HOW TO THINK

A SURVIVAL GUIDE FOR A WORLD AT ODDS

ALAN JACOBS (2017)

Quantitative Exercises on 'Thinking Principles'

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WHEN ANN WAS 6 HER BROTHER WAS HALF HER AGE.

PLEASE, ANSWER THE FOLLOWING QUESTIONS:

- What is a general relationship between Ann's age and her brother's age?
- When Ann was 6, how old was her brother?
- Now, Ann is 70, how old is her brother?

- Are you sure?
- What if Ann was born in September and her brother in December?

A STORY OF TWO LITTLE BOYS

- "One night when the moon was full, the older, who was about four, led his younger brother into the front garden of his house and ordered him to walk back and forth. As little brother faithfully did so, big brother carefully observed him – and the moon. 'I was trying to see if the moon follows him when he walks', the older brother explained. 'But it doesn't, it only follows me.' "(Allan Jacobs, 'How to Think' , Page 38)

- "By contrast, if he had been told that a giant had hung the moon in the sky as a great lamp to guide his nocturnal hunting, and had believed that tale, he would rightly have understood that the moon doesn't follow anyone. But the correctness of the conclusion would not erase the falsity of the premises". (Allan Jacobs, 'How to Think' , Page 39)

"...ALL OF US AT VARIOUS TIMES IN OUR LIVES BELIEVE TRUE THINGS FOR POOR REASONS, AND FALSE THINGS FOR GOOD REASONS..." (ALLAN JACOBS, 'HOW TO THINK' , PAGE 39)

	Poor Premise (Giant had hung the moon)	Good Premise (Experiment on whether the Moon followed his brother)
False Conclusion		The Moon follows only him
True Conclusion	The Moon does not follow anyone	

- It is a POOR premise to think that Ann's brother is always half her age. When Ann was 6 years old, this POOR premise leads you to a correct conclusion: her brother was 3 years old. But this is true only at a certain point in time.
- The TRUE premise is to think that Ann's brother is 3 years younger than her. Because when time passes, they gain same age. When Ann was 7, his brother was 4. Similarly, when Ann is 70, her brother will be 3 years younger and not half her age.

	Poor Premise (Half of Ann's age)	Good Premise (3-years-younger)
False Conclusion	35	
True Conclusion	3	

- But in order to be more precise about her brother's age, we need to have more information. It is logical to think that Ann's brother is 67 when Ann is 70 and it is based on a GOOD premise, however, lack of information might lead us to a wrong conclusion.
- Suppose the first statement about Ann's age being 6 years and her brother being half her age was true in December (64 years ago, when Ann was 6). If Ann was born in September and her brother was born in December and it is October now, then Ann is already 70 but her brother is still 66. He will be 67 only in December.
- "…all of us at various times in our lives believe true things for poor reasons, and false things for good reasons…" (Allan Jacobs, 'How to Think' , page 39) This statement could apply to our views about politics, religion and even to the way we understand and solve some classroom assignments.

	Poor Premise (Half of Ann's age)	Good Premise (3-years-younger)
False Conclusion	35	67
True Conclusion	3	66

SOLVE THE FOLLOWING PROBLEMS:

Problem 1

- $\pi = q * (P * Q - (\omega * h * L + \rho * K))$
- Find π if q=2, P=200, Q=10, ω=12, h=10, L=5, ρ=50, K=2.

Problem 2

- Now imagine that you own 2 bakeries.
- In each bakery each day you sell 200 pies for $10 each.
- In each bakery, you employ 5 workers who work 10 hours a day and you pay $12 hourly.
- In each bakery, you pay $50 for the rent of the place and another $50 for the rent of the oven.
- How much is your profit (income generated from sale of pies *minus* the cost of workers and all rents) a day from both bakeries?

- The above two problems are identical analytically. Which problem do you want to solve?
- You probably do not want to spend time on solving the first problem even if you have very good analytical skills. You just see some symbols and numbers.
- While in the second problem, you can relate personally, you know what each number stands for and you are more determined to find the solution.
- Even more, you are more likely to solve the second problem correctly if you are an actual owner of the bakeries even if your math skills are not good enough for the first problem.

ON REASON AND FEELING:

"... BRINGING ANALYTICAL POWER TO BEAR ON A PROBLEM IS NOT ENOUGH...IF THE PROPER FEELINGS ARE NOT PRESENT AND IMAGINATIVELY ACTIVE, THEN YOU WILL NOT EVEN BOTHER TO DO ANALYSIS THAT WOULD REVEAL UNMISTAKABLE INJUSTICE. IF THE FEELINGS ARE NOT CULTIVATED THE ANALYTICAL FACULTIES MIGHT NOT FUNCTION AT ALL." (PAGE 44)

"LEARNING TO FEEL AS WE SHOULD IS ENORMOUSLY HELPFUL FOR LEARNING TO THINK AS WE SHOULD" (PAGE 87)

ON REASON AND FEELING:

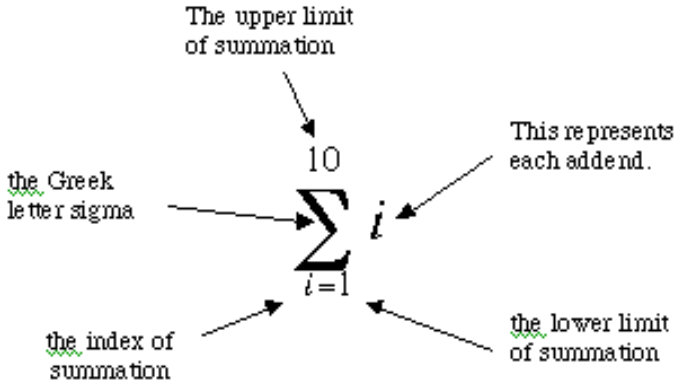
- Try to feel the problem all the time before judgement. Put yourself into other people's shoes before you criticize them for their thoughts or behavior.

- Base your profession not only on monetary benefits but also on your interests and feelings.

PLEASE, CALCULATE:

Problem 1

- $\sum_{n=1}^{5} n$



- ∑ is a summation notation. n subscript shows the first value that n takes in the sum, while superscript shows the last value n takes in the sum. And n can be only a natural number.

Problem 2

- Now, calculate: 1+2+3+4+5

FAST AND SLOW THINKING

SYSTEM 1 VS. SYSTEM 2

- System 1 provides us " with a repertoire of biases, biases that reduce the decision-making load on our conscious brains". (Page 86)

- System 1 is fast thinking with "biases, the emotional predispositions, to relieve that cognitive load", while system 2 is slow, conscious thinking.

- "System 1 works on its own without conscious direction, but it can be changed, trained; it can develop new habits." (Page 87)

FAST AND SLOW THINKING

SYSTEM 1 VS. SYSTEM 2

- $\sum_{n=1}^{5} n$

- This expression is "UGLY" signaling that it is difficult and we will never understand (System 1). While it is just the sum of numbers from 1 to 5: $\sum_{n=1}^{5} n$ = 1+2+3+4+5.
- System 1 is fast thinking with "biases, the emotional predispositions, to relieve that cognitive load" and it blocks our mind from conscious thinking. "But it can be changed, trained".

ONE MORE EXERCISE:

- Suppose, there is a project that will cost you $6mln and will give you earnings of $8mln. Thus, you will earn $2mln profit (earnings *minus* cost) and you decide to start it.
- Now suppose, that you have already invested $5mln in this project and thus, you need $1mln more to finish the project.

- Scenario 1:

  Suppose, market conditions have changed and instead of $8mln you expect to earn $3mln. Would you finish the project?

- Scenario 2:

  Suppose, another project is available for an investment of $1mln and will give you earnings of $9mln. Assume that you have only $1mln to spend. Would you continue the ongoing project or start a new one?

SUNK COSTS

- Sunk costs – investments in a particular project that cannot be recovered
- In scenario 1, $5mln is a sunk cost. It cannot be recovered. Thus, you should ignore its role when you make a decision. The return of $3mln is larger than $1mln investment needed, thus, you should finish the project.
- In scenario 2, if you stick with the first project, you will spend $1mln to finish the project and earn $8mln, thus you will get the net benefit of $7mln (again, you ignore the role of $5mln that has already been spent).
- While if you start a new project and spend $1mln, you will earn $9mln. This will give you a net benefit of $8mln. Thus, the second project gives you higher net benefit and you should switch.
- In this example, it is clear that if you switch, you will benefit. However, very often, people do not follow optimal rule and stay with their initial plans, keep their inaccurate views/opinions or maintain memberships in certain social groups even if it is no longer optimal.

SUNK COSTS AND SOCIAL GROUPS

- "In 1954 Marian Keech … was prophesying the end of world. Keech claimed that she had received messages from inhabitants of a distant planet named Clarion, and from them she had learned that the world would be destroyed by a great flood on the twenty-first of December 1954… Those, who heeded this warning and joined Keech's group would be rescued by the arrival of a flying saucer from Clarion…"
- Three social psychologists. Festinger, Riecken , and Schachter "pretended to be true believers in Keech's message so that they might infiltrate and study the group. They had formulated a two-fold hypothesis: first, that Keech was a charlatan; and second, and more interesting, that when the falsehood of her prediction was revealed her followers would not abandon her but rather escalate their commitment to the cause". (pg. 130-131)

CONT…

- "When the promised rescuers did not show up, and the threatened flood did not arrive either, the group was shaken. But then Keech felt once more the desire to write… there was indeed a flood, but not a flood that kills, rather one that saves…
- …With every step they had taken over the previous months, the little group-the little Inner Ring-had invested more and more in the revelations from Clarion. They had abandoned families, jobs, social respect. … It had become… impossible for them to question the validity of their decisions. Their rigidity had become absolute; the immensity of their sunk costs had made them terrified of resuming the work of thinking." (pages 131-132)

SUNK COSTS

- "The more people have invested in a particular project, the more reluctant they are to abandon it, no matter how strong the evidence indicating that it's a loss …
- Stock market speculators can't bear to face that their prized stock is going down the tubes, and won't sell at a loss – even when the value of their investment is declining precipitously.
- Such people are fixated on their sunk costs, on what is irretrievably *past*, rather than on the best available decision *right now*." (Page 129)

EXERCISES:

- You can work in groups or individually.
- 1. Think of our life and beliefs and bring examples where people might do/believe good things for poor reasons or wrong things for good reasons.
- 2. Train your mind in *Conscious Thinking* and find $\sum_{n=3}^{10} n$
- 3. Think of someone (or a group of people) who you dislike most for a good reason. Please, describe why you dislike that person or a group. Now think of the background of this person: birth place, family income, appearance, talent, social respect, etc… Now, imagine that you are that person and have had the same life. Would you differ? Do you still dislike the person or a group in the same way?
- 4. Bring an example of sunk costs from your/our everyday life (It could be time you have been waiting in a bus/train station, lost money, lost friend, lost girlfriend or boyfriend, willingness to revenge, etc…). Remember that you need to ignore them in your future decisions. What would you do to deal with it?
- 5. Which of the above questions was easiest to answer?
- Yes, math is not that difficult if you allow system 2 (conscious/slow thinking) to work.