

The Art and Science of Innovation

When trying to extract the formula for success from a given cohort of people experts apply the “*The Millionaire Next Door*” type of analysis. In this case we would look at successful artists and discover what habits and work preferences they have in common. The problem is that artists are like the number π (pi) – endlessly fascinating but highly irrational and excellent source of randomness. Some of them like to work early in the morning like Frank Lloyd Wright others in the small hours of the night like George Sand (Currey 2013). Many artists work long hours but a sizeable percentage were a bit more leisurely (we’re looking at you, Kafka).

On the surface scientist seem a more congruous (and well-behaved) group. But what could scientist possibly have in common with artists?

The common denominator of scientists and artists is creativity. Both groups take existing elements, combine them in creative ways and produce something new. We all know from Peter Drucker that innovation is one of the only two functions of a business. Creativity is the lifeblood of innovation. That is why any business can learn valuable lessons about innovation from artists and scientist.

This essay will explore the nature of the creative process and extrapolate how creativity can be induced in the workplace. The essay is more concerned with the act of innovation rather than what innovation should be (which was explored by Drucker). Along the way we will demolish some unhelpful myths about creativity.

The Myth of the Lone Genius

One of the most persistent fairy tales of modern times is the myth of the lone genius. Picture a lone figure toiling away in a darkened room, untouched by the mediocrity of everyday life. It makes for a good narrative, and why should we let truth get in the way of a good story.

Common wisdom holds that proficiency in the high fantasy genre of fiction is inversely proportional to social life. However, even the father of the modern fantasy genre J. R. R. Tolkien was not alone in his endeavour. He received great support from another pioneer in the genre C. S. Lewis – who gave detailed comments on Tolkien’s early mythical stories and poems (Farrell 2003). The two and some scholars from Oxford formed a literary discussion group called “The Inklings”. Ideas for future stories were bounced among members of the group. Writing and painting may often be solitary activities but the creative fuel behind them has collaborative origins. Therefore the lessons from many great artists and scientists can easily be applied to organizations which by nature are collective.

Great creative ambitions (e.g. new sub-genre of fiction) always need strong support. In art we have the Impressionists, “*La Bande à Picasso*”, the Dadaists, and the Surrealists. Many of them were ostracized from mainstream life but together they changed art (Taleb 2010). Supporting peers are not just a source of new ideas but moral support. We all need peer-validation especially when our creative impulses lead us into unexplored lands. Even the

great David Hume spent weeks sick in bed after his masterpiece “*A Treatise of Human Nature*” was thrashed by critics. When a team is working on some potentially ground-breaking innovations (e.g. Google[x]) it needs the full support and confidence of management.

Eureka!

Another aspect of the lone genius is the “*Eureka!*” moment, the bright ray of brilliance which immediately cuts through the fog of uncertainty. This is referred by Drucker as the “flash of genius” moment.

Ideas are a dime a dozen. The script for the original “Star Wars” went through many rewrites which altered the plot and characters completely. Edison and his team tried more than 100 different compounds in over 9000 experiments to find the most suitable light bulb filament (Caldicott 2012). Darwin also hit many dead ends until he formulated the critical component: natural selection (Gruber 1974). In his own words: “*I love fools’ experiments. I am always making them.*”

Bottom line is that innovation is very inefficient. Companies that want to innovate have to be aware of the blubber of failures that surrounds a good idea.

That is why blindly stressing efficiency in a company which thrives on innovation could be very counter-productive. For example, in 2000 the multinational conglomerate 3M appointed James McNerney (former GE executive) as its CEO. McNerney was a disciple of Jack Welch and tried to apply his famous Six Sigma programme in order to boost efficiency. When McNerney left in 2005 the prevailing sentiment was that his efficiency policies have greatly damaged 3M’s culture of creativity (Huang 2013). Six Sigma and the efficient “Work-Out” have done wonders for GE. However, Six Sigma it is not entirely suited for companies that survive on constant innovation rather than razor-sharp efficiency.

Innovation Assembly Lines

Creative work is like running an ore refinery: bigger the output the higher the chance of gold nuggets. One study used statistics to analyse the output of exceptionally creative individuals. The surprising fact is that in each category (writers, painters, scientists, and composers) there is a strong correlation between output and creative success (Simonton 1997). One would think that creative people would exhaust themselves if they churn out a lot of work (e.g. Mark Twain). The right conclusion would be that more ideas increase the chance of stumbling upon something great.

The wrong conclusion would be that innovation employees need to be constantly spurred with tight deadlines. One study analysed creative teams in 7 US companies and found out that hectic days were less likely to result in good creative ideas (Amabile 2002). Employees actually believed the opposite: that they were more creative on these days. But the creativity-inhibiting effect was felt up to several days after a particularly intense day. Let’s not forget that many artists (especially composers: Beethoven, Tchaikovsky) liked to take long

walks, usually with a pen and paper to jot down ideas (Currey 2013). Leisurely pace produces the initial sparks and hard work afterwards puts sheen on the final product.

Failure is an Option

I am not yet done with the ore refinery metaphor. The residual ore can also be used for other purposes. Many ideas fail at different stages of development or implementation but can be repurposed. Edison and his colleagues from Menlo Park spent the better part of a decade trying to perfect alkaline storage batteries for his vision of a future filled with electric cars. By that time the internal combustion had been vastly improved. However, these batteries found application in heavy-duty manufacturing – something that Edison had never intended (Pickett 1977).

A responsible and innovative company should recycle failure. A good example is the Tata group introduced an annual award for best failed idea (the Economist 2011). Pharmaceutical company Eli Lilly not only has “failure parties” but assigns a team of scientist and doctors to analyse every compound that has failed (at any point) during the clinical trial (Burton 2004).

The Da Vinci Code

Renaissance Italy might seem far removed from our email-infested daily lives but Leonardo da Vinci still had to make job applications (Gelb 2004). In one application sent to Ludovico Sforza (the regent of Milan) Leonardo carefully listed his abilities to construct cannons, mortars, covered cars (basically a tank), scaling ladders and other instruments of warfare. In peace time he could construct buildings, execute sculpture and paintings. In stark contrast to today’s applicants Leonardo was actually holding back on his breathtakingly diverse range of talents. Suffice to say he got the job.

“Successful innovators use both the right side and the left side of their brains” (Drucker 2001). Leonardo was the epitome of that phrase (except the ‘success’ part). His example teaches us that great ideas often come at the edges of different disciplines. If it wasn’t for Leonardo’s interest in anatomy, light and botany he would not have created such vivid paintings. How do we crack the Da Vinci code and emulate his creative genius in an organization?

We don’t actually need polymaths to create great ideas. The relentless pace of knowledge creation and exponential growth in complexity makes it impossible to be a complete expert even in one field. If Leonardo sent his job application today HR would probably reject him - thinking he is exaggerating more than acceptable. If we are looking to solve a problem or come up with a new product it is not advisable to bring generalists. As ever Peter Drucker saw the winds of change: *“the operating organization tends to become an organization of specialists of all kinds”* (Drucker 1988).

The aptly named “Polymath Project” shows us why.

The Polymath Project is an online collaboration where mathematicians from across the globe solve fiendishly complex problems. Many of them have a very specific area of microexpertise

where they surpass even their most accomplished peers. Pooling diverse knowledge creates “*designed serendipity*”: breakthrough advancements are not occasional fortuitous turn of events but commonplace.

Even Einstein used a bit of help from Lady Fortuna. While working on his general theory of relativity Einstein was stuck on a mathematical problem related to nonstandard geometry. Luckily, one of his friends pointed him to Bernhard Riemann who had worked on the geometrical ideas Einstein needed (Nielsen 2011). To paraphrase John Donne: “no genius is an island”.

Designed Serendipity

Serendipitous connections are the key to unlocking the creative potential of any organization. Designed serendipity can be achieved in the workplace through simple means such as a whiteboard or a company discussion forum. The Googleplex is full of whiteboards where computer engineers can write down specific problems. Most often when they return they will be some solution or at least a funny cartoon. Other more eccentric serendipity-enhancing solutions include a wooden staircase littered with electric plugs. Googlers are encouraged to sit and work there and thus increase the chance of close encounters of the fortunate kind (Sawyer 2008).

Open work environments are where serendipitous creativity thrives. It is advisable to have water-cooler/relaxation/lunch areas between different units of the company. So employees from different divisions can bump into each other. Some furniture companies such as Herman Miller have designed furniture that can easily be folded and moved to suit budding collaborative efforts (Sawyer 2008).

In the end, no fancy furniture can stimulate collaboration if the organizational structure is very hierarchical. Employees should feel comfortable discussing problems with their supervisors. Peter Drucker (along with Rosabeth M. Kanter) was one of the first to champion flat organizations. He anticipated that in the “information-based organizations” knowledge will exist primarily at the bottom. Drucker forecasted that in product inception employees from across functions will work together in synchrony. He likened it the organization to an orchestra where the CEO is the conductor who unifies performers and sets the tempo.

Here I prefer the metaphor presented by John Kao who likened innovative organizations to jazz bands. When performing jazz musicians have no script and often improvise. At the same time each improvisation is naturally weaved into the performance.

To Improvise Success

But when it comes to stage performances I believe improvisational theatre (or improv) offers the best tools for innovative organizations. One Silicon Valley firm (Palantir) even requires new employees to read a guide to improvisational acting called “*Impro: Improvisation and the Theatre*” (Pink 2012). In improv the characters, dialogue, setting are made up on the fly. They are millions of places where the story can go. Every actor through his or her dialogue

and actions can shape the story. Improv theatre can equip a person with some very useful skills for collaborative work and innovation.

A fundamental rule of improv is deep listening. There are long pauses during the dialogue because actors don't know what follows. Likewise, team members have to listen intently and not just rush to speak their mind. This way each idea is a continuation of what came before it. Unexpected questions arise all the time because participants have few pre-conceptions of what follows. Asking surprising questions is a hallmark of the most creative teams.

In improv every actor makes meaningful contributions and no one has full control of the creative process. Researchers found that lower status in organizations leads to greater awareness of the surrounding context (Kraus et al 2011). That is why in creative teams a manager should be a participant rather than a towering figure. Other fundamental rules of improv are: "don't deny" and "make your partner look good". This ensures a smooth and friendly discussion and encourages even the least verbose participants to contribute. It's all about suppressing egos. Last but not least improv can help employees cope more easily with unexpected developments. After all – in real life there is no script.

A massive asterisk needs to be inserted here. The lesson and techniques used in improv theatre work best when there problem is not defined, where the team is looking for both questions and answers. Improv is different from brainstorming which historically has shown very mixed results. Brainstorming is more restrained; ideas are piled onto each other instead of being re-developed. Mimicking improv is not a good idea when dealing with specific problems and there's a time pressure. Too much freedom has its price and next we will look at the dark underbelly of unrestrained creativity.

All Play and No Work

The 19-century French poet Arthur Rimbaud announced: "I saw mosques in the sky". This interpretation prompted him to go "poetic" Abyssinia (in East Africa) where he was brutalized by a slave merchant, contracted syphilis and lost a leg to bone cancer (Taleb 2005). This tad extreme example tries to say that sometimes we need restraint on our pursuits be they creative and with noble intentions.

From the examples and explanations above it seems that creativity doesn't need a leash. Not at all – improv work for instance can be risky for manifold reasons. First, improv work is inefficient and takes time from other planned projects. Second, improvisation makes it far more difficult to retain a central vision especially when there are many teams within a large company. Third, too many suggestions might lead to "feature creep". Overthinking a product might lead to it being "too clever" and that's number one on Drucker's "Don't Do list" of innovation. The risks of improv innovation are best summed up by the great Yogi Berra: "*If you don't know where you're going, you might not get there*".

Depending on the industry and type of work management should find the balance between creative chaos and order. Successful innovators define risks and confine them (Drucker 2001). Greater individual autonomy is possible mainly in smaller units that do not exceed Dunbar's number (around 150 people). Brazilian manufacturer Semco keeps its unit size well below 150 people even though its workforce is in the thousands (Semler 2004).

Even “*without a common power to keep them in awe*” creative companies can be highly productive if they “*require greater self-discipline and even greater emphasis on individual responsibility*” (Drucker 1988). In the end, most innovative companies would want some structure in the form defined responsibilities and prioritisation of projects. At the same time there should be constant communication between units and project teams.

The Four Horses of Creativity

Consider these statements presented by the writer E. M. Forster: “the king died and the queen died” and “the king died and then the queen died of grief”. People are more likely to remember the second statement even though it contains more information (Margalit 2002). People remember stories not facts. That is why to sum up the lessons from artists and scientists on creativity I am going to tell four short stories featuring horses:

1. The Ancient Greek painter Apelles was unsuccessfully trying to depict foam around a horse’s mouth. In terrible frustration he threw his sponge at the painting and it left a perfect representation of foam (Cahn 2012). Throughout history and across disciplines we see how great feats of creativity are frequently serendipitous in nature. Persistent “trail-and-error” opens the door for more serendipitous discoveries. Companies can create “*designed serendipity*” by creating an open working environment that stimulates the flow of people and ideas.
2. One team was trying to create a dispenser for viscous liquids that doesn’t get clogged with dried up substance (Gordon 1961). One collaborator who had farming experience suggested they use a horse’s ass as a model of releasing mechanism (which turned out to be a success). The main takeaway is that creative sparks can come from the unlikeliest places. That is why innovation teams should consist of specialists from different fields and background.
3. The great French essayist Michel de Montaigne came up with his ideas not in front of a desk but while on horseback. This shows that creativity cannot be rushed. Oftentimes sparks that fly from collaborative innovation need to stew in people’s minds. Tight deadlines and great workload might increase efficiency but it will subdue the creative potential of employees.
4. After he got the job Leonardo was commissioned to design and build the largest statue of a horse (Gelb 2004). He did some extensive work on the project but never completed it. Leonardo had many unfinished works and did not realise the wondrous ideas glimpsed in his notebooks. Creativity is a good servant but a less than stellar master. It has to be captured and channelled in the right places at the right time.

The future ain't what it used to be...

Peter Drucker dreamed of the entrepreneurial society: “*innovation and entrepreneurship have to become an integral life-sustaining activity in our organizations, our economy, our society*”. I believe that day by day his wish is becoming more real. Diffusions of innovations are getting shorter while the pressures to innovate stronger. The average time a company spends in the S&P 500 index has declined from 75 years in 1937 to about 15 years today (the Economist 2011). The most innovative companies (usually tech companies) are now flatter and less bureaucratic. Employees in them now resemble entrepreneurs operating within an organization: they are far more autonomous and expected to initiate projects. Perhaps this essay subconsciously channels the dream of the entrepreneurial society.

Perhaps the entrepreneurial society will be this generation's revolution!

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