# Seeing and drawing reinforcing feedback

Feedback is a main cause of complex behavior. Past behavior feeds back to influence future behavior. All variables in a feedback loop are both causes and effects and work in both directions. In reality, a feedback loop is simply a succession of causal relationships. When multiple feedback loops are present in a systemic structure, it becomes difficult to predict how the situation will evolve.

One consequence of feedback is reinforced or amplified growth or decline. Whenever a growing or
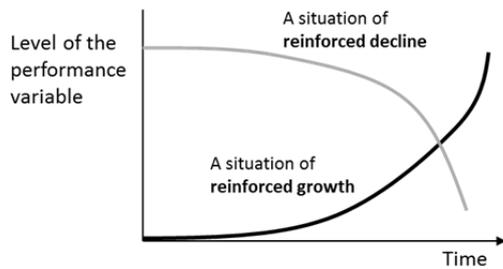
decaying action is influenced by a variable whose level was determined by previous growing actions, reinforcing feedback is at work. Such a structure is called **reinforcing, amplified** or **positive** feedback. Whenever you are faced with a situation of accelerated growth or decline, reinforcing feedback is at work.

The structure of a reinforcing loop is quite simple. It has two main elements: a growing action and a performance variable. The **performance variable** is something that you measure or observe to be growing or declining. The **growing action** is something that you or someone else does to generate growth or decline.
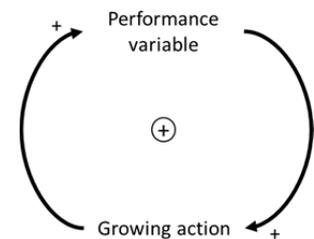
There are **two steps to drawing a reinforcing loop**.

Step 1: Identify the performance variable. What is the variable that is growing or declining?

Step 2: Identify the growing action. What is the main cause or driver of growth or decline?
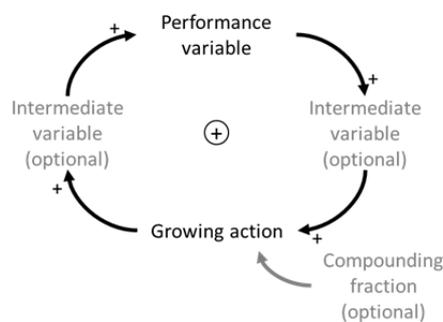

We can add intermediary variables between the performance variable and the growing action to improve the clarity of the systemic story.

When the growing action increases by a fixed fraction of the performance variable, we include this fraction in our model as a new variable called a **compounding fraction**. The bigger the compounding fraction is, the quicker the growth.

Illustration: I found an article entitled "Italy set to double child benefit to combat low birth rate" on www.bbc.com. The article reports that in 2015 the birth rate in Italy fell to its lowest level since 1861. Italy's current birth rate is 8 per 1,000 people compared with 12 for the UK.

The birth rate is important as the number of births per year (growing action) increases the size of the population (performance variable). These two variables form the reinforcing loop that is driving Italy's population growth. We do not need to add any intermediate variables to the loop as the systemic story is clear. We can add a compounding fraction, the birth rate to show that the growing action increases by this fraction of the performance variable: when the population increases by 1000, the number of births increases by 8.
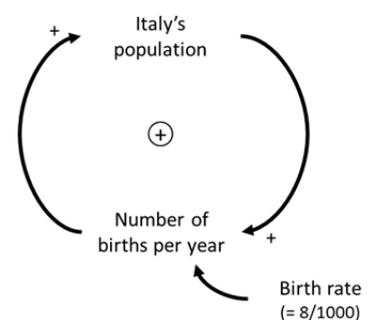
References

"Italy set to double child benefit to combat low birth rate", The BBC, 15 May 2016, http://www.bbc.com/news/world-europe-36297177