

# Elementary School Social Studies Applications Of System Dynamics and Systems Thinking

Presented by Scott Suter  
Waters Grant Project - Catalina Foothills School District

## **Getting started**

- Introducing students to the concept of mental models using experiential activities.
- Introducing students to the Ladder of Inference and Iceberg Model.

## **Connections to Current Events**

- Introducing Behavior Over Time Graphs (BOTGs) using current events.

## **Slavery/Civil War**

- Applications of the Ladder of Inference in relation to slavery and the economy.
- Using BOTGs to analyze the growing tension between the North and South.
- Using the Balancing Tubes activity to analyze people involved in the Civil War, and how well they were able to see the “big picture.”

## **Industrial Revolution**

- Hands on activities to stimulate students to look beyond the obvious.
- Hands on activities used to have students compare and contrast the mental models of competition vs. collaboration.

## **WWI & WWII**

- Using the Escalation Archetype to analyze an arms race.
- Connecting to other conflicts, including those that may occur on the playground.
- Using the Shifting the Burden Archetype to analyze Hitler’s rise to power.
- Using activities for students to experience the value of teamwork and alliances.

## **Prosperity and Depression**

- Using the Tragedy of the Commons Archetype to understand the stock market crash.
- Using the STELLA Stock Market Simulation.
- Using the Limits to Success Archetype to analyze inventory problems related to the 1920’s.

## **Q&A**

# Using the Limits to Success Archetype to analyze overproduction during the 1920's.

**Grade Level:** 5

**CFSD Curriculum:** Social Studies- Prosperity and Depression unit

**Lesson Objectives:** Students will see that faster production ability does not necessarily mean sales will increase.

**Activities at a Glance:** Students will use the Limits to Success archetype to see that increased labor and production capacities may lower the demand for a product, which in turn may lead to excess inventory. After a time delay this will result in layoffs and firings, which will decrease production, and so on.

**Time Allotment:** 45 minutes

**Integration Area(s):** Social studies, economics

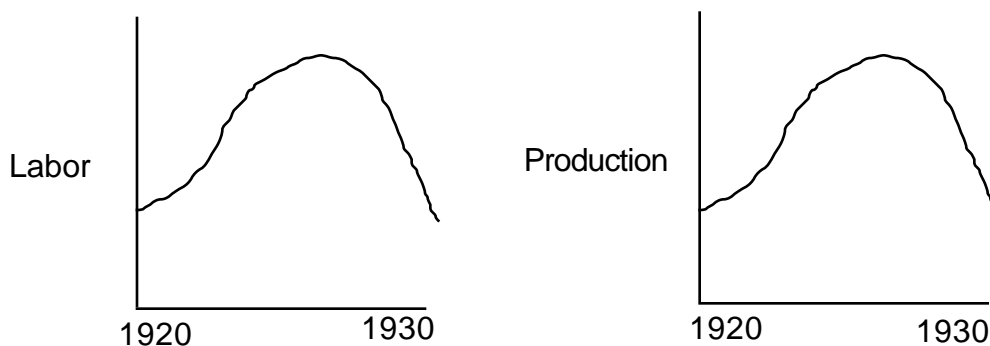
**Materials Needed For Lesson:**

**Materials:** Attached CLD

**Preparation:** Be familiar with the Limits to Success archetype. Students should have learned about the prosperity of the 1920's and the tendency of companies to over-produce.

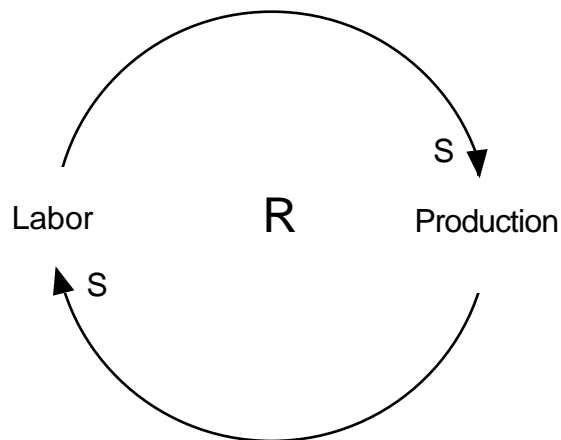
**Background Information:** This CLD is based on a basic supply-demand situation. It shows that when production exceeds demand, supplies increase unless production is reduced to meet demand. Many companies failed to reduce production during the 1920's, which helped to bring on the depression.

**Activity(ies):** Have students discuss how production and labor were changing over time during the 1920's. They should come up with BOTGs similar to these:

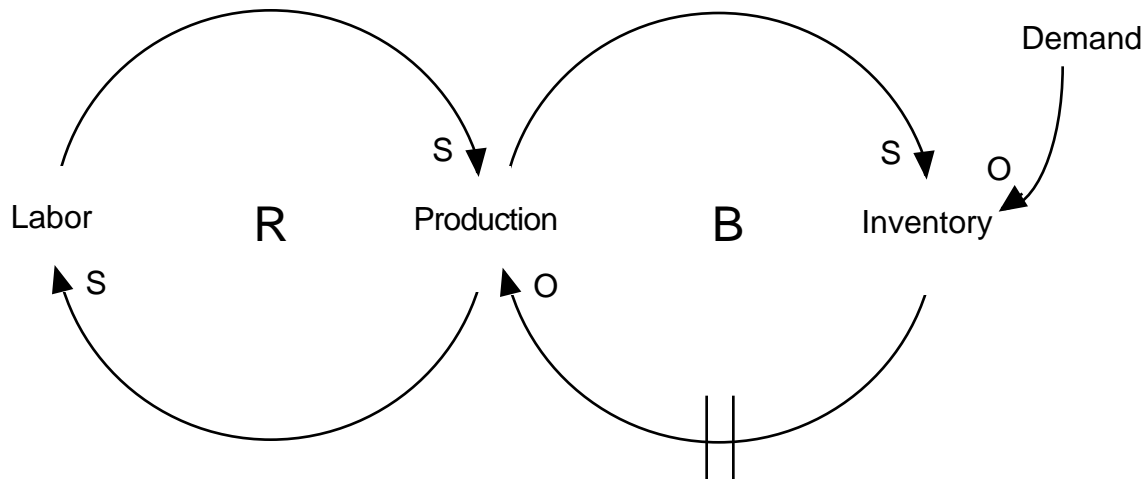


Based on this information you can construct the following loop:

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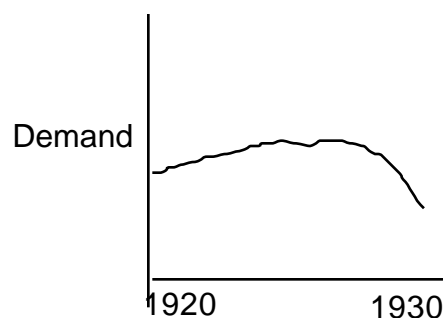
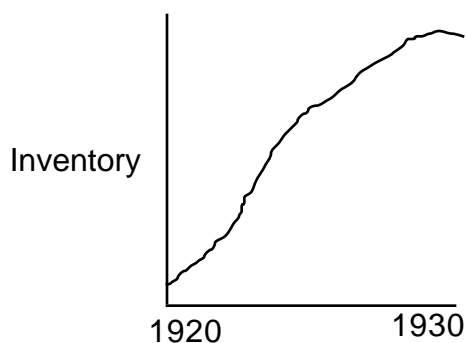


Now have the students discuss inventory, and how it is affected by demand. You can now add a second loop to the CLD.



Now that students can see the two systems working together they can discuss how failure to react to the entire system caused many problems during the 1920's.

**Debrief/Closure:** Discuss further the Limits to Success archetype. Follow the loops around for both high and low production. Then consider the behavior over time of demand and inventory during the 1920's. (The BOTGs below are one interpretation of that behavior.) Relate these back to labor and production. Talk about why this was one cause of the Great Depression.



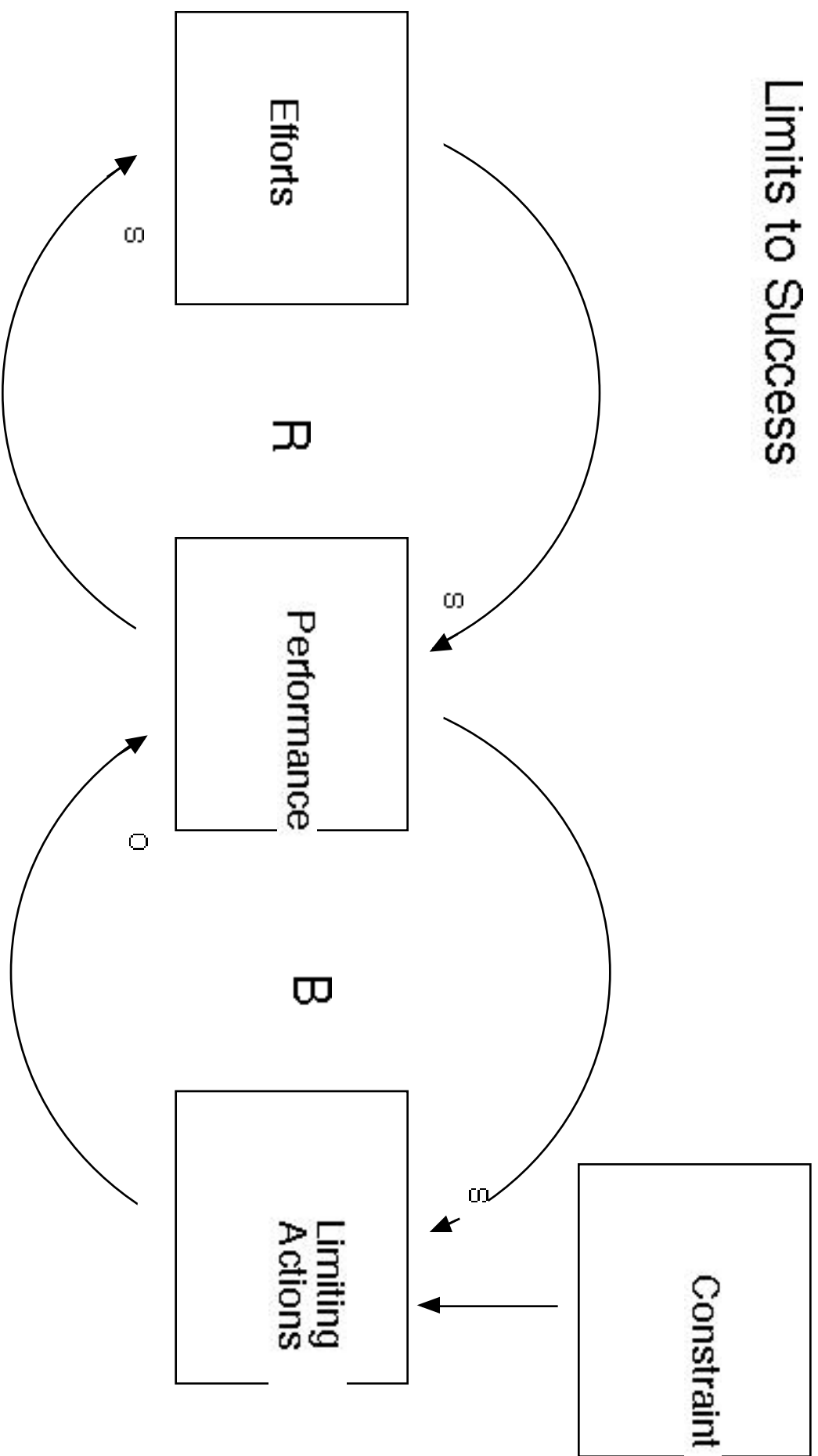
**Assessment:** Have students create BOTGs that compare supply, demand, and labor for a given product (something that fluctuates that students would be familiar with).

**Sources:** Limits to Success archetype (see attached); The Fifth Discipline Fieldbook, By Peter Senge, et al.

**Extension(s):** This can lead to discussions on how modern companies achieve success in a highly competitive market.

**Additional Resources For Follow-up Activities/Lessons:**

# Limits to Success



# Using the Tragedy of the Commons Archetype to analyze the 1920'S.

**Grade Level:** 5

**CFSD Curriculum:** Social Studies-Prosperity and Depression unit

**Lesson Objectives:** Students will see how the personal goal of individual prosperity, can be devastating to the economy as a whole.

**Activities at a Glance:** Students will use the Tragedy of the Commons archetype to look at one way of interpreting the economy of the 1920's and its eventual collapse.

**Time Allotment:** 30 minutes.

**Integration Area(s):** Social studies

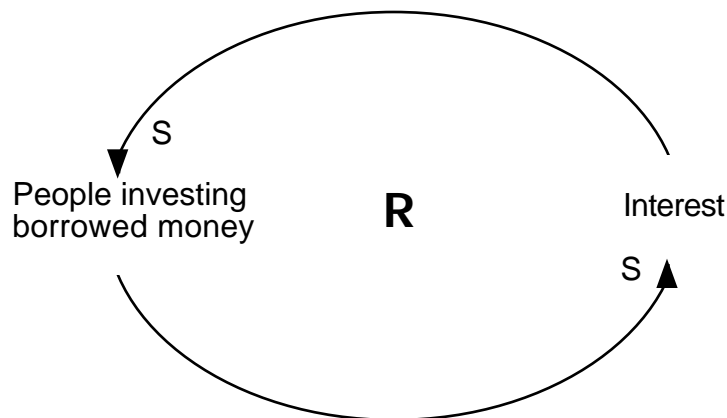
**Materials Needed For Lesson:**

**Materials:** Attached CLD

**Preparation:** Be familiar with the Tragedy of the Commons archetype. Make sure students are aware of the economic situation during the 1920's.

**Background Information:** This CLD is based on the premise that aggressive investing of borrowed money by individuals and banks, without consideration of the long-term effects on the economy, would eventually lead to a collapse of the Stock Market, and thus the economy.

**Activity(ies):** Have students discuss the benefits of investing, focusing on increasing capital from interest. Discuss the following CLD:

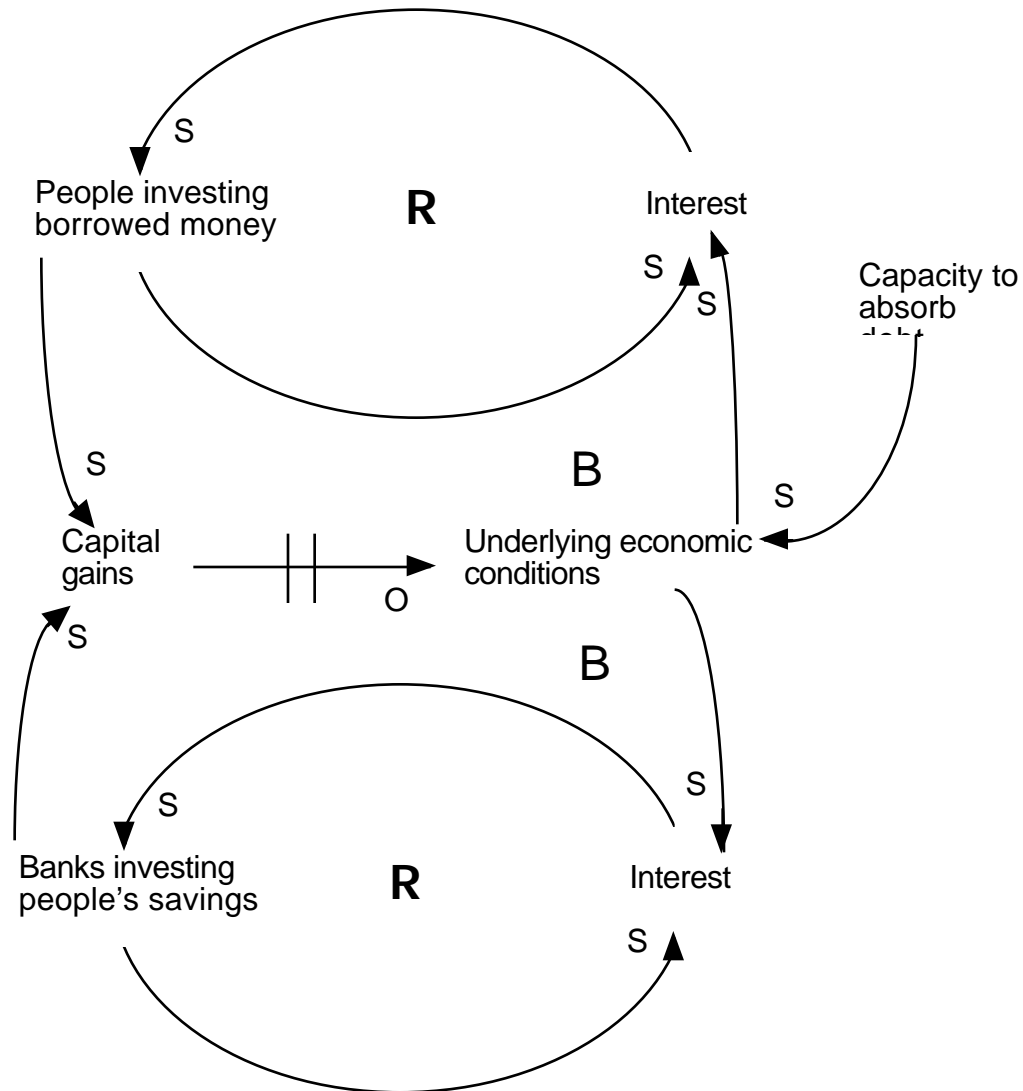


One could argue that interest does not lead back to investing more borrowed money. But since most people were reinvesting the interest, and the interest is being earned from borrowed money, then you are reinvesting borrowed money.

Next, create the same CLD, but substitute 'Banks investing people's savings' on the left side where it says 'People investing borrowed money'. Discuss this cycle with students pointing out that the banks were trying to get a piece of the action as well.

This should lead into a discussion about how the economy as a whole would be affected by this type of investing. Also, talk about the danger of personal gains at the expense of a system that cannot sustain the gains over long period of time.

At this point you can introduce the loops that connect the two preceding loops.



**Debrief/Closure:** After discussing the implications of this “Tragedy of the Commons” with students, see if they can identify other circumstances that fit this archetype. The example of traffic in Los Angeles is a common parallel. Many people trying to reach a goal individually, which in turn makes the groups collective goal very difficult to achieve and very time consuming.

**Assessment:** Have students create BOTGs to analyze change over time during the 1920's. They can also look for connections between the graphs to identify cause and effect.

**Sources:** Tragedy of the Commons archetype (see attached); The Fifth Discipline Fieldbook, By Peter Senge, et al.

**Extension(s):** Based on the above information, have students develop a personal financial plan as if they were living during the 1920's.

**Additional Resources For Follow-up Activities/Lessons:**



# Using the Escalation Archetype to analyze the WWI or WWII Arms Race

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# Using the Escalation Archetype to analyze the WWI or WWII Arms Race.

**Grade Level:** 5

**CFSD Curriculum:** WWI or WWII Social Studies units

**Lesson Objectives:** Students will see that the threat of an enemy's military strength can lead to an escalation in weapons for both sides.

**Activities at a Glance:** Students use the Escalation archetype to understand how an arms race develops in virtually every war.

**Time Allotment:** 60 minutes

**Integration Area(s):** Social Studies, Literature

**Materials Needed For Lesson:**

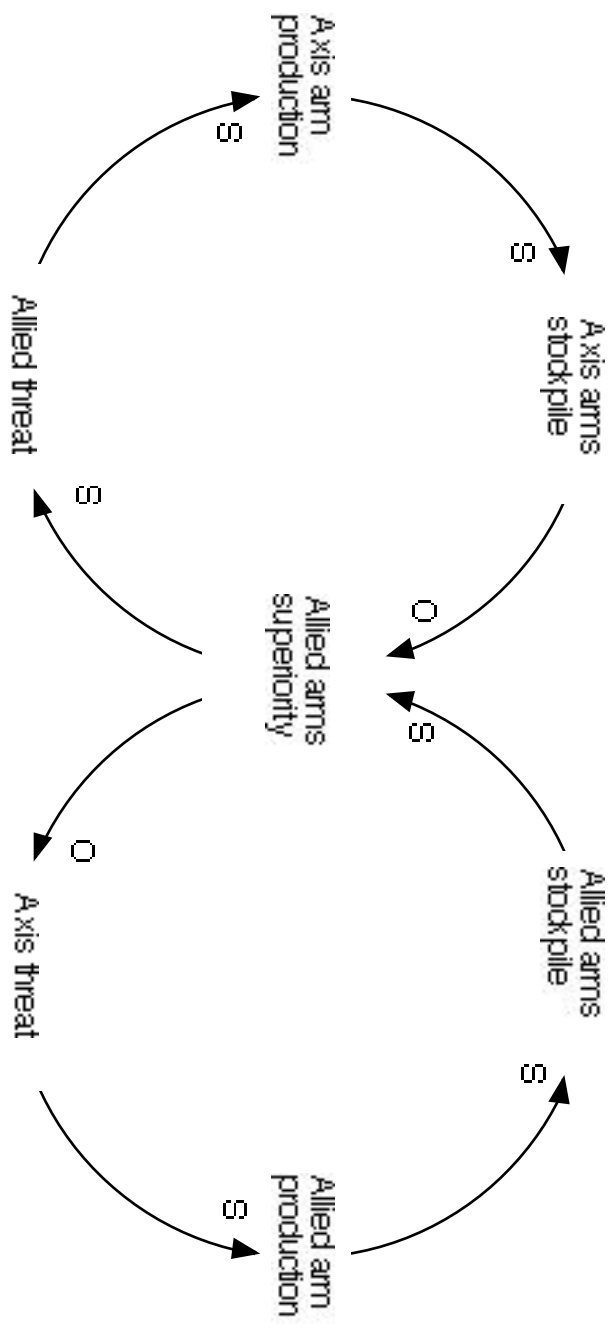
**Materials:** Attached CLD  
The Butter Battle Book, by Dr. Seuss, 1984, Random House Inc.

**Preparation:** Be familiar with the Escalation archetype. It may also help to be aware of the types of weapons that were developed during these wars and how they were used to oppose the strategies of the enemy. The Butter Battle Book can be used show students how an arms race can escalate out of control.

**Background Information:** This CLD is based on a simple arms race/escalation archetype. It can be modified to fit any arms race situation including the one described in The Butter Battle Book.

**Activity(ies):** Discuss with the students how production rate and effectiveness of weapons are critical to the success of the military. (You may want to introduce The Butter Battle Book at this time.) Talk them through the following CLD:

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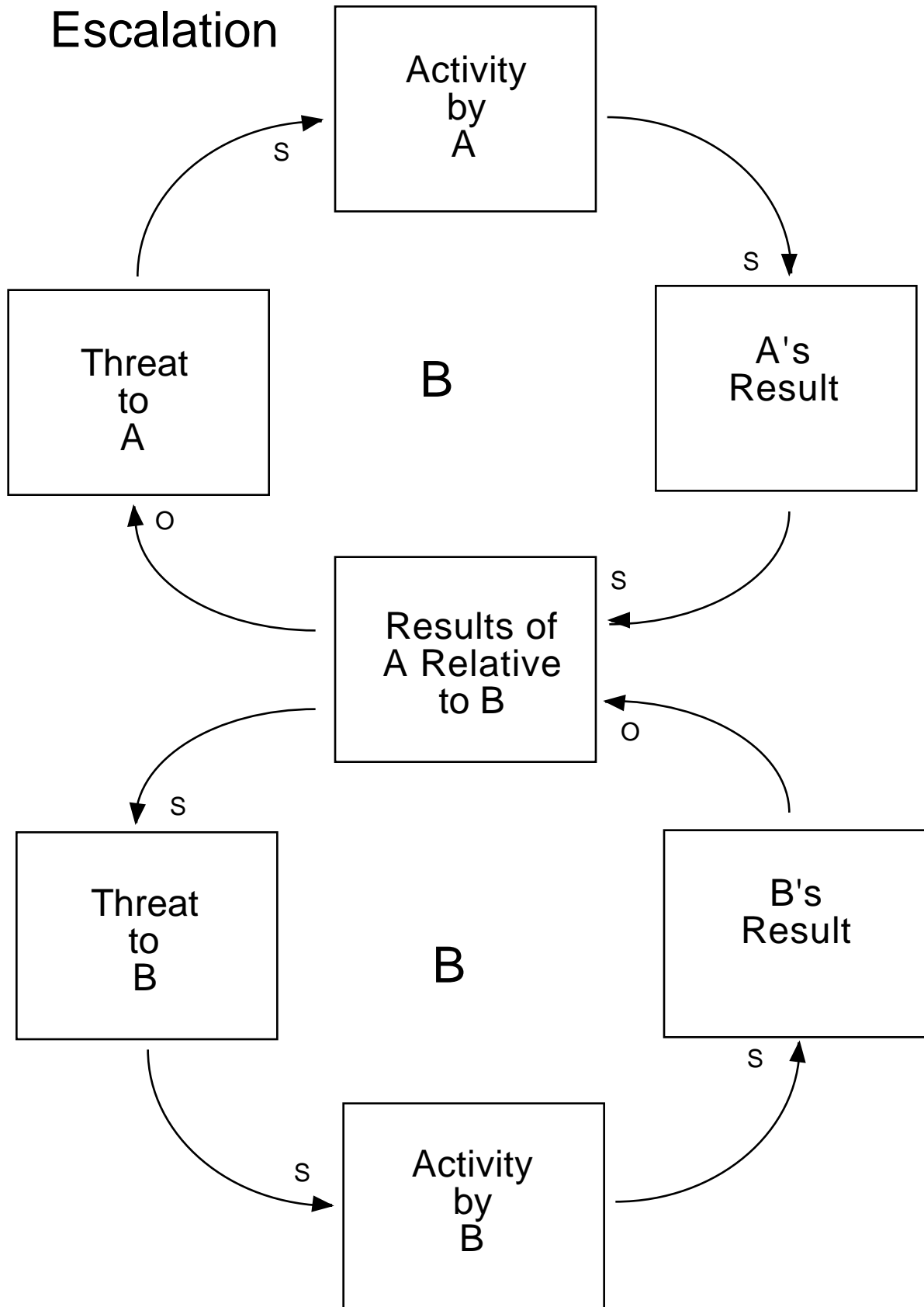
**Debrief/Closure:** Have students discuss why they think this archetype describes the arms race that occurs in virtually every war. Have them look at one side of the war and have them describe what might happen if that side decided not to escalate its amount of military power.

**Assessment:** Have students write a comparison and contrast paper describing the similarities and differences between the arms races in WWI and WWII. Students can also use the escalation archetype to describe the events of The Butter Battle Book.

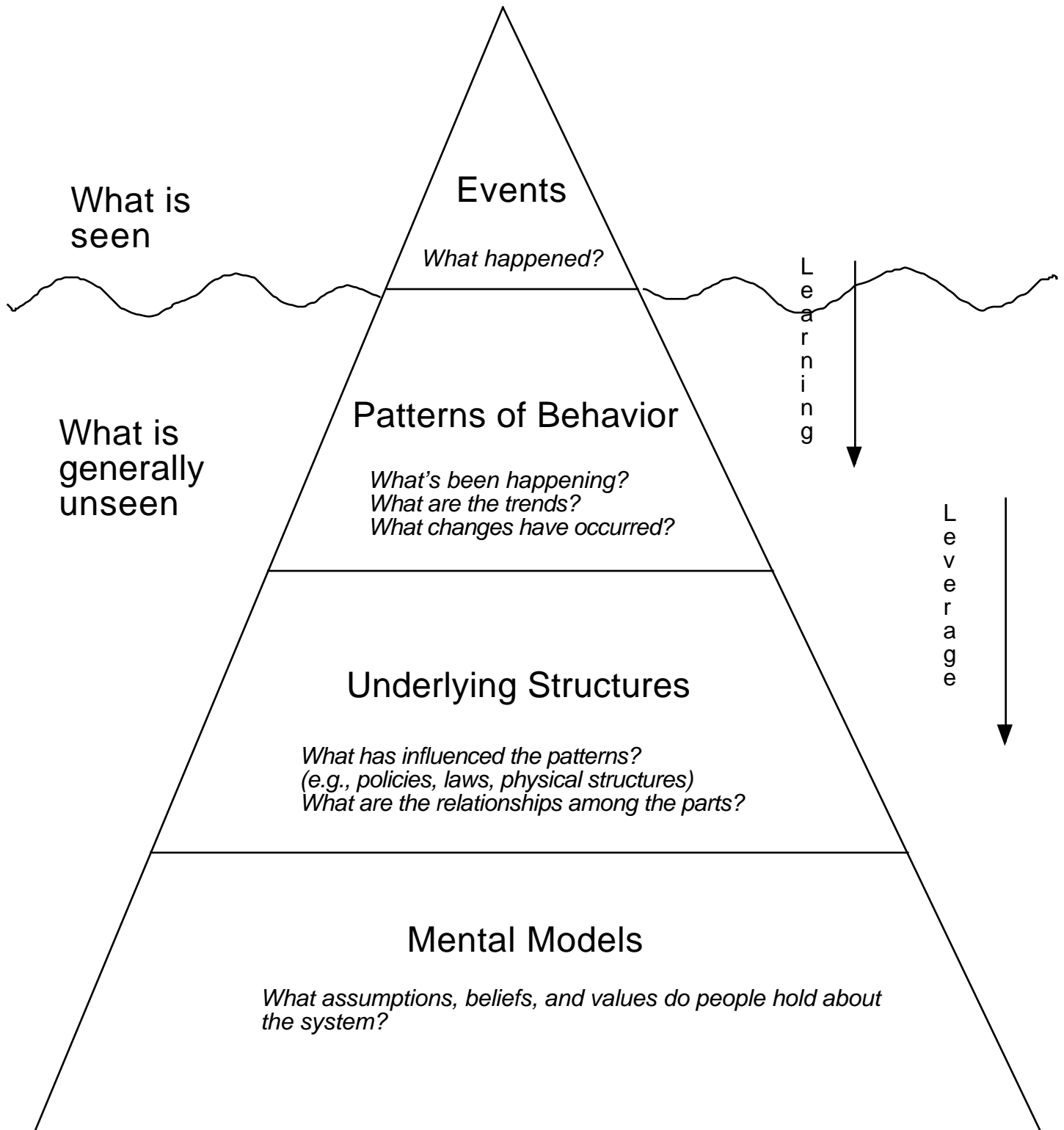
**Sources:** Escalation archetype (see attached); The Fifth Discipline Fieldbook, By Peter Senge, et al.

**Extension(s):** Have students create an escalation CLD to describe a different conflict to see if they can transfer the learning. A sibling rivalry could be an example.

**Additional Resources For Follow-up Activities/Lessons:**



# Iceberg...Seeing What's Below the Surface



# Ladder of Inference

Adapted from  
*The Fifth Discipline Fieldbook*

