POSITION PAPER

Brain Power in the Age of AI

A call for a new way to teach critical thinking

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Critical Thinking For Humanity

"Thinking is difficult; that is why most people judge."

CARL JUNG

Critical thinking for kids

We are experiencing a once-in-a-species moment (Fernando, 2026). There is a call for schools to teach critical thinking skills to young people so that they build the capacity to assess information on social media and AI for accuracy, bias, relevance and risk before making a decision. We need to encourage curiosity, empathy and evidence-based judgement (Newman, 2026).

This begins in primary school, with building blocks that form the foundation for critical thinking development:

- Inquire and wonder
- Real or fake

- Identifying emotions
- Learning how to regulate emotions
- How to show empathy
- AI can change what is real
- Bunny thoughts (I want to learn) and shark thoughts (I know everything)
- Paying attention to notice the details
- Independent thinking in uncertainty (not learned helplessness)

Critical thinking for teenagers

For the first time in history, teens have more information coming into their prefrontal cortex than can be processed (Willis, 2020), raising anxiety levels in an uncertain world. They need the tools to navigate the volume of misinformation and disinformation they are exposed to every day.

The teen brain is also vulnerable to errors in judgement, because at times it is "offline" to rewire, laying down myelin and pruning neural networks to prepare for adulthood. When the brain is offline, the prefrontal cortex, associated with logic and critical thinking, is not easily accessed. Teens then tend to make decisions largely on how they feel rather than reflecting on a more reasoned approach.

In addition, teens have 24/7 access to a continuous feed of fast-food information through AI tools, social media and smartphones. The marked decline in cognitive effort that follows reduces the development of grey and white matter in the brain. The result is fewer active neural connections and weaker memory retention, which affects problem-solving ability (MIT, 2025; Purnell, 2026; Willis, 2020).

Drawing on my work with teenagers and teachers over thirty years, I have collated these building blocks for developing critical thinking in teenagers:

- Fast and slow thinking
- Reducing stress for emotional regulation
- Listening skills
- Learning to apply cognitive verbs for higher-order thinking (for example, *analyse* and *assess*)
- Perspective taking
- Understanding personality preferences
- Truth over loyalty under pressure
- Bottom-up and top-down thinking
- Mitigating bias, such as them-and-us bias and confirmation bias
- Empathetic inquiry
- Resistance to rage bait and angertainment

What is critical thinking?

Critical thinking is the process of skilfully interpreting, analysing, evaluating and synthesising information to guide beliefs, decisions and behaviours. It involves questioning assumptions, examining evidence, recognising bias and balancing emotion with logic to make reasoned judgements. Rather than accepting information at face value, a critical thinker probes the source, tests the reliability of claims, considers alternative perspectives and stays open to revising conclusions when better evidence emerges. Ultimately, it is an intentional way of thinking that improves decision-making, problem-solving and the ability to navigate complexity in an increasingly information-rich world.

Critical thinking can be viewed through a lens that recognises how human bias evolved to protect us by putting our safety first, and it should draw on what we know about how the brain rewires. Instinctive, rapid judgements help the brain save fuel, which is essential in a critical incident. In the long term, though, slowing down our thinking and staying open to learning before we judge will serve us better. Changing beliefs takes time because the brain needs to rewire. There is limited learning and behaviour change without neuroplastic changes in the brain over time (Gordon, 2025).

What do young people need to know and do?

Critical thinking requires content knowledge, cognitive thinking processes, practical skills and mindsets. These are summarised in Table 1.

Content (Knowledge)	**Processes** (Thinking skills)	**Skills** (Doing skills)	**Mindsets** (Attitude)
• What is bias? • What types of bias are common? • Challenges with bias • Benefits of reducing bias • How to minimise bias • What is critical thinking? • Why critical thinking is so important • Tools for critical thinking • Overcoming them-and-us bias • Impact of AI on bias • Social media hijacks • Social media antidotes • How to rewire the brain and change habits • Personality preferences • Differences between schema, heuristics, assumptions and bias	• Retrieve, define, name • Interpret meaning • Explain in coherent order • See connections • Link to prior learning • Examine parts and whole • Categorise • Differentiate fact from opinion • Detect patterns • Investigate perspectives • Synthesise • Evaluate arguments • Justify positions • Infer • Create reasoned responses • Problem-solve • Detect bias • Balance emotion and logic • Notice detail • See perspectives and possibilities	• Self-regulation • Attention and focus • Questioning • Listening • Curiosity • Persistence • Empathy • Metacognition • Emotional regulation • Reflective thinking • Pattern seeking • Habit formation • Shifting mindsets • Coping with change • Flexible cognition • Resisting rage bait	**Kids** Use bunny thoughts (we are open to learning), not shark thoughts (we know everything). **Teens** Slow down thinking for inquiry, learning, empathy and curiosity over instant judging. **Adults** Move from an agitate state to a contribute state.

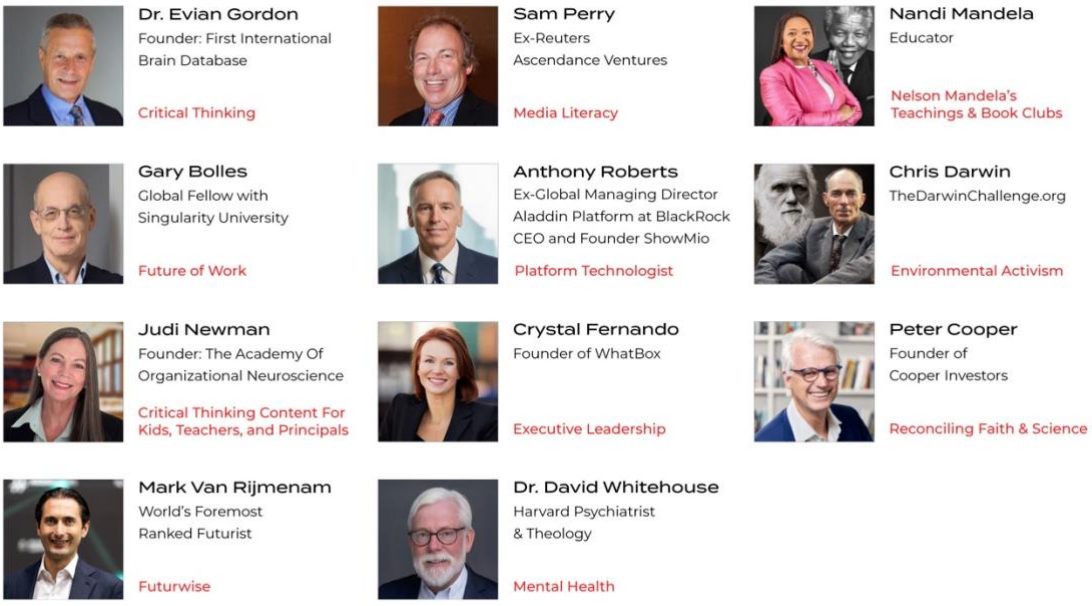
Table 1: What young people need to know and do

A way forward

Dr Evian Gordon, MD, PhD, a brain scientist and medical doctor, is working with a network of researchers, educators and business leaders, pooling their expertise to develop a platform called **ForHumanityNow**. It is a non-profit initiative that fuses insights into brain function with practical critical thinking, empowering people to interrupt reactive instincts, expose unconscious biases and make decisions that serve themselves and humanity. Dr Gordon is the founder of the largest standardised brain database in the world, and his findings underpin this work.

ForHumanityNow brings critical thinking skill development to the world, for the benefit of humankind and a more hopeful, peaceful and united future. The initiative had its soft opening in May 2026 in South Africa's Cradle of Humankind, a fitting setting for the start of such an important journey.

The initiative brings resources to schools and organisations around the world, including online modules, readings and games that teach critical thinking to kids, teens and adults. The guides representing the different fields in this project are shown below.



ForHumanityNow guides and their fields

A new framework for teaching critical thinking in schools

The cognitive skills are not new. Every school is familiar with teaching higher-order thinking through cognitive verbs across subject areas. However, there is now an urgent need to emphasise reflective inquiry. Reflective inquiry can be explained through the ABC framework (Gordon & Newman, 2026) and is shown alongside the cognitive verbs in Table 2.

Thinking skill	Meaning with the brain in mind
Recall	Can you remember it?
Understand	Can you make meaning of it and explain it?
Analyse	Can you detect patterns and make connections?
Apply and transfer	Can you apply it? Can you transfer it to different contexts?
Reflective inquiry	Can you critically examine the impact of your own bias on your thinking? Can you balance emotion, intuition and logic to make a better decision? What is the underpinning premise of your thinking?

Table 2: Critical thinking skills

Conceptual framework

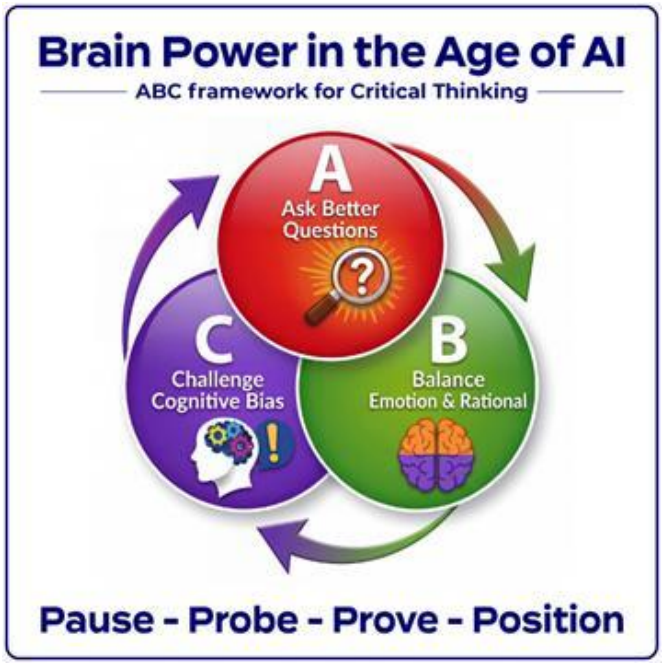


Diagram 1: ABC framework (Gordon & Newman, 2026)

The ABC framework for reflective inquiry

The highest level of critical thinking, reflective inquiry (Table 2), is guided by the ABC framework (Gordon, 2025). The ABC of critical thinking is the ability to understand, analyse, apply, synthesise and evaluate information by asking questions that lead to evidence-based thinking. It uses cognitive thinking skills to mine for bias, notice the evidence-based reality (bottom-up thinking) and the big picture (top-down thinking), and balance our emotional and intuitive responses with more reasoned logic. Let's unpack the ABC of reflective inquiry.

Pause, probe, prove, position

When teaching critical thinking, a simple practical application is the 4P strategy. Young people are flooded with fake news, often blended with some factual messages. Referring to the fallout that explodes on social media after an emotive story or post, psychologist Dr Michael Carr-Gregg recently said:

> *"They [teenagers] are at risk of seeing that the truth doesn't always matter, that being loyal is more important than being honest, that getting angry and outraged is a pretty effective way to get attention as long as you show conviction. The loudest voices demanding allegiance encourage young people to pick a side, defend it to the death and never concede an inch. That's not strength. That's intellectual laziness dressed up as conviction."*
>
> Carr-Gregg, 2026

We need to teach young people to **pause**, **probe**, **prove** and **position** themselves, so they can change their minds when the facts demand it.

A: Ask better questions

This is about pausing to use both top-down and bottom-up thinking.

PAUSE before you judge, act or make an assumption. Misinformation spreads through urgency, drama, rage and emotion, not accuracy. Reflect on what made you feel so certain so quickly.

Misinformation spreads through urgency, drama, rage and emotion, not accuracy.

Top-down thinking: what is the big picture? Determine the governing principle, purpose, theory, rule or intent. Apply it logically and reach a conclusion. This is also called deductive reasoning, and it starts with something you already know. What we already know serves us well in an emergency, or when it comes from significant expertise. However, if we only ever use top-down thinking, we may miss something. Perhaps our beliefs are just assumptions that we hold true.

Bottom-up thinking: what is the reality showing? Notice the detail and the data on the ground. Gather evidence, look for patterns, then form a theory or make a decision. This is also called inductive reasoning, and it starts with an open mind to what the evidence will reveal. Starting from scratch gives us the opportunity to collect all the data before we form any expectations.

Perhaps our beliefs are just assumptions that we hold true.

Critical thinking draws on both top-down and bottom-up thinking. Relying on only one type carries risks.

Risks of using only bottom-up thinking: *"I saw it, so it must be true."*

- You may get sidetracked by detail and miss the broader meaning or context.
- You may spot a pattern too early and assume it represents the whole picture.

Risks of using only top-down thinking: *"I already know, so I don't need to look."*

- If your starting premise is flawed, your conclusion will also be flawed, even if it sounds logical.
- You may dismiss information that contradicts your existing model.
- You may stop asking questions too early because you think you already know.
- You may notice only the information that fits your expectations and ignore what doesn't.

If your starting premise is flawed, your conclusion will also be flawed, even if it sounds logical.

Strong critical thinking comes from **cycling between both**:

- Use **bottom-up** thinking to gather evidence and notice patterns.
- Use **top-down** thinking to test those patterns against known principles.
- Then **challenge both**:
  - *What evidence am I missing?*
  - *What assumptions am I making?*

> **A simple way to teach it**
>
> **Bottom-up question:** *"What do I notice?"*
>
> **Top-down question:** *"What do I think I know?"*
>
> **Critical thinking question:** *"What if I'm wrong?"*

B: Balance unconscious emotion and intuition with conscious, rational reality

PROBE to dig into what is driving the decision: an emotional wave or a more logical thought. Probe to interrogate the sources, not just the content. Don't assume confidence equals truth. Don't place loyalty over truth.

Useful probing questions:

- Is it hearsay, anecdote or verified proof?
- Is it data, research or first-hand observation?
- Is it opinion or fact?
- How credible is the author?
- Is it complete, or is key information missing?

- Is there a benefit or hidden motive?
- What evidence would prove this wrong?
- Has it been reviewed or challenged by multiple independent sources?
- What are my intuition, emotion and logic telling me?

Humans are not wired to react dispassionately to information.

Emotion and logic both play a role in sound decision-making. Humans are not wired to react dispassionately to information (Boyatzis, 2012; Feser, 2016; Gordon, 2022; Wang, 2019). We attach feelings to what we think about, and this emotional connection determines how we respond. Emotions capture our attention and can be a helpful warning or an unhelpful distraction. If we bring emotion and facts together when making decisions, by acknowledging human feelings such as fear and desire, we can balance our unconscious and conscious processes. Be mindful that the emotion behind confidence, power and passion does not equal truth. Balance what we feel against what we can show.

Don't place loyalty over truth.

Strong critical thinking comes from **identifying both logic and emotion**:

- **Acknowledge** the emotions that may be driving a reaction.
- **Anchor** into logic for a reasoned, evidence-based response.
- Then **challenge both**:
  - *What evidence am I missing?*
  - *What assumptions am I making?*

> **A simple way to teach it**
>
> **Emotional response:** *"How do I feel, and why?"*
>
> **Seek logic:** *"What are the facts?"*
>
> **Critical thinking question:** *"What is the right balance here for a good decision?"*

C: Challenge cognitive bias

PROVE by looking for proof, not judgements distorted by bias. Biases are unconscious shortcuts that act before rational thought. They evolved to protect us and ensure our survival, but they often distort judgement and lead to poor decisions. They feel true even when they are false.

Biases are unconscious shortcuts that act before rational thought.

Bias weakens critical thinking, polarises people and erodes our humanity. There are over 100 documented biases, such as confirmation bias and them-and-us bias. Confirmation bias is when we notice only the information that confirms what we already believe. Them-and-us bias is our tendency to be loyal to one group.

Assumptions are different from bias. Assumptions are things we haven't checked yet, whereas bias is a lens we view things through. Assumptions are easy to fix. Bias is harder to change, because it is deeply embedded in the unconscious as a distorted belief system.

Strong critical thinking comes from **mining for bias**. Questions we can ask ourselves include:

- What is the underpinning premise of my thinking?
- Would I apply the standards I use for my own thinking to other people's thinking?
- Have I looked only at information that confirms my existing beliefs? (confirmation bias)
- Is my affection, respect or loyalty towards my friend distorting my thinking? (them-and-us bias)
- Is a dominant, confident voice affecting my clarity? (authority bias)
- Am I going along with the most popular opinion rather than thinking critically for myself? (group bias and the bandwagon effect)
- Am I putting politeness over safety?
- Have I taken a "show me, don't tell me" approach?

> **A simple way to teach it**
>
> **Remind yourself:** *"I don't know what I don't know."*
>
> **Ask:** *"Am I missing something?"*
>
> **Critical thinking question:** *"Am I subject to the them-and-us pull or to confirmation bias?"*

Take a position

POSITION comes last. Understanding all the options, even those you disagree with, matters before you land on a position. It is OK to change your mind as better information updates your thinking. After reflection, draw a reasoned conclusion.

It is OK to change your mind as better information updates your thinking.

Unpacking the cognitive verbs

To embrace the ABC framework for critical thinking, we must first make sure young people know how to apply the basic critical thinking verbs. Most teachers understand the importance of teaching cognitive verbs as part of higher-order thinking. Students still need to be able to recall, understand,

analyse, synthesise and assess, but we now need to go beyond this and extend the skill set to include reflective inquiry.

Table 3 shows the cognitive verbs associated with each thinking level. The levels are not a step-by-step model. Learning is developmental and experiential, not linear. When learners construct their own meaning, they learn what they come to understand. Our thinking moves back and forth across the different levels as we understand, reflect and problem-solve to make reasoned decisions.

Learning is not a linear process.

Thinking level	Key question	Cognitive verbs
Recall *Remembering facts*	Can you remember it?	Name, identify, list, define
Understanding *Explaining the concept*	Can you make meaning of it and explain it?	Explain, elaborate, give examples, provide a metaphor, summarise, highlight key points
Analysis *Seeing the parts and the whole*	Can you detect patterns and make connections?	Categorise, reorder, prioritise, find cause and effect, sort, compare similarities and differences, infer, find evidence
Application and transfer *Applying learning to solve problems, and combining information in new ways across a range of contexts*	Can you apply it? Can you apply it in different contexts?	Evaluate, create, synthesise, translate, problem-solve, judge, formulate a plan, justify, hypothesise, defend, test, theorise, determine criteria
Reflective inquiry *Metacognitive thinking, ABC framework*	Can you critically examine the impact of your own bias on your thinking? Can you balance emotion, intuition and logic to make a better decision? What is the underpinning premise of your thinking?	Relearn, reflect, question, focus and notice, mine for assumptions, take perspectives, mine for bias and beliefs

Table 3: Cognitive verbs

Applying the new critical thinking framework

Let's use the COVID-19 pandemic, which most people around the world are familiar with, to show how you can pose questions at each thinking level.

Thinking level	Example questions: the COVID-19 pandemic
Recall	• List the ten countries with the fewest COVID-19 deaths per 1,000 people. • Recall the official public health guidelines issued at the start of the pandemic. • Identify the countries with the highest vaccination rates per capita. • Name the medical protocol Finland used to treat people who tested positive.

Thinking level	Example questions: the COVID-19 pandemic
Understanding	• Explain the main factors that kept Australia safer from the pandemic than many other countries. • Describe how viruses spread differently through the air compared with surface contact. • Summarise why some populations were more vulnerable to severe illness than others. • Demonstrate how the government's hand-washing policy reduced the spread during the pandemic.
Analysis	• Construct a graph showing the number of people hospitalised by country, gender and age. • Compare infection and mortality rates between urban and rural populations. What patterns emerge? • Analyse how the timing of government responses influenced the spread of COVID-19 across countries. • Show the similarities and differences between public testing routines in the USA and Australia. • Sort the countries in order of distance from the first reported case. What questions do any patterns raise?
Application and transfer	• Formulate a plan to reduce the spread of viruses through air and contact in the community. • Design a community awareness campaign to improve hygiene and reduce virus transmission. • Apply lessons from COVID-19 to develop a response plan for a future pandemic. • Hypothesise the top three impacts on the economy if another pandemic struck tomorrow. • Assess the effectiveness of public mask wearing based on this professional paper.
Reflective inquiry	• What assumptions did you make early in the pandemic that were later shown to be untrue? • Explore whether your group shares a range of values about individual freedom versus community safety. • How would perspectives and memories of the pandemic differ for a hospital nurse in Canada, a homeless person in India and an elderly person in an Australian nursing home? • How did your personal experiences during the pandemic shape your views on risk and safety? • In what ways might the media, AI, culture or social groups have influenced your thinking during the pandemic, despite the facts? • What were the three most common cognitive biases linked to pandemic misinformation, and what behaviour problems did they cause? • Detect what was fake and what was real in social media posts about the pandemic. • Was there a time when the population was hijacked by emotion, pulling our collective thinking away from what mattered? • What was your gut feeling or intuition telling you when you first saw the pandemic on TV?

Table 4: Applying critical thinking verbs

Critical thinking in the age of AI

AI is a powerful tool with real promise and possibility. However, we need to be mindful of the good, the bad and the ugly of AI.

> *"As teachers and school leaders, the challenge is not just to keep up to date with changes, but to ensure AI serves the goals of education, fostering independent [critical] thinkers, creative problem solvers and lifelong learners."*
>
> Purnell & Burgos, 2026

Studies from Oregon State University and the University of Toronto confirm that AI boosts creativity only when guided by clear human intention. Over-reliance leads to weaker independent performance on creative tasks, making it harder for students to think critically and independently (Kosmyna et al., 2025). For example, in a creative writing unit, students who brainstormed ideas first and then used AI to refine their stories produced more original and engaging work than those who relied solely on AI prompts (Purnell & Burgos, 2026). Research also shows that people who interact with biased AI systems become more biased themselves (Glickman & Sharot, 2025).

The factors below can help us use AI to our advantage without letting it distort our critical thinking (Clark, 2026; Purnell, 2026).

Brains grow through effort, not shortcuts

MIT research on AI and brain activity using EEG scans found that students who used AI tools such as ChatGPT to write essays had a 47% reduction in active neural connections compared with those who wrote manually or used traditional research tools. Active brain engagement dropped from 79% to 42%, showing a marked decline in cognitive effort. Alarmingly, 83% of AI users could not recall what they had just written, compared with only 10 to 11% in the non-AI groups. Teachers described the AI-generated essays as "soulless" and "bland" (Kosmyna et al., 2025).

A Grade 10 English teacher noticed that students who used AI for essay drafts struggled to discuss their arguments in class. When asked to explain their reasoning, many drew a blank, highlighting the risk of mental disengagement (Kosmyna et al., 2025).

Students relying on AI also showed weaker memory retention, less neural connectivity and a reduced sense of ownership over their work. The more we learn and commit to memory, the more schemas we have, the more connections we can make, and the less cognitive load we experience when we learn something new.

Use AI, don't let it use you

AI can be both friend and foe. Used wisely, AI boosts accuracy, creativity and problem-solving, but overuse makes us lazy. Let AI assist you, not lead you. Apply critical thinking principles in partnership with AI tools for better results.

Stay connected to real-life experience and humanity

Although AI may sound human, it cannot show real empathy or love, or feel an experience. Don't forget that it isn't human, so it can make mistakes in surprising ways. AI can only respond using the information it has been trained on (Clark, 2026). AI cannot replace the teacher's ability to connect, use intuition, offer wise counsel at the right moment or act as a role model.

Fire and wire neurons for critical thinking

Learning is an effortful process, not a passive one. It takes focus and directed energy over time to grow the spines and dendrites needed to strengthen neural networks for memory consolidation. Indeed, there is limited change in thinking, learning and behaviour without neuroplastic changes over time.

Thinking fires neurons. Learning wires neural connections.

If AI is used continuously, neurons will fire but not wire. This is the difference between thinking and learning: thinking fires neural networks, and learning wires them. To master critical thinking and transform belief systems, the brain needs time to rewire.

Use fact-checking

Don't believe everything AI produces. You still need to fact-check sources and credibility. Critical thinking is essential in a world of plausible but wrong answers (Purnell, 2026).

Learn better prompting

The better you describe what you want the AI to do in your prompt, the better the results will be. If you aren't careful with your phrasing, it can misinterpret you (Clark, 2026; Purnell & Burgos, 2026).

The Bias Bank

Common cognitive biases, the safety story that makes each one feel right, and a question and small action to counter it.

Bias	What it does	Example	Safety story	Antidote question	Micro action
Confirmation bias	You only see what supports your current belief.	You only watch clips that agree with your take on a school rumour.	I stay certain. I avoid the discomfort of being wrong.	What would change my mind?	Find one credible source that disagrees and read it first. Talk to someone who saw it.
Bandwagon effect	You copy what others do.	You pile on in a chat thread because everyone else is.	If I do what the group does, the group protects me.	If everyone else were wrong, would I still do it?	Pause before you post.
Authority bias	You over-trust people who seem famous, powerful or expert.	A famous actor sells a product, so it must be good.	If they know better, I can stop thinking and feel safe.	What evidence supports their claim?	Check an independent source before you buy.
Projection	You argue against something because it unconsciously reflects something you fear or desire in yourself, even though it may be quite reasonable for another person.	You tell your friend they're stupid for dancing on stage at a parade when everyone is watching.	I would feel embarrassed and lack the confidence to dance in front of people.	Is this about my fear, or about supporting my friend in what they're good at?	Don't project your own fears onto others. Ask yourself: who is this hurting?
Halo effect	One positive trait makes you assume other positives.	A popular athlete seems automatically smart and trustworthy.	I can decide fast and reduce uncertainty about people.	What evidence do I have for that specific trait?	Rate two traits separately.
Them-and-us bias	You favour people who are like you or on "your side".	You excuse rude behaviour from your friends but not from others.	My group protects me, and I owe them loyalty.	Would I judge this the same way if the roles were reversed?	Think of three reasons the other side might be just as right before you take sides.
Availability bias	Vivid or recent examples feel more common than they are.	A shark attack at your beach makes a rare shark bite feel more likely.	If I can picture it, I can prepare for it.	What do the statistics say about how often attacks happen?	Reflect on the actual probability of a shark attack right now.
Negativity bias	One negative event outweighs several positives.	A tourist died of heat stress in the desert, it was on the news, and it's on your mind.	Bad things might mean danger, so I should focus there to stay safe.	What three facts show the full picture?	Think of the 20 desert walks you've done safely.

Bias	What it does	Example	Safety story	Antidote question	Micro action
Anchoring bias	The first idea sticks and pulls your choices.	The first friend who comes to you with a story about you, and you believe it.	A starting point gives me quick certainty.	What would the person concerned say if I asked them?	Compare at least three options before deciding.
Sunk cost fallacy	You keep going because you've already invested time, money and effort.	You stay in a club you hate because you've already joined.	Quitting feels like loss and failure, so I avoid it at all costs.	If I could choose fresh, what would I do?	Make decisions based on future value, not past effort.
IKEA bias	Things you make yourself seem more valuable to you.	You break a pottery cup you made and are upset all day.	I can control what I've made, and control makes me feel safe.	What are my options for getting a similar cup?	Let go of emotional decisions when you can't do anything about it.
Social identity bias	Automatic associations can influence judgement without awareness.	You assume someone is not smart because of the way they look.	Fast categorising feels efficient and safe, but it can be unfair.	What objective evidence am I using right now?	Replace labels with observed facts.
Lego bias	When adults have a problem, they tend to add rather than subtract.	A father and son build a Lego bridge that collapses. While the father gets more bricks, the boy takes some away and fixes it.	Fear of loss and of not having enough. Move towards abundance.	Do I need to add or take away to solve this problem?	Keep problems in perspective. Bigger and more is not always better.

Table 5: The Bias Bank

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