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Theory of Talented Thinking (TTT) expands the notions of TRIZ, related to thinking. TRIZ was initially created to find solutions for specific tasks; the predictive function appeared much later, therefore thought procedures in TRIZ still remain mainly aimed at solving technical tasks.

The basis of TTT is a system of 19 thought procedures. Some of them are taken from TRIZ with additions; some are developed by other researchers, but adapted for TTT. Others are formulated for the first time.

The object of the study are methods of changing notions, leading to strong, talented results. To select these changes, the scale of the levels of the system (invention) changes developed by G.S. Altshuller was refined. [3] Below is a refined scale with examples of the development of technical, scientific and artistic systems.

Level 5 (synthesis): Creation of a fundamentally new system that uses a new resource and forms a new global supersystem.

a. The invention of the airplane. A new resource for support – air. A new global supersystem - air transport.
b. The idea of a rotating celestial sphere, to which celestial bodies are attached. A new resource of analogy – a wheel. A new global supersystem is astrology, then astronomy.
c. The invention of opera. A new resource for theatre – music. A new global supersystem - musical theatre.

Level 4 (expansion): Development and/or update of the main subsystems of the 5th level system. Use of effects and phenomena to qualitatively improve the use of the resource.

a. The invention of the aerodynamic profile of an airplane wing. This allowed to increase greatly the lift of a wing.
b. The idea of several concentric spheres. This allowed to explain the main features of the planetary motion.
c. The use of polyphony, duets and trios, melodeclamation in opera. This made the opera an independent type of music.

Level 3 (adaptation): Changes in individual subsystems that allow fuller use of the already known resource.

a. The invention of flaps, slats and other control elements. Aerodynamic effects are better used.
b. The idea of epicycles - additional spheres attached to the main spheres (cycles). The best use of geometric effects to explain the minor features of planet motion.

c. The introduction of new specific musical techniques to the opera music - chorus separation, new modulation methods, new vocal techniques, etc. This made opera music versatile and allowed for the creation of new sub-genres.

Level 2 (idiot adaptation): Minor changes that do not affect the functioning of the system, but make it more convenient to manufacture, use and sell.

a. The use of rivets for the assembly of metal airplanes. The principle of flight has not changed, but the assembly was made easier.
b. The idea of eccentricity – a small shift of epicycles. The principles of geocentric celestial mechanics have not changed, but the results of predictions became slightly more accurate.
c. The introduction of techniques for decorating music, rare instruments, etc. Principles of opera music have not changed, but it has become more popular.

Level 1 (regression): Cosmetic changes that facilitate the advertisement and sale of the system. They often complicate or worsen the functioning of the system due to it being overloaded with "commercial" elements.

a. The service system in airplanes. Without affecting the principle of flight, the service increases the weight and the size of the airplane and the cost of the flight.
b. Eccentricities of the second and third order, deviation from the sphere of the moon, etc. Calculations have become incredibly complex and long.
c. Changes in costumes and the design of theatres, to increase the popularity and sales of the opera. [8]

For further research, only the changes of levels 3-5 were selected.
Based on these, we can give the following definition of TT:
Talented thinking – is the ability to create constantly new notions that are qualitatively different from the previous and that open new possibilities for humanity.

Procedures of talented thinking were identified by the pattern "the initial notion of an object or phenomenon – the new notion." Then the method of the change of the notion was identified.

Example 1: The description of the character in a novel is usually entrusted either to the author or to another character. In the novel "Dara" by Patrick Besson, however, the characterisation of the heroine is built on a large number of stories about her by various characters. The novel received the "Grand Prix du Roman" award from the French Academy in 1985-1986. [7]

Example 2: Ultrafine filaments from minerals are produced by blowing a molten mineral through a hole with a stream of energy. According to author's certificate 1049443, it is suggested to rotate the stream of the energy carrier while simultaneously affecting the filament with ultrasound.

Example 3: The Boyle-Mariott law (1662, 1676) states that at a constant temperature the product of the volume of a gas on its pressure is a constant value.
In 1873 the physicist J. D. Van der Waals derived an equation that relates the pressure, volume and temperature of gases, as well as constants that take into account the size of the gas molecules and the attraction between them. [2]

In all three cases, the pattern is the same: initially one system is examined, and it is affected by one or two factors (descriptor, pressure of the energy carrier's stream, volume-pressure), but next – a system that is affected by several factors together (several descriptors, pressure-rotation-ultrasound, pressure-volume-temperature-molecule size-attraction). The result is a talented invention, discovery. This procedure of transition from one-factor to multifactor system is repeated so often and inevitably that it can be considered an indispensable element of talented thinking.

The procedures of talented thinking

Primary

1. The ability to see the systemic nature of objects and phenomena (systemic thinking).
2. The ability to solve contradictions.
3. The ability to see the ideal model and the resources for building it.
4. The ability to build a generalized model.
5. The ability to single out a single model of the object or phenomenon under examination. The ability to see hierarchical and temporal boundaries of properties of objects.
6. The ability not to relate the fact to a known model.
7. The ability to overcome the supermodel or to change it.
8. The ability to go to the supersystem of notions.
9. The ability to identify the absolute model of the phenomenon, and then abandon it.
10. The ability to go from examination of one object to examination of groups and sets of objects.
11. The ability to operate with several parameters simultaneously. The ability to go from one-factor systems to multifactor systems.
12. The ability to unlimitedly increase and decrease any parameters of objects and phenomena.
13. The ability to unfold notions in time. The ability to see processes not just events or states.
14. The ability to go from the examination of ontogenesis to examination of phylogenesis.

Auxiliary

15. The ability to control associative imagination. The ability to build and develop analogies.
16. The ability to use languages fully and consciously.
17. The ability to operate with large array of information.
18. The ability to see the limitations of the constructed model.
19. Courage of thinking.

The primary procedures of TT – are specific methods of working with notions about studied or changeable objects. They are developed within the framework of G.S. Altshuller's paradigm about the immanence of the laws of development of systems, including those created by culture. By following these laws, talented thinking makes it possible to create new notions before the need for them escalates.
The carrier of TT, however, is a person. Therefore, the auxiliary procedures are aimed at raising a person to be as talented as possible.

Example 4: D. Mendeleev was not the first to notice the regularity of changes in the chemical properties of elements depending on their atomic mass. In 1817-1829 this regularity was noticed by J.W. Döbereiner. D.A.R. Newlands discovered this regularity in a more developed form in 1865. However, when faced with criticism from their colleagues, both discoverers decided not to continue the research. In 1869 D. Mendeleyev did a report on the same topic. After receiving criticism he continued the research and published a new article with predictions about the properties of undiscovered elements. About 20 years after this, the periodic law was recognized by most chemists. [8]

As we can see, it is not enough to make a discovery. A tremendous courage of thinking is needed to develop and defend it, despite the criticism. Even more courage is needed in order to even assume a serious change of notions. Bold thinking is one of the auxiliary procedures. A whole array of methods was revealed for forming these procedures. The materials of other researchers – M.Rubin [16], B.Nikitin [11] [12], M. Novitska, were used for this. [8]

The basics of the Theory of Talented Thinking are described in the book «'Secrets' of talented thinking» published in Russian and Latvian languages with the help from the Foundation ASNI and from L. Sakieva and V. Tamuzhs personally.

In addition to talented thinking, research has been conducted in more specific areas for many years. "Biography of arts" is a two-volume book published about the regularities of development of artistic systems. [7] It describes the main regularities of development of the means of expression of artistic systems, 12 typical changes of artistic systems that form a time line, and the regularities of development of themes. The book contains 482 examples and 112 tasks, as well as a number of development predictions for some art directions.

For several years the theory of the development of artistic systems was taught to design students at the Faculty of Education, Psychology and Art of the University of Latvia. The works of students, made with the use of the above-mentioned regularities, turned out to be truly interesting.

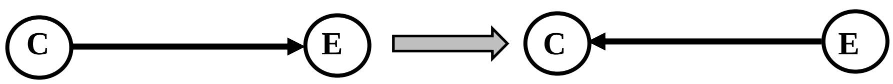
The research in the field of philosophy of science has been conducted for more than 20 years. The main regularities of development of scientific notions and a number of typical changes of notions that give qualitatively new models have been identified. A theory of the development of scientific concepts (TDSC) is being developed. Now a new book is being written on the regularities of development of scientific notions.

Using the identified regularities, it is possible not only to solve the specific scientific problems, but also to create new concepts. An example of a concept developed using TDSC – the creation of a new traffic flow paradigm. [10]

Some examples of large regularities in the development of science are given in the online lecture by Y.S. Murashkovsky “Talented thinking in science. How to make discoveries.” [9].

A number of typical patterns for changing scientific concepts have been identified within the large regularities. These are changes of quite narrow classes of notions, giving new, more adequate notions..

For example, let’s consider one such pattern – “Inverse cause-and-effect”.
If the model containing the direct cause-and-effect (CE) encounters a contradiction, it makes sense to test the model with an inverse cause-and-effect relationship (cause and effect change places).



Example 5: The Darwinian model implied that mutations within the species lead to separation of subspecies from each other, then one subspecies enters another niche and a new species is formed. The Chetverikov model implies the reverse process - part of the species gets into another niche, and as a consequence, it produces adaptive mutations. [5]

Example 6: According to the theory of phlogiston, the melting of metal is the transition of phlogiston from charcoal to ore. Lavoisier suggested that this is the process of transition of gas from ore to charcoal. [1]

Example 7: A researcher of Australian Aborigines, Collins believed that the locality was named after the name of the community that lives on it. Kabo showed that in fact the communities were named after the locality. [6]

Example 8: Seebeck believed that by heating the contact point of dissimilar metals, it creates a magnetic field that causes a current in the circuit. Later it turned out that the heating causes the appearance of a current, and the current causes a magnetic field. [4]

Example 9: In Freud's old view that homosexuality develops in families with a strong-willed mother and a detached father, the cause and the consequence are confused. A feminine youth in the family is a shock for the father and causes a natural concern for the mother. [14]

Let's see if this pattern can be used to solve modern scientific problems.

Example 10: According to the traditional model, human activity causes an increase of CO_2 in the atmosphere, which, in turn, increases the average temperature. However, the analysis of the content of CO_2 in the air tens of millions of years before the appearance of humans shows that there is indeed a correlation between the temperature and the concentration of CO_2 in the atmosphere, although it cannot be related to human activity. Let's try to solve this problem by using this pattern. In the initial model the increase of the concentration of CO_2 in the atmosphere is the cause of warming. Let's construct a reverse model: the warming causes an increase in the concentration of CO_2 in the atmosphere. Where does CO_2 come from then? It is known that as the temperature rises, the solubility of CO_2 in water drops, so when the temperature is raised, carbon dioxide is released in large quantities from the oceans. [13]

There are two main levels of creativity: finding solutions for problems that have already arisen and prediction of future systems. TRIZ has mechanisms for distant prediction, but the modern practice of application of TRIZ has almost completely discarded this level.

Meanwhile, the current acceleration of the development of systems requires engaging in distant predictions first. There is no point in solving problems on the way, if you are going the wrong way.

Example 11: In 1993 Microsoft started to release digital multimedia encyclopaedia Encarta on CDs. It would seem that the project was good, but then Google appeared. [17] But to predict a perfect medium was not so difficult!

Simultaneously with theoretical developments, an experimental training is conducted. A course in basics of talented thinking was taught at the Association of Latvian Young Scientists (three semi-annual seminars), a short course is being conducted at the Baltic International Academy and at the RISEBA University, and the Foundation ANSI organized a number of seminars for teachers.

This training revealed a number of problems faced by adults in learning TT. It became clear that the current paradigm of education and upbringing is unsuitable for the upbringing of talented people. The attempts to find the mythical "gifted children" or to adapt TRIZ to the existing education system have reached a dead end. Therefore, a Concept of Talented Education was developed. It is described in a manual for teachers, published under the project Erasmus+ „School of Talents” [15]

The transition from training capable performers to the system of education and upbringing of versatilely talented people is inevitable. It can be ignored, it can be resisted, but it cannot be stopped.

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