

Connection to Characteristics of Complex Systems Project

Lesson Title: *The Systems Thinking Playbook*, Exercise 23: Paperfold

Overview:

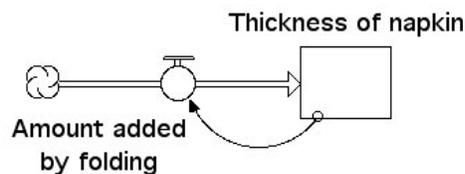
Folding a paper in half multiple times illustrates the concepts of exponential growth and limits to growth. The nature of the system (in this case a rule of doubling) impacts the trend over time (in this case exponential growth). A compounding structure is a building block within more complex systems.

Related Characteristic(s) of Complex Systems:

The cause of the problem is within the system.

Ideas and Examples for Connecting to the Characteristic:

Using a simple stock/flow diagram can help students see beyond individual events to the underlying interdependent structure, in this case, a compounding system that creates exponential growth.



Story of the diagram: As the napkin is folded, the thickness increases. As the thickness increases, it causes even more to be added on the next fold. In reality, a napkin can only be folded so many times, but theoretically, it could continue to double infinitely.

The simulation link below allows students to see what happens if the napkin were actually able to be folded 33 times as described in the activity.

As part of a debrief conversation, examine how the structure of the “napkin” system generates specific behaviors over time, while connecting to other systems studied.

- Why does the doubling occur?
- What is the underlying mathematical equation? How can an equation represent the structure of the system?
- What other systems experience exponential growth?
- How does the structure of those systems limit growth over time?

Resources:

The Systems Thinking Playbook by Linda Booth Sweeney.

A compounding simulation, created by the Waters Foundation, is available at:

<http://forio.com/simulate/simulation/a.lavigne/compounding/>