



A General Model of Simple and Complex Systems

By David Alderoty © 2015

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Chapter 6) Static Systems, Forces, and Imperceptibly Small Movements

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THE FOCUS AND PURPOSE OF THE SYSTEM PERSPECTIVE PRESENTED IN THIS E-BOOK

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*To prevent confusion, I am placing the following statement at the beginning of each chapter in this e-book. **Keep the ideas presented in the following three paragraphs, in mind as you read this e-book.***

The main utility of a systems theory, especially the **General Model of Simple and Complex Systems**, is to assist in the study of systems, especially in terms of problem solving, goal attainment, and observational and experimental research. From a system perspective, all the relevant factors of a system are considered to obtain an objective. This can include the behavior and overall functionality of the system, its environment, its components, its structure, and related dynamics, cause-and-effect sequences, inputs, outputs, forces, energy, rates, time, and expenditures.

Examples of a system are atoms, molecules, chemicals, machines, electronic circuits, computers, planets, stars, galaxies, bridges, tunnels, skyscrapers, forests, rivers, streams, oceans, tornadoes, hurricanes, microorganisms, plants, animals, human beings, social groups, small businesses, organizations, political parties, cultures, and the human mind of an individual, including related behaviors and personality traits.

A systems perspective is also useful for writing projects. This involves writing about all the relevant factors of a system, in terms of a thesis, or topic.

The purpose of this e-book is to discuss and explain the many details associated with the systems perspective described above. This required twelve chapters, which are relatively short.

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Static Systems, and Related Concepts

General Model of Simple and Complex Systems

What Are Static Systems?

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Static systems **do not** have any moving components, and they do not consume or produce energy. Static systems do not produce or initiate cause-and-effect sequences. Examples of static systems are buildings, bridges, walkways, land, mountains, and boulders.

Forces and Static Systems

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Static systems can be highly complex structures. They have forces that hold their components together. This includes forces produce by the binding properties of plaster, glue, cement, welding joints, rivets, screws, and nails. All of the forces holding a static system together ultimately relate to molecular forces of the binding materials and the structural components.

Static systems are surrounded by environmental forces that are counteracting the forces that are holding the system together. This includes gravity, wind, and any type of impact force that the system may encounter. If the forces of the binding materials and structural components are stronger than the forces mentioned above, the system will not fall apart. If this is not the case, the system will collapse or deteriorate.

With large systems, such as bridges or skyscrapers, the above represents a complex problem for engineers. They must consider the strength of structural components and the binding materials, versus wind, and gravity. This generally involves complex mathematics, involving vectors.

Static Systems are Not Totally Static

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No system is completely static. For example, skyscrapers sway slightly, because of wind. Solids, liquids, and gases are comprised of [molecules that are moving or vibrating](#). This is obvious for anyone that studied physics, because temperature is the result of moving or vibrating molecules or atoms. Most [static systems](#), including a ball of steel, [expand when they are heated, and contract when they are cold](#), which is also a type of movement.

The most dramatic example of movements in static systems are the slow movements of the continents. [Over many millions of years, the Earth's geography has changed](#), because of these slow

movements. [Earthquakes appear to be caused by these movements. That is when two landmasses collide, tremendous forces buildup.](#) When the potential energy associated with these forces, are suddenly released, there is an earthquake. Thus, the imperceptibly slow movements of a static system can be important, and relevant for survival.

Static Systems

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The components comprising a static system have forces holding them together. In addition, there are usually environmental forces, acting on static systems, such as wind, and gravity. A good example, of a manmade static system is a skyscraper. There are forces holding its **components together**, such as steel beams, metal paneling, concrete blocks, and wallboard. Gravity and wind are two major environmental forces affecting a skyscraper. All of the forces must be carefully calculated, to be certain that the forces holding the skyscraper together are stronger than the forces produced by gravity and wind. The angle of each force must be considered in the calculations, when the skyscraper is designed.

If Static and Dynamic Systems Both Involve Movements, How are Static Systems Defined

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Based on the ideas presented above, what is a static system? A static system is a relative concept. A system is defined as static,

when its movements are too small to be relevant, for a specific, problem, goal, study, or research project. For example, if you are building an apartment complex on solid bedrock, you can define the bedrock as a static system. This is because the tiny movements of the bedrock are too small to be relevant for a housing complex. However, if you are studying earthquakes, and tectonic plate movements, the bedrock should be defined as a dynamic system. This is because the tiny movements are significant for this study, and these small movements cause earthquakes.

When a Static System is Defined as Dynamic

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When a static system is defined as dynamic, all of the concepts previously described for dynamic systems apply.

For example, when the continents and related tectonic plates are defined as a dynamic system, the concept of cause-and-effect applies. This includes the cause-and-effect sequence that involves collisions of tectonic plates that causes a buildup of forces to the point where the rock eventually shatters or cracks. When this happens a tremendous amount of energy is released in a very short interval of time, which is an earthquake.

Dynamic Systems may have some Static Components

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Many dynamic systems have some static components. Often the static components are part of the structure that houses moving

parts, such as the outer walls of an engine. Another example is electronic devices, which contain many static structures that are not involved with the electrical operation of the device. This includes the plastic or metal case that house electronic components, as well as the structures that support the components. The components themselves in an electronic circuit are physically static, but from the perspective of electronics they are performing dynamic functions.

Interestingly, most living entities have little or no static structures. Animals might have tiny amounts of material that are more or less static, such as the outer portion of teeth, or the outer portion of horns. In addition, systems comprised of only people, such as social groups, and political parties, do not have any static structures.

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