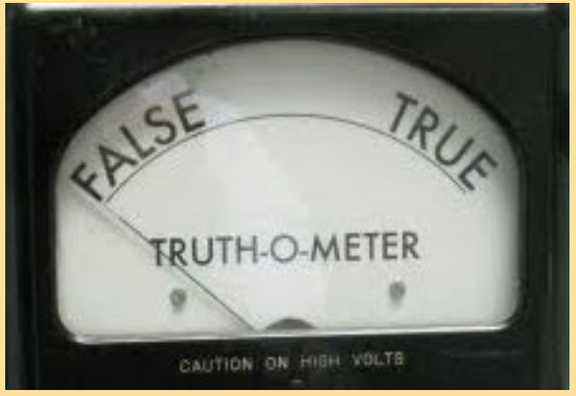
You're searching for the truth. What sources of information should you use and trust? Brian Martin recommends reflecting on a topic that you know a lot about and taking note of which information sources were useful or misleading. To illustrate this process of reflection, he tells of his own experiences learning about the effects of nuclear war, the origin-of-AIDS debate and the sources of talent, in each case commenting on different sources of information that influenced him. Truth Tactics is an encouragement to learn from your own learning about how best to pursue the truths that matter to you.



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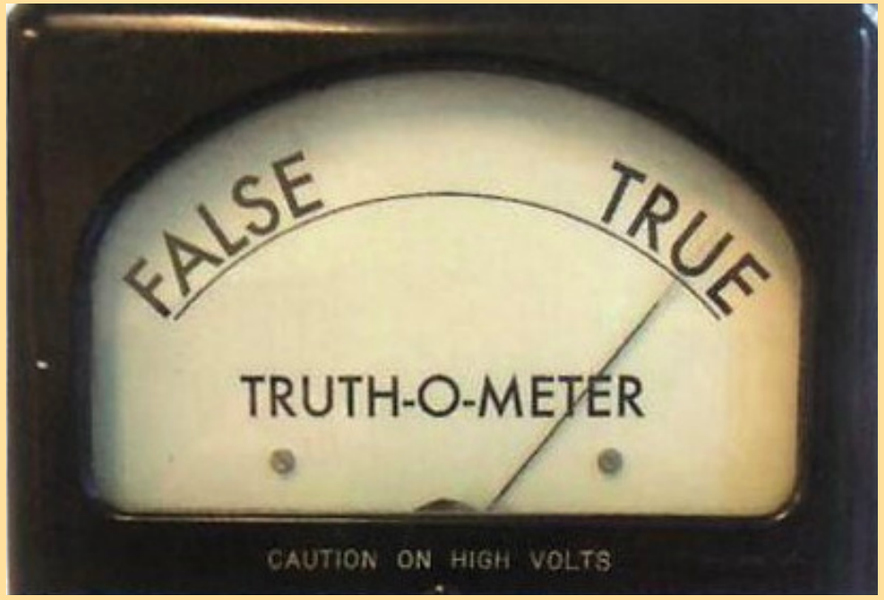

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CONTENTS

Acknowledgements

In *Truth Tactics,* I tell about how I learned about the effects of nuclear war, the origin-of-AIDS debate, and talent. Some individuals who contributed to my learning are mentioned in the text but many aren't. As well, some others led my learning down unproductive paths. That's okay. They have all been part of the journey.

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Three individuals mentioned in the text — Des Ball, Hugh Comins and Anders Ericsson — died in recent years. I can only hope to have written an account they would have approved.

1
Introduction

Do you want to know the truth?

There are lots of things you might want to know, for example what your neighbour is doing, whether you should quit your job or how the universe began. There are also lots of things you don't need or want to know because they aren't important or interesting, for example the average annual hours of sunshine in Zambia in 1900 or the speed of the water flowing down your street after a heavy rain.

To talk of "the truth" usually implies it is something significant. In a courtroom, the truth is supposed to be the basis for making a judgement of guilty or not guilty.

The truth can be distinguished from data, information and knowledge. Philosophers have analysed the nature of truth and how it can be determined. Here, though, I'm interested in something more practical: how we acquire information that is useful and meaningful for us.

Think of it this way: there are various sources of information available to us through our senses, information that we can accept, reject, synthesise and categorise and use to understand the world, including ourselves. The challenge is to decide which sources to seek out or believe and which sources to avoid or reject.

This challenge can be thought of in terms of tactics. Other people, through their speech and actions, offer information for you. They can use various methods of persuasion

to serve their interests. For example, advertisers try to get you to believe in and buy their products and services. Every source of information, from your friend to news media, is offering information that can help you or lead you astray. These are the tactics, conscious or otherwise, of information sources. Even nature can be thought of as using tactics. When you look at a tree, it presents itself to you with certain implicit messages. Some insects use camouflage so predators won't notice them.

Many of the things around us are involved in appearance management: they want you to see certain things and draw certain conclusions. Clothes and make-up serve to influence how others see you. So are news headlines and the titles of scientific articles. How can you tell which ones are providing accurate information and helping you figure out the truth?

When I first had the idea of writing about this topic, I thought of it in terms of the reliability of information.[1] My plan was to look at various sources of information and comment about their characteristic strengths and weaknesses. This led to a listing of sources, for example family and friends, advertisements, personal experience, social media

1 I was influenced by an article by R. David Lankes, "Credibility on the internet: shifting from authority to reliability," *Journal of Documentation,* vol. 64, no. 5, 2008, pp. 667–686, in which he found that "users are shifting from more traditional 'authority' methods of credibility determination, where users cede determinations to trusted third parties, to a 'reliability' approach where users seek commonalities and coherence among multiple information sources." This prodded me to think more about reliability.

and scientific papers. However, there's a big problem: within each category, there is a lot of variation in the quality of information provided. An ad giving the price of broccoli at the local fruit and vegetable shop is quite different from — and probably more accurate than — a video ad for the latest model of car.

Looking at the characteristic strengths and weaknesses of different sources of information has another limitation: it depends greatly on your purpose. If you want to buy some fruit and your budget is limited, then the price of broccoli at the local shop is relevant, but otherwise this information can be ignored.

My next idea was to help people think for themselves about information sources. Knowing the techniques used by advertisers, especially sneaky techniques such as product placement — in a film, the lead character just happens to use an Apple computer — would be helpful in identifying reliable information. Or would it? From what I had learned, many techniques of persuasion are effective even when you know they are being used. You might know intellectually that if you are a heavy consumer of news, you are likely to overestimate the level of crime in your neighbourhood or the world. But can knowing something at an abstract level counteract your emotional reaction to a flow of information and images? These reservations led me to question my plan to help people think for themselves.

Then I had a thought. The people who are best positioned to see through misinformation are those who know a whole lot about a topic. A criminologist, for example, knows a lot about crime statistics, definitions of crime, perpetrators, legal systems and much else. With a compre-

hensive understanding of many facets of the issue, a criminologist is well placed to watch a politician making claims about crime and to know whether the claims have any validity and furthermore to have a well-informed idea of what agendas the politician is serving. Similarly, a criminologist can make informed assessments of statements in a criminology journal as well as comments about crime at a dinner party. This doesn't mean the criminologist is right or has exclusive access to the truth about crime. After all, the criminologist might be personally biased, might be trained to think a certain way or be attuned to the views of an employer.

There's an important point here: there's a difference between being knowledgeable and being right. Being "right" refers to knowing the truth. Usually we assess the truth based on the consensus of experts in a field. When knowledgeable people agree about something, it is the current truth. The trouble is, this truth can change.

Think back to the early 1800s. Most experts on zoology and geology believed the world was relatively young, having been created a few thousand years ago. They were creationists. They were knowledgeable and they subscribed to the current truth. Then along came Charles Darwin (and Alfred Wallace) with a different interpretation of plants and animals based on the theory of evolution, along with geologists who thought the earth was very old. A furious struggle ensued between creationists and evolutionists. The evolutionists won, at least among nearly all experts. The point, to state it again, is that there's a difference between being knowledgeable and being right.

If being knowledgeable about a topic enables you to better interpret information, dismiss false or misleading claims and cut through to important points, then this enables you to assess different sources of information. This led to my next idea: to better understand the strengths and weaknesses of different sources of information, it can be illuminating to reflect on your own understanding, especially your understanding of a topic you know a lot about.

My primary message is that it's worth spending time reflecting on how you learned about a topic about which you now know a substantial amount, thinking especially of different sources of information and insight and whether they were helpful, irrelevant or misleading.

How to reflect on what you know can be done in a variety of ways. What I do in the following chapters is provide my own reflections on three areas that I know a lot about. Or at least I think I know a lot about them! The three areas are the global effects of nuclear war, the origin-of-AIDS debate, and talent.

Here's an important point: I'm not trying to convince you that I'm right about what I know about these topics. Indeed, it's probably helpful if you disagree with me. What I'm doing is illustrating how I can reflect on how I acquired information about these topics. More specifically, I'm trying to think about what I've learned about the quality of different sources of information.

The rush to judgement

A good friend of mine, Isla MacGregor, became involved in campaigning on the issue of prostitution. Specifically, she supported what is called the Nordic model and, because

some public supporters of this model were subject to censorship, defended free speech for them. Some time down the track, after she had told me a lot about this issue, she asked me my view. I said I hadn't studied the issues in sufficient depth to make a judgement. Isla said I was the first person she had encountered who didn't have an opinion. Few Australians have ever heard of the Nordic model. In Isla's experience, as soon as people hear about it, nearly all of them express a view for or against it.

In another case, one of my PhD students was the target of a media campaign of denigration, and I was also named in the media stories about her. I received quite a few messages, some supportive and some hostile. Only one person asked me for more information.

I'm sure that on many issues I have formed a view before I've learned much about it. When people ask, "What do you think about X?" — where X is any controversial topic — it seems hard to say, "I'm not sure" or "I don't know enough to say."

The problem with the rush to judgement is that it can prematurely take your mind along a predetermined path, through the phenomenon of confirmation bias. Let's say you've formed a view about the Nordic model. If you come across information about it, you are more likely to be interested in material that supports your view and more critical of information that clashes with it. How many people do you know who go out of their way to study the perspective of those they disagree with?

In examining what I've learned about sources of information, in two of the case studies I changed my mind along the way. As I learned more, from different sources, I

changed my views. Does this show something about the sources of information? I'm not sure, but at least it shows that something, at some point, was persuasive enough to overcome confirmation bias.

In each of the next three chapters, I first give a roughly chronological account of how I learned about the topic, followed by thoughts on how different sources of information influenced my understanding. The sections on influences repeat some of what went before in the chronological reflections. The conclusion chapter sums up some of what I've learned through this exercise. The appendix is a compendium of my assessments of the strengths and weaknesses of various information sources. It provides a sort of guide to traps in searching for the truth. Based on your own experiences in learning, you might like to develop your own guide suited for your own purposes.

In studying truth tactics, perhaps the most insidious pressure is self-deception, which is your willingness to believe something even though contrary evidence is readily available. Self-deception is hard to overcome. The best help comes from others, especially those with different viewpoints to yours. As you'll see, I've tried to assess the role of self-deception in my case studies. You will know better than me whether I've made an accurate assessment. This is just a warning. In examining truth tactics, the deceiver to be most wary of is your own mind.

Nuclear weapon test, Nevada, USA, 1951

2
The effects of nuclear war

What would be the effects of a global nuclear war? Here, I'm going to tell you about my own quest for answers to this question. My aim is not to persuade you about any particular answer, but rather to reflect on the role of various sources of information in my quest. Some sources helped and some didn't.

The first nuclear bombs were exploded in 1945. I was born in the US in 1947 and thus am a child of the nuclear age. However, nuclear issues were not prominent in my upbringing. Nuclear war was a possibility, but it didn't have a big emotional impact.

Neighbours on the other side of the street had a bomb shelter in their front yard. It was something to comment on but not to emulate. I have a vague memory of a drill in primary school to leave classrooms and crouch in the corridors. This was in Tulsa, Oklahoma, not a prime nuclear target.

The Cuban missile crisis, in October 1962, was the closest the world has come to a major nuclear war. Getting up before the rest of the family, I remember collecting the morning newspaper and checking the front page to see whether nuclear war had broken out. I was sufficiently naïve not to realise that if there had been attacks, we would have been notified immediately, via radio or sirens. Note

that this was long before the Internet and 24-hour news channels.

In 1969, to avoid going into the army, I left the US and immigrated to Australia, undertaking a PhD in theoretical physics at the University of Sydney. My thesis topic included a study of the effect of exhausts from supersonic transport aircraft, such as the Concorde, on stratospheric ozone. These exhausts include nitrogen oxides, created by high temperatures in the engine essentially burning nitrogen in the air.[1] The fireball of a nuclear explosion also creates high temperatures that cause atmospheric nitrogen to burn. Some of the studies of the effect of nitrogen oxides on stratospheric ozone looked at atmospheric testing of nuclear weapons, and assessed whether the explosions had affected stratospheric ozone levels. This was my first encounter with research on the environmental effects of nuclear weapons.

My studies in physics gave me a basic grounding in nuclear matters. I was not especially knowledgeable, but did learn about nuclear decay, radioactivity, half lives and chain reactions. I knew enough to realise that training in physics was not essential for understanding the most important issues concerning nuclear weapons and nuclear war.

In 1976, I moved to Canberra and soon became an active member of Friends of the Earth. The group's main issue was uranium mining and nuclear power. Worldwide,

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1 Approximately 78% of the atmosphere is nitrogen, 21% oxygen and 1% argon. Carbon dioxide and other gases are a much smaller percentage. Burning the atmosphere means the nitrogen (chemical symbol N) and oxygen (O) in the air combine to form nitrogen oxides, namely nitric oxide (NO) and nitrogen dioxide (NO_2).

the main public worries about nuclear power concerned reactor accidents and long-lived radioactive waste. However, because there were no serious plans for nuclear power in Australia, the focus of the anti-nuclear-power movement was on uranium mining and, in particular, the potential contribution of Australian uranium to the proliferation of nuclear weapons. In several countries, so-called "peaceful" nuclear facilities — nuclear power plants, uranium enrichment plants and nuclear fuel reprocessing plants — were avenues for obtaining nuclear weapons. In opposing uranium mining and export, the Australian campaign against nuclear power gave much more attention to nuclear weapons and nuclear war than in most other countries.

August 6 is Hiroshima Day, the day in 1945 that an atomic bomb was dropped on Hiroshima. Every year, Hiroshima Day is an opportunity to reflect on the danger posed by nuclear weapons. In the late 1970s in Canberra, there was no peace group to organise activities. Instead, anti-uranium groups organised Hiroshima Day protests. I contributed by helping write leaflets for the rallies. This meant saying something about the effects of nuclear war. I'll come back to this.

In December 1977, there was a national election. Uranium mining was one of the issues. Taking advantage of heightened public interest, Friends of the Earth organised numerous public meetings in country towns. A typical meeting started off with short talks from two speakers, a question-and-answer session, and screening of a film. Most commonly we showed *The War Game,* directed by Peter Watkins, an hour-long dramatisation of the possible aftermath of a nuclear attack on Britain, showing the role of the

government in controlling the population. We also screened *Hiroshima,* a documentary about the 1945 bombing and the aftermath, with disturbing images of radiation burns, and *Doctor Strangelove,* a classic black comedy about US nuclear war planning.

I watched each of these films several times. Eventually, while *The War Game* was being screened at public meetings, I and the other speaker would go to the next room. We had seen the film too often, but we continued to hear the soundtrack.

Watching films about nuclear war provided some information, though only *Hiroshima* had some historical accuracy. None of these films provided a careful assessment of the likely effects of global nuclear war.

In the background of many people's minds was another film, *On the Beach,* based on the best-selling novel of the same name, written by Nevil Shute and published in 1957. *On the Beach* is set in Melbourne. Prior to the book's narrative, there had been a major nuclear war in the northern hemisphere apparently killing everyone there, and lethal radiation from this war was gradually moving south. It was only a matter of months before the radiation reached southern Australia. *On the Beach* followed the activities of several individuals in these final months, aware that the end was looming for themselves and their loved ones. In many people's minds, this fictional treatment provided the message that a major nuclear war meant human extinction: everyone was going to die.

Adding to this message were statements by anti-nuclear-war campaigners about "overkill". They said that

the world's nuclear arsenals were enough to kill everyone on earth many times over.

It was with this context that I got to know Des Ball some time during the late 1970s. Des worked in the Strategic and Defence Studies Centre at the university, a small research-only unit that seemed, on the surface, to be just the opposite of what someone in the peace movement might be looking for. Given the centre's orientation to military matters, Des was an enigma. He seemed to have connections in military and intelligence circles, enabling him to write detailed accounts of US nuclear targeting plans. At the same time, he exposed the Australian government's ties to US spying and nuclear war-fighting operations, most famously in a 1980 book titled *A Suitable Piece of Real Estate: American Installations in Australia.*

In the 1960s, the Australian government agreed to allow several major US military bases to be established in the country. The Pine Gap and Nurrungar bases were located in central Australia; North West Cape was on the western coast of the state of Western Australia. These bases were crucial links in US early-warning and nuclear war-fighting capabilities, which relied on transmissions from orbiting satellites. Despite the importance of these bases, or perhaps because of their importance, they were shrouded in great secrecy. Even their existence was little known outside of specialist circles. As Des wrote in *A Suitable Piece of Real Estate,* information about the bases was known by Soviet military planners but not by Australian citizens.

Des's publications about the US bases were instrumental in turning them into a public issue. The Australian peace movement at the time was opposed to the bases, and

the Labor Party in the late 1960s had a policy against them. However, after Labor was elected in 1972, it did not implement its policy.

Pine Gap and Nurrungar collected signals from satellites monitoring the Soviet Union for signs of the launching of nuclear missiles. North West Cape was a crucial part of a network that would send commands to US nuclear submarines to launch missiles. Information about the bases was vital to anyone who cared about Australia's role in nuclear war.

If there had been no US bases, there would have been no particular reason for the Soviet Union or any other government to launch attacks against Australia. The bases, though, being part of the US nuclear command and control system, were prime targets. Knocking out these bases would seriously degrade US early-warning and nuclear war-fighting capabilities.[2]

I forget how I first made contact with Des. He worked in the Coombes building across campus, so whenever I was in the neighbourhood, for example visiting the library nearby, I would check to see if he was in his office.

We had common interests in nuclear war. Des thought it would be good to write a book about the effects of nuclear

2 This was the state of play in the 1980s. Things are different now due to changes in technology and international politics. Nurrungar was closed in 1999, with Pine Gap taking over its functions. For a peace-movement perspective on the US bases, see Kieran Finnane, *Peace Crimes: Pine Gap, National Security and Dissent* (Brisbane: University of Queensland Press, 2020). For more information, see the Nautilus Institute, https://nautilus.org.

war on Australia. He would provide the information about targeting, namely which cities and US installations in Australia were likely to be hit with nuclear weapons. I would estimate the likely impacts of attacks by calculating the areas affected by blast, heat and fallout, using data on upper atmospheric winds. Though discussing this project for several years, we never proceeded with it. Each of us was too busy with our own projects.

Before this, though, Des provided me with comments that changed my understandings of nuclear war. One day I visited his office, taking along the draft text for a leaflet advertising the upcoming Hiroshima Day rally. I asked Des about the accuracy of statements about the effects of nuclear war. He said, "No, no." He explained that a major nuclear war, though it would be devastating and potentially kill hundreds of millions of people, would be very far from wiping out life on earth.

By this time, I had come to trust Des as someone who had insider access to military matters but who was willing to help peace activists, if only to ensure that our information was factually accurate. At one meeting Des, sensing that I saw him as committed to a military perspective, proudly told me that he had been the first person in Australia arrested for protesting against the Vietnam War. That was in 1965, well before mass mobilisations against the war.

When Des told me that a global nuclear war wouldn't kill everyone on earth, indeed that most people on earth would still be alive afterwards and directly unaffected,[3] I

3 Most of our contact was face-to-face. In July 1981 Des sent me a letter responding to a questionnaire that a group of us had

suddenly began questioning my prior assumptions. I decided to start searching for authoritative information about the effects of nuclear war. I didn't take Des's word for it, but I did respond to his views by probing further.

I tracked down and read quite a few scientific studies of the effects of nuclear war. The one I remember most vividly is a large book edited by Samuel Glasstone titled *The Effects of Atomic Weapons.* It was published by the US government in 1962 and updated in later editions.[4] It is a sober, practical treatment of the issue, giving detailed information about what was known at the time about the three types of immediate effects of a nuclear explosion: blast, heat and fallout. Based on figures and formulas in Glasstone's book, it would be possible to calculate what would happen if a nuclear weapon were exploded in the air over a city or, alternatively, exploded on the ground. An air burst maximises the area devastated by the blast, whereas a

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circulated. Des's estimate of the maximum worldwide fatalities from an all-out nuclear exchange was 400 million, about one tenth of the world's population at the time.

4 Samuel Glasstone (ed.), *The Effects of Atomic Weapons* (Washington, DC: United States Atomic Energy Commission, 1962; revised edition, 1964). In 1979 I read the 1964 edition, taking these notes: "Descriptions of physical phenomena associated with nuclear explosions, effects on structures, radiation, effects on people. Systematically presented; not difficult." Later I asked the university library to order a newer edition, by which time Philip J. Dolan had been added as a co-editor: Samuel Glasstone and Philip J. Dolan (editors), *The Effects of Nuclear Weapons,* third edition (Washington, DC: United States Department of Defense and Energy Research and Development Administration, 1977).

surface burst leads to far more fallout downwind. The radioactive material generated by a nuclear explosion rises high up in the atmosphere, as shown in well-known photos of nuclear tests. The material is blown by winds in the upper atmosphere. Heavier particles fall to earth more quickly while lighter ones blow further downwind. The result is a plume of fallout, typically several hundred kilometres long.

If there's a nuclear explosion, you're in danger if you're too close to the epicentre, the point on the ground underneath the point of explosion, or downwind in the case of a surface burst. But how close is too close? Most people imagine that if a nuclear bomb explodes over the city where they live, they're goners. But checking through Glasstone, you can work out the areas of highest danger and almost certain death and the areas of low risk.

The bomb dropped on Hiroshima had an explosive power equivalent to 13 kilotons of TNT. It was a fission bomb, with the energy created by chain reactions that broke up atoms of uranium, releasing energy and more particles to continue the process.[5] A fission bomb is also called an atomic bomb or an A-bomb. In the early 1950s, scientists developed a more powerful nuclear weapon based on fusion, the process used in the sun to produce energy by combining hydrogen atoms into the slightly heavier helium atoms. This was called a thermonuclear weapon, or a hydrogen bomb or an H-bomb. It used the intense heat and pressure from a fission bomb to create the conditions for fusion in a layer of suitable material.

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5 The bomb dropped on Nagasaki on 9 August 1945 was 21 kilotons and used plutonium as its fissile material.

H-bombs can be far more powerful than A-bombs. A typical H-bomb has an explosive power equivalent to one million tons, or one megaton, of TNT. This is more than 50 times as powerful as the Hiroshima bomb. Some H-bombs tested have been 20 megatons or more.

The existence of arsenals, mainly in the US and Soviet Union, of thousands of thermonuclear weapons gave rise to the idea of overkill. If a 13-kiloton weapon at Hiroshima killed 78,000 people,[6] then an arsenal with a million times the explosive power should be able to kill a million times as many people — far more than the earth's population.

However, it didn't take me long to realise the flaw in this line of argument. A bigger bomb is more destructive, to be sure, but there's a limit to how many people it can kill in a city. A 13-megaton bomb won't kill a thousand times as many people in a city like Hiroshima as a 13-kiloton bomb, simply because the population of Hiroshima isn't that great.

This, I concluded, was a basic mistake in claims about overkill. But it wasn't all that simple. As I searched for explanations of overkill, I was frustrated. I couldn't find an author who actually spelled out the details of the overkill claims, namely that there were enough nuclear weapons to kill everyone on earth 16 times over, or whatever the figure happened to be. It seemed that overkill was a type of urban myth within peace movement circles, repeated but seldom sourced and never justified in detail.

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6 The exact number of immediate deaths is uncertain. 78,000 is the figure we used in Hiroshima Day leaflets in the early 1980s. Tens of thousands more died from delayed effects.

The idea of nuclear overkill is analogous to saying that a large lake has enough water to drown everyone on earth. A bathtub or a swimming pool has enough water to drown a person, so any lake with ten billion times as much water is enough to drown ten billion people, more than the earth's population. In principle, the Dead Sea has enough water to drown everyone in the world, but of course not all people are in it or even near it. Similarly, the earth's population is not concentrated in 10,000 compact urban areas waiting to be obliterated by nuclear weapons targeted precisely at their centres.

I also discovered, from Glasstone and from other sources, that even a large H-bomb was not powerful enough to entirely wipe out a large city — a large city in the geographic sense, namely spread out over a large area. Sydney today has a population of about five million. If it were hit by a one megaton nuclear weapon, this would devastate the immediate area. Anyone within a few kilometres of the epicentre would be incinerated unless very well protected. But Sydney is more than a few kilometres in diameter. It's closer to 50 kilometres. This means that if a one megaton bomb drops on downtown Sydney, and you live in western Sydney, you have a good chance of survival, especially if you're in a basement or behind a hill.[7]

In the 1950s and 1960s, US officials ran a public-awareness campaign about how to increase the chances of survival in the event of nuclear war. The key slogan, and

7 As Des wrote to me in his July 1981 letter, at 10km from a 1 Mt detonation, there would be no injuries except from fallout. Parramatta, in western Sydney, is 20km from the city centre.

the title of a 1951 film, was "duck and cover." The basic idea is to avoid being in the direct line of sight of the blast. If you duck behind a brick wall, you improve your chance of survival. If you hide in the basement of a building, that's better protection. A fallout shelter gives even more protection, in case you need to stay inside for days or weeks until the radioactivity from fallout subsides.

In the peace movement, though, the idea of surviving nuclear war was rejected and sometimes ridiculed. Plans for civil defence — preparations for surviving attack, especially bombardment — were seen by anti-war campaigners as accepting nuclear arsenals and nuclear war. There was a cartoon encapsulating the contrary position. It stated, "In case of nuclear war, bend over and kiss your arse goodbye."

I had long accepted this sort of peace-movement doomsdayism, but now I questioned it. However, questioning doomsdayism seemed like accepting the views of the nuclear establishment about the likely effects of nuclear war. Did that somehow mean accepting other views of the nuclear establishment such as the necessity for nuclear arsenals?

The immediate impacts of nuclear strikes are near to the epicentre of the blast, and downwind, where most of the radioactive plume falls to earth in what is appropriately called fallout. Prevailing higher-altitude winds around the globe blow mainly from west to east, so most of the fallout from a bomb exploding in downtown Sydney would probably blow to the east, out to sea. Again, those living in western Sydney could survive, especially if they ducked and covered.

But what about long-term fallout, which would spread across the globe? A large nuclear explosion on the surface of the earth injects fine particles into the stratosphere, ten or more kilometres above ground level, where it drifts until winds and diffusion cause it to fall to earth, often by being "rained out," namely absorbed by rain droplets. Calculations show that a single blast can lead to fallout across the globe, but by the time this global fallout comes to earth its radioactivity is usually much less. It will lead to an increase in cancers, but this would not increase the cancer rate very much.

Earlier I mentioned the novel and film *On the Beach.* The characters in the story chose different ways to spend the last few months of their lives before lethal radiation from a nuclear war in the northern hemisphere spread across Australia and the rest of the world, leading to human extinction. According to knowledge about nuclear weapons effects, *On the Beach*'s scenario was impossible.

But was it? In 1950, physicist Leo Szilard said on radio that an arsenal of cobalt bombs could kill everyone on earth. A cobalt bomb is a nuclear weapon surrounded by a layer of the element cobalt. The explosion would create a cobalt isotope that would be deadly over a large area for many years. However, there is no evidence that a cobalt bomb was ever built, much less an arsenal of them. Szilard's idea was an exercise in doomsday thinking — as was *On the Beach.*[8]

8 I sent a draft of this chapter to Richard Tanter, who had collaborated with Des Ball. Richard sent me a paper of Des's in which he addressed the *On the Beach* scenario and dismissed it as implausible. I decided to reread *On the Beach* to check my memory

As noted earlier, Des Ball and I had talked about writing a book about the likely impacts of a nuclear attack on Australia. Although we never proceeded with this project, I did make efforts to find relevant information, for example by obtaining data on winds in the upper atmosphere above Australia, which would be needed to calculate the likely trajectories of fallout from surface nuclear blasts. As well as searching for relevant data, I tried to find out whether anyone had already studied or prepared for nuclear strikes on Australia. Making enquiries at the Australian Department of Defence, I discovered to my surprise that no one in the Australian military was doing anything either to study the effects of a nuclear attack or to prepare for such an attack.

The only person I found who had pursued this issue was Des Posener. In the 1960s, when he was scientific adviser to the Commonwealth Directorate of Civil Defence, he calculated the likely number of casualties from nuclear attacks on several Australian cities — Canberra, Melbourne and Sydney — under various scenarios. Later he was scientific adviser to the New South Wales State Emergency Services and Civil Defence. After reading a paper of his,

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of the book. The author, Nevil Shute, set the scene by imagining that thousands of cobalt bombs had been exploded in a nuclear war involving several major powers in the northern hemisphere. His idea that radiation from such a war would gradually move south killing everyone in its path, while implausible, was a nice plot device. He told about how ordinary people might spend their lives knowing they and everyone around them had only months to live, encouraging readers to reflect on how they might behave in such a circumstance.

"Emergency planning for radiological defence," that he presented at a conference in Canberra in 1980, I corresponded with him and obtained more of his writings. He even sent me print-outs of computer code for making calculations. We met on one occasion.

Des Posener was frustrated that no one would pay attention to the issue. As someone concerned about disaster preparedness, to him it seemed anomalous that there was such a lack of concern about one of the biggest potential disasters that could be imagined. So far as I could determine, he was the only person in Australia who had carried out calculations of the likely effects of nuclear strikes on Australian cities.

Having investigated the health effects of nuclear war and discovered that what military establishments had been saying was much more accurate than peace movement beliefs, I had a choice about what to do next. I realised that publicising this information might make me unpopular among some peace activists, but nevertheless I thought, "It's important to publicise this information, and peace activists need to take it into account in their campaigning." So I set out to do just that.

I decided to write articles. Being published in journals would give my views some credibility, and then I could circulate copies of the articles to interested people. Other options for raising the ideas, for example giving talks or obtaining media coverage, were limited because I wasn't a recognised authority in the area.

My first article was "The global health effects of nuclear war." It explained the likely effects of heat, blast and fallout on the human population, with a speculative

section about the effect of nuclear explosions on stratospheric ozone, based on work by physicist John Hampson.[9] The article was published in *Current Affairs Bulletin,* an Australian magazine, in 1982, at the height of the worldwide peace movement mobilisation against nuclear war.[10] It was not an immediate sensation but had staying power. In the mid 1990s, I put it on my website, and a decade later found that, in terms of web hits, it was one of my most visited publications.[11] I could only presume that no one else had written a convenient summary of the global health effects of nuclear war.

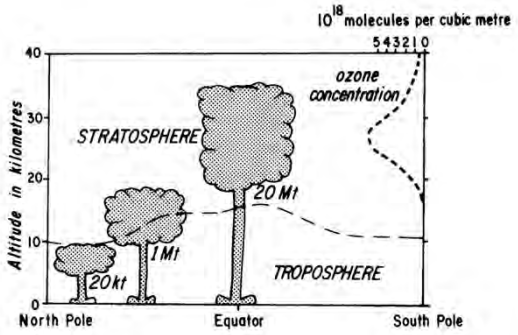

Figure 1. *A typical configuration of the troposphere and stratosphere (divided by the dashed line) in July. The approximate heights of clouds from nuclear explosions of 20 kiloton, 1 megaton and 20 megatons are sketched (widths are not to scale). The dotted line is a typical distribution of stratospheric ozone. This figure first appeared in my 1982 article "The global health effects of nuclear war."*

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9 I corresponded with Hampson. He sent me long typed letters filled with technical detail. I wrote a separate article about him and his ideas. It was never published but is on my website at https://www.bmartin.cc/pubs/88Hampson.html.

10 "The global health effects of nuclear war," *Current Affairs Bulletin,* vol. 59, no. 7, December 1982, pp. 14–26.

11 Beginning in 2018, it was translated into several European languages.

My second article was "Critique of nuclear extinction," in which I argued that nuclear war was unlikely to lead to the extinction of the human species, and gave reasons why peace activists did not want to recognise this.[12] My third article was "How the peace movement should be preparing for nuclear war," in which I argued that nuclear war — especially a limited nuclear war — would not kill everyone, but it would almost certainly lead governments to impose repressive measures against dissent. The peace movement needed to be prepared for the aftermath, in particular to be prepared to resist repression.[13]

These two articles were published in 1982 in peace research journals. I sent out numerous reprints but only a few people seemed to be interested.[14] My message, it seemed to me, was unwelcome to most peace activists and of little interest to others.

In the decades since, nothing has changed to affect my views about the implications of nuclear war for peace activism. The 9/11 attacks, in which nearly 3000 people died, led to a huge expansion of US government powers for

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12 "Critique of nuclear extinction," *Journal of Peace Research,* vol. 19, no. 4, 1982, pp. 287–300.

13 "How the peace movement should be preparing for nuclear war," *Bulletin of Peace Proposals,* vol. 13, no. 2, 1982, pp. 149–159.

14 Ros Haynes, editor of *SANA Update,* published by the Australian group Scientists Against Nuclear Arms, wrote that she found my articles extremely interesting and challenging. At her invitation, in 1984 I wrote an article about nuclear extinction for *SANA Update.*

surveillance and control of the population. If this was the response to 9/11, imagine the response to a nuclear strike killing hundreds of thousands of people. Even if the nuclear exchange was in another country, governments elsewhere would seek to increase their powers. This would be justified as necessary to deter a nuclear attack, but an important side effect would be to subordinate civil liberties. Going by previous experience with wartime powers, governments would not hesitate to sacrifice freedoms — freedom of speech and assembly, freedom from arbitrary arrest and imprisonment — for the greater cause of defending against attack (especially an attack that threatens governments). Peace activists, indeed all supporters of freedom, were doing little to prepare for such a possibility.[15] Rather than obsessing about nuclear extinction, I thought activists should be preparing for the political aftermath of nuclear war and, in so doing, reduce the risk of both war and associated repression.

Even as my articles appeared, there were new developments in the study of the effects of nuclear war. In the popular domain, the most significant event was the publication of Jonathan Schell's book *The Fate of the Earth* in 1982. Schell argued that a major nuclear war could cause human extinction. Much of his book was about extinction,

15 Later I wrote another article, "Politics after a nuclear crisis." It was rejected by seven different left-wing or political science journals and eventually published in the *Journal of Libertarian Studies*, vol. 9, no. 2, Fall 1990, pp. 69–78. One explanation for the repeated rejections was that socialists and political scientists were unreceptive to material critical of state power.

which he called "the second death." It is one thing for a person to die. But if everyone dies, then so does every single person's legacy: children, influences on others, good works and memories. Extinction would mean the end of every human value and striving. Schell thought extinction was such a terrible possibility that it warranted extraordinary efforts to avoid it. The book was a best-seller and had a huge impact.

However, I was a sceptic. Schell was not a scientist. He was a writer and relied on scientific findings to make his case. His claim about extinction largely hinged on the effects of nuclear explosions on stratospheric ozone. If ozone levels were drastically depleted, there would be a great increase in the intensity of ultraviolet light at the earth's surface, with consequent impacts of humans and the environment.

I had read the scientific studies of the effect of nuclear explosions on stratospheric ozone. Yes, there would be an effect, but this was very unlikely to result in the consequences outlined by Schell.

I wrote an article about this, arguing against Schell's extinction claims while supporting the utmost efforts against war, and submitted it to *Bulletin of the Atomic Scientists,* a magazine that was the prime venue for critical commentary about nuclear matters. *The Bulletin* is most famous for its "doomsday clock," indicating pictorially what experts say is the risk of nuclear catastrophe. The clock is typically a few minutes from midnight, midnight signifying major nuclear war or some other threat to human existence. Incidentally, the clock encourages people to

think that nuclear war means the end of everything: doomsday.

The Bulletin editors seem to have misplaced my submission. Months later, by the time it surfaced, they apologised but said my article was now dated because Schell's arguments had been superseded by early work on nuclear winter that supported Schell's concerns by pointing to a different mechanism for possible human extinction.

In 1982, an article appeared in the Swedish journal *Ambio* titled "The atmosphere after a nuclear war."[16] The authors examined the impact of the nuclear explosions on the atmosphere. Nuclear attacks on cities can lead to firestorms, in which fires rage out of control, consuming vast quantities of wood and anything else that can burn. US bombing of Tokyo during World War II intentionally caused firestorms that killed more people than the atomic bombs dropped on Hiroshima and Nagasaki. As well as being devastating for everything in their path, firestorms pump huge amounts of smoke into the atmosphere.

The *Ambio* paper was subtitled "Twilight at noon" because the authors' calculations showed that major nuclear war could insert enough smoke into the atmosphere to block much or most sunlight from reaching the surface of the earth. This possible effect of nuclear war had not been investigated previously.

The *Ambio* study triggered an upsurge of research into the effect of nuclear war on the atmosphere. As well as

16 Paul J. Crutzen and John W. Birks, "The atmosphere after a nuclear war: twilight at noon," *Ambio,* vol. 11, nos. 2–3, 1982, pp. 114–125.

smoke from fires, there is another important process. Surface nuclear bursts can directly loft huge quantities of particulates — tiny particles, like dust — into the stratosphere, where it can stay for months or years. This is because there's no rain in the stratosphere. When the dust and smoke drifts to lower altitudes, down into the troposphere, it comes to earth more quickly by being caught in rain.

The dust and smoke would obscure the sun, and the result would be a major cooling. Summer would become more like winter, and winter would become far colder. Hence, the effect was dubbed "nuclear winter." An article was published in *Science,* one of the world's most prestigious scientific journals, titled "Long-term biological consequences of nuclear war."[17] The authors, whose names read like a roll call of eminent figures in the field, raised the alarm about the effects of nuclear winter, suggesting that it might even lead to human extinction.

This was an important new contribution to the case against nuclear war. Carl Sagan, an astrophysicist and famous science communicator, took the lead in arguing that the spectre of nuclear winter created a political imperative for nuclear disarmament. Nuclear arsenals simply had to go because they posed too great a risk of catastrophic global environmental effects, with mass starvation and possibly human extinction.

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17 Paul R. Ehrlich and 19 others, "Long-term biological consequences of nuclear war," *Science,* vol. 222, 23 December 1983, pp. 1293–1300.

I shared the same goal as Sagan and other nuclear winter scientist campaigners — elimination of all nuclear weapons. However, I was sceptical of their arguments on both technical and political grounds. Nuclear winter studies made arbitrary assumptions about nuclear targets. Instead of consulting with specialists in nuclear war-fighting — such as Des Ball — the scientists simply assumed that a large number of cities would be targeted with surface bursts followed by firestorms. Based on these assumptions, calculations showed that large quantities of dust and smoke would be injected into the stratosphere, causing maximum reductions in sunlight at ground level. However, by the 1980s, war-fighting plans were less oriented to targeting highly populated areas and more about targeting the opponents' nuclear war-fighting facilities. In other words, the plans shifted from "counter-city" to "counter-force" targeting.

For example, any nuclear strikes on Australia would more likely be on the US military and spy facilities such as Pine Gap than the cities of Sydney and Melbourne. Most of the US bases in Australia are remote from population centres, so there would be no firestorms. In some other countries, many key military facilities are near to population centres, so there is less difference between counter-city and counter-force targeting.

The nuclear winter studies also made assumptions about *when* a nuclear war would occur. At some times of the year, the effects would be much less, but these results were not emphasised.

Politically, I also had concerns. The nuclear winter scientist campaigners assumed that the new evidence of the

effects of nuclear war should convince government decision-makers to move rapidly towards nuclear disarmament. The trouble was that everyone already knew the effects of nuclear war would be devastating, and this had never been enough to induce governments to disarm. Indeed, more governments wanted their own nuclear weapons, despite the likelihood that this would make them prime nuclear targets. Nuclear weapons programmes were not driven by rational argument concerning human welfare but by power politics.

My other concern was that making nuclear winter a prime argument against nuclear arsenals put too much weight on scientific arguments and scientific experts. For me, and many others, nuclear war preparations should be opposed for moral reasons: they lead nowhere except to massive suffering, for no human benefit. To understand why nuclear weapons are bad, it is not necessary to be a scientist. If the case against nuclear arsenals is built around nuclear winter science, this is a precarious foundation: new calculations might lead to different results, and in any case the arguments are removed from the public and put in the hands of experts.

I decided to write an article about the science and politics of nuclear winter, developing these points. I wrote to a great number of nuclear winter scientists asking for their views on a few questions. After writing a draft of my article, I sent it to quite a few of them, inviting comments. What was surprising, and a little disturbing, is that few nuclear winter scientists offered helpful feedback on this draft. The most helpful respondent was Russell Seitz, who was not a scientist but who was a prominent critic of nuclear

winter science. He offered many comments, and helpfully pointed out a mistake I had made. I could only conclude that most nuclear winter scientists didn't want to help someone who was critical of their work.

My article, "Nuclear winter: science and politics," was published in 1988.[18] By this time, the huge worldwide mobilisation against nuclear weapons was in decline. Indeed, it had nearly faded away entirely. In 1989, Eastern European Communist regimes collapsed in the face of popular protest, and in 1991 the Soviet Union dissolved. The Cold War was over, and this meant that the threat of nuclear war largely disappeared from public consciousness. However, nuclear arsenals did not disappear. They were maintained. The possibility of nuclear war did not go away, but because there was no mass movement and no media interest, nuclear war dropped off the public agenda.

Nuclear winter scientists continued to produce studies showing the possibility of major effects even for a limited nuclear war, but these received only limited publicity. I did not pay further attention to the effects of nuclear war except for occasionally reading new scientific papers.

Thinking back on when I learned about the global effects of nuclear war, the most active years were in the 1970s and 1980s when I investigated various sources of information and wrote several articles. I was opposed to military systems but at the same time I thought the peace movement should base its campaigns on an accurate assessment of the likely consequences of nuclear war.

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18 *Science and Public Policy,* vol. 15, no. 5, October 1988, pp. 321–334.

Next I will undertake a different sort of reflection, with the focus on the influence of different sources of information on my understanding. This will cover some of what I've already presented, looked at from a different perspective.

Influences on my understanding

Over several decades, I obtained information about the likely effects of nuclear war from various sources, including friends, experts, scientific studies, government, mass media and personal examination. The table summarises my assessment of these and other sources of information. I include several sources that had little or no influence in order to facilitate comparison with the topics covered in chapters 3 and 4.

Table. My assessment of influences on my understanding of the effects of nuclear war

Influence	Contribution	Comments
Family and friends	Large	For many years, I simply assumed that common ideas among my friends and acquaintances were correct.
Experts	Large	Comments from Des Ball, an expert on nuclear warfare, led me to investigate the issue and rethink my ideas. I corresponded with several

		scientific experts concerning aspects of nuclear war.
Scientific publications	Large	I read many studies of the effects of nuclear war.
Learning through writing	Large	To write about the effects of nuclear war, I collected and evaluated information, formulated coherent arguments and obtained comments from readers from a variety of backgrounds.
My mind	Medium	From what I know about confirmation bias, my guess is that I have often tried to maintain my current views in the face of contrary information. This is hard to judge.
Governments, corporations and other bureaucracies	Small	In the 1950s, nuclear weapons states produced information about preparing for nuclear attack. This probably influenced some of my early understanding but had little impact after I studied the issue.
News media	Small	There has been media coverage about various relevant issues, for example

		about the Cuban missile crisis (with the possibility of nuclear war), the size of nuclear arsenals and protests against nuclear war. A lot depended on the stories to which I paid attention.
Schooling	None or small	I have no recollection of hearing anything about nuclear war in my classes, but of course I don't remember everything ever discussed.
Advertising	None	I have no recollection of government ads concerning civil defence.
Personal experience	None	Thank goodness!
Social media	None	My understanding of the effects of nuclear war developed before the advent of social media.
Wikipedia	None	My understanding of the effects of nuclear war developed before Wikipedia was created.

What I do here is consider several of these influences in turn, looking at the tactics or techniques that make information convincing. Talking about tactics and techniques in this way makes it sound like the sources of information are consciously scheming. Maybe so in some cases, but usually this is just a way of talking about processes that lead to some information being convincing and other information being ignored or rejected.

Family and friends

In this category I also include acquaintances, colleagues and like-minded individuals, those who might be called peers. One way to think of this category is in terms of "peer pressure," which is pressure to conform with others in your circle of relationships.

During my years in the anti-uranium and peace movements, my peers in this sense included other activists as well as sympathetic acquaintances. The most influential peers were those with the greatest experience or stature in the movement. This didn't mean they were especially knowledgeable about the effects of nuclear war. The key thing is that I went along with the assumptions made by nearly everyone involved. Let's examine the specific tactics.

Crucially important was that everyone seemed to accept the same view, that nuclear war was the end. No one in the peace movement referred to studies showing any other result. No one ever talked about what they would be doing after a nuclear war. You might say that in this peer group, alternative views were *covered up,* but this wasn't a conscious process of censorship. It was just that no one

questioned the standard view. No one brought a military text to a meeting and said, "Let's check this out."

We knew that military establishments were preparing to fight a nuclear war. Indeed, a few of us read critiques of military plans.[19] It might have crossed our minds that nuclear planners did not assume human extinction; they were planning for survival and maintaining political control in the aftermath. We knew this but somehow dismissed it as not credible. We *devalued* claims made by military sources as self-serving or misguided. Because the military was the source of the danger, we didn't take seriously the military's claims about what would happen. This helps explain why the film *Duck and Cover* was a source of amusement and derision rather than treated as a source of sensible information about how to increase chances of survival.

Because of the two processes of ignoring contrary information and rejecting military sources, we didn't often engage with claims deviating from our views. In as much as there was some engagement, there was a powerful process at play: *framing.* The military establishment looked at nuclear weapons as deterrents: they protected the peace. In this way of thinking, Australia was protected from attack by the government's alliance with the US government, and this meant US nuclear weapons provided a deterrent against threats. This framing of the issues was alien to peace

19 For example, in July 1979 I read Robert C. Aldridge's *The Counterforce Syndrome: A Guide to U.S. Nuclear Weapons and Strategic Doctrine* (Washington, DC: Transnational Institute, 1978).

activists, who thought instead that nuclear weapons were an abomination and that the alliance between the Australian and US governments made Australia far more likely to come under nuclear attack, with few compensating benefits. Because military framing was so different, indeed contrary, it had little influence on peace movement views except as something to reject and criticise.

Another factor was the role of authorities and experts. Very few individuals in the movement had looked into studies about the effects of nuclear war, indeed few have ever read a single scientific paper on the topic. So how had they come to such definite views about what was likely to happen? The answer: trusting authorities and experts. The question then becomes, *which* authorities and experts? As noted, within the peace movement, government and military sources were suspect. Instead, prominent commentators within the peace movement were treated as more credible. When some of these commentators repeated claims about overkill or about human extinction from nuclear winter, their views were more readily accepted as credible.

Within any group, there are pressures to adhere to the group's standard views. This depends a lot on the group. Among the top management of a company, no one might care about your views about abortion, whereas in a church this might be a key issue. Openly deviating from standard views can make things awkward. Your stature and credibility might be lowered. In some cases, you might even be expelled from the group.

The peace movement is more than a group, instead being more like a network of groups and allied individuals.

There can be pressures within groups and more general pressures within the network. Most members of peace movements have other careers, so their livelihoods are not at stake. Nevertheless, especially for those strongly committed to the cause, being held in esteem by other members is important, and the possibility of losing this esteem by adopting an unwelcome view is a significant concern. This is another factor in preventing acceptance of contrary views about the effects of nuclear war.

In summary, peer pressure can be an incredibly powerful force in maintaining beliefs and preventing consideration of contrary views. In relation to beliefs about nuclear war within the peace movement, peer pressure operated by giving little attention to military views, treating military perspectives as not credible, rejecting military framing of the issues, looking to authorities and experts within the peace movement, and providing a subtle incentive to keep on good terms with others by not questioning standard views.

Experts

The next source of information to consider is experts, in this case experts on the effects of nuclear war. Des Ball led me to the body of knowledge developed by such experts. As well, Des was one of the experts himself, via his studies of nuclear targeting. For his writing, he apparently drew on his access to relevant documents and to people knowledgeable about nuclear war planning.

Des was a crucial go-between, in two ways. First, I knew him personally, not well, but well enough. Second, he fostered my trust by telling me of his early arrest for

protesting against the Vietnam war. He thus positioned himself as being "one of us," us being antiwar activists, while also being intimate with "them," the military establishment. I also knew of Des's exposés of the role of US spy bases in Australia, which also fostered my trust that he was not just a military functionary or apologist.

Des was not an expert in every aspect of the effects of nuclear war. No one is. This is an important point: expertise in this area is a collective phenomenon. Des was an expert on targeting; others were experts on the effects of blast and heat, or on fallout plume calculations, or on the effects of heavy radiation exposures on human survival, or on decay rates within fallout plumes, or on the protective effects of barriers and buildings. To become an expert on just a single one of such areas typically involved becoming familiar with relevant studies and often carrying out one's own studies. To repeat, no one is an expert on all of these areas. So there isn't a single person you can consult who, on the basis of their own extensive investigations, can give the most informed view on every element involved. Those who make general statements depend on the knowledge of others. This means trust is essential to building knowledge, just as trust is essential in every scientific field.[20]

Among those with expertise about the effects of nuclear war, Des was instrumental in making me question my assumptions. After he challenged my beliefs, I turned to other experts, via the medium of writing. In the table, I've

20 On the role of trust in science, see for example Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994).

listed this in a different row, "scientific publications." Obviously there's a considerable overlap between experts and scientific publications, which might be considered to represent an expression of expert knowledge, in other words a sort of congealed understanding. In the table listing influences on my understanding, I've used "experts" to refer to personal interactions and "scientific publications" to refer to indirect connections via text.

Scientific publications

In trying to learn from scientific publications, trust remains crucial. The role of trust is epitomised by Glasstone's book *The Effects of Atomic Weapons.* Glasstone was not the author; he was the editor. The book is a compilation of information based on the work of numerous contributors. For me, the question was, should I trust this information? Was there some reason why the editors or authors would present fraudulent information, be subject to conflicts of interest or otherwise be biased?

The book was designed, in part, for use by civil defence planners, namely for making preparations to survive a nuclear attack. Therefore, if anything, the authors would presumably want to overestimate rather than underestimate the dangers; it would be better for preparations to be more rather than less adequate.

I looked for other sources of information, and there were quite a few. Of special interest would be anyone who disagreed with the data, calculations or findings in Glasstone. But I couldn't find any criticisms. *The Effects of Atomic Weapons* was treated as the definitive source, and other treatments were compatible with it.

There was another angle I wanted to pursue: sources for the idea of "overkill," namely that the world's nuclear weapons were many times more than enough to kill everyone on earth. The claim that nuclear weapons arsenals enabled overkill was made in a number of places, but I couldn't find any source which gave a careful explanation or justification for it. It seemed that the claim was based on extrapolation from the number of people killed at Hiroshima and Nagasaki. As noted earlier, a bomb ten times as powerful won't kill ten times as many people. The conclusion that nuclear arsenals had the capacity for overkill was dramatic but lacked backing. Perhaps it had initially been a way of dramatising the size of nuclear arsenals, and then taken literally.

In looking up various sources of information about the effects of nuclear war, I looked for both agreement and disagreement. Widespread agreement inspired confidence in findings, while disagreement provided a challenge that could be revealing, possibly indicating flaws in claims. However, I didn't just rely on what studies showed; I had sufficient understanding to assess some of the findings myself. I could do some of my own simple calculations. If long-lived fallout from a nuclear war caused a certain number of deaths from cancer across the world, I could calculate how many might die in Australia. I was able to subject the claims about overkill to scrutiny.

Now let's turn to another matter. Suppose you read a popular treatment of an issue and you want to check whether the evidence and arguments are sound. One good way to do this is to look for publications that give a critical or contrary view. Then you can compare the popular treat-

ment and the critical analysis and make a judgement or, perhaps, investigate further. However, if no critical analysis has been published, or it remains obscure because no one cites it, this makes it more difficult to make a judgement.

Jonathan Schell's 1982 book *The Fate of the Earth* argued that global nuclear war could cause human extinction, and this possibility warranted much greater concern than the deaths of individual humans, however tragic that might be. Based on my understanding of the effects of nuclear weapons on stratospheric ozone, I knew Schell's claims about extinction didn't stand up scientifically. However, for one reason or another, my critique of *The Fate of the Earth* was not published at the time.[21]

What is more significant is that no one else published a critique of Schell's claims either, at least not that I'm aware of, and certainly no one who was otherwise sympathetic to his concerns about nuclear war. Why not? I can only speculate. One possibility is that none of the scientists knowledgeable about nuclear weapons and stratospheric ozone wanted to speak out because they, like Schell, opposed nuclear weapons and didn't want to detract from his overall message. Another possibility is some scientists did write critiques but journals were unreceptive. Whatever the reason, the key point here is that a highly popular account, whose claims are suspect, can be published without being subject to public critiques.

As noted earlier, soon after publication of *The Fate of the Earth,* its claims were superseded by new research on

21 It's now on my website: "The fate of extinction arguments," https://www.bmartin.cc/pubs/83fea.html.

nuclear winter, which provided a basis for thinking that global nuclear war could lead to human extinction. Nuclear winter research was contested, to a limited extent, but still it was hard to find critiques. My 1988 article in the journal *Science and Public Policy* is one of the few critiques addressing both scientific and political dimensions.

Suppose you read an article providing the latest calculations relating to nuclear winter. You might think that the authors would address criticisms, for example about their assumptions about nuclear targets. But when they do, this is only in the fine print. No nuclear-winter scientist responded to my article. More significantly, few experts on nuclear targeting have been forthright in questioning assumptions made by nuclear-winter scientists. The implication is that in seeking commentary about nuclear winter, there may be omissions that are hard to recognise because few experts are willing to go public with their views.

Learning through writing

One of the strongest influences on my understanding of nuclear war was writing about it. This might seem strange given the common assumption that writing is the expression of ideas, but actually writing is itself a process of thinking. To write "The global health effects of nuclear war," I had to put my ideas into a logical form, provide sources for information, and address objections. Writing the article led me to search for additional information and to question some of my statements. It was a learning experience.

After writing a draft, in July 1982 I sent it for comment to 15 individuals, most of them scientists with some relevant expertise, such as atmospheric scientists. One of

them, Trevor Owen, sent copies to several others. In all, I received comments from nine people, which I took into account in making revisions to my article before submitting it to *Current Affairs Bulletin* in early September.[22]

Receiving comments is an important means of learning. For me, it is immensely stimulating. It represents an engagement of minds in which I need to understand others' points of view and to reconcile them with my own.

Among the replies was one from Allen Thompson of the Strategic Guidance and Policy Branch of the Australian Defence Department. If I had just sent some questions to the department, I doubt that I would have received such informed and specific comments. By writing an article that showed my understanding of the issues and, perhaps more importantly, the likelihood that the article would be published, I was taken more seriously. Obtaining feedback is crucial for learning. Writing is valuable on its own, and the process of obtaining comments adds more value. When the comments come from experts — Allen Thompson is an example — this represents a learning synergy between writing and experts.

My own mind

The way that our minds work has a powerful influence on how we process information. One potent influence is called confirmation bias, which is the tendency to look for information that supports current beliefs and dismiss or counter

22 One set of comments, from prominent Soviet atmospheric scientist G. N. Nikolsky, only arrived well after I had submitted the article.

contrary information. The implication is that changing one's views can be difficult due to mental commitments. To this can be added various forms of bias, interpersonal influences such as wanting to maintain relationships, over-confidence in one's knowledge, desires to appear smart, not wanting to admit being mistaken, and career impacts of having particular beliefs. It is difficult to assess the role of these influences on yourself. Indeed, according to psychologists, it is difficult to access the sources of our own emotions.[23] So I don't expect to be able to accurately assess the influence of my mind's operations on my views about the effects of nuclear war. It is possible to observe that I changed my mind after talking with Des Ball and reading scientific publications and developed a view contrary to that common in the peace movement at the time. That shows a willingness to differ with many of my peers. However, perhaps I adhered to my new views, especially in relation to nuclear winter, in part due to confirmation bias and unwillingness to change. I say "perhaps" because this is hard for me to assess. A well-informed outsider might be able to make a better assessment.

Conclusion

In this chapter, I've told about how I learned about the effects of nuclear war. It's a topic I know a fair bit about, though not nearly as much as some who have studied the issue in great depth. I don't expect you to agree with what I

23 Timothy D. Wilson, *Strangers to Ourselves: Discovering the Adaptive Unconscious* (Cambridge, MA: Harvard University Press, 2002).

say I've learned: persuasion is not the purpose of this exercise. My aim in telling this personal story is to reflect on sources of information that influenced my understanding. This provides some insight into the strengths and weaknesses of different types of sources. These strengths and weaknesses are based on my personal assessment, which might be wrong or not apply to other people or other topics. Nevertheless, there is some insight available.

My wider purpose is to encourage you to make a similar assessment of how you learned about something you know a lot about. In this way, you may gain insights into the strengths and weaknesses of different sources of information, for you and for the particular topic you select.

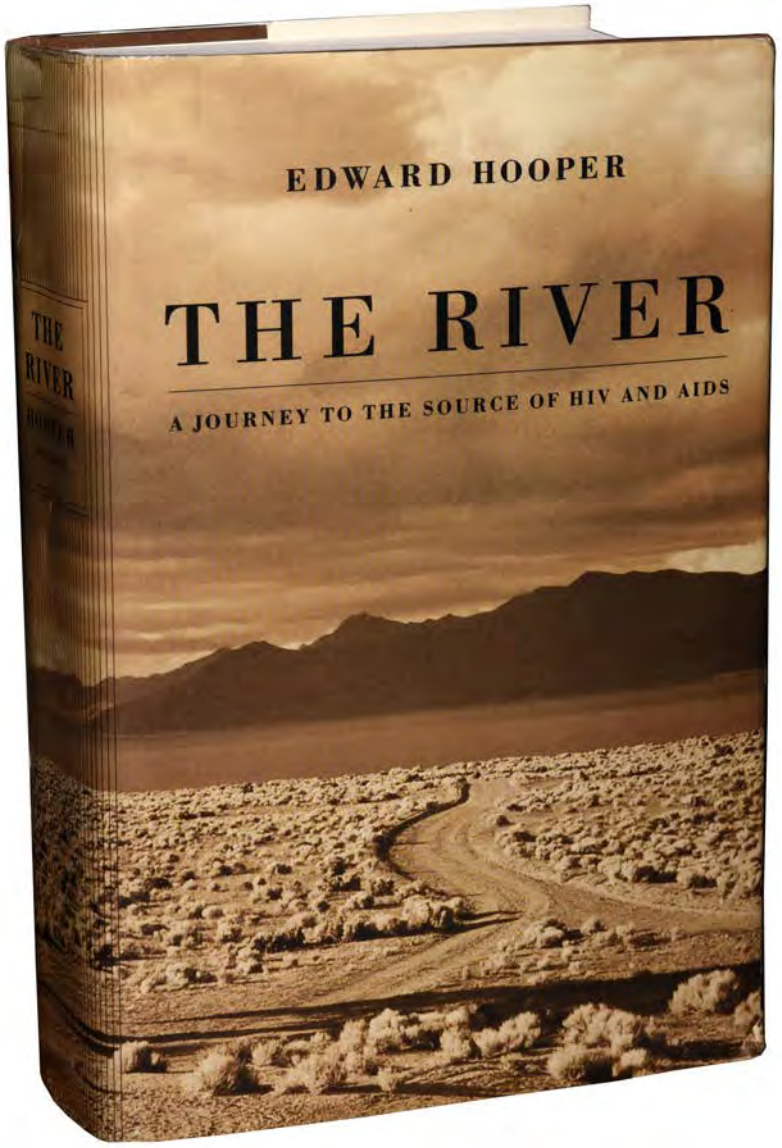
In my own case, the sources of information that influenced me most were peers, experts, scientific publications, writing and my own mind. Initially I made assumptions based on common beliefs among my peers in the peace movement. These were disturbed by an encounter with an expert, Des Ball, leading me to study scientific publications. This process of learning was built on my previous study and experiences, for example by studying physics. To talk of "sources of information" is to assume a capacity to recognise, assess and assimilate the information into one's understanding of the world, and this will vary from person to person. The same considerations apply to any discussion of information.

When starting out on this process of storytelling and reflection, I didn't think of writing — my own writing on the topic — as a way of learning. Yet, on reflection, it has been highly influential. As noted earlier, writing isn't just expressing ideas: it helps to form, organise and assess ideas.

Writing about a topic makes me acutely aware of what I don't fully understand and what I need to investigate further, or perhaps set aside.

Then there is the most difficult facet of the process, my own mind. It may be fooling me, leading me astray, or hiding important points and ways of seeing the world. This facet is the most difficult because it's less accessible to investigation.

So far, I and the rest of the world have been lucky: there has been no global nuclear war, and no nuclear weapons dropped on people since 1945. Back in 1980, when I started investigating the effects of nuclear war, it seemed that an actual nuclear war was virtually inevitable as long as nuclear arsenals remained. With a small chance of nuclear war each year, maybe two percent, after half a century there are only slim odds of no war. So we've been lucky. But there's no guarantee this luck will continue. The only guarantee will come from the complete elimination of nuclear weapons from the world.


EDWARD HOOPER
THE RIVER
A JOURNEY TO THE SOURCE OF HIV AND AIDS
THE RIVER
HOOPER

3
The origin-of-AIDS debate

Most people know about AIDS, but very few give any thought to the origin of the disease. I didn't either until, by chance and by choice, I became engaged with the issue. This turned out to be a much longer and deeper involvement than I had imagined. Along the way, I learned a lot.

Here, I tell about what and, more importantly, *how* I learned about the debate over the origin of AIDS. My aim is to illustrate how I have reflected on sources of information and insight on a topic I've learned a lot about. Just because I've learned a lot doesn't mean my views are necessarily correct. You don't need to agree with my views. That's not the point. The point is you might use some of the same processes of reflection about sources of information and insight about something you know a lot about.

The first news reports of what is now called AIDS appeared in 1981. Back then, scientists and public health officials weren't sure what to call this new disease. One name was GRID — Gay-Related Immune Deficiency — because it seemed to target gay men. Their sexual behaviours were blamed as the reason for AIDS.

In 1983, an infectious agent was discovered. HIV, human immunodeficiency virus, became the medical explanation for AIDS. It seemed that HIV was insidious. It would undermine the body's immune system, making hosts susceptible to other diseases such as Kaposi's sarcoma.

After an infection, HIV's effects were usually slow, often taking years before symptoms appeared. This meant that HIV could spread to others without anyone noticing. It became more deadly precisely because of its slow onset. When an infectious agent starts causing disease immediately, this causes alarm and action, as in the case of Ebola, which is quick and deadly, so mobilisation against it becomes urgent.

HIV is not a conscious agent, but it can be useful to imagine that it is, to provide insights into how it became so deadly.[1] It is a very tricky agent. In the early stages of spread in the US it targeted stigmatised groups, notably gay men, injecting drug users and men from Haiti. Some commentators blamed the gay men and drug users for their immoral behaviour. As a result, action against AIDS initially was slower than it might have been. Then there was another susceptible group: recipients of HIV-contaminated blood. No one could blame them: they were "innocent." This distinction between innocent and not-innocent victims was condemned by some as reflecting prejudice.[2]

It's hard for me to remember what I knew in the 1980s about AIDS, and how I learned what I knew. AIDS was in the news; indeed, in health reporting, AIDS became one of

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1 I developed this idea in "Tactics against scheming diseases," *Journal of Sociotechnical Critique,* vol. 1, 2020, pp. 1–20.

2 In 1985, I wrote an article titled "Death and prejudice" in which I contrasted prejudice against gay men in relation to AIDS with the lack of similarly discriminatory measures against people who posed health risks to others via, for example, smoking or measles. See https://www.bmartin.cc/pubs/85tribune.pdf.

the biggest stories of the period, so anyone keeping up with current affairs learned something about it. Because I was interested in the politics of health, I read stories about AIDS in magazines such as *New Scientist,* which provided informed commentary.

From 1986, I worked in the Department of Science and Technology Studies (STS) at the University of Wollongong. One of the main interests of department members was the politics of health, so AIDS was potentially a research topic. Alison Rawling, one of the honours students in the department, chose for her thesis topic the allocation of priority for the discovery of HIV. In other words, she studied who received credit for the discovery, which was considered a major scientific achievement.

Soon after AIDS was recognised as infectious, scientists tried to identify an infectious agent. In 1983, two scientists, Robert Gallo in the US and Luc Montagnier in France, independently discovered HIV. Gallo initially received most of the credit. There was a priority dispute, namely a dispute over who deserved credit for the discovery, and later a formal agreement to share priority for the discovery. People in the field of STS were interested in these sorts of matters. Alison studied citation patterns and concluded that scientists increasingly gave Montagnier credit.[3]

3 Alison Rawling, "The AIDS virus dispute: awarding priority for the discovery of the human immunodeficiency virus (HIV)," *Science, Technology, & Human Values,* vol. 19, no. 3, 1994, pp. 342–360.

One of the puzzles concerning AIDS was how it had begun. The earliest cases of AIDS and HIV-positive blood were from the Belgian Congo, nowadays the Democratic Republic of Congo or DRC. In 1985, SIVs were discovered. SIVs — simian immunodeficiency viruses — are found in simians, which include monkeys, chimpanzees and gorillas. It was soon assumed that AIDS arose when SIVs somehow got into humans and became transmissible. When an SIV entered humans, the same virus was called HIV.

For those who sought non-mainstream perspectives, the best sources were independent magazines; this was before the World Wide Web. I subscribed to about a hundred magazines, on a range of topics. One of them was *CovertAction Information Bulletin,* which exposed the machinations of US spy agencies and related matters. In 1988 there was an article by Robert Lederer describing a dozen different theories about AIDS.[4] This was interesting but not a topic that I pursued at the time.

Then in 1990 I received a package of material from a fellow named Louis Pascal. This led to my involvement in the debate about the origin of AIDS. But first, a bit of background about how I ended up with the material from Pascal.

In the late 1970s, I began studying cases of "suppression of dissent." Initially, I came across several cases in which scientists or university teachers had encountered obstacles because of their research or teaching on environ-

4 Robert Lederer, "Origin and spread of AIDS: is the West responsible?" *CovertAction Information Bulletin,* no. 28, 1987, pp. 43–54 and no. 29, 1988, pp. 52–65.

mental issues. This may sound peculiar today, but back in the 1970s taking a stand on the environment was seen as radical, and some of those who did research or teaching had their research blocked, tenure denied, access to libraries denied, or threats made to their jobs.

Having noticed a pattern, I gathered more information about suppression of dissent, found out about more cases, and wrote an article about the issue, gaining considerable media attention along the way.[5] As a result of my articles and visibility, people contacted me with information and requests. In the following years, I learned through personal experience that having a profile on an issue is a magnet for inquiries from others interested in the issue. Gaining a profile thus can lead to becoming more knowledgeable. If your profile is due to knowledge about a topic, then your knowledge can increase in a snowball process.

Richard Sylvan was a philosopher who worked at the Australian National University, just across campus from me. Richard and his wife Val Plumwood wrote a pioneering book titled *The Fight for the Forests.* This was unwelcome to members of the Forestry Department at the university, who tried to block its publication and then, after it appeared, blocked Richard from using the department library. Richard and Val wrote an account of their experiences that appeared

5 Brian Martin, "The scientific straightjacket: the power structure of science and the suppression of environmental scholarship," *The Ecologist,* vol. 11, no. 1, 1981, pp. 33–43.

as a chapter in the 1986 book *Intellectual Suppression,* which I co-edited.[6]

Louis Pascal had written a couple of articles in philosophy journals.[7] Later, when he wrote about the origin of AIDS, he sent letters about his attempts to publish his work to several prominent philosophers. One of them was Richard Sylvan. Richard, knowing my interest in dissent, forwarded Pascal's package of material to me.

Pascal was fascinated by the question of how AIDS began. He knew that the earliest cases of AIDS and HIV-positive blood were from central Africa. He knew that HIV was similar to SIVs found in simians. So how had SIVs gotten into humans and become transmissible? And why had this occurred only recently? Humans and monkeys had been interacting for thousands of years. Humans killed monkeys, butchered them and ate them. This was a possible route for SIVs to get into human blood.

Pascal noted the coincidence, in time and place, between the earliest known samples of HIV-positive blood and the world's first mass vaccination campaign for polio. Pascal discovered that from 1957 to 1960, hundreds of thousands of people in the Belgian Congo had been given a polio vaccine developed by US scientist Hilary Koprowski. How could a polio vaccine give rise to AIDS? The potential danger is not from the vaccine but from the medium on which it is prepared, called its substrate. Polio vaccines then

6 Brian Martin, C. M. Ann Baker, Clyde Manwell & Cedric Pugh, eds. *Intellectual Suppression: Australian Case Histories, Analysis and Responses* (Sydney: Angus & Robertson, 1986).

7 Later, I obtained and read them.

were grown on a substrate of monkey kidney cells (and still are sometimes). The kidney cells were found to be an ideal base on which to grow the attenuated polio virus, designed to trigger immunity to polio while not causing the disease.

The risk in using monkey kidneys, or indeed any cells from another species, is that they might contain other viruses. Pascal realised that some kidneys would contain SIVs, which might contaminate polio vaccines. In this way, SIVs could have gotten into thousands of people. An SIV in a human is just HIV: it could be the exact same virus, with a different name. If some of the new HIVs became transmissible from one human to another, this could have been the origin of AIDS.

Koprowski's polio vaccine was given orally: it was squirted into the mouth of each recipient. It could have entered the bloodstream via a cut or through mucous membranes in the mouth.

Simians have had SIVs for so long that they have developed immunity to them. However, when exposed to a new SIV from a different species, they can develop AIDS-like symptoms. Humans and monkeys had been interacting for tens of thousands of years, and quite possibly individual humans had been exposed to SIVs on numerous occasions through butchering and eating monkeys. Why hadn't these exposures led to AIDS? Pascal argued that exposure via vaccines made transmissibility more likely. He discovered that babies in Kinshasa, the capital of the Congo, had been given polio vaccine with an extra high concentration, because their immune systems were undeveloped. But if their immune systems were undeveloped, they were more susceptible to any SIVs in the vaccine.

In the 1950s, three scientists vied for development of the first polio vaccine for mass use: Jonas Salk, who developed an injected vaccine; Albert Sabin, who developed an oral vaccine; and Koprowski, also with an oral vaccine. Pascal found one other bit of evidence: a precedent. Early versions of Sabin's vaccine, which became the standard for use for decades, were found to be contaminated by a simian virus called SV40: it was the 40th simian virus identified.

SV40 was not an immunodeficiency virus: it was not an SIV. Nevertheless, the contamination by SV40 of polio vaccines given to millions of people showed that simian viruses could enter the human species via polio vaccines.

Pascal was not a scientist. He was not an expert on polio vaccines, on immunology or epidemiology. But he had scoured the scientific literature and come up with a plausible theory for the origin of AIDS.

Pascal had written to Richard Sylvan, and other philosophers, about his ideas and also about his difficulties in getting them published. He had written a short article aimed at scientific journals, but it had been rejected or ignored by them. He had also written a much longer article, but it too was unpublished.

I was intrigued. Pascal's theory about the origin of AIDS was interesting, to be sure, but my special interest was in what is called the scientific reception system, namely how the scientific community responds to new ideas. My judgement was that Pascal's ideas deserved attention and further investigation, just in case they were correct. Pascal himself thought the issue was crucial and urgent, to prevent the emergence of additional virulent human diseases.

I wrote to Pascal. He was a highly informed correspondent. Every time I raised a question or concern, he would write extensively about it. It was apparent that he had thought very deeply about the issues and was familiar with a wide range of relevant research and writing.

Over the course of five years corresponding with Pascal, I estimate that his letters to me totalled 50,000 words — as long as a modest-sized book. In addition to his letters, he enclosed numerous articles plus copies of his correspondence with others. Of special interest to me was his correspondence with editors of journals to which he had submitted articles, as well as the articles themselves. This provided me with insight into responses to his ideas.

Pascal was not alone in thinking about a connection between polio vaccines and AIDS. Two scientists from South Africa, Mike Lecatsas and Jennifer Alexander, raised the same connection in a short published comment.[8] That established scientists with relevant expertise thought AIDS might have arisen from contaminated polio vaccines provided some assurance that Pascal was not alone in his analysis.

After exchanging quite a few letters, I offered to publish Pascal's long article in a working-paper series published by my research group at the University of Wollongong. The article, some 19,000 words long, was titled "What happens when science goes bad." It was published in December 1991. I mailed it to dozens of

8 G. Lecatsas and J. J. Alexander, "Safe testing of poliovirus vaccine and the origin of HIV infection in man," *South African Medical Journal*, vol. 76, 21 October 1989, p. 451.

leading scientists and other figures; Pascal sent me a list of names, and I added a few of my own. For me, this was an experiment in seeing how a new idea was taken up.

I sent Pascal's paper to people I thought might be interested, especially ones who might publicise it. One copy got to the editor of *Nexus,* a popular magazine specialising in unorthodox ideas. He wrote a short rave about the paper, leading numerous readers to write to me requesting copies. At the more sober end of the spectrum, I sent a copy of Pascal's paper to the editor of the *Journal of Medical Ethics,* who had declined to publish the paper. He wrote an eloquent editorial summarising Pascal's argument and explaining why he had declined to publish Pascal's paper, usefully providing my address for those who wanted to obtain a copy.[9] Over the following several years this generated numerous requests for copies.

In total, I received hundreds of requests for Pascal's paper, from scientists, doctors and a range of others. As well as requesting the paper, many of these correspondents sent me comments relevant to the origin of AIDS. Most of the requests predated the World Wide Web, so they came by post. Some correspondents wrote to me after reading Pascal's paper. All of this material gave me insights into the way people responded to the polio-vaccine theory.

As mentioned, for me this was a sort of social-science experiment in learning how a new idea, introduced to the world from a single source — Pascal's paper — could

9 Raanan Gillon, "A startling 19,000-word thesis on the origin of AIDS: should the JME have published it?" *Journal of Medical Ethics*, vol. 18, 1992, pp. 3–4.

spread. However, the experiment, in my original conception of using a single source, was short-lived, because it was overtaken by another development. Independently of Pascal, an AIDS activist named Blaine Elswood had come up with the same idea about polio vaccines and AIDS. Elswood made contact with Tom Curtis, an experienced journalist at the *Houston Post.* Curtis did additional investigation, including interviewing Koprowski and other key figures, and wrote a lengthy article about the theory that was published in Februrary 1992 in the rock magazine *Rolling Stone.*[10]

In terms of inserting new ideas into the scientific domain, Curtis's article was like a bombshell. It attracted widespread attention, including commentary in *Science* magazine and the *New York Times,* among many other publications. From my point of view, there was a strange discrepancy. Pascal had sent a sober article to several scientific journals, none of which were interested in publishing it or pursuing the ideas. He had also sent his article to quite a few scientists, most of whom didn't reply or even acknowledge receipt. But when exactly the same ideas were published in a rock magazine, suddenly scientific publications were interested.

In my mind, there was a simple explanation for this difference in treatment. When Pascal was unpublished, or only published as a working paper from far away in Australia, scientists could ignore the ideas. Curtis's article, on the other hand, appeared in a magazine with a very large

10 Tom Curtis, "The origin of AIDS," *Rolling Stone*, Issue 626, 19 March 1992, pp. 54–59, 61, 106, 108.

circulation. Lots of readers were influenced by it. Scientists took note. The most important response was to attack the theory.

There was an exchange of letters in the prestigious journal *Science.* Curtis sent in a letter, and Koprowki replied to it. However, *Science* did not publish Curtis's response.[11] It seemed like Koprowski had the last word.

I knew differently, because I was part of a network of correspondents. I took the initiative of alerting Elswood and Curtis to Pascal's work, and they began corresponding. Pascal sent me copies of his letters with Curtis, including Curtis's drafts of his letters to *Science.* Curtis also sent me copies and told me what was going on. So I knew that Curtis had written a response to Koprowski's letter in *Science,* and I had copies of Curtis's correspondence with *Science.*

The polio vaccines used in Koprowski's mass vaccination campaign in Africa in the late 1950s had been developed at the Wistar Institute in Philadelphia, where Koproski was the director. When the AIDS story broke in the early 1990s, he was still director. Curtis, in some of his articles in the *Houston Post,* called on the Wistar Institute to test polio vaccine seed stocks that it held in storage, to check for contamination. However, the Institute didn't do this. Instead, it set up a committee of seven prominent scientists to examine the claims in Curtis's *Rolling Stone* article.

The Wistar committee, as it was commonly called, concluded that it was very unlikely that polio vaccinations

11 Tom Curtis, unpublished letter to *Science,* 30 September 1992, https://www.bmartin.cc/dissent/documents/AIDS/Curtis92ul.html

had led to AIDS, giving several reasons.[12] The most telling argument was that a Manchester sailor named David Carr had died of AIDS in 1959. The Wistar committee report was brief, only seven pages, and was not published in a scientific journal. Nevertheless, it was treated by the scientific establishment as a definitive refutation of the polio-vaccine theory. It was only years later that evidence emerged that despite an initial report, there might not have been any HIV in David Carr's tissues.

There was a mysterious side to Pascal: he communicated only by letters. I never spoke to him. Planning a trip to New York in 1991, I suggested meeting, but he said he would not be available. I could only presume that "Louis Pascal" was a pseudonym, and that he also had some other identity. From mid 1995, Pascal stopped writing to me, I think due to my not publishing a new paper of his. I wanted changes, because it was grossly defamatory of Koprowski, but Pascal refused to modify his text.

My concern about defamation was sincere. Koprowski sued Curtis and *Rolling Stone* for defamation. For Curtis, this was damaging. In the discovery process, he had to turn over all his interview notes to Koprowski's legal team. He had planned to write a follow-up article, but it never happened. He would have had to tell every informant that it was possible that a record of everything they said would end up with Koprowski and his lawyers. This was enormously inhibiting for Curtis and for potential informants.

12 Claudio Basilico et al., Report from the AIDS/Poliovirus Advisory Committee, 18 September 1992, https://www.bmartin.cc/dissent/documents/AIDS/Wistar92.html

Koprowski's legal action served to silence those who might have something to say about his polio-vaccine campaigns.

The legal action was also damaging for *Rolling Stone.* Its legal expenses amounted to half a million dollars even before the case got to court, so it settled, agreeing to pay Koprowski $1 and publish a "clarification."[13] Although this short text did not disown any factual statements in Curtis's article, it was treated by *Science* as a retraction. To me, it seemed strange that a scientific journal, *Science,* would treat a statement made under legal duress as having any scientific validity. This was just one example of the way leading scientific journals were antagonistic to the polio-vaccine theory.

Though I found the possibility that AIDS had arisen from contaminated polio vaccines fascinating, that wasn't my main reason for remaining interested in the idea. For me, having studied several scientific controversies already, and having a special interest in the suppression of dissent, what kept me involved was interest in the "politics of knowledge," which is about how power and knowledge interact.

It was apparent from the beginning that mainstream scientists, especially those concerned about the reputation of the scientific community, intensely disliked the polio-vaccine theory. The theory implied that scientists — specifically, Koprowski and his collaborators — had been responsible for introducing to humans the deadliest new infectious disease in modern history.

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13 "'Origin of AIDS' update," *Rolling Stone,* 9 December 1993, p. 39, https://www.bmartin.cc/dissent/documents/AIDS/rs93.html

It was implausible that Koprowski could have done this intentionally. After all, SIVs weren't even known back in the 1950s. But it might be argued that Koprowski had been reckless in giving an inadequately tested vaccine to hundreds of thousands of people, and never doing follow-up health checks.

More important than Koprowski's reputation, though, were implications for vaccination. If people thought that polio vaccines had caused AIDS, this might make them sceptical of current vaccines. It doesn't matter that today's vaccines are tested for SIVs and other simian viruses. The very possibility of vaccine contamination causing a deadly human disease could worry people, making them reluctant to be vaccinated for measles, pertussis and other infectious diseases that still cause many deaths in some parts of the world.

From the time that Pascal first contacted me, I judged that resistance to publishing his articles, and antagonism to the polio-vaccine theory more generally, was due in part to wanting to protect the reputation of science, in particular of medical research. This resistance and antagonism didn't need to be conscious. As an unconscious source of bias, it was all the more potent.

By the mid 1990s, Pascal had stopped communicating. Curtis and *Rolling Stone* were muzzled by Koprowski's legal action. *Science* had refused to publish Curtis's reply to Koprowski. It also refused to publish a letter from W. D. Hamilton, one of the world's leading evolutionary biolo-

gists.[14] I knew about this because I was in the communication loop with all these figures. But very few others were in the loop, and for outsiders it seemed that the polio-vaccine theory had been refuted.

As mentioned earlier, when I published Pascal's long paper, I had planned to observe the response to his ideas, and the way the ideas spread. This would be an examination of the "scientific reception system." Although this plan was interrupted by Tom Curtis's article in *Rolling Stone,* I continued to watch the evolution of the ideas. Intervening in the process myself, I wrote some articles about what I called the "political refutation" of the polio-vaccine theory. In 1996 I set up my own website, hosting my own publications and, importantly, lots of documents about suppression of dissent. On this part of the site, I added key writings about the polio-vaccine theory, many of them favourable to the theory but quite a few critical of it. Keeping this section of the site up to date required monitoring significant new developments.[15]

In addition to Curtis and Elswood, there were a few others who took the theory seriously and publicised it. One of them was Australian science journalist Julian Cribb, who wrote a feature story in the daily newspaper *The Australian*

14 W. D. Hamilton, unpublished letter to *Science,* 27 January 1994, https://www.bmartin.cc/dissent/documents/AIDS/Hamilton94/

15 "Polio vaccines and the origin of AIDS: some key writings," https://www.bmartin.cc/dissent/documents/AIDS/

and later a book.[16] Nevertheless, most readers of scientific journals or the mass media would have assumed that the polio-vaccine theory was dead and buried even though its arguments had not been refuted. This might have been the end of the story, except for one person: Edward Hooper.

Hooper was a writer. He had spent years in Africa and wrote a book about AIDS titled *Slim.*[17] He became fascinated by the origin of AIDS and began investigating various theories. Two years into his quest, he had eliminated all but two of the theories. One of them was the dominant scientific view, called natural transfer or the cut-hunter theory. It posited that a hunter, while butchering a chimp, had got chimp blood in a cut — or that SIVs had entered humans through some other such "natural" process. Hooper's second remaining candidate was the polio-vaccine theory, otherwise known as the OPV theory. OPV was oral polio vaccine, the type of vaccine used by Koprowski.

Hooper engaged in a multifaceted investigation. He searched archives, read scientific papers and conducted interviews around the world. He sought to determine the way AIDS had spread, because that might help pin down

16 Julian Cribb, *The White Death* (Sydney: Angus & Robertson, 1996), https://www.bmartin.cc/dissent/documents/AIDS/Cribb96.html

17 Ed Hooper, *Slim. A Reporter's Own Story of AIDS in East Africa* (London: The Bodley Head, 1990).

the location of its origin. He looked into the different strains of HIV, including HIV-1 and HIV-2.[18]

Hooper had the support of Bill Hamilton — as noted earlier, an eminent evolutionary biologist — who provided expert advice about the biological side of the issues. He also struck up correspondence with Pascal, Curtis, Elswood and me, among others. Before long, Hooper had moved far ahead of anyone else in obtaining information relevant to the OPV theory. For example, he interviewed Africans who had worked at Camp Lindi, where Koprowski's vaccine was prepared in the 1950s.

During the 1990s, one of the crucial questions was about which particular SIV entered humans and became HIV-1(M), the strain of HIV that has caused the AIDS pandemic.[19] This wasn't easy to determine, because SIVs and HIVs mutate and recombine at a rapid rate. Nevertheless, it seemed that the most likely SIV was one found in chimpanzees. Polio vaccines were made in monkey kidneys, not chimp kidneys. Hooper investigated the possibility that chimp kidneys might have been used to make some lots of polio vaccine.

In 1999, Hooper's book *The River* was published.[20] It was massive in size and scope, yet it read like a novel. It

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18 HIV-1 has several variants. HIV-1 group M is responsible for most of the AIDS deaths around the world. There are also HIV-1 groups N, O and P.

19 To add to the complications, HIV-1(M) has various subgroups.

20 Edward Hooper, *The River: A Journey Back to the Source of HIV and AIDS* (Harmondsworth: Penguin; Boston: Little, Brown, 1999; revised edition, Penguin, 2000).

was an instant sensation, leading to reviews in major newspapers and scientific journals, and extensive commentary. It reopened consideration of the polio-vaccine theory.

Here was a curious thing. Efforts to publish commentary about the polio-vaccine theory in scientific journals had either been unsuccessful — that was Pascal's experience — or, when occasionally successful, ignored. For example, an article by Elswood and Raphael Stricker was published in *Research in Virology,* but was not taken up by mainstream researchers.[21]

Remember that Curtis in 1992 had called on the Wistar Institute to make available its stored polio vaccine seed stocks for testing. The Wistar did not act. However, after publication of *The River,* Wistar management suddenly decided to test their samples.

My assessment, based on the responses to Pascal, Curtis, Elswood, Hamilton and Hooper, was that the scientific mainstream opposed publishing submissions about the OPV theory in scientific journals and, when anything was published, it was ignored. However, when the theory obtained massive publicity, mainstream scientists were spurred into action, mainly to try to refute the OPV theory.

Hooper's book *The River* was the trigger for the convening of a major scientific conference by the Royal Society of London, Britain's body parallel to the US National Academy of Sciences. Nominally, the conference was about all possible theories about the origin of AIDS,

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21 B. F. Elswood and R. B. Stricker, "Polio vaccines and the origin of AIDS," *Research in Virology*, vol. 144, 1993, pp. 175–177, https://www.bmartin.cc/dissent/documents/AIDS/Elswood93.html

but in practice it was set up to look at just two of them: the cut-hunter theory (orthodoxy at the time) and the OPV theory (the challenger, put on the agenda by *The River*). The attendees were a line-up of the key figures in the debate. On one side there were Koprowski, Stanley Plotkin (Koprowski's collaborator) and other scientists who supported the cut-hunter theory. On the other side were Hooper and one or two scientists whose work was compatible with the OPV theory.

I was a speaker too, commenting on the nature of the debate. I argued that the burden of proof had been put on the OPV theory, even though the evidence for the cut-hunter theory was incomplete.[22]

The conference was an opportunity to see key players up close. Sitting in the audience fairly close to the front, I could observe the speakers, listening to what they said and noting the tone of their voices. I noticed who asked questions and the spirit in which they were made. In the intervals between formal talks, I conversed with various participants. The meeting brought together most of the key figures then active in the debate over the origin of AIDS who were sympathetic or hostile to the polio-vaccine theory.

One key person was not there: Bill Hamilton, who supported Hooper. Hamilton was a member of the Royal Society, and his status was instrumental in the conference being held. On a trip to Africa with Hooper, Hamilton

22 For documents about the Royal Society meeting, including the papers presented and associated media coverage, see https://www.bmartin.cc/dissent/documents/AIDS/rs/.

collected monkey stool samples to test for SIVs. He caught malaria and died shortly afterwards, in 2000. If he had lived, the course of subsequent events might have been different.

Observing the conference dynamics up close, I was able to see that the conference organisers had set out to discredit the OPV theory.[23] The conference was two days long, with speakers, comments and questions throughout. However, the press conference, attended by numerous journalists, was held mid-afternoon on the *first* day. That was suspicious enough. It turned out that the press conference was held just after the announcement of the results of testing of polio vaccine seed stocks held by the Wistar Institute in Philadelphia. The results were interpreted, and trumpeted, as showing there was no contamination of Koprowski's polio vaccines.

This was a partisan interpretation of the results. There was no proof that the OPVs used in Africa were uncontaminated. Furthermore, Hooper in his talk announced new evidence that some of Koprowski's polio vaccines had been amplified in Africa using chimp kidneys. But Hooper's bombshell information was overshadowed by the announcement of testing of Wistar vaccines.

The press conference was designed to influence media coverage, and in this it was quite effective. Most journalists

23 Brian Martin, "The politics of a scientific meeting: the origin-of-AIDS debate at the Royal Society," *Politics and the Life Sciences,* vol. 20, no. 2, September 2001, pp. 119–130. Though dated 2001, this issue of the journal was not published until 2005 due to legal difficulties mostly unrelated to my article.

filed their reports based on the announcement about the Wistar vaccines; few bothered to think through the arguments themselves or consider Hooper's new evidence.

The OPV theory had not been refuted, but judging by most reports in scientific journals and in the mass media, it seemed that it had been. Another factor is that major scientific journals repeatedly rejected submissions giving support to the OPV theory. I was aware of half a dozen submissions, by different authors, to *Nature,* the highly prestigious journal. One of the rejected submissions was my own. Unless you were in the small group keeping in touch about the OPV theory, you would have had no idea that the OPV theory still had any credibility.

After the Royal Society meeting in 2000, there was relatively little public discussion of the OPV theory. One exception was a film, "The Origins of AIDS," produced by a team from France and Canada and released in 2003. The film presented both sides of the debate but was mainly sympathetic to the OPV theory. It won some awards and was screened in several countries.[24]

Little known to most people, opponents of the OPV theory organised behind the scenes against the film, sending letters that denigrated Hooper. These letters may have been responsible for Channel 4 declining to broadcast the film in the UK.

Hooper's book *The River* had sold well, and before long went out of print. Its publishers — Penguin in Britain and Little, Brown in the US — did not reprint the book even though there was a continuing demand for it. One possible

24 The film has been available online.

reason was that letters had been sent by Koprowski's lawyers to the publishers, suggesting the possibility of legal action. Lawyers representing Koprowski's collaborator Stanley Plotkin also sent threatening letters.

Opponents of the OPV theory occasionally published scientific articles in which the authors interpreted the results as showing that the theory was wrong, and some of these articles received media coverage. Hooper wrote replies to these scientific articles, published on his web-site.[25] From the point of view of those who relied for information on scientific papers or, more commonly, on media stories about research findings published in scientific journals, it might have seemed that the OPV theory had been disproved.

The scientists opposed to the OPV theory presented the issues as being entirely scientific. A prime avenue for investigation was the use of a computer model, called a "molecular clock," to examine the genetic evolution of HIV. Because HIV mutates rapidly, over time its genetic composition shifts. In particular, it spreads genetically in different directions in different places. Using available samples of HIV, including the earliest ones from the 1950s and 1960s, it is possible to work backwards to a presumed origin date, when an SIV entered humans to become HIV. The calculations came up with origin dates much earlier than the 1950s, for example an estimate of 1906 plus or minus 20 years. If correct, this was too early for polio vaccines to have played a role.

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25 "AIDS Origins: Edward Hooper's Site on the Origins of AIDS," http://www.aidsorigins.com

Hooper cited several factors casting doubt on this sort of analysis. One factor was recombination, when different variants of HIV interact to produce a virus with genes from both of them. Recombination allows change in HIV much faster than mutation. It thus throws into question the molecular clock. Hooper has cited several scientific studies about how recombination undermines molecular clock calculations.

Hooper also pointed out that the molecular-clock researchers did not consider an alternative hypothesis to explain the diversity of HIV: that several different variants simultaneously entered humans in the 1950s via polio vaccines. Hooper referred to a study, presented at the Royal Society meeting, showing that current HIV diversity was compatible with just such a "star-burst" of HIV variants.[26]

Molecular-clock theorists ignored this possibility. It seemed that the molecular-clock researchers sought to discredit the OPV theory by using their own framework, without considering how the same outcome might occur starting with the assumptions underlying the OPV theory.

For me, this provided a good illustration of how scientists proceed. The famous philosopher Karl Popper argued that scientists should try to falsify their theories, namely to prove them wrong. Many scientists claim this is what they do. However, according to sociologists of science, most

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26 Tom Burr, J. M. Hyman and Gerald Myers, "The origin of acquired immune deficiency syndrome: Darwinian or Lamarckian?", *Philosophical Transactions of the Royal Society of London, Series B,* vol. 356, 2001, pp. 877–887, https://www.bmartin.cc/dissent/documents/AIDS/rs/papers/Burr.pdf

scientists accept dominant theories and use them as a basis of further research.[27] They do not attempt to falsify them. The molecular-clock theorists sought to disprove the OPV theory, not to question their own approach by using a star-burst model. More generally, mainstream scientists focused on discrediting the OPV theory, not on falsifying the cut-hunter theory.

There was another factor: blood samples. If AIDS began decades before the 1950s, there might be HIV-positive blood samples from the time before Koprowski's polio vaccination campaign. It can be presumed that supporters of the cut-hunter theory would be eager to find evidence of pre-1950s HIV, but no such evidence has been reported before 1959, which was after the start of the OPV campaigns in the Congo. Likewise, there are no credible reports of patients, pre-1950s, who died of what might have been AIDS. Remember that David Carr, who died in 1959, was seen as such a medical mystery that his case was written up in a medical journal and samples from his body saved in paraffin wax.[28] Africa pre-1950s was mostly controlled by European colonial powers that had some advanced medical facilities, but none apparently reported any cases that might, in retrospect, have been AIDS.

It is certainly possible that HIV entered humans before the 1950s via interactions with chimpanzees, and then

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27 The classic reference is Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Princeton: Princeton University Press, 1962).

28 As noted earlier, Carr's case was cited by the Wistar Committee as showing that the polio-vaccine theory was implausible.

remained unnoticed for decades as it gradually spread. However, this possibility is far from definitive proof that this is what occurred. A possibility, based on a questionable molecular clock, does not seem like a disproof of the OPV theory, at least not from the perspective of Hooper and others.

For most of the years following the Royal Society meeting in 2000, there was relatively little public debate about the origin of AIDS. There were occasional papers in scientific journals and associated publicity, and the struggle over the 2003 film *The Origins of AIDS,* but little else. There was, though, one venue where the struggle continued: Wikipedia.

Wikipedia presents itself as the encyclopaedia that anyone can edit. This is true: it is easy to register and begin making changes. However, it is not so easy to make significant changes that stick. Experienced editors, who know Wikipedia rules, keep a close watch on major changes, and often revert edits to the original text.

In 2007, someone set up a Wikipedia entry about me. Most editors are anonymous, but I did encounter one or two individuals who said they had edited my entry. Editing your own entry is against Wikipedia guidelines: it involves a conflict of interest. I never contemplated editing my entry, even to fix obvious errors.

For years, I never paid much attention to my Wikipedia entry. It seemed innocuous. I had my own website containing vastly more information.

Then in January 2016, a Wikipedia administrator named Guy completely rewrote my entry, turning it into an attack on me. This was part of a more general attack on one

of my PhD students, who had just graduated. I've written about this amazing saga elsewhere.[29] For the purposes here, what's interesting is what was added to my entry about the origin of AIDS.

It was apparent that Guy and some others thought the OPV theory was wrong, and wanted to discredit both the theory and, by association, me. Consider this statement from the entry: "Martin is known as one of the supporters of the theory of OPV-AIDS." Actually, as should be apparent from my articles about the OPV theory, I have always considered it as worthy of investigation and having been unfairly treated, but not endorsed it. In 2016, Wikipedia editors added several sentences about the OPV theory, painting me as a supporter of an "unproven" theory.

Consider this statement in the entry: "In 2010, Martin published a paper in which he argued that 'medical researchers had colluded to silence' the discredited OPV-AIDS hypothesis …" This makes it sound like I had written the phrase "medical researchers had colluded to silence," thus associating me with conspiracy theories which, on Wikipedia and elsewhere, are commonly assumed to be misguided or even deluded. Actually, the phrase "medical researchers had colluded to silence" was taken from a newspaper article, namely one of the newspaper articles attacking my PhD student, the very articles that led to the rewriting of my Wikipedia entry.

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29 Brian Martin, "Publications on scientific and technological controversies: Judy Wilyman thesis," https://www.bmartin.cc/pubs/controversy.html#Wilyman.

My entry wasn't the only one affected. The attack on my PhD student led Guy to write a new Wikipedia entry about her, and components of this new entry were added to the Wikipedia entry about the University of Wollongong. I saw the rewriting of my entry as part of a wider campaign, though from the point of view of Guy and some others, Wikipedia was simply providing an account of what happened.

On Wikipedia, the OPV theory was dismissed. This occurred not just on my entry, but on others, including an entry about Hooper.

For years, I had been a supporter of Wikipedia. It is an amazing achievement: a crowd-sourced compendium of information that is free to access, and for which contributors are not paid and there are no advertisements. The Wikipedia model is an alternative to the commercial models used by Google, Facebook and other online operations. Now, with the rewriting of my entry, I came face to face with a different aspect of Wikipedia, one showing bias and hostility.

I was alerted to this when I was contacted by a Wikipedia editor — someone previously unknown to me — who told me about how he had questioned Guy's editing of my entry and eventually been banned from editing. I considered various options for responding to the hostile editing of my entry. In this, I was aided by comments from several Wikipedia editors who told me that it wasn't worth my time to try to fix my entry.

Eventually, I decided to write an article about persistent bias on Wikipedia, using the struggle over my own

entry as an illustration.[30] In doing this, I learned a lot more about Wikipedia.

I also learned about the techniques used by Wikipedia editors who opposed the OPV theory. There was a double-denigration process involved. In adding text to my entry, Guy and others included negative assessments of the OPV theory and then criticised me for supporting the theory, even though my stance over many years was only to say it deserved a fair hearing. In the Wikipedia domain, I didn't learn anything new about the OPV theory itself, but learned quite a bit about the way the debate over the theory proceeded among anonymous Wikipedia editors.

In January 2020, the name of the Wikipedia entry "OPV AIDS hypothesis" was changed to "OPV AIDS conspiracy theory." The rationale given in the talk page for the entry was that "The concept of intentional creation of HIV is fringe."[31] This showed a lamentable ignorance of the OPV theory, which says HIV is an SIV that entered humans. The idea that HIV was created in a biowar lab is a

30 Brian Martin, "Persistent bias on Wikipedia: methods and responses," *Social Science Computer Review,* vol. 36, no. 3, June 2018, pp. 379–388.

31 Here is the full exchange:

Should this really be called a hypothesis?[edit]

It's been pretty thoroughly debunked. Purely the realm of conspiracy theorists. — Preceding unsigned comment added by DonkeyPunchResin (talk • contribs) 06:53, 28 January 2020 (UTC)

I changed the title from "OPV AIDS hypothesis" to "OPV AIDS conspiracy theory". The concept of intentional creation of HIV is fringe, and to discuss this idea is either ignorance or misguided. Blue Rasberry (talk) 17:06, 28 January 2020 (UTC)

Thanks. I agree.—DonkeyPunchResin (talk) 01:34, 3 February 2020 (UTC)

completely different theory. That a couple of Wikipedia editors might make changes based on ignorance is not too surprising. It took several months before a different editor intervened, arguing that the theory, or hypothesis, was not a conspiracy theory, and the name of the entry was changed to "Oral polio vaccine AIDS hypothesis."

Reflections on influences

Here, I reflect on sources of information about the debate over the polio-vaccine theory of the origin of AIDS that influenced my understanding. This will address some of the same information already covered.

Table. Influences on my understanding of the origin-of-AIDS debate

Influence	Contribution	Comments
Experts	Large	I corresponded with many key figures in the debate, especially Louis Pascal and Edward Hooper.
Scientific publications	Large	I read many studies relating to the origin of AIDS.
Learning through writing	Large	In writing articles about the origin-of-AIDS debate, I collected and evaluated information, prepared coherent arguments, and obtained illuminating comments on drafts.

My own mind	Probably large	From the beginning, I thought, "This is an intriguing theory that might be true, and it should be given a fair hearing." I seem to have maintained this view in the face of contrary information, which may suggest the role of confirmation bias.
Family, friends, colleagues and audiences	Small	Very few friends, family members or acquaintances knew anything about the origin of AIDS. I learned some things from their reactions to what I told them about the polio-vaccine theory.
News media	Small	Tom Curtis's articles in *Rolling Stone* and the *Houston Post* helped me learn more about the polio-vaccine theory. However, I already knew a fair bit about the issues before Curtis's articles. Subsequent media coverage has provided me with more insight into how the media cover the story than new information or perspectives about the issues being debated.

Wikipedia	Small	The origin-of-AIDS debate proceeded for many years before Wikipedia was created. Wikipedia treatments have told me far more about Wikipedia than about the origin of AIDS.
Governments, corporations and other bureaucracies	None	
Schooling	None	
Advertising	None	
Personal experience	None	
Social media	None	Social media seem not to have played a significant role in the issue.

Influence: experts

How do you know whether someone is an expert on a topic? A common way is to see whether they have relevant credentials, such as a PhD, a position such as a university post, and/or publications in the field. These are fairly good signs of expertise, but they are signs, not the expertise itself. It's possible for someone to be highly knowledgeable without having relevant credentials, positions or publica-

tions. How can you tell? This was the question that faced me concerning the origin of AIDS. Many of the key figures were not established scholars. I had to make a judgement myself. I had to decide whether they were knowledgeable.

I was introduced to the theory by Louis Pascal, via letters and articles sent through the post. When I showed some interest, Pascal tried to win me over. He had limited means to do this: only what he could send me in printed form. He was obviously a recluse or had a separate identity: he was not available to speak to in person or over the phone.

Pascal's most effective technique for convincing me was to demonstrate his knowledge of the topic. Whenever I raised some question about the theory, or about some statement he had made, he responded with cogent arguments and new evidence. Usually these responses were far more than required to address my points. His responses showed that he had thought deeply about the issues, anticipating possible objections and collecting copies of scientific articles that bolstered his views.

Because our correspondence was fairly slow — airmail postage between New York and Wollongong often took a week or more each way — we had time to carefully read each other's letters and to ponder what we wanted to say in response. I didn't realise at the time how valuable this was for judging another person's knowledge. In the age of the Internet, interactions are often rapid exchanges, giving insufficient thinking time to evaluate what the other person has said or written.

The same applies to interacting face-to-face or having a conversation over the phone: there is little time to reflect and to carefully formulate questions or answers. Because I

never met Pascal or spoke with him, our interactions were slowed down. In the course of our correspondence, I had weeks or months to think about what he had to say and how he said it.

Did it matter that I didn't know anything about Pascal himself, aside from a few comments he made about what he had done? I didn't know his age, background or occupation. Although this created an intriguing mystery, it also meant I focused on what he had to say.

This is in contrast to people's tendency to judge a person's credibility on the basis of extraneous characteristics, namely characteristics separate from what they say and do. For example, research shows that people tend to trust others who are better looking, who are similar to themselves in age and cultural background, and who conform to cultural stereotypes of trustworthiness. If you hear a statement, you probably want to know who said it, though logically it may make no difference. When art works are discovered to have been painted by women, their market value drops precipitously.

Pascal didn't have the advantage, or disadvantage, of being a known quantity. He had written some philosophical articles, but that was all. This meant I couldn't use the mental shortcut of judging what he said about AIDS on the basis of other factors. My attention was on the evidence and arguments.

In corresponding with Pascal, I needed to decide whether the polio-vaccine theory was worthy of being investigated but was not being given fair consideration. Pascal may have been trying to convince me that contaminated polio vaccines were responsible for AIDS but, from

my point of view, all he needed to do was show that this explanation was worthy of being brought to the attention of others. Pascal, in my judgement, had developed a strong personal stake in the polio-vaccine theory. My interest, in contrast, was in the social dynamics of science and, in particular, the ways in which dissident views were addressed.

After Tom Curtis's article appeared in *Rolling Stone,* I made contact with him and with his key source, Blaine Elswood. A few years later I met them, and later still I met Ed Hooper. Each of them contributed to my understanding of the origin-of-AIDS debate. It would be possible to analyse each personal interaction, which included articles, letters and occasional conversations. I've focused here on my interaction with Pascal because it was how I first became exposed to the polio-vaccine theory and decided it was worthy of consideration.

Buried within the origin-of-AIDS debate is an instructive episode concerning "lying informants," which is relevant to learning from experts. Hooper, in his exhaustive investigations, interviewed European and American scientists involved with polio vaccination campaigns in Africa in the 1950s, and also interviewed African technicians who worked at Koprowski's chimpanzee holding facility. A key issue was whether, in the preparation of polio vaccines, chimp kidneys had ever been used as a substrate, and chimp sera as a growth medium. If they had, then this provides an obvious way by which chimp SIVs could have contaminated the vaccines and then, on entering vaccine recipients, have become HIVs.

Hooper found a discrepancy between the statements made by the European and American scientists and by the

African technicians. It seemed that one group was either mistaken or lying.

I discovered a small body of writing, mostly by anthropologists, about "lying informants." When an anthropologist is trying to find out information about a cultural practice, it is possible that locals will not tell the truth, due to embarrassment, sensitivity, confidentiality or amusement. Therefore, it is important to look for possible reasons for informants to lie.

My assessment is that the European and American scientists had a much stronger reason to lie, or hide the truth, about events from decades earlier: if chimp kidneys had been used to prepare polio vaccines, it meant that they were implicated, however inadvertently, in the origin of AIDS. On the other hand, the African technicians, who did not make decisions about the polio vaccine trials and whose involvement was not publicly known, had much less reason to lie.[32]

There are two important points here. The first is that people lie — indeed, research shows that most people lie regularly about all sorts of matters, important and trivial.[33] The second point is that it is worth looking at reasons why people might lie. If there are incentives to lie, then it pays to make extra efforts to check statements.

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32 I made this argument in "Contested testimony in scientific disputes: the case of the origins of AIDS," *The Skeptic,* vol. 13, no. 3, 2007, pp. 52–58.

33 See the commentary on lying in the appendix, pp. 168–171.

Influence: scientific publications

I read quite a number of scientific papers about the origin of AIDS. Initially, I read papers from scientific journals sent to me by Pascal. After I published Pascal's own paper, various correspondents sent me scientific papers, and I tracked down others via citations. Some authors sent me their papers.

Because of my experience studying scientific controversies, I was wary of assuming that any paper was definitive or even correct. It was apparent to me that most mainstream researchers found the polio-vaccine theory for the origin of AIDS unwelcome, so I read papers purporting to refute the theory with a critical eye. This seemed warranted in retrospect after several supposed refutations turned out to have flaws.

Thus, in reading scientific papers on the topic, I was doing two things: learning about the issues — ranging from development of polio vaccines to the epidemiology of HIV and AIDS — and scrutinising the papers in light of what I knew about the issues and the controversy. In particular, I looked for the way papers referred to the polio-vaccine theory and to the cut-hunter theory. I observed that some scientists seemed to set out to find flaws in the polio-vaccine theory but did not make an equivalent effort to find flaws in the cut-hunter theory.

In my view, Koprowski and his collaborators had an obvious reason to oppose the polio-vaccine theory: their reputations were at stake. More generally, most medical researchers were not keen on the polio-vaccine theory because it attributed the emergence of AIDS to contaminated vaccines. Vaccination is almost unquestionable in

mainstream medicine, and anything that might deter people from vaccinating is therefore unwelcome.

Influence: learning through writing

I have published quite a few articles about the origin-of-AIDS issue, in every case laying out the issues as I see them and providing sources for my claims. After writing a draft of an article, I send it to several colleagues who I think can offer informed comments that will improve the article. After making revisions, I submit the article to a journal, where it is assessed by the editor and, in the case of refereed journals, by one or more reviewers.

Writing for me is a process of learning. Putting thoughts into words, and putting those words into a coherent structure, involves thinking and can lead to different and better understanding. I also learn from the feedback I obtain from readers of drafts and of published articles. Because my publications make me seem knowledgeable, people write to me offering new information.

For me, the main challenge in this process is lack of comments on my drafts from supporters of the cut-hunter theory. Because they are opposed to the polio-vaccine theory, either I do not seek their comments or they do not offer any. The only time I have received extensive comments from a cut-hunter-theory proponent was from a reviewer for a journal to which I submitted an article.

Influence: my own mind

An important player in any understanding of the origin of AIDS is one's own self, meaning one's own assumptions, preferences, biases, commitments and stake. Few individu-

als come to a contentious issue without preconceptions. A key factor is whether you believe mainstream scientists are to be trusted or distrusted, something that may vary from issue to issue. Those who believe scientists are always objective will be predisposed to supporting the dominant view, whereas those who suspect scientists are influenced by funding, personal aspirations, previous commitments and reputations may be more critical of the dominant view.

Having a preference can be self-sustaining, especially through confirmation bias. People with a strong view on a topic are likely to seek out material supporting their views and to ignore or dismiss material challenging it.

My intervention on this issue has been to argue that the polio-vaccine theory had been unfairly treated by mainstream scientists and journal editors. I have continued with this line of argument for thirty years. It is reasonable to expect that, like everyone else, I am subject to confirmation bias, always on the lookout for information that will support my views and vindicate the position I've taken. How should I take that into account?

For others, those who read my publications about the origin of AIDS — including this chapter — it is sensible to look for the influence of confirmation bias. This influence is most obvious in my interpretation of the treatment of the OPV theory: I treat many of the instances of rejection, denigration and hostility as unwarranted in terms of the evidence and arguments, whereas proponents of the cut-hunter theory would undoubtedly say the OPV theory is rightly dismissed and ridiculed.

Influence: family, friends, colleagues and audiences

I've talked to quite a number of people about the OPV theory in the course of conversing about current research, responding to queries and giving talks. Very little of this interaction provided information or insights about the theory itself, but all of it showed me how people responded to the theory. Their questions often revealed their thinking, so I learned a lot about what they didn't know and wanted to know. This has been valuable for my writing about the theory, which in turn leads to people contacting me, asking questions, offering ideas and in other ways deepening my understanding of the debate.

Influence: news media

Most people have never heard of the OPV theory. Most of those who have heard about it obtained their information from the mass media. To understand media treatments, it's useful to distinguish between two models of journalism concerning science. One is news and current affairs, the sort of journalism typical of the general news pages in newspapers and current-affairs programmes on television. In this sort of reporting, decisions about what is considered newsworthy are made on the basis of news values such as proximity and prominence. A key news value is conflict. A conflict — a war or a riot — can be newsworthy, whereas harmony or business as usual is not. In relation to science, a conflict over a theory can be newsworthy, especially if it relates to a hot topic such as health. At a few points, the polio-vaccine theory received considerable mass media coverage from this perspective: after Curtis's 1992 article in *Rolling Stone,* which led to numerous news stories, and

after publication of Hooper's book *The River* in 1999, which likewise led to many news stories as well as reviews. In highlighting conflict, in this case a challenge to orthodoxy, this sort of coverage does not give priority to the relative credibility of different theories: it is the conflict that is the focus. This can be frustrating to those who believe their views are correct.

In contrast to the conflict focus of news-and-current-affairs coverage is science journalism, commonly written by specialist science journalists. These journalists usually maintain good relations with the scientific community, especially scientific elites, and are likely to report stories from the perspective of dominant scientific views. In reporting on the origin-of-AIDS debate, science journalists usually adopted the standard view in the scientific community, namely the cut-hunter theory. Prior to Curtis's 1992 article in *Rolling Stone,* there was no story about the origin of AIDS. Likewise, in most of the subsequent time, aside from the period of debate over Hooper's book *The River,* science journalists regularly reported that the OPV theory had been disproved — several times, in fact, because the disproofs kept being overturned. A classic example is the news report in the journal *Science* titled "*Rolling Stone* rolls over for Koprowski."[34] *Rolling Stone* had published a "clarification" about Curtis's story about the polio-vaccine theory. The *Science* report treated this as a scientific vindication for Koprowski, without mentioning that the

34 "*Rolling Stone* rolls over for Koprowski," *Science,* vol. 262, 26 November 1993, p. 1369. Note that this was a news item rather than a refereed article.

scientific significance of a statement made as part of the settlement of a legal action is questionable at best.

Someone relying on the mass media to understand the origin of AIDS would thus have to have a long memory to make much sense of the issue. Coverage was episodic. If you happened to read articles around 1992 or 1999–2000, you would gather that there was a controversy, with the unorthodox polio-vaccine theory suddenly on the scene, whereas if you read the occasional media stories about the origin of AIDS published at other times, the polio-vaccine theory would be either invisible or discredited.

Most journalists do their very best under incredibly difficult circumstances, having to pump out stories at a great rate, bound by news values that prioritise conflict and prominence. Only a rare journalist, like Tom Curtis and Julian Cribb, spends weeks or months investigating an issue in order to write an in-depth story. In essence, the mass media provide a special sort of filter on the underlying issues, giving an occasional glimpse of a more complex picture.

Influence: Wikipedia

I have described the struggles that take place within Wikipedia. The key insight here is that Wikipedia texts are not neutral, objective descriptions of their subject matter, but reflect the outcome of struggles among various editors and administrators over the importance of topics, what should be addressed and how. Many Wikipedia entries provide information valuable to readers. Entries are probably most reliable when there is little disagreement among editors about facts. However, when a topic is contentious,

there is no way of presenting information that is neutral: every choice about information to include, sources to use, ways of organising material and ways of expressing ideas involves value judgements about which different readers, and Wikipedia editors, might disagree. The trouble is that a casual reader of Wikipedia might not know that a topic is contentious.

After studying writings about Wikipedia, and by observing the struggles over the entry about me, my conclusion is that Wikipedia can often be used as a convenient introduction to a topic, but for deeper knowledge it is important to check other sources of information. In relation to the origin-of-AIDS debate, I have learned very little from Wikipedia but quite a lot about how Wikipedia operates, in particular how bias is introduced and maintained.[35] In other words, my learning about the origin-of-AIDS debate has enabled me to better understand Wikipedia rather than vice versa.

Summary

In short, here is my assessment of the influence of various sources of information on my learning about the debate over the origin of AIDS.

Experts I received considerable information and insights from a few individuals including Louis Pascal and Ed Hooper. I used my own judgement, based on what they

35 See Robert Dildine, "Wikipedia's strange certainty about Edward Hooper, Brian Martin, and the OPV/AIDS hypothesis," May 2016, https://www.bmartin.cc/dissent/documents/AIDS/Dildine16.pdf

told me and how they responded to my queries, to assess their credibility. The debate over the origin of AIDS is, in part, a debate about who counts as an expert. Virologists and epidemiologists have much to contribute but, at least if the OPV theory is considered, so do journalists, historians and independent scholars.

Scientific publications There is lots of valuable information in scientific publications. However, I learned that there was a systematic exclusion of information about the OPV theory in the scientific literature. The implication is that relying solely on published papers is risky whenever there are non-standard positions, especially ones threatening to the interests of powerful groups within or outside the scientific community.

News media Journalists mostly report the dominant scientific view, but a few report challenging viewpoints, especially when a conflict is deemed newsworthy. Relying on mass media for understanding is risky if you don't have a deep knowledge of the topic.

Informants If you hear or hear about testimony about a topic from someone who was involved, it is wise to consider whether the informants have any reason to lie or to deceive themselves. This applies to testimony that you hear for yourself, see on television, or read reported in a news story or scientific paper.

Your own mind Confirmation bias, the tendency to search out and accept information that conforms with prior belief, can influence understandings. It is worthwhile taking this into account. One way to counter confirmation bias is to seek challenges to your beliefs. This wasn't a problem

for me, because there have been sustained attempts to discredit the OPV theory and to remove it from consideration.

This chapter is an account of my experience learning about the origin-of-AIDS debate. My aim is not to convince you about a particular perspective on the debate, but rather to illustrate how reflecting on learning can be a way to gain insights into the role of different sources of information. For me, the origin-of-AIDS debate is not over yet. It will be interesting to see how it proceeds and to see whether my assessments of information sources need to be revised.

My assessments are specific to me and to the origin-of-AIDS debate. If you reflect on how you learned about a topic you know a lot about, no doubt you will come up with different assessments of the influence of information sources. Whatever they are, you can use your insights as a guide for your future learning.

Serena Williams at the Australian Open, 2010

4
Talent

What is talent? More generally, what enables people to acquire advanced skills? Are they born with a gift, or do they have to work at it? Here I make an attempt to describe my own evolving ideas about talent. The early years are sketchy in my memory, so all I can do is provide a few highlights. After telling this story, I'll reflect on the influences on my understanding of talent.

The earliest episode I know only from what my mother told me many decades later. At the end of first grade in school, when I was seven years old, my teacher informed my parents that my reading was slow. They were concerned. Before long, they figured out the problem: I was reading words separately and didn't realise that the words told a story. According to my mother, once I realised there was a story, what today might be called a narrative, I became a keen reader, checking out books from the school library and ploughing through them.

Imagine if I had been less fortunate, with an unconcerned teacher or parents who assumed I was a slow learner. I might have gone for years being unable to make sense of what I read. The implication is that family background and the social environment make an enormous difference to what a person is able to do. I was very fortunate; in less favourable circumstances, my capacity to learn and interest in learning might have been far less.

My parents played the flute. They met while playing together in a university orchestra, and they continued to play flute duets through their entire lives together. I was the first of three children. My father thought we should all play instruments and that as a family we eventually could play woodwind quintets together. A woodwind quintet is comprised of flute, oboe, clarinet, bassoon and French horn. A flutist can easily play the oboe part, so we children needed to cover the parts for clarinet, bassoon and horn.

When I was 11, my father bought me a clarinet and I began weekly private lessons with an experienced music teacher. The following year I played in the school orchestra and in a local concert band. I continued private lessons for seven years, until the end of high school. I became the best clarinettist in my large school. I led the clarinet section in the band, which had some 20 clarinettists, and performed as soloist with the band. I auditioned for the all-state band and twice placed in the second clarinet section, meaning that I was judged to be among the top ten clarinettists who had auditioned.

I knew back then that my musical achievements were primarily due to hard work. Only a few students had private lessons like I did. Starting in the ninth grade, my teacher was the best clarinettist in the city, who performed in the philharmonic.

Then I had the example of my younger brother Bruce. He had a "musical ear," which I didn't, so my parents started him on the French horn, which requires exquisite sensitivity to pitch. He also had weekly lessons and practised every day, and before long became very good.

The French horn is the most difficult brass instrument to play. The mouthpiece is small, which means very tiny variations in lip pressure are needed to ensure the right note is played. Indeed, the horn is widely recognised as one of the more difficult instruments to play in an orchestra. Listening to a concert by a professional orchestra, you are more likely to hear a wrong note by a horn player than any other instrumentalist.

Gradually I learned that Bruce had some musical capacities that I lacked. One time, he put on a record of a horn concerto — this was long before CDs or cassette tapes — one he had never heard before. After listening to a passage, he picked up his horn and played along with the record. There was no way I could have done this.

Another time, Bruce and I were each practising in preparation for an annual city-wide performance evaluation in which students played a short piece before a judge and received a report. A week before the occasion, Bruce broke his wrist. Furthermore, it was his left wrist, and the horn is fingered with the left hand. Bruce's wrist was bandaged up to his fingers. He couldn't play with his left hand, so he played the keys with his right hand. He did pretty well before the judge, though he couldn't cup the bell with his right hand in the usual way. Even taking into account left-right symmetry, this was a remarkable accomplishment.

It was only years later that I realised that Bruce, and nearly every other musician, had a capacity that I lacked: auditory imagery. On vacation, our family used to go hiking in the Colorado mountains. My mother told me that she heard Bruce whistling bits from a symphony. Later, perhaps half an hour later, she heard him whistling from a much

later part of the symphony. Bruce was listening to the symphony in his head, occasionally whistling along.

I couldn't do this. In fact, I have almost no auditory imagery. Mention Beethoven's Fifth Symphony to classical musicians and they can hear the opening four-note motif in their heads. But I can't. During high school band practice, we often worked on tuning. The director, asking us to play a tuning note, would say, "Hear the note in your head before you play it." I never really understood what this meant, because I couldn't hear any notes when they weren't being played. Only later did I figure out that others, with auditory imagery, can hear notes in their head.

This helped explain why I found it so difficult to "play by ear." I could look at the notes on the page and play them without difficulty, but if I heard a melody, I couldn't reproduce it on my clarinet except by trial and error. Others seemed to play by ear without difficulty. I met a fellow who had just learned to play the clarinet: he knew what fingers to put down to produce different notes. Without looking at any music, he was able to play a familiar melody. Presumably he heard the notes in his head and went from the notes to the appropriate fingering, producing the melody. I couldn't do this, and I guessed that my lack of auditory imagery played a role.

I've only met one other musician without auditory imagery. Jo plays drums in a five-piece ensemble called the Chardonnay Sippers. The others don't need sheet music: they can play the pieces by ear. Jo needs the music. She becomes frustrated when the others shift to another key.

In my 30s, I read a book about mental imagery.[1] It explained that different people think in different ways, namely with different types of pictures in their minds. Some people see images. Some see words written out. And some don't see anything. That last category was where I fitted in. When I close my eyes, there is just a blank canvas, usually black unless the surroundings were bright, in which case I can see brightness. I can't conjure up any images: faces, landscapes, objects. They aren't there.

This explained a few things. I can recognise people when I see them, but when they're not around and someone asks me what they look like, I can't say. Do they wear glasses? What colour is their hair? What clothes were they wearing? Without visual imagery, I can't create an image of their appearance. However, I can remember facts about their appearance. For example, if I noticed the colour of their hair, or whether they had any, this was a fact that I might be able to recall.

Learning about my own mental imagery made me interested in the topic, so sometimes I would ask others about what goes through their minds when they think. It's peculiar that people don't usually talk about this. Working as a university teacher for decades, neither teachers nor students probed into how they thought. My guess is that most people think that everyone else thinks the same way they do.

1 I haven't been able to track down this reference.

In 2015, I read about some research into people who have no visual imagery.[2] The condition is called aphantasia, and it's not a question of having it or not, because there are all manner of gradations and variations. Taking a quiz provided, I learned that my aphantasia is fairly pervasive.

I did well in high school, especially in mathematics, which seemed to come easily. Though I was shy, teachers remembered me, so when Bruce was in their classes two years later, they asked whether he was my brother. This annoyed him. He was also a very good student, but he felt himself in the shadow of my previous good performance.

One time, he was complaining to my mother about me being so smart. She said, "But Brian tries so much harder." This was a perfect expression of the view that performance is due more to effort than talent.

However, my mother's comment was contrary to the prevailing assumption, which was that some people are smart and some aren't, and there was nothing much that could be done about it. This view was seldom stated baldly but seemingly was implicit in the way most people saw the world. It was apparent in attitudes towards standardised tests.

In the US, high school students aspiring to attend college commonly took the SATs: Scholastic Aptitude Tests.[3] There were a couple of general tests, which were

2 Since then, there has been an upsurge of research and interest in extremes of mental imagery. See for example the Aphantasia Network, https://aphantasia.com. People without visual imagery are often lacking in imagery in other senses.

3 They were later renamed the Scholastic Achievement Tests.

rather like IQ tests, and others specific to areas of study, such as physics. Many students treated SAT scores as measures of intelligence, which was assumed to be fixed.

Another important test was the National Merit Scholarship test. Doing really well on this test was a ticket for acceptance into top universities. My high school was unusual, at least in Oklahoma, in making special efforts to help students do well on the test. Someone identified students who had the most promise for doing well on the test, and there were meetings to encourage us to study for it. I remember attending sessions in which vocabulary questions were asked and answers discussed.

My impression from these sessions is that not many students studied for this test. But I did. Indeed, I did quite a bit of private study, unrelated to classes, just out of personal curiosity. For example, I had a book about vocabulary by Norman L. Lewis, and assiduously worked my way through it. In some standardised tests that we took in eighth grade, spelling was my worst score. My parents bought me Lewis's book about spelling, and before long I could spell much better than most people.[4]

I did very well on the National Merit test. Indeed, my high school did very well that year, having one quarter of the semi-finalists in the entire state. In retrospect, there were two main reasons. One was demographics. Parents of students at my high school were in a growing affluent area of the city: we students had advantages that others did not.

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4 The vocabulary book might have been *Word Power Made Easy* or perhaps *30 Days to a More Powerful Vocabulary.* The spelling book might have been *Correct Spelling Made Easy.*

Secondly, unlike most schools, academic achievement was valued — perhaps not as much as sporting performance, but at least it was taken seriously.

At some point, I learned how to play chess. In my final year of high school, I joined the chess club. The members seemingly were a bunch of misfits, not the usual social types. We were all boys, and the ones I remember were in tenth grade, a couple of years behind me. My friend Bill Devin was the emotional centre of the group. Yes, chess players can be emotional! I remember some of them becoming excited when someone made a daring sacrifice, following the game, making exclamations about the possibilities. I was a beginner compared to them.

A common assumption then was that you needed to be smart to be a good chess player, and that being smart meant that you could be good at chess. The game certainly requires thinking, about positions and combinations.

Clashing with the equation of smartness and chess ability was a student named John. He was not a star student. Indeed, he was just ordinary. Yet on the chess board he was daunting, playing better than just about anyone. His example stuck with me when, decades later, I learned about expert performance. More on that later.

I loved taking tests. They were a challenge. I spent time learning test-taking strategies, such as not spending too much time on any given question and figuring out the most likely answer to multiple-choice questions based purely on the options provided. I didn’t become nervous when taking tests, which was a great advantage.

For fun, I took IQ tests. Yes, for fun! In those days, IQ was supposed to measure innate intelligence, so when I got a high score, it was satisfying. At one point I took an IQ test for joining Mensa, the organisation for people with IQs in the top 2% of the population. I qualified but decided not to join. The people seemed a bit freaky. Later I read that being a member of Mensa did not predict achievement.

At one point, I took some IQ tests in a book, and my result was lower than previously — 50 points lower. Part of the variation might be ascribed to a different standard deviation to determine how far a score is from average. Anyway, some of the questions on the test had flummoxed me: I couldn't understand what the testers were looking for. After studying the answers, I figured out the logic behind the questions, and took another test, this time doing better. For me, the lesson was that it is possible to train for IQ tests and do better with practice. The implication is that it's hard to know whether performance on these tests owes much to innate capacities.

Decades later, I read about EI: emotional intelligence.[5] This refers to a variety of skills in interpreting emotions, one's own and those of others. I knew my EI was not very high. Like quite a few other scientists, I was prone to literalism, responding to people's words rather than the intention or emotion behind them. Often I didn't notice or interpret the expressions on their faces, again listening to the words they said. Noticing and interpreting others' emotions is just one part of EI, but for me it was indicative.

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5 This area was popularised by Daniel Goleman, *Emotional Intelligence* (New York: Bantam, 1995).

After I became aware of the importance of this dimension of interpersonal understanding, I tried to work on it, to improve. I used to say that previously I was in the bottom 10% of people in terms of interpersonal skills and had gradually improved, until maybe I was approaching average.

Among my peer group in theoretical physics and applied mathematics, though, I was not unusual. It is sometimes said that some people are oriented to other people, whereas others are oriented to objects. Doing well at mathematics, especially pure mathematics, requires the capacity to spend significant time thinking about numbers and their relationships. For about 15 years, from my early 20s through my late 30s, I spent much of my time among physicists and mathematicians who, on average, were just as number-oriented as me.

In this milieu, there seemed to be an assumption that some people are naturally brilliant. In 1970 at Sydney University, my first full year in Australia, I did a course in physics as preparation for doing a PhD. One of my classmates, Mike, knew some of the students doing PhDs. He was in awe of a fellow named Hugh Comins, who had topped the leaving certificate in the state of New South Wales. This meant he had received the highest score in the state in standardised tests taken by high school students. In his undergraduate degree in physics at Sydney University, he shared the University Medal with another student, George. Mike was also in awe of George.

Coming from the US, these achievements meant nothing to me. I had no feeling for the significance of the leaving certificate and knew nothing about university medals. This was a great advantage, because the following

year I met Hugh and George and related to them as fellow students. Indeed, they were my best friends during the four years I worked on my PhD thesis.

In the Department of Theoretical Physics, some of the academics felt they, collectively, were smarter than anyone else. Physics was seen as superior to any other discipline because it was rigorous. It was also seen as superior to mathematics because it dealt with the "real world." Theoretical physics was seen as more demanding, intellectually, than experimental physics. (On the other hand, the experimentalists positioned themselves as central to the discipline, at one point using the assertion that "physics is an experimental science" as a way of asserting superiority over theoreticians.)

If physics was the queen of the disciplines and Sydney University was Australia's elite university, and theoretical physics was the most demanding intellectually, this of course meant the Theoretical Physics Department was the best of the best. This attitude, which only surfaced occasionally, increasingly grated on me. After Sydney University, I spent a decade at the Australian National University, where many thought they worked at Australia's best university. It was only years later, when I obtained a job at the University of Wollongong, that I escaped the cloying attitude of superiority.

Among mathematicians, there is a common belief that brilliant work is done while young. If you haven't made your mark by the age of 30, you're never going to be a star. This same attitude prevailed in theoretical physics at Sydney University. Bruce MacKellar, a nuclear physicist at Sydney, was appointed to a chair — the top position in a

department — at Melbourne University at age 30. The biggest star, though, was Bob May, who was my initial supervisor before he moved to Princeton. Bob had a superlative undergraduate record at Sydney University, then did his PhD in record time, and soon was publishing significant work in various areas of theoretical physics. At age 35, he was given a personal chair, which was highly unusual at the time. Age 35 might sound old for a prodigy, but it was okay: he had been offered a chair at another university at age 29.

Without being stated, the assumption in this milieu was that some people are naturally brilliant, plus the self-centred view that brilliance in theoretical physics outshown that in other fields. For most of the rest of us, who couldn't pretend to be brilliant, it was enough just to be among those who were.

I got along fine with Bob May, but some others were put off by his seeming arrogance. He was, in one way, particularly infuriating: he thought he was very good — and he was.[6]

What people think about talent — in particular, what they think about something called natural talent — is not so often stated explicitly, but comes through occasionally in conversation. I encountered this most commonly when I worked in applied mathematics and would meet people socially. A frequent opening question is "What do you do?" When I said I was a mathematician, others would say, "Oh, you must be smart" or "I was never any good at maths." Their assumption seemed to be that being good at mathematics

6 Bob died in 2020. Look for obituaries for Lord Robert M. May.

meant you had some special capacity that most others lacked or, more grandly, that you were smarter in every way.

Once I became aware of this assumption about a connection between doing maths and being smart, I would sometimes try to counter it by noting my lack of capacity in learning foreign languages. However, this seems not to be connected so closely with assumptions about whether someone is smart.

Another domain in which assumptions about talent become apparent is in discussions about sport. People who follow sports often seem to believe that famous performers are naturally talented. There's even an expression, "He's a natural" — said most commonly about male athletes. Watching skilled athletes can indeed lead to the impression that they have something special, some skill or capacity not available to the ordinary person. The trap is that spectators see athletes at the peak of their skills but seldom see them through the daily slog of training. Also, spectators only take notice of athletes after they have become good and have no idea what they were like when starting out.

Many sports writers seem to subscribe to the natural-talent assumption. An Australian tennis player, Nick Kyrgios, is noted for his great skills and for temperamental behaviour. He sometimes plays really well against highly rated opponents, but then fails to measure up at other times. Sports writers explain this by saying he has great talent but is not using it, sometimes, because of his attitude.[7]

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7 For example: "The frustration with Nick Kyrgios is obvious — he is a bloke with more talent in his little finger than the run-of-

Occasionally I've encountered colleagues who think they are god's gift to the world. They have a grossly inflated opinion of their own brilliance, sometimes fitting the criteria for narcissistic personality disorder. The total self-belief of narcissists can be contagious, and some other colleagues buy into the belief, seeing these self-centred individuals as innately smart.

During my years at Sydney University, where I was surrounded by some impressive scientists and aware of the assumptions about natural talent, I started reading some of the current writing about schooling, in particular criticisms of schooling. This was the early 1970s, and the outpouring of radical ideas spread from one area to another. Education was no exception.

Ivan Illich's book *Deschooling Society* was published in 1971. Illich argued that schooling was hindering natural learning, and argued for learning to be organised around doing, in a supportive economic system. Illich was a critic of professional control. He also wrote about transport and health.

Illich's writings were fairly abstract, but there were others who provided more practical approaches to radical thinking about education. John Holt wrote *How Children*

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the-mill professional tennis player has in his whole body, and yet so often throws it all away with ludicrous tantrums over trivialities." Peter FitzSimons, "Time of Nick: now is Kyrgios' chance to really stick it to the man," *Sydney Morning Herald,* 24 January 2020.

Fail and then *How Children Learn.*[8] He gave detailed examples of the shortcomings of formal education and advocated support for learning tailored to individual interests.

Other critics at the time analysed the rise of schooling, seeing it not as a means of liberation but rather social control. Samuel Bowles and Herbert Gintis wrote *Schooling in Capitalist America,* a Marxist analysis of schooling as training for becoming an obedient worker. The liberatory possibilities were presented by Brazilian educator Paulo Freire, who advocated linking methods to read and write with developing a vocabulary to understand and challenge one's own oppression.

If schooling was not the answer, what was the alternative? This was provided by so-called "free schools." The most famous was Summerhill in Britain. *Summerhill* was also the title of a book about the school written by A. S. Neill. At Summerhill, students were supported to learn what they wanted when they were ready. Decision-making was carried out by a forum including both teachers and students. Summerhill thus provided practical experience in self-determination, the exercise of freedom and collective decision-making.

Summerhill, at least as presented in writing about it, showed a way to change what was called the "hidden curriculum." Most discussions about schooling are about

8 See also John Holt, *Instead of Education: Ways to Help People Do Things Better* (Harmondsworth: Penguin, 1977); John Holt, *Teach Your Own: A Hopeful Path for Education* (New York: Delacorte, 1981).

what is in the syllabus — the formal curriculum — as well as testing, student-teacher ratios, facilities and other such matters. The hidden curriculum is what students learn that isn't in the syllabus. At a conventional school, students attend classes at specified times, in classrooms. Each class addresses specific topics, such as reading or history, under the direction of a trained teacher. From this sort of arrangement, students learn — without it being explicitly taught — that learning is something that is supposed to take place in schools, that they are supposed to learn what the teacher tells them to, and that learning is a task. Quite a few students learn that studying is a burden, to be avoided when possible. As a result, few students retain the spontaneous love of learning they had before beginning school. Very few enjoy studying, so when school is out, they stop studying.

There is something else in the hidden curriculum: assumptions about talent. Giving grades on assignments and for courses sent the message that some students were smarter than others. Those with the highest grades were smart whereas those with the lowest grades were slow or dumb. Of course there were alternative explanations, for example that high grades were the result of a supportive family background, including encouragement to study. But at school, there was no discussion of factors that enabled better performance, aside from teachers saying we needed to study. No one, in class or out, described what it was like at home, what their parents did to encourage or discourage studying, what sort of conversations families had over dinner, or whether their parents had read to them when they were little.

Whereas the hidden curriculum in conventional schools fostered belief in natural talent and in the banking theory of education — Freire's expression for students being filled up with information by their teachers — free schools fostered belief in each student's multifaceted capacities that could be developed with the right sort of opportunity and support. At least this is the impression I gained reading *Summerhill* and other books about free schools.

I remember reading a book titled *The Children on the Hill.*[9] It was about an unorthodox family in which the children didn't go to school and instead were supported by their parents to pursue whatever activity they desired. The children became tremendously advanced both intellectually and emotionally. The message was that just about anyone, given specially tailored support, could become extremely talented. I knew the book may have idealised the learning process it described, and anyway a single case did not prove what was possible for others. Nevertheless, this book, and writing about free schools more generally, made me receptive to the idea that most children, with the right support, have tremendous potential, but conventional schooling, with their prescribed syllabuses and formal teaching methods, catered for only a few learning styles.

I reflected on my experiences in high school and university. I had been happy in school and an obedient student, but gradually became more resentful about having

9 Michael Deakin, *The Children on the Hill: The Story of an Extraordinary Family* (London: Quartet Books, 1973). I read it in August 1975.

to take subjects that didn't interest me. I was especially keen on mathematics and science, and enjoyed a high school physics class even though it wasn't taught very well. But I wasn't particularly interested in history or English, yet was required to take them. In my first semester at Rice University, my tutor for history — a required subject for all students at the university — was a senior academic who asked difficult questions in tutorials and made dismissive comments about any responses he didn't like. After making a couple of attempts to participate by responding to his questions, I never said anything else during the semester. Neither did most of the other students. Only two or three were intrepid enough, or sufficiently attuned to what he was trying to get us to understand, to keep responding to his questions throughout the semester. I have no doubt that our tutor was a highly knowledgeable historian and that he had many insights for us, but his teaching methods turned me off history for many years. The next semester I had a more sympathetic and supportive academic as tutor, but this was not enough to undo the damage to my interest in history.

I had similar experiences in studying anthropology, German and linguistics. I wouldn't have taken these subjects except for Rice's requirements. Anthropology, for example, was a Group B elective. As a science major, I needed such an elective. In high school, I had read quite a few books about anthropology because I enjoyed learning about it. At Rice, though, for me anthropology was an undesired imposition, and it turned me against the field.

On the other hand, I continued to enjoy physics and mathematical applications. Given my unfortunate experi-

ence with history, I could appreciate how others were repelled by mathematics.

As I read books about free schools and reflected on my own experiences in high school and university, I could imagine how different it would have been to learn without the lock-step approach imposed in schools. Somewhere I read that children who missed all their primary schooling could learn it all in six months. Even though I can't recall ever seeing a careful study backing up this claim, it made sense to me. In retrospect, much of my time in school was spent listening to things I already knew or didn't care about or was taken up in administrative processes.

Years later, I heard about the 80–20 rule: 80% of what you get done is accomplished in 20% of your time. In other words, 80% of your time is pretty unproductive. The implication, in all sorts of advice manuals, is to set a priority on doing the most important things. Applied to schooling, most of what is learned in six hours of time at school occurs in just over an hour. Applied to the first six years of schooling, you should be able to accomplish most of the learning in a year. Note that the 80–20 rule assumes you're actually working during the whole time. For many students in school who don't want to be there, the efficacy of learning is even lower.

The studies of free schooling thus made sense to me. In relation to talent, they implied that most students have enormous potential that is often squeezed out of them in schools. Note that this is not a reflection on teachers, most of whom do their best to encourage students to learn and most of whom were attracted to teaching precisely for this

reason. The problems with schooling are mainly due to its structure, not the commitment of teachers.

Over the years, I read a number of books about creativity. I'm not sure why this was interesting to me. As a scientist, it was intriguing to read about famous scientists.

One thing I remember learning about was the role of unconscious processing. In some instances, scientists would work for weeks or months on a challenging problem, unable to make a breakthrough. Then, when they were doing something else entirely — such as going for a walk — the solution would suddenly emerge in their minds. What this meant is that solving problems, even the most difficult ones, relies in part on what goes on outside of consciousness. One of the most famous examples involves the chemist Kekulé, who said he had a dream that revealed the chemical structure of benzene: the benzene ring.

I had the idea that mental processing for ordinary scientists like me was similar to that of famous scientists. In other words, mental processing was similar in all people; those who made breakthroughs on important problems had minds just like anyone else. This meant that I could rely on the same combination of conscious and unconscious processing as famous scientists. That is just what I discovered. In tackling some small challenge in my PhD, I might work away at it for days or weeks and then a solution would emerge in my mind, often when least expected. Gradually I began to expect a solution would pop into my consciousness at some point when I was not concentrating on the problem. However, this didn't always happen. Quite often, no solution ever appeared. It probably meant that I

had incorrectly formulated the question or was just going up a path with no exit.

Charles Darwin and Albert Einstein are two of the most famous scientists in history. I read that Darwin withdrew from medical school and that Einstein had some difficulties as a school student. This was encouraging. Making major scientific contributions apparently did not require always being a top student. After reading about Darwin and Einstein, I regularly mentioned their stories to students, especially ones not doing so well: it's possible to succeed in life, including science, even though you didn't do all that well in school.

In 2002, I read a book titled *Genius Explained.*[10] The author, Michael Howe, traced the careers of a number of well-known creators, including novelists Charlotte and Emily Bronte, inventor Michael Faraday and scientists Charles Darwin and Albert Einstein. Howe carefully analysed the efforts of these individuals before they produced the work by which they became famous. Each of them had spent a great deal of time developing their skills. For example, the Bronte sisters, along with a childhood friend, spent years having fun writing stories for each other. They had a long preparation period, during which they practised their writing skills, before they emerged as novelists of note.

Howe's argument was that genius is not due to genetics but due to hard work. Hard work is always necessary, though it is not guaranteed to produce works that are

10 Michael J. A. Howe, *Genius Explained* (Cambridge: Cambridge University Press, 1999).

considered those of a genius. The implication of *Genius Explained* is that people aren't born as geniuses, with special attributes, but become talented through their efforts. "Genius" is a label that others apply. In a way, the label genius is way of avoiding recognition of the crucial role of effort. The label "genius" is often used to suggest qualitative difference, a talent that is unavailable to others. *Genius Explained* challenged this view.

Howe's perspective resonated with me. I knew from my own experience learning to play the clarinet that I had no innate talent for music. Instead, I was brought up in a supportive environment for music-making and through my efforts, guided by teachers, had become a good amateur. I thought of my experience in learning about politics and social dynamics. This didn't come naturally. I had struggled with basic concepts and spent a lot of time reading and thinking. I thought about my experience writing, for example my struggles writing essays during high school and the years of effort working on my first book. To the extent I had become a fluent writer, I was sure it was due to effort and to learning from feedback from others.

Some time later, I first read about research on expert performance. The classic study involved a violin academy in Berlin, where students were already playing at a high standard. The researchers, relying on assessments by teachers at the academy, assigned each student to one of three categories: those at the highest level, who might have a chance at a solo career; those at the next level, who could expect to obtain a position in a professional orchestra; and those at a lower level, who might become violin teachers. All the students were interviewed and asked about the

amount of individual practice they had done during their lives.[11]

If there is such a thing as natural talent for playing the violin, then you might expect that some students in the top category had not practised all that much: they shouldn't need to practise, precisely because they had natural talent. But that's not what the researchers found. Instead, all the students had put enormous effort into individual practice: thousands of hours. Furthermore, the best performers, on average, had practised more than the others.

The research had limitations. It depended on students' memories about how much they had practised. The researchers had no way of evaluating the quality of each student's practice sessions, for example to determine how focused and intense the practice sessions were. Despite these limitations, the results were striking: no students became good violinists without massive amounts of practice, and the findings suggested that becoming an exceptional violinist required more practice than becoming "merely" an excellent, professional-standard violinist.

The lead researcher in the team, Anders Ericsson, went on to do many more studies. He was the lead editor of a huge edited collection of papers by researchers in the field,

11 K. Anders Ericsson, Ralf Th. Krampe and Clemens Tesch-Römer, "The role of deliberate practice in the acquisition of expert performance," *Psychological Review,* vol. 100, no. 3, 1993, pp. 363–406.

and I read quite a few of the chapters,[12] including ones on professional writing, music, chess and history. The message in each one was much the same: to acquire advanced skills in just about any field requires an enormous amount of practice, whether this is flying a plane or becoming an archaeologist. Note an important caveat: this applies to areas where there are large numbers of people trying to attain excellence and where criteria for performance are relatively objective. If you're one of the few individuals learning to play the violin while riding a unicycle, you can become one of the best in the world with much less practice.

The fields where the role of practice can be studied most easily are ones where achievement can be measured most objectively: competitive sports, chess and classical music performance are good examples. When the quality of performance is based more on subjective assessments, as in painting or management, the role of practice is less clear, in part because it's not obvious exactly what needs to be practised.

As well as reading the scholarly papers about expert performance, I also read popular treatments. There are some really good ones. They tell about the research in an engaging fashion and apply the ideas to practical domains.[13]

12 K. Anders Ericsson, Neil Charness, Paul J. Feltovich and Robert R. Hoffman (eds.), *The Cambridge Handbook of Expertise and Expert Performance* (Cambridge University Press, 2006).

13 Geoff Colvin, *Talent Is Overrated: What* Really *Separates World-class Performers from Everybody Else* (Penguin, 2010); Daniel Coyle, *The Talent Code. Greatness Isn't Born. It's Grown. Here's How.* (Bantam, 2009); David Shenk, *The Genius in All of Us: Why Everything You've Been Told about Genetics, Talent, and*

One of the important messages is that in most activities people, after acquiring basic competence, hardly ever practise their skills. A familiar example, often used by Ericsson, is learning to drive a car. Initially, it is a challenge that most learners can handle. After maybe twenty to fifty hours, a new driver is ready to pass the driving test and to handle driving in traffic. Everyone knows that there are good drivers and not-so-good drivers. What is also obvious, but hardly ever noticed, is that few drivers, after they become competent enough for their usual activities, practise their skills to become better. The exceptions are those who require advanced skills, for example racing drivers. Note also that racing drivers are competitors. They can't afford to be merely competent. If others train harder and develop better skills, being merely competent means never winning a race.

In classical music, there is a long tradition of training to become top-level performers. Undoubtedly there is a subjective element in evaluating performances, but there is much more about which expert judges can agree. That's because written music had closely defined requirements: the notes are given with their durations, emphases and speeds. Some music is extremely challenging to play, so what it takes for a good performance is apparent — at least to performers themselves.

The most well-known clarinet concerto is the one by Mozart, written in 1791. It has beautiful melodies and hence

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IQ is Wrong (Doubleday, 2010); Matthew Syed, *Bounce: The Myth of Talent and the Power of Practice* (London: Fourth Estate, 2010, 2011).

is a joy to practise and perform. Technically, it is one of the easiest concertos in the repertoire. The clarinet in Mozart's time had only a few keys, making it difficult to play technical passages.[14] Later, when more keys were added, more challenging pieces could be played. As a result, with the modern clarinet the Mozart concerto is relatively easy. It's still difficult. Years of practice are needed to become good enough to play it well. It is such a favourite with players and audiences that there are numerous recordings available. The best performers are expected to play every note perfectly and add nuances of stylistic interpretation.

A typical member of the audience will hardly notice the difference between a very good performance and an excellent one. However, experienced musicians can readily tell the difference. In orchestras, many players do their best, more to impress their fellow musicians than the audience.

With the advent of recordings, expectations of classical performers became much higher. No longer is it acceptable to make a few mistakes. A recording needs to be note-perfect. For well-known pieces, live performances, at least by professionals, are expected to be extremely good.

If the Mozart clarinet concerto is relatively easy technically — though one of the most difficult musically — then what about other concertos? Louis Spohr, a violinist

14 There's a slight complication. Mozart's clarinet concerto was written for the basset clarinet, which is a bit longer than the standard clarinet, which enables playing some additional lower notes. The concerto is more commonly played on a modern A clarinet, though performances on the basset clarinet are becoming more frequent.

and composer, was as famous as Beethoven in his time, but is now little known. He wrote four clarinet concertos that are quite difficult technically, with fast passages and some very high notes. The first Spohr concerto is the most pleasing as a piece of music, but has never become a concert standard, I think in part because it is so daunting for performers.

Although I reached quite a good level of performance as an amateur clarinettist, at times I've become aware of much greater heights. Mark Walton is an exceptional clarinettist. Originally from New Zealand, he moved to Australia and in the 1990s organised a series of clarinet camps, which would bring together clarinettists of different standards for several days of learning and music making. Beforehand, we were all sent music to practise and then at the camp we worked on pieces in sessions under the guidance of Mark or another tutor. For the most advanced group, some of the pieces were extremely difficult.

What impressed me most at the camps was finding out about aspects of playing about which I had no inkling. There were subtleties of expression and interpretation that for a beginner would be completely invisible. Just playing a single note could be subject to scrutiny, in terms of how it began and finished, as well as volume and pitch.

Players who had attended music schools, and who had regular lessons on an ongoing basis, would be familiar with many of these nuances, and would acquire advanced skills. The point is that there were skills in playing far beyond my capabilities, and which few audience members, or even players on other instruments, would have any awareness.

More than two decades later, I played in the Sydney Clarinet Choir, an ensemble of clarinettists. We rehearse every two weeks or so, usually under the guidance of Deborah de Graaff, an outstanding clarinettist. Deb would sometimes have us work on just a few bars of a piece, addressing tuning, entries, dynamics and other refinements. Once again, I was continually impressed by how much more there could be to learn.

Reading research and commentary about expert performance was illuminating and answered several puzzles. One puzzle relates to an obvious discrepancy: if no one has innate talent, then how can the obvious differences between learners be explained? In taking up any sort of learning task, such as sports, languages or mathematics, it is apparent that some individuals seem to have a natural aptitude. They advance much more quickly and soon are far ahead of their peers. Ericsson says that this difference applies to the early stages of learning, and that intelligence is often what makes the difference; motivation also plays a big role. However, as people develop higher levels of skill, other processes seem to take over, and after thousands of hours of practice, the initial differences due to aptitude for rapid learning are swamped by the effect of practice.

In support of this explanation are studies of IQ among chess players. The very best ones have, on average, IQs that aren't much different from the norm. In other words, you don't need to be a genius (in terms of IQ) to become a chess grandmaster.

There's research on the IQs of scientists who make the greatest contributions. Most of them have IQs of 120 or more, which seems to suggest that some level of natural

intelligence is needed to be a good scientist. Ericsson notes, however, that extra IQ, above 120 or so, is not correlated with scientific excellence. How can this be explained? Ericsson suggests that to be become a scientist normally requires succeeding first in school and undergraduate study, and this sort of study selects for those with somewhat better IQs: those who are quicker learners. If students who were poor at school were given the opportunity to undertake scientific research and persisted in their efforts for many years under knowledgeable mentors, perhaps they too could become top scientists. It's useful to remember that it's possible to play chess without going to school at all.

Another puzzle is what some people, after working hard at something for many years, become more highly skilled than others who work just as hard. This puzzle was accentuated by publicity about the 10,000-hour rule, which states that to become a world-class performer in any field requires at least 10,000 hours of practice. This works out to be four hours per day — roughly the most that anyone can spend on the sort of concentrated practice required — for ten years. But what about people who have practised for 10,000 hours but haven't become all that good, or at least not world class?

The first thing to say is that Ericsson and other researchers never claimed there was a "rule" involving 10,000 hours. In their pioneering study of the Berlin violin academy, the best players had practised for many thousands of hours, but there was nothing magical about the figure 10,000. The so-called rule was popularised by science writer Malcolm Gladwell in his book *Outliers.* He gave the example of the Beatles, who played many long gigs in

German nightclubs for years before they became famous. Gladwell's books are best-sellers and his account gave unprecedented attention to the importance of practice. However, unfortunately, his treatment was inaccurate in many ways.

Ericsson and co-author Robert Pool in their 2016 book *Peak* addressed Gladwell's claims. They acknowledged that Gladwell had got right the central idea that lots of practice is essential to becoming an expert performer. However, there is nothing special about 10,000 hours. Depending on circumstances, it is neither required nor sufficient. The Beatles are not a good example. They are noted for their song-writing, not for the skill of their performances, and the long hours playing in Hamburg and elsewhere were not deliberate practice in the sense specified by Ericsson.

"Deliberate practice" refers to a special sort of practice, one in which you give your full attention to addressing weaknesses in your skills under the regular guidance of a knowledgeable teacher. For a musician, it might mean focusing on a difficult technical passage, playing it slowly enough to be note-perfect, then speeding up until errors creep in, then going more slowly again to correct the mistakes. After some time on one passage, then you turn to another difficult passage, perhaps working on tone, pitch or expression. The next day, at your regular practice session, you return to the same passages, continuing to concentrate on them, always seeking to improve.

For a tennis player, deliberate practice might involve hitting the same stroke over and over, attempting to put the ball in exactly the same location. For a pilot, it might

involve using a simulator to attempt a landing, doing this over and over until it is perfected, and then moving to a different landing, or a more difficult one.

Deliberate practice requires guidance by a teacher who can identify shortcomings in performance, demonstrate what needs to be done and suggest methods of practice. Young musicians may have a weekly lesson with their teacher, who hears them play, identifies weaknesses, demonstrates proper technique and assigns music for practice during the following week. For a pilot, the simulator serves as a teacher, at least for part of the learning process.

Performing is not practice. An example is a pianist who plays cocktail music for several hours every day. The pianist may be quite skilled, but not because of these performances, which do not involve working on challenges at the limit of one's skills. When the Beatles were performing, they were not engaged in deliberate practice. Their practice would have been while they were rehearsing numbers and, more importantly, when Lennon and McCartney were working on new ones.

In his book *The First 20 Hours,* Josh Kaufman tells about how to become proficient in a field as rapidly as possible, using his own experiences as examples.[15] He did this without teachers, at least not teachers in person, but he drew heavily on guidance from sources online. One of the skills he developed rapidly was typing. He regularly used

15 Josh Kaufman, *The First 20 Hours: How to Learn Anything ... **Fast*** (New York: Penguin, 2014). In *Truth Tactics,* I'm using an approach like Kaufman's, illustrating a general approach using personal experiences.

the usual QWERTY system that is standard on typewriters but decided to learn a different system in which the letters are located in different places on the keyboard. After setting up the system, he practised diligently, gradually improving his speed. When he got to 40 words per minute, he had some other work to do, and so just *used* the new system. He discovered that in using the system, quite a lot, he didn't improve. Only after he started practising was he able to improve his typing speed. This is a good example of how practising a skill leads to improved performance, whereas just using the skill does not make it any better.

When you just start learning a skill, improvements can be rapid, as shown by Kaufman in *The First 20 Hours.* However, at more advanced levels, the rate of improvement may not be so obvious. When you're learning to swim, with guidance from a teacher, extra hours of practice can make a difference, but for advanced swimmers in training, it can be a challenge to shave just a few seconds off your time. The solution might be correcting your stroke, doing more weight training, changing your diet or getting more rest. Deliberate practice is a crucial part of improving performance but has to be supplemented by supportive measures in other aspects of your life.

If deliberate practice is so important, there's an obvious question: why do some people become better than others? The 10,000-hour rule gives the misleading impression that all you need to do to become a world-class performer is to practise for 10,000 hours. But some people who have practised for 20,000 hours are no better than others who have practised much less.

Think of tennis star Serena Williams. Is her outstanding performance due entirely to more practice, or is something else involved? Well, there are bound to be quite a few other things involved. Physique can make a difference in sport. She might have been blessed with good luck, for example to be relatively free of injuries.

Practice certainly made a difference. She and her older sister Venus were pushed strongly by their father from a young age, and Serena as the younger sibling had the benefit of his improved skills in fostering their development.

The factor that to me is usually hard to assess is the quality of practice. When talking about thousands of hours of practice, there can be an inclination to assume that every hour of practice is of equal value. I know from my experience practising the clarinet that sometimes my mind wanders: my fingers are playing the notes on the page but I'm thinking of something else. Sometimes I'm not all that motivated, so I'll play through some easy pieces rather than concentrating on difficult passages.

I don't think it's sensible to attribute all improvement to practice, taking into account amount and quality. Nor do I think all genetic influences should be discounted. My current view is that the amount and quality of practice, along with teaching and assistance, have an enormous impact on performance. The onus of proof should be on those who claim that genetics is a dominant or even a significant influence on performance of those who have acquired thousands of hours of deliberate practice.

After finding out about research on deliberate practice, I decided to write something about it. My initial effort was

titled "Expertise and equality."[16] In some action groups, members oppose traditional hierarchies in which some individuals have formal power over others. This opposition to hierarchy can sometimes become also an opposition to expertise, or at least a distrust of expertise. To the extent that "knowledge is power," then there can be reservations about those with more knowledge acquiring more power in the group.

This was the initial motivation for writing an article, but before long my thinking turned to the question, "What is expertise for?" Nearly all research on expertise assumes it serves a valuable social function. Becoming good at being a surgeon? Of course that's worthwhile. Becoming good at swimming? Hardly anyone questions that goal, though its social value is not quite so obvious. But a moment's reflection is enough to realise that one can acquire skills that are damaging and dangerous.

Skills in engineering can be used to construct more devastating weapons. However, that can be attributed to the specific application of a skill; after all, engineers also build bridges. Consider, though, skills in torture. Some torturers gain considerable experience and become very good at causing pain and humiliation. Hardly anyone would say this is beneficial to society.

After writing a draft of this article, I sent it to several people for comment. One of them was Anders Ericsson. He was very generous in offering support and critical com-

16 "Expertise and equality," *Social Anarchism,* no. 42, 2008–2009, pp. 10–20.

ment, enabling me to better understand the research and its implications.

In 2008, I read Tara Gray's short book *Publish and Flourish.* It presents a multi-step programme for becoming a more productive writer, aimed mainly at university scholars. Her programme builds on research by Robert Boice, a psychologist and educational researcher. Inspired by Tara's approach, I started using it and recommending it for my PhD students, and I initiated a writing group for academics and research students in my faculty.

The writing programme has obviously links with research on expert performance. A central aspect of the programme is writing daily. I saw a connection with sports training. No coach thinks it is sensible to train just once a week, at least not for successfully competing. Yet many academics have a "research day" once a week, and postpone writing up their findings until completing their projects or until deadlines loom.

Using the writing programme, I started writing a book eventually titled *Doing Good Things Better,* proposing a set of tactics to protect and promote good things such as happiness, health and chamber music.[17] A key chapter was on writing. I described my experience with the writing programme and related it to the set of tactics. In an appendix, I looked at the writing programme in the light of research on expert performance. In several ways, daily writing and weekly meetings with other writers are an application of the key ideas about expert performance.

17 *Doing Good Things Better* (Sparsnäs, Sweden: Irene Publishing, 2011).

Writing daily is practice in writing and, perhaps more importantly, practice in thinking. Writing is not just the exposition of preformed ideas but includes and stimulates the thinking through of ideas.

An aspect of the writing programme is recording the number of words written each day and the number of minutes it took to write them, and reporting these figures to a supervisor or mentor each week. This is a form of accountability not unlike the expectation that athletes report for training every day. At the writing group meetings, we read short selections of each other's writing and make suggestions for improvement. This addresses a requirement for practice being called deliberate, namely that it is done under the guidance of a good teacher. Although in the writing group we are not experts in each other's topics, we can provide useful feedback about the clarity and expression of the writing. Research students in the group receive expert feedback on the content of their writing from their supervisors.

When I set out to write about the writing programme and its relationship with research on expert performance, this involved me in all the facets I was writing about. I wrote the chapter in daily instalments, polished the text, checked references and obtained feedback on drafts from other members of the writing group as well as others, including Ericsson, who again was generous with his assistance.

Over the following years, on several occasions I wrote further pieces about expert performance. This deepened my understanding in several ways. Firstly, as noted, writing itself is a way of thinking: it requires articulating and clari-

fying thoughts. Secondly, doing the writing pushed me to read more research in the area and address the ideas, either by integrating them with my own or figuring out differences and shortcomings. Thirdly, I sought and obtained comments on drafts and learned a lot from this process: having others engage with my writing, in terms of both content and expression, has been a powerful learning process.

How to achieve high performance and how to understand others' high performance is important in many domains, including athletics, music and research. As I read more about expert performance and started writing about it, I raised the ideas with others. In doing this, I learned how to better express my views and to understand how others thought about the issues.

To my partial surprise, most people I talked with seemed open to the possibility that genetics has relatively little impact on the acquisition of advanced skills, whereas practice is crucially important. On the other hand, few seemed to want to take this insight on board in terms of their own careers. I told undergraduates in my classes about research on expert performance, noting that spending one or two hours per day learning about a social issue such as homelessness or torture would, within a few years, be enough to make you one of the more knowledgeable people in the country, at least for the purposes of campaigning. Yet few seemed inspired to put in this sort of effort, despite it being far less than needed to become a leading athlete or classical musician. This made me aware that although well-informed advice is available on how to achieve better performance, few people are motivated to follow it. I saw this closest to home among academics. The writing

programme is based on research on academic performance, yet academics have not rushed to take it up. Most continue with their usual ways of doing research and teaching. University administrators continue to promote improvement through incentives and penalties, paying little attention to skill development, especially skill development based on changing habits.

There have been quite a few critics of the view that expert performance is largely driven by deliberate practice. In his book *The Sports Gene,* David Epstein examines evidence about the superiority of specific groups in particular sports, for example Kenyans in long-distance running. Epstein makes the case for natural ability, with a key example being the high-jumper Donald Thomas, who stunned friends and coaches by clearing 7 feet (2.13m) apparently with no prior practice. In *Peak,* Ericsson and Pool examine this case, presenting a different interpretation. Thomas had played basketball and so had quite a bit of practice in jumping. Furthermore, he apparently had learned the Fosbury flop — a method of high-jumping — suggesting that he was not as new to the sport as others believed. Finally, Thomas didn't improve much in subsequent years; if he was a genuine newcomer to the sport, coaching and practice should have enabled him to achieve greater heights. Ericsson says he pays special attention to claims about natural athletes but has yet to find one whose outstanding performances were achieved without considerable prior practice.

Of course, Ericsson's assessments are not the end of the story. It's always valuable to keep an open mind and pay attention to new evidence. Nevertheless, my current

view is that talent — defined as the capacity for high performance — largely results from practice under the guidance of a knowledgeable teacher or peers. I think the onus should be on those who emphasise the role of genetics.

Reflections on influences

What I've learned about talent has come from various sources. Each one has characteristic features that encourage particular ways of understanding. This table and the subsequent text look at what I've already described from the point of view of sources of understanding.

Table. Influences on my understanding of talent

Influence	Contribution	Comments
Schooling	Large	In my years in primary and high school, testing and grading provided a strong implicit message about natural talent. Some teachers articulated views about some students being smarter.
Family, friends, colleagues and others	Large	Friends, and others I meet, have assumptions and views about talent, and these have shaped the way I've thought about it. Their influence was greatest before I started learning about research in the area.

Personal experience	Large	Participating in various domains — sport, music, foreign languages, board games, scientific research — gave me personal experience which I interpreted differently, depending on my current views about talent.
Scholarly publications	Large	I read many studies about expert performance, genius and skills.
My own mind	Possibly large	Perhaps I have become overly committed to certain views, especially concerning expert performance. In thinking that natural talent is not crucially important, I might be deceiving myself. It's hard to judge how this influence has operated.
Experts	Medium	In correspondence, Anders Ericsson provided useful insights.
Learning through writing	Medium	In writing articles about expert performance, I collected and evaluated information, prepared coherent arguments, and obtained helpful comments on drafts.

News media	Medium	Most media coverage I've seen is built on the assumption that talent is natural. This influenced me more before I started learning about research in the area.
Advertising	Small	There's probably an influence, but it's hard for me to judge it.
Social media	Small	
Governments, corporations and other bureaucracies	Small	Government departments are based on the bureaucratic principles of hierarchy and the division of labour. To the extent that this way of organising work is seen as natural and fair, it provides implicit support for meritocracy, in which workers are rewarded, in promotions and pay, in accordance with their merit, which may be assumed to be linked to talent. This may have influenced my understanding.
Wikipedia	None	

Schooling

In school, we were never taught anything about talent, at least not by explicit instruction. However, as noted earlier, there were strong messages conveyed via the "hidden curriculum," namely messages implicit in the way schooling is organised. We received scores on assignments and tests, and received grades for different subjects. This sent a strong message that some students were better than others. Was the message also that talent is innate, in other words that some students are inherently smarter than others? It seemed so to me. But there was more to it than just grades. In year 8, we took some aptitude tests that gave grade equivalents for different areas of performance. If you received a score of 8.0, it meant you were performing at year 8 level; a score of 5.8 meant you were performing at slightly below year 6 level, and a score of 11.5 meant you were performing at a level typical of students half way through year 11.

Grades and scores on standardised tests sent a message that some students were smarter than others, but this was only an interpretation of the results. Another interpretation would have been that students who did well had worked harder than others, or that they had an advantage due to upbringing, or were feeling better on the day of the tests. The interpretation of the results was shaped by assumptions. And these assumptions seemed widespread.

Family, friends, colleagues, peers — and news media

Among my peers, it was widely assumed that better grades meant that you were smarter. At my high school, this provided some status, though more status came from being a football player, a student politician or being part of the

trendy social scene. Teachers also assumed that some students were smarter than others.

Lots of people assume that superior performance is due to innate smartness. As noted earlier, I encountered this most often back in the days when I worked in physics and mathematics, when people would ask what I did and then, after I replied, say "I was never any good at maths." Their assumption about innate talent in mathematics was so common that it was bound to rub off on others, even though I would say, or think to myself, "No, that's just what I've worked at."

My guess is that everyday interactions with people who hold the most common assumption about talent are the most important channel by which this assumption is perpetuated. The implication is that the most influential mode of learning about talent is not instruction, personal experience or media, but routine personal interactions.

However, after I started reading and writing about expertise, some personal interactions took a different slant. I would tell colleagues and friends about what I had learned about expert performance and listen to their responses as well as their own personal stories.

The media are important, both mass media and social media, because they are avenues for conveying common assumptions. When journalists hold the usual assumptions about talent, then their stories about high performers — athletes, scientists, doctors, writers — can convey their assumptions. When people communicate through social media, their assumptions are implicit in their comments.

Scientific publications and personal experience

If everyday interactions, schooling and media commentary are all built on the same assumption, it takes some effort to reach a different understanding. For this, something different is needed. For me, it was reading about research in the field, combined with reflections on my own experience. I read about research on expert performance, reading some technical research papers and popular accounts of the research in the area. This research challenged everyday attitudes about talent that had been around me all my life. Quite possibly, research on expert performance appealed to me because it helped to make sense of some of my own experiences. Reflecting on my efforts to learn to play the clarinet and to become a better writer, I could recognise that it was my continuing efforts that were essential while natural aptitude, whatever role it played, was not crucial.

There's another side to personal experience that has been important. As I've described, I have been fortunate in having supportive parents, good teachers and a life free of debilitating trauma. This has influenced my capacity to develop skills and, indirectly, my understanding of talent. Someone with very different life experiences might well arrive at a different view about talent, but how this might play out is not easy for me to judge.

My own mind

One potent influence is confirmation bias, which involves giving preferential attention to information that supports existing beliefs and dismissing or giving excessive scrutiny to information that challenges existing beliefs. (Note that I accept findings about the importance of confirmation bias.)

It's very likely that my views about talent have been influenced by confirmation bias, but this is quite difficult to assess. Other psychological factors are bound to play a role too, for example wanting to encourage others to practise skills and wanting to appear knowledgeable.

Accepting findings from expert performance research makes geniuses seem more like ordinary people, with their accomplishments due to their opportunities and efforts rather than genetic advantage. Could being envious of people who are called geniuses play a role?

The inherent limitations of trying to understand the workings of one's own mind point to the limitations of learning about sources of information by reflecting on one's own learning. If the mind, out of conscious awareness, is influencing the way we select, process, retain, assess and express ideas, this seems to cast a great uncertainty over learning about one's own learning. Luckily, there are other people. They can point to bias, offer new perspectives and challenge entrenched viewpoints. My mind is probably tricking me, so I need to find others to help me see through the trickery.

Learning through writing

As well as reading about research on expert performance, I wrote about it. Writing is often thought of as expressing thoughts, but I had learned that writing is more than expressing: it is itself a process of thinking. I could have spent more time thinking about talent, but I did this via writing, which serves to constrain and channel thinking in a particular logical and linear fashion. Writing helped me learn.

Writing enabled a particular sort of interaction. I sent drafts of my writing to various people, inviting comments. I learned from their responses. Anders Ericsson was particularly helpful. This suggests an important connection between writing and learning from experts. By writing on this topic, I would be taken more seriously and thus be more likely to obtain comments from experts and thus learn more.

Conclusion

Reflecting on how I learned what I now understand about talent, the most important sources of insight were studying and writing about research about expert performance, discussing the research with others, and reflecting on my own experiences in the light of this research. In contrast, prevalent assumptions about talent, conveyed through schooling, peers and the media, have been misleading. This makes me wonder about some of the other things I take for granted. Am I just accepting what everyone else thinks? If I studied these areas in some depth, would I change my views? At least I know there's a way to find out and, based on my reflections on learning about talent and other topics, have a good idea where to begin the search.

5
Conclusion: learning from learning

When I started out on this project, my aim was to assess different sources of information, ranging from personal experience to news media. This seemed far too ambitious, because every source of information has so many strengths and weaknesses depending on the topic and circumstances. After years pondering this issue, I came upon a much more doable approach: telling how I had learned about several particular issues, and then reflecting on my learning to throw light on sources of information.

In this way, my quest has been narrowed from great generality to something much more specific. Nevertheless, it still has the same core: assessing different sources of information. I can attempt to do this for my own learning but I can't do it for you, dear reader. You have to do it for yourself. And that's exactly what I encourage you to do. I also have a personal reason for encouraging you to reflect on your learning: we can compare notes.

I chose to reflect on my learning about topics that I know a lot about. This doesn't mean knowing more or better than anyone else. It just means I've greatly increased my understanding compared to most people and compared to many other topics to which I've never paid much attention. I chose the effects of nuclear war, the debate over the origin of AIDS, and talent as three examples. There are

several reasons why these seemed suitable. In two cases, I changed my views considerably, which can be revealing: it can show how I decided that some sources of information were misleading, at least for me.

Each of the three topics is bounded, being sizeable but not too big. Each of the topics is big enough so that several sources of information contributed significantly. If I had chosen "what I know about the book *Peak,*" this would not have revealed very much. If I had chosen "what I know about life" or "what I know about people" it would have been harder to identify precise contributions to my understanding, though I don't know this for sure, because I haven't tried it.[1]

The topics I chose reflect my life as an activist and academic, and my orientation to certain types of knowing. You might have a different approach, for example pursuing spiritual, emotional or interpersonal truths.

For each of the three topics, I relied heavily on my memory but, to check my memory, I had some evidence, such as copies of letters and notes. If my topic had been "what I know about adding and subtracting", I would have

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1 I know a lot about whistleblowing and suppression of dissent. In two previous books — *Suppression Stories* (1997) and *Official Channels* (2020) — I described how I learned about these areas. Perhaps my decision not to use this topic for assessing truth tactics reflects my feeling that there's too much material to deal with or that I've already told about my learning. It is worth noting that compared to nuclear war, the origin-of-AIDS debate and talent, much more of my understanding about suppression of dissent comes from personal experiences and talking to others about their experiences.

few personal memories, though my parents or teachers might be able to offer insights.

When I started on this exploration, I imagined engaging with several well-known sources of information, including news media, social media, schooling and peer groups. However, as it turned out, in my three topics several of these sources did not play an obvious role. Partly that is due to timing. I only started learning about the effects of nuclear war and about the origin-of-AIDS debate when I was an adult, so schooling played no direct role. The timing also meant that my views were established well before social media and Wikipedia. If I had chosen other topics, the relative influence of different sources would have been different.

In this exploration, I've taken no account of interactions between sources of information. For example, news reports often are based on media releases from governments or corporations, and sometimes on scientific studies. Investigating the interactions between sources is another, related project. It would be fascinating. However, I've adopted the much simpler approach of thinking about the immediate influences on my understanding rather than deep-seated or ultimate influences.

For me, the biggest surprise was the influence on my understanding about a topic of writing about it. The process of writing forces me to organise my thoughts in a particular way: linear in exposition, grammatical in expression, logical in terms of argument. Trying to express my ideas in writing has been a driving force in searching for additional sources of information and obtaining feedback from others. When others read my publications, some of them contact

me, providing new information and perspectives. As I write this now, the same processes are in play. Finally, writing — including nonfiction writing — is a creative process: it inspires new ideas and ways of putting them together. Writing isn't just expressing what you think, but in many ways is the creation of thoughts.

Writing is just one way to express your explorations with learning. You might choose to produce a recording, a video or an artwork. You might choose to use an interview or a piece of fiction. I have little idea of how these would compare with nonfiction writing. You can but try them and see what insights they provide.

Another valuable way to learn about a topic is to teach it to others, including students, friends, colleagues and audiences. Their questions and difficulties can stimulate you the teacher to search for deeper knowledge and clearer expression of ideas. Teaching a topic to highly knowledgeable individuals requires even deeper engagement. In many cases, those who are nominally the students know things from which the teacher can learn.

I chose the title *Truth Tactics* because it captures two key elements of what I'm trying to do. One of them is the search for truth or, alternatively, understanding or insight. The other is the idea of tactics used in a strategic encounter with various others each trying to convince you of their preferred facts, ideas and perspectives. Most have the best of intentions, yet they can lead you astray in various ways. You need skills of discernment and engagement to operate effectively in the midst of multiple agendas and ways of thinking and being.

I also chose *Truth Tactics* because it has a nice alliteration. However, reflecting on sources of information doesn't necessarily lead to truth in any absolute sense. As I've said repeatedly, knowing a lot about a subject doesn't mean you're right. Yet, even if you're wrong, as judged by future generations with more insight, you might have good reasons for maintaining your views. Your views might be the best guess as to what's right. Alternatively, you might be part of a loyal opposition to the dominant perspective, ensuring that those who go along with orthodoxy are forced to properly justify themselves. You might be a devil's advocate, presenting ideas that push others to think more deeply and carefully about their beliefs.

Finally, it is worth asking, do you really want to know the truth? Perhaps not, because it might reveal things about your friends or society that would be deeply disturbing. Sometimes it is more comfortable to maintain illusions, indeed to defend them vehemently. If you are searching for the truth, be aware that there are many obstacles, not the least of which are in your own mind.

Appendix
Truth tactic alerts

In the following sections, I present some observations about news media, scientific papers, Wikipedia and other sources of information. An initial assessment might be that news media are unreliable and scientific articles are reliable, but this is too simple. Some news reports reveal accurate information not available elsewhere, and some scientific articles are biased or even fraudulent. It is sensible to be aware that some sources are more likely to be reliable than others, but this doesn't get you very far on its own.

The next step is to look at characteristic strengths and weaknesses of different sources. For example, news media are driven by so-called news values such as conflict and prominence, so you are more likely to hear about a dispute between leading politicians in your country than about harmonious neighbourly interactions in a distant part of the world. If you know the typical strengths and weaknesses of a source, you are better placed to learn from the strengths and be alert to the weaknesses.

Knowing that every source of information has some weaknesses implies that it's valuable to compare different sources. Rather than relying on scientific papers, you might also check with some individual scientists, especially those who disagree with what you're reading. In general, it's helpful to identify disagreements and examine both sides or, even better, multiple sides. You can also question the

assumptions underlying the way the issue is framed and debated.

Another source of information and understanding is your own personal experience, but you need to be careful. Your personal experiences might be atypical and you might be deceiving yourself. I've included discussions of the strengths and weaknesses of personal experience and of the role of lying. These are crucially important.

In writing these treatments of information sources, I've drawn on a variety of information sources, so there is a recursive process here: how do I trust what is said about a source given that it might be wrong? All I can say is that this is my best effort to summarise ideas drawn from what I've learned. When possible, I list sources so that you can check for yourself. Most of these sources are books, in part because this is where I've learned a lot and in part because some sources, like personal experience and social media, can't be easily consulted.

Most of the books listed under "Further reading" are for non-specialists. If you are an expert in a field, you'll be familiar with more technical treatments. My preference for listing books is in part due to my experience. If I can find a book by a knowledgeable author, it's an excellent introduction to a new field or new ideas. Also, it's easier to list a few books than a much larger number of articles.[1]

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1 In listing books, the academic convention is to include the publisher and the city of publication. However, given how easy it is to find information about books with an online search, I've decided to omit publishers and cities. A few book annotations are taken from my earlier publications.

If you go searching, you can find a large amount of informed commentary about algorithm biases, disinformation, fact-checking, hoaxes, information integrity, lying, misinformation, post-truth, propaganda, rumours, fake news and related topics about information. You can learn a great deal from sources in these areas, especially if you make connections with topics you know a lot about.

Writing these comments about sources of information, I eventually realised that they are simply my own perspective. There's no possible way to be definitive because what's useful for me might be useless or worse for you, and vice versa. The categories I've used — advertising, experts, news media, etc. — are just one way to think about information. The categories overlap in various ways, and quite a few things are left out, for example apprenticeships and entertainment. For your own purposes, you probably will want to categorise things differently and give different emphases.

For some of the sources, I've structured my comments under categories of awareness, valuing, understanding and endorsement. This is a holdover from my original plan to imagine that information sources are using tactics — truth tactics — to shape how you understand the world. If the sources can be thought of as using tactics, then you can use counter-tactics to serve your own interests, including to gain greater understanding.

Missing from these notes is something crucial: frameworks for understanding. You can acquire all the information you like but it's not very useful unless it's organised according to systems of meaning that you can apply for further learning and action. Many sources of information

are based on implicit frameworks, encouraging you to see the world in certain ways. However, if you've developed your own frameworks, or adopted ones especially suited for your needs, then you are better able to negotiate your way through the information that comes your way.

Part of my learning has been to check what I've written with others. I sent drafts of these treatments to quite a few individuals. Their comments have improved what I've written. Nevertheless, treat this material only as one person's map, a map that might provide ideas for undertaking your own journey.

Advertisements

Strengths
- Understandable
- Accessible
- Informative

Weaknesses
- Manipulative
- Self-serving
- Selective

Everyone is exposed to advertisements — lots of them. On commercial television, there are ads for goods and services. On Google, there are ads among the links. Ads are on billboards, T-shirts and leaflets.

The purpose of ads is straightforward: to persuade you to buy or support something, whether it is lettuce, choco-

lates, cars, politicians or tax cuts. Some ads are better called promotions. When you put information about yourself on a dating site, you are advertising yourself to others. What you post may or may not include misleading descriptions and claims.

Ads can provide useful information. They can also be manipulative and deceitful. It is in the interest of advertisers to make you trust their messages or to be influenced by them even though you don't trust them.

Consider three examples: bananas for sale at your local grocer; a new car; and a job. These usefully illustrate the techniques that advertisers can use.

Awareness (what is highlighted and what isn't)

An obvious technique is to highlight positive information and conceal other information. The banana ad gives the price, which is probably accurate, and it might say "Top quality." What it doesn't say is the price of bananas at other shops, at least not if the other bananas are cheaper. Maybe the bananas advertised really are cheaper and better, sold at a discount to attract shoppers. If so, the ad won't say, "Our bananas are good value, and once you come into our shop you'll probably want to buy other fruits and vegetables that are more expensive."

A video ad shows a car being driven on a mountain road with spectacular views, effortlessly going around corners at great speed. The car is glossy, almost glowing, with not a speck of dirt on it. The price of the car might be given at the end of the video clip or perhaps not at all. The brand name is provided.

This ad provides several types of information. It shows what the car looks like and something about its performance. It also sends a signal that the car company has enough money to produce an expensive ad. The ad doesn't show what driving the car might be like in normal conditions, stuck in traffic. It doesn't give information about failure rates, competing models, or indeed about much of anything. The main point of this sort of ad is not to convey information but to create an emotional connection. "Toyota, Oh what a feeling!"

The job ad tells about job specifications, something about the employer and gives the salary. So far so good. What the ad doesn't tell you is anything about the downside of the job, for example that the boss is a bully, there's a high turnover at the workplace or extra unpaid hours are expected.

In each of these examples, the ad provides some information but omits things you probably want to know. The ad is useful to you if you already know a lot about the topic: the usual price of bananas and the usual quality of food at the shop, the qualities and prices of cars that will suit you, and knowledge about the job, the occupation and the employer.

Many people are sceptical about ads because they are obviously self-interested and manipulative. Therefore, many ads are designed to look like something else. There are "advertising features" that look like news stories but are actually paid for by advertisers. On search engines, sponsored links may look similar to genuine links, namely the ones that no one paid for.

Many news stories are partially or totally promotional material in disguise. A company issues a media release or a promotional video, and a time-pressed journalist or editor uses the material without indicating its source.

If things are not for sale, you'll learn little about them through ads. Pharmaceutical companies promote their drugs, naturally enough. There are ads for antidepressants but no ads for exercise as a means to overcome depression. There are ads for goods that, to produce or use them, create pollution but no ads for the cleaner air and water than comes from less consumption.

Ads are part of what is called a promotional culture. Many people feel like they need to advertise themselves, often with a false image of their appearance, possessions, achievements and talents.

Valuing

Ads invariably aim to present a positive image of the featured product or service. The ad for the car makes associations with wilderness, the open road, freedom and power. The idea is that when you think of the car, specifically the make of the car, these associations give you a positive feeling.

The car ad might include an attractive woman, man or couple. They have nothing to do with the merits of the car, but they suggest an association that might stick in your mind, perhaps the wishful thought that if I have that car, I'll be like the people in the ad, or attract people like them. The less you think about the absurdity of this association, the more likely it is to be influential.

Images are important for brands. One of the most well-known is the golden arches of McDonald's. You see the arches and McDonald's would like you to think of hamburgers, fries and shakes and the pleasure of eating. Advertisers make great efforts to build brand reputations by reinforcing positives and avoiding negatives.

Tobacco companies were well known for using images to associate cigarettes with freshness, glamour and rebellion. Campaigners in the anti-smoking movement tried to counter this image-making by promoting contrary images. Australian anti-smoking campaigners using the acronym BUGAUP defaced billboards with slogans that challenged glamorous images. This was an early form of what is called culture jamming, which involves turning symbols of the dominant culture into challenging or questioning images.

Understanding

Some ads give false information. Others give misleading impressions about goods or prices. For example, in small print is the information that the model of the goods displayed is not standard or that extra charges apply.

The most important way that advertising affects understanding is by presenting products and services as desirable. This occurs, in part, by simply raising them to awareness. You might not be thinking of bananas or cars or a new job. An ad puts an idea into your mind, a particular idea rather than another one. Collectively, ads foster a culture of consumption, of seeking material possessions and purchased experiences as a means of satisfaction rather than the intrinsic satisfaction from work, relationships or service to others. Ads, in effect, reframe perceptions of the world into

buying and selling, of having and wanting. They are a crucial component of commercial culture.

Endorsements

Endorsements might be seen as attempts to gain credibility by association. "Our toothpaste is recommended by 97% of dentists." The figure of 97% is probably misleading, but the point here is that recommendations by dentists are a selling point because they are made by credible professionals. As well as endorsements by experts such as scientists, there are others by well-known people such as celebrities or sports stars who usually have no special expertise relating to the product. They promote desirability by association.

Rewards

You might receive special points for buying groceries. You might get a chance to win a car or a trip to Hollywood. More generally, though, ads make an implicit promise: buy and you'll be happy.

Most people see hundreds or thousands of ads every day. Some are overt, such as the ones that pop up on webpages and the logos on buildings, vehicles and t-shirts. Some are covert, such as product placement in films. The result of this relentless onslaught of images is that people may start to think of all activities and relationships in terms of buying and selling, of having and owning.

What is lost or marginalised in a commercial culture is attention to other values, such as family, friends and satisfaction from developing skills. Ads for these things are possible but are swamped in a commercial culture by ads for things that you buy.

In summary, ads can provide guidance for practical tasks and for making decisions but are seldom a useful way of developing deep understanding about anything. You can obtain some information, but it is likely to be one-sided in a number of ways. Consumer beware!

There is one consolation: by studying ads, examining them in depth in the context of other knowledge, you can learn about commercial culture.

Further reading

J. Scott Armstrong, *Persuasive Advertising: Evidence-based Principles* (2010). The definitive account of what research shows makes advertising persuasive.

Kalle Lasn, *Culture Jam: The Uncooling of America™* (1999). An exposé of the commercialisation of every-day life and excess consumption, and a call for revolution against commodification in the US.

Vance Packard, *The Hidden Persuaders* (1957). A classic study of how advertisers exert their influence.

Andrew Wernick, *Promotional Culture: Advertising, Ideology and Symbolic Expression* (1991). A thought-provoking analysis of how the marketing mentality has penetrated various areas of modern life.

Judith Williamson, *Decoding Advertisements: Ideology and Meaning in Advertising* (1978). An analysis of ads, mostly from magazines, delving deeply into symbolic meanings and evocation of meaning from culture.

Experts

Strengths
- Skilful
- Knowledgeable
- Credible

Weaknesses
- Serving powerful groups
- Narrow

An expert is someone who is really good at something. It can be skiing, harvesting crops, playing video games or practising medicine. To say someone is really good usually means they are far better than average. If you're an expert at playing video games, it means you're far better than most other players.

Some experts are good at *doing* things, like playing soccer. Other experts *know* things, like the rules or history of soccer. Some are good at both doing and knowing.

In some fields, expertise can be demonstrated by performance. If you can win high-level surfing competitions, this shows your skills. "Expert performance" refers to high-level performance, in any area, ranging from archery to zoology. Researchers into expert performance point to the vital importance of practice to refine skills, especially a special type of practice called "deliberate practice," in which the learner strives to master skills at the edge of their capacity under the regular guidance of an experienced teacher or mentor. Research on expert performance shows

the importance of practice and the motivation, methods and habits that sustain it.

In many fields, though, there are no clear-cut measures of expertise. For example, in medicine, there are no standard ways of showing that one general practitioner is better than another. Doctors might know which of their colleagues are really bad, but identifying the best ones — in diagnosis, treatment or communication skills — is difficult, because some patients do badly despite the best care, and vice versa.

Often, experts are judged not by performance but by surrogate measures, such as credentials. If you have a degree in electrical engineering, people might assume you're an expert. However, if you got your degree many years ago but haven't been practising as an electrical engineer, your skills in the area may have declined so your level of expertise no longer corresponds with your credentials.

It might seem that if you want to know something, consulting an expert is an ideal choice. Often that's true. However, there are some things to watch out for. Experts at doing things, like soccer or video games, may not be the best teachers. Teaching requires its own skills, which are not the same as skills in doing.

Many experts are employed by or otherwise serve the interests of powerful groups such as governments and corporations. This often means their expertise is slanted: it serves particular agendas. A biologist working for the military is likely to be knowledgeable about topics useful to the military but not to peace activists.

It's important to recognise that experts can be biased, just like anyone else. Just because you know a vast amount

about something doesn't mean your views are balanced or even sensible.

Expertise is often extremely narrow. A chess grandmaster may not be particularly good at playing poker. A famous violinist is unlikely to be any good at playing the accordion. An acclaimed historian is unlikely to be good at chemistry.

It's important to remember how narrow expertise can be, because people with credentials, achievements and awards are sometimes treated as especially knowledgeable outside their specialties. This is especially pronounced with Nobel Prize winners. If you win the physics prize, why should this make your views about science policy or the meaning of life especially insightful?

Further reading

Charles Derber, William A. Schwartz and Yale Magrass, *Power in the Highest Degree: Professionals and the Rise of a New Mandarin Order* (1990). Professionals are a new class, along with labour and capital, using knowledge as the basis for their power.

David Elliott and Ruth Elliott, *The Control of Technology* (1976). An excellent discussion of the relation of experts to systems of power.

Anders Ericsson and Robert Pool, *Peak: Secrets from the New Science of Expertise* (2016). Insights about expert performance from the top researcher in the field, accessibly provided.

Ivan Illich, *The Right to Useful Unemployment and its Professional Enemies* (1978). An attack on industrial society serviced by expert professionals.

Brian Martin (ed.), *Confronting the Experts* (1996). Case studies in challenging systems of expertise tied to establishments.

Jeff Schmidt, *Disciplined Minds: A Critical Look at Salaried Professionals and the Soul-Battering System that Shapes their Lives* (2000). A powerful critique of professions, with the chief charge being that aspiring professionals are selected and moulded to have system-reinforcing attitudes, thereby directing their creative energies to system-specified tasks.

Philip E. Tetlock and Dan Gardner, *Superforecasting: The Art and Science of Prediction* (2015). An accessible treatment of Tetlock's research showing that experts are seldom very good at making predictions.

Charles Tilly, *Why?* (2006). An elegant treatment of the sorts of reasons people, including professionals, give for things.

Michael Young, *The Rise of the Meritocracy 1870–2033: An Essay on Education and Equality* (1958). An amusing satire highlighting the link between formal education and privilege.

Family and friends

Strengths

- Personally relevant
- First person
- Vivid

Weaknesses
- Limited in scope/perspective
- Deceptive

"Family and friends" is shorthand for people who know you well. They are important sources of information. For practical purposes, they may tell you about a useful app or when you are meeting for lunch. More deeply, the way they respond to your suggestions, humour and activities may help you better understand yourself. Of course, you learn a lot about them from what they say and do.

Family members and friends gather a lot of information from many sources, for example from media stories and from other people they know. What they tell you is likely to be personally relevant. That's one of the main reasons they tell you, after all. If you like rap and yoga, they may tell you about information on these topics that they come across.

Family and friends are people you interact with. Because they trust you, they may tell you personal stories from their lives, the sorts of stories you are unlikely to hear from strangers. Many of these stories are vivid: they have the authenticity of personal experience. All of these factors make the information you receive from family and friends especially influential.

The influence of this sort of information is also a weakness. Most people have limited perspectives that are formed primarily through their relationships with the people they know and trust, often from similar backgrounds. They are unlikely to know a cross-section of the world's population.

There's also a more insidious feature of what you hear from those closest to you. People who know you and want to maintain a relationship with you may put up with your prejudices without arguing. Sometimes they will not tell you what they really think about your ideas. If you want to obtain an honest opinion about how well you sing, it's better to send a recording to an independent judge than to ask people who know you.

The strengths and weaknesses of information from those closest to you are interlinked. They know you and can tell you things no one else will — on some topics. But because they expect to continue a relationship with you, there are some things they won't tell you. The challenge is to figure out which is which.

If people you know are mistaken, then the information they provide will be inaccurate or misleading. Likewise, the information they *don't* provide might be just what you need to know.

Some of your family members and friends might be experts themselves. They might be scientists, journalists or advertising scriptwriters. If so, learn from them but also be aware of possible limitations in their perspectives.

Lying

People, including family members and friends, lie. This can be either by not revealing the truth, sometimes called lying by omission, or by telling falsehoods. Studies show that lying is quite common in everyday life. Most people lie several times every day.

Children are taught to lie by their parents and others. For example, "Tell your grandmother that you like her present." A child who blurts out unwelcome truths — "You're ugly" — will soon learn to withhold them.

Some lies are conventional. When asked how you're feeling, you may not want to tell about your headache or your distressing family argument, and so you say "Fine." When your partner asks "How do I look?" you might say "Good." These little lies enable smooth interpersonal relations. Whether or not people believe them depends on the circumstances.

Some lies are more significant. You might lie to your employer about the work you've been doing (or not doing), lie to those close to you about illicit sexual affairs, and lie about stigmatised behaviours such as gambling and drinking. You might lie to the tax office about your income.

Lies can also be for a good cause. A classic example: Nazis come to your house looking for Jews and you tell them there aren't any inside. Another example: you're a doctor for a woman who just died. You tell her grown-up children that she didn't suffer at the end.

Can you tell whether someone is lying? Most people think they can, but research shows that they are wrong: only a very few individuals can identify lies at a rate above chance. The other side of the coin is that most people are very good liars: they can convince others they are telling the truth even when they are not.

The prevalence of lying means that it is unwise to put much reliance on what other people tell you. If you don't know the person, it is always wise to check with some independent source of information. If you know the person,

then you can learn from their track record: if they always provide reliable information on a particular topic, then you have reason to trust them — at least on that particular topic. Again, this assumes you have some way of independently assessing the quality of their information.

In many circumstances, it makes sense to trust what people tell you. The more specific the information, often, the more you can trust it. Your teacher tells you about the population of the place where you live; a local resident tells you how to find a nearby street; a doctor tells you that you have a broken bone; a sign says "wet paint." In these sorts of cases, the information is probably right, and if it's wrong, it's probably due to the person being wrong, not due to lying.

When people gain some benefit from lying, then it makes sense to be especially sceptical. If you see two cars collide in a street and one of the drivers says, "It was their fault," scepticism is warranted because the driver gains a benefit from lying. Of course, it doesn't necessarily mean the driver is lying out of self-interest, just that extra care is needed in making a judgement about what happened.

Further reading

Dan Ariely, *The (Honest) Truth about Dishonesty: How We Lie to Everyone — Especially Ourselves* (2012). An eye-opening and engagingly written account of fascinating findings from experiments about honesty, many by Ariely himself.

Paul Ekman, *Telling Lies: Clues to Deceit in the Marketplace, Politics, and Marriage* (2009). An accessibly

written account of research on detecting lies from a liar's words, voice or body.

Charles V. Ford, *Lies! Lies!! Lies!!! The Psychology of Deceit* (1996). A straightforward, readable account of the psychology of lying and deceit, covering developmental issues, personality types, pathological lying, false memories, detecting deceit and the effects of deception.

David Nyberg, *The Varnished Truth: Truth Telling and Deceiving in Ordinary Life* (1993). A powerfully argued case that deception doesn't warrant the condemnation it normally receives, and instead that truth-telling and deception are tools that are, and need to be, mobilised for human benefit.

W. Peter Robinson, *Deceit, Delusion and Detection* (1996). A thorough treatment of lying from a psychological perspective, including a systematic treatment of institutional lying and the relevance of power in lying.

Aldert Vrij, *Detecting Lies and Deceit: Pitfalls and Opportunities* (2008). A comprehensive survey of methods of detecting lies, including verbal and nonverbal cues, lie detectors, behaviour analysis interviews, statement validity assessment, reality monitoring, scientific content analysis, and fMRI.

Governments, corporations and other bureaucracies

Strengths
- Informative
- Accessible
- Understandable

Weaknesses
- Secretive
- Obscure
- Self-interested

Governments and corporations are large organisations. They operate on the principle of bureaucracy, which involves a combination of hierarchy and the division of labour, so different workers do different things, and are replaceable cogs. Large hospitals, churches, trade unions and environmental groups usually operate on bureaucratic principles. So does the military.

Inside bureaucracies, information flows upwards and orders are sent downwards. If you work inside an organisation, you will have access to information that outsiders do not, for example about people's behaviour and plans being developed.

Public information provided by bureaucratic organisations has been approved via formal processes in the organisation. Public information, available to outsiders, comes in three main kinds. One is useful, practical information, which is intended to be accurate and easy to access and understand. If you go into a shopping mall, the notices about shops and facilities are likely to be clear. Other

examples are street signs, airline timetables and online weather reports. People expect such information to be as accurate as possible and will complain if it is not.

It doesn't much matter whether this information is provided by a government or a private organisation. Most of it is not threatening to anyone inside the organisation.

The second sort of public information is promotional. It might be called public relations (PR), spin, advertising, lying, disinformation or propaganda. As a general rule, promotional material involves presenting positives and hiding negatives. It includes advertisements, media releases and websites.

Websites are especially revealing as a combination of practical information and promotional material. The promotional material is most commonly in descriptions of the organisation itself, in the "about" section, giving positives only. This might be classified as advertising.

In bureaucracies there is a lot of secrecy and obscurity, especially about negatives. Anything that might be detrimental to the top people or to the organisation's official mission is likely to be hidden. This includes information about inside struggles, problems and corruption. Employees who report on problems inside an organisation are called whistleblowers. They often suffer reprisals because they have exposed, or threaten to expose, information that is normally secret or obscure.

There is also a third, curious type of information that organisational elites would prefer to remain secret but must be made public for legal or other reasons. A common technique is to make it difficult to read and understand. Examples are software agreements and product inserts for

pharmaceutical drugs. These are long, detailed and often in tiny print, so very few consumers bother to read them. Even if they do, they may not understand the implications.

Further reading

David Mitchie, *The Invisible Persuaders* (1998). An exposé of public relations in Britain, written by a spin doctor.

Tom Mueller, *Crisis of Conscience: Whistleblowing in an Age of Fraud* (2019). An engaging, informative and alarming account of US whistleblowers, who are one of the few remaining challenges to systemic corruption in the intertwined system of industry, government, regulators and courts.

Steven Poole, *Unspeak*™ (2006). A delightful analysis of political speech based on examining key words and showing the ways they are associated with particular misleading meanings. "Unspeak" is defined as a "mode of speech that persuades by stealth."

The mind

Strengths

- Attention/selectivity
- Rationality
- Memory
- Sense-making

Weaknesses

- Irrationality
- Prejudice

The mind is what people use to process sensory inputs and generate responses. Much of the mind operates without conscious awareness. Breathing, for example, occurs automatically, and usually no attention is required to ensure that you take your next breath.

One of the key functions of the mind is to select and process information originating from other sources. Because selection and processing of information are so crucial to how people live, understanding the role of the mind is at least as important as understanding the strengths and weaknesses of external sources of information.[2]

Every waking moment, the mind receives a huge number of inputs. Your skin sends signals about temperature, pressure and pain. Your ears send signals about ambient sounds. There are also internal signals, such as from digestion. Hardly any of these signals enter conscious awareness. One of the great powers of the mind is to focus attention, which means selecting from the enormous number of signals and bringing just a few to consciousness. The mind deals with many of the other signals either by ignoring them as unimportant or by monitoring them to respond in an automatic manner. For example, blood flowing through your eardrums sends signals to the brain that are usually ignored without any conscious awareness on your part.

The mind has the capacity for rational thinking, a capacity that can be improved and refined through training,

2 I refer here to the mind rather than the brain, and would prefer to avoid the longstanding debates about the relationship between them.

experience and the accumulation of memory. Rational thinking involves using logical means to process information and reach conclusions, within a set of assumptions about the way the world works. When you see Mary walk around the corner of a building and disappear from sight, you assume Mary still exists, even though you can't see her. However, a young child might imagine Mary has disappeared altogether. You are using your knowledge of the continuity of material objects in combination with your observations of Mary. You are also using your awareness of witnessing material reality rather than a simulation. If you see Mary on television, you know she's not actually there near you.

Rationality is vitally important in all sorts of contexts, for example for buying and selling products, doing accounts and investigating crimes. Often it is taken for granted, so that departures from rational thinking are especially noticeable, as in cases in which police investigators fixate on the wrong suspect.

Memory is the capacity of the mind to store and recall information, for example the product of two times two and where you lived a year ago. Memory is a powerful tool for helping make sense of information, enabling new information to be compared with what you already know. Just as important as remembering is forgetting. If you remembered everything you ever saw and heard, your mind would be burdened down with images, conversations and much else. It would be like having to search through a telephone directory (without a computer search function) every time you wanted to find a number. By forgetting what is not essen-

tial, the mind enables faster processing of what is more important.

The combination of attention, rationality and memory makes it possible to create meaning out of the otherwise bewildering sensory inputs that constantly occur. Creating meaning is crucial for humans for understanding and acting in the world, and because the mind is the interface or intermediary for nearly all sources of information, its strengths and weaknesses are especially important. Learning about how to overcome or counteract mental shortcomings can have a greater benefit than learning lots of additional information from other sources.

Despite the power of the mind to make sense of the world, there are some shortcomings in its operation. In terms of dealing with information, one of these flaws is confirmation bias. If you strongly believe something — for example in the guilt of a suspect for a crime — you are likely to pay attention to evidence supporting your belief and ignore contrary evidence. If you favour a political party, you are more likely to want to read stories supporting the party than those hostile to it. When you are confronted with evidence and arguments conflicting with your beliefs, you are likely to find flaws in them. When you come across flawed evidence and arguments supporting your beliefs, you are less likely to notice the flaws.

The mind can make mistakes in estimating probabilities, due to influences such as priming. If you watch lots of news reports about crime, you are likely to overestimate the crime rate and your likelihood of being robbed. Because airline crashes are more newsworthy than car crashes, you may falsely believe flying is more dangerous than driving.

Because terrorist attacks receive saturation media coverage, you may falsely believe these attacks kill more people than suicides or falls.

Influences from the mind, including unconscious prejudice, confirmation bias, priming and a host of others, affect every source of information. Scientific research papers may be rigorous, but if you ignore research that conflicts with your beliefs, your learning is one-sided. Your schooling might be balanced, but if you are prejudiced, what you learned at school may not counteract false beliefs.

Further reading

Dan Ariely, *The Upside of Irrationality: The Unexpected Benefits of Defying Logic at Work and at Home* (2010). People have irrational tendencies but don't understand how they affect behaviour.

Mahzarin R. Banaji and Anthony G. Greenwald, *Blindspot: Hidden Biases of Good People* (2013). An explanation of research on subtle prejudice.

Robert B. Cialdini, *Influence: How and Why People Agree to Things* (1984). A popular treatment of methods of personal influence.

Robert B. Cialdini, *Pre-suasion: A Revolutionary Way to Influence and Persuade* (2016). How attention shapes judgements, in advertising and beyond.

Stanley Cohen, *States of Denial: Knowing about Atrocities and Suffering* (2001). A superb treatment of the way people and governments respond to information about atrocities, analysing a variety of mechanisms of denial.

Jennifer L. Eberhardt, *Biased: Uncovering the Hidden Prejudice that Shapes What We See, Think, and Do*

(2019). A fabulous treatment of bias, focusing on bias against blacks in the US, combining explanations of psychological research with stories, including the author's own experiences and those of her sons.

Daniel Kahneman, *Thinking, Fast and Slow* (2011). An authoritative and comprehensive account of a wide range of biases in thinking.

Marshall McLuhan, *Understanding Media: The Extensions of Man* (1964). Media are extensions of human senses, and to some extent the nature of each medium shapes or overlays the content of the message, as highlighted in the famous saying, "The medium is the message."

Raymond S. Nickerson, "Confirmation bias: a ubiquitous phenomenon in many guises," *Review of General Psychology,* vol. 2, no. 2, 1998, pp. 175–220. A comprehensive treatment of confirmation bias, covering historical discussions, distinctions, aspects, persistence of belief and evaluation of one's beliefs.

Christian Rudder, *Dataclysm: Who We Are* *When We Think No One's Looking* (2014). Insights from information that people share about themselves online.

John Tierney and Roy F. Baumeister, *The Power of Bad: How the Negativity Effect Rules Us and How We Can Rule It* (2019). People are affected more by negatives than positives, which is a pervasive influence on thinking.

Timothy D. Wilson, *Strangers to Ourselves: Discovering the Adaptive Unconscious* (2002). A fascinating study of research showing that in addition to the conscious mind there is an "adaptive unconscious" mind that is

impossible to access from the conscious mind and which operates independently.

News

Strengths
- Informative
- Understandable
- Up to date

Weaknesses
- Lack of context
- Limited perspective
- Lack of interaction

News reports appear in newspapers (in print and online), on television, radio and social media. A typical news report is about something considered important that has happened recently.

There are high and low quality news stories. A story based on in-depth investigations is likely to be high quality. One copied from media releases provided by a government or corporation is probably low quality. Others are superficial, misleading or even knowingly false. This diversity makes it difficult to make generalisations about news coverage.

Most news reports are generated by or circulated by the mass media, for example newspapers and television. A relatively small number of editors and journalists produce reports for a much larger audience. For commercial media,

getting to a large or affluent audience is important and is dictated by economics: media sell audiences to advertisers. For government media (even in dictatorships), reaching a large audience is still seen as important, because it means conveying the government's view. So sometimes popular programmes are needed to attract audiences. For public-service broadcasters like the BBC (British Broadcasting Corporation), capturing an audience is important to justify continued funding.

Seeking a large audience leads to "news values," which are features of a story that journalists and editors believe make it worthy of being published. Important news values include prominence, impact, proximity, timeliness, conflict, and human interest. These news values provide insight into the strengths and weaknesses of news.

Then there are the goals of journalists, who write stories, and editors, who decide what is published. Journalists want to make a living but also bask in the glory of having their stories published. Most have professional pride in good work. So there is an incentive (in some circles) for high-impact stories. This helps fuel the role of the mass media in holding powerful groups to account.

Awareness (what is highlighted and what isn't)

When news stories satisfy key news values, they highlight recent activities of rich and powerful people, especially those nearest to audiences. A meeting of the leaders of China and the US is international news. Because of this focus, the activities of people who are less prominent hardly ever feature in the news: people going about their daily lives, interacting with their families, working, relaxing,

talking with friends. What is routine is, almost by definition, not newsworthy.

In contrast, a major crime is newsworthy. Major sports events, usually with elite athletes, are newsworthy. A celebrity being arrested or in an accident is newsworthy.

Things that are unusual, such as shark attacks, are more newsworthy. A major aeroplane crash can be worldwide news, unlike ten times as many people killed in auto crashes.

Valuing

News stories give more attention to people and groups that have high status or are well known, such as politicians, sports stars, multi-billionaires and familiar faces on television. Not all coverage of such individuals is favourable; some is highly critical. The key point is that these sorts of individuals are treated as important, whereas others are less important, often unnoticed.

Some groups are stigmatised in news coverage, including those labelled criminals, terrorists, enemies and cheaters. To some degree, news is the source of devaluation, for example when someone is labelled a terrorist. Even though news reports might just be quoting politicians referring to a group as terrorist, this can create a stigma.

"News" has status as representing information that is worth paying attention to. People may distrust the media but nonetheless tune in to the latest news, thus reflecting the value they give to information about current events. Information about what is happening is seen as valuable. Journalists seek answers to the questions who, what, where, why and how. Journalists, in supplying this information, are

seen as more objective than groups with agendas of their own, such as governments and corporations.

For this very reason, there is a great incentive to use the news for private agendas. This is apparent in advertising that comes in the form of news-like stories, for example videos provided to television stations by companies, designed to be broadcast and appear as news.

Journalists gain and lose credibility in various ways. When a story provides information you wanted to know, and seems reliable according to what you know, then you will probably think more highly of the journalist. On the other hand, if a story tells about someone you know about personally, and makes major mistakes, then you're likely to think less of the journalist.

Understanding

It is often said that the media do not tell people what to think, but they tell people what to think *about.* In other words, media stories influence what people think are the most important issues, a process called agenda-setting. This effect of the media is hard to avoid. People hear about the latest shooting, massacre, natural disaster, election, economic crisis or sports event, and that becomes what is thought about and talked about.

This is apparent in reader comments on online articles. The article sets the agenda for the commenters. It is difficult to set a different agenda.

All sorts of groups — governments, corporations, religious groups, charities, environmentalists — try to influence the media to cover issues from their perspective. They use media releases, public events, leaks, stunts and

other methods to obtain media coverage. Those who are powerful and famous have the least trouble attracting media attention, though not always on their own terms: the paparazzi who stalk celebrities are a reflection of news values. Marginalised groups usually have great difficulty getting media coverage, especially favourable treatment. A disruptive protest can be newsworthy, but often what is reported is the disruption, not the issues the protesters are concerned about.

The way the media interpret issues thus results from an interaction between groups seeking coverage for their own purposes and the news values used by journalists and editors to assess whether something is newsworthy.

News reports are interpretations of reality but most of them appear as authoritative statements about reality itself. Although most reports appear with a by-line, saying who the author is, the actual writing obscures authorship, giving the audience the impression that facts rather than opinions are being provided. Indeed, in newspapers there are separate places for "opinion" and "editorial" where viewpoints are expressed.

Journalists are taught to write in a particular style. For example, in a written story the most important point comes first, with each successive paragraph having declining importance, so articles can be truncated at any point without wrecking the story. The author's role is submerged. Journalists usually do not write "I saw" or "I heard." They might write "The official said" or "A source within the cabinet revealed."

In these ways, news reports give the misleading impression of objectivity about the information provided.

The subjective elements in news production — the roles of news values and journalistic style — are removed from the final product, so audiences feel more confident that they are receiving information untainted by choices and biases. In other words, audiences are given the impression that they are being informed in a balanced or neutral fashion.

One of the consequences of news values is that little attention is given to what can be called the context or the big picture. To understand how the world works, it is useful to have an interpretive framework. There are quite a few possibilities, such as evolutionary theory, neoliberalism, feminism and big-power rivalry.

Some of the most useful frameworks involve history, which is fundamentally important for understanding current affairs. Historical perspectives can help explain how and why things happen. For example, to understand wars, it can help to know something about military history, the military-industrial complex and the histories of warring groups, among other things.

News reports typically tell about the latest events, out of context and with little or no background. There is a story about a terrorist attack, with little information about the groups involved or the issues that motivate them. Almost certainly there will be no information about studies of the role of the media in enabling terrorism. Almost certainly there will be no mention of "state terrorism." Consuming the news, for years or decades, can expose you to lots of facts but without a framework for making good sense of them. Least of all do news reports encourage thinking that there are diverse ways to make sense of current affairs, and

that it can be useful to try to understand events in light of several different frameworks.

What to watch out for

• News reports set the agenda for what many people think about. Be aware that some topics important to you are not covered.
• Many groups, for example governments and corporations, try to influence media coverage. Beware that quite a bit of news coverage is advertising or propaganda in disguise.
• News reports tell about events, mostly recent ones. You need to be aware that you're probably not getting a big picture perspective.

Further reading

W. Lance Bennett, *News: The Politics of Illusion* (2016). A perceptive analysis of structural biases in US news, tracing them through politicians' manufacture of news events, journalists' standard procedures, and reasons why people follow the news.

Kristina Borjesson (ed.), *Into the Buzzsaw: Leading Journalists Expose the Myth of the Free Press* (2002). Revealing accounts of US media censorship of stories about high-level government or corporate wrong-doing. The message: important stories remain hidden.

Virgil Hawkins, *Stealth Conflicts: How the World's Worst Violence Is Ignored* (2008). An insightful analysis comparing the actual scale of violence (primarily by counting deaths) in post-Cold-War conflicts with the visibility of these conflicts, especially in the West, where most of the capacity to intervene resides.

Edward S. Herman and Noam Chomsky, *Manufacturing Consent: The Political Economy of the Mass Media* (1988). This book introduces the "propaganda model" of the mass media, with special reference to the US. The model has been criticised but nevertheless it can be valuable for thinking about how news is shaped by powerful forces.

Alex P. Schmid and Janny de Graaf, *Violence as Communication: Insurgent Terrorism and the Western News Media* (1982). Terrorism is communication activated and amplified by violence, using news media.

Eesha Williams, *Grassroots Journalism* (2000). An inspiring manual on doing locally relevant, action-generating journalism in the US, including practical how-to advice and examples of effective social action aided by journalism.

Tim Wu, *The Attention Merchants: The Epic Scramble to Get Inside Our Heads* (2016). A wonderfully engaging account of the intersection of media and commerce from the point of view of struggles to capture attention.

Personal experience

Strengths
- Directness
- Impact
- Integration into thinking

Weaknesses
- Limited in scope
- Unrepresentative
- Self-centred
- Self-interested

When your mother says, "Don't touch the dish — it's hot," you might not believe her. If you touch the dish yourself and receive a painful burn, you receive a powerful lesson. You will believe the dish actually was hot, that you shouldn't have touched it and perhaps that you should believe your mother's warnings — at least the ones about hot dishes.

Personal experience is a powerful and useful source of information. It is the most common basis for everyday activities. Your experiences tell you whether it is safe to get out of bed, walk down the street, say hello to neighbours and have something to eat. Your touch, sight, hearing and other senses are accurate for most practical purposes, and you learn from using them. Your personal experiences of drinking juice or approaching strangers are crucial in deciding whether they are safe and desirable.

Personal experience is most reliable for understanding and doing things that occur the most often. Your experience

of the daily cycle of sunlight and darkness — you have experienced it thousands of times — is far more reliable than your observations of a major traffic accident (unless you deal with lots of traffic accidents!). Your experience of talking with your best friend is much more extensive than talking with a movie star (unless your best friend is a movie star!).

Personal experience becomes less and less useful for understanding things that we only know indirectly, often by media reports. Most people hear about terrorist attacks and foreign wars but very few experience them directly. If you have never spoken to terrorists, you have no way of knowing what they are like except through what other people tell you.

If you've met one terrorist, one politician, one movie star or one person with a serious intellectual disability, you have some personal experience. However, it's risky to generalise from limited experience. Personal experience is necessarily limited in scope. One person can only experience a very small number of events compared to what billions of people experience collectively.

Personal experience is a good guide when most people respond the same way to sensory inputs. When you smell a flower and enjoy it, this is probably representative of how others smell flowers, though a minority of people can't smell anything or dislike flower aromas. When you have a headache, this gives you a sense of what others may be experiencing when they have headaches, though some people have migraines, which are much worse and harder to imagine.

Personal experience is not a good guide when people live their lives differently. Living in a mansion provides little insight into what it's like to be homeless, and vice versa. Growing up in a loving family gives little insight into what it's like to experience abusive relationships — and vice versa.

Personal experience is inevitably self-centred. It involves you, the self, observing and interacting with the world. This makes it difficult to develop a good sense of what the world is like from other people's perspectives. Even people who help others and attempt to think from others' points of view are still trapped in their own bodies and minds. This is a feature of the human condition.

As well, personal experience is often self-interested, but not inevitably. Self-interested is different from self-centred. Self-centred means seeing the world from your perspectives, whereas self-interested means seeing the world in a way that serves your interests, namely that benefits you.

Your experience includes interacting with your parents, teachers and employers. Examples of being self-interested include seeing the ways your parents treat you unfairly but not recognising the way your own behaviour affects them, and looking out after your own career at the expense of co-workers or your employers.

Further reading

Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (1966). An abstract treatment on how human knowledge is developed, transmitted and main-

tained in social situations so that a taken-for-granted reality congeals for people. This is a classic treatment in the social analysis of everyday knowledge of the social world.

Donald D. Hoffman, *The Case Against Reality: How Evolution Hid the Truth from our Eyes* (2019). Hoffman, a professor of cognitive sciences, argues that evolution selected the way we see and understand the world in terms of fitness, and this is not the same as seeing reality.

Robert Trivers, *The Folly of Fools: The Logic of Deceit and Self-Deception in Human Life* (2011). A tour-de-force treatment of self-deception from a biologist's perspective, starting with deceit among non-human animals, using evolutionary arguments and working through self-deception at a range of levels, including war, religion and social science.

Schooling

Strengths

- Accurate
- Understandable
- Age-appropriate

Weaknesses

- Hidden curriculum
- Imposed
- Nationalistic

Most children attend school and most learn many things, including reading, writing, mathematics, history, science and other skills and subjects, depending on the school. What children learn at school can depend greatly on the country, the syllabus and the teacher.

Some learning is about developing skills such as reading, that can be deployed in various ways, for example to read social media or legal documents. What about the subject matter learned? In most cases, it is standard material as laid out in textbooks. In science classes, conventional ideas about cells, falling objects and chemical reactions will be learned.

Few adults, when wanting to learn something, look it up in a school textbook. Actually, though, textbooks are usually good guides to the currently accepted viewpoints on the topics covered.

Textbooks, and school materials more generally, are chosen because they provide information that is accurate and understandable. In addition, school materials are age-appropriate: they are designed for learners at particular stages in development. For example, reading materials are easy for younger pupils, gradually becoming more difficult, with pupils assumed to improve at roughly the same rates.

School learning has several potential downsides. Some learning materials are slanted, most commonly in history and social studies. History textbooks, for example, are likely to give a country-centric perspective.

The most serious problems associated with school learning are not with the syllabus but with schooling as a system of learning. The curriculum is imposed on students, who seldom have much choice about what they are

expected to learn. The result is that, for many students, formal learning is seen as an imposition, as something to be avoided or postponed. Doing assignments is seen as an undesirable activity, often leading to a pattern of procrastination and working at the last moment.

One of the implicit lessons of schooling is that studying is something that occurs in educational systems, so when classes are over there is great joy in not having to study. Students learn to associate studying with unpleasant effort, something to be avoided unless there is compulsion, namely assignments and exams. The consequence is that when classes are over, most students stop studying.

Adults, when they want to learn something, sometimes attend classes — designed for adults. Very few adults who realise they need to improve basic skills in reading, writing, languages or mathematics would consider attending their local school. Why not? Schools are for children.

In many countries, children are compelled to attend. When school is compulsory, quite a few students would prefer not to be there. On the other hand, parents in some parts of the world require children to work to help support the family, thus preventing them from attending school.

One alternative to schooling is learning independently. Some students do this outside of school hours. Others have support from parents or others to pursue their own directions through home schooling.

A closely related alternative is apprenticeship, which involves learning under the guidance of a skilled practitioner. Young children who are schooled at home are in a sort of apprenticeship with their parents or tutors. Some children learning sports and musical instruments have

personal tutors — sometimes their parents — who provide guidance.

Most schools focus on content, on *what* children should know. If schools followed the research on expert performance (see the section on experts) and adopted deliberate practice as a model learning strategy, their focus would shift. Students might be encouraged to pick some area — which could be algebra, Mandarin or swimming — to develop their skills to a much more advanced level than normally expected. The aim would be to learn how to learn, namely to understand what it takes to become highly skilled. This capacity then could be turned to whatever area a student thinks is important in life. Schools hardly ever do this, at least not in traditional subjects.

Further reading

Benedict Carey, *How We Learn: The Surprising Truth about When, Where, and Why It Happens* (2014). An accessible guide to key practical findings from learning research.

Randall Collins, *The Credential Society: An Historical Sociology of Education and Stratification* (1979). Formal education provides part of the cultural basis for group formation for those struggling to shape their occupational positions and careers.

Ronald Dore, *The Diploma Disease: Education, Qualification and Development* (1976). An illuminating treatment of the explosion in formal education in "developing" countries.

John Holt, *Instead of Education: Ways to Help People Do Things Better* (1977). The basic problem of schools

and an outline of the alternative of just doing (rather than learning to be able to do).

Ivan Illich, *Deschooling Society* (1971). An argument that schooling is deadening and that learning should be part of life in the community.

Scientific papers[3]

Strengths

- High quality
- Reliable
- In-depth

Weaknesses

- Low understandability
- Low accessibility (in many cases)
- Funding priorities, leading to limited coverage of some topics
- Influence of dominant ideas and vested interests

Scholars undertake research, which involves investigating how the world works. This can be anything from electrons to riots, covering the physical world, nature, humans, history and much more.

Most researchers are full-time professionals working for universities, governments or industry. University researchers gain status by publishing studies that other

3 I was unsure whether to write about science or scholarship, and ended up with a mixture of language.

researchers think are important. Although a few researchers are driven purely by the quest for knowledge, nearly all seek approval and praise from their peers, who are others working in similar areas. This creates pressures to be original and to find new and exciting results, ones that will impress their peers.

The competition between researchers for status by obtaining credit for important findings is a driving force behind the dynamism of science and scholarship. Peers do not want to give credit to poor work that can easily be challenged. The competition between researchers also helps to ensure high quality: the research results have to stand up to peer scrutiny. At the same time, competition can encourage bad practice, including sloppy research, claiming credit for others' ideas, and an excess of scholarly journals and publications.

Most research findings are published in scholarly journals. Many of the most prestigious journals are owned by large publishers that seek to maximise profits by charging exorbitant fees to access articles. This means that non-scholars, without access to journal databases, do not have cheap and easy access to scientific articles. (The same applies to scholarly books.) There is an ongoing challenge to these publishers by the open access movement, which aims to make all publications free online.

Millions of scientific papers are published each year. Do they represent the truth? That isn't the question here. Instead, the question is, how do scientific papers present themselves as the truth? This includes what they present to readers and what is hidden.

Awareness (what is highlighted and what isn't)
Picking up a scientific journal, it's apparent that most articles are written in a standard style and presented in a standard format, which depend on the field and the journal. A typical paper includes an introduction to the topic addressed, a review of previous work of relevance, research methods, findings and discussion. The language is technical and formal, making it sound more objective. Outsiders who are unfamiliar with the terminology and ideas in the field may find the paper incomprehensible.

What isn't revealed in the paper is the messy process involved in getting to the polished publication. This process may involve mistakes, misconceptions, repeated attempts to obtain interesting results, retrospective formulation of hypotheses and arguments between co-authors. The paper in its published form thus misrepresents the process of doing science, making it seem more rigorous and objective than it is in practice.

In some fields, like cancer research, scientific findings are hyped, namely given exaggerated importance. This is most common in promotional materials, but can also affect scientific papers.

Valuing
Most authors of scientific papers work for universities or other research institutions. Their institutional affiliation gives greater credibility to the results, and the more prestigious the institution, the greater the credibility bestowed. A paper whose author is from MIT has more credibility than one whose author is from Idaho State — even for exactly the same paper. An author who writes from a home address,

rather than an institutional address, usually has even less status.

Authors also gain credibility by producing lots of publications, and typically some previous publications are cited. Previously unpublished authors have less status.

Scientific papers also gain credibility by the reputation of the journals in which they are published. Papers published in *Nature* or *Science* have more status than ones in little-known journals. The reputation of journals serves as a proxy measure of the importance and quality of articles published in them. This means that if the most prestigious journals do not publish articles on certain topics — for example organic farming — then those topics are devalued to some extent.

Understanding

Readers may assume that scientific findings, as presented in published papers, are objective treatments of facts and theories, and thus represent the truth. However, this can be misleading, in several ways. In a few cases, scientists alter or manufacture data, in what is called scientific fraud. These scientists mimic the scientific process while subverting it.

More common is bias, due to scientists' presuppositions about methods, theories and the nature of reality. In most fields, there are a number of dominant ideas and methods that influence how and what research is done. The dominant approaches, sometimes called paradigms, orient researchers to certain problems, making progress more possible. At the same time, dominant approaches mean that other approaches are neglected or stigmatised.

A particularly pernicious bias is due to the influence of vested interests. For example, when a company funds research into its own product — for example when a pharmaceutical company carries out research into one of its prospective drugs — then the funded scientists are much more likely to produce results favourable towards the product. Independent scientists often report less favourable results. This is called the funding effect. Scientific papers never include a statement saying, "These findings may have been influenced by the funding effect."

Some research is funded by universities. Quite a lot is funded by industry or government, and some university research is supported by research grants from industry or government. The result is research oriented to topics that serve the agendas of industry and government.

Another sort of bias is the failure to research certain topics because the findings might be unwelcome to groups with vested interests. For example, environmental activists might call for research into the effect of particular chemicals on native wildlife, but there is no funding for this research. The companies that produce the chemicals don't want to fund this research because it might hurt their profits, and government bodies won't fund it either because their managers have adopted a company-friendly perspective. An example is the failure in the US to study the health effects of Roundup, the most heavily used pesticide in the world. Reading a scientific paper, there is seldom any way to discover areas that are not being studied.

Endorsement

In most scientific journals, papers go through what is called peer review. The submitted paper is sent to one or more specialists in the research area, called referees or reviewers. They are asked to assess the paper, offering comments and making recommendations about whether the paper should be published. Standard recommendations, often offered on an online menu, are to accept the paper for publication unchanged, accept with minor revisions, "revise and resubmit" (which usually means to make major changes according to the editor's and referees' comments, and submit the revised version for a new round of peer review), or reject. The editor, on the basis of the referees' comments and their own judgement, gives the author a judgement.

Peer review is considered to provide quality control. Editors and referees weed out poor, flawed or irrelevant submissions, and provide advice on improving papers, so what is published is good quality. In the most prestigious journals, peer review is usually more rigorous: higher quality is expected of submissions and reviewers are more demanding.

Another formal process is the expectation that authors declare any conflicts of interest. A scientist who received research funding from a government or company is expected to state this in the paper.

Any experienced scientist has considerable personal experience of peer review, and as well there is an enormous amount of research about how peer review operates. In many cases it serves a valuable function. On the other hand, it is not flawless. Editors and reviewers often do not notice

flaws in submissions, for example statistical shortcomings. Some fraudulent work is published.

Editors and reviewers have biases, conscious or unconscious, so submissions that challenge conventional ideas in a field may be rejected, even though the research was carried out just as rigorously as research coming up with non-challenging findings.

Conflict-of-interest statements are warnings to readers about the possibility of bias. The problem is that stating a conflict of interest does not get rid of the bias. A declaration is not a substitute for not having a conflict of interest.

In some fields, these shortcomings are severe. Some pharmaceutical companies carry out in-house research on their own drugs, using dodgy methods to hide problems, such as using inappropriate placebos. They then recruit university scientists to be the listed authors of the paper, even though these scientists had little or no participation in the actual research. The papers are submitted to top journals, like the *New England Journal of Medicine.* When published, the companies make huge numbers of copies and use them to promote their drugs. In such cases, peer review and conflict-of-interest declarations give only an illusion of quality control.

Further reading

David J. Hess, *Undone Science: Social Movements, Mobilized Publics, and Industrial Transitions* (2016). A high-level analysis of the politics of scientific knowledge, including treatment of "undone science," which refers to research that social movements want

to be carried out but governments and industry are reluctant to fund or perform.

Sheldon Krimsky, *Conflicts of Interest in Science: How Corporate-Funded Academic Research Can Threaten Public Health* (2019). Included is treatment of what Krimsky calls the "funding effect": research, when it is not independent, is very likely to be biased.

Thomas S. Kuhn, *The Structure of Scientific Revolutions* (1970). According to Kuhn, in this classic and influential history of science, most scientists carry out their investigations using a standard set of assumptions, methods and goals, called paradigms. Research of this sort, which doesn't actively seek to question standard ideas, Kuhn called "normal science."

Nicholas Maxwell, *From Knowledge to Wisdom: A Revolution in the Aims and Methods of Science* (1984). Rather than being a search for pure knowledge, science should be explicitly oriented to solving the world's most pressing problems, such as poverty and war.

Sergio Sismondo, *Ghost-managed Medicine: Big Pharma's Invisible Hands* (Manchester: Mattering Press, 2018). How the pharmaceutical industry creates and promotes scientific findings that serve its interests.

Social media

Strengths
- Easy to use
- Low cost
- Understandable
- Up to date
- Personally relevant
- Interactive

Weaknesses
- Superficial
- Unverified
- Prone to rumours
- Addictive

Social media includes many different platforms, such as Facebook, Snapchat, YouTube and Twitter. They allow interactive communication. They can be distinguished by their capacity to enable one-to-one and one-to-many messages and by their interactive features.

Social media are designed to be easy to use. For many of them, registering and getting started takes only a few minutes. Because they are easy to use, social media are participatory: many people can join in, without restrictions due to skills or qualifications. As well, most social media are free or inexpensive. This also contributes to making them participatory.

Most users prefer to join groups that interest them, exchanging messages with like-minded others. As a result, posts are usually understandable by most readers or

viewers. There is not much extra status in posting something that others find obscure, because they will just move on to something they can understand.

Because users select their platforms, groups and topics, social media are usually personally relevant. Unlike a news broadcast that tells of political developments far away, social media users can participate in ways that are most meaningful to their own knowledge and interests.

Social media are online, so posts are normally available very quickly. Whether a birthday picture, a meeting, an announcement or a disaster, pictures and messages can be posted within seconds or minutes. This is quite different from forms of communication that require checking, such as government policy announcements or scientific papers.

Social media are interactive: they allow both sending and receiving in response to each other. This allows conversations. In some ways, social media are like face-to-face conversations, except that participants don't need to be near each other physically, and articles, pictures, videos and other media can be readily shared.

The strengths of social media are linked to its weaknesses. Because online information is provided so rapidly, there is little time for verification. Therefore, it may be inaccurate, incomplete and out of context. It can be entirely wrong.

Social media are prone to rumour-mongering. Someone can make a claim that is taken up by others and spread widely before anyone checks its accuracy.

Because it is so easy and inexpensive to use social media, much of the information on social media is superficial, for example when someone shares pictures of their

breakfast, latest outfit or holiday. Because little effort is required to post text or pictures, sometimes little thought is given to what is chosen. This may be of interest to friends and family but not more widely.

Because so many people put so much material online, important items can be missed due to information overload. You might have to search through dozens or even hundreds of tweets to find one thing of central importance. Meanwhile, there are so many interesting but less relevant items that it's easy to be distracted.

Another problem is censorship by Google, Facebook, Twitter and other platforms. Some viewpoints are removed from search results and some posts are "shadow-banned": not presented to anyone.

Social media can be addictive. Every new post you look at has the potential to be interesting, so it's tempting to check at every available opportunity.

To use social media for in-depth learning, you need to take control of your use of it. This can involve subscribing to a limited number of high-quality sources and screening out irrelevant, self-interested and noisy contributions by filtering or not subscribing to them. In this way, you may be able to create a relatively controlled flow of useful information.

Further reading

Adam Alter, *Irresistible: Why We Can't Stop Checking, Scrolling, Clicking and Watching* (2017). A highly engaging account of behavioural addictions, covering evidence for their rise (especially with smart phones), addictive tendencies, biology of addiction, the

engineering of behavioural addiction through goals, feedback, escalation, cliffhangers and social interaction, and what to do about it.

Zeynep Tufekci, *Twitter and Tear Gas: The Power and Fragility of Networked Protest* (2017). An exceedingly valuable analysis of how protest organizing has changed in the age of networks.

Wikipedia

Strengths
- Wide ranging
- Up to date
- Referenced

Weaknesses
- Uneven coverage
- Persistent bias

Wikipedia is a free online encyclopaedia. When you search for information on the Internet, it is common to come across links to Wikipedia. In many cases, Wikipedia is a convenient way to learn about a topic. The entries are in a standard format, and the presentation suggests neutrality rather than partisanship. Despite its practical value, there are some things to watch out for.

Rather than being written by topic experts, Wikipedia is open to contributions from anyone. Most of the contributors are not experts but draw on writings by experts. Over

time, a complicated set of rules has developed to control editing of entries.

You can go into Wikipedia, look at an entry, become an editor immediately and make a change. However, if your change introduces a mistake, adds profanity (you're trying to vandalise the entry), expresses an opinion without a source, or doesn't conform to Wikipedia's guidelines on neutral point of view and no original research, then your change is likely to be quickly reversed. Although anyone can edit Wikipedia, it's not so easy to make a lasting contribution.

Some entries are uncontroversial, and the main disagreements are about how accurate and relevant the information is. When topics are controversial — such as Donald Trump, abortion or Israel-Palestine — then there can be editing wars, in which partisans for particular viewpoints make change after change. Sometimes the result is a semi-balanced perspective. Sometimes, though, when partisans for one viewpoint are dominant, the result is a one-sided perspective.

Wikipedia is very useful for finding factual information and for convenient summaries of topic areas. However, it is important to remember that there can be bias, especially on controversial topics. Furthermore, on many topics, the treatment is not the most authoritative or sophisticated, nor are the references provided always the most important (as judged by experts in the field).

To understand Wikipedia's strengths and weaknesses, you need to understand the process by which entries are created and modified.

Awareness (what is highlighted and what isn't)

On the surface, most Wikipedia entries look authoritative, at least when you don't know all that much about the topic. Few readers look beyond the articles in Wikipedia to see the argy-bargy behind the scenes. It's easy to do. Just click on the tab "View history" and you can see every edit ever made on an entry. Usually there are numerous edits, often hundreds or even thousands. You can also click on the tab "Talk" and read discussions among editors. This offers an insight into disagreements, disputes and resolutions concerning what should appear.

Although it's easy to look behind the scenes of each Wikipedia entry, few readers ever do. It can be an overwhelming amount of information and hard to make sense of, so time and effort are required. Unless you already know a lot about the topic, it will be hard to judge the rights and wrongs of the changes and comments.

It is not easy to determine the knowledge and credibility of Wikipedia editors. Some edits are anonymous. Others are by identifiable individuals who maintain pages about themselves, but even so they may not reveal their real-life identity. What becomes apparent after some investigation is that few editors are experts in the topics to which they contribute. They are supposed to rely on credible sources. However, because they are not experts on topics, often they are not aware of the most authoritative sources, do not fully understand them or disagree with them.

Valuing

When topics are not controversial, everyone or nearly everyone agrees about the facts and their significance. This

is where Wikipedia is most likely to give a fair treatment. The trouble is that lots of topics are controversial. Some are bitterly debated in public forums, such as euthanasia or racism. However, many other topics can be subject to dispute. There are entries on major companies. Supporters of a company have a stake in the Wikipedia entry being positive, whereas critics — which might include employees or customers or others — want negatives to be included.

There are many struggles over Wikipedia entries that are driven by preferences or passions to show someone or something in a positive or negative light. Behind the scenes, editors battle it out.

Understanding

Wikipedia — like other encyclopedias — emphasises factual information. If you look up the entry for a film, you'll find information about when it appeared, how much money it made, a plot summary, the leading actors, the director and awards. What is usually missing is the wider context, for example concerning genre, filmmaking techniques, filmmaking as a technology, and the social and political context. You can find much on Wikipedia about these things. It's just that this sort of wider perspective is not the main emphasis. Wikipedia is better at providing facts than in providing frameworks to make sense of facts.

Endorsement

When you use a search engine, such as Google, to find information about a topic, Wikipedia entries often appear. This is a type of implicit endorsement of Wikipedia. Sometimes, when you read a book or article, you might see

a reference to Wikipedia: the author thinks Wikipedia is worth citing. Once you're on Wikipedia, there are numerous cross-references to other Wikipedia entries. This is a sort of self-referential universe, in which Wikipedia endorses itself. It's rare to find a Wikipedia citation of anything from another encyclopedia.

In schools and universities, quite a few teachers discourage the use of Wikipedia, at least for academic purposes like listing references in an essay. One reason is that Wikipedia is written by non-experts; another is that the entries are subject to change.

Further reading

Dariusz Jemielniak, *Common Knowledge? An Ethnography of Wikipedia* (2014). Jemielniak studied Wikipedia by participating in it, as an anthropologist.

Geert Lovink and Nathaniel Tkacz, eds., *Critical Point of View: A Wikipedia Reader* (2011). A variety of perspectives.

Joseph Michael Reagle, Jr., *Good Faith Collaboration: The Culture of Wikipedia* (2010). An insider's analysis of the Wikipedia community.

Joseph Reagle and Jackie Koerner, eds., *Wikipedia @ 20: Stories of an Incomplete Revolution* (2020). A variety of perspectives reflecting on Wikipedia's first twenty years.

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