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Analysis vs. Illusions in Project Management

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Structured analysis of the situation helps project managers to overcome illusions can improve their judgment. However, more likely than not, prior to making a decision people have not performed any structured analysis, or they misinterpret the results of the analysis. Complicating matters, sometimes the analysis is extremely complex and results may be incorrect. Even if the analysis is performed and is correct, often people do not realize its value. As a result, even now where we have highly trained experts with access to powerful computers, running the most advanced advanced mathematical models, we still bear witness to the outcome of so many poor quality decisions.

Why people don't perform even simple analysis?

On September 15, 2008, the Lehman Brothers filed for Chapter 11 bankruptcy protection following the massive exodus of most of its clients, drastic losses in its stock, and devaluation of its assets by credit rating agencies. Why did one of the largest and oldest financial firms with \$691 billion dollars in assets collapse so rapidly? Superficially, we have been told that their heavy investment in subprime mortgages and associated derivatives were the catalyst that set off the fall of Lehman Brothers. But how did their army of highly educated MBAs and powerful financial models fail to foresee this risk and communicate the threat to the decision-makers at the helm of Lehman Brothers and other related financial institutions to do something it? Sadly, the truth is that the senior management of Lehman Brothers, particularly CEO Richard Fuld, was well aware of the subprime mortgages problem having being warned on multiple occasions, but they deliberately chose to ignore these warnings. Moreover, the management carried on a campaign to silence individuals who talked about these risks (McDonald and Robinson 2009). What this arrogance, ambition, greed, or something else?

Lehman Brothers worked within a framework of government regulations. Government, in this case the Federal Reserve, is supposed to ensure that financial crisis like the subprime meltdown should never happen. Did they (the Federal Reserve) see the danger of the type of financial practices associated with sub-prime mortgages? Apparently yes, but for the long period

of time they believed that the problem associated with subprime mortgages would be localized and could not bring down the entire economy (Wessel 2009). Macro-economic analysis is not trivial calculation like simple arithmetic, but surely the Federal Reserve with its significant resources, expertise, and mandate to oversee economy would be able to foresee the unintended consequences of the financial decisions that were being made by the major US financial institutions. As it turns out they did make mistakes and there are at least three reasons for this.

In complex situations when potential issues are identified, it is generally obvious that an in depth analysis would help decide on a proper course of action. Low quality decisions are usually the result of:

1. No or insufficient analysis was performed. This is common in many projects, but not in a case of Lehman Brothers and Federal Reserves.
2. The analysis is partially or completely incorrect. In our example, the analysis was probably partially correct. The economists like in both the Federal Reserve and Lehman Brothers create very complicated mathematical models: however, these models often cannot account for novel or emerging economic processes, in this case the combination of derivatives and the subprime mortgages.
3. Decision-makers amend, ignore, misinterpret or overwrite results of the analysis. This is what mostly likely happened at Lehman Brothers.

Financial organizations, like Lehman Brothers, as well as the Federal Reserve are not run by computers (though given recent events it may be not so outrageous an idea), they are run by people who have the discretion on whether or not to accept the recommendations that come from an analysis. As we learned before, people's perception of reality is subject to illusions. People are often under the illusion that analysis is either not necessary or their judgment is better than the direction provided by the analysis. Here is a paradox:

- We (humanity) consistently fail to make the best decisions given circumstances because we are subject to illusions.
- To uncover these illusions and see the correct path, we need to perform some sort of analysis.
- Unfortunately, we often do not perform sufficient analysis because of the illusion that following our own intuition will lead to a better outcome. In other words, we fail to overcome illusions because we are subject to yet more illusions. .

This leads us to the question, "What types of illusions makes people ignore and misinterpret the results their analysis?"

Overconfidence

While this story is completely fictional, it is portrays a very common scenario that unfolds during many projects.

The CEO of Festival Cruise Line company Vicky Morrison was scheduled to approve the preliminary design of new their new flagship, the Festival Tragedy. Over the past many months, a large team of engineers and analysts had worked on the market analysis, cost estimation, revenue forecasting, etc. that needed to be studied before starting with the detailed design for the ship. After the presentation of the analysis, Vicky brought his management team together and declared that based on his judgment, the planned 80,000 ton ship which would carry 2,500 passengers was not big enough. His own prediction foresaw a much larger market demand for cruises in the coming years and they needed more capacity to meet it or they would lose it to the competition. Moreover, he was so confident that his assessment was correct, as opposed the the recommendations that had been put forward, that he ordered the project team to redesign the ship to increase the size and capacity of the Festival Tragedy (and cost by the way) by 30%. Let us review what just happened. A dedicated team of experts performed extensive and detailed research on the subject, compiled a report with their recommendations and submitted it to the CEO for approval. What was supposed to be a final reality check and approval of the project plan instead became a launching point for a much more ambitious project based on one man's intuition. The CEO was so confident in the superiority of his decision-making skills that he essentially overrode the analysis of his experts.

Overconfidence psychological bias according to which people tend to overestimate the accuracy of their predictions

Overconfidence in decision-makers is one of the major reasons why analysis is not performed or the results of analysis are ignored. It is one of the most common biases in project management. Who else other than CEO's like our protagonist Vick Morrison might exhibit overconfidence? Most likely you also suffer from it. Let's check if you are overconfident or not. For each of the following questions, you must provide a low and high estimate so that you are 90% confident that the correct answer falls between the two estimates. Your challenge is to try and ensure that your estimates are neither too narrow (overconfident) nor too broad (under confident). Your goal is to try and get at least 9 correct answers.

	Question	Low estimate (90% certainty that it will be no less than ...)	High estimate (90% certainty that it will be no higher than ...)
1	Population of Nigeria		
2	Height Mount Kilimanjaro		
3	Shakespeare year of birth		
4	Length of Titanic		
5	Diameter of Milky way galaxy in light years		
6	How much milk average US cow produces per year		

7	Number of hurricanes formed in North Atlantic in 2008		
8	Distance between Seattle and Miami		
9	World record in long jump		
10	Number passenger cars registered in USA in 2007		

Psychologists administered similar test to more than 100 people and found that less than one percent of the respondents got nine or more correct answers. Most people missed four to seven items, which indicated a substantial overconfidence (Russo and Schoemaker, 1989).

Now check your answers and count your incorrect responses:

1. Population of Nigeria - 149,229,090 July 2009 est. (Central Intelligence Agency, 2010).
2. Height Mount Kilimanjaro: around 19,334 ft or 5893 m.
3. Shakespeare year of birth - 1564
4. Length of Titanic - 882.75 feet or around 268 meters (Titanic-titanic.com, 2010)
5. Diameter of Milky way galaxy in light years: 100,000
6. Average U.S. cow produced 20,460 pounds (9.28 tons) of milk in 2008 (Dairyline, 2010)
7. Number of hurricanes formed in North Atlantic in 2008 – 8
8. Total distance between Seattle and Miami is 2,734 miles or 4,399 km
9. World record in long jump: 8.95 m Mike Powell (USA) Tokyo 1991-08-30.
10. Number passenger cars registered in USA in 2007: 135,932,930 (Bureau of Transportation Statistics, 2010).

Here are interesting some fact about overconfidence (Plous 1993):

1. Overconfidence is independent of intelligence. This means that our CEO Vicky Morrison, a Harvard MBA or a bottle picker Mickey Dorrison , a grade one drop-out may both have the same level of overconfidence (Lichtenstain and Fischhoff, 1977). The real difference is that if Vicky has overestimated the required capacity for his new ship it may result in losses of millions of dollars, if Mickey overestimates the number of bottles he might find, he may be short a few dollars.
2. More information does necessarily improve the accuracy of our decisions, but may significantly increase our level of confidence. Practically, this means that more you learn about a subject, the more confident you will be about your judgment regarding that subject, but your decision still may be incorrect (Figure 1). Managers can have many years of experience in an industry, but still can make poor judgments. This is a very common phenomenon with executives and project managers.

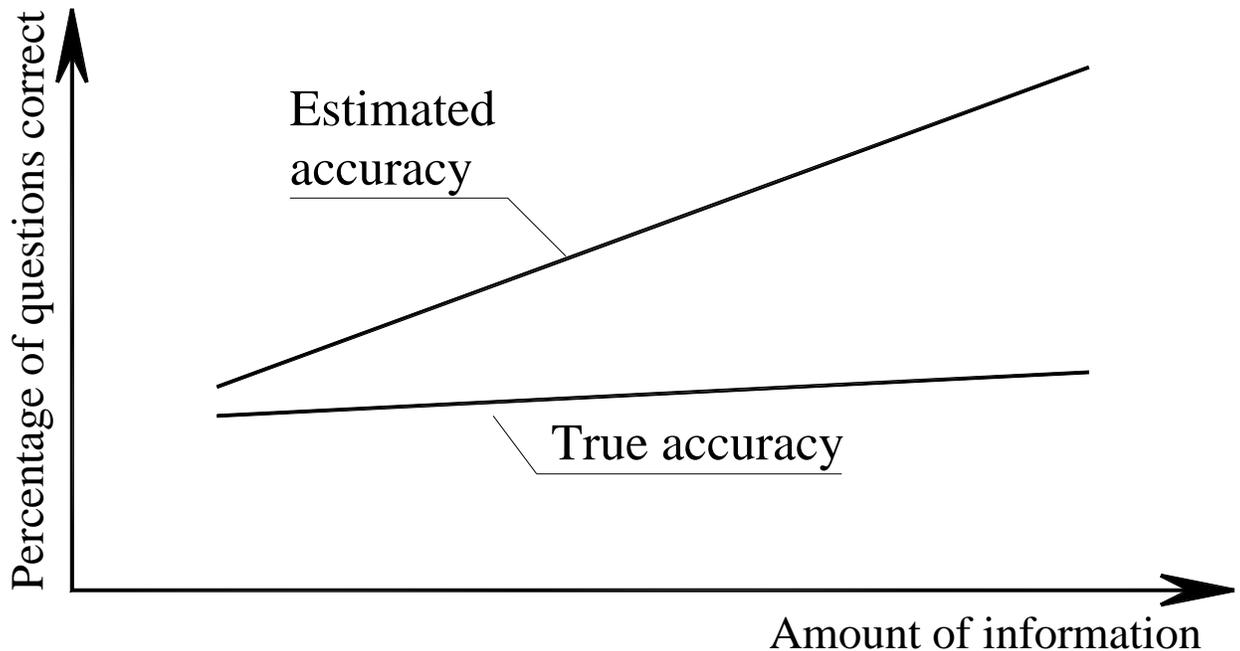


Figure 1. True accuracy versus estimated accuracy

3. Overconfidence is not destiny and can be moderated. If people receive regular feedback regarding the results of their decisions, overtime they will exhibit little or no overconfidence. For example, professional bridge players or weather forecasters are less overconfident than project managers who manage different types of projects.
4. If you ask a person to explain why their decisions may be wrong, get them to play devil's advocate to themselves, this will reduce overconfidence (Plous 1993). For example, if Vicky Morrison is asked to explain why the original design for the cruise ship would be more be large enough, he might rethink his decision and rescind his order. Answering questions or understanding an opposing perspective may push Vick Morrison and others in his position towards a better analysis of a problem.

Confirmation Bias

You have arrived in Lisbon, Portugal for a vacation. While walking along the street you hear quite a bit of English being spoken. Because of this, you start to believe that at least half of Lisbon population speaks English. However, your assessment is incorrect: you simply pay more attention to English speaking people than the others on the street. This effect is called *selective perception* or "I see what I want to see".

One manifestation of selective perception is the *confirmation bias*. We cannot know what Lehman Brother's CEO Richard Fuld was thinking when he steering his company into a program of risky securities investments that originated in subprime mortgages. But he may already have the pre-conceived idea that an investment in subprime mortgage derived securities was the profitable or sound choice. So he might dismiss evidence that these investments were too risky.

In particular, he did not listen to his employees who warned against this strategy. At the same time, he may have put too much weight on opposite evidence. For example, because other financial institutions were involved in similar investments, this confirmed his theory.

Confirmation bias: a tendency to confirm preconceptions or hypotheses, independently of whether or not they are true.

Confirmation bias can lead to frustrating consequences. For example, confirmation bias is one of the reasons why people are obsessed with conspiracy theories. Did men actually landed on the moon? There are those who point to evidence that it did not happen. Examine this picture of Apollo 11 (Fugure 2). There are no apparent blast craters or any sign of dust scatter in the 16 mm movies of the landing. Conspiracy theorists believe that this confirms their suspicions and the movies and images of lunar landings were staged on a sound studio located in a secret government facility, similar to the manner that the war with Albania in the movie “Wag the Dog” was shot in Hollywood. In reality, due to way how lunar module operates it does not create a blast crater. If you have more such ‘evidence’ and you want to ignore the vast amount of evidence that men actually did walk on the Moon, you are probably a hard-core conspiracy theorist.



Figure 2. Actual photo of Lunar module of Apollo 11

Here is an idea, if you manage to derail your project, come up with conspiracy theory that plays to the preconceptions of your managers. Point to evidence that suggests malfeasance on the part of your competitors, previous management, or poor plan alignment if one of the managers has recently mentioned it. With persistence you should be able to convince management that the issues with the project are not your fault; even there is a lot of evidence to the contrary.

Confirmation bias is one of the reasons that project managers do not perform a proper analysis for their projects. Why go to all the additional effort to analyze a situation if you already believe that investing in subprime derivatives is the way to go?

Optimism Bias

Are you an optimist or pessimist when you are considering the possible consequences of your project plan? To find out, here is a small admittedly unscientific test for you:

	Question	Points
1	During holiday shopping you spent: A. More than 30% than budgeted B. Exactly what I budgeted C. Much less than I budgeted. D. I don't shop at all. It is a waste of time, money, and my IQ.	6 4 2 0
2	For more than three years you experienced huge delays during my work commute because of the construction of new interchange on the highway nearby. After the interchange is opened: A. I will reach my work 3 times faster than before construction started B. Nothing will change, delays may be even longer C. I never use any highways; staying at home all the time is much safer alternative	4 2 0
3	You made a New Year's resolution to lose 20lbs: A. I am very confident that I will lose the weight. B. I will exercise and eat less junk food, but I doubt that I will meet my goal. C. I will never lose weight, I like cheesecake and junk food too much.	4 2 0
4	With all the effort that you put into your job this year: A. I worked hard and should expect significant raise at my work. B. I am not expecting any raise, in spite of my efforts. C. I don't care about my salary because I have more than enough to survive stashed away in my bomb shelter.	4 2 0

Now, calculate your score:

- 12 or more you are most likely an optimist.
- 0 – 11 you are most like a pessimist
- If you have zero, you are not human. Most likely you are an alien or robot and do not need to continue to read this paper

Physiological research shows that most people are over-optimistic about the outcome of planned actions (Armor and Taylor, 2002). It is called the *optimism bias* or *planning fallacy*. For example:

Optimism bias is a tendency to be over-optimistic about the outcome of planned actions

- Second-year MBA students overestimated the number of job offers they would receive and their starting salary.
- Most smokers believe they are less at risk of developing smoking-related diseases than others who smoke.
- Most newlyweds in a US study expected their marriage to last a lifetime, despite being aware of the divorce statistics.
- Professional financial analysts consistently overestimate corporate earnings.

We are not implying that is a bad thing that people are generally optimistic. Most of mankind's greatest achievements were entirely dependent upon someone's abundant optimism that they could overcome insurmountable odds. Without optimism, there would be no persistence. Who would risk starting a new business or become married without it?

At the same time optimism bias can lead to major blunders much in the same manner that overconfidence or confirmation bias can lead to a lack of analysis. Optimism bias also manifests itself when we underestimate project cost, duration, and available resources. Perhaps Richard Fuld was overly optimistic about the outcome of investments in subprime mortgage backed securities.

Optimism bias is an illusion which is very hard to overcome. For example, each time we go on vacation we spend significantly more than we plan, regardless of whether we know of this bias or not.

Analysis Is Not Trivial

What causes more greenhouse gases: using paper towels or hand driers? It is extremely difficult to tell conclusively, though some have tried. What are all the factors that we would have to take into account? Greenhouse gases are emitted during the production of paper, electricity, and the hand drier itself. How much depends on different conditions: there different types of paper and hand driers, electricity can be produced from different sources, and human hands could be different sizes? How were they transported to their current location? This is just barely scratching the surface and already it has become quite complex.

Here is another example. According to the research, production of 0.5 ponds (~225 g) hamburger causes emissions of greenhouse gases which is equivalent to driving 16 km (Simonov, 2009). The same amount of pork produces emissions equal to 4 km of driving, half pound of chicken is equivalent of 1.2 km driving, and a half-pound of apples is equivalent of 0.32 km driving. In general, the cattle industry is the second largest emitter of greenhouse gases (18% of all emissions) after electric power generation (21%) and ahead of many other industries including oil and gas. And you thought the biggest danger from cows came during run of the bulls at Pamplona, Spain. The analytical model included the huge amount of methane produced by cattle – methane is a much more potent greenhouse gas than carbon dioxide. The model also

accounts for greenhouse gases produced during beef production, refrigeration, and transportation, but there is a catch. Without seeing the actual model and its calculations, we do not know all details of analysis and original assumptions. For example, vegetation consumed by cattle will grow again removing CO₂ from the atmosphere, but cars use roads that permanently displace natural habitats like forests. It is also unclear how the analysis accounted for all the different types of grass found in different regions and seasons and how they consume varying amounts of carbon dioxide.

The popular books *Freakonomics* (Levitt and Dubner 2005) and *Superfreakonomics* (Levitt and Dubner 2009) have many examples of analyses that lead to sensational conclusions. For example, Steven Levitt and Stephen Dubner found a correlation between rates of abortions and crime in recent decades. They concluded that deduction of crime is caused in part by increased abortion rates because potential criminals were not born. Perhaps increased abortion rate is a contributing factor to the reduction of crime, but is definitely not the only one. Any analysis of social processes crime is very complex and non-trivial. There are many researchers involved in this type of analysis and they often do not agree with each others findings.

Since analysis can be very complex, it creates an opportunity for intentional or unintentional misinterpretation. Improving health care systems (delivery, insurance, etc.) is a major policy issue in many countries. How much would different health care initiatives cost, what would be the potential savings or improvements? The result this analysis may depend on who is performing it and who is funding it. Therefore, you hear all sorts of different cost and benefit estimates that are often contradictory even though they all seem to be coming from reputable sources. This can make deciding upon a course of action or policy to support very difficult. Even very advanced analysis can give misleading results. That is why so many people including perhaps Richard Fund, do not believe it is worth the effort.

What Is The Value of the Analysis?

Kutsch and Hall researched why project managers rarely use risk management and risk analysis in IT projects (Kutsch and Hall, 2009). They interviewed a number of project managers and received feedback like this:

- We don't have the time
- Upper management did not ask for it
- It is unnecessary or not important.

Project managers have a point: any analysis costs money. Does it make sense to spend this money and what value will the analysis bring? A leading psychological researcher Gerd Gigerenzer (Gigerenzer, 2007) tells story about a Los Angeles International Airport police officer Dan Horan. Horan was responsible for spotting drug traffickers. One day he saw a quite ordinary looking woman trailing a black suitcase behind her, a color preferred by most people. Horan described how in an instant he formed an opinion of the woman. He and his partner stopped her. Within a few minutes, a police dog sniffed out the traces of drugs in her suitcase. When Hogan was asked how he was able to pick the woman out of crowd of hundreds he said he did not know. He could not point to any one thing that leads to his suspicion; neither her behavior nor appearance seemed to indicate that she was a drug trafficker. Officer Horan did not do any analysis, nor would it probably have helped in this case. In depth analysis of all

passengers for drug trafficking in addition to the increasingly onerous security measures would be prohibitively costly in time, money, and resources not to mention the goodwill of the flying public and would not necessarily lead to the interdiction of more drug traffickers.

So, having seemingly contradicted ourselves here, why bother with analysis if intuition will suffice most of the time? In many cases, especially those that deal with primarily with human emotions or behavior such as crime prevention or politics, or health care, detailed analysis may not bring better results. However, when dealing with information where it is possible to get objective measures such as in finance or project management, analysis can significantly improve the quality of decisions. The issue is that in most cases people could not assess the value of the analysis before it is done.

People do not do analyses because of different psychological biases. Among them are:

- **Overconfidence:** a tendency to overestimate the accuracy of predictions.
- **Confirmation bias:** a tendency to confirm preconceptions or hypotheses, independently of whether or not they are true.
- **Optimism bias:** a tendency to be over-optimistic about the outcome of planned actions

In addition, analysis can be very complex and because of it can lead to wrong conclusions.

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