TOC Thinking Processes

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Introduction: Anybody Can Be a Jonah!

> *If I have ever made any valuable discoveries, it has been owing more to patient attention, than to any other talent. —Sir Isaac Newton*

The *Thinking Processes* (TP) are the tools of Jonah, the beloved physicist-mentor of *The Goal*'s Alex Rogo (Goldratt and Cox, 1986). In order to really gain benefit from the use of the *Theory of Constraints* (TOC) TP, you need to adapt the mentality and discipline of thinking like Jonah. You don't need to be born a genius. You don't need to have a PhD. You *do* need the conviction to think clearly, and to consider yourself a scientist. According to Dr. Eli Goldratt, "no exceptional brain power is needed to construct a new science or to expand on an existing one. What is needed is just the courage to face inconsistencies and to avoid running away from them just because 'that's the way it was always done'" (Goldratt and Cox, 1986, Introduction). This leads us to the principle on which all of TOC is based—the concept of *inherent simplicity.* Goldratt discusses this concept in *The Choice*, explaining that *"the key for thinking like a true scientist is the acceptance that any real life situation, no matter how complex it initially looks, is actually, once understood, embarrassingly simple"* (Goldratt, 2009, p. 9).

> *Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius—and a lot of courage—to move in the opposite direction. —Albert Einstein*

Goldratt's description of science and his concept of inherent simplicity are not new. Not surprisingly, his messages can be traced to one of the most important scientists of all time, Sir Isaac Newton. Newton's Rules of Reasoning in Philosophy (Newton, 1729) have guided scientists since the early 1700s to recognize that "nature is simple and consonant with itself," and thus few causes are responsible for many effects rather than the other way around; to avoid attributing more causes to an effect than are both true and sufficient to explain its existence; and to enthusiastically analyze and learn from (rather than ignore) the situations in which reality contradicts (or appears to contradict) our understanding of it (see Appendix A at McGraw-Hill www.mhprofessional.com/TOCHandbook or at TOCICO http://www.tocico.org/?page=toc_handbook).

When it comes to the use of the TP, people generally fall into two categories. The first consists of the people who make the decision to adapt the mentality of a scientist and the second category consists of the people who don't. Those in the former category create meaningful improvements. They work hard at it—they exercise the muscle between their ears rigorously—but instead of feeling drained, they are energized not only by the results, but by the expansion they have made to their knowledge and understanding of the world around them.

What are the TP tools? Why are they so effective in analyzing business and personal problems? How is the application of logic, language, and structure brought together for penetrating analysis of problems and conflicts? How do the TP tools then help in laying out the transition from an undesirable present to a desirable future? How do they help protect a plan from unanticipated pitfalls? How do they link together as an integrated system of logical capabilities for bringing about positive change? I hope to answer these questions in a way to show that almost anyone willing to do the work can achieve deep insight and make significant and meaningful improvements to environments both simple and complex; with step-by-step instructions on how to do it.

I begin with discussion of the tenets in logic and fundamental assumptions in philosophy that underlie the TOC TP. Then I illustrate how the discipline of diagramming helps in guiding our analysis. Each of the TP tools is discussed in sequence with instructions on how to use it. The chapter moves on to examples, some of them real application cases.

The Basic Building Block—Cause and Effect Logic

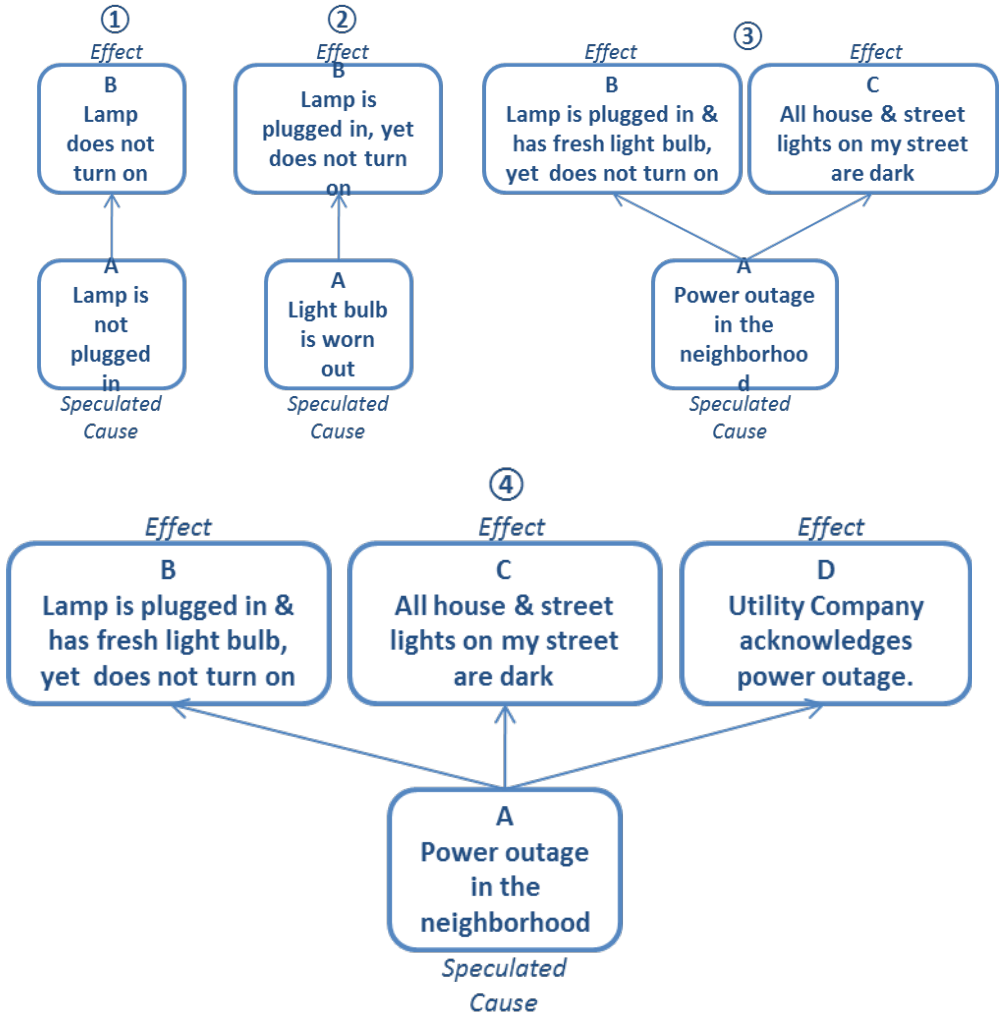
You see there is only one constant. One universal. It is the only real truth. Causality. Action, reaction. Cause and effect. —The Merovingian, The Matrix Reloaded

When we accept the premise of inherent simplicity, we accept the premise that every element of a system is connected to the system via cause-and-effect relationships with the other elements of the system. This means that the better our capability to uncover and understand the actual cause-and-effect relationships that exist today, or that we intend to put into place tomorrow, the better our capability to improve.

What do we mean when we say there is a cause-and-effect relationship? We mean that by the mere fact that one condition exists in a system, another condition is an inevitable result. Let's look at a simple example which may seem trivial because it is obvious, yet it does illustrate clearly the basic building block of the TP. It is evening, and you have just arrived home from a day at work. You open the door to your home and turn the switch that operates the lamp in the hallway to the "on" position. The lamp doesn't turn on. What could be the reason? After verifying that you did in fact turn the switch to "on" rather than "off," you check to see if the lamp is plugged in. Why? Your life experience has led to your intuitive understanding of a cause-and-effect relationship—you know that if the lamp is not plugged in, the light will not turn on.[1] You find that the lamp is not plugged in. Aha! You confidently plug the cord into the wall, flick the switch on again, and—oh no, the light is still not on. What do you check next? Your brain goes through a quick checklist of potential causes for the light not turning on. Do you change the light bulbs? Do you turn on another light in your home to verify that the problem is isolated to the lamp and not a larger issue such as the circuit breaker or fuse, or even an electricity outage in the neighborhood? Any of these would be sufficient to cause the lamp to not turn on, so you keep checking—in the order that your intuition, which is based on experience with similar situations, tells you is most likely to least likely—until you uncover the cause, make the appropriate change, and turn on the light.

Figure 25-1 graphically illustrates the cause-and-effect map you built in your mind. Please note that as you gained more information, your cause-and-effect mental map enlarged and you better understood the situation. You checked directly the facts you could check directly, and you modified the "entities"—your verbalization of the facts—as you went along. In the third scenario, when you finally looked outside at the rest of your street and found that it, too, was as dark as your lamp, you predicted and verified an effect that gave credence to a potential cause. If the street and neighbors' lights were on, you would continue checking for alternative causes.

1 As I write, I am imagining more than one occasion in which I thought a TV, a computer, or other electronic gadget was not working, and "the fix" came in the form of my husband calling from another room with just a small tinge of sarcasm in his voice, "Honey, are you sure it's plugged in?"



You also may not have been satisfied that you had at last verified the cause—you may have decided to speak with a neighbor or call the utility company. If they did in fact verify the power outage, the resulting cause-and-effect map would have looked like Fig. 25-2.

In this example, you instinctively conducted checks on the hypotheses of cause-and-effect you were making, and you used a process to do so.

1. You identified a problem. *The light doesn't work.*
2. You hypothesized a cause. *The switch is not turned on.*
3. You checked your hypothesis by checking for two conditions:
   a. You verified the condition. You checked to see if "switch is not turned on" was actually the case. It was, in fact, turned on, so you hypothesized a different cause, and then verified that the condition existed.
   b. You validated the cause-and-effect connection. Was the fact that the lamp was not plugged in really the cause for the lamp not turning on? You checked directly by plugging in the lamp and it still did not turn on! So, back to hypothesizing a condition that could cause the lamp to be out and then validating the cause-and-effect connection.

When you adapt the mentality of the scientist, you will do these checks automatically. As we make our way through the chapter, we will expand our understanding of these steps, and at the conclusion of the chapter, a template for the detailed process of checking is provided.[2]

While the example I used may seem trivial, the scientific process is not. Most of us simply are not practiced in using or communicating cause-and-effect logic. Dr. Goldratt recently conducted an experiment. He asked about 40 people—all were intelligent, educated adults ranging in age from 20-something to 60-something, ranging in professions from student to CEO—to think of and then write a sentence that contained the word "because." The only qualifier for the sentence was that it needed to be a sentence that the individual writing it believed. In other words, they were each asked to make a statement of cause and effect that they believed to be correct. There were a wide variety of sentences, such as *"I discipline my children because I care about their well being" to "Americans drive SUVs because they don't care about the environment"* to *"My boss and I don't get along because…"* to "*The cake tasted bad because the recipe was lousy."* Dr. Goldratt then asked the group to apply the simple checks to their statements. In the vast majority of cases, the individuals wrote to him and said that once they applied the checks, they came to realize that their original statements were wrong.

Think about how many decisions are made every day based on assumptions of cause and effect. If the group of 40 is any indicator—and I have no reason to believe they are an exception to the general population—I cannot help but think how many decisions are wrong. People are hurt and organizations do not improve, due to our carelessness in the use of *"because."* The only difference between using cause and effect thinking in a situation like the lamp and a situation in which the direction of an organization is set is the decision to really check the assumptions that would drive a given course of action.

When you develop the habit of using cause and effect, using it to make the tough decisions will be as natural as using it to figure out why the lamp does not turn on. I cannot stress the importance of practicing—of exercising your brain muscle to think clearly, and to regularly map the cause-effect statements you use, hear, and read (the sentences you use that contain the word "because"). This is the best preparation you can do for when you need to reach for the TP to make the big improvements which you care about. By incorporating into your daily practice the use of the basics that I introduce in the next section, you will have everything you need to use—and even develop for yourself—the TOC TP.

2 The detailed process is called the *categories of legitimate reservation* (CLR).

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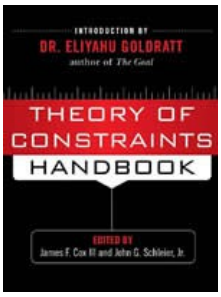

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