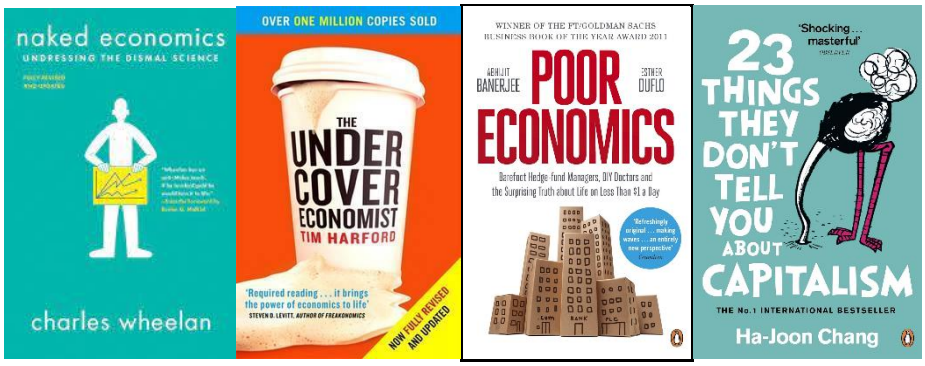
THE NATIONAL MATHEMATICS AND SCIENCE COLLEGE

Economics

SUMMER PREPARATION WORK FOR A LEVEL



Year 1 Transition Work

Introduction

We would like to welcome you to the Economics Department at NMSC.
In this booklet you will find some tasks to support you in preparation for your A level course in September.

What is Economics about?

In our lessons together, we will look at a host of questions such as:
● What is inflation – and how can a government try to combat it?
● Should the government make landlords set lower rents?
● Why are some nations rich and developed while others remain desperately poor?
● How reliable is 'GDP' as a measure of an economy's performance?
● Would taxing foreign imports help preserve jobs here in the UK... or harm them?
● In tackling the coronavirus pandemic, many governments around the globe borrowed billions of dollars… but who did they borrow it from?
● Is it true that the gap between the rich and the poor in the UK is getting bigger?

Economics is a fascinating field of study in part because it touches on so many other disciplines, such as politics, business, history, geography, and psychology. It's a great subject and I'm sure you will enjoy it.

The course

We follow the OCR H460 specification.

Preparatory Work

To help you understand the kind of things we look at in Economics, at the end of this booklet are two short pieces of mandatory reading. These are books I've abridged. They will give you a good introduction to our subject and will, in total, only take a couple of hours to read. I hope you enjoy them!

To help focus and consolidate your reading, complete the following short tasks and bring your answers with you to our first lesson together.

Tasks:

50 Things That Made The Modern Economy

Chapter one

- In your own words, what is meant by conspicuous consumption.
- Suggest your own example of a product that people might buy for the purpose of conspicuous consumption.

Chapter two

- How would you define globalisation?
- How are shipping containers central to the rise of globalisation?

Chapter three

- Why does Sony sell Play Station consoles at a price lower than the cost of production?

Chapter four

- What is a Randomised Controlled Trial (RCT)?
- Why are RCTs important to scientists and social scientists?

Chapter five

- Give two ways Selfridge revolutionised shopping.

Chapter six

- Explain how the invention of the barcode allowed supermarkets to diversify their range of stock in the 1990s.

Chapter seven

- What are 'economies of scale' and why are they important to Ikea's success?

Chapter eight

- Explain the term 'welfare state' in your own words.

Tasks:

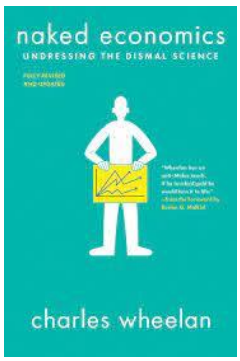
Predictably Irrational

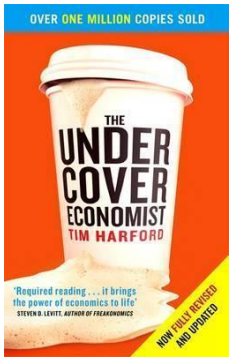
- Suggest your own example of how a supermarket might use the decoy effect.
- Using the concept of anchoring explain why Starbucks chose to sell less well-known snacks like biscotti and chose foreign words like Venti to describe its drink sizes.
- Does the price of a medicine affect people's perceptions of its effectiveness? How did Dan Ariely use behavioural experiments to investigate this?

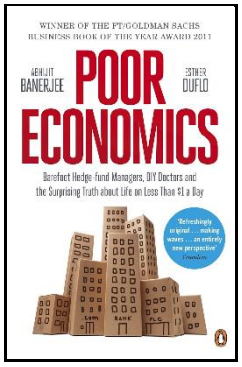
Optional Activities - if you are keen to go further

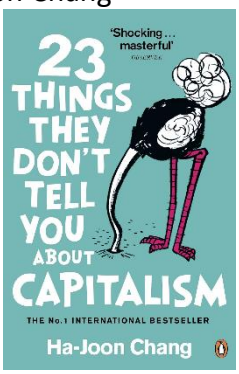
If you enjoy the mandatory reading at the end of this booklet, you might want to go further and do some more reading. If so, four good books are

- Naked Economics by Charles Wheelan
- The Undercover Economist by Tim Harford
- Poor Economics by Abhijit Banerjee & Esther Duflo
- 23 Things They Don't Tell You about Capitalism by Ha-Joon Chang









Another great way to prepare for your economics course is to keep up-to-date with the **news** - through TV, newspapers, or apps. For example, the BBC website is a great source of business and economic news. https://www.bbc.co.uk/news

BBC NEWS

We look forward to seeing you in September!

To answer the questions set earlier in this booklet, read the two abridged books that follow on the next pages.

FIFTY THINGS THAT MADE THE MODERN ECONOMY

'Every Tim Harford book is cause for celebration' MALCOLM GLADWELL

Tim Harford

AUTHOR OF *THE UNDERCOVER ECONOMIST*

How market research revolutionised advertising and shopping

In the early years of the 20th Century, US carmakers had it good. As quickly as they could manufacture cars, people bought them. But by 1914, that was changing. In higher price brackets especially, purchasers and dealerships were becoming choosier. One commentator warned that the retailer "could no longer sell what his own judgement dictated". That commentator was Charles Coolidge Parlin, widely recognised as the world's first professional market researcher and, indeed, the man who invented the very idea of **market research**. A century later, the market research profession is huge: in the United States alone, it employs about 500,000 people.

Parlin was tasked with taking the pulse of the US automobile market. He travelled tens of thousands of miles, and interviewed hundreds of car dealers. After months of work, he presented his employer with what he modestly described as "2,500 typewritten sheets, charts, maps, statistics, tables etc". You might wonder which carmaker employed Parlin to conduct this research. Was it, perhaps, Henry Ford, who at the time was busy gaining an edge on his rivals with another innovation - the assembly line?

But no: Ford didn't have a market research department to gauge what customers wanted. Perhaps that's no surprise. Henry Ford is widely supposed to have quipped that people could have a Model T in "any colour they like, as long as it's black".

In fact, no carmakers employed market researchers.

Parlin had been hired by a magazine publisher. The Curtis Publishing Company depended on advertising revenue. The company's founder thought he'd be able to sell more advertising space if advertising were perceived as more effective, and wondered if researching markets might make it possible to devise better adverts.

In 1911, he set up a new division of his company to explore this vaguely conceived idea, headed by Charles Parlin, a 39-year-old former high school principal from Wisconsin. The invention of market research marks an early step in a broader shift from a "**producer-led**" to "**consumer-led**" approach to business - from making something then trying to persuade people to buy it, to trying to find out what people might buy, and then making it.

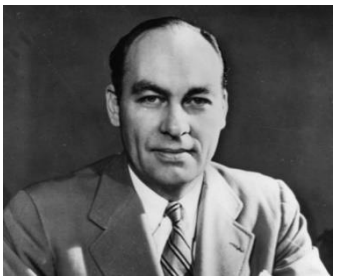
Henry Ford famously began by selling one type of car available in just one colour.

The producer-led mindset is exemplified by Henry Ford's "any colour, as long as it's black". From 1914 to 1926, only black Model Ts rolled off Ford's production line: it was simpler to assemble cars of a single colour, and black paint was cheap and durable. All that remained was to persuade customers that what they really wanted was a black Model T. (To be fair, Ford excelled at this.)

Few companies today would simply produce what's convenient, then hope to sell it. Instead they have as **consumer-centric** approach. A panoply of market research techniques helps determine what might sell: **surveys, focus groups, beta testing**. If metallic paint and go-faster stripes will sell more cars, that's what will get made.

Where Parlin led, others eventually followed. By the late 1910s, not long after Parlin's report on automobiles, companies had started setting up their own market research departments. Over the next decade, US advertising budgets almost doubled.

George Gallup pioneered opinion polls in the 1930s



Approaches to market research became more scientific. In the 1930s, George Gallup pioneered **opinion polls**. The first **focus group** was conducted in 1941 by an academic sociologist, Robert K Merton. (He later said that he wished he could have patented the idea and collected royalties.)

Adverts began to portray smoking and smokers as liberated and modern

But systematically investigating consumer preferences was only part of the story. Marketers also realised it was possible systematically to change them. Robert K Merton coined a phrase to describe the kind of successful, cool or savvy individual who routinely features in marketing campaigns: the "**role model**". The nature of advertising was changing: no longer merely providing *information*, but trying to manufacture *desire*. Sigmund Freud's nephew Edward Bernays was a pioneered in the field. In 1929, he helped the American Tobacco Company to persuade women that smoking in public was an act of female liberation. Cigarettes, he said, were "torches of freedom".

Today, attempts to discern and direct public preferences shape every corner of the economy. Any viral marketer will tell you that creating buzz remains more of an art than a science, but with ever more data available, investigations of consumer psychology can get ever more detailed.

Whereas Ford famously offered cars in a single shade of black, Google tested the effect on click-through rates of 41 slightly different shades of blue.

Should we worry about the reach and sophistication of corporate efforts to probe and manipulate our consumer psyches? The evolutionary psychologist Geoffrey Miller sees humans showing off through our consumer purchases much as peacocks impress peahens with their tails. Such ideas hark back to an economist and sociologist named **Thorstein Veblen**, who invented the concept of **conspicuous consumption** back in 1899. We use the signalling power of consumer purchases to show our wealth or sophisticated good taste. We might, say, choose a Prius if we want to publicly display our green credentials.

These signals carry meaning only because brands have spent decades consciously trying to understand and respond to consumer desires - and to shape them.

How a simple steel box transformed global trade

Perhaps the defining feature of the global economy is precisely that it is so very global. Toys from China, copper from Chile, T-shirts from Bangladesh, wine from New Zealand, coffee from Ethiopia, and tomatoes from Spain. Like it or not, **globalisation** is a fundamental feature of the modern economy.

In the early 1960s, world trade in merchandise was less than 20% of world economic output, or **gross domestic product** (GDP). Now, it is around 50% - but not everyone is happy about it. There is probably no other issue where the anxieties of ordinary people are so in conflict with the near-unanimous approval of economists, who see global trade as driving down prices worldwide to the benefit of consumers. Arguments over trade tend to frame globalisation as a policy - maybe even an ideology - fuelled by acronymic trade deals like NAFTA and TTIP. But perhaps the biggest enabler of globalisation has not been a free trade agreement, but a simple invention: the **shipping container**.

It is just a corrugated steel box, 8ft (2.4m) wide, 8ft 6in (2.6m) high, and 40ft (12m) long but its impact has been huge. Consider how a typical trade journey looked before its invention.

In 1954, an unremarkable cargo ship, the SS Warrior, carried merchandise from New York to Bremerhaven in Germany. It held just over 5,000 tonnes of cargo - including food, household goods, letters and vehicles - which were carried as 194,582 separate items in 1,156 different shipments.

Just keeping track of the consignments as they moved around the dockside warehouses was a nightmare.

But the real challenge was physically loading such ships. Longshoremen would pile the cargo onto a wooden pallet on the dock. The pallet would be hoisted in a sling and deposited in the hold. More longshoremen carted each item – boxes of soap, bags of sugar, barrels of olives - into a snug corner of the ship, poking the merchandise with steel hooks until it settled into place against the curves and bulkheads of the hold, skilfully packed so that it would not shift on the high seas.

There were cranes and forklifts but much of the merchandise, from sacks of coffee beans heavier than a man to metal bars the weight of a small car, was shifted with muscle power. This was dangerous work. In a large port, someone would be killed every few weeks. In 1950, New York averaged half a dozen serious incidents every day, and its port was safer than many.

Researchers studying the SS Warrior's trip to Bremerhaven concluded the ship had taken ten days to load and unload, as much time as it had spent crossing the Atlantic.

In today's money, the cargo cost around $420 (£335) a tonne to move. Sixty years ago, then, shipping goods internationally was costly, chancy, and immensely time-consuming.

Surely there had to be a better way?

Indeed, there was: put all the cargo into big standard boxes, and move those. That sounds easy enough. The real challenge was overcoming the social obstacles.

To begin with, the trucking companies, shipping companies, and ports could not agree on a standard size. Some wanted large containers while others wanted smaller versions; perhaps because they specialised in heavy goods or trucked on narrow mountain roads.

The sector was also tightly bound with government red tape. Then there were the powerful dockworkers' **unions**, who resisted the idea. Yes, the containers would make the job of loading ships safer - but the greater efficiency would also mean fewer jobs.

Malcom McLean understood how revolutionary containerisation could be for shipping

The man who navigated this maze of hazards, and who can fairly be described as the inventor of the modern shipping container system, was called Malcom McLean. McLean did not know anything about shipping but he was a trucking entrepreneur. As Marc Levinson explains in his book, The Box, McLean not only saw the potential of a shipping container that would fit neatly onto a flatbed truck, he also had the skills and the risk-taking attitude needed to make it happen.

First, McLean gained control of both a shipping company and then, began to refit old ships to new container specifications. He repeatedly plunged into debt.

But probably his most striking coup took place in the late 1960s, when Malcom McLean sold the idea of container shipping to perhaps the world's most powerful customer: the US Military.

Faced with an unholy logistical nightmare in trying to ship equipment to Vietnam, the military turned to McLean's container ships. Containers work much better when they are part of an integrated logistical system, and the US military was perfectly placed to implement that.

Even better, McLean realised that on the way back from Vietnam, his empty container ships could collect payloads from the world's fastest growing economy, Japan.

And so trans-Pacific trading began in earnest.

A modern shipping port would be unrecognisable to a hardworking longshoreman of the 1950s. Even a modest container ship might carry 20 times as much cargo as the SS Warrior did, yet disgorge its cargo in hours rather than days. Gigantic cranes weighing 1,000 tonnes apiece lock onto containers which themselves weigh upwards of 30 tonnes, and swing them up and over on to a waiting transporter.

The colossal ballet of engineering is choreographed by computers, which track every container as it moves through a global logistical system. The refrigerated containers are put in a hull section with power and temperature monitors. The heavier containers are placed at the bottom to keep the ship's centre of gravity low. The entire process is scheduled to keep the ship balanced.

And after the crane has released one container onto a waiting transporter, it will grasp another before swinging back over the ship, which is being simultaneously emptied and refilled.

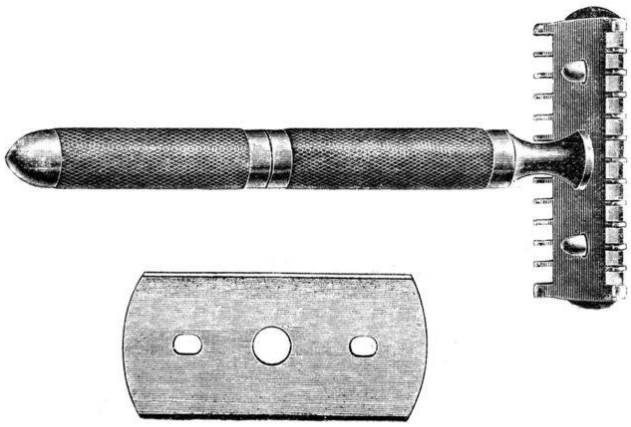
Not everywhere enjoys the benefits of the containerisation revolution. Some ports in poorer countries still look like New York in the 1950s. Sub-Saharan Africa, in particular, remains largely cut off from the world economy because of poor infrastructure.

But for an ever-growing number of destinations, goods can now be shipped reliably, swiftly and cheaply. As a result, factories no longer need to be located near to end consumers. This creates job opportunities for workers in China, but threatens the jobs of similar workers in developed countries. Governments feel the need to complete with each other to attract business investment. Meanwhile prices are driven down. Rather than the $420 (£335) that a customer would have paid to get the SS Warrior to ship a tonne of goods across the Atlantic in 1954, you might now pay less than $50 (£39).

Indeed, economists who study international trade often round down the transport costs are zero. It keeps the mathematics simpler, they say, and thanks to the shipping container, it is nearly true.

How a razor revolutionised the way we pay for stuff

The man who founded the Gillette corporation, King Camp Gillette, had some surprising philosophical ideas.

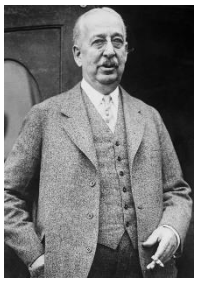


In 1894, Gillette published a book arguing that "our present system of competition" breeds "extravagance, poverty, and crime". He advocated a new system in which just one corporation - the United Company - would make all of life's necessities, as cost-effectively as possible.

His idea didn't take off.

But a year later, in 1895, King Camp Gillette had another brainwave that really did change the world. He invented the **disposable razor blade**.

It revolutionised more than shaving. Gillette's blade led to a business model that has become ubiquitous in the modern economy. That model is called **two-part pricing**.



If you have ever bought replacement cartridges for an inkjet printer, you may well have been annoyed to discover they cost almost as much as you paid for the printer itself.

That seems to make no sense.

The printer is a reasonably large and complicated piece of technology. How can it possibly add only a negligible amount to the cost of supplying a bit of ink in tiny plastic pots?

The answer, of course, is that it doesn't. But for a manufacturer, selling the printer cheaply and the ink expensively is a business model that makes sense.

After all, what's the alternative? Buy a whole new printer from a rival manufacturer? As long as that is even slightly more expensive than the new ink for your current printer, you will reluctantly pay up.

Two-part pricing is also known as the "razor and blades" model, because that's where it first drew attention - draw people in with an attractively priced razor, then repeatedly charge them for expensive replacement blades.

Before King Camp Gillette, razors were bigger, chunkier affairs - and a significant enough expense that when the blade got dull, you would sharpen - or "strop" - it, not chuck it away and buy another.

Gillette realised that if he devised a clever holder for the blade, to keep it rigid, he could make the blade much thinner - and hence much cheaper to produce.

He did not immediately hit upon the two-part pricing model, though. Initially, he made both parts expensive. Gillette's razor cost $5 (£4) - about a third of the average worker's weekly wage. The model of cheap razors and expensive blades evolved only later, as Gillette's patents expired and competitors got in on the act.

Nowadays, two-part pricing is everywhere. For example, an electricity company charges you a fixed lump sum for maintaining a connection to the grid and a unit price per kilowatt hour of electricity supplied.

The Sony PlayStation 4, which went on sale in November 2013, and surpassed 40 million sales worldwide

Consider the PlayStation 4. Every time Sony sold one, it lost money: the retail price was less than it cost to manufacture and distribute. But that is OK, because Sony makes its money whenever a PlayStation owner buys a game.

Or how about Nespresso? Nestle profits not from selling the machine, but the coffee pods.

Obviously, for this model to work you need some way to prevent customers putting cheap, generic blades in your razor.

Nespresso makes more money from selling its coffee pods than the coffee machines

One solution is legal: patent-protect your blades. But patents don't last forever. Patents on coffee pods have started expiring, so brands such as Nespresso now face competitors selling cheap, compatible alternatives.

Some are looking for another kind of solution: technological.

Just as other people's games don't work on the PlayStation, and non-branded print cartridges may not work in some printers, coffee companies have put chip readers in their machines to stop you sneakily trying to brew up a generic cup.

Two-part pricing models work by imposing what economists call "**switching costs**". Want to brew another brand's coffee? Then buy another machine.

They are especially prevalent with digital goods. If you have a huge library of games for your PlayStation, or books for your Kindle, it is a big thing to switch to another platform.

Switching costs don't have to be financial. They can come in the form of time, or hassle. If I am already familiar with Adobe's Photoshop software, I might prefer to pay for an expensive upgrade rather than buy a cheaper alternative, which I would then have to learn how to use. That is why software vendors offer free trials, and why banks and utilities offer special "teaser" rates to draw people in. When they quietly raise the price, many will not bother to change.

Switching costs can be psychological, too - a result of brand loyalty.

If Gillette's marketing department persuades me that generic blades give an inferior shave, then I will happily keep paying extra for Gillette-branded blades. That may explain the otherwise curious fact that Gillette's profits remained high after his patents expired and competitors could make compatible blades.

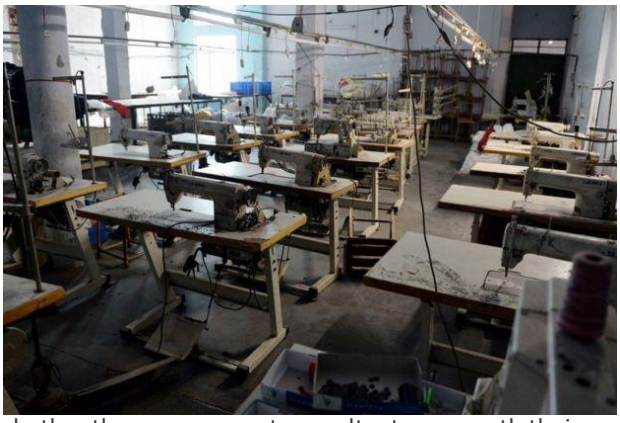
Economists have puzzled over why consumers stand for two-part pricing. The most plausible explanation is that they get confused. Either they don't realise the extent to which they will be exploited later, or they find it hard to think ahead and pick out the genuine best deal.

The irony is that the razors-and-blades model - charging customers a premium for basics such as ink and coffee - is about as far as you can get from King Camp Gillette's vision of a single United Company producing life's necessities as cheaply as possible.

Evidently, it's easier to inspire a new model for business than a new model for society.

How can we tell if management consultants are worth their fees?

The place: a textile plant near Mumbai, India. The time: 2008. The scene? Chaos.



Rubbish is piled up outside the building - with almost as much inside. There are piles of flammable junk, and open chemical containers. The yarn is at least bundled up in white plastic bags, but the inventory is scattered around the plant in unmarked piles. Such shambolic conditions are typical in the Indian textile industry, and that presents an opportunity.

A team of researchers from Stanford University and the World Bank is conducting a novel experiment. They're going to send in a team of management consultants to tidy up some of these companies - but not others.

Then they'll track what happens to their profits as part of a **rigorous, randomised controlled trial**.[1] It will tell us whether the management consultants are worth their fees.

What should we make of the people who tell managers how to manage? Picture a management consultant. What comes to mind? A young, sharp-suited graduate, earnestly gesturing to a bulleted PowerPoint presentation full of jargon and meaningless buzzword. The industry battles a stereotype of charging exorbitant fees for advice that, on close inspection, turns out to be either meaningless or common sense.

Managers who bring in consultants are often accused of being blinded by jargon, implicitly admitting their own incompetence, or seeking someone else to blame for unpopular decisions.

Still, it's big business. The year after Stanford and the World Bank started their Indian study, the UK government alone spent well over $2bn (£1.5bn) on management consultants. Globally, consulting firms charge their clients a total of about $125bn (£94bn).

Where did this strange industry begin?

In the late 19th century the US economy was expanding fast, and thanks to the railway and telegraph it was also becoming more of a single national market and a myriad of local ones. Company owners began to realise that there were huge rewards to be had for companies that could bestride this new national stage. So, began an unprecedented wave of **mergers** and consolidations.

Heinz, which dates back to 1869, grew substantially at the beginning of the 20th century

Companies swallowed each other up, creating giant household names: US Steel, General Electric, Heinz, AT&T. Some employed more than 100,000 people. And that was the challenge: nobody had ever tried to manage such vast organisations before.

Enter a young **professor of accountancy** by the name of James McKinsey. His breakthrough was a book published in 1922, with the not-entirely-thrilling title Budgetary Control. But for corporate America, Budgetary Control was revolutionary. Rather than using traditional historical accounts simply to provide a picture of how a business had been doing over the past year, McKinsey proposed drawing up accounts for an imaginary corporate future. These future accounts would set out a business's plans and goals, broken down department by department. And later, when the actual accounts were drawn up they could be compared to the plan, which could then be revised. McKinsey's method helped managers take control, setting out a vision for the future rather than simply reviewing the past.

James McKinsey saw the potential of setting out a corporate vision of the future

[1] RCTs are commonly used in the sciences, for example to test the effectiveness of a new medical treatment.

McKinsey was a big character - tall, and fond of chomping cigars, ignoring his doctor's advice. His ideas caught on with remarkable speed: by the mid-1930s he was hiring himself out at $500 (£380) a day - about $25,000 (£19,000) in today's money.

Aged just 48, James McKinsey died of pneumonia. But under his lieutenant, Marvin Bower, McKinsey & Company thrived. Bower was a particular man. He insisted that employees wore a dark suit, a starched white shirt, and, until the 1960s, a hat.

McKinsey & Co, he said, was not a business but a "practice". It didn't take on jobs, but "engagements". It was not a company, but a "firm". Eventually it simply became known as "The Firm".

Duff McDonald wrote a history of The Firm, arguing that its advocacy of scientific approaches to management transformed the business world.

It acquired a reputation as perhaps the world's most elite employer. The New Yorker once described McKinsey's young Ivy League hires parachuting into companies around the world as a "Swat team of business philosopher-kings".

But hold on. Why don't company owners simply employ managers who've studied those scientific approaches themselves? There aren't many situations where you'd hire someone to do a job, and also hire expensive consultants to advise them how to do it.

What explains why companies like McKinsey gained such a foothold in the economy?

Part of the explanation is surprising: government regulation. The **Glass-Steagall act** of 1933 was a far-reaching piece of American financial legislation.

The Glass-Steagall act - signed by Franklin Roosevelt in June 1933 - was meant to limit conflicts of interest

Among many provisions, Glass-Steagall made it compulsory for investment banks to commission independent financial research into the deals they were brokering. Fearing conflicts of interest, Glass-Steagall forbade law firms, accountancy businesses and the banks themselves from conducting this work. Effectively, the act made it a legal requirement for banks to hire management consultants.

Here's another argument for employing management consultants: ideas on management evolve all the time, so maybe it's worth getting outsiders in periodically for a burst of fresh thinking.

But often it doesn't work like that: the consultants continually find new problems to justify their continued employment. Some use the analogy of leeches, attaching themselves and never letting go. One UK government ministry recently admitted that 80% of its supposedly temporary consultants had been working there for more than a year - some for up to nine years.

Needless to say, it would have been much cheaper to employ them as civil servants.

No doubt the consultancy firms will claim that their expertise is giving the taxpayer value for money. Which brings us back to India, and that randomised controlled trial.

The World Bank hired a global consulting firm to put some structure into these jumbled Mumbai textile factories, instituting preventive maintenance, proper records, systematic storing of spares and inventory, and the recording of quality defects (so that the most common causes could be identified them eliminated).

It worked. Productivity jumped by 17% - easily enough to pay the consulting fees.

We shouldn't conclude from this study that cynicism about management consulting is always misplaced.

These factories were, after all, ripe with obvious problems that were easy pickings for an outsider to spot - what a jargon-filled PowerPoint presentation might call "low-hanging fruit".

But it's scientific proof of one thing, at least. As so often in life, when an idea is used in the right context, it can pay dividends.

How department stores changed the way we shop

"No, I'm just looking." Words most of us have said when approached politely by a sales assistant while browsing in a shop. Most of us will not have then experienced the sales assistant snarling: "Then 'op it, mate!"

Hearing those words in a London shop made quite an impression on Harry Gordon Selfridge. The year was 1888, and the flamboyant American was touring the great department stores of Europe - in Vienna, Berlin, the famous Bon Marche in Paris and then Manchester and London - to see what tips he could pick up for his then-employer, Chicago's Marshall Field. Field famously popularised the phrase "the customer is always right". Evidently, not yet the case in England.

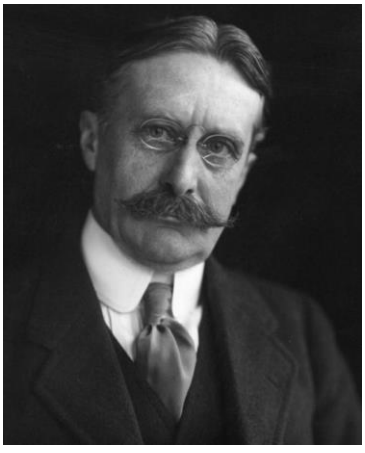
Two decades later, Selfridge was back in London, opening his eponymous department store on Oxford Street - now a global destination for retail, then an unfashionable backwater, but handily near a station on a newly opened Tube line.

Selfridges - pictured on its opening day, 15 March 1909 - became renowned for sumptuous window displays

Selfridges caused a sensation, partly due to its sheer size: the retail space covered six acres (24,000 sq. m). Selfridge also installed the largest glass windows in the world - and created, behind them, the most sumptuous shop displays. But more than scale, what set Selfridges apart was attitude.

Selfridge introduced a whole new shopping experience. "Just looking" was positively encouraged.

As he had in Chicago, Selfridge swept away the previous custom of stashing merchandise behind locked glass doors in cabinets, or high up on unreachable shelves. Instead, he laid out the open aisle displays we now take for granted, where you can touch a product, pick it up, and inspect it from all angles, without a salesperson hovering by your side. In the full-page newspaper adverts he took out when his store opened, Selfridge compared the "pleasures of shopping" to those of "sightseeing".



Harry Gordon Selfridge revolutionised the shopping experience

Shopping had long been bound up with social display. The old arcades of the great European cities were places for the upper classes. Selfridge had no truck with snobbery or exclusivity. His adverts pointedly welcomed the "whole British public": "No cards of admission are required." In his Chicago store, he had appealed to the working classes by dreaming up the concept of the "bargain basement".

Selfridge did perhaps more than anyone to invent shopping as we know it. But the ideas were in the air.

Another trailblazer was an Irish immigrant named Alexander Turney Stewart. Stewart introduced New Yorkers to the shocking concept of not hassling customers the moment they walked through the door, a novel policy he called "free entrance".

The great department stores became cathedrals of commerce. At Stewart's "Marble Palace", the shopkeeper boasted: "You may gaze upon a million dollars' worth of goods, and no man will interrupt either your meditation or your admiration."

They took shopping to another level, sometimes literally. Corvin's in Budapest installed a lift that became such an attraction in its own right that they began to charge for using it. In London, Harrods's moving staircase carried 4,000 people an hour.

In such shops, one could buy anything from cradles to gravestones.

Golf champion John Henry Taylor instructing customers at Harrods in 1914

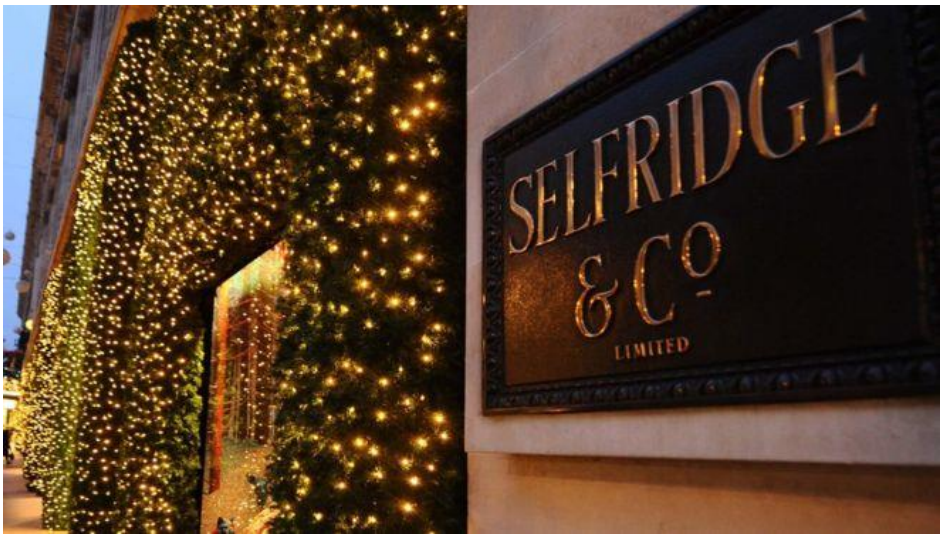
Harrods offered a full funeral service. There were picture galleries, smoking rooms, tea rooms, concerts. The shop displays bled out into the street, as entrepreneurs built covered galleries around their stores.

And it may be no coincidence that they did it at a time when women were gaining in social and economic power. Harry Gordon Selfridge saw that female customers offered profitable opportunities that other retailers were bungling. Selfridge certainly saw himself as a social reformer. He once explained why, at his Chicago store, he'd introduced a creche. "I came along just at the time when women wanted to step out on their own," he said.

One quietly revolutionary move was that Selfridges featured a ladies' lavatory, a facility London's shopkeepers had hitherto neglected to provide. He saw - as other men apparently had not - that women might want to stay in town all day, without having to use an insalubrious public convenience or retreat to a respectable hotel for tea whenever they wanted to relieve themselves.

Selfridges was designed to be as attractive as possible to women

Selfridge's biographer Lindy Woodhead even thinks he "could justifiably claim to have helped emancipate women". That's a big claim for a shopkeeper, but social progress can sometimes come from unexpected directions.



How the barcode changed retailing and manufacturing

In June 1974 at the checkout counter of Marsh's Supermarket in the town of Troy, Ohio, a 31-year-old checkout assistant named Sharon Buchanan scanned a 10-pack of 50 sticks of Wrigley's juicy fruit chewing gum across a laser scanner, automatically registering the price of $0.67 (£0.55). The gum was sold. The barcode had been born.

We tend to think of the barcode as a simple piece of cost-cutting technology: it helps supermarkets do their business more efficiently, and so it helps us to enjoy lower prices.

But the barcode does more than that. It changes the balance of power in the grocery industry.

Barcode technology required a significant investment for smaller retailers

Part of the difficulty was getting everyone to move forward on a system that did not really work without a critical mass of adopters.

It was expensive to install scanners. It was expensive to redesign packaging with barcodes - bear in mind the Miller Brewing Company was still printing labels for its bottles on a 1908 printing press.

The retailers did not want to install scanners until the manufacturers had put barcodes on their products. The manufacturers did not want to put barcodes on their products until the retailers had installed enough scanners.

But it also became apparent over time that the barcode was changing the tilt of the playing field in favour of a certain kind of retailer. For a small, family-run convenience store, selling only a limited range of products, the barcode scanner was an expensive solution to problems they did not really have.

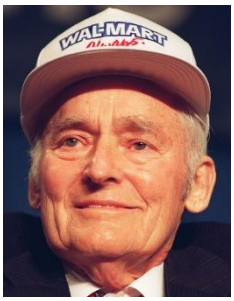
But big supermarkets could spread the cost of the scanners across many more sales. They valued shorter lines at the checkout. They needed to keep track of their huge inventory.

Also, with a manual checkout, a shop assistant might charge a customer for a product, then slip the cash into a pocket without registering the sale. With a barcode and scanner system, such behaviour would become conspicuous.

Prior to the barcode, each supermarket product had its price on a sticky label attached to the item itself. This was necessary because the cashier had to register each price by hand on the manual till. Changing prices was therefore a slow and laborious process. In the 1970s, a time of high **inflation** in America, barcodes let supermarkets change the price of products by simply sticking a new price tag on the shelf rather than on each item.

It is hardly surprising that as the barcode spread in the 1970s and 1980s, large retailers also expanded. The scanner data underpinned customer databases and loyalty cards, enabling supermarkets to learn more about customers' buying patterns and to target their market more precisely.

By tracking and automating inventory, it made **just-in-time deliveries** more attractive, and lowered the cost of having a very wide variety of products. Shops in general - and supermarkets in particular - started to generalise, selling flowers, clothes, and electronic products.



Wal-Mart founder Sam Walton was able to exploit the possibilities barcodes offered

Running a huge, diversified, logistically complex operation was all so much easier in the world of the barcode.

Perhaps the ultimate expression of that fact came in 1988 when the discount department store Wal-Mart decided to start selling food.

It is now the largest grocery chain in America - and by far the largest general retailer on the planet, about as large as its five closest rivals combined. Wal-Mart was an early adopter of the barcode and has continued to invest in cutting-edge computer-driven logistics and inventory management.

The company is now a major gateway between Chinese manufacturers and American consumers. Its embrace of technology helped it grow to a vast scale, meaning it can send buyers to China and commission cheap products in bulk.

From a Chinese manufacturer's perspective, you can justify setting up an entire production line for just one customer - as long as that customer is Wal-Mart.

Geeks rightly celebrate the moment of technical inspiration that led to the barcode.

But it is not just a way to do business more efficiently. It also changes what kind of business can be efficient.

The barcode is now such a symbol of the forces of impersonal global capitalism that it has spawned its own ironic protest. Since the 1980s, people have been registering their opposition to "The Man" by getting themselves tattooed with a barcode.

That countercultural fashion statement recognises something important.

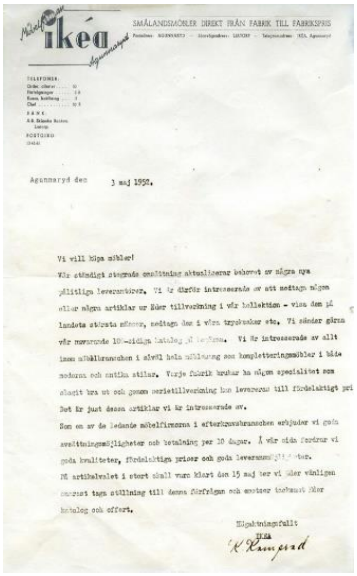
Yes, those distinctive black and white stripes are a neat little piece of engineering. But that neat little piece of engineering has changed how the world economy fits together.

How Ikea's Billy bookcase took over the world

The Billy bookcase is perhaps the archetypal Ikea product. It was dreamed up in 1978 by an Ikea designer called Gillis Lundgren who sketched it on the back of a napkin, worried that he would forget it. Now there are 60-odd million in the world, nearly one for every 100 people - not bad for a humble bookcase.

In fact, so ubiquitous are they, Bloomberg - the business and finance media company - uses them to compare 'purchasing power' of currency across the world. According to **the Bloomberg Billy Bookcase Index** - yes, that's a thing - they cost most in Egypt, just over $100 (£79), whereas in Slovakia you can get them for less than $40 (£31).

Every three seconds, another Billy bookcase rolls off the production line of the Gyllensvaans Mobler factory in Kattilstorp, a tiny village in southern Sweden. Framed on the wall in the factory's reception is a typewritten letter - the company's very first furniture-making order from Ikea in 1952. The factory's couple of hundred employees tend machines, imported from Germany and Japan, which work constantly, to cut, glue, drill and pack the various component parts of the Billy bookcase.



Ikea

SMÅLANDSMÖBLER DIREKT FRÅN FABRIK TILL FÄRDSPRIS

Agunnaryd den 3 maj 1952.

Vi vill köpa möbler!

In goes particle board by the lorry load, 600 tonnes a day, and out come ready-boxed products, stacked six-by-three on pallets and ready for the lorries.

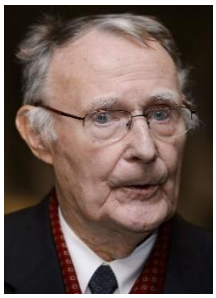
Ikea was not, back then, the global behemoth of today, with stores in dozens of countries and turnover in the tens of billions. Its founder, Ingvar Kamprad, was just 17 when he started the business with a small gift of cash from his father, a reward for trying hard at school despite dyslexia.

By 1952, aged 26, Ingvar already had a 100-page furniture catalogue, but had not yet hit on the idea of flat-packing. That came a few years later, as he and his company's fourth employee - Gillis Lundgren - were packing a car with furniture for a catalogue photo shoot.

"This table takes up too much darn space," Gillis said. "We should unscrew the legs."

It was a light bulb moment.

Kamprad was already obsessed with cutting. One way to keep prices low is to sell furniture in bits, rather than paying labourers to assemble it.



Even bigger savings come from precisely the problem that inspired Gillis Lundgren: transport.

In 2010, for example, Ikea rethought the design of its Ektorp sofa and made the armrests detachable. That helped halve the size of the packaging, which halved the number of lorries needed to get the sofas from factory to warehouse, and warehouse to shop. And that lopped around 15% off the price.

Consider another Ikea icon: the Bang mug.

You have probably had a drink from one - with yearly sales reaching 25 million, there are plenty knocking around. Its design is distinctive - wide at the top, tapering downwards with a small handle, right by the rim - and is not motivated purely by aesthetics.

Ikea changed the height of the mug when it realised it could make slightly better use of the space in its supplier's kiln, in Romania.

And tweaking the handle design made them stack more compactly - more than doubling the number you could fit on a pallet, more than halving the cost of getting them from the kiln in Romania to the shelves in the shop.

It has been a similar story with the Billy bookcase. It does not look like it has changed much since 1978, yet it costs 30% less. That is partly due to constant, tiny tweaks in both product and production method. But it is also thanks to sheer **economies of scale**.

Look at Gyllensvaans Mobler: compared to the 1980s, its number of employees has only doubled but it is making 37 times as many bookcases. That is thanks to German and Japanese **robots**.

Yet a business needs confidence to sink so much money into machinery, especially when it has no other client: pretty much all Gyllensvaans Mobler does is make bookcases for Ikea.

Consider the Bang mug again. Initially, Ikea asked a supplier to price up a million units in the first year. Then it asked: "What if we commit to five million a year for three years?" By increasing the size of their order, they got a **discount** of 10%.

Every penny counts. Just ask the famously penny-pinching Ingvar Kamprad: in a rare interview, to mark his 90th birthday, Mr Kamprad said he was wearing clothes he had bought at a flea market. He is said to fly economy and drive an old Volvo. This frugality may help to explain why he is the world's eighth-richest man - although the four decades he spent living in Switzerland to avoid high Swedish taxes may also have something to do with it.

Anyone can make shoddy, ugly goods by cutting corners. And anyone can make elegant, sturdy products by throwing money at them. To get as rich as Mr Kamprad has, you have to make stuff that is both cheap and acceptably good. That is what seems to explain the enduring popularity of the Billy.

"Simple, practical and timeless," is how Gillis Lundgren once described the design. Sophie Donelson who edits the interiors magazine House Beautiful called the Billy "unfussy" and "modern without trying too hard".

But business nerds do not admire the range for its modernity or flexibility. They admire it - and Ikea in general - for relentlessly finding ways to cut costs and prices without reducing the quality of the product. It demonstrates that innovation in the modern economy is not just about snazzy new technologies, but also boringly efficient systems.

The Billy bookcase isn't innovative in the way that **the iPhone is innovative.**

The Billy innovations are about working within the limits of production and **logistics**, finding tiny ways to shave more off the cost, all while producing something that looks fine and does the job.

How does the welfare states affect economic growth – does it boost growth… or stunt it?

Women in politics are sometimes accused of consciously exploiting their femininity to get ahead in a male-dominated world. Frances Perkins did that, but in an unusual way: she tried to remind men of their mothers.

She dressed in a plain, three-cornered hat, and she refined the way she acted, based on careful observation of what seemed to be most effective in persuading men to accept her ideas. Perhaps it's no coincidence that those ideas could reasonably be described as maternal or parental. Any parent wants to shield their children from serious harm, and Perkins believed governments should do the same for their citizens.

She became President Franklin D Roosevelt's Secretary of Labour in 1933.

Frances Perkins pictured with the rest of Franklin D Roosevelt's cabinet in March 1933

The Great Depression was ravaging America. A third of workers were unemployed. Those with jobs saw wages slide. Perkins drove through the changes that became known as the New Deal, including a minimum wage, benefits for the unemployed and pensions for the elderly.

It wasn't Frances Perkins who invented the welfare state. That was Otto von Bismarck, chancellor of the German Empire, half a century earlier. But it was largely during Frances Perkins's era that various welfare states took their recognisably modern shape across the developed world.

Details differ, from place to place, measure to measure, and time to time. But the same basic idea links every welfare state: that the ultimate responsibility for ensuring people don't starve on the street should lie not with family, or charity, or private insurers, but with government.

This idea is not without its opponents. It is possible, after all, to mother too much. Every parent instinctively knows there's a balance: protect, but don't mollycoddle; nurture resilience, not dependence. And if overprotective parenting stunts personal growth, might too-generous welfare states stunt economic growth?

It's a plausible worry. Imagine a single parent with two children. He or she might qualify for various pay-outs: housing benefit, child benefit, unemployment benefit. Could he or she accumulate more from the welfare system than they could get by working at the minimum wage?

In 2013, **according to research by the Cato Institute**, in no fewer than nine European countries, the answer to that question was "Yes". In three of them - Austria, Croatia and Denmark - the effective 'marginal tax rate' was nearly 100%. What that means, is if the single parent took a part-time job to earn some extra cash, he or she would immediately lose almost all of the income gain through reduced benefits. Such a "**welfare trap**" or "**poverty trap**" hardly seems sensible. It would disincentivise people from becoming productive members of the workforce.

But it's also plausible to think of ways that welfare states can improve economic **productivity**.

If you lose your job, unemployment benefit means you have a safety net. Entrepreneurs might take more risks when they know that a bankruptcy won't be catastrophic: they could still send their children to school, and get treatment when they're sick. So, do welfare states boost economic growth, or stunt it?

It's not an easy question to answer - the systems have many moving parts, and each part could affect growth in many ways. Each nation has its own mix of benefits and entitlements. Overall, there's no clear evidence that welfare states make the pie bigger or smaller. But they do help to keep a lid on **inequality**.

At least, it used to. In the past two decades, the data shows welfare states haven't been doing that so well. And that's not surprising - they're creaking under the weight of a rapidly changing world.

There's **demographic** change: people are living for longer after retirement. There's social change: entitlements and benefits were devised in an age when jobs were typically full-time and long-lasting. But in the UK, for example, most jobs created since the 2008 financial crisis are the result of people employing themselves. That means if there's an accident at work, a builder who's employed will get "statutory sick pay" from the welfare state, but a self-employed builder will not.

And there's globalisation: welfare states are funded by **taxation** and originated when employers were more geographically rooted. Today's footloose **multinationals** can easily relocate to jurisdictions with lower taxes if the burden seems high.

Mobility of labour creates headaches, too - the thought of immigrants claiming benefits may have helped set Britain on the path to Brexit.

As we ponder how - or even whether - to fix the welfare state, we shouldn't forget that one of the biggest ways welfare states shaped the modern economy was to take the heat out of demands for much more radical change.

Bismarck's welfare state reforms in the 1880s were designed to stop voters backing the rival socialist party

Otto von Bismarck was no social reformer in the Frances Perkins mould. His motives were defensive. He feared that the public would turn to the revolutionary ideas of socialists **Karl Marx** and Friedrich Engels.

Such political tumult feels long past, but perhaps that's complacent. Some say we're experiencing another industrial revolution now, as the **robots** come for our jobs. Inequality, which in many countries widened sharply during the 1980s and 1990s, may widen further. In the past, new and better jobs have come along to replace those that were lost, but perhaps **artificial intelligence** will be able to do those new jobs better, too.

If in the future human labour is less needed, keeping societies stitched together may require us to reinvent the welfare state. Some economists are considering an idea that dates back to Thomas More and his 1516 book, Utopia – that idea is a payment by the state to every adult in the nation - a **universal basic income**. It does seem utopian, in the sense of fantastically unrealistic. Could we really imagine a world in which everyone gets a regular cash handout, enough to meet their basic needs, no questions asked?

Some evidence suggests it's worth considering. In the 1970s, the idea was trialled in a Canadian town called Dauphin. For years, thousands of residents received cheques every month. And it turns out that guaranteeing people an income had interesting effects. Fewer teenagers dropped out of school. Fewer people were admitted to hospital with mental health problems.

It would, of course, be enormously expensive. Suppose you gave every American adult, say $12,000 (£9,000) a year. That would cost 70% of the entire current federal budget. It seems impossibly radical.

But then, impossibly radical things do sometimes happen, and quickly.

In the 1920s, not a single US state offered old-age pensions.

By 1935, Frances Perkins had rolled them out across the nation.

TIM HARFORD

Tim Harford is an economist, journalist and broadcaster.

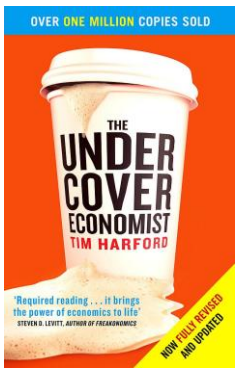
He was educated at Brasenose College, Oxford. He obtained a Bachelor of Arts degree in Philosophy, Politics and Economics and later a Master of Philosophy in economics, in 1998.

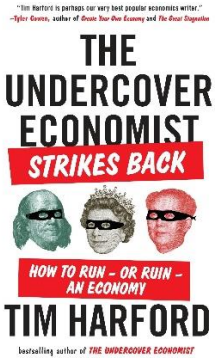
Tim is a senior columnist at the Financial Times, and the presenter of Radio 4's "More or Less", the iTunes-topping series "Fifty Things That Made the Modern Economy", and the new podcast "Cautionary Tales". He is an associate member of Nuffield College, Oxford and an honorary fellow of the Royal Statistical Society.

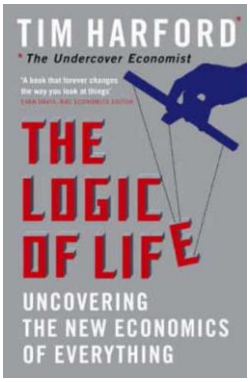
He is author of seven books including "Fifty Things That Made the Modern Economy", "Messy", and the million-selling "The Undercover Economist".

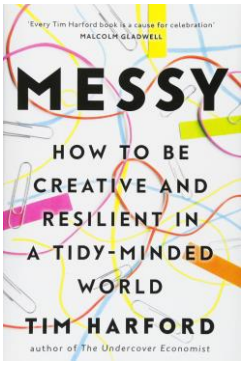
Awards

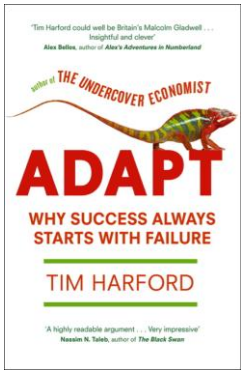
- Tim was made an OBE for services to improving economic understanding in the New Year honours of 2019.
- Science and Data Commentator of the Year 2018
- Winner of the Bastiat Prize for economic journalism 2016
- Winner of the Royal Statistical Society journalistic excellence award 2015
- Winner of the Society of Professional Economists writing prize (Rybczynski prize) 2014-15
- Economics Commentator of the Year 2014











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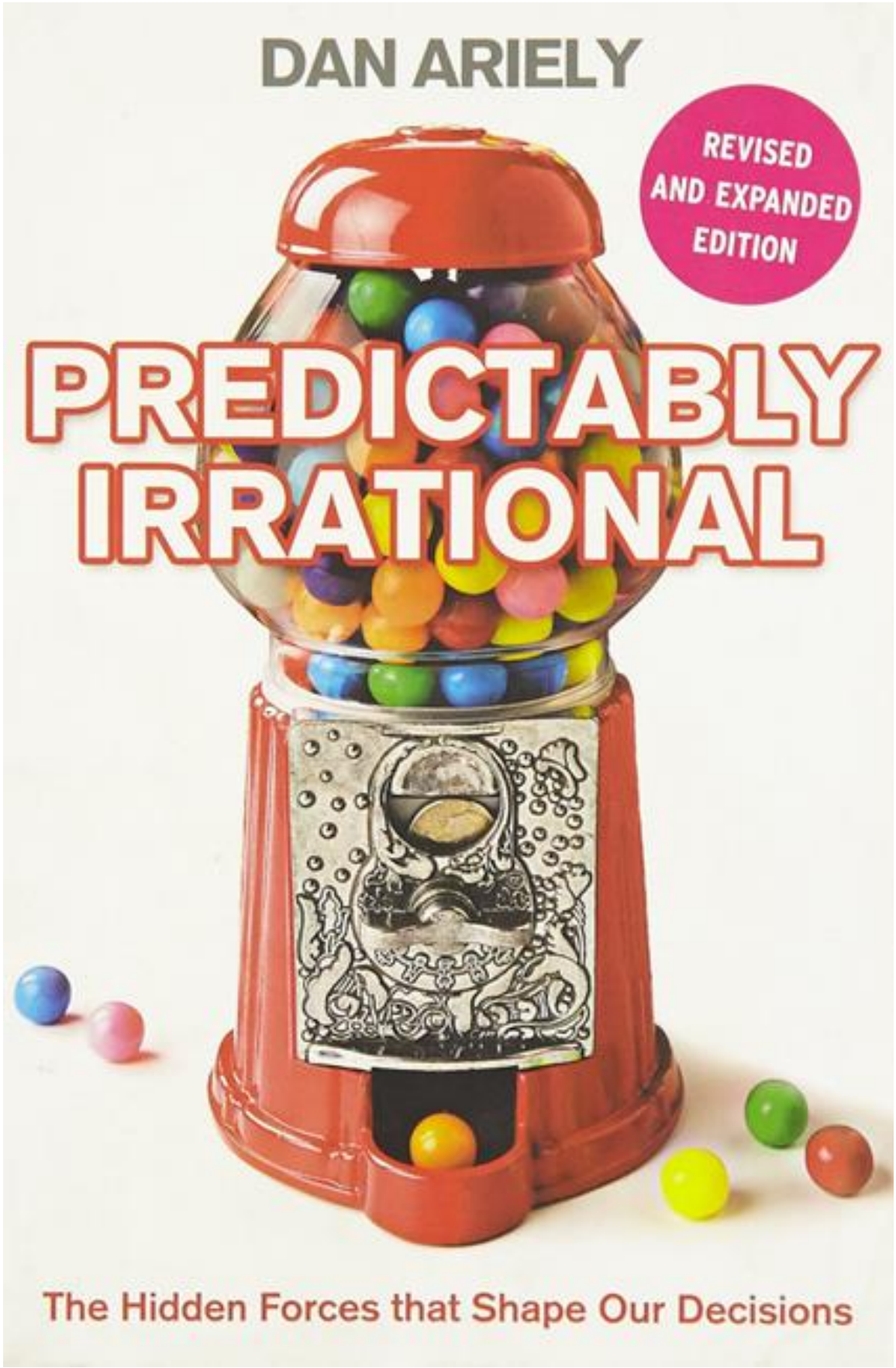

DAN ARIELY
REVISED AND EXPANDED EDITION
PREDICTABLY IRRATIONAL
The Hidden Forces that Shape Our Decisions

“Predictably Irrational”
The Hidden Forces That Shape Our Decisions
By Dan Ariely (2008)

In a series of illuminating, often surprising experiments, MIT behavioural economist Dan Ariely explains how expectations, emotions, social norms, and other invisible, seemingly illogical forces skew our reasoning abilities.

DAN ARIELY is the Alfred P. Sloan Professor of Behavioural Economics at MIT, where he holds a joint appointment between MIT’s Media Laboratory and the Sloan School of Management.

Reviews:

“This is going to be the most influential, talked-about book in years. It is so full of dazzling insights — and so engaging — that once I started reading, I couldn't put it down.”

—Daniel McFadden, 2000 Nobel Laureate in Economics,

“Predictably Irrational is wildly original. It shows why — much more often than we usually care to admit — humans make foolish, and sometimes disastrous, mistakes. Ariely not only gives us a great read; he also makes us much wiser.”

—George Akerlof, 2001 Nobel Laureate in Economics

CHAPTER 1: The Truth about Relativity

One day while browsing the World Wide Web (obviously for work—not just wasting time), I stumbled on the following ad, on the Web site of a magazine, the Economist.

SUBSCRIPTIONS

Pick the type of subscription you want to buy or renew.

□ Economist.com web subscription - US $59.00
One-year subscription to Economist.com. Includes online access to all articles from The Economist since 1997.

□ Print subscription - US $125.00
One-year subscription to the print edition of The Economist.

□ Print & web subscription - US $125.00
One-year subscription to the print edition of The Economist and online access to all articles from The Economist since 1997.

I read these offers one at a time. The first offer—the Internet subscription for $59—seemed reasonable. The second option—the $125 print subscription—seemed a bit expensive, but still reasonable.

But then I read the third option: a print and Internet subscription for $125. I read it twice before my eye ran back to the previous options. Who would want to buy the print option alone, I wondered, when both the Internet and the print subscriptions were offered for the same price? I suspect that the clever people at the Economist's London offices (and they are clever—and quite mischievous in a British sort of way) were actually manipulating me. I am pretty certain that they wanted me to skip the Internet-only option (which they assumed would be my choice, since I was reading the advertisement on the Web) and jump to the more expensive option: Internet and print.

But how could they manipulate me? I suspect it's because the Economist's marketing wizards (and I could just picture them in their school ties and blazers) knew something important about human behaviour: humans rarely choose things in absolute terms. We don't have an internal value meter that tells us how much things are worth. Rather, we focus on the relative advantage of one thing over another, and estimate value accordingly. (For instance, we don't know how much a six-cylinder car is worth, but we can assume it's more expensive than the four-cylinder model.)

In the case of the Economist, I may not have known whether the Internet-only subscription at $59 was a better deal than the print-only option at $125. But I certainly knew that the print- and-Internet option for $125 was better than the print-only option at $125. In fact, you could reasonably deduce that in the combination package, the Internet subscription is free! "It's a bloody steal—go for it, governor!" I could almost hear them shout from the riverbanks of the Thames. And I have to admit, if I had been inclined to subscribe, I probably would have taken the package deal myself. (Later, when I tested the offer on a large number of participants, the vast majority preferred the Internet-and-print deal.)

So, what was going on here? Let me start with a fundamental observation: most people don't know what they want unless they see it in context. Everything is relative, and that's the point. Like an airplane pilot landing in the dark, we want runway lights on either side of us, guiding us to the place where we can touch down our wheels.

In the case of the Economist, the decision between the Internet- only and print-only options would take a bit of thinking. Thinking is difficult and sometimes unpleasant. So, the Economist's marketers offered us a no-brainer: relative to the print-only option, the print-and-Internet option looks clearly superior.

The geniuses at the Economist aren't the only ones who understand the importance of relativity. The New York Times ran a story recently about Gregg Rapp, a restaurant consultant, who gets paid to work out the pricing for menus. He knows, for instance, how lamb sold this year as opposed to last year; whether lamb did better paired with butternut squash or with risotto; and whether orders decreased when the price of the main course was hiked from $39 to $41.

One thing Rapp has learned is that high-priced entrees on the menu boost revenue for the restaurant—even if no one buys them. Why? Because even though people generally won't buy the most expensive dish on the menu, they will order the second most expensive dish. Thus, by creating an expensive dish, a restaurateur can lure customers into ordering the second most expensive choice (which can be cleverly engineered to deliver a higher profit margin).

So, let's run through the Economist's sleight of hand in slow motion. As you recall, the choices were:
1. Internet-only subscription for $59
2. Print-only subscription for $125
3. Print-and-Internet subscription for $125

When I gave these options to 100 students at MIT's Sloan School of Management, they opted as follows:
1. Internet-only subscription for $59 — 16 students
2. Print-only subscription for $125 — zero students
3. Print-and-Internet subscription for $125 — 84 students

So far, these Sloan MBAs are smart cookies. They all saw the advantage in the print-and-Internet offer over the print-only offer. But were they influenced by the mere presence of the print-only option (which I will henceforth, and for good reason, call the "decoy")? In other words, suppose that I removed the decoy so that the choices would be the ones seen in the figure below:

SUBSCRIPTIONS

□ Economist.com subscription - US $59.00
One-year subscription to Economist.com. Includes online access to all articles from The Economist since 1997.

□ Print & web subscription - US $125.00
One-year subscription to the print edition of The Economist and online access to all articles from The Economist since 1997.

Would the students respond as before (16 for the Internet only and 84 for the combination)?

Certainly, they would react the same way, wouldn't they?

After all, the option I took out was one that no one selected, so it should make no difference. Right?

Au contraire! This time, **68** of the students chose the Internet-only option for $59, up from just 16 before. And only **32** chose the combination subscription for $125, down from 84 before!

What could have possibly changed their minds? It was the mere presence of the decoy that sent 84 of them to the print-and-Internet option (and 16 to the Internet-only option). And the absence of the decoy had them choosing differently, with 32 for print-and-Internet and 68 for Internet-only.

This is not only irrational but predictably irrational as well.

To explain the decoy effect further, let me tell you something about bread-making machines. When Williams-Sonoma first introduced a home "bread bakery" machine (for $275), most consumers were not interested. What was a home breadmaking machine, anyway? Was it good or bad? Did one really need home-baked bread? Why not just buy a fancy coffee-maker sitting nearby instead? Flustered by poor sales, the manufacturer of the bread machine brought in a marketing research firm, which suggested a fix: introduce an additional model of the bread maker, one that was not only larger but priced about 50 percent higher than the initial machine.

Now sales began to rise (along with many loaves of bread), though it was not the large bread maker that was being sold. Why? Simply because consumers now had two models of bread makers to choose from. Since one was clearly larger and much more expensive than the other, people didn't have to make their decision in a vacuum. They could say: "Well, I don't know much about bread makers, but I do know that if I were to buy one, I'd rather have the smaller one for less money." And that's when bread makers began to fly off the shelves.

Relativity helps us make decisions in life. But it can also make us downright miserable. Why? Because jealousy and envy spring from comparing our lot in life with that of others.

It was for good reason, after all, that the Ten Commandments admonished, “Neither shall you desire your neighbour’s house nor field, or male or female slave, or donkey or anything that belongs to your neighbour.” This might just be the toughest commandment to follow, considering that by our very nature we are wired to compare.

Modern life makes this weakness even more pronounced. A few years ago, for instance, I met with one of the top executives of one of the big investment companies. Over the course of our conversation he mentioned that one of his employees had recently come to him to complain about his salary.

“How long have you been with the firm?” the executive asked the young man.

“Three years. I came straight from college,” was the answer.

“And when you joined us, how much did you expect to be making in three years?”

“I was hoping to be making about a hundred thousand.”

The executive eyed him curiously.

“And now you are making almost three hundred thousand, so how can you possibly complain?” he asked.

“Well,” the young man stammered, “it’s just that a couple of the guys at the desks next to me, they’re making three hundred ten.”

The executive shook his head.

An ironic aspect of this story is that in 1993, federal securities regulators forced companies, for the first time, to reveal details about the pay and perks of their top executives. The idea was that once pay was in the open, boards would be reluctant to give executives outrageous salaries and benefits.
This, it was hoped, would stop the rise in executive compensation, which neither regulation, legislation, nor shareholder pressure had been able to stop. And indeed, it needed to stop: in 1976 the average CEO was paid 36 times as much as the average worker. By 1993, the average CEO was paid 131 times as much.

But guess what happened. Once salaries became public information, the media regularly ran special stories ranking CEOs by pay. Rather than suppressing the executive perks, the publicity had CEOs in America comparing their pay with that of everyone else. In response, executives’ salaries skyrocketed. The trend was further “helped” by compensation consulting firms (scathingly dubbed “Ratchet, Ratchet, and Bingo” by the investor Warren Buffett) that advised their CEO clients to demand outrageous raises. The result? Now the average CEO makes about 369 times as much as the average worker—about three times the salary before executive compensation went public.

Keeping that in mind, I had a few questions for an executive I met with. “What would happen,” I ventured, “if the information in your salary database became known throughout the company?” The executive looked at me with alarm. “All but the highest-paid individual would feel underpaid—and I wouldn’t be surprised if they went out and looked for another job.”

Isn’t this odd? It has been shown repeatedly that the link between amount of salary and happiness is not as strong as one would expect it to be (in fact, it is rather weak). Studies even find that countries with the “happiest” people are not among those with the highest personal income. Yet we keep pushing toward a higher salary. Much of that can be blamed on sheer envy. As H. L. Mencken, the twentieth-century journalist, satirist, social critic, cynic, and freethinker noted, a man’s satisfaction with his salary depends on (are you ready for this?) whether he makes more than his wife’s sister’s husband. Why the wife’s sister’s husband? Because (and I have a feeling that Mencken’s wife kept him fully informed of her sister’s husband’s salary) this is a comparison that is salient and readily available.

All this extravagance in CEOs' pay has had a damaging effect on society. Instead of causing shame, every new outrage in compensation encourages other CEOs to demand even more. "In the Web World," according to a headline in the New York Times, the "Rich Now Envy the Superrich."

CHAPTER 2: Why the Price of Everything Is Up in the Air

A few decades ago, the naturalist Konrad Lorenz discovered that goslings, upon breaking out of their eggs, become attached to the first moving object they encounter (which is generally their mother). Lorenz knew this because in one experiment he became the first thing they saw, and they followed him loyally from then on through adolescence. With that, Lorenz demonstrated not only that goslings make initial decisions based on what's available in their environment, but that they stick with a decision once it has been made. Lorenz called this natural phenomenon imprinting.

Is the human brain, then, wired like that of a gosling? Do our first impressions and decisions become imprinted? And if so, how does this imprinting play out in our lives? When we encounter a new product, for instance, do we accept the first price that comes before our eyes? And more importantly, does that price - which in academic lingo we call an **anchor** - have a long-term effect on our willingness to pay for the product from then on?

It seems that what's good for the goose is good for humans as well. And this includes anchoring.

Our first decisions translate into long-term habits. To illustrate this process, consider this example. You're walking past a restaurant, and you see two people standing in line, waiting to get in. "This must be a good restaurant," you think to yourself. "People are standing in line." So, you stand behind these people. Another person walks by. He sees three people standing in line and thinks, "This must be a fantastic restaurant," and joins the line. Others join. We call this type of behaviour **herding**. It happens when we assume that something is good (or bad) on the basis of other people's previous behaviour, and our own actions follow suit.

But there's also another kind of herding, one that we call self-herding. This happens when we believe something is good (or bad) on the basis of our own previous behaviour. Essentially, once we become the first person in line at the restaurant, we begin to line up behind yourself in subsequent experiences. Does that make sense? Let me explain.

Recall your first introduction to Starbucks, perhaps several years ago. (I assume that nearly everyone has had this experience, since Starbucks sits on every corner in America.) You are sleepy and in desperate need of a liquid energy boost as you embark on an errand one afternoon. You glance through the windows at Starbucks and walk in. The prices of the coffee are a shock—you've been blissfully drinking the brew at Dunkin' Donuts for years. But since you have walked in and are now curious about what coffee at this price might taste like, you surprise yourself: you buy a small coffee, enjoy its taste and its effect on you, and walk out.

The following week you walk by Starbucks again. Should you go in? The ideal decision-making process should take into account the quality of the coffee (Starbucks versus Dunkin' Donuts); the prices at the two places; and, of course, the cost (or value) of walking a few more blocks to get to Dunkin' Donuts. This is a complex computation—so instead, you resort to the simple approach: "I went to Starbucks before, and I enjoyed myself and the coffee, so this must be a good decision for me." So, you walk in and get another small cup of coffee.

In doing so, you just became the second person in line, standing behind yourself. A few days later, you again walk by Starbucks and this time, you vividly remember your past decisions and act on them again—voila! You become the third person in line, standing behind yourself. As the weeks pass, you enter again and again and every time, you feel more strongly that you are acting on the basis of your preferences. Buying coffee at Starbucks has become a habit with you.

But the story doesn't end there. Now that you have gotten used to paying more for coffee, and have bumped yourself up onto a new curve of consumption, other changes also become simpler. Perhaps you will now move up from the small cup for $2.20 to the medium size for $3.50 or to the Vendi for $4.15. Even though you don't know how you got

into this price bracket in the first place, moving to a larger coffee at a relatively greater price seems pretty logical. So is a lateral move to other offerings at Starbucks: Caffe Americano, Caffe Misto, Macchiato, and Frappuccino, for instance.

If you stopped to think about this, it would not be clear whether you should be spending all this money on coffee at Starbucks instead of getting cheaper coffee at Dunkin' Donuts or even free coffee at the office. But you don't think about these trade-offs anymore. You've already made this decision many times in the past, so you now assume that this is the way you want to spend your money. You've herded yourself—lining up behind your initial experience at Starbucks—and now you're part of the crowd.

However, there is something odd in this story. If anchoring is based on our initial decisions, how did Starbucks manage to become an initial decision in the first place? In other words, if we were previously anchored to the lower prices at Dunkin' Donuts, how did we move our anchor to Starbucks? This is where it gets really interesting.

When Howard Shultz created Starbucks, he was an intuitive businessman. He worked diligently to separate Starbucks from other coffee shops, not through price but through ambience. Accordingly, he designed Starbucks from the very beginning to feel like a continental coffeehouse.

The early shops were fragrant with the smell of roasted beans (and better-quality roasted beans than those at Dunkin' Donuts). They sold fancy French coffee presses. The show¬cases presented alluring snacks—almond croissants, biscotti, raspberry custard pastries, and others. Whereas Dunkin' Donuts had small, medium, and large coffees, Starbucks offered Short, Tall, Grande, and Venti, as well as drinks with high-pedigree names like Caffe Americano, Caffe Misto, Macchiato, and Frappuccino. Starbucks did everything in its power, in other words, to make the experience feel different—so different that we would not use the prices at Dunkin' Donuts as an anchor, but instead would be open to the new anchor that Starbucks was preparing for us. And that, to a great extent, is how Starbucks succeeded.

CHAPTER 9: The Effect of Expectations

Suppose you're a fan of the Philadelphia Eagles and you're watching a football game with a friend who, sadly, grew up in New York City and is a rabid fan of the Giants. The Eagles have possession and an Eagles wide receiver near the corner of the end zone dives for the ball and makes a spectacular catch. The referee signals a touchdown. But wait. Did the receiver get both of his feet in? You turn to your friend: "Look at that! What a great catch! He was totally in. Why are they even reviewing it?"

Your friend scowls. "That was out! I can't believe the ref didn't see it! You must be crazy to think that was in!"

What just happened? How could two friends—two honest guys—see one soaring pass in two different ways? In fact, how could any two parties look at precisely the same event and interpret it as supporting their opposing points of view?

Leonard Lee (a professor at Columbia), Shane Frederick (a professor at MIT), and I didn't have any answers to these profound questions. But in a search for the root of this human condition, we decided to set up a series of simple experiments to explore how previously held impressions can cloud our point of view.

Welcome to the Muddy Charles—one of MIT's two pubs, and the location for a set of studies that Leonard, Shane, and I would be conducting over the following weeks. The purpose of our experiments would be to determine whether people's expectations influence their views of subsequent events— more specifically, whether bar patrons' expectations for a certain kind of beer would shape their perception of its taste.

Let me explain this further. One of the beers that would be served to the patrons of the Muddy Charles would be Budweiser. The second would be what we fondly called MIT Brew. What's MIT Brew? Basically Budweiser, plus a "secret ingredient"—two drops of balsamic vinegar for each ounce of beer.

At about seven that evening, Jeffrey, a second-year PhD student in computer science, was lucky enough to drop by the Muddy Charles. “Can I offer you two small, free samples of beer?” asked Leonard, approaching him. Without much hesitation, Jeffrey agreed, and Leonard led him over to a table that held two pitchers of the foamy stuff, one labelled A and the other B. Jeffrey sampled a mouthful of one of them, swishing it around thoughtfully, and then sampled the other. “Which one would you like a large glass of?” asked Leonard. Jeffrey thought it over. Jeffrey chose beer B - the vinegar-laced MIT Brew.

A few minutes later, Mina, dropped in. “Like a free beer?” asked Leonard. Her reply was a smile and a nod of the head. This time, Leonard offered more information. Beer A, he explained, was a standard commercial beer, whereas beer B had been doctored with a few drops of balsamic vinegar. Mina tasted the two beers. After finishing the samples (and wrinkling her nose at the vinegar-laced brew B) she gave the nod to beer A. Leonard poured her a large glass of the commercial brew and Mina happily joined her friends at the pub.

Mina and Jeffrey were only two of hundreds of students who participated in this experiment. But their reaction was typical: without foreknowledge about the vinegar, most of them chose the vinegary MIT Brew. But when they knew in advance that the MIT Brew had been laced with balsamic vinegar, their reaction was completely different.

As you see, expectations can influence nearly every aspect of our life. Imagine that you need to hire a caterer for your daughter’s wedding. Josephine’s Catering boasts about its “delicious ginger chicken” and its “flavourful Greek salad with olives and feta cheese.” Another caterer, Culinary Sensations, offers a “succulent organic breast of chicken roasted to perfection and drizzled with a merlot demi-glace, resting in a bed of herbed Israeli couscous” and a “melange of the freshest roma cherry tomatoes and crisp field greens, paired with a warm circle of chevre in a fruity raspberry vinaigrette.”

Although there is no way to know whether Culinary Sensations’ food is any better than Josephine’s, the sheer depth of the description may lead us to expect greater things than from basic-sounding tomato and goat cheese salad. This, accordingly, increases the chance that we (and our guests, if we give them the description of the dish) will rave over it.

Have you heard of the famous “Pepsi Challenge” ads on television? The ads consisted of people chosen at random, tasting Coke and Pepsi and remarking about which they liked better. These ads, created by Pepsi, announced that people preferred Pepsi to Coke. At the same time, the ads for Coke proclaimed that people preferred Coke to Pepsi. How could that be? Were the two companies fudging their statistics?

The answer is in the different ways the two companies evaluated their products. Coke’s market research was said to be based on consumers’ preferences when they could see what they were drinking, including the famous red trademark. By contrast, Pepsi ran its challenge using so-called blind tasting and standard plastic cups marked M and Q. It appears that Pepsi tastes better in a blind taste test but that Coke tastes better in a non-blind (sighted) test!

CHAPTER 10: The Power of Price

J. B. Moseley, an orthopaedic surgeon, had increasing doubts about the use of arthroscopic surgery for a particular arthritic affliction of the knee. Did the procedure really work? Recruiting 180 patients with osteoarthritis from the veterans’ hospital in Houston, Texas, Dr. Moseley and his colleagues divided them into three groups.

One group got the standard treatment: anaesthetic, three incisions, scopes inserted, cartilage removed, correction of soft-tissue problems, and 10 litres of saline washed through the knee. The second group got anaesthesia, three incisions, scopes inserted, and 10 litres of saline, but no cartilage was removed. The third group—the placebo group—looked from the outside like the other two treatments (anaesthesia, incisions, etc.); and the procedure took the same amount of time; but no instruments were inserted into the knee. In other words, this was simulated surgery.

For two years following the surgeries, all three groups (which consisted of volunteers, as in any other placebo experiment) were tested for a lessening of their pain, and for the amount of time it took them to walk and climb

stairs. How did they do? The groups that had the full surgery and the arthroscopic lavage were delighted, and said they would recommend the surgery to their families and friends. But strangely—and here was the bombshell—the placebo group also got relief from pain and improvements in walking—to the same extent, in fact, as those who had the actual operations.

In the previous chapter we saw that expectations change the way we perceive and appreciate experiences. In this chapter we will be exploring the placebo effect.

In particular, I want to probe an aspect of placebos that is not yet fully understood. It is the role that price plays in this phenomenon. Does a pricey medicine make us feel better than a cheap medicine? Can it actually make us physiologically better than a cheaper brand? What about expensive procedures, and new-generation apparatuses? Does their price influence their efficacy?

Placebo comes from the Latin for "I shall please." Before recent times, almost all medicines were placebos. Eye of the toad, wing of the bat, dried fox lungs: these were all touted as suitable cures for various ailments. When Lincoln lay dying across the street from Ford's Theatre, it is said that his physician applied a bit of "mummy powder" to the wounds. Egyptian mummy, ground to a powder, was believed to be a remedy for epilepsy, abscesses, rashes, fractures, paralysis, migraine, ulcers, and many other things. We may think we're different now. But we're not. Placebos still work their magic on us. Recently, when researchers tested the effect of the six leading antidepressants, they noted that 75 percent of the effect was duplicated in placebo controls.

In general, two mechanisms shape the expectations that make placebos work. One is belief—our confidence or faith in the drug, the procedure, or the caregiver. The second mechanism is conditioning. In the case of pain, expectation can unleash hormones and neurotransmitters, such as endorphins and opiates, that not only block agony but produce feelings of wellbeing. Branding, packaging, and the reassurance of the caregiver can make us feel better. But what about price? Can the price of a drug also affect our response to it? For instance, would a cheaper painkiller be less effective than a more expensive one?

Imagine that you're taking part in an experiment to test the efficacy of a new painkiller called Veladone-Rx. (The actual experiment involved about 100 adult Bostonians, but for now, we'll let you take their place.)

You arrive at the MIT Media Lab in the morning. Taya Leary, a young woman wearing a crisp business suit (this is in stark contrast to the usual attire of the students and faculty at MIT), greets you warmly, with a hint of a Russian accent. A photo ID identifies Taya as a representative of Vel Pharmaceuticals. She invites you to spend a moment reading a brochure about Veladone-Rx. Glancing around, you note that the room looks like a medical office: copies of Time and Newsweek are scattered around; brochures for Veladone-Rx are spread out on the table; and nearby is a cup of pens, with the drug's handsome logo. "Veladone is an exciting new medication in the opioid family," you read. "Clinical studies show that over 92 percent of patients receiving Veladone in double-blind controlled studies reported significant pain relief within only 10 minutes, and that pain relief lasted up to eight hours." And how much does it cost? According to the brochure, $2.50 for a single dose.

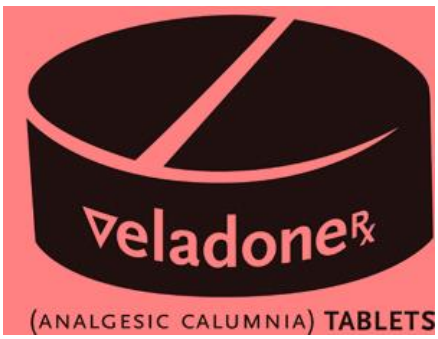
Once you finish reading the brochure, Taya calls in Rebecca Waber and leaves the room. Rebecca, wearing the white coat of a lab technician, with a stethoscope hanging from her neck, asks you a set of questions about your medical condition and your family's medical history. She listens to your heart and measures your blood pressure. Then she hooks you up to a complicated-looking machine. The electrodes running from the machine, greased with a green electrode gel, encircle your wrists. This is an electrical shock generator, she explains, and it is how we will test your perception and tolerance of pain.

With her hand on the switch, Rebecca sends a series of electrical shocks through the wires and into the electrodes. The initial shocks are merely annoying. Then they become painful, more painful, and finally so painful that your eyes fly open and your heart begins to race. She records your reactions. Now she starts delivering a new set of electrical

shocks. This time she administers a set of charges that fluctuate randomly in intensity: some are very painful and some merely irritating. Following each one, you are asked to record, using the computer in front of you, the amount of pain you felt. You use the mouse to click on a line that ranges from “no pain at all” to “the worst pain imaginable” (this is called a “visual pain analog”).

When this part of the torture ends, you look up. Rebecca is standing before you with a Veladone capsule in one hand and a cup of water in the other. “It will take about 15 minutes for the drug to reach its maximal effect,” she says. You gulp it down, and then move to a chair in the corner, where you look at the old copies of Time and Newsweek until the pill takes effect.

Fifteen minutes later Rebecca, smearing the electrodes with the same green electrode gel, cheerfully asks, “Ready for the next step?” You say nervously, “As ready as I can be.” You’re hooked up to the machine again, and the shocks begin. As before, you record the intensity of the pain after each shock. But this time it’s different. It must be the Veladone-Rx! The pain doesn’t feel nearly as bad. You leave with a pretty high opinion of Veladone. In fact, you hope to see it in the neighbourhood drugstore before long.



Indeed, that’s what most of our participants found. Almost all of them reported less pain when they experienced the electrical shocks under the influence of Veladone. Very interesting—considering that Veladone was just a capsule of vitamin C.

From this experiment, we saw that our capsule did have a placebo effect. But suppose we priced the Veladone differently. Suppose we discounted the price of a capsule of Veladone-Rx from $2.50 to just 10 cents. Would our participants react differently?

In our next test, we changed the brochure, scratching out the original price ($2.50 per pill) and inserting a new discount price of 10 cents. Did this change our participants’ reaction? Indeed. At $2.50 almost all our participants experienced pain relief from the pill. But when the price was dropped to 10 cents, only half of them did.

From our experiments with our “pharmaceuticals” we saw how prices drive the placebo effect. But do prices affect everyday consumer products as well? We found the perfect subject in SoBe Adrenaline Rush, a beverage that promises to “elevate your game” and impart “superior functionality.”

In our first experiment, we stationed ourselves at the entrance of the university’s gym, offering SoBe. The first group of students paid the regular price for the drink. A second group also purchased the drink, but for them the price was marked down to about one-third of the regular price. After the students exercised, we asked them if they felt more or less fatigued relative to how they normally felt after their usual workouts. Both groups of students who drank the SoBe indicated that they were somewhat less fatigued than usual. That seemed plausible, especially considering the hefty shot of caffeine in each bottle of SoBe.

But it was the effect of the price, not the effect of the caffeine, that we were after. Would higher-priced SoBe reduce fatigue better than the discounted SoBe? As you can imagine from the experiment with Veladone, it did. The students who drank the higher-priced beverage reported less fatigue than those who had the discounted drink.

So we’ve seen how pricing drives the efficacy of placebo, painkillers, and energy drinks. But here’s another thought. In AD 800, Pope Leo III crowned Charlemagne emperor of the Romans, thus establishing a direct link between church and state. From then on the Holy Roman emperors, followed by the kings of Europe, were imbued with the glow of divinity. Out of this came what was called the “royal touch”—the practice of healing people. Throughout the Middle Ages, as one historian after another chronicled, the great kings would regularly pass through the crowds, dispensing the royal touch. Charles II of England (1630-1685), for instance, was said to have touched some 100,000 people during his reign; and the records even include the names of several American colonists, who returned to the Old World from the New World just to cross paths with King Charles and be healed.

Did the royal touch really work? If no one had ever gotten better after receiving the royal touch, the practice would obviously have withered away. But throughout history, the royal touch was said to have cured thousands of people.

Scrofula, a disfiguring and socially isolating disease often mistaken for leprosy, was believed to be dispelled by the royal touch. When people think about a placebo such as the royal touch, they usually dismiss it as "just psychology." But, there is nothing "just" about the power of a placebo, and in reality, it represents the amazing way our mind controls our body. How the mind achieves these amazing outcomes is not always very clear. Some of the effect, to be sure, has to do with reducing the level of stress and changing hormonal secretions. In reality, physicians provide placebos all the time. For instance, a study done in 2003 found that more than one- third of patients who received antibiotics for a sore throat were later found to have viral infections, for which an antibiotic does absolutely no good (and possibly contributes to the rising number of drug-resistant bacterial infections that threaten us all). But do you think doctors will stop handing us antibiotics when we have viral ailments? Even when doctors know that an illness is viral rather than bacterial, they still know very well that the patient wants some sort of relief; most commonly, the patient expects to walk out with a prescription. Is it right for the physician to fill this psychological need?

What Is Behavioural Economics?

In this book, I have described experiments that I hoped would be surprising and illuminating. If they were, it was largely because they refuted the common assumption that we are all fundamentally rational. Time and again I have provided examples that are contrary to Shakespeare's depiction of us in "What a piece of work is a man." In fact, these examples, show that we are not noble in reason, not infinite in faculty, and rather weak in apprehension. (Frankly, I think Shakespeare knew that very well, and this speech of Hamlet's is not without irony.)

Standard economics assumes that we are rational—that we know all the pertinent information about our decisions, that we can calculate the value of the different options we face, and that we are cognitively unhindered in weighing the ramifications of each potential choice.

The result is that we are presumed to be making logical and sensible decisions. And even if we make a wrong decision from time to time, the standard economics perspective suggests that we will quickly learn from our mistakes either on our own or with the help of "market forces." On the basis of these assumptions, economists draw far-reaching conclusions about everything from shopping trends to law to public policy.

But, as the results presented in this book (and others) show, we are all far less rational in our decision making than standard economic theory assumes. Our irrational behaviours are neither random nor senseless—they are systematic and predictable. We all make the same types of mistakes over and over, because of the basic wiring of our brains. So, wouldn't it make sense to modify standard economics and move away from naive psychology, which often fails the tests of reason, introspection, and—most important—empirical scrutiny?

Wouldn't economics make a lot more sense if it were based on how people actually behave, instead of how they should behave? That simple idea is the basis of behavioural economics, an emerging field focused on the (quite intuitive) idea that people do not always behave rationally and that they often make mistakes in their decisions.

In many ways, the standard economic and Shakespearean views are more optimistic about human nature, since they assume that our capacity for reasoning is limitless. By the same token the behavioural economics view, which acknowledges human deficiencies, is more depressing, because it demonstrates the many ways in which we fall short of our ideals. Indeed, it can be rather depressing to realize that we all continually make irrational decisions in our personal, professional, and social lives. But there is a silver lining: the fact that we can become aware of our mistakes also means that there are ways to improve our decisions.

According to the assumptions of standard economics, all human decisions are rational and informed, motivated by an accurate concept of the worth of all goods and services and the amount of happiness (utility) all decisions are likely to produce. Behavioural economists, on the other hand, believe that people are susceptible to irrelevant influences from their immediate environment (which we call context effects), irrelevant emotions, short-sightedness, and other forms of irrationality. The good news is that these mistakes also provide opportunities for improvement.

For example, the question why Americans are not saving enough for retirement is meaningless from the perspective of standard economics. If we are all making good, informed decisions in every aspect of our lives, then we are also

saving the exact amount that we want to save. We might not save much because we don't care about the future, because we are looking forward to experiencing poverty at retirement, because we expect our kids to take care of us, or because we are hoping to win the lottery—there are many possible reasons. The main point is that from the standard economic perspective, we are saving exactly the right amount in accordance with our preferences.

But from the perspective of behavioural economics, which does not assume that people are rational, the idea that we are not saving enough is perfectly reasonable. In fact, research in behavioural economics points to many possible reasons why people are not saving enough for retirement. People procrastinate. People have a hard time understanding the real cost of not saving as well as the benefits of saving. (By how much would your life be better in the future if you were to deposit an additional $1,000 in your retirement account every month for the next 20 years?) Being "house rich" helps people believe that they are indeed rich. It is easy to create consumption habits and hard to give them up. And there are many, many more reasons.

The potential for improvement from the perspective of behavioural economics lies in new methods, mechanisms, and other interventions that would help people achieve more of what they truly want. For example, there is a mechanism called "save more tomorrow," which Dick Thaler and Shlomo Benartzi proposed and tested a few years ago.

Here's how "save more tomorrow" works. When new employees join a company, in addition to the regular decisions they are asked to make about what percentage of their pay-check to invest in their company's retirement plan, they are also asked what percentage of their future salary raises they would be willing to invest in the retirement plan. It is difficult to sacrifice consumption today for saving in the distant future, but it is psychologically easier to sacrifice consumption in the future, and even easier to give up a percentage of a salary increase that one does not yet have.

When the plan was implemented in Thaler and Benartzi's test, the employees joined and agreed to have their contribution, as a percentage, increase with their future salary raises. What was the outcome? Over the next few years, as the employees received raises, the saving rates increased from about 3.5 percent to around 13.5 percent—a gain for the employees, their families, and the company, which by now had more satisfied and less worried employees. Although irrationality is commonplace, it does not necessarily mean that we are helpless.

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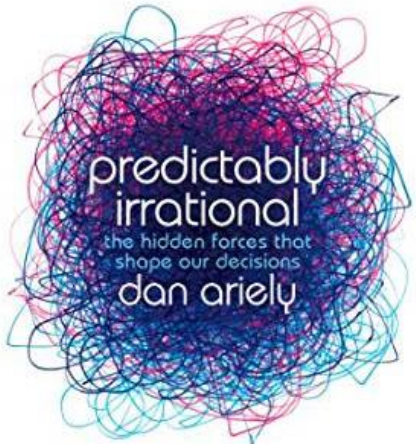
Thank you for reading this book. I hope you have gained some interesting insights about human behaviour, gained some insight into what really makes us tick, and discovered ways to improve your decision making. In my opinion, studying human behaviour is a fantastic gift because it helps us better understand ourselves and the daily mysteries we encounter. Although the topic is important and fascinating, it is not easy to study, and there is still a lot of work ahead of us. As the Nobel laureate Murray Gell-Mann once said, "Imagine how hard physics would be if particles could think."

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