The Systems Perspective
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Life's never simple, is it? We've all tried to tackle certain problems only to find the solution wasn't as easy as we first hoped. The world is complicated and there is rarely a sole cause of any problem. Systems thinking tackles these complex problems by stepping back and looking at all the factors which contribute to a particular activity and just as importantly, the relationship between these factors.

Draper L. Kauffman, Jr. describes a system as "a collection of parts which interact with each other to function as a whole."[i] By "a whole" he means that a system cannot be split into separate parts and still be useful. Similarly, you can't add one system to another and make a bigger system; you'll simply have two systems. Some examples of systems spring readily to mind are, a computer or a car engine. While these are systems, many are not as clearly defined. For example, the human body is a system; it's made up of many individual parts (internal organs, veins and arteries, skin, etc.) each of which interacts with the others to allow each to function. We could keep looking closer and closer, focusing on the individual molecules, atoms and particles which make up the body, all of which are systems of their own.

There's nothing to say that a system's components and relationships have to be physical objects. Each person is a part of larger systems such as a neighborhood and a workplace, each of which is made up of, not only people and solid objects, but also such things as relationships, morale and community feeling, all of which play a vital role in the behavior of the systems.

As you can see, with all these systems being made up of smaller systems, and being part of larger systems, things get complicated. Obviously, we can't take every factor into account when looking at a system, and we have to choose where to draw the line so we can look at a system of a manageable size. However, with parts of systems being so closely related it's usually impossible to change one thing without it affecting another. This notion leads to one of the major ideas of systems thinking, that of feedback. This describes the way one part of a system can affect itself. The part's behaviour will, by working through the rest of the system, come back to alter itself. Feedback is the screech from a stage as the microphone gets too close to a loudspeaker. The microphone and speaker form a system, with the sound from the speaker feeding back through the microphone to be amplified through the speaker again. While this feedback creates an increasingly louder noise, some feedback leads in the opposite direction: to stability, a major feature of many systems.

A thermostat is an example of one of the simplest systems, featuring feedback and stability. Thermostats are designed to keep the temperature in a room fairly constant. If the temperature drops below a certain point the thermostat switches on the room's heating until the temperature has risen enough, at which point the heating is turned off. Over time the temperature will drop again and the thermostat will start the heating again, creating a reasonably stable environment. The temperature will fluctuate slightly up and down but will remain within reasonable boundaries, creating stability.

It's rare that systems are this easy to identify and conceptualize, perhaps one reason why systems thinking doesn't necessarily come naturally to us. Components of systems are often hidden and only become apparent when someone tries to solve a problem. Solving it without looking at the entire system often only creates other problems that weren't apparent before. For example, if insects are eating a farmer's crops he may decide that he needs to spray the fields with insecticide. However, he might find this will also harm the insects' natural predators and without them he'll end up with a worse problem than before. A systems solution to the problem might be to increase the number of predators, although of course, the increased predator population might cause other problems...

Apart from parts of systems being hidden, another difficulty with identifying a system is that there is often a delay built in. A delay means that the effect an action is having won't be immediately obvious. For example, there might be a shortage of office space in a city, so a number of companies will set to work planning and constructing new buildings in the hope of filling the demand. However, there is a lengthy delay between deciding to construct an office building and it being ready for occupation. During this time the economy might slow, reducing demand, or competitors' buildings may be completed first. Either way, the delay between the need for more space and the completion of the attempt to fulfill the need has created a glut on the market, leaving empty offices.

This example also demonstrates the main benefit of systems thinking. We have a tendency to focus purely on events and how to react to them. In this example the speculators look at the event (lack of office space) and react to it by constructing new buildings. With delays in the system this reaction to current events will leave us one step behind. Systems thinking allows us to look at the big picture to envision what might happen in the future. If the contractors looked at the system as a whole they could look ahead and realize that perhaps now isn't the best time to build. In fact, maybe they should start planning construction when there's little demand for more space, so that land is cheaper, and by the time their new building is finished demand might once again be high.

There are numerous other characteristics of systems, and many common forms that crop up again and again, but we have looked at the basic ideas behind systems thinking. A number of components interact with each other to form a complete system and when the state of one component changes it will have an effect on the others. Often components and relationships are not immediately obvious and delays in the system can make it difficult to identify how one part affects another. The benefits of identifying the behavior of a system are that we can look further ahead and not concentrate solely on immediate cause and effect relationships.

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[i] Draper L. Kauffman, Jr., *Systems 1*, p1, Future Systems, Inc., 1980.