

Drawing systems – a primer

A system is an entity that maintains its existence through the mutual interaction of its parts.

The basic idea of system thinking is that every action triggers a reaction. In system dynamics this reaction is called feedback. There are two types of feedback - reinforcing feedback and balancing feedback. Sometimes a feedback (or a reaction) does not occur immediately - the process contains delays. Any system can be drawn as a diagram set up with circles of causality – including actions, feedbacks and delays.

Causal loop diagrams consist of arrows connecting variables (things that change over time) in a way that shows how one variable affects another.

- **'S'** on some of the arrows means that **when the first variable changes, the second one changes in the same direction** (for example, as your anxiety at work goes up, the number of mistakes you make goes up, too).
- **'O'** means that the first variables causes a change in the **opposite direction** in the second variable (for example, the more relaxation exercises you do, the less stressed you feel).



In causal loop diagrams, the arrows come together to form loops, and each loop is labelled:

- **'R' or '+' means reinforcing;** this speeds up whatever is already happening – ever-quicker growth or collapse. (For instance, the more anxious you are at work, the more mistakes you make, and as you make more mistakes, you get even more anxious, and so on, in a vicious, upward spiral).
- **'B' or '-' means balancing;** this means the causal influences in the loop keep things closer to an equilibrium or a desired state. (For example, if you feel more stressed, you do more relaxation exercises, which brings your stress level down.)

Causal loop diagrams can contain many different "R" and "B" loops, all connected together with arrows.

Delays in systems cause people to perceive a response to an action incorrectly. This causes an under- or overestimation of the needed action and results in oscillation, instability or even breakdown. Delays are marked on the causal influences by a couple of lines.

Systems archetypes are a way of recognising certain fundamental ways in which systems can behave. The diagram below helps to identify archetypes. Simply begin at 'trying to' and work outward as the descriptions are appropriate to the situation you are considering. (From <http://www.systems-thinking.org/theWay/theWay.htm>)

