

4. Divergent and lateral thinking

As a kid, I loved chess and still remember many stories about famous masters of the clever strategy board. Two of them have just finished the last game of the World Championship Match. During the press conference, the loser is asked how many moves he would usually analyze in advance. "Eight to ten", he answers. The winner is faced with the same question. "I always look only one move ahead", he replies with a smile, "but I try to make sure it's the best one".

To look ahead, to be farsighted, to be creative, to win, to solve problems, to be efficient - all these concepts are in close relation to the human ability to think efficiently and productively. We all intuitively know that efficient thinking makes all the difference. What is efficient thinking anyway?

How many times you had to fight against aimless thoughts that were crossing your mind, just when you had to concentrate on some useful intellectual task? How many times the parents, teachers, colleagues, friends and bosses had to warn you not to let your mind wander about? How often have you received benevolent advice not to bother with unimportant or irrelevant ideas, but to direct your full energy and concentrate all your efforts on The Relevant and The Important instead? "Act, don't think!". "Don't play with it, just do it!". Don't be a smart Alec, do it the way other people have always done it!. "Follow/obey the rules!". "Never ask stupid questions!".

All our life we have listened such wise, self-assured comments so often that we almost got accustomed to believing that "they" are right and "we", who disobey, deserve nothing but contempt or punishment. Were "they" really right? Before trying to answer, we should analyze the very essence of thinking as a process. What is there to know about thinking?

In problem-solving there are two types of thinking: (1) Convergent Thinking; and (2) Divergent Thinking. **Convergent thinking** is the mental activity oriented towards finding The Solution, based on the assumption there is only one solution to a given problem. A physician who diagnoses a disease, a contestant who answers the questions on a quiz, a teacher who evaluates the school test, or a kid who tries to solve a jigsaw puzzle, they all have to use convergent thinking, or they fail. The master of convergent thinking is Sherlock Holmes, the famous detective. By using iron-strong logical deduction, he is always able to find the solution to a mystery he is dealing with.

How does he do it? First, the problem has to be broken into parts. Then, by trying to solve/understand each of the parts, he gradually recollects the whole, and comes up with the right solution.

The idea that there is one and only one solution to a problem is the core of the education process. We have already demonstrated it by the barometer example. The convergent solution is to measure the air pressure and calculate the building height from the difference at the bottom and at the top. Most schools teach us how to use convergent thinking, and how to take as much as we can from the pool of all the existing knowledge. The unpleasant side effect is the conviction that all the problems are either already solved (we just have to learn 'how'), or they will be solved by us (we must find '**the right way**'), or the solution does not exist.

Divergent thinking differs drastically from the previous approach. Rather than being directed towards only one goal, the thoughts are dissipated on several targets. Instead of searching for the only one, we believe there are many possible solutions. Remember the many divergent ideas to be used in solving our barometer problem?

Unlike the jigsaw puzzle, an epitome of convergent thinking, the symbol of divergent approach is a painter in front of an empty canvas. The artist starts filling it with ideas that are often not planned or preconceived. One idea brings another, and there is an infinite number of possible "solutions". Another good example of divergent thinking is an architect who makes a project for a new house. At the start, his head is full of different ideas. After many drawings, adjustments, analyses, and evaluations, he picks one or two that he considers to be the best. The number of possible solutions is limited only by available time or by the architect's imagination.

Thomas A. Edison, the famous inventor with practically no formal education, was one of the masters of divergent thinking. Here's an example: A team of technical experts was given a task to develop as many alternative designs

for a complex machine as possible. In a month, they developed three options. The same problem was then approached by Edison. After only two days, he elaborated 48 new variants. He said he would come up with more proposals if he had more time.

Unlike the divergent thinker, the thoughts of an average individual are not flexible. The solutions he has adopted, or got accustomed to, make him a prisoner of habits and prevent him from searching for the other, maybe better and more original ideas. The experience could also play a negative role here. Whoever, blindly or automatically, follows the paths approved by experience; he may as well carry a flag with the inscription: 'Creativity does not live here anymore'.

The convergent-divergent thinking duality is only one side of the mind coin. Science deals with other distinctions. For example, we may talk about the dichotomy of vertical and lateral thinking.

Vertical thinking approaches all problems gradually, step by step. It is most appropriately illustrated by a flow diagram. An idea is developed in small stages, all directed towards one solution or one goal. Such unidirectional flow of ideas is based on conscious thought control, some kind of internal censorship. Vertical thinking is, as one might guess, closely related to the convergent, rational problem-solving, and based on analytical approach. We already know the principle: any complex problem should be decomposed into parts, and then solved in a step-by-step manner. As a knowledge-oriented approach, vertical thinking seems to be a slow, continuous and often painful method. But it's rather efficient when dealing with well structured, logical and rational problems.

Suppose you are a newlywed and you want to make tea for your wife in a traditional way. You call your mother and she provides you with a detailed procedure based on the vertical (flow diagram) thinking:

1. Take a clean pot;
2. Put two pints of water into the pot;
3. Warm the water on a gas stove until it boils;
4. Take a spoonful of tea and put it in the water;
5. Wait for 5 minutes;
6. Filter, taste and observe the color; IF strong enough, then CONTINUE, else GO TO 4.
7. Pour the tea into a cup;
8. Put one small spoon of sugar in the tea;
9. Stir for 30 seconds and taste; IF sweet enough, then END, else REPEAT step 8.

Following the described vertical procedure, you will always get a perfect old-fashioned cup of tea, the way your mama used to make it.

What would be the other, creative way? Instead of being straightforward, **lateral thinking** is curved and winding. All kinds of associations flow in and "distract" the main line of thinking. One idea comes after another as in meditation, followed by a sense of freedom and relaxation. It is the kind of thinking that is easily "killed" by constraints, orders, rigid control, strict rules or similar conformity mechanisms. The ideas produced by lateral thinking happen all of a sudden; the solutions emerge out-of-the-blue, like lightning. Many innovators are "enlightened", and, unlike the rational approach, they find the lateral thinking to be highly intuitive. The extreme cases are called "subconscious thinking", "precognition" or "vision".

Take the same problem of making tea. In solving it, a lateral thinker does not follow the flow of vertical orders. Instead, his mind will meander like this:

1. Why should the pot be clean? I might take a ceramic glass instead, or maybe I could use a samovar... Do I have to make tea? Maybe coffee would be better, or I could make a juice.
2. Do I need 2 pints of water; I might try to use only one. Why wouldn't I try to make tea with milk instead of water? What if I take 2 pints of beer, coke or brandy?
3. I might use an electric stove instead of gas. Or I could warm the water by putting few blazing stones in it. Maybe I should try an iced tea.

4. A spoonful of tea is too much (too little). I could use a fork, a knife, my fingers or my eyebrows instead of a spoon.
5. Why should I wait for 5 minutes? What if I leave the tea until tomorrow, next week, next century?
6. What if I don't filter? Maybe I could eat tea instead of drinking it, with some water or without.
7. I can pour the tea into a plate, a bottle, an icemaker, or I could wash my hair with it.
8. Why sugar? Maybe salt, mustard, ketchup or pepper would taste better.
9. Instead of stirring I could pour the tea in the mixer, or shake the cup, or ride a carousel with it, or drink it and then perform a belly-dance.

Such lateral thinking will definitely not produce a boring cup-of-tea experience. Instead, we get a bunch of original ideas; among them there might be a real winner.

There are other ways to differentiate the human thinking. For example, research has provided us with the theory of [two sides of the brain](#). **The left side** is used in mathematics, logical reasoning and hard scientific analysis. It's specialized for cause-effect relationships and logical conclusions. On the contrary, **the right side of the brain** helps poets and artists resolve complex problems with no standard solutions. The "left" (convergent and vertical) analysis provides solutions to well structured, straightforward and unambiguous problems. The "right" (divergent and lateral) analysis is oriented towards holistic, intuitive and emotion-based idea-seeking process. It is particularly suited for diffuse situations, where there is no logical or obvious solution to a problem.

Sometimes creative solutions seem to appear out of the blue. It's the so-called [Aha-effect](#), and it's often used to describe the creative individuals and their thinking process. Take a look at the following problem: Suppose you are a hunter. Tracking down the prey you walk straight 10 miles from your cabin to the south. Then you turn to the west and walk another straight 10 miles until you catch the bear. From there you walk another straight 10 miles and reach your cabin with your prey. What is the color of the bear you have just killed?

Obviously, the normal reasoning, based on geometry and logic, does not help you solve this puzzle. What you need is "inspiration", a special missing ingredient to the story, the idea that comes to your mind all of a sudden, as by magic. And when it does, you get startled by the simplicity of the solution and you usually say: Aha!

What idea solves our bear problem? The cabin must be situated on the North Pole. Only under this assumption, you go 10 miles south on a meridian, then walk 10 miles west on a parallel, and carry your prey another 10 miles on another meridian to the North Pole. Your path is not an isosceles but an equilateral triangle. And, of course, the answer to the puzzle is a white polar bear.

There are many famous examples. While he was daydreaming in a hot bathtub, Archimedes suddenly realized that any object, immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object, as was the case with his body. Only, instead of "aha", he said, "eureka" (I have discovered). Hit by a fallen fruit while sitting under an apple tree, Isaac Newton discovered a law of gravity. This is exactly what [Richard Buckminster Fuller](#) meant when he said that you never change things by fighting the existing reality. To change something, you must build a new model that makes the existing model obsolete.