

# Systems Are Dynamic

*(Variations of this activity have been used for many years, in a variety of educational settings, to provide a direct experience of the dynamic nature of systems.)*

## OVERVIEW

Students experience the dynamic, interconnected, and self-organizing nature of systems through an exercise in which they move around an open space trying to keep an equal distance between themselves and 2 other people.

## INQUIRY/CRITICAL THINKING QUESTIONS

- What is the inherent nature of a system?
- How can understanding the nature of systems help us find solutions to large, complex problems?

## OBJECTIVES

Students will:

- Experience and discuss the dynamic, interconnected, and self-organizing nature of systems
- Consider how understanding the nature of systems can help us find sustainable solutions

**TIME REQUIRED:** 30 minutes

## KEY ISSUES/CONCEPTS

- Systems dynamics
- Interconnectedness
- Self-organizing systems

## SUBJECT AREAS

- Social Studies (Geography, Economics, Global Studies)
- Science (Life, Environmental, Physical)

## NATIONAL STANDARDS CONSISTENCY

- NCSS: 3, 7, 8, 9
- NSES: A, C, E, F

## GRADE LEVEL: 5–12



## FTF Related Reading

- Intermediate: Chapter 1 from *Global Issues and Sustainable Solutions*
- Advanced: Unit 1 from *It's All Connected*

## Materials/Preparation

- No materials needed, but you will need a large open space to conduct the activity
- This activity works best if students have a very basic understanding of systems. *Facing the Future* related readings (above) provide more than enough background to conduct this activity.

## Activity

### Introduction

1. Ask students to define a “system”. What are some of the defining features of a system? (e.g. a system has many parts that work together; if you change 1 part it affects other parts; if you remove or add something it can change the whole system; a system is made of interconnected parts; a system can be something in nature, or it can be mechanical or human). Ask for examples of systems that they encounter, use, or are a part of.
2. Explain to the students that they are

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going to do an exercise to help them understand the dynamic nature of systems.

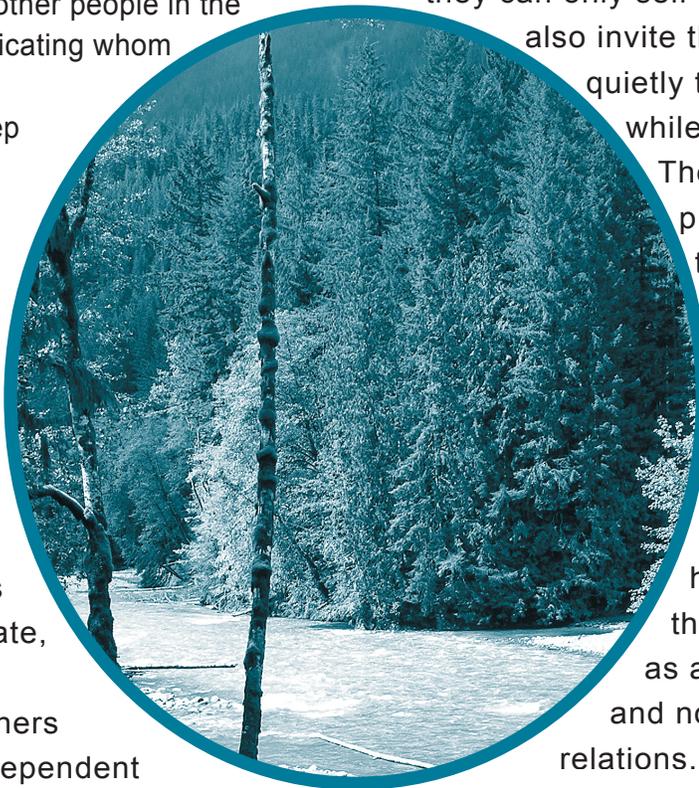
## Steps

1. Have the students stand randomly in a large open space either indoors or outside.
2. Give the following 2 instructions:
  - Mentally select 2 other people in the group, without indicating whom you have chosen.
  - Move so as to keep an equal distance between you and each of these 2 people at all times. This does not mean simply remaining at the midpoint between them.
3. To pursue this objective, students will begin to circulate, each movement triggering many others in an active, interdependent fashion. Movement may speed up for a while, then may abate, accelerate, and again slow down toward equilibrium, but it rarely reaches stasis.
4. Let the movement continue for 3 or 4 minutes, then, as activity lessens, have students pause where they are and begin the reflection questions.

**Lesson Variation:** Have 2 students stay outside the room during instructions, then call them in at a certain point during the activity and ask them to try

to detect what is happening. When the process halts and they learn (or have discovered) the principle guiding people's movements, ask the observers if they could organize this complex process from the outside. This highlights the principle that relations within systems are so complex that they can only self-regulate. You can also invite the observers to walk quietly through the game while it is in progress.

The observers and the players will notice that this pass-through does not affect or disrupt the game, since the players are moving solely in relation to each other. This models how humans can pass through a system (such as a forest or a swamp) and not disrupt its defining relations.



## Assessment Reflection Questions

### For Intermediate and Advanced Students

- Have the students describe what happened. Begin by asking, "What did you experience?" Their reflection may bring out some key features of self-regulating systems, such as the interdependence of all parts and the continuous process of seeking and maintaining balance. Students may realize that they thought the point of the game was to achieve stasis, whereas in fact the game demonstrated that self-regulating systems

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require constant internal activity.

- Where was your attention focused when you were doing this activity? Were you focused on the big picture or the small details? Were you focused on your own actions or the actions of others? Why is this perception important?
- What other systems can you think of that are interconnected, dynamic, and self regulating? (e.g. the human body, an automobile, a natural habitat, etc.)
- Why and how is it helpful to understand these aspects of a system? How can this understanding of systems help us to figure out solutions to large and complicated global issues?
- How far-reaching are the effects of one small, intentional change within a system? What might the implications of this be for making positive changes to a system?

## For Advanced Students

- What kinds of feedback helped us to fulfill the function of the activity (staying equidistant from 2 others)? Could we have done it with our eyes closed? The ensuing discussion can address how not only visual perceptions, but feedback of all kinds, guide us in our daily lives in the systems we co-create at home, work, and school.
- Would anyone volunteer to organize this process? It is obvious that no party or person on the outside could direct the movements necessary to keep this system in balance.

## Writing Connection

Have students create a “cluster” graphic organizer following these guidelines: Choose a global issue and write that in the center of the paper. Write as many connecting issues as you can think of around the issue. Write as many other issues you can think of that affect or are affected by these issues and connect them with lines. Write a short summary explaining the cluster.

## Action Projects

- Have students identify a local system (e.g. your school or classroom, watershed, park, or forest) and the changes that could be introduced to that system to make a positive difference.
- Visit [www.facingthefuture.org](http://www.facingthefuture.org), click on **Take Action**, then **Fast Facts and Quick Actions** for information and action opportunities on a variety of local and global issues.

## Additional Resources

### Films

- *MindWalk*, Bernt Capra (based on the book *The Turning Point* by Fritjof Capra), 1990, 112 minutes. A U.S. politician, a poet, and a scientist discuss their philosophies of life while walking through an island off the coast of France.  
<http://www.fritjofcapra.net/mindwalk.html>

### Books

- *The Web of Life: A New Scientific Understanding of Living Systems*, Fritjof Capra, Anchor, 1997. Capra sets forth a new scientific language to describe the interrelationships and interdependence of psychological, biological, physical, social, and cultural phenomena.

### Websites

- [www.pegasus.com](http://www.pegasus.com) - Pegasus Communications' website provides systems thinking resources to help individuals, teams, and organizations understand and address the challenges and complexities of a changing world.
- [www.sustainabilityinstitute.org](http://www.sustainabilityinstitute.org) - The Sustainability Institute focuses on understanding the root causes of unsustainable behavior in complex systems and, through projects and training, helps people shift their mindsets and restructure systems in ways that move us toward a sustainable society.