# Memory and Entropy

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In [1], Pinotsis and Miller state:

> *It may help to consider the following analogy: Brain anatomy is like the road-and-highway system. It is where traffic could go. Current thoughts, memories etc. are the patterns of traffic at that moment. An exact network of specific neurons is one particular route through the road-and-highway system. But, importantly, the same destination can be reached by taking different routes at different times (i.e., representational drift). What really matters are the general patterns of the traffic, not the exact roads it takes. There are multiple ways to travel from lo- cation A to location B.*

This is apparently similar to the distinction between the physical layer and actual network information flow. Patterns of network information flow are proposed above to encode memories. Ephaptic coupling induces synchronization which can alter patterns of network information flow. In this manner, it may have a role in memory alteration or even formation.

In [2], we proposed that ephaptic synchronization in coupled axon tracts amplifies the higher entropy stimulus, conveying it to more downstream destinations. In the light of the previous paragraph, we may say that memory is nothing but Shannon entropy in random variables that are multiply stored or transported.

## References

1. Pinotsis, D. A., & Miller, E. K. (2022). Beyond dimension reduction: Stable electric fields emerge from and allow representational drift. NeuroImage, 253, 119058.
2. Chawla, A., & Morgera, S. D. (2014). Ephaptic synchronization as a mechanism for selective amplification of stimuli. BMC Neuroscience, 15(Suppl 1), P87.