Development of Creative Imagination

The Power of Fantasy

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It has become a textbook maxim that fantasy plays a large role in any creative activity, and in technical science as well. But there is a surprising paradox here. The recognition of fantasy's importance has not been accompanied by a systematic effort focused towards its development.

So far, the only widespread, and practically effective means for developing fantasy was the reading of science fiction literature (SF). Incidentally, a clear correlation is seen here: scientists and engineers are more attracted to SF than other readers. Several years ago, the Committee of Technical-Scientific Literature of the Azerbaijan Writers Union conducted a survey that resulted in the following: 20 percent of all engineers and physicists preferred SF to other literary genres.[1] There are half as many SF readers among doctors — nine percent.

Fifty-two percent of the engineers and physicists surveyed mentioned that they value SF first of all for its new technical-scientific ideas. Really, in this regard, SF can give the thinking engineer quite a lot: a project that can be developed, or even a ready solution that can be transferred into engineering language.

Recently, there was issued patent #1,229,969 in the FRG (Federative Republic of Germany) having the following formulation: "A method of mining mineral resources from an astronomic source. This invention differs by choosing as a site an asteroid with a small mass, and having such an orbit that it is economically possible to transport the asteroid to the Earth." A person familiar with SF literature will immediately notice that Jules Verne ("The Golden Meteor") and Aleksandr Beliaev ("Star KEZ") should be co-inventors of this patent.

This can be reinforced with many similar examples. For instance, in the novel *20,000 Leagues Under the Sea,* Jules Verne for the first time expressed, and substantiated, the idea of a double-shelled hull for a submarine. The patent on double-hulls was issued 30 years later to the French engineer Leboeux. His description of the idea in the patent did not have any more detail than Jules Verne's novel. A similar fate befell another idea described in the same novel: provide electric power through the temperature differential between ocean surface water and deep water. Thermoelectricity was known, of course, before Jules Verne. But he was the first who suggested the idea of using the temperature differential of the ocean. Later, at the opening ceremony of the power station utilizing this principle, the designer pointed directly to the Jules Verne novel as the basis for his work.

There are well-known cases of the close interaction between science fiction and technology. In one of M. Shiverov's SF novels, a device for sleep learning was described. At Shiverov's request, the engineer E. Brown designed and built the "Sleepphone" — a combination of clock-driven gramophone and audio head set, and R. Eliot used this device to teach students during sleep.

Very often, the ideas of fiction writers are directly used during the early development stage of a new field of science and technology. At some period (although, for a very short time) fiction becomes one of the main sources for an emerging new area of knowledge. A similar thing happened, according to testimony by V.V. Parina and R.M. Baevskogo, with astrobiology: "Our fiction writers described in their novels many 'Cybernetic' ideas that can, and must be, used in astrobiology. For instance, the problem of controlling anabolism plays an important role, not only for enabling interplanetary flights, but also for space flights of long duration in the same solar system that are possible even during this Century. Unfortunately, most detailed investigations of this problem were not done in scientific literature, but in Ivan Yfremov's novel *Nebula of Andromeda*."[1]

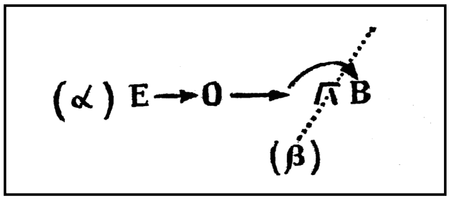
Of course, science fiction does not always contains correct and mature ideas. Often, they are most doubtful from a scientific-technological point-of-view. Or, they are completely symbolic ideas offered to readers. Moreover, often fictional ideas are completely wrong. In spite of that, because of their singularities and brilliance, they attract the attention of researchers, and force intensive research that sometimes leads to important discoveries or inventions.

The Lenin Prize winner, Yri Denisiuk, once said "I decided to create an interesting project for myself by undertaking a gigantic — verging on the impossible — problem. I recalled an almost forgotten Yfremov story . . . ." He is talking about the novel *Shadow of the Past.* In a cave, as the result of a rare combination of circumstances, a photo-camera effect appeared: a narrow entrance into the cave played the role of lens, and the wall opposite the entrance, covered with a resin, became a gigantic photo film, memorializing moments of a long past epoch.

Denisiuk looked at this phenomenon differently: Is it possible to get an image without a lens? Research led to discovering a holographic application. The first stimulus, however, was made by the novel. "I am not discarding, on the contrary, I am confirming with pleasure the unusual participation of Efremov in my work."

SF helps overcome psychological barriers on the road to "crazy" ideas without which science cannot continue its development. This is an admirable, and so far, little acknowledged function of SF that becomes a component of the professional training of scientists.

Usually, the impact of fantasy resides in its reaction with real "working" thoughts. The essence of this reaction can be understood when Academician B. M. Kedrov's schematic of the creative process is used.[1]



While searching for a solution to a problem, human thought follows along a certain direction (**α**) from single facts (E), revealing something special (0) that these facts possess. The next step has to be the determination of commonality (B), in other words, the formulation of a law, theory, etc. The transition from (E) to (0) should not present any difficulty; however, the further step from (0) to (B) presents a psychological barrier. This requires a springboard (**λ**) that allows us to overcome the barrier. Very often, an accidentally appearing association can become this springboard. This association appears at the intersection of line (**α**) and another line of thought (**β**).

Science fiction literature works very well as line (**β**).

When *Problem #7* was presented during a seminar, one of the listeners formulated an IFR as follows:

"The contact, by itself, closes the terminals with minimal friction."

I asked, "Why not without any friction, instead of "minimal friction?"

They answered that "The conditions of the problem stated that the contact must touch the terminals. If a physical contact is present, friction must be present as well. We cannot get rid of friction completely — why should we state an unrealistic IFR?"

"Why," I insisted, "can we not imagine a touch as tight as possible, yet without any friction — and at a normal temperature without super fluidity?"

Some other seminar attendants began to object: "It looks like the substance of the contact must penetrate through the substance of the terminal ... . How can this be imagined?"

A strong psychological barrier arose, and the solution went on hold. Then, I told a story from the science fiction novel of E. Voiskunckogo and I. Lukodianova, *Mekong Crew*. This novel described a device that gives to any being or object the characteristic of permeability. The hero of the novel, being permeable, was crossing a street, pondering, when he collided with a moving bus. To the surprise of those around him, the man passed through the bus as if nothing had happened!

Somebody recalled other fictional novel — another "permeable man." A movie was recalled about a man that moved through walls . . . . In three minutes, everyone clearly imagined "permeability," and it was possible to return to our problem. "Now you can see that the contact must (in its ideal state) go through the protruding terminals. Let's make a drawing. *Step 3-2.*"

SF plays a role in the experimental field of modeling problematic ideas. Some of these ideas, in time, develop into scientific hypothesis (when speaking about technology, they develop into improvements, projects, inventions, and so on); in other words, they completely transpose into areas of science and technology. Often, SF effects the creative process from the side, slowly reducing psychological inertia, and increasing sensitivity to something new. On Kedrov's diagram, this increasing openness to something new can be shown as a reduction in the height of the perceived psychological barrier, and the development of an ability to create a self-springboard; in other words, to overcome a barrier without the immediate outside influence of line **β**.

It is wrong to say that SF is an irreplaceable creative tool for science and technology. However, it is, without doubt, one of the most important tools. The recording and careful analysis of SF ideas is long overdue.

In 1964, I started to create a *Registry of Contemporary Science Fiction Ideas.* Today almost all interesting ideas are registered in the list. They are separated into12 Classes, 75 subclasses, 406 groups, and 2,360 sub-groups. This analysis answers the question: "When has a fictional idea become successful, and when has it not?" Moreover, some of the patterns in the generation of fictional ideas become clearer.[1]

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Reading science fiction undoubtedly helps to develop the creative imagination; however, it cannot replace systematic training. Imagination must be systematically developed through special exercises.

An attempt in this direction was made by John Arnold, a Professor at Stanford University. Arnold's method suggests solving inventive problems while in the environment of an imaginary planet, Arktur IV. This imaginary planet is different because it has some very unusual conditions: Its surface temperature is 100 ° lower than on Earth, its atmosphere consists of methane, its oceans are made of ammonia, its gravity is ten times stronger than Earth's, and its intelligent beings are birds. It is necessary to overcome many psychological barriers to think about automobiles, or houses, for Arktura IV. Systematically solving problems, Professor Arnold's listeners gradually developed the knowledge to overcome their psychological barriers.

Unfortunately, Arnold's method is very narrow. In essence, this is only an exercise with variations.

To provide for an effective development of the fantastic imagination requires a special system of exercises — mainly, the teaching of fantasy methods. It is not enough to say, "extend your imaginative thinking about something" — the methods for achieving this must be explained. (*Methods* here play the same role as *paint* to painting; we cannot say that the "paint" interferes with the freedom of fantasy. Experiments along these lines were made by the Public Laboratory of Inventive Methods, at the Central Committee of the All Union Society of Inventors and Innovators. A course, *Development of the Creative Imagination*, was produced and functionally tested. Students studied a method for generating fantasy ideas and a method for overcoming psychological inertia, and used them during special exercises or problem solving processes.

While working out the course, all exercises were first tested with writers of science fiction. This created standards for comparison, allowing for the development of a "the scale of fantasy." As a rule, the degree of fantasy imagination before training was relatively low. The spark of fantasy is struck with difficulty, and soon dies. This is not by chance. During the course of human evolution, the brain has adjusted to act with customary notions about many things. It requires hundreds, and thousands, of attempts for thought — shackled by these customary notions, to overcome psychological barriers.

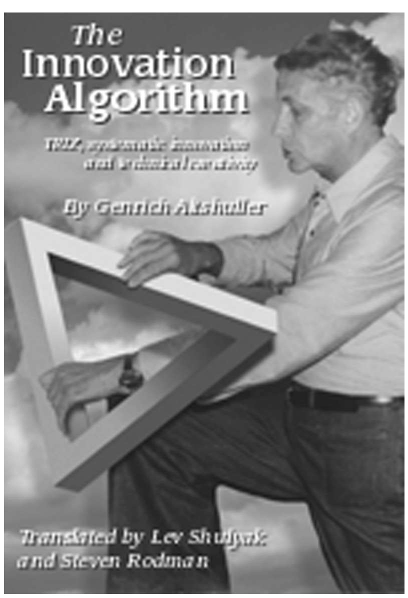
A person with no knowledge of gymnastics probably, upon seeing exercises for the first time, finds it difficult to understand what is happening on the gym floor — adult people gather together, without any perceived goal, waving their hands, jumping around, and then suddenly leaving without making or producing anything. Fantastic imagination exercise classes may look just as strange to the outside observer. Meanwhile, this is very serious and intensive work. From session to session, methods for fantasy development are learned. In the beginning, they are simple (*increase*, *reduce*, *do it in reverse* and so on). Then, they become more complex (*change characteristics of an object through time*, *change the interactions between an object and the environment*), and thought eventually learns to overcome its psychological barriers.

When asked to think of a fantastic plant, ten out of ten people will surely begin by modifying a flower or tree. In other words, change a whole organism. But, it is possible to get down into the micro-level — change the cells of the plant — and then make even smaller changes within the cellular level to produce remarkable plants that do not exist even in super-fantasy novels. It is also possible to go up to the macro-level and change the characteristics of a forest — again, making very interesting discoveries.

Each object (animal, plant, ship, lathe, and so on) possesses certain principal characteristics: chemical composition, physical design, micro-structure ("cell"), and macro-structure ("association assemblies"), energy support, directions of development, and so on. All these characteristics can be changed, and there are also dozens of methods for making these changes. Therefore, the fantastic imagination development course has a section on learning how to create and use *phantograms*. The phantogram is a table with one axis representing the changing characteristics of an object, and the other axis the main methods used to change them.

The richness of fantasy is characterized, for the most part, by the amount of these accumulated combinations, which essentially represent the *phantogram*. Before this type of training, the brain stored only separate pieces of such combinations. Only science fiction writers combine these pieces into the *phantogram* as the result of their professional training.

Studying the fantasy technique does not resemble learning the conventional methods by heart. The same exercise can be done differently, depending on the individuality of each person. Here, as in music, technical methods help uncover individual qualities — and very well done exercises can sometimes bring genuine aesthetic satisfaction, just like a very well played piece of music.



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