4.2   Welcome to the systems zoo

There are a number of archetypes that we can use to help us quickly understand what is going on in a complex situation. They improve our operational thinking by helping us get at the interactions and causal loops lying at the heart of causality. Each archetype is unique and each has its own story to tell.

The first story is about the limits to growth or success. Have you ever noticed that whenever you learn a new sport or a new skill, your progress is generally rapid at first but then slows? Growth is first pushed by a reinforcing feedback loop until you approach your own physical or intellectual limits at which time a balancing feedback loop comes into play and loop dominance shifts. This s-shaped curve is well known in innovation diffusion. When a new product is launched, sales often grow quickly at first pushed by marketing and selling actions before they are limited by the size of the market or the reactions of competitors. We saw this happen to clowns and Netflix in chapter two, and yes, this even happens to Apple.

When we react to competition or some other aggressive behavior, we often find ourselves in a situation of escalation. We cut prices, competitors do the same and before you know it a price war has started. We can describe an escalatory situation using two balancing feedback loops. Each loop is regulated by the activity of the other. When one party feels they are losing ground, they react to restore the status quo or gain the upper-hand. This action of course changes the balance in the situation and provokes a counter-action.

Sometimes we may be limiting our own growth. Did you know that half of all businesses fail before their fifth birthday? The main reason is not lack of customers or a poor product, but "growing pains": a lack of organizational capacity such as personnel, procedures and processes. When the limits to growth are due to limits of your own, expandable capacity then the "growth and underinvestment" archetype is most probably at work. Growth is slowed by the inefficiency of operations, with available capacity regulating and limiting current performance levels.

Sometimes growth can also lead to the exhaustion of a common, collective resource. Whenever a resource is free to use or consume then rational, individual behavior may not be in the collective interest. We saw this with our fishery in chapter three. This has been called the "tragedy of the commons" after an article by Garrett Hardin that appeared in the journal *Science* in 1968. Using the example of a pasture upon which all herdsmen can freely graze their cattle, Hardin argued that:

> "Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest"

Such tragedies exist wherever there is a common resource such as the air we breathe, fisheries, forests and the climate but also anything else we freely share and consume such as roads and highways, the ambiance in a bar or a restaurant, computer server resources, and even views and parking spaces.

The structure is a little elaborate, made up of two loops per individual: a reinforcing loop that reflects the personal gain from consuming the resource and a balancing loop reflecting how individual gains diminish as total resource use increases and the resource becomes exhausted.

The fifth story in our systems zoo is that of "success to the successful". When two people or entities are competing for a limited resource there is always the risk that the more successful one consumes more of the resource at the other's expense. We can use this structure to think through the growing gap between the rich and the poor or an unassailable lead taken in a political campaign. How do you win in the Monopoly board game? Buy up as much property as you can and cover the board with houses and hotels! In this structure, there are two reinforcing loops, with the reinforcing growth of one loop pushing the reinforcing decline of the other.

It's true that there are often many issues involved in a complex situation, but archetypes help us identify the key interactions and feedback loops. We place an archetype in the middle of our page and then build up around it. Archetypes help our operational thinking.

The sixth story in our systems zoo tells of a fix that has unintended consequences. It is a simple structure made up of one balancing loop and one reinforcing loop. This happened during the bailout of Greece's economy in May 2010. The International Monetary Fund, the European Commission and the European Central Bank agreed to lend Greece money but only on the condition that it apply a number of cost-cutting or "austerity" measures. Cutting back on public spending and raising taxes improved the deficit in the short term through a balancing loop, but it also had an impact on the economy. When you reduce people's wages or increase living expenses, consumer spending falls as do business revenues, and government tax receipts. The end result was a worsening of the deficit in the long run through a reinforcing mechanism.

Sometimes we chose a fix that treats the symptom, and not the true cause of the problem. The structure at work here is called "shifting the burden". For example, workers who drink or self-medicate relaxant drugs as a "coping strategy" to forget about work place tension and pressures are addressing the symptom and not the problem. This may work at first but regular drinking or drug abuse may affect on-the-job performance and job pressures may then increase even more. In this structure there are two balancing processes that both attempt to treat the symptom. The upper loop is the easy, symptomatic solution that provides immediate relief. The lower loop represents a more fundamental but delayed solution to the problem. Sometimes the symptomatic remedy may even stymie efforts to find a fundamental solution. We often find this structure in companies that rely too heavily on external advisors.

I'm sure you have met most of these archetypes at some point. You should practice looking through the news for examples of archetypical systemic behavior. Once we unveil the structure, we can then look for leverage points to take action.