2.5 Stability, resistance and balancing feedback

While reinforcing feedback drives growth and change, balancing or negative feedback seeks stability and imposes limits. Whenever you pursue a goal or look to correct or adjust something to a desired state you are engaging in balancing feedback. Imagine you throw a big party and the next day you have a whole lot of mess to clean up. Guess what? That's balancing feedback. You don't want to live in a mess, so when you clean up you are bringing the state of your house back to a desired state.

In positive feedback, an increase in a variable eventually leads to a further increase in that same variable. In negative feedback, an increase in a variable such as the amount of mess eventually leads to a decrease in that same variable. You clean up your mess to keep it at an acceptable level.

Balancing feedback operates whenever there is a goal-oriented behavior. The goal may be explicit or implicit. If the systems goal is one you like, you will be happy but if it is not, you will find your efforts to change are frustrated until you can either change the goal or weaken its influence.

A balancing loop always has four elements: a corrective action, a performance variable, a target or goal and a gap between your target and your actual performance. The difference between the performance variable and your goal stimulates corrective action until the gap disappears.

The current level of cleanliness of your house is the performance variable, the desired state of cleanliness is the objective and any cleaning activity that you do is a corrective action that brings the current situation towards the target state.

There are many examples of balancing feedback in the world around us. When you ride a bicycle, you use it all the time. A sway to the left and you adjust to the right. A sway to the right and you adjust to the left. This is how we keep our balance on a bicycle. This cycle of continual adjustment is balancing feedback.

Whenever you learn something you are also in a balancing feedback loop. Exams and continual assessment help us compare our current understanding to a learning goal and then read or revise to reduce the gap.

Balancing feedback is also everywhere in business. All goals, budgets, targets and objectives have a balancing feedback structure. You set a target, and so long as current performance is below it you undertake corrective actions. Strikes and conflicts also have the same structure. People generally strike to oppose some change in working conditions or to protest, resist or influence some change that has or will push the current situation away from a desired state.

Our body also constantly engages in a wide variety of balancing feedback, such as when it regulates the sugar levels in our blood or our body temperature. When blood sugar levels are high, your body releases a hormone called insulin that helps glucose bind with muscle and fat tissue cells. So long as the gap between actual and desired blood sugar levels is positive, the body continues to release insulin. This balancing feedback loop keeps turning until actual blood sugar levels return to desired levels, closing the gap between the two to zero. Biologists call these regulatory processes "homeostasis".

We can find balancing feedback designed into many machines. A thermostat is a very common example: the heat produced by a furnace or the cold air produced by an air-conditioning unit depends on the difference between the thermostat setting and the actual temperature.

Balancing feedback often combines with reinforcing feedback to create more complex behaviors in the real world.

Let's see how this happened with the creepy clown attacks. Given the rise in public concern, French authorities took action. The police made arrests, the courts handed down tough sentences and some towns even banned the rental of clown costumes. We can group these actions together, call them "repressive and preventive actions" and add them to our diagram. The variable most directly affected by these actions would be the number of attacks. The most direct cause would be the level of public concern. We now have two loops. Can you see how this second loop uses some variables in the first loop to complete itself?

To make our model clearer, let's name the loops. The first is a reinforcing loop of "media driven growth in attacks". The second is a balancing loop that represents the "reaction of authorities". We can tell the second loop is a balancing loop by going around the loop and counting the number of negative polarities. If there is an odd number, it's a balancing loop otherwise it's a reinforcing loop. The balancing loop has the effect of a brake on the reinforcing loop. We can see this happening in week 45 when clown attacks begin to drop as loop dominance shifts from the growth driving reinforcing loop to the goal seeking balancing loop.

These two types of feedback are central in all complex behaviors in the world around us.