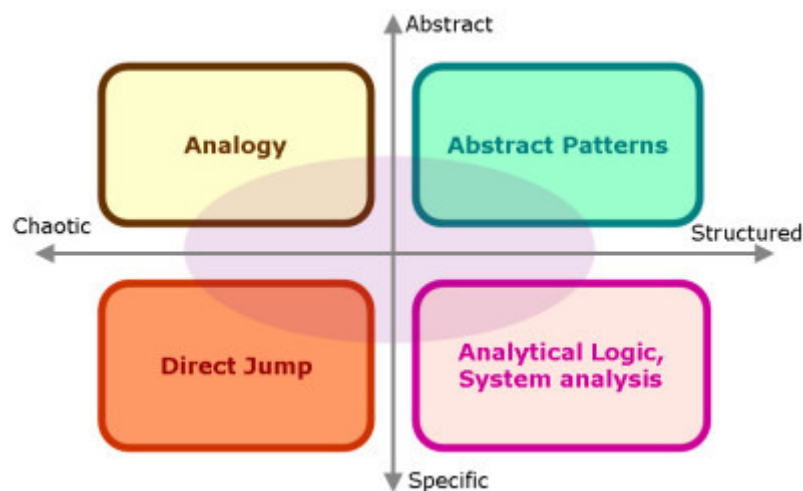




DIMENSIONS OF CREATIVE THINKING

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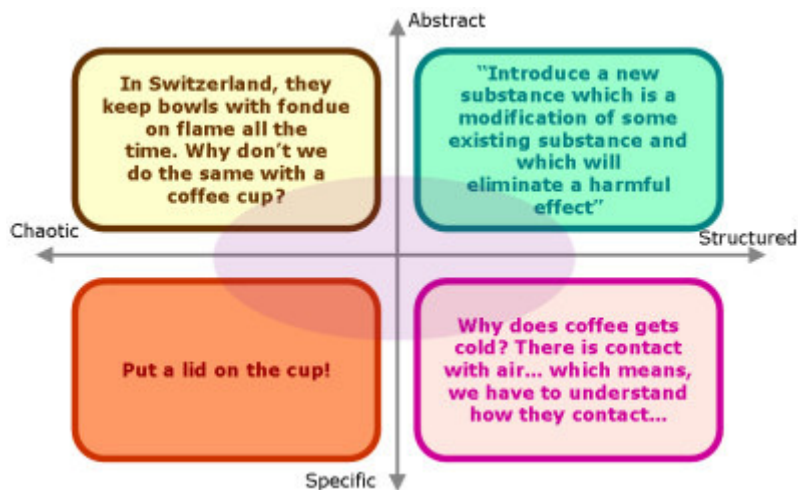
Being involved for a long time as a TRIZ trainer and developer, I've had a great chance to meet many different creative personalities. This certainly enriched my life, and I also noticed that there are two major dimensions along which a creative thought is developed, regardless if people use TRIZ or not: a) from specific to abstract and b) from chaotic to structured. Of course, there are no clear borders between different types of thinking and there can not be, but we can clearly see dominance of one or another type of thinking. What does this mean? Below I try to explain this concept by illustrating it with the following problem: I am a very slow coffee drinker, which means that coffee in my cup gets cold too quick and its taste degrades. What can be done? Now, to four type of thinking dominance in creative problem solving:



- **Chaotic and Specific:** we try to solve a problem by simply guessing what a solution can be. This is the trials and errors method in its full extent. Might be good for problems of low-level difficulty but how many trials we should make to solve problems of high levels of difficulty? This is like playing in a casino. We have a chance, but its probability is low. So what are we going to do to have our coffee warm as long as possible? We might quickly jump to solutions without much analytical thinking: for instance, put a lid on a cup, insert a radioactive element to the cup which will warm up coffee, or simply stop drinking coffee to avoid experiencing discomfort...
- **Specific and Abstract:** We use guidance by the methods which help us to diverge to break mental inertia or associate our problem with some already known solution but residing in a different area. For instance, we might use lateral thinking, or we might have to search for analogy. I noticed that outstanding inventors read a lot of different literature and have ability which I call "hunger for knowledge". This "hunger" helps to establish an analogy between seemingly unrelated things. By visiting houses of such inventors I was always impressed by sizes and diversity of their libraries: from history of theater to quantum mechanics. Do you know that Voltaire (1694-1788) had a library of over 6.000 books? He was not just a bibliophile; his handwritten comments can be found in more than 2.000 books. A library of Thomas Edison counted 10.000 books. Now, how do we apply analogy to our coffee problem? To keep meals warm, Chinese use a pad with a flame. Why not to use a flame pad for warming up coffee? Or,

similarly to arctic igloos which use ice blocks for thermal insulation, we can put a floating foam-plastic pad with a hole for drinking on the surface of coffee; or to make a cup from porous thick material with a drinking hole. Solving problems by analogy is a very powerful method, but how to find a right analogy? This might be troublesome.

- **Specific and Structured:** this is where logical thinking comes to play. We use logic to analyze why a problem is happening, what causes the problem; and assume that the deeper we understand the problem, the higher chance we will have to solve it. This won't necessarily provide us with solutions (although in many situations it will) but at least give us a better insight to what forms the problem. This way of thinking is often attributed to scientific approach: first, understand the problem and then solve it. But what to do if understanding of the problem's causes does not give us insight on what a solution can be? Still, understanding the problem is very important. Example: At this level we try to understand why coffee gets cold. Why? Because it has a contact with air which has much lower temperature. Thus there is heat and mass transfer which goes too fast in order to establish a thermodynamic balance. So the question will be how to slow down the heat transfer? Probably, by warming the air, and so forth.
- **Abstract and Structured:** This is where we not only use logic to understand the roots of a problem but also use universal abstract patterns which can solve the problem. This is the most effective way to solve creative problems. But what are these abstract patterns? In my opinion, they are aggregation of many different analogies, which we can observe in technology, biology, social life. They are exactly what Altshuller and TRIZ researches have identified by studying vast massive of creative and innovative solutions. Altshuller also noted that outstanding inventors use 5-7 patterns which they discover due their lifetime. Example: Let us use a pattern which is known in TRIZ as "inventive standard 1-2-2: If there is a harmful effect of interaction of two objects, then introduce another object between them, which is a modification of either of the objects". Modification can be seen in a broad sense: it can be a different phase state, physical state, chemical state... Why not to use foamed coffee, for instance? If we make a nice foam layer of coffee on top of liquid coffee (crema), it will have low thermal conductivity and prevent coffee from getting cold too fast. My espresso coffee machine uses exactly this solution, and I am happy with it. Advantage of TRIZ is that it identified many such abstract patterns: inventive principles, inventive standards, patterns of system evolution. It is impossible to say that TRIZ has a comprehensive set of patterns, but its set of patterns helps to solve many difficult problems.



This diagram also shows evolution of human thinking: from chaotic and specific to abstract and structured. I often hear that to come up with creative ideas, we need to unstructure our thinking. I can't completely agree with that. We need to unstructure our thinking only when we do not have a more powerful method of thinking. But combining analytical logic and knowledge of universal patterns of solutions, we get much stronger instrument for solving creative problems.