

FREE FIRST CHAPTER

THE HABIT OF CRITICAL THINKING

How To Think Like A Thinker

Powerful Routines To Change Your Mind And Sharpen Your Thinking — Chapter One. About a 28-minute read.

"All truths are easy to understand once they are discovered; the point is to discover them" — Galileo Galilei

How many times do you feel like you have to choose between professional and personal success? That life is an unwinnable compromise that leaves you feeling that you are falling short despite your best efforts?

You want to do your job well, to get things perfect, working efficiently in time and money. You may be responsible for leading by example to others, keeping them motivated, delivering good results without dropping the ball or causing too much stress. You don't want to be pushy or greedy, just to be the best you can be. You have probably trained hard and considered your options carefully along the way.

There is often that catch, that to be who you need to be at work means sacrificing who you want to be at home. Missed opportunities may haunt you at times, and the thought of getting out of the rat race taunts you on bad days. Some people seem to have it all by luck or inheritance, but where is the fair reward for decent hard work?

You can use your brain to win back that balance. You already have the skills, but those skills need to be recognized and then practiced just like anything in life. You can succeed at work without constantly sacrificing your home and social life for your career. And it is easier than

you think, as well as free. You just need to identify old auto-pilot behaviors that do not help you and replace them with smarter, upgraded ones.

Think about it as an update on your phone or computer. It helps things to run more smoothly. If you still used the original operating system, your device would be very slow indeed. It doesn't mean you have to get a new phone. You just have to acknowledge that an update is needed then set aside a short amount of time for that update to occur, resulting in saving plenty of time down the line.

This book is your guide to your brain update. By learning these critical thinking habits, you will improve your approach to challenges, make more reasonable choices professionally and personally, and improve your outlook to solve future problems more effectively and independently.

So, what do I know about learning? Why have I written this book? I am a scientist, a teacher and I still love the challenge of learning. I have seen what works, what doesn't and had plenty of opportunities to make mistakes and try a different way again. If you have ever heard the saying 'if you need something done, ask a busy person,' that has been my life. I have been that 'busy person' who constantly expands their to-do list. It hasn't sunk me yet.

After turning 30, I got a promotion to run a large secondary school science team in a new school, co-ordinate the moving of the lab equipment and teaching material to a new building within the first term of the job, moved house myself, got married, and ran my first marathon. As I am still in my job, house, and marriage and having a few more marathons under my belt, I deem that seven-month spell successful. It was crazy, but it taught me how to use the skills I had more efficiently and gave me the chance to learn many new ones. I had more fun and achieved more than I ever had previously imagined possible in such a short time frame.

My academic background and love of learning lead me into teaching, and I still read widely on the latest research and success stories about how people learn best. For me, teaching

and education are much more than a means to a grade on a piece of paper. Education is about discovery and about learning to use your mind effectively.

To succeed in life at anything, you need to learn new facts, skills, and methods constantly. To learn effectively, you need to be able to think critically. I love the sciences for being a direct way to investigate the physical world around us, but every subject requires an investigative approach to dig deeper and discover more.

This is what this book is about. Identifying the skills you probably already know about makes them more explicit and turns them into habits that will serve you well for many years to come.

Are you ready to update your brain and refresh your auto-pilot thinking? Keep reading.

Claire Johnson

Your Holidays Are Really Experiments

"The scientific method is just the normal working of the human mind" — Thomas Henry Huxley

Think the science experiments you did in school were just about getting a good grade, drawing neat diagrams of strange equipment, and plotting graphs? Think again! You can use the skills you learned in the classroom to reveal new choices and opportunities. All you need to do is a bit of revision.

My role as a science teacher is to get students to learn scientific facts and use the scientific method to help them solve problems. Essentially, to be a good scientist, you need to have critical thinking as your default setting. This does not, however, mean acting like a Vulcan!

You can be entirely logical in your approach to life and be in touch with your emotions. Empathy is crucial in being a true critical thinker*. Critical thinking is not about choosing to follow your head over following your heart. It is about considering them both to arrive at the

best conclusion. Scientists have a reputation for having the emotional range of a teaspoon, but this is just a stereotype. And stereotypes represent the opposite of critical thinking.

So, what is our scientific method? In short, a scientist will first observe something unusual, like penicillin mold stopping bacteria growing around it. They will then pose a question to investigate, such as 'can I repeat this to stop different types of bacteria growing near the mold' or 'if I use more mold, will that kill more bacteria?'. They will make a plan to test this by doing experiments and gathering data, which they will use to come to a conclusion and answer their original question. In reality, it is common in science, as in life, that in finding the answer to one question, you open the doors to many others and can then seek more answers.

This method is not just for science. You have probably used it without even consciously thinking about it.

Observing And Questioning

Let us think about your next holiday. Whether you've been saving for it or not, when you start planning it, your main goal is to get it right. You probably start by 'observing' what you and your family need. Is everyone tired and needs to relax? Do they need to go on a big adventure and see something new? Have you all been fed up with your weather and want to go somewhere different? Essentially, why do you need that holiday? What need are you trying to fulfill?

Establishing the aims of the holiday means that you have to honestly question yourself about that, but you need to seek the opinions of whoever you are traveling with. If you want a successful holiday, you may need to compromise on the aims. Going into the process already having decided for yourself where you want to go and then persuading others that you are right is rarely going to meet everyone's needs.

When you decide your holiday destination and aims, you may ask friends, or Google, to suggest somewhere that fits the bill. You may ask about price, weather, transport,

accommodation, entertainment and more. It is best to do both critical thinking and holiday planning with an open mind.

Testing And Concluding

Choosing your destination is like choosing which experiment to do. You don't know if it will meet your criteria; you are testing and gathering information by going on holiday. The holiday is your investigation! Is it going to serve the original purpose or not?

At the end of the holiday, you can form your conclusion. Are you more relaxed, more energized, or more tanned? We all do this automatically; we decide if it was a 'good' holiday and if we would consider going there again. We recommend it to our friends or tell them to steer clear.

Sometimes holiday 'experiments' do everything we hoped they would. Sometimes they do not! When I was about twelve, my parents decided to take us on holiday to Spain. We had been there before in October, and there was a lot to see and do, plus there were amazing beaches! It seemed like a smart plan. The 'experiment,' the holiday itself, proved that there was a problem with this plan. Spain is very hot in the summer. We are English and not great at being that hot. In the afternoons, we needed a siesta, and the only time we could cope with exploring the area was late in the evenings and into the night. I remember being at a funfair at 1 am! My parents said they got less sleep on holiday than if we had stayed at home, and the conclusion was that, for our family, Spain was not the best option for a summer holiday.

I still use this information now to plan holidays. I learned that I do not enjoy being in scorching places. Building a solid understanding of yourself supports the critical thinking process. It is like knowing a few more of the rules to use to make your future decisions.

If you can plan a holiday, you can think critically. The skills are all there already. All you need to do is to make them your new autopilot.

Why 'Being Right' Is The Wrong Path To Take

When was the last time you went hiking? If it was a popular route, there must have been plenty of paths leading to the top. Nonetheless, the question is: have you done any research before getting to the starting point? When you decide to take any action, do you first consider your abilities and the means you have to achieve your goal? For instance, before going on a hike, having a good look at the available paths, where they lead, and what kind of equipment you need will make the difference between a great experience and a painful one.

You don't want to choose a path that means you have to do some rock-climbing to the summit if you have only got your hiking boots and don't know how to use a rope. You don't want to choose a path just because it starts from the closest car park, or it looks the shortest on the map, without getting a little more evidence and without considering the alternative routes. That short path may be the steepest and most dangerous. Choosing a path on a hunch may be pretty dangerous!

Our default way of thinking is often like taking that short but unresearched path. We will choose an option that looks easiest at first glance. If we put no more thought into it, fail to ask any questions, seek no evidence, we end up on a randomly chosen path, potentially dangerous.

To think critically, we need to change our autopilot to one that runs through the scientific method. Think about the aims, questions, plan, experiment, and conclusion required. To do this effectively, we must start with an open mind. You do not plan an experiment by deciding what the conclusion is in advance. Experiments are all about finding out the answers and being prepared to be surprised!

This is the first key to critical thinking: do not decide on your conclusion before you start thinking. You need to think before you form your arguments and decisions, rather than seek evidence to fit what you have already decided is your truth.

It sounds very obvious when you see it written down, but this is the biggest barrier most people face. This is because most of us like to be right. We like to seem smart. Thinking and making decisions with an open mind means there is a real possibility that the way we have been operating so far is not the best path to take. Maybe someone else has a better idea. Maybe we have been heading on the wrong path because we took a default decision, and we have found out halfway that this was not the best option. Is it better to carry on regardless, knowing that the path ahead is uncertain and potentially dangerous? Or take the time to turn back and try another way?

The latter means that we have to accept that we did not make the best choice. It may even mean we have a friend saying 'I told you so!' as we make a new plan. It means being humble enough to consider the opinions of others genuinely. Thinking critically entails practicing this sort of 'slow thinking'* that stops us from jumping to conclusions and then being too proud to back down.

Critical thinkers are truth-seekers. They gather the evidence before forming their conclusions. They are open to new perspectives and to admitting they are wrong without taking it personally. It should not be shameful to agree that someone else had a better idea, but our modern society often makes it feel like we have failed. However, just believing something is right does not make it the best decision. The truth, as is said, will set you free, so embrace it even if it didn't come from you.

Skill Up To Shake Up Your Thinking

It is human nature to think, but not human nature to think well. We get very easily misled and distracted*.

To be a truth-seeker means re-tuning how you think. It takes the right mindset, certain character traits, awareness of predispositions and limitations, and plenty of practice to enhance the traits that make a critical thinker. This is not as much hard work as it sounds; we are all born with these skills. We just live in a busy world where we take shortcuts that

become our habits, and we stop thinking properly. With a few tweaks, we can form a new and improved auto-pilot.

Learning is not thinking, just the same as knowledge is not understanding*. I can get a student to recite a definition to get the marks in a test, but that only tests their memory, not their scientific understanding. In our world, where it is possible to look up most facts in a matter of seconds, we still get tricked into believing that someone who knows lots of points has a real understanding of a topic.

Knowledge does have a crucial role; a solid basic knowledge is a foundation for understanding. The ability to read and write a language does not make you a poet. However, you cannot be a poet without having that knowledge first.

Our minds cannot hold loads of facts in our short-term memories and use that information to solve complex problems. It is our cognitive load* that determines how well we can solve problems. If you want to improve your ability to solve problems in a particular area, you need to make sure you have the required knowledge.

Just like a scientist who has done their research and is ready to start their experiment, to build the ability to be a critical thinker, you need to build your scientific skill set. If you master these, then critical thinking becomes the default pattern embedded in your long-term memory for all your decision-making. Before that point, just like learning a new phone number or a routine, you need to practice.

Your skillset will involve mastering the following: identification, analysis, interpretation, inference, evaluation, explanation, and self-reflection. You might already use these most days, in your job or with your thinking. The trick is to apply them consistently to your personal as well as professional life.

Identification Is Key

Identification sounds easy, but it is often the hardest skill to do well. Think about a problem you want to solve. Most of us think big. Then we either panic about the enormity of the task

ahead and do nothing, or we make a huge to-do list and get increasingly anxious as we struggle to make progress with it. This is why most New Year's resolutions fail.

The most common New Year's resolutions are to get healthier, which are broken down by many into 'to do more exercise' and 'lose some weight'. These may sound good but they are terrible goals! There is no identification of the actual root problem and achievable solutions in these resolutions. They are too broad. Most people will give up when they first decide to eat some cake or when they won't feel like going for a run.

Think about the path up the mountain again. The most important thing was to start on the right path. That tiny decision to identify the right starting point, the correct place to park and start from, is what everything else hinges on.

If your resolution is to lose weight, then the best way is to identify one small aspect of your life that will help. Maybe you identify that you need to eat breakfast at home rather than grab a less healthy snack with a coffee before work. Perhaps you identify that you need to change your sugary drinks for versions with less sugar. Maybe, like me, you decide that the best way not to be tempted to eat chocolate is simply to stop buying chocolate?! One small, manageable change can have big effects. That alone means that you are more likely to succeed and then be able to identify your next issue.

Identification is your hinge point. Identify your problem clearly, and you will find the right path. Everything gets easier from there. But start by thinking small and specific.

Your next skill is analysis.

Analyze That

The analysis is where your Vulcan logic comes in. It is about looking at the data or the language used with no preconceptions, no emotion, no bias, no excuses. Think about the scientists who have to note all trends or patterns in their results, including the ones they weren't expecting. Or, how the lawyers have to analyze the information provided to them

and summarize their findings, even if it means acknowledging something their client has done, which they would prefer had remained unknown.

It is pretty much the same if you want to lose weight — you need to analyze your diet. You have to be honest about what you are eating, how much, and when. You need to note if you eat more when you are out, stressed, or with friends. Critical thinkers see all of this as cold, hard data. Analysis means seeing the overall picture and patterns, even if we don't like what we see.

For this reason, many people think they are good at analyzing their lives but are not. They only analyze the bits that they allow themselves to see. If you are a scientist, you can only analyze data after the conclusion of the whole experiment. You need all your data to draw a good graph.

Open To Interpretation

After you have analyzed what is going on, you can start to form a conclusion. This is often called inference. Remember, it comes after data gathering, not before!

Remember the last time you were going through your finances? Did you write down (or use an app) what you spend, when, and where? Perhaps your data told you that you spend a lot on eBay at night. Or maybe that all of the little cups of take-out coffee add up to a large proportion of your food bill. If that was the case, you might have concluded that you are more likely to overspend when you are tired (late at night, early in the morning) and not focussing on your spending. The spending is an effect of your state of mind.

Conclusions often require you to choose your future self. It may mean deciding to do something new or stopping an existing habit. This is why it is important to follow the method; a wrong conclusion may lead you into the wrong future actions.

Life, however, is not usually as simple as providing black or white conclusions. You and a friend can see the same data and arrive at a different conclusion. It doesn't necessarily

mean that either of you is wrong or that either of you is right! To think critically, you need to open your eyes to this possibility of alternative interpretations.

For example, my husband often looks out of the window and exclaims, 'it's pouring with rain outside; I'll go for a run later.' I can look outside at the same weather and class it as merely 'drizzle,' which would be no reason to avoid going out for a run. We can see the same evidence and draw very different conclusions. Neither of us can say our 'truth' is the only possible one. We just come to different conclusions.

Evaluation And Bias

As a critical thinker, whenever you draw a conclusion, particularly one that requires a change in your behavior, you need to ask yourself a question: is what you have found out the truth? As far as possible, you need to be sure it is accurate and free of bias. This is an evaluation.

This skill means that you often have to play devil's advocate. Do you trust that data? Could the data lead to a different conclusion? Is there anything missing or anything that you know but didn't reveal? Think back to the spending example. Do you pay for some coffees with cash so that they wouldn't have shown up on the credit card bill? Or are you the person who makes the office coffee run, and many of those coffees were not for you?

Anyone can analyze data and come up with a conclusion. Total strangers could look at your bank statements and conclude. Some may be true. Others may not be. You are the only one who can evaluate these conclusions because you are the only one who knows the full picture.

After the evaluation, you can choose whether to accept or reject the conclusion. If you reject it because the conclusion was flawed, you would typically go back to the start and make sure you collect a better set of information to come to a more accurate conclusion the next time around.

Explanation

If you apply the steps above, you will sometimes come out with conclusions that do not seem obvious.

While marathon training, I wanted to improve my times. I thought that if I ran more frequently and for longer distances, this would do the trick. It worked, but only up to a certain point. I could not get my half marathon time under 2 hours. I got it to 2 hours and 10 seconds, 2 hours and 4 seconds. But I never really made gains. It was frustrating! I looked at a wider variety of training plans and focused on including hill sprints and 5k park runs each week. It worked, but it only took about 5 minutes off my time. My conclusions did change my actions but didn't change the results.

I then realized that I had only focused on analyzing data from my runs. It sounds sensible, but it led me to a blind spot — my diet. I have always been healthy, so I ignored treating my diet as potential data. I didn't think it would affect my times, but I was wrong.

Convinced there was something else going on, I got some medical advice and found out I have a lactose intolerance. So I quit dairy, and every race I ran was a new personal best from that point onwards. My husband missed me at plenty of finish lines because I often finished ten minutes ahead of when I thought I would!

Others asked what I had done to change my race times so much suddenly. I had to explain that I was doing nothing differently; apart from that, I had quit dairy products, which wasn't going to work for most people. It invited questions, so I had to learn to explain my conclusion to people who thought it sounded like a fad or a joke. It was not the running tip they had hoped for!

Practicing intense exercise for prolonged intervals puts our bodies under stress and makes the gut more sensitive. This means that even mild food allergies can become an issue during hard training or racing.

Explaining your actions clearly, particularly those that do not seem like the obvious decisions, is another critical thinking skill. It is like writing a synopsis of a book. You need to communicate your reasoning and conclusions before the listener switches off. Explain too briefly, and you will just invite more questions. Explain in a lengthy manner, and people will tune out.

Self-Reflection

The final skill in the critical thinking toolkit is not about the decision-making process. This one is more personal.

Scientists choose to study particular sciences for many different reasons. It may be an exceptionally interesting topic; they may aim to discover something new or add to their career options. I did not choose chemistry for any of these very valid reasons. I picked my A-level subjects and then my degree, based on what I had to do the least amount of writing.

The irony of this, as I write a book, is not lost on me. I love writing now, but in my early twenties, I chose numbers over words every time. Apart from the odd dissertation, this worked well; labs were mostly maths, and organic chemistry involved a lot of drawing. Then I did teacher training. We had to do lots of essays, particularly self-reflective essays. I felt like a bunny in the headlights. I wanted to teach science to kids. Why did I have to write these pieces?

I couldn't see it at the time, but the essays were useful. Self-reflection is about being aware of your intentions and motivations. It is a skill that is rarely taught, certainly not in a chemistry degree, but one that is often the difference between making progress in any area of your life or stagnating.

To be skilled at self-reflection means asking one question to yourself a lot, and that question is 'why'?

Why do you want certain things? Why do you feel the way you feel? Why do you have certain goals? Why do you think your life would be better if 'X' happened?

To do this, you need to know yourself and step outside of yourself in equal parts. You may have completed a '360' analysis or worked out your Myers-Briggs personality type in your professional life. These are good places to start, but you need to understand how they apply to your private and professional lives.

A good way to practice self-reflection for your daily life is to imagine playing a reality game like the SIMS. You are doing the self-reflecting for the characters you control. You can do this well because you know the exact characteristic breakdowns and the needs of those fictional pixel beings. You can see if they are extroverted and need to socialize more, if they are low on energy and need to relax more, or they are fun-loving and need to play more. You can also see what they need to do to get to the next stages of their careers and relationships. You know their needs and have the overall picture to direct them to do what is best for them at any particular time.

What if you could 'check' your own needs and motivations this easily? How much simpler would it be to choose the next right thing to do? This level of reflection allows us to be efficient in developing the best habits to suit our lives.

Winning Characteristics

Critical thinking skills are a toolkit that helps to structure and guide the decision-making process. They are something for you to do and practice doing.

The critical thinking characteristics are something for you to be and practice being. Without developing these characteristics, the skills will always feel a bit forced.

The critical thinking experts Richard Paul and Linda Elder* describe the goal as becoming an 'accomplished thinker' by practicing the techniques and developing certain characteristics until critical thinking is your autopilot. Both are required.

The big barriers to this are, unfortunately, both ourselves and our society*. But you can overcome these barriers easily when acknowledged! As Matt Haig writes, you cannot put out a fire by ignoring the fire*.

So what is your society? How can it shape the way you think? Spend a minute on what you would consider 'normal.' What does it look like? If you had a 'normal job,' 'normal family,' 'normal house,' what would that look like? The irony is that most of us want to be normal and to stand out from the crowd, at the same time. We want to be just the right amount of normal to feel like we fit in but still feel unique.

This is natural; we are social creatures, and society evolved by having set expectations and rules for the group for it to succeed. Some rules still stand (don't murder others), and some don't (you should always carry a bale of hay in your cart).

However, to be normal enough to be accepted, we often end up like sheep without even realizing it.

Be Skeptical

A friend recently updated her location and marital status on Facebook, about two and a half years later than the events themselves. One person said congratulations, understandable when many of us have acquaintances on social media who are not up to date on our personal lives. Then, someone else wished her a happy anniversary, knowing she had been married and assuming that the update was on the anniversary of this. Suddenly she got loads of messages wishing her a happy anniversary. Some of these even came from people who had been to the wedding!

We see others' messages online and we copy, not wanting to be the one who fails to note a significant date. We don't always check first, not even when we should know better from the first-hand experience! The more people claim that something is true, the less likely we are to contest it. We doubt ourselves more readily than we doubt mass opinion.

Conformity is not always a bad thing; however, it can lead to bad habits and strongly held stereotypes if done in an unthinking manner. Critical thinkers hold autonomy over their thoughts and beliefs. They dare to do so even when it flouts the 'normal' in their society.

Many amazing new ideas would not have taken hold if their inventors had been shy. Think about the printing press, a huge leap in spreading education amongst all people regardless of class. However, it was strongly opposed, with Conrad Gessner writing to authorities to ban it as he was concerned that it would lead to a "confusing and harmful abundance of books." What is new or different is often feared.

Having the courage to question the normal is a healthy form of skepticism. It does not mean you are a negative person! It means you want to be sure someone gives you the correct information. To do this well, simply ask yourself, 'am I sure this is true?' for a given topic. Pretty easy!

A word of warning; healthy skepticism may be taken as mistrust by others. It may mean asking for evidence rather than blindly accepting a statement, even from someone whom you trust. Ask to see articles and generally ask awkward questions if you are not convinced! A good question to ask yourself (and others): 'is this a fact or an opinion pretending to be a fact?'.

A good place to practice this is any social media platform. Do you trust that the posts you see represent the unbiased truth?

Be Curious

A small step from skepticism is curiosity and inquisitive thinking. Once you stop automatically accepting the information presented to you by society, it means you can be more curious about your world. It gives you the mental freedom to ask 'what if...?' more often.

Galileo is a great example of this. He (correctly) went against popular opinion at the time to say that the Earth orbited the Sun rather than the other way around. While other astronomers were devising increasingly complicated models to explain the planets' movements across the night sky, Galileo used his new 'telescope' to support his alternative idea. He stopped assuming that the current theory was correct, and this allowed him to be inquisitive while others were desperately trying to make their data fit an existing conclusion.

Those in power at the time refused to look through his telescope; they would not even consider the evidence. Galileo was not popular for his discovery, but he was right.

Be Open-Minded

Open-mindedness is the opposite of lazy thinking and is often another victim of the expectations of our society. Stereotypes are humanity's way of making decisions faster about who to trust*. But they are the enemy of critical thinkers and the epitome of lazy thinking*. Stereotypes are there to stop us from having to think, which is why they are so dangerous.

To be open-minded, you need to be aware of the stereotypes you hold. Everyone has them; it is a consequence of the society we grew up in. So question yourself. Ask yourself why you assume someone would act in a particular way. If you find it hard to do this on yourself, look at those closest to you, your family, and close contacts. The chances are that you hold the same stereotypes to some extent. Stereotypes are catching. Make sure you know yours and then challenge them by asking questions and answering with honesty.

Be Objective

After you have worked on eliminating your personal bias, you can use the critical thinking toolkit of skills to look at the issues objectively. It means seeing reality, not a mirage. Objectivity is a fruitful state of mind to practice using, even when shopping! What do you need, and what are impulse purchases? Which things are you buying based on what others expect from you? Take the emotion out of these small decisions to see the effect on your choices.

Be Fair-Minded

The other barrier to critical thinking comes under our sense of self. Mastering these characteristics is the difference between being a 'self-serving' critical thinker and a 'fair-

mindful' critical thinker^{*}. I'm sure you know which one you would prefer to be just by looking at the titles!

The self-serving critical thinker is highly rational and can use critical thinking well but does so for their advantage. They use arguments to confuse and manipulate others on purpose. You will be better than that, for the downfall of self-serving critical thinkers is that there is always a bias to their thinking. So it isn't critical thinking at all, just an illusion of it.

Be Humble

There is so much to know that considering what you have yet to learn and what you may never be able to learn is tough. It is sometimes easier to pretend that we know everything on a subject. This is where being humble helps. Humility means not assuming you know best or that the right solution is the one that is in your favor.

It is a strange truth that the more able a person is at a task, the more likely they are to underrate themselves and underestimate their ability. There is increasing research into 'imposter syndrome,' where 'high-achieving individuals ascribe their accomplishments to luck and contingency rather than individual skill and merit'^{*}. This is not what being humble means either; you can acknowledge your strengths, but you need to know your weaknesses. It is a balance.

Be Tolerant

When you can accept different views and perspectives and not take those as a blow to your ego, you know you are getting close to mastering critical thinking characteristics. Finding that you are wrong in the process of discovering a truth is exciting to critical thinkers. It broadens the horizons and opportunities.

Be Flexible

Finally, in a world where talking about flexibility usually means discussing a yoga class or an admission to 'giving in' to another's request, this useful characteristic is often underrated.

This summary is given in a (fairly) well-known quote by Lao Tzu.

"Men are born soft and supple; dead, they are stiff and hard. Plants are born tender and pliant; dead, they are brittle and dry. Thus, whoever is stiff and inflexible is a disciple of death. Whoever is soft and yielding is a disciple of life."

Flexibility does not mean that you cannot hold firm to your beliefs. It means that when life changes, which it will, you can realign rather than break.

And whatever you think, life will change. Sometimes by your choice but more often not. You will have to adapt. Beliefs and habits that serve you well now will need reviewing and updating. You may be surprised at the opportunities this can present if you are ready to open your eyes and look.

Action Steps

You know what to do, so how can you do it? Here is a selection of brain games to help.

1. Get a puzzle book or app: focus on the logic crosses or sudoku. These rely on your analysis and interpretation skills rather than knowledge or observation.
2. Challenge your stereotypes: when you walk past someone in the street, ask yourself, 'What do they do for a job? Where do they live?'. Chances are an answer will pop into your mind if you hold biases; take note of that, so you'll know where you need to check yourself in the future.
3. Find an article online or in a newspaper that you are interested in; then try to find the same story reported elsewhere. Are there differences? Can you find the primary source data? This will improve your awareness of what you can trust as a valid source while also broadening your reading!
4. Consider what you chose to wear today: ask yourself why you chose those items; what image are you aiming to give to others? It is a good way to start to understand your motivations.
5. Pick a nearby item: think how it got to being there. What is it made from? Where did it come from? Who did its production involve? Who designed it? Why did they design it? This gets you into the habit of asking questions and exploring options.

6. Try to keep a running total of costs when you go shopping or scores when playing a game rather than writing it down. Not only will it improve your memory, but your numeracy will improve, so you can analyze information more quickly and spot potential errors faster.
7. Break down complex problems and solutions by imagining you are explaining it to a 6-year-old. See how simple you can make it without losing meaning. You will improve your explanation skills if you can learn to be accurate but concise*.
8. Next time you plan a trip out or an evening in, try using the critical thinking process: identify your aims, ask questions to form a plan, and then analyze your choices. This will help you with the process as well as giving you many opportunities to be self-reflective.

Once you have identified that you want to spend quality time with a friend, you are less likely to end up binge-watching TV. You will plan activities that meet your aims. Once you acknowledge your experience, you will choose a mountain path that is safe for you. Once you have identified your own biases, you can appreciate a wider variety of opinions and form more balanced judgments.

Critical thinking skills will help you take back control of your time and your path through life. You can start to develop the habits you want to have and ditch the habits that are holding you back.

That's a pretty good reason to revise the scientific method.

References

1. Paul, R. W. (2005, Summer). 'The State of Critical Thinking Today,' *New Directions for Community Colleges*, pp. 27–38. <https://onlinelibrary.wiley.com/doi/abs/10.1002/cc.193>
2. Kahneman, D. *Thinking, Fast and Slow*. Penguin, 1st Edition (10 May 2012).
3. Paul, R. and Elder, L. *The Miniature Guide to Critical Thinking Concepts and Tools* (Thinker's Guide Library), Eighth Edition. The Foundation for Critical Thinking (September 20, 2019).
4. Cohen, M. *Critical Thinking Skills for Dummies*. For Dummies; 1st edition (May 4, 2015).
5. Lovell, O. *Sweller's Cognitive Load Theory in Action*. John Catt (23 Oct. 2020).
6. Paul, R. and Elder, L. *Critical Thinking: Tools for Taking Charge of Your Learning and Your Life*. Pearson (2013).
7. Kahneman, D. *Thinking, Fast and Slow*. Penguin, 1st Edition (10 May 2012).
8. Haig, M. *Notes on a Nervous Planet*. Canongate Books Ltd; Main edition (5 July 2018).

9. Babin, J. and Manson, R. *Critical Thinking: The Beginners User Manual to Improve Your Communication and Self Confidence Skills Everyday. The Tools and The Concepts for Problem Solving and Decision Making* (March 9, 2019).
10. Paul, R. and Elder, L. *The Miniature Guide to Critical Thinking Concepts and Tools* (Thinker's Guide Library), Eighth Edition. The Foundation for Critical Thinking (September 20, 2019).
11. Cohen, M. *Critical Thinking Skills for Dummies*. For Dummies; 1st edition (May 4, 2015).
12. Botello, J. and Roulet, T. 'The Imposter Syndrome, or The Misrepresentation of Self In Academic Life,' *Journal of Management Studies*, vol. 56, issue 4, June 2019, pp. 854–861. <https://doi.org/10.1111/joms.12344>
13. <https://www.inc.com/larry-alton/7-mental-exercises-to-make-you-a-better-critical-thinker.html> (Jan 2021).