Anatomy of the Noosphere: Segment 1

David Sloan Wilson What we're working towards, especially with The Human Energy Project is the concept of the Noosphere and ultimately the whole earth as some kind of superorganism. Before we can talk about superorganisms, we really should get our idea straight about organisms. That's our master kind of a concept. So let's talk about organisms.

What you just said, you said this whole system can be adaptive without the agents being adaptive. Is that true for an organism? Can you make that statement for an organism? In what sense are the elements that make up an organism, the cells, or the organs, not adaptive in their contribution to the functioning of the whole organism?

Francis Heylighen: Of course in an organism, the way we know it by the logic of organisms, they are a result of many different evolutionary transitions where each time you started with a system that had some degree of adaptivity. So, I'm not going to claim that the multicellular organism is only adaptive at the multicellular level. The cells themselves obviously are also adaptive.

Let's make a caricature or simplification. Let's assume that each cell is purely programmed by its DNA. So it has a DNA program that tells it, "If these molecules enter the cell, then you produce these other molecules to deal with it." In principle, that should be sufficient for the whole of this cell to coordinate. In my view, the critical term here is coordination. Each agent is capable of adaptive action. The agent itself does not need to be adaptive in the sense, they changes its rules. The agent is adaptive in the sense that if something changes in the environment, the agent will perform some action that makes the action that the agent appropriates to the environment.

The problem is if you have lots of agents, that each perform his actions, how do you coordinate them? I distinguished two forms of coordination. The one that I already described, that's the stigmergy one. The stigmergy one is you have this common medium. You drop signals in that medium. Everybody can read them, and whoever wants to react to what you have put in the medium can do so.

The equivalent in the multicellular organism would be hormones. A cell has some kind of a problem. It is programmed in this form of stress to release a certain type of hormone. That hormone goes to the bloodstream. Other cells that are specialized in reading that kind of hormone now will react by maybe releasing some other chemicals or maybe they will change some of the activities. Maybe your heart rate will go up. Or you will start sweating, all because of this one hormone that was deposited in the bloodstream. That's one way of coordinating the activities.

The other way, and that's the most sophisticated way is the one we find in the brain. In the brain, one neuron if it has let's say some kind of a problem, instead of depositing just the neurotransmitter that everybody can read, it will send a signal to particular other neurons that is connected to it. Then you get the network, and in the network, of course you wanted the right signals, go to the right agents.

Then you get this difficult problem that people in your network in theory are trying to solve. How do you get that network to self-organize so that it becomes effective in the sense that all the neurons together collectively are solving these difficult problems that single neurons cannot solve? So we know a number of algorithms that do that of which the most basic one is reinforcing whichever connection works, meaning that it did something that you wanted.

Let's say these are roughly the two prototypes of coordination. Either stigmergy, you just leave a message in a medium that everybody can read, or neural network, you send a particular message to one or more particular agents. If that's the right agents, the connection is reinforced. The next time, they are more likely to get this message.