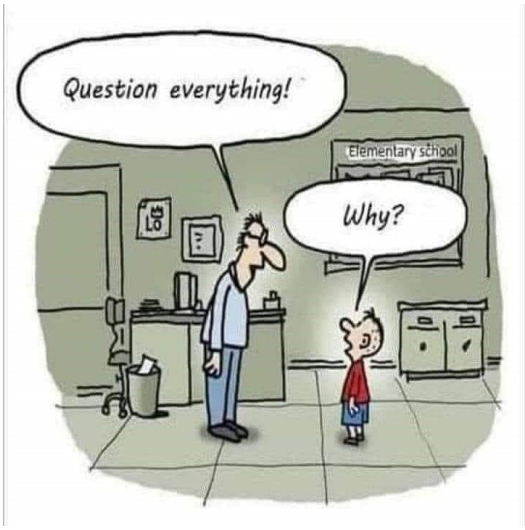
I QUESTION, THEREFORE I AM

A BOOK ON QUESTIONS FOR CHILDREN



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Children must be taught how to think, not what to think.

— Margaret Mead, 1928

Science is the belief in the ignorance of experts.

— Richard Feynman, 1966.

Nothing in life is to be feared, it is only to be understood.

— Marie Curie

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Preface

We have a serious problem. In many ways we are living in the Mediaeval Ages once again. Fear and panic pervades society. The sky is surely going to fall down, they say.

Clearly we have failed as a society in building a basic level of critical thinking in our children.

Hysteria, unjustified panic, is harmful in many ways. It leads to bad policies which cause greater harm than good, and it leads to a mental state of siege and perpetual stress. Children today are often unable to enjoy their childhood since they think the world is about to end.

Sometimes, it appears that H.L. Mencken was right: "The aim of public education is not to spread enlightenment at all; it is simply to reduce as many individuals as possible to the same safe level, to breed and train a standardized citizenry, to put down dissent and originality".

The great psychologist James Flynn "conducted a study in which he compared the grade point averages of seniors at one of America's top state universities … to their performance on a test of critical thinking. … Flynn was bemused to find that the correlation between the test of broad conceptual thinking and GPA was about zero. In Flynn's words, 'the traits that earn good grades at [the university] do not include critical ability of any broad significance'. .. Almost none of the students in any major showed a consistent understanding of how to apply methods of evaluating truth. Flynn's conclusion: 'There is no sign that any department attempts to develop [anything] other than narrow critical competence'".[1]

Our education system has comprehensively failed. It only teaches what to know, not how to think. This ends up creating deeply confused people who are easily swayed by what they watch on TV or read in the media. Never able to ask a single useful question to confirm the facts, they end up increasing their own suffering but also cause needless suffering to others as they impose their misconceptions upon the rest of the world.

I am writing this little booklet to be used as a guide in school. It is my hope that all schools will adopt this or similar books and introduce "Questioning Everything" as a key part of their syllabus. I would like all children in the world of the future to be able to ask at least the most basic questions.

Critical thinking sits at a much higher level than the scientific method. Critical thinking derives directly from epistemology and broad-based philosophical thinking. It encompasses all kinds of reason and doubt. The scientific method is a small offshoot of critical thinking. So this is not a book on the scientific method.

The main message of education should be our ignorance and limited memory. The expert with a PhD might have perhaps about 0.1% of the world's current knowledge compared with an average person with 0.05% of current human knowledge. Basically, there is no significant difference in the ignorance of the expert and the average person.

Therefore, an illiterate villager who asks simple questions will easily end up with more useful information about a topic than an expert who imagines that he knows everything. While knowledge is important, humility and the ability to ask questions is far more essential.

The other issue in the education system is the focus on grades. It is possible to get good grades through sheer repetition and memorisation. Those without the time for such activity end up with lower grades and lose their self-confidence. On the other hand, those with higher grades think they are superior, and that they possess a god-gifted right to impose their will on others. Many of the ethical failures in the world today boil down to this lack of ethical restraint, and the failure of the general public to ask questions.

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[1] David Epstein (2019). *Range*. New York: Riverhead Books.

I believe that children from age 10 onwards should attend one class each week only on questions. The teacher should list various topics and then let students ask as many questions as they can on that topic. As they grow older their ability to ask questions will get deeper and more sophisticated.

While this book is not dependent on a classroom course to teach key concepts, but if it were possible to run a course in a school, this is how I suggest the course could run:

1. Let the teacher go through the early chapters of this book, allowing a Socratic discussion in the classroom of the issues raised in the chapter.

2. The teacher can then go through one of the illustrative topics and questions listed in this book, e.g. on climate change. Then let students add to these questions. The entire set of questions should be written down on the blackboard.

3. The students would then take these questions home and pick at least three questions out of the list to conduct their research.

4. When students return to the next class (to be held after a gap of at least one week, to allow for their research efforts), they should be randomly selected to present (as many of them as possible, given the time constraints of the classroom). The students who are selected should briefly talk about the three questions they picked, and provide their answers to one of these three questions. At that stage, the class should ask more questions – since the deeper we enter into a topic, the more the questions that are generated. These additional questions should be added to the list of questions on the topic.

5. After three to five such sessions, all students should have had a chance to make a presentation.

6. Thereafter, students could be asked to do a written assignment. Illustratively, the assignment could involve picking any topic outside the list of topics discussed in the classroom. They would think about it and build a list of at least 20 questions. There would be no answers. Only questions.

7. These assignments would be shared with others in the classroom. Depending on the time available, written assignments and class presentations could be graded for the quality of critical thinking displayed.

8. At the end of the course, students would have a long list of topics and a large number of questions, as well as a few answers.

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3 January 2023

1. Thinking is the highest trait of mankind

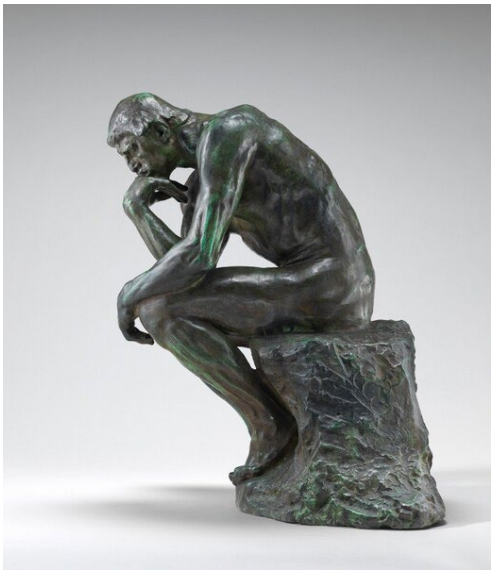
All of us are born ignorant. Imagine how little you knew before you learnt to read and went to school. Acquiring knowledge is therefore important: language, arithmetic, science, history, geography.

We stand on the shoulders of previous generations. Most of the knowledge we learn in school is based on someone else's thinking. And since there so much to learn, schools are in a rush to finish "the syllabus".

Unfortunately, in their hurry, they forget to teach us the most important thing of all: *How to think*.

Why is thinking for ourselves so important? Because mankind has made many mistakes throughout history, and there are always huge gaps in human knowledge. We must never assume that the knowledge in textbooks is the last word. While much of it is true, a good portion of it will be found wanting in the future. Each of us needs to know how to contribute to mankind's journey towards the truth.

While the entire art of thinking for oneself can't taught in a short book like this, I will try to take you a few steps on that journey.



The Thinker, by Auguste Rodin

In 1637 Rene Descartes wrote in Latin: *cogito, ergo sum* which means, "I think, therefore I am".

Thinking is about rational evaluation of the world around us. This evaluation must be independent. We must, each of us, assess the important facts for ourselves so that we are not fooled. The way to do that is to ask questions. And so, we can say: *I question, therefore I am*.

1.1 All questions are important

The questions you ask can be big or small but **all** of them are important.

At one time I made the mistake of thinking that some questions are not really important. But in reality, nothing is irrelevant. A child who shows interest in the potty of animals (cows, etc.) is asking important questions. Where did the potty come from? Why does the potty of different animals look different, what shapes it, what gives it its smell? These questions, properly explored, can lead to significant scientific discovery.

Questions matter more than answers. Of course, one should look for answers. But first, the questions.

1.2 Three types of questions

1.2.1 *Questions for which there is one correct answer*

There is only one correct answer for 2+2. If you want to send a spacecraft to the moon, all you have to do is to apply the principles of gravity. Such questions have a single correct answer and depend on the application of prior (already-known) human knowledge. School and university textbooks are a good example of such prior knowledge.

While much of such knowledge is already known, we will learn better by asking questions.

1.2.2 *Questions for which there are many partially correct answers*

But many times, there is no uniquely correct answer. For example, what will be the future population size of a country? Many factors influence future population size, so different experts provide different projections. This doesn't mean that their knowledge is wrong, simply that the complexity of the world makes it impossible to arrive at a unique, correct answer.

1.2.3 *Questions for which we may never know the answer*

For many things there is no verifiable answer, nor the expectation that we will ever find any. People ask what happens to them after they die. Different religions provide different answers. But since there is no possibility of confirming this information, we will never know. While it is a good thing to ask even such questions, we need to understand our limitations.

1.3 Three kinds of knowledge

Aristotle, an ancient Greek philosopher, proposed a classification of human knowledge that has stood the test of time.

He divided human knowledge into three types. These were **episteme** (scientific or theoretical knowledge), **techne** (skill and crafts) and **phronesis** (often translated as practical wisdom). Both craft knowledge (techne) and practical wisdom (phronesis) are types of practical knowledge, in contrast to scientific knowledge (episteme) which is theoretical. Both techne and phronesis involve action and some kind of "production".

Techne is about technology and practical physical skills. It often involves the application of episteme (scientific knowledge) but also includes learning from experience. In some occupations like carpentry and hair-dressing, experience is more important than theory. Carpenters learn to use instruments including lathes by practical hands-on experience. In other technical occupations, books form the basis of learning, but experience matters a lot. Thus, surgeons need significant practice but first they must read a lot of books. Doctors and engineers need practical skills to understand an X-ray, to administer an injection, or to make the calculations for the structural strength of a bridge or building, but their skill is based on significant scientific knowledge and they need to update their knowledge through books.

Episteme is the discovery of the laws of the world. In general, there is only one answer to such questions, and discovering the answer involves the scientific method. I will outline the scientific method in the last chapter. This kind of knowledge requires the most questions, for example: Why does an apple fall to the earth?

Scientists are typical of those who spend a lifetime on acquiring this kind of knowledge. But occupations that involve techne can also sometimes involve episteme. For example, doctors might find a pattern of disease or a pattern of responses of patients to a medicine. That information, when filtered through the scientific method could lead to the discovery of a new law of nature, or about a new disease or about a new medicine.

Phronesis is practical wisdom. It involves decisions about which there is no unique answer, when multiple options for action are possible. Or it can be about inventing new ways of doing things, such as a mobile phone or smartphone, instead of a wire-based phone that is linked to an outlet in the wall. This type of knowledge includes things that do not exist but can exist if we imagine them. This type of knowledge also includes things like public policy, i.e. actions of government which affect many people. People like inventors, economists and artists often operate in this kind of knowledge which requires a lot of imagination and for which there is often never a single answer or way of doing things.

2. The problem of human ignorance, bias and fear

All of us know *very little*. Even your teachers. Even someone with a PhD, like me. A person with a PhD might know something about his area of specialisation but is ignorant about almost everything else. And once someone's PhD becomes old, like mine, they have generally forgotten most of what they learnt. Everyone forgets almost everything they learn. The human brain is not designed to remember things unless we refresh them regularly in the mind.

We are like the boy on the seashore which the great scientist Isaac Newton talked about before his death (there is no proof that he said this, though): "I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

A vast ocean of ignorance will always surround us all.

2.1 The danger of believing in "experts"

Since knowledge is vast, it is convenient for teachers to tell children to "believe" in the "experts". They may not say so directly but they unconsciously create an image in our mind that the "expert" knows a lot. In school, we are rewarded for repeating the opinions of the "experts": people whose work is reported in textbooks.

Yes, by all means we must learn what is taught, but we need to try to understand its logic. If the logic is not clear, we need to pause and ask questions.

There is no more dangerous word than "expert". As Richard Feynman said: "Science is the belief in the ignorance of experts"[2].

If we think of the "expert" as someone who knows it all, we can make big mistakes. Experts can sometimes be very wrong. History is littered with wrong ideas of "experts". "Experts" once said that the Earth is flat, malaria is caused by bad air, the earth is at the centre of the universe. Till recently most medical "experts" believed that ulcers are caused by stress. But John Lykoudi discovered in 1958 that most ulcers are caused by bacteria. When John tried to publish his findings, medical journals (which are managed by "experts") refused to publish them. In 1968, he was fined 4,000 drachmas for treating patients with antibiotics. Slowly, and luckily for mankind, others pursued his findings. He was right, and everyone else was wrong.

It is not unusual for 99.999% of the experts to be wrong. An amazing number of "facts" are proven wrong by subsequent generations. In 1847, Ignaz Semmelweis proposed that washing hands with antiseptic solution can reduce the deaths of new born mothers from infections. But Semmelweis's observations were rejected by the medical community. In 1865, Semmelweis was committed to an asylum by his colleagues and died soon thereafter. Of course, now we all know that he was right and all his medical colleagues ("experts") were wrong.

In the broadest sense, college degrees do not matter. It is the logic of an argument that matters, not how many degrees someone has. If someone "throws" his degrees at us or cites an "authority" instead of providing the logic of an argument, he is using the wrong method to persuade us. We need to shun such "experts".

Let us learn what the experts say but never regurgitate their ideas without asking questions. Unless we can critically analyse even the claims of Nobel prize winners, we will never be educated.

Be fearless in asking questions. You will not just learn more, you may stumble upon things that no one else has yet discovered.

People like Isaac Newton with his humility are extremely rare. People who acquire even elementary levels of knowledge (such as a PhD degree) tend to become arrogant and over-confident in their beliefs. Such people can

[2] Richard Feynman, "What is Science?", presented at the fifteenth annual meeting of the National Science Teachers Association, in New York City (1966), published in *The Physics Teacher* Vol. 7, issue 6 (1969)

often prove dangerous to humanity. Many of them do not like the idea of open debate and questioning. Instead, they are authoritarian and impose their views on everybody else.

There is a saying in India: *Nim Hakeem Khatra-e-Jaan*. This means that someone with bookish knowledge can becomes so over-confident that he prescribes remedies that end up harming others. This has happened too many times in human history for us to consider it an aberration. This is probably the law of the expert.

The latest example is of lockdowns that were imposed upon society by "experts". These experts did not even know their subject well. They had forgotten everything the learnt. Anders Tegnell, a scientist in Sweden said: "It was as if the world had gone mad, and everything we had discussed was forgotten".

And they did not consider the harms of lockdowns and school closures. Instead, they created hysteria which ultimately cost thousands of more lives to be lost.

The way to look at such things is to consider the costs and benefits of an intervention. I will talk about it a little later.

We need a method to stop the experts from killing us.

2.2 The danger of believing the government

Should we believe what the government says on the TV?

In many cases, the government has the authority to impose its views. For instance, it can impose lockdowns. When schools were shut down by the government during covid, the right thing was to obey the government and to not go to school.

But just because someone in a position of authority says something, that does not make it true.

Propaganda is the name given to mass-advertising of the opinions of those in power. Even if such views are repeated many times – on TV, in newspapers, that doesn't make them true.

Sometimes, you'll be asked to believe something because people in authority say so. This is called an "appeal to authority". You may be told that the United Nations or the Government says so. But here is a simple rule: If you cannot question something, it is propaganda.

If anyone stops you from asking questions, they are disrespecting you as a human. You are obviously not a sheep: so why would you not be allowed to think for yourself? Shun those who stop you from thinking and asking questions.

2.3 The danger of believing in the herd

We like to belong to groups. Particularly as children, we like to believe what our friends believe. We also like to "follow the leader" and the crowd. But this can sometimes lead to problems. It can lead to what is called the "madness of the crowds".

The number of people who believe in something does not make it true. Of course, if a number of experts hold a particular view, there is a good chance that they are right. In such a case we should accept their opinion but make sure that we understand the logic.

But even experts are human and subject to the "madness of crowds". During the 2020 covid episode, almost everyone (including the "experts") thought that the sky was falling down, that they would all die if they did not lock down the whole world.

But when groups go into panic, things might not turn out well. The panic and "group think" during covid caused great harm to the world, particularly to children.

2.4 False alarms and false fears

We humans evolved relatively recently on this planet. Our brain is "grafted" on to a primitive animal brain. This animal "rootstock" is very important, for it sustains us, and allows our modern brain (cerebral cortex) to focus on thinking. Our autonomic nervous system regulates our body's unconscious actions: homeostasis, blood circulation and breathing.

Our autonomous brain also protects us through the "fight or flight" response. While this response was vital when we lived in the jungle, it can also be *falsely* activated, and then it causes us great trouble.

Being afraid of something that can genuinely harm us is a good thing, so we can take precautions. But these days, particularly with non-stop news and social media, we often get scared by hobgoblins of the mind.

We need to keep our head about us when those around us are losing theirs! Fear is the most crippling disease one can get.

No one, including each of us, is exempt from fear. Even the smartest person, good at maths and science, can easily get terrorised by fearful thoughts.

Is someone using the words: "this could be catastrophic!"? That's the right point to stop and start asking questions – a lot of questions!

Fortunately, almost all the alarms that we hear about in the media today are false. The only way to be sure, though, is to ask questions. Through harsh questioning can we distinguish genuine concerns from false alarms.

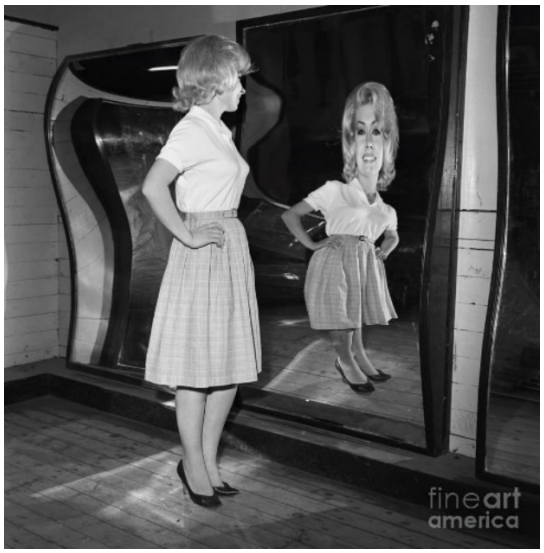
The way fear works is very problematic. People don't first question their fears, instead they form them based on what others are saying. Once they form a belief (e.g. that GM food is bad, CO_2 and nuclear energy is dangerous) the they look for news or other reports that match their belief. This is a bad way to think.

2.4.1 *Example: Genetic modification*

A lot of people are terrified of genetically modified organisms (crops), or GMOs. To find out whether their fear is justified, you could ask: What is GMO? When was it invented? What are the common crops and foods that are GMO? For how many years have people been consuming GM foods (three decades now). Can GMO be grown organically?

Then you can try to find out how many people have died after eating GM food (answer: none). You will soon find that the fears of GM are not substantiated by some of the claims made in the media. Yes, there are issues that may require some regulation (such as the spread of GM seeds in the neighbouring fields) but there is no basis to fear GM foods. I have written a paper on this topic that you can read, to study this topic in more detail.[3]

2.5 The problem of human perception and human bias



It is not just external things that can distort our perception of reality (such as the mirror depicted above), it is also our own brain's limitations that can distort our perception of reality. We all suffer from a wide range of biases.

[3] https://swatantra.org.in/Documents/FeedIndiaPaper17Feb22.pdf

A few of these include:

Confirmation bias. In this we limit our search to the information that supports or confirms our prior belief. For example, if we believe in climate change, we will focus only on reports and studies which support our prior belief. We may "cherry-pick" studies that support our view and ignore other findings which contradict our prior belief.

Halo effect. In this we are influenced by the opinions of those whom we admire. So, if a movie model says on TV that a particular soap is good, we will believe it even though in reality there might be no difference between it and other similar but cheaper soaps.

Anchoring and framing. In this, the initial claims about something then influence our further thinking. For example, if someone quotes the price of a painting at $10,000 we may offer $8,000, not $80.

Bandwagon effect. This is about group think, in which we believe whatever the group believes.

The way out is to rigorously question our beliefs and to retain an open mind to those with opposing opinions. As Heraclitus said, "that which opposes produces a benefit".

John Stuart Mill said that "he who knows only his own side of the case knows little of that". What he meant is that we need to fully understand both sides of an argument before we truly understand which side is correct.

This is all the more reason to be aware of rushing to judgement. We need to ask questions and understand all sides of an issue.

2.6 Complex phenomenon

The world is very complex. For example, even with physics, there's no universal general theory. And string theory is full of assumptions that cannot be tested.

You need to know only one thing: that the complexity of the world does not reduce just because you spend many years studying it. Experts tend to use complex mathematical models to try to understand complex phenomenon. And they do pretty well in simple things like physics. But in complex phenomenon, which involve many "variables", they know very little.

What is a variable? For example, in the climate there are hundreds of variables – or things that affect the climate. The motion of distant stars within the galaxy affects climate, so also the components of the solar system. The distance from the sun is crucial, but also the nature and composition of the Earth's atmosphere and the water on the Earth. The temperature of the planet varies hugely over time, and no model is able to explain why this happens.

Therefore, for someone to claim with certainty anything about complex events, is highly questionable. You should question all such claims.

We have seen earlier that there is nothing magical about what the "experts" know. Everything they say is tentative. You must therefore never hesitate to question experts, particularly on complex issues like the climate or the economy.

2.6.1 *Climate change*

Climate change is one of the complex topics which is in the news all the time. All kinds of claims are made in the media. But you should be fully aware that underpinning these claims are models with highly simplified assumptions, models that cannot "predict" what happened in the past, and which have been repeatedly unable to predict even for the next 30 years since they were first introduced. Their failure to match reality is but to be expected for a topic as complex as the climate.

For instance (and this is technical, so you can skip this para if you like), the "governing equations" of climate models are highly nonlinear (Navier Stokes). The models make assumptions to simplify these for computational capacity (non-linear equations are hard for computers, even on supercomputers). Thereafter, the "butterfly effect" applies: small input errors lead to massive output errors.

But leaving aside this information which you are not yet trained for, be clear that the claims of "experts" are just their guess, based on highly simplified assumptions. The only time we can believe in their results is if they can

accurately predict the past. Yes, the past. A model must first predict the past before it can be used meaningfully to predict the future. No climate model has yet ever predicted the past. So they are fundamentally flawed.

The models also ignore that CO_2 (carbon dioxide) is hugely beneficial to plants. They ignore the fact that the Earth has one of the lowest ever levels of CO_2 today in its entire history, and that the Earth is at one of the coldest stages ever (with its polar caps intact).

So to think about complex phenomenon like the climate change you should ask a lot of questions.

What is climate? What factors impact the climate? (Answer: at least a few hundred). How is the Earth's temperature measured? Long-term quality thermometer measurements have only been available in a few European and American sites, with most of them now contaminated by urbanisation. What about satellite measurements and surface measurements: e.g. the reliable surface measurements come from the US Climate Reference Network.

How is the sea level measured? Be aware that the land itself can sink: it is very common. What is the proof of the greenhouse gas effect? There is no robust way to prove it in a laboratory. How is CO_2 measured?

What information is needed to confirm (or reject) the CO_2 hypothesis? What is the correlation between CO_2 and temperature over the recent past? Answer: very little. What is the correlation as we stretch out to hundreds and then millions of years? Answer: zero. What climate "model" predictions could prove the hypothesis? What would nullify it?

What are the strengths and weaknesses of temperature and CO_2 estimates of the past? E.g. tree rings, ice core, marine sediments, pollen. Tree ring data is a better measure of rainfall than of temperature, ice cores show that CO2 increased when the Earth's wobbles first made it warmer – CO_2 was thereafter ejected from the oceans.

Are extreme events increasing? Read the IPCC's reports that say: "there is only low confidence regarding changes in global tropical cyclone numbers over the last four decades", there is "low confidence that anthropogenic climate change has affected the frequency and the magnitude of floods" and that there is a "decreasing trend in the global number of tropical cyclones and globally accumulated cyclonic energy".

Ask about the costs and benefits of CO_2. Read IPCC's reports which show no economic harm. Since CO_2 is plant food so it gives us a lot of benefits. Ask: what other competing scientific hypotheses exist to explain the slight increase in temperature since 1800?

This topic is not going away any time soon. Let this be an ongoing opportunity to ask questions.

Einstein was smart not because of his intelligence but because he asked questions.

3. Some tips for sensible thinking

Since we are so fallible as a species, subject to fears, biases and ignorance, it behoves us be sensible in our thinking methods. We could make the same mistakes that others are making, unless we are very careful about how we think.

3.1 Absence of strong beliefs

People (all of us) know very little with complete accuracy. And the universe is too complex. Even if someone knows quite accurately about a narrow part of the world, it is possible that future knowledge can overturn or at least improve it.

When human beings, including experts, are so fallible, we should probably remain humble about much of the knowledge that we may acquire.

My personal thinking has evolved over time on many issues. My beliefs have criss-crossed a wide canvas. Almost no belief has stood the test of time in all aspects. Some of my beliefs broke down logically, some were rooted in the environment in which I was nurtured and broke down when the environment changed. Others – mostly relating to the society – got upturned as I experienced life more deeply.

Even an entire society can change over time. The worldview of people in the same country can change quite dramatically over time. It is sometimes harder for older people to change their beliefs. Such society-wide changes therefore occur slowly, and mainly occur when the older generations dies out and younger people accept the new information.

A problematic thing about holding a strong belief is that in order to be internally consistent, we may need to act on our belief, and in some cases that might lead us to make mistakes, or even harm others. We should at least try to ensure that our beliefs do not harm others.

A scientist's beliefs are therefore always tentative. He is always open to changing his mind once new information comes in.

3.2 Big Picture thinking

David Epstein describes a professor of chemistry who set questions of this type in his exams: "How many piano tuners are there in New York City?" You may think that such a question has nothing to do with chemistry. But you would only be partly right. Such questions develop the skill of Big Picture estimation which is crucial to all science but also to our life in general.

After much learning, David Epstein realised that such questions are very good tools to develop thinking skills. He realised that there is a method to answer such questions. For this particular questions he found the following method to answer the question:

> "I knew the population of New York City; most single people in studio apartments probably don't have pianos that get tuned, and most of my friends' parents had one to three children, so how many households are in New York? What portion might have pianos? How often are pianos tuned? How long might it take to tune a piano? How many homes can one tuner reach in a day? How many days a year does a tuner work?"[4]

The point of this example is to illustrate one of the most important thinking methods: Big Picture thinking. It involves taking a well-considered *guess* about the answer. It generally involves **thinking about proportions**.

[4] David Epstein (2019). *Range*. New York: Riverhead Books.

I was introduced to this method (also called the Fermi estimation method) by a geography teacher in year 9 in school. Since then, I have used it intensively. I call it Big Picture thinking.

Another way this method works is to **think of extremes**. For example, there are people who claim that GM food kills. Now, we know that if someone inhales hydrogen cyanide, he will die within seconds. The causality is clear.

But if someone eats GM food no such thing happens. Even 30 years later they are still alive. Yes, they will ultimately die, but that's from the sheer act of living: death occurs to all. That's not due to GM food.

Likewise, to test whether a minimum wage causes any harm to society, imagine that it is fixed at 1 million dollars per hour.

Looking at the big picture also means **going back to the longest data series we can find**. For example, with CO_2, "scientists" often show the period since 1979 when there is some correlation between CO_2 and temperature. But the moment we go back by a few decades or a few hundred years, the correlation breaks down.

3.3 Get to the bottom of people's fears

People suffer from two types of fears. One, for which there is a clear link to harm. The other fears are generally those for which there no direct relationship but a possible, circuitous and indirect relationship: such fears are often overblown.

3.3.1 *Fears with direct evidence of harm*

If we don't install railings on top of a building to protect people, they might fall. Even though not everyone will fall down if a railing is absent, a railing can prevent some falls, so it is a good idea to act on this fear and to install a railing.

Similarly, if we don't protect against mosquito bites, we might get malaria, which could kill in some cases. While every mosquito is not dangerous, it is good ideas to use nets while sleeping in a mosquito infested area.

We know that a catastrophic collision of Earth with an asteroid may well occur in the future, so we need to monitor asteroids and even try to divert their course. That is already being done.

3.3.2 *Fears with indirect harms*

These are imaginary or highly exaggerated fears. H.G. Wells's novel, *The War of the Worlds*, is an excellent example. Although the original novel was published in 1898, the book was dramatised in a 1938 radio programme. People who had not read the book thought that a real Martian invasion was taking place, and a panic was created across the United Kingdom. People panic very easily. They tremble in fear at every shadow.

In all such cases the fear is plausible. It might happen. But it is greatly exaggerated.

It is here that asking questions is most useful. We need to ask: "What's the evidence?", not "Who said it?"

3.4 Seeing the Invisible

There's a lot that is not visible to us, particularly in human affairs. When people talk about masks for covid, they do not quite understand that there are thousands of types of masks, with different properties. And the way people wear masks is different for each person: further, each person may wear it differently on different occasions. If it is hot, the mask might come loose. If a person is poor, he will re-use the mask. When "scientists" try to prove that masks work (or not) they completely ignore the real world. Their studies are therefore futile and entirely meaningless.

[Note: add picture of child with tattered mask]

To empower you to see the invisible, and to think clearly, I have written a book, *Seeing the Invisible*. You can download and read it.[5] It will show you how to become a detective, so you are not fooled by "experts" who – most often – don't know how to think clearly.

3.5 Creative thinking and liberty

The unique feature among people who stretch the frontier of knowledge is their curiosity and imagination.

They ask questions and do not easily accept anything as the truth. But more important is their imagination. They imagine how things might be; how we might do things differently; how we might explore the stars. Then they try to create what they see in their imagination. That is perhaps the most productive trait of all, which gives us new products and ways of looking at the world.

You can probably earn a decent living by learning existing knowledge. If you ask questions, you will learn faster and be sure of your learning. But if you add imagination to your questions, you can help mankind stretch the frontier of science and liberty.

Why do I mention liberty? Because it is not just about knowledge that we have to ask questions. We need to ask questions even about the way a society is organised.

For example, we take for granted today that our government should not just make the law but follow the law.

But that was not so obvious in the past. John Lilburne (1614-1657) was treated very badly 400 years ago. His flaw was that he kept asking questions from the rulers of the day about the authority under which they acted differently in similar situations depending on who is involved. He also claimed that all humans are born equal: he is called a "Leveller", since he levelled all social levels in society.

The aristocrats obviously did not like being questioned, so he was not only tortured and beaten but jailed for almost all his life. He died at a very young age of 45 after being mistreated by all kinds of governments of the day.

But what he left behind were a lot of questions. The common people of England read these questions and also started asking them. These questions would lead to the Glorious Revolution of 1688 in which John Locke's explanations of the sources of government power and equality of all citizens became widely accepted. The people of England were liberated for ever from the tyranny of kings and whimsical aristocrats (now they only suffer the tyranny of experts).

If you want to find out about how human beings asked questions and fought for their liberty and their right to think independently for themselves, you can read my draft manuscript, *The Discovery of Freedom*.

[5] http://efc.sabhlokcity.com/download-free/

3.6 Trade-offs and cost-benefit analysis

Everything has costs and benefits. If we do one thing, we can't do another. If we use money for one thing, we can't use it for another. The way to assess the costs and benefits of something is through a cost-benefit analysis (CBA).

A CBA is a comparison of pros and cons. Most people think either of the costs or the benefits. They are unable to see both together. In that manner they make huge blunders of analysis. Do not assume that just because someone is an adult, or even an "expert", that he or she knows how to think. Most people will fail to identify the costs and benefits, or to understand trade-offs.

3.6.1 *Example: covid pandemic*

Questions that people often fail to ask regarding the pandemic include:
How big is this pandemic in comparison to other pandemics?

How many people die in annually from all causes? - How many people die in an average year in the world?

When was any textbook or article published that recommended lockdowns and mandatory masks? Was any of this recommended in the official pandemic plans of Western countries? What were the recommendations of the WHO prior to the pandemic?

Have any of the kinds of policies that we saw implemented in 2020 (such as lockdowns) been implemented successfully anywhere else in the world in the past to control over respiratory pandemics?

Is the method of counting covid deaths the same as a method used for counting other deaths in the world? Or has the method changed?

Which population group was most affected? Were children affected by covid? What could have been the most effective manner off preventing covid deaths?

Were there any harmful effects from the lockdowns on people? Were there any harmful effects on children's education and upbringing because of the closure of schools and mandatory masks?

Who are the people who lost their lives in the covid pandemic? (These are people with generally over the age of 80, and also people who have been sick for a long time – what is called comorbidities; most of these people would have gently died on average within 3 to 5 years anyway)

Lockdowns probably delayed the death of some of these people by a few months or years.

I have undertaken a cost-benefit analysis of lockdowns and have found that the harms greatly exceed any benefits. You can (and probably should) do such analysis, as well.

3.7 Advanced topics

I would have liked to introduce you to more, but this is enough to get you started.

Once you become good at asking questions you can start looking at things like:

Biases: There are many more biases we have.

Statistics: You should learn to read charts and graphs and not be fooled by them. You should learn that correlation does not imply causation. You should learn about "mean reversion". You should about probability distributions.

You should read the work of John Ioannidis who showed that most medical papers are wrong and their results cannot be reproduced.

One of the finest thinkers is James Flynn, whose book, *How To Improve Your Mind: 20 Keys to Unlock the Modern World*, is worth reading.

And you can read David Epstein's book, *Range: How Generalists Triumph in a Specialized World.*

There is no limit to the readings you can undertake to fine-tune your ability to ask questions. But this much is clear: just because you get the highest grade in your class does not mean that you know how to think.

Thinking and asking questions is a much higher skill than getting high grades in class.

* * *

May you have many happy years of questioning!