrenia is associated with a pattern of spatial working memory deficits consistent with cortical disinhibition. *Schizophrenia Research, 181*, 107-116.