Group 5: Project 4

1) Implement the working memory model of Botvinick & Watanabe (2007), and show that it can reproduce positional accuracy and transposition gradient effects.

2) Botvinick and Watanabe model the broader transposition gradients of children by increasing the tuning width of the rank input units. Can this phenomenon be explained instead by keeping the width fixed while reducing the amount of training?

3) Humans and animals have the ability to represent hierarchically structured sequences (Dehaene et al., 2015). What are the limitations of the Botvinick & Watanabe model with regard to hierarchically structured sequences? How might the model be modified to deal with them?

References:

Botvinick, M., & Watanabe, T. (2007). From numerosity to ordinal rank: a gain-field model of serial order representation in cortical working memory. *Journal of Neuroscience, 27*, 8636–8642.

Dehaene, S., Meyniel, F., Wacongne, C., Wang, L., & Pallier, C. (2015). The neural representation of sequences: from transition probabilities to algebraic patterns and linguistic trees. *Neuron, 88*, 2-19.