

Another important theory in complexity is the *theory of emergence*. The theory of emergence is that patterns that occur at small scales—and this is also the notion of a self organizing system—emerge to create, from individual actions, changes at the next level, which is a pattern. We looked at it in terms of the flocks and the birds, and we say that these very simple rules of interaction, they're occurring at a micro event, at the next level of generality or scale, create a pattern, which is this flocking of birds. You can see that pattern. That's an idea of emergence.

Steven Johnson's written an excellent book called *Emergence*, that really looks very closely at this, and argues that this signaling and interaction is there, and then creates a pattern at the next scale, and interactions of the pattern between that scale, create the pattern of the next scale. Understanding how these patterns, like the one that we just saw, the one that's up there right now about this interaction, how that has emerged from much more localized interactions that created patterns which have now become a global phenomena of interconnectedness. How did that get created?

To do that, you have to take on the concept of *scale*, and scale is an important concept in

social innovation. It's a word that is a colloquial word. We use it all the time, and we often mean *more of*. In the corporate sector, we say that we're going to scale up. What we really mean is what we call *scaling out*, which is: let's just do more of the same. If you're going to scale your exercise regime, it means you're going to do three hours a day instead of two hours a day, or you're going to scale your commitment to your studies, you'll just study more. We think of that as scaling up.

When we're using this in complexity thinking, it really has to do with this notion of *emergent and nested systems*. Scale is not used that way, but there's still some variation about its use. We often talk about hierarchical scale, so geographical scale, of thinking about space. We talk about local, regional, national, global, as geographical scales going from small to large, defined by physical space largely, the space that our analysis is focused on.

The other place we use it is around organizational hierarchy, so we talk about local government, regional government, provincial government, federal government, global, international government. In a particular organization, we'll talk about the

shop floor, who report to middle management, who reports to senior management, who reports to CEO, i.e., the classic organizational structure, where we're talking about scale as moving up where there is less at each scale, but it creates this pyramid, and its levels of authority: bottom, middle, and top; and also usually levels of resources. There's some interaction between those scales, as there is in geographic scales.

Lastly, there's a much more abstract notion, but it's important for understanding complex systems, which is really what we call *institutions*. By that, we mean that, at a very micro level, we have our interactions that are occurring right here in this room. Those get embedded in broader systems which have to do with organizational routines and resources. We're sitting in this room as part of this system, and we're interacting in a certain way because that's the designated way in which you do these kinds of things. Then, those in turn, are nested in broader, conceptual structures that we're all part of.

We all belong to, at this point, Canadian culture. We also probably belong to some subcultures, which have different ways of looking at things. They supersede us. They are higher than us. They contain us. We're all

subject to laws which constrain our activity and shape it, but we can also challenge. We're part of an economy which distributes resources. We're part of a political system which distributes another kind of resources, which is power. Those are above us all, and it's above the organizations we're working in, and it's above our individual interactions.

There's a kind of relationship between them, so that when you take the institutional framework, you can see all those big systems embedded right in the way that we interact here. What we do here has implications for that as well.