



PSYCHOLOGICAL BARRIERS AND CREATIVITY

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Psychological inertia is a major factor which limits our creative imagination. During our lifetime we collect and accumulate a great deal of knowledge, which includes facts, associations, assumptions, rules, constraints. Role of this knowledge is two-fold: first of all, it enables and evolves our thinking process. The more we know, the more we can create. Second, it guides us towards making right decisions. With respect to most technical problems which are not inventive, this knowledge is very useful and helps us create robust and reliable designs based on reusing previous knowledge, principles, facts and rules.

However when it comes to creativity, this knowledge might play a rather negative role since it often does not let us jump what is called "out of the box". This "box" is created by our mental associations, assumptions and constraints – by anything that is stored in our mind and is used in our reasoning. For instance, a great british scientist Lord Kelvin once noted that "flight of anything heavier than air is not possible". This statement (or assumption) delayed creation of a plane for quite a while since people trusted opinion of such a distinguished scientist. But brothers Wright, inventors of the first plane, probably were not familiar with this statement – they were bicycle engineers - and as a result they came up with a breakthrough invention thus disproving Kelvin's assumption.

Usually psychological inertia manifests itself in three categories: scope constraints, assumptions, and communication and cultural barriers. Let us have a look at these three categories:

Scope Constraints. This type of constraints usually limit our "out of the box" thinking when we generate new ideas and solutions.

1. **Thinking too specific.** To overcome specific thinking, we need to think about a problem and possible solutions at abstract level. For instance, specific terms can be replaced by more generic terms. When we say the word "wall" we will imagine a wall consisting from wood, bricks or concrete panels or any other association with a wall of a building which is most familiar to us. However if we replace "wall" with the word "barrier" we will get rid of associations caused by buildings' walls. A barrier is not only a wall, it is something which can not be penetrated – in many different ways rather than walls only.
2. **Lack of system thinking.** Almost any problem can be solved at many different system levels. As within a system where the problem emerges as well as outside the system. But traditionally we tend to look at a very narrow spot where the problem emerged. It is fine as long as a desired solution can be found. But it is not always possible or feasible. For instance, if we want to make driving a car safer, it might be not necessary to make a car stronger or more impact-resistant – we can change traffic rules, redesign roads, add intelligent car communication systems preventing accidents, and so forth.
3. **Blocking thinking with existing solutions.** To avoid this barrier, we should learn how to "unlearn". Sometimes knowing how to solve a problem prevents us from finding a better solution since we stuck among known concepts and lose motivation for further search.
4. **Looking for a single solution.** Each inventive problem has more than one solution. In fact, inventive problems have an open solution space. A final decision on what solution to choose depends on specific constraints. But it is very

important to ignore these constraints during an idea generation process since they will limit our imagination to a large extent.

5. **Lack of metaphorical thinking.** It often helps to break thinking barriers by trying to present a problem in a totally different way, or to see how a similar problem was solved in another area of technology or in nature. An example of a technique which copes with this barrier is Syntectics which uses a method of metaphor to represent a technical behaviour in terms of human behaviour.

Assumptions usually emerge when we already have an idea and try to make its preliminary evaluation. A danger of such assumptions is that a great invention can be rejected or delayed.

1. **"Too far from today"**: a usual assumption that an idea might be good, but it belongs to a much distant future. As a result a competitor might implement the idea much faster.
2. **"It is impossible"**. It is quite a common assumption which is based on knowledge of current constraints and limitations in a specific knowledge area. However this is a dangerous assumption since it often prevents from checking an idea which might be possible to implement. Such assumption must be made only after the idea is tested, of course unless it is clear in the very beginning that the idea violates basic laws of science.
3. **"Contradictions must be compromised"**. Traditionally, our mind tends to soften contradictions rather than resolving them completely. Optimization is much safer than stepping onto unknown territory. However as TRIZ studies demonstrated, most important inventions in human history were created by elimination of contradictions.
4. **"Idea is too crazy"**. Many novel and bright ideas seem to be crazy when they are exposed for the first time. People are conservative in their nature so they tend to reject ideas and things which do not fit their current pictures of the world. When Alexander G. Bell invented a phone, it took him quite a lot of efforts to convince authorities and investors that the phone will be useful. Most of them considered the phone useless even after Bell demonstrated how it worked. The same happened with many other high-level inventions.
5. **"It will be too complex"**. This happens when an idea is accepted as a promising one but we believe it might be too complex to implement and therefore there is a high chance of failure. Which, in fact might not be true after analysis.

Communication and Cultural barriers:

1. **A fear to express your ideas.** Sometimes we are afraid of telling about our ideas to others since we do not want to be put down by someone who will say that the idea is not interesting, or not promising, and so forth. All people have mental inertia, even the smartest and most talented ones. Thus saying your idea is very important otherwise the idea might be lost.
2. **Lack of communicating your ideas at any time.** Any significant invention is not a result of work of a single ingenious mind – it is always a result of collaborative effort, either in space, or in time, or in both. No hi-tech invention would be possible today without great amount of knowledge created in the past by different people. Making your ideas known can contribute to further inventions – either by you or by someone else from your team.
3. **Wrong attitude towards creative imagination.** Many organizations treat creative imagination as childish and not deserving attitude in a "serious" organization. It is a totally wrong approach and they should know that Albert Einstein once said, "Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand."

4. **Lack of incentives for creative efforts.** Many managers still believe that everyday routine work is more important and heavier than creative efforts since it directly contributes to profits, and thus they often consider creative work as a “pleasant waste of time”, forgetting that all their business is based on someone’s creative idea, first of all. Organizations which treat creativity as a side job will have a little chance to survive in a highly dynamic and global competitive environment. Creativity is not easy and must be properly rewarded to create enough motivation for people to invest their time to innovation.

Any team, organization, or an individual who wants to be successful with creativity, should be aware of these barriers and take countermeasures to diminish their role as much as possible. In TRIZ, many tools help to directly fight mental inertia, especially linked to the scope constraints. But only TRIZ is not enough to create sustainable innovative organization: it is very important to nurture creative culture in the organization or any team.