WHAT WE REALLY KNOW ABOUT NOT KNOWING

We know little, but we still have an opinion about everything. Having ideas doesn't cost anything, there isn't the burden of the proof, and we can even fool ourselves.

Try to ask more often "Why?" or "What evidence do you have?" You'll be amazed!

Someone says: "I'm a vegetarian"; and you: "Why?"

You could debate for hours, but it's likely that there isn't a real explanation. He can be right, but the point is another: it's foolish to be convinced of something, without an explanation.

He could argue that he feels better, but also a meaningless diet would statistically benefit someone. This doesn't prove anything.

But suppose your friend has a reason, right or wrong. Then ask the second question: "What evidence do you have? Have you simply read about it or you have verified it? "

You could go on for days, without coming to any consclusions, because the only conclusion that can be drawn is that people do not think in a scientific manner. In fact, many times they do not think at all.

We cannot be certain of what we don't prove and we cannot have any certainty of what noone has ever proved. Yet at school they instill the idea that having personal opinions means having "thinking skills". It would be true if the

opinions were always supported by facts, but most of them are not at all.

An opinion based on facts is far better than one that is not.

On the surface they are identical, but the latter is often dictated by personal **beliefs**, **fears**, wrong **associations** and the **thirst for definitive answers.**

So **don't listen to recommendations based on auto-referential opinions, but take someone's advices based on facts to heart**.

But how to distinguish the true facts from the false ones? In circulation there are a lot of lies. **Dissenting opinions, among other things, almost always originates from the spread of falsehood.**

There are cases where you can't have an opinion, not having enough data to formulate one. Yet people are always able to get the smartest ones, any way they want.

It's funny that people almost always have an opinion on everything, even when they haven't enough information to have one.

The scientist is honest about it, when he doesn't have enough information to determine if there is a green ball or a blue ball in the box, he keep himself open, in a sort of "wise doubt." He doesn't invent an answer anyway.

LET'S LEARN HOW TO THINK

Most of the discussions stems from the fact that we don't think in a scientific manner. And thinking in a scientific way is thinking in a practical and demonstrable way. The reality is one and there can be no discussion about it.

You can "produce" pro-vegetarian or anti-vegetarian students, simply teaching and educating them in different ways. People don't realize the influence of culture, until they clash with reality. The only way out of the trap is to analyze the data ourself and compare it with the real world. To do this you must also be able to refrain from having an opinion when there isn't enough data to have one. This is the first step to be rational.

Only people able to observe the facts are not open to influence. Thinking rationally means to analyze facts, not elaborating opinions.

It doesn't mean we can't be original, but creativity and personality are one thing, knowledge is another.

HOW A SCIENTIST THINKS

If we want to be rational, we must understand how a scientist think.

1) First he **observes**. It can be, for example, an apple that falls.

2) Then he asks himself some questions and formulates **hypotheses**. He supposes that the apple is dropped due to a force exerted by the planet (**inductive reasoning**, i.e. from the particular to the general).
3) He makes a **predictions**. He supposes that on a spaceship there can be no fall of bodies (**deductive reasoning**, i.e. from the general to the particular).
4) He **experiments** what has been deducted. He goes on board a spacecraft and performs experiments.
5) He formulates a final and consolidated **theory**.

The scientist can distinguish at a glance a proof from an opinion, even if both can be communicated with the same words. But the scientist is aware of what is behind and when he doesn't have enough information, he says: "Prove it!"

The scientist knows that most of the time we try to explain a phenomenon, that explanation is wrong. This is an hypothesis (step number two) and we need to formulate and test many hypotheses, before to find a correct answer.
Chemists and physicists know that very well, the developers as well, since the software doesn't work until they find the error. But the bad doctors can be contented of giving explanations and evaluations not based on diagnostic tests, that patients not used to think in a scientific way, accept without difficulty and consider by the same standard as statements validated by tests. The difference is that developers must always solve problems, but doctors can be contented by having incurable patients.

The scientist knows that a verified thesis can always be

demolished by new experiments. For this reason new tests are always devised to confirm or invalidate.

According to Karl Popper, a theory must be **refutable**, therefore the experiments must be such as not to give rise to doubts, validating or invalidating the original thesis. Psychology is not scientific because it's always possible to support our own argument, finding confirmation among the patients. Even the friend convinced to have the "best" diet in the world, will find confirmations anywhere, convincing himself more and more to be right.
Much of the man's knowledge hasn't gone far beyond assumptions. Economics is a good example and it will become a science only the day you'll do real experiments on whole villages. The main shortcomings of classic and social studies are the non-testability or non-refutability. Such a disciplines have a large number of theories in contrast with each other.

Journalists can even make non-scientific statements out of scientific findings, simply by extrapolating further data from research that actually states something else.

Knowing the scientific method is useful in everyday life to interpret a book or an article, and even if it won't happen to use the scientific method yourself very often, you can draw three very useful lines of conduct.

THE CONFIRMATION

Experiments take place in the present, while confirmations

are sought in the past. In everyday life we can't operate as a scientist, but we can think like him. This is made by using precise and certain facts of our experience, to confirm or refute what we hear or read.
If we are told that "when there is no wind, it rains", we can think to a time in which there was no wind and it was raining, to immediately refute the claim.

THE FEEDBACK

The feedback method consist in finding evidence in the present, rather than in the past, but without all the trappings of the experiments. The good journalist makes extensive use of it, crossing information, accessing databases, performing real investigations; in our small very useful not to be deceived.
If an article sustains that in the Middle East has been used a nuclear weapon, it will be easy to verify by consulting the data recorded by seismographs. If we read that a drug has been introduced without prescription, it will be even easier to check by calling a pharmacy.
It is an effective method, but it requires a little of action, and lazy people will find less tiring to trust their opinions based on hearsay or nothing.

THE WHY

Sometimes we have no way to confirm a news, neither through experience, nor investigating. But there is still something we can do: pretend to know the why of things.
If we are told a fruit prevents cancer, but we are not told

why, the information is almost worthless.
Why should it prevent cancer? Does it contain some beneficial substances? Does it favors a particular process?
Many people are so naive to accept information without having been provided them any reason.

Never believe anything unless there is a why.

THE PYRAMID OF KNOWLEDGE

We have said that an opinion based on facts is better than one that is not, but still doesn't pass the wall of the hypothesis (step number two of the scientific method); an auto-referential opinion instead doesn't event reach the step number one of the observation, and it's of no use. There is an upper level: that of the hypotheses based on a large number of confirmations, as in the case of statistics, pharmaceutics or part of medicine (clinical studies, epidemiology etc). At the top of the pyramid there is the out-and-out scientific knowledge.

All the human knowledge could be represented as follows:

1. Scientific knowledge
(Physics, chemistry, biology etc.; step 5 of the scientific method)

2. Statistics knowledge (pharmaceutics, clinical studies and epidemiology).

3. Opinions based on facts (psychology and many personal

opinions; step 2 of the scientific method)

4. Opinions not based on facts (personal opinions; below the step 1 of the scientific method)

It all begins as philosophy, then it becomes science. Chemistry and physics were once matters largely based on opinions, often the result of popular credulity, and were getting lost along the dark paths of alchemy and sorcery.

Statistics is the discipline that has allowed us to make more reliable even those knowledge of social kind on which the scientific method is not always easy to apply.

Statistics is the art of getting valuable information from a sea of useless information.

An estimate is much more accurate as much data you have available. There isn't in nature a thing as chance. If I showed you a dice and I asked: "What are the chances of it falling?" Many of you would say: "Fifty percent." But I could continue to hold it in my hand and say: "It actually has one hundred percent chance of not falling".
The paradox is due to the fact that you lacked a datum, that is you didn't know I did intend to let it fall in the first place. It follows that:

The calculation of the probability is much more precise as much data is available.

And as a corollary we can state that:

If there is a deviation between what has been observed and the estimated probability, there must be one or more information not considered.

The weather forecast is not an exception. Having enough data, we could not only predict the weather, but also the future in general, as Google is trying to do with the trend analysis

CONSPIRACY THEORIES

There are certainly questions that aren't worth answering. So what are the questions we should really ask ourselves in the life?
The why a machine works is more important of the details of the functioning.

In general we can say that the "why" of things is more important than the "how."

Journalists often get lost in details and forget the important things: why did the killer shoot him?

But this distinction is not enough, in fact, **"a truth that can change our point of views is of greater value than one that can't"**. Knowing what happens to a body in the absence of gravity is interesting, but does not change the way we think about it, because we all know already what gravity is. So this is not only about understanding how important a knowledge is in itself, but how important it is for us.

The research is the most precious thing the society has, because it's the only means by which to change its paradigms. For the individual the study and the inquiry are the key to the change and the personal success.

It's what you don't know that can really change things, what you know has already had enough chances to do so.

A conservative and conformist science, linked to old paradigms and that refuse to confront the unknown, is an unfortunate fate for humanity. I'm not suggesting to violate the principle of the Occam's razor, according which it's better to prefer simple explanations than complex ones. I'm just saying that it's necessary to investigate new ways and possibilities.

A research deserves to be undertaken to the extent its finding promises to be relevant or to the extent its phenomenas are unexplained.

It's precisely the most controversial thesis that deserves the greatest attention as, although unlikely, the human progress that can arise from them is immense. Often it's exactly the most insignificant things to conceal the greatest treasures. The doctor usually ignore phenomena not contemplated in the literature, but in doing so he never discovers new diseases and never find new treatments. After all, aren't the unusual noises that warn us of a malfunction?

What you don't understand must be analyzed, not

ignored.

At a more personal level, going down the pyramid of knowledge, we can use confirmations to endorse or refute many of the alternative theories we run into. It's easy to recognize a theory without any contact with the reality, from one that has relations and on which you can find confirmations.
The theory of the control of media is plausible, given that the newspapers report the news in the same way, but there is nothing of concrete to support the theory of the "hollow Earth", so it must be a nonsense.

It follows that:

The true explanations usually also clarifies a lot of other facts around us.

Many ignore alternative theories, but in doing so they don't realize to be gullible fools.

Skepticism is synonymous of credulity, to change is just what you believe in.

As we have already said, you can't have a good opinion without evidence or facts. The subject of conspiracies hasn't to be dealt by becoming convinced supporters of conspiracies or debunkers, it's dealt by becoming researcher and investigator of the unknown, keeping an open mind, ready to any outcome.

The more the thesis are shocking and bizarre, the greater must be the scientific rigor and the interest. The testimonies are sufficient in a court case, but limited in the case of conspiracy. A conservative science however prefers to cover its eyes and ignore, rather than observe.

CONCLUSIONS

With these information you will be able to think in a scientific way and drive towards the rationality the people around you.

When the vegetarian is back to you, he doesn't know what is awaiting him. This time there is also a fervent supporter of the hyper-protein diets.
The two could go on to argue for days. Luckily you start asking the right questions: "Where did you hear this?", "Who told you that?", "What proof do you have of that?", "Why is this true?"
The discussion won't go on for long and perhaps the two will realize how much they talk and how little they know. Or maybe they won't, but at least they'll stop bugging you with their meaningless discussions.
At last you have a powerful weapon in your hands!