A General Model of Simple and Complex Systems

By David Alderoty © 2015

Chapter 3) Dynamic Systems: Preventing and Solving Problems, with an Understanding of Cause-and-Effect Sequences

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

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.

Dynamic Systems: Preventing and Solving Problems

Identifying, and Preventing Adverse Cause-and-Effect Sequences

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Many adverse events and problems start with one or more cause-and-effect sequences. This can involve accidents, hostile arguments, fights, wars, and a failure at goal attainment. These ideas are discussed under the following subheadings.

Accidents and Cause-and-Effect Sequences

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The cause-and-effect sequences that lead to accidents are often triggered by, the **impaired concentration of one person**. Concentration and focus can be compromised by, illness, sleepiness, information overload, (cognitive overload), and intoxication from alcoholic beverages or drugs.

Highly unpleasant events can interfere with concentration for hours or even days after they occur. Examples are severe conflict in a family, the loss of employment, academic failure, death of a relative, the ending of a relationship, such as divorce.

Even highly pleasant events can sometimes interfere with concentration for hours or days, especially if they are unusual, or exciting. Examples are a recent marriage, expected birth of child, graduation from high school or college, etc.

Thus, accidents can probably be reduced, by avoiding potentially hazardous activities, such as driving, when concentration is likely to be compromised by events or circumstances, such as the examples presented above.

However, impaired concentration certainly is not the only cause of accidents. Accidents are sometimes triggered by poorly designed products, by inadequate maintenance of equipment, damage walkways, disorderly environments, etc. These accidents can probably be reduced by developing an awareness of potential hazards. That is, do **not** assume that equipment, walkways, and products are safe. Carefully evaluating the systems you frequently encounter, will help you avoid hazards. For example, if you assume walkways do not have cracks or bumps, you are probably more likely to fall. However, if you are looking for cracks and bumps, as you walk, you can easily avoid these hazards.

For additional information, and alternative points of view see the following websites: **1)** Health & Safety, causes and factors affecting accidents, **2)** Using a Cognitive Theoretical Framework to Support Accident Analysis, by Daniela K. Busse, **3)** DISTRACTED DRIVING AWARENESS EFFORTS TAKE ON COGNITIVE OVERLOAD.

Adverse Cause-and-Effect Sequences

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One or more adverse cause-and-effect sequences can be triggered by ONE UNFORTUNATE EVENT. For example the **loss of employment**, can result in severe financial problems. This can result in difficulties paying the mortgage for a house, which can result in loss of the house. All of the above can trigger family conflict, health problems, and divorce.

Problems with the economy of a nation can result in adverse cause-and-effect sequence that affect the personal lives of individuals, which can lead to an employment, divorce, and even suicide. For additional information see the following websites: 1) Global economic crisis 'linked to suicide rise, 2) Economic suicides' shake Europe as financial crisis takes toll on mental health, 3) Can Culture Create Mental Disease? The Rise of "Hikikomori" in the Wake of Economic Downturn in Japan by MICHAEL GRISAFE on NOVEMBER 16, 2012

Sometimes, relatively minor difficulties trigger a **cause-and-effect sequence** of very severe problems. This can be seen in the following examples.

A fight, serious assault, or murder is sometimes triggered by a disagreement, or a hostile remark. This usually involves an escalating sequence of hostility, which eventually leads to a physical conflict, involving the fists, or weapons.

Sometimes a relatively minor complaint, such as a problem with a defective product, can lead to an escalation of hostility, resulting in a major lawsuit.

War can be triggered by many factors. Sometimes relatively minor disagreements can trigger a war, especially when it involves leaders that are willing to resolve problems with military actions. Sometimes the main trigger of war is the result of a new leader of a nation, who is willing to engage in war to obtain more power, to obtain more land and resources, or to resolve minor border disputes.

Sometimes war is triggered by rational or irrational concerns, or fears in relation to another nation. The Vietnam War appears to have been triggered by a concern that communist leadership would take over surrounding territory, in a cause-and-effect sequence that was called the domino effect (also called the domino theory).

How to Prevent an Unfortunate Event from Triggering A Set of Adverse Cause-and-Effect Sequences

One adverse event often triggers a chain of problematic cause-and-effect sequences, as was explained in the previous subsections. This chain of problematic sequences can be prevented or minimized, with the strategies presented in the following two paragraphs.

When an adverse event occurs, carry out an evaluation to determine, the possible adverse cause-and-effect sequences that might be triggered. If you develop an awareness of the potential sequence of problems, you might be able to prevent them, or minimize them, by carrying out corrective actions. For example, if you lose your job, you might be able to minimize or prevent set of adverse cause-and-effect sequences in your family, with a budget, by postponing all unnecessary purchases, and by spending at least eight hours a day in an effort to find new employment as quickly as possible.

Very often, an adverse event triggers problematic cause-and-effect sequences that involve other people, especially family members, and coworkers. These difficulties can be prevented, or minimized by avoiding hostile arguments, any type of conflict, and rude or angry remarks. This should be coupled with the opposite of the underlined words. This includes, being kind, patient, and understanding, especially towards the individuals that may be affected by your problematic situation.

There are similarities and some major differences between the three types of cause-and-effect sequences that were discussed in the previous subsections. This is explained in the following four paragraphs.

Programmed cause-and-effect sequences require an input of **energy**, and **information**. **For example**, with **software** the information (or instructions) for the sequence, is written in computer code. This code instructs the computer to carry out **the programmed cause-and-effect sequence**. The input of energy to carry out the sequence is obtained from the power supply of the computer. However, programmed sequences are certainly **not** limited to computers. There are programmed cause-and-effect sequences in plants and animals. In these sequences, DNA provides the information, and the energy is obtained from cellular metabolism.

Endothermic cause-and-effect sequences require an input of **energy**, but there is no **need for an input of information**. This is because the information to carry out the sequence is essentially encoded in the components, in terms of their geometry, structure, and layout. For example, the cause-and-effect sequence involved with a steam engine requires an input of energy, so it is endothermic. However, the information for the

sequence in a steam engine is contained in the geometry, structure, and the overall layout of its components. This involves, a boiler, connected by pipes to a cylinder, with a piston, which is connected to a crankshaft, to produce rotary motion from the back and forth movement of the piston. Another example is an endothermic cause-and-effect sequence with chemicals. The information (**instructions**) for the sequence is encoded in the molecular structure of the chemicals.

Exothermic cause-and-effect sequences **do not require an input of energy**, **or an input of information**. This is because the components involved with an exothermic sequence, contain potential energy, which is used to carry out the cause-and-effect sequence. For example, when the exothermic cause-and-effect sequence involves chemicals, the potential energy is in the molecular bonds. The information (**instructions**) for the sequence is encoded in the molecular structure of the chemicals.

Programmed, endothermic, and exothermic cause-and-effect sequences are sometimes controlled by feedback loops. For example, the programmed sequences involving DNA appear to have a number of feedback mechanisms controlling the development of the fetus. The exothermic reactions that are used to produce heat are often controlled by thermostats. A thermostat is a simple type of feedback device.

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