Seeing the Forest through the Triz

How are inventions created? Studies of creativity are usually psychological in nature, but beginning in the 1940's, a Russian engineer named Genrich Altshuller took a different approach. He decided to study the nature of creativity by studying previous solutions to creative problems. Initially, Altshuller analyzed 200,000 Russian patents. Since, his work has been expanded to over 3,000,000 patents.

From this work, Altshuller developed a theory of problem solving called Triz. Pronounced "trees", Triz is the Russia acronym for Теория Решения Изобретательских Задач (Theory of Inventive Problem Solving).

What Altshuller found were the following patterns:

That problems and solutions were repeated across industries and areas of study.

That creative solutions often came from outside the field where the problem occurred.

That breakthroughs came from solving contradictions.

That the same inventive principles were repeatedly used to solve problems.

That the evolution of technologies follow predictable patterns.

Using these patterns, Altshuller was able to create a methodology for solving "inventive" problems. By inventive, Altshuller meant problems that contained the contradictions that are at the heart of his method.

In a sense, Altshuller created an algorithm for creativity.

Altshuller's idea was simple. He proposed to take a specific problem and convert it into a "model problem" which had known solutions. An inventor could then take one of the known model solutions and apply it to the specific problem. Altshuller converted a specific problem to the model problem by focusing on the inherent contradiction of the problem.

In Altshuller's model, a contradiction occurs when a bad result prevents a good result. For example, suppose a dye range operator wants to increase production. The obvious decision is to increase the speed of the machine. The only thing that stops the operator from doing so are the bad results. For this example, the bad results are the dyes will not react properly with the fabric and the machine will break. In Altshuller's method, these two contradictions create two model problems: 1) increase production and dyes will not properly react; and 2) increase production and the machine will break.

What Altshuller's analysis found was that contradictions could be described by combinations of measurable parameters such as weight, volume, temperature or energy. One parameter would make the problem better and another parameter would make the problem worse. Using only the parameter combinations, Altshuller was able to predict successful solution strategies. Inventors could then choose from these strategies to apply to the specific problem.

There are two other things to note about Triz. First, the Triz model appears to be stable. While I believe some parameters have been added over time (there are 39) they have not dramatically changed since Altshuller developed his initial methodology. As new technologies bring new solution strategies, they seem to fit into the existing parameters. Second, the Triz model has statistical significance. Solution strategies generated by Triz appear to have higher probabilities of success than other strategies.

In the end, however, Triz is only a tool. It can provide guidance, strategies and priorities but it still takes the insight of the inventor to choose the right strategy and apply it to solve the specific problem.

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