

A Left-Brained Approach to Creativity, a Very Right-Brained Subject

I've learned that people communicate most effectively when they speak the same language. Creativity is an essential tool in an innovative organization but when creativity topics are discussed with scientists, they are most often discussed in the language of "creativity". I recently had opportunities to present a "left-brained" approach to creativity to scientists and product developers with excellent feedback. To do this, I expressed creativity and innovation in language of equations. Exploring these equations leads to a better understanding of the ways creativity might be initiated, encouraged, and discouraged, and as I collaborate on these concepts in the best spirit of scientific advancement, the equations have been enhanced through the input of others.



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Investment community has a positive impact on company valuation.

- To increase value based on perceived innovation, management seeks a predictable means to produce successful, sustainable new product offerings.
- Management often seeks creativity, but actually profits from innovation.

So what specifically do the terms creativity and innovation mean? We can turn to experts for their input:

- Maya Angelou – You cannot use up creativity. The more you use the more you have.
- Charles Kettering – An inventor should be defined as someone who doesn't take his education too seriously.
- Roger von Oech – Creative thinking involves imagining familiar things in a new light, digging below the surface to find previously undetected patterns, and finding connections among unrelated phenomena.

Or, I can propose the following definitions in the form of equations:

$$\text{Creativity} = \text{knowledge}^{(1+\text{imagination})}/\text{evaluation} \quad (1)$$

$$\text{Innovation} = \text{creativity} \times \text{action} \times \text{emotional intelligence} \times (1+\text{persistence}) \quad (2)$$

So let's briefly explore the meaning of these equations.

Creativity

Creativity (equation 1) starts from a base of knowledge. Knowledge alone may support creativity, but the relationship isn't very powerful. However, if you have no knowledge, you will have no creativity in that area. Imagination and evaluation cannot improve a zero knowledge base (Fig. 1).

Creativity facilitators and skilled problem solvers view knowledge more broadly than that directly related to the problem at hand. For example, housewives have been invited to apply their worldly knowledge to the solution of electrical engineering problems. While the housewives presumably were not electrical engineers, the application of their knowledge to the stated problem could often result in analogies that could then be applied by the electrical engineers. So, in this case, knowledge was applied at two levels in the creativity process: the original, direct knowledge of the problem and knowledge used as a source of stimulating analogies leading to its solution.

Knowledge, raised by the power of imagination, is the base from which creativity really flows. We have "1+" in the exponent because imagination doesn't ever diminish knowledge. If imagination is zero, you still have knowledge but no enhancement. A tiny amount of imagination enhances knowledge a small amount. However, since imagination is an exponent, as imagination increases, creativity is greatly increased (Fig. 2).

I believe imagination is always positive...you may have a small amount or a great deal, but it is unlikely that imagination can ever be "negative". Certain cultural elements known to increase imagination in an organization have a huge, positive impact on the creativity. These include:

- No fear: the organization embraces risk, tolerates failures
- Encouragement of child-like play

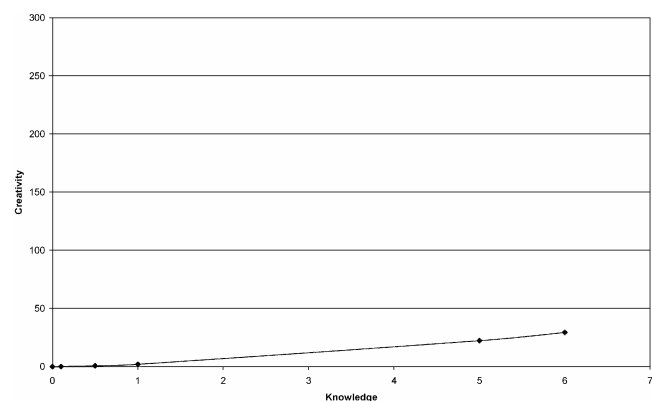


Fig. 1. Effect of knowledge on creativity.

- Facilitation of face to face interaction
- Encouragement to seek input from outside resources
- Collaboration and building on the work of others

Evaluation is a necessary part of the creative process. Evaluation focuses the possibilities to those germane to the problem or opportunity. If you have no evaluation step, all you have are facts or creative ideas, but they are likely to be unfocused. (Actually, by the equation, you actually have nothing at all since you can't divide by zero.) But the equation guides us to see that there is an optimum amount of evaluation. It also shows us the impact of "negative" evaluation.

As a society, we are trained and rewarded for being evaluative, so we have a strong tendency to move quickly to a thorough evaluation process. Good creativity process facilitators always

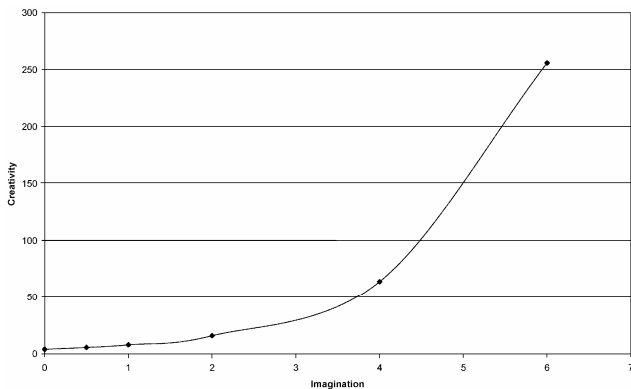


Fig. 2. Effect of imagination on creativity.

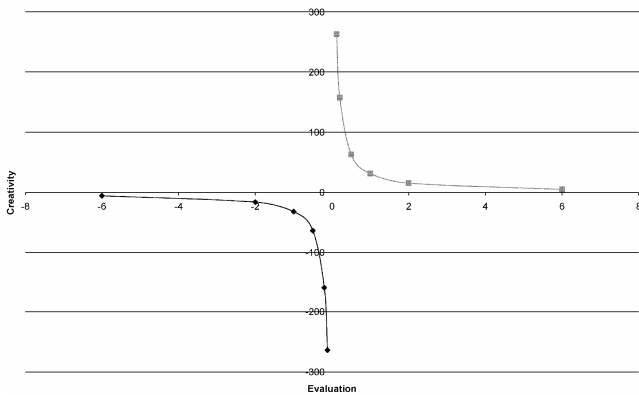


Fig. 3. Effect of evaluation on creativity.

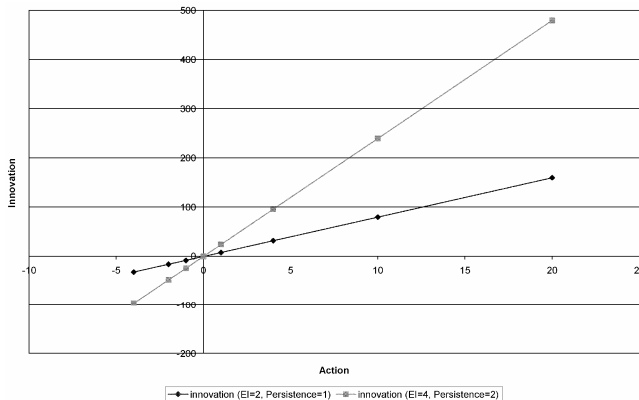


Fig. 4. Effect of action, emotional intelligence, and persistence on innovation.

separate evaluation from creativity activities. They also carefully manage the amount and type of evaluation of the creative output. The equation explains why this is appropriate. As evaluation begins, creativity is enhanced. However, even though the evaluation is "positive" (carefully considered, delivered in a positive, constructive manner), as it increases, creativity rapidly diminishes (Fig. 3).

When evaluation is "negative" (given with the intent to "shut down" the idea, delivered in a mean-spirited way, etc.), the effect suggested by the equation is unexpected, but instructively parallels real observations. When a large amount of negative evaluation is given, its effect on creativity is negative, as expected. However, when a small amount of "negative" evaluation is given, its effect is more harmful. And a very small amount of negative evaluation can be devastating!

The reasons for this become clear on reflection. If the evaluation is blatantly negative, it is easily discarded for its obvious negative intent. If the evaluation is negative, but not blatant, it has significant negative effect, but no easy means of refutation. It's the small "digs" on a creative idea that chip away at an individual's self esteem and consequent willingness to take risks.

So, you may wonder if the optimum amount of evaluation is small but it can have extremely powerful effects based on its intent, how do you know if the evaluation is positive or negative? And how can you assure the optimum amount of positive evaluation?

You can recognize the direction of the evaluation by its effect on the organization. If the organization views evaluation negatively, or if it is delivered in a negative fashion, you will see creativity diminish. Suffice to say, evaluation is a crucial and powerful part of the creativity process. And as such, this is a place where the help of experts can be very effective.

Innovation

Innovation (equation 2) is the process that produces the desired ultimate business result, which is change, profit, or some specific end benefit. Creativity is only one factor in the innovation equation. Too often, people assume that once creativity occurs, the job is done. But the generation of a creative idea produces nothing tangible, and is, of its own, insufficient to produce innovation.

Once we have a creative idea, the equation guides us to the realization that there are other factors that are critical to producing innovation. It also takes action, emotional intelligence, and persistence to bring creative ideas to life.

Action may be zero, positive, or negative. Specific actions may facilitate the innovation process and others may harm it. If no action is taken, creativity is multiplied by zero, resulting in zero innovation. Positive actions related to the idea help convert a creative idea into a real innovation. Larger positive actions help more than small positive actions. But even a small positive action is more constructive than any negative action...which, when multiplied with the creative idea, drives a negative result (Fig. 4).

Have you ever seen a good creative idea suddenly become perceived as a "bad thing"? Often, a negative action becomes associated with the creative idea leading to this result. Knowledge of the innovation equation provides the constructive possibility of dissociating the idea from the action, so the beneficial creative idea can be retained, and the negative action discarded.

Persistence is also a factor. Like action, persistence helps, and a great deal of persistence may help a great deal.

But persistence alone can be problematic...we've all seen persistent jerks who hurt their causes more than help it. Inclusion of emotional intelligence as a factor recognizes this fact. Emotional intelligence is defined as "the capacity for recognizing our own feelings and those of others, for motivating ourselves, and for managing emotions well in ourselves and others. It describes abilities distinct from, but complementary to, academic intelligence..." (1) Strong emotional intelligence goes a long way toward helping innovations become reality. Conversely, a lack of

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(Skarra—continued from page 278)

emotional intelligence skills can certainly diminish an innovation effort. If emotional intelligence is totally lacking, the effect on innovation can be as severe as a lack of action...no innovation may result.

Persistence is the characteristic that enhances the base emotional intelligence skill already present. Like imagination and emotional intelligence, I don't believe you can have negative persistence. However, if persistence is zero, you still have the base of emotional intelligence. The equation reflects this fact by adding 1 to persistence.

Persistence can be viewed as one way to counterbalance the difficulties of evaluation discussed above. Using good emotional intelligence, it is possible to persistently move a creative idea forward by counterbalancing a suboptimal evaluation process. Edison, a phenomenally innovative person, described each failed experiment as one more he didn't need to run.

Finally, the innovation equation shows us that creativity can be compounded by the product of action, emotional intelligence, and persistence. Increasing any of the factors has the potential to increase innovation. This explains why some organizations, with relatively small creative output but significant emphasis on the other factors, may still produce significant innovations. Conversely, some organizations may be wildly creative, but without emphasis on the other factors, may not produce innovations.

Benefits of Creativity and Innovation Equations

So what's the use of considering equations about creativity? Certainly, it is not my intent to suggest that creativity and innova-

tion can really be reduced to a formula. However, feedback indicates that for scientists who may be most effective in a "left-brained" world, this orderly consideration of a frequently disorderly topic provides a framework to help them contribute their considerable talents to the creativity and innovation process. It clarifies the importance of knowledge in the process and demonstrates the role of imagination for enhancing that knowledge. It shows the critical and surprising impact of evaluation.

The innovation equation clarifies that creativity alone does not produce innovation; action and emotional intelligence are also required. Persistence may also play a role, but it is emotionally intelligent persistence that is actually required.

Finally, this brief discussion stimulates a different way of viewing creativity and innovation and has already produced wonderful discussion and collaboration on these topics.

The equations show an actionable path for the scientific community to increase its value to their corporations. Creativity and innovation can be expressed in our language. As a scientist, I find that fully understanding a phenomenon and the levers I can utilize to maximize a desirable outcome lets me more reliably deliver that desired outcome. In effect, these equations guide me to increase my own creative and innovative behaviors, and the effect of enhancing the creativity and innovation of the technical community can be profound. Best of luck in your creative endeavors! I welcome your input to any of these ideas (Lskar@merlindev.com).

Reference

1. Goleman, D. Page 317 in: *Working with Emotional Intelligence*. Bantam Books, 2000.