

## Response to “EMERGENCE – The connected lives of Ants, Brains, Cities and Software.”, Steven Johnson

By Randy Horton

The connection between ants, brains, cities, and (some) software is that they depend heavily on self-emergent systems for their development.

The reading starts out by examining patterns of behavior in ant colonies in order to determine how such simplified organisms can evolve into very complex lifecycle systems. It delves in to swarm logic and theory, which states that self-emergent systems rely on local information – not global information.

According to the reading, local information comes from “listening to your neighbor”. In the case of embryonic development, this means that developing cells secrete certain acids, sugars and other chemicals that allow a neighboring cell to know that it is supposed to be a blood cell. Another pattern of chemicals lets another cell know that it is supposed to be a bone cell and so on. The same pattern can be applied to an ant colony – one ant's pheromones tells another that there is food north from their location, or that, “home is that way.”

The theory of self-emergent systems growing from local information is demonstrated in computer simulations like SimCity. The author talks about how each zone in SimCity communicates with other zones and based on that communication the city either thrives or declines. It is not a master plan that simply says to all the elements “Lets Thrive”. It is a series of simple messages shared by each zone, which is interpreted into the complex system. This is very similar to the author's example of the ants and “swarm theory”.

Finally the author examines how these messages are conveyed. In a city example, he outlines that there are two major information flows; highways and sidewalks. Highways, in the reading, are seen as information conduits which bring messages (contained within people) from the outer areas of a city into the central areas of the city. Sidewalks in the same fashion – act as conduits for local information. The example shows that there are many levels to emergence and emerging systems.

The author finishes the writing by noting that emergence is seen clearly in an ant model because ants are stupid and do not question the signals they receive. Humans on the other hand question almost everything, therefore the “emergent system model” is more difficult to observe. None-the-less, “cities, like ant colonies, possess a kind of emergent intelligence: an ability to store and retrieve information, to recognize and respond to patterns in human behavior.”