How cognitive functions converge: the case of the cognitive map.

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A great evolutionary conundrum is how convergent cognitive functions emerge from divergent developmental and evolutionary pathways. One example is the ability to extrapolate a novel orientation vector across untravelled space - i.e., the cognitive map. Despite the independent evolution of the brain in metazoans such as vertebrates and arthropods, the cognitive tools by which they encode spatiotemporal variations in resources across space are remarkably convergent. Patterns of spatial encoding that differ among species and sexes across diverse taxa suggest that they use the same mechanism for cognitive mapping, specifically the use of a parallel map structure (Jacobs & Schenk, 2003), despite the divergence in neural structure from their common ancestor. Here I present a new hypothesis about the developmental and evolutionary pathway that led to this convergent solution and how this could have been derived from homologous gene networks found in their Precambrian common ancestor.

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