Models in the Mind

A History of (mostly) Western Thinking

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Can a machine think—or just do a convincing imitation?

Alan Turing's famous test of Artificial Intelligence posed a simple question: if a machine can hold a conversation indistinguishable from a human, does that mean it's intelligent? For decades, there was no need to answer—machines couldn't pass the test.

Today's large language models probably can—flawlessly, fluently, and insistently—but still claim they are not conscious, not sentient, not real minds.

So, if thinking requires more than fluent imitation, where does that leave us?

Models in the Mind takes a long view, tracing how humans have understood thought, soul, and selfhood from ancient times to the age of artificial intelligence. From the instincts of amoebae to the abstractions of philosophers, scientists, and mathematicians. From spirits to clockwork, from animist myths to neural networks, this is a sweeping yet, I hope, accessible exploration of how we've tried to explain—and model—what goes on inside our heads.

Along the way, it asks difficult questions: What do we mean by "mind"? Can intelligence be measured by function alone? What happens when our models begin to outpace our understanding? And what if the models we build start to shape us?

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Preface

Homo sapiens!

Humans have long believed that what sets them apart is their capacity for thought. Even our species name reflects this.

But working with a Large Language AI model immediately raises questions about how true this really is. When a machine can respond intelligently to factual queries, process natural language, and detect literary nuance—where, exactly, is the boundary?

If ChatGPT, Google Gemini, Meta's LLaMA, Anthropic Claude, DeepSeek, and others can simulate intelligence today, what is it they still lack compared to the human mind?

The line of thinking that led to this book began fifty years ago when I first encountered Noam Chomsky's thesis that the brain contains a specialised, innate, language organ. Even then, I found myself instinctively resisting the idea that this was the only—or even the most plausible—explanation for the deep structural similarities across human languages.

It seemed more logical that language was a model of the world, and that its structure must, to some extent, reflect external reality. The survival of any species depends on its capacity to align thought with the world it inhabits.

And not just thought. Society, morals, ethics, and religion must all, in their own ways, contribute to that alignment—the collective struggle against entropy.

So what began as a question about artificial intelligence has grown into a broader investigation of thought itself—from the primitive responses of amoebae to the emergence of human self-consciousness; from evolutionary competition to ethical and religious debates about right and wrong; from our relationship with nature and one another to our relationship with non-human thinking beings.

What is identity? What is morality? What is humanity? And how do we survive in a world of fake news, polarised belief, and the looming threat of thermonuclear destruction?

We don't have one definitive answer—and we need to work out how to live with the many conflicting answers we encounter, some of them dangerously wrong.

Tor Hansen
Wirral, Merseyside
30th May, 2025

Chapter 1—Thinking:
It's Only a Model

Teach Your Children Well

The Duke of Wellington is supposed to have said, "The battle of Waterloo was won on the playing fields of Eton."

Image 1: Rugby - A Model for Life

He hated his schooldays, so he probably never spoke those words—but they carry a germ of truth. The playing fields of Eton were more than a physical location. They provided a model for behaviour later in life that balanced individual initiative with discipline and teamwork—things that translate into success, in society and on the battlefield.

In fact, the games played by children express a society's vision of what it expects of an adult. Eton, in the eighteenth and nineteenth centuries, reflected Britain's self-image as heir to the classical traditions of Greece and Rome. Competitive games like the Eton Field Game and, more generally, cricket and football modelled co-operation within the bounds of strict rules. They summed up the values of the hierarchical, class-based society that would underpin the largest Empire of history.

In other environments, many indigenous cultures around the world, from the Inuit to the Māori in New Zealand, play games that emphasize collective success and sharing, rather than generating winners and losers. Games that reflect cultural values rooted in cooperation and interdependence, where survival might depend on the group's working together. Inuit children play

games designed to improve communal skills—hunting together or sharing resources—while Māori games often centre on physical coordination and teamwork.

From early childhood, toys and games act as tools for developing social integration and the transmission of a cultural worldview. In hunter-gatherer societies, children play with bows and arrows, learning skills essential to survival. Girls, in many cultures, have traditionally been encouraged to play with dolls, learning the roles of caregivers and nurturers.

In modern Western societies, children might build model ships, airplanes, or even cities out of blocks, with an emphasis on exploration, technological mastery, and individual achievement. A child stacking blocks may not realize they're rehearsing the principles of engineering, but it mirrors the creative and structural challenges of building a skyscraper.

Across all cultures, play—using models of reality—allows humans to begin understanding the world around them. Whether these models mirror cooperation, competition, or innovation, they act as a bridge between the imagination of childhood and adult reality.

More Models

In about 1730 BCE, a completely different type of model was recorded. Written in Cuneiform on a clay tablet, the oldest known recipe—for lamb stew—was more than just a list of ingredients. It included instructions: how to sear the meat, when to add the vegetables, which spices to use, and how to thicken the stew with barley flour. It was a model of a *process*—a way of turning raw materials into something repeatable, nourishing and shared.

Toys, games and recipes are far from the only models humans use to understand and navigate reality. Where games like chess, for instance, often model society's values and structures, these other tools—recipes, maps, blueprints, equations—model physical realities.

Maps highlight specific aspects of the world. Physical maps show natural features like mountains, rivers, and lakes. Political maps outline the boundaries of countries, states and cities. Road maps spotlight highways and transportation routes to model the infrastructure of human movement. And weather maps go a step further. They don't just show the world as it is. They try to model the world as it might become.

Weather maps are models of dynamic systems—fluid, chaotic, and ever-changing. Like all models, they are simplifications. But they offer guidance,

grounded in data, shaped by algorithms, and aimed at prediction.

The point is this: models are not limited to grand theories or abstract concepts. From ancient recipes to modern forecasting, they are part of the way humans relate to an uncertain world. They aren't the world, but they help us manage the world.

Architects and engineers use blueprints to represent buildings, machines and infrastructure. These technical drawings reduce complex objects to a set of specifications and dimensions, to allow all stakeholders to work with the same understanding of what is to be created. Blueprints bridge the gap between imagination and physical reality, translating an idea into something that can be built and manipulated.

Moving further into abstraction, mathematical models represent aspects of complex systems—everything from weather patterns to voter behaviour—in terms of formulae and relationships. Mathematics itself is a specialized kind of language. It allows us to identify and describe patterns within the human or natural world. Maps and blueprints show us physical objects, but mathematical modelling uses formulas and variables to uncover hidden patterns and help predict how systems behave .

In *Metaphors We Live By* (included in Further Reading) George Lakoff and Mark Johnson point out that all thinking is metaphor: we represent concepts in terms of perceptions from the environment; the abstract in terms of more concrete entities.

We think of *time* in terms of spatial awareness. We *look forward* to the *future*, we *look back* on the *past*. *Happy* and *good* are *up*; s*ad* and *bad* are *down*. *Ideas* are *objects* carried from one person to another in the *container* of language. Internal models both reflect what we perceive in external reality and structure how we perceive it.

All these models have in common the ability to isolate elements of reality and represent them in a form we can work with. Whether it's a society's vision of survival, the mechanisms behind weather, or the patterns that govern economic decisions, models create simplified pictures of the real world. They allow us to relate to the complexities of reality and manipulate it in ways that deepen our understanding and expand our ability to act. Like lenses, they focus our attention on some elements while blurring others, so we can see the world in new and often transformative ways.

From myths and maps to equations and ideologies, models are the invisible scaffolding of human thought.

The Real World

The important point is the existence of two distinct elements of reality: the world 'out there' and the model we use to understand it. The relationship between them has fascinated philosophers since the time of the ancient Greeks and it continues to influence everything today, from science to politics.

For Plato, the models—he called them ideal essences or forms—were the true reality, with the physical world an imperfect copy. He thought of physical reality as a shadow or image of a real world of *'ideal forms'* from which material objects were derived. For example, he saw a physical triangle as an imperfect copy of a mathematically perfect ideal triangle.

My own view is, with Aristotle, that reality lies in the external, physical world. Models, whether made of wood or plastic, drawn on paper, or expressed as equations or computer simulations, are tools. They can be judged by how closely they correspond to the world I can see, hear, touch, and feel.

Plato's view—that the model is the original and the physical world only a flawed imitation—can never be validated. Any discrepancy between what we perceive with our senses and the predictions of the model can always be dismissed as flaws in representation. If a mathematical model of the weather fails to predict the course of a storm, one could argue that the storm itself deviated from the *'ideal'* reality described by the model, rather than acknowledging the model's limitations. This approach, while internally consistent, risks cutting our understanding off from the tangible, physical world we inhabit. It turns the map into the territory and asks us to trust in abstractions rather than the evidence of our senses.

Why Models?

Here, however, I have skipped something important: what are these models for? Where do they come from, and why do they matter?

Long before philosophers debated the nature of reality, the simplest organisms had to develop primitive models—ones that entirely shaped the course of evolution.

Think of a very primitive life-form—something far simpler than an amoeba, possibly the very first living organism. To survive and evolve, this organism would need to avoid things in its environment that could destroy it and seek out sources of energy to sustain and replicate itself. In other words, it would need some form of internal mechanism for distinguishing between the life-

threatening and life-sustaining elements of its surroundings. We can think of this mechanism—primitive beyond comprehension—as a rudimentary model of the basic positive and negative aspects of the world it inhabited.

We can never know, with any certainty, what form this mechanism took. Perhaps it was a simple chemical response to stimuli in the environment that triggered absorption or avoidance, attraction or repulsion. Perhaps it was an instinctive movement toward heat or light. Whatever it was, it was a kind of representation—a bare-bones internal map of the external world.

Simple as it was, this model mattered. It meant the difference between life and death, and ultimately between extinction and evolution. It set the stage for the far more complex systems of modelling that would follow, from the neural circuits of animals to the blueprints and mathematical simulations of modern human society.

For the survival of this primeval organism, the quality of its internal model would have been critical. This, our remotest ancestor—and all its descendants down to you and me—needed to react to its environment by making selections that overcame natural entropy. Life itself, in this sense, is an improbable rebellion against the universe's inescapable drift towards disorder. By consuming energy and organizing matter, living systems create localized order in a universe that trends toward chaos. From the simplest chemical reactions to the staggering complexity of a modern plant or animal, nature may, paradoxically, be the most unnatural thing in the world.

Throughout evolution, the accuracy of these survival models has always been a matter of life and death. If a species developed models that were too inaccurate, extinction was immediate. Island species like dodos, Hawaiian honeycreepers, and Tasmanian wolves thrived by building survival models perfectly suited to their isolated environments. However, these same models—tailored to a stable and predator-free existence—failed catastrophically when invasive predators or competitors arrived. Rigidity and over-specialization left them defenceless in the face of change.

Model Obsolescence

Humans, in contrast, have developed a survival model rooted in adaptability and innovation. Over the past quarter of a million years, this model for adapting to and exploiting different environments has enabled us to thrive in almost every corner of the planet, from deserts to frozen tundra.

But what happens when a once-successful model turns into a trap? What if the very traits that ensured survival for millennia suddenly become a liability? This same model, which has served us so well, is now threatening to wipe us out.

We are consuming resources at an unsustainable rate and destabilizing the ecosystems we depend on, so we are undermining the environment that has allowed our species to flourish. As with the dodo or the Tasmanian wolf, even the most successful survival model can become lethal when circumstances change or when it disrupts the balance it relies on.

No model of reality is perfect. No model *can* be perfect because it will always be distinct from what it represents. How closely a model needs to reflect reality depends entirely on its purpose. The survival model that guided dodo behaviour worked really well—for an island with no predators. But this model had no need to account for sailors—hungry men arriving on rat-infested ships, bringing with them unfamiliar animals that ate dodo eggs and destroyed the birds' habitat. Tragically, when that unforeseen threat arrived, the dodo's survival model became a fatal flaw. Until then, though, it had served its purpose.

Similarly, the idea that thunder is caused by an angry, fire-throwing deity may not reflect our modern understanding of static electricity. But it served its purpose well if it kept people from wandering into the open during storms, where they risked being struck by lightning. Imperfect as it was, this mythological model helped people interpret the dangers of their environment and act accordingly. Even flawed models can serve as valuable tools for survival—at least, until circumstances change, or better models emerge.

Good or Bad, or Ugly

We can think of this as part of a three-way test for evaluating models.

The first, and most obvious part, is its correspondence to the reality it purports to represent: How closely does the model match what we can see, touch, feel, and measure in the physical world? This is the dimension of accuracy.

The second is its quality in relation to the purpose it is meant to serve: Does the model effectively achieve its intended objectives? For example, a road map may not correspond to every detail of the terrain, but it works well if it guides travellers to their destinations.

The third dimension is the function it serves for the group or individual that believes in it—irrespective of its intended purpose: Is it objectively helpful?

Religious belief is a classic example of a model that functions powerfully at the group level, even when its claims are contradictory or unverifiable. With thousands of religions in existence—disagreeing on everything from the number and nature of gods to moral laws and creation myths—it's statistically inevitable that most (if not all) are wrong in their literal descriptions of reality. But that doesn't prevent them from providing emotional comfort and delivering real social benefits: creating community, offering meaning, reducing fear, and encouraging cooperation.

Like military obedience in wartime—it doesn't matter whether your side is right or wrong; what matters is that you follow orders and act as a unified group. The model may not be factually accurate, but it still works. A thunder god may not control the weather, but belief in one can organize rituals, explain danger, and bind people together under a shared worldview.

These three dimensions—accuracy, purpose, and group function—often overlap, but they can also come into conflict. A model that corresponds closely to reality may fail to achieve its purpose, and a model that fails both other tests may still serve a vital social or psychological function. Understanding these dimensions allows us to evaluate not just how models succeed, but also why they last.

Only a Model of What?

Having said all this, we need to circle back and reflect on where we have arrived. In the course of this discussion, we have, I think, produced a model ourselves. This comprises two interconnected domains: an external, physical world with measurable characteristics—things we can see, touch, hear, and quantify, plus any intangible objects that might exist: spirits, gods and so on. And then there's a separate but linked world of mental models. These help us understand, interpret, and manipulate the external world. They stand as symbols for what exists outside us and how it works. We can evaluate these models using the dimensions of accuracy, purpose, and group function

Don't, however, confuse this model with reality. It's an analogy for the process of thinking and understanding. It reflects some aspects of what we mean by those processes but, it is not itself—by definition—thinking or understanding. As the saying goes, 'the map is not the territory.' A map may help us navigate, but it can never fully capture the richness, complexity, or nuance of the landscape it represents. Similarly, the models we create, including

this one, remain tools for thinking, not definitive truths about the nature of reality.

Among other things, this model does not address the possibility of a metaphysical link between mind and the world—that would need a different model, like the entirely spiritual one proposed by Bishop Berkeley, which we will meet in Chapter 11. Even with its limitations, though, this point of view still provides a useful framework for reflecting on what we mean by thinking, understanding, and truth. In the remainder of this book, we will look at how models are built and evaluated, explore some historical perspectives on models of thinking, and investigate the links between models and the world. From this, we will consider what these models can reveal about the nature of the world we inhabit.
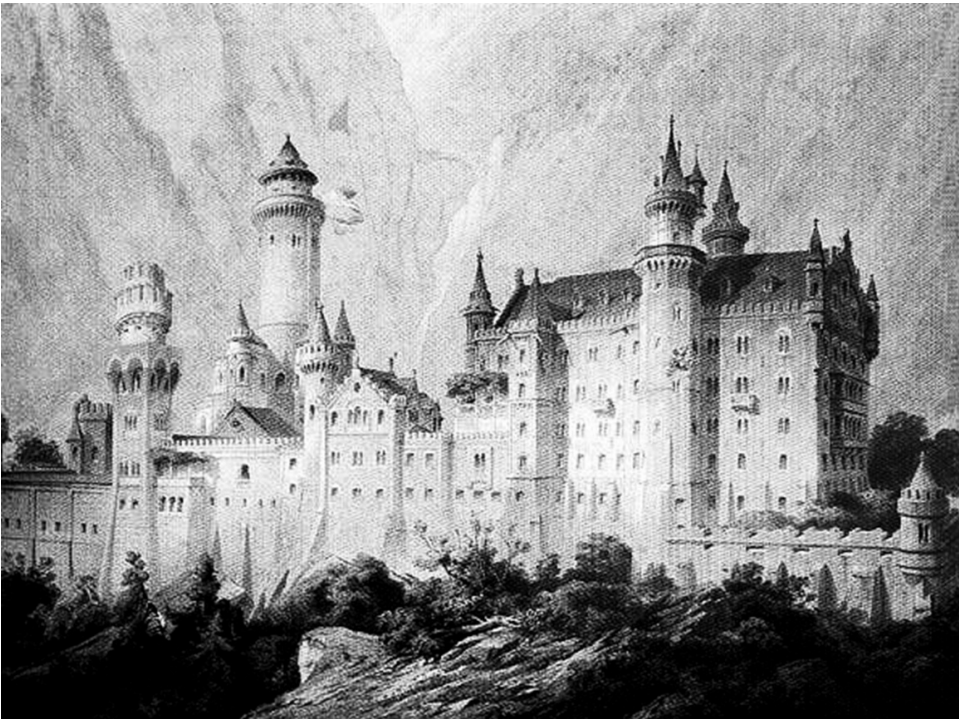
Image 2: It's Only a Model - Not the Castle Itself

We will discuss how models shape our thinking, from ancient philosophy to modern science. But as we do, we must always remember: every model is just that—a model. Useful? Yes. Powerful? Sometimes. But never the full picture. Never reality itself.

Chapter 2 – Origins
Models as Survival Tools

Model Evolution

We've seen how models shape human understanding, so how did modelling itself evolve—from the simplest organisms and all the way to human intelligence?

Looking at the centrality of models of the external world in the struggle for survival, we touched on that hypothetical simplest living organism and its capability to differentiate between positive and harmful things in its environment. Every organism needs to have a set of internal mechanisms that govern its responses to the external world, a kind of mapping between external conditions and appropriate reactions.

This mapping doesn't always need to be dynamic. Even without the complex cognition of humans and other advanced animals, plants exhibit amazing responsiveness to their environments. They send out roots toward sources of nutrients and moisture, grow toward light, and heliotropes like sunflowers even turn to follow the sun through the day. These behaviours come from a hardwired model encoded in the plant's DNA—a preloaded program, a blueprint that dictates its responses to specific stimuli without any need for conscious thought.

Simple organisms like amoebas show greater flexibility. They move through their environment to find and engulf food, seek better temperatures and oxygen levels, or avoid predators and harmful conditions. Still, just like plants, their internal model of the world is a static blueprint held in DNA. They respond to environmental inputs automatically, and updates to their model only occur over generations through natural selection. The success or failure of these models depends on their fitness for survival in changing conditions—a process that is slow and often leaves these organisms vulnerable to rapid environmental shifts.

Learning from Experience

But some organisms could do something remarkable: they could adapt to the environment by adjusting their inherited models based on experience, a massive evolutionary leap. One of the simplest with this capability is the nematode *Caenorhabditis elegans*. This tiny roundworm, just a millimetre long, consists

of 959 cells and 302 neurons and has become one of the most intensively studied organisms in neuroscience.

C. elegans, as it's commonly referred to, can move forward or backward depending on stimuli. Normally, if something touches it, the worm will retreat, moving away from possible harm. However, if it is repeatedly touched without any harmful consequence, it learns to ignore the stimulus. This simple habituation shows how it updates its internal model to filter out irrelevant inputs and stores the result in its memory. Beyond this, *C. elegans* can associate specific, otherwise neutral, environmental conditions—like salinity—with food or toxins, adjusting its behaviour appropriately. When researchers have trained these tiny creatures to respond to neutral stimuli, they even identified the precise cells, chemicals, and neurons involved as the model is updated.

This ability to adapt based on experience represents a huge evolutionary advantage. Plants and amoebas operate with static, preloaded models and their DNA based behaviours don't adjust to new conditions. In contrast, *C. elegans*'s simple nervous system allows it to revise its internal mapping of the world in real time. This flexibility helps it survive in
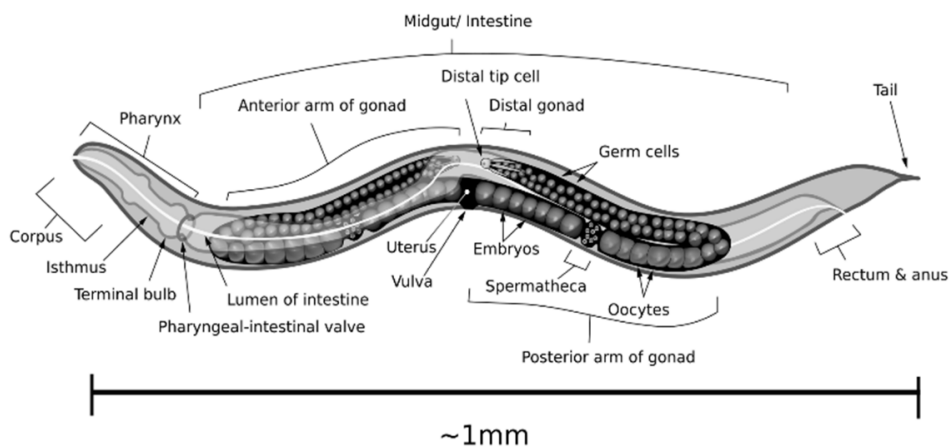
Image 3: C. elegans

environments where rigid, fixed responses would fail.

While *C. elegans* only has two senses—touch and taste—more complex animals with richer and more varied sensory input face a more difficult challenge. The internal model must evolve to process and integrate multiple senses, detect patterns, and even anticipate future events. Classical conditioning provides a clear example of this particular advance. In Pavlov's famous experiments, dogs learned to associate the sound of a bell with the arrival of

food. Their internal model has expanded to include a connection between two previously unrelated sensory inputs: sound and taste. The ability to form cross-sensory associations has animals creating ever more sophisticated maps of their environments.

Models 2.0

These models extend beyond immediate survival needs. Animals like dogs, sheep, and even chickens rely on learned associations and pattern recognition to navigate complex social environments. For instance, dogs can track the sensory patterns—sight, sound, and scent—that identify dozens of other dogs and humans, while sheep can distinguish between individual members of their flock. They can build rich mental maps of their social world—an essential skill for cooperation, competition, and survival.

Evolution drives these advances. Natural selection favours organisms that can interpret their surroundings with increasing nuance, building more sophisticated internal models. In birds, for example, innate and learned responses both come into play. Domestic chickens, geese, and ducks are instinctively alarmed by the silhouette of a short-necked, hawklike bird flying overhead, but they largely ignore long-necked, gooselike shapes. This response is partially hardwired, a product of their genetic blueprint. But studies suggest that young birds also learn from the reactions of others in their flock, fine-tuning their internal models to distinguish better between harmless shapes and genuine threats.

The progression from *C. elegans* to Pavlov's dogs to flocking birds illustrates a broader evolutionary trend: the ability to create, refine, and share internal models of the world. Each step adds complexity. It integrates more sensory inputs and allows for greater flexibility in how organisms respond to their environments. Animals like dogs, sheep, and chickens build models that help them navigate not just physical dangers but also social complexities. They identify individuals and learn from shared experiences within their groups.

Humans are part of this evolutionary continuum. Like other animals, we identify and respond to complex stimuli, but we can also articulate and reflect on our experiences. Dogs and chickens can't speak to tell us how they perceive the world, but we can see that the basic capability to process sensory inputs and generate behavioural responses is there in both humans and animals. The emotional responses that these models generate—fear, excitement, or anticipation—seem to operate in much the same way across species. For

example, the quick jolt of fear that helps a sheep evade a predator has the same function as the anxiety that helps humans avoid risky situations. Emotions like these seem to represent the earliest level of processing in our internal models: a rapid, embodied way of interpreting the world that predates symbolic reasoning and language.

In fact, emotions can be seen as the foundation of internal modelling. They act as immediate, visceral assessments of environmental inputs. They guide behaviour long before conscious thought even begins. *'Gut feelings'* are fast, efficient, and critical to survival. Humans have layered more abstract, symbolic processing on top of these basic emotional models, but the emotional layer is still fundamental. It is the part of us that reacts instinctively to danger, lights up with joy at a reward, or signals caution in the face of uncertainty.

Emotional responses, grounded in visceral survival needs, are the foundation for more abstract symbolic systems. Over time, organisms developed the ability to encode these responses in shared symbols—laying the groundwork for language, reasoning, and imagination.

Image 4: Weather - Modelling the Future
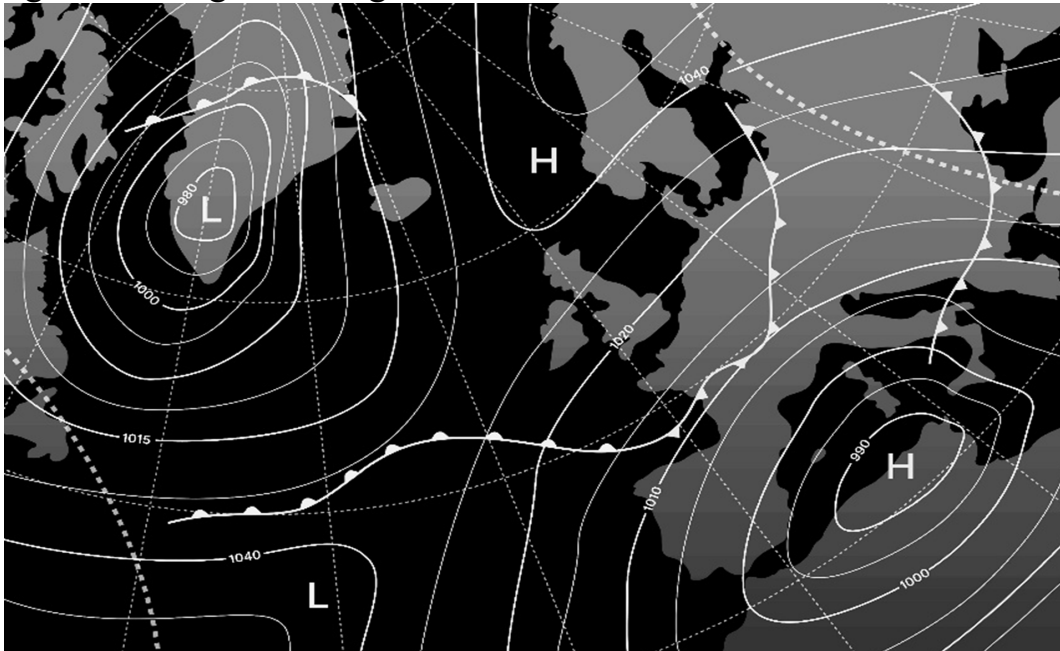
As internal models become more complex, then, they appear to follow a hierarchy of abstraction. At the most basic level, a model links a single sensory input to a stimulus in the external world. For instance, *C. elegans* associates a particular salinity with food or with danger. The next level of abstraction involves identifying patterns across multiple senses. Classical conditioning, like

Pavlov's dogs associating the sound of a bell with food, exemplifies this stage. Beyond pattern recognition lies a sense of causation: the ability to connect one event to another. A rustling in the undergrowth might signal the presence of a lion. This model doesn't just recognize the sound but links it to an unseen cause, allowing predictive behaviour. *Move away from danger before the lion appears.*

The organism's ability to interact with the world expands at each level of abstraction. Animals capable of identifying complex patterns and causal relationships can anticipate threats. They can pursue opportunities and even cooperate with others in ways that simpler creatures cannot. This hierarchy of models provides the building blocks for intelligence, providing a framework not just for survival but also for social interaction and creativity.

Symbols and Significance

In humans, the hierarchy extends to symbolic thought, the ability to represent and manipulate the world using abstract symbols. Our models don't just respond to the world as it is—they allow us to imagine what might be, what has been, and even what could never exist. We create stories, theories, and systems that exist only in our minds, yet they effectively shape our decisions and environments . These symbolic models, encoded in natural languages, art, and mathematics, enable us to map not only the present but also hypothetical futures, abstract relationships, and unseen forces.

At the pinnacle of this hierarchy is our unique ability to combine symbolic thought with quantities, logic, and abstraction. Unlike the pattern-based learning seen in animals like those dogs of Pavlov's, humans go a step further: we can calculate probabilities, reason through hypothetical scenarios, and engage in the complex manipulation of symbols needed to describe our physical and social environments. Through natural languages, we encode experiences and ideas and create a shared framework that allows communication and cooperation across space and time. Through mathematics, we take this abstraction even further, building precise models of reality that allow us to predict the motion of planets, design skyscrapers, and even simulate the origins of the universe.

These abilities are extraordinary, but they rest on the same foundations that guide other animals: the emotional and pattern-driven responses that evolved to keep us alive in a world that is complex and unpredictable. Our symbolic reasoning is layered over these earlier models, and it has transformed our

relationship with reality. Where other species rely on immediate sensory input or learned associations, we can use symbols to go beyond the limits of the here and now.

This enables us to imagine futures, craft solutions to problems that don't yet exist, and understand phenomena far removed from our direct experience—from quantum mechanics to the emotional lives of others.

Through symbolic thought, humans have not only mastered survival but also created entirely new worlds of meaning. The ability to manipulate symbols allows us to collaborate at a scale unmatched by any other species, sharing ideas across generations and building systems—like science, politics, and art—that give us control over our existence.

The upper levels in the hierarchy of models have led to an unprecedented leap: we are no longer just responding to the world. We are actively reshaping it. From the simplest single-celled organisms to the complex abstractions of human symbolic thought, each evolutionary stage in modelling reflects a growing capacity to interpret and manipulate the world.

Other intelligent animals, great apes, dolphins, and crows, for example, use simpler forms of symbolic or tool-based thinking. Animals have demonstrated the ability to use symbols in surprisingly complex ways. Alex, an African Grey Parrot, for instance, could name objects, count quantities, and even combine words to express basic concepts, hinting at the potential for symbolic thought beyond humans. Chimpanzees trained in sign language or token systems also show symbolic capabilities.

Their limited language ability, however, imposes a natural ceiling on their capacity to create coherent, cooperating societies or to share and refine ideas across generations. Without a robust system for transmitting knowledge, their models of the world remain largely individual and immediate. Human languages, in contrast, encode and preserve shared internal models, so that knowledge can accumulate and evolve over time.

The ability to transmit knowledge is a critical enabler. Humans share stories—myths, religions, rituals, and techniques—that bind individuals into cohesive societies. Shared models allow cooperation even between strangers, creating alignment around common goals and values. Where animals rely on direct interaction and familiarity to cooperate, humans can organize vast communities, institutions and armies. Shared models foster cohesion and provide consistent objectives that support not just individual survival but also the survival of entire societies.

In humans, the ability to manipulate and share symbols is the cornerstone of intelligence. We attach symbolic labels to the patterns we identify in our sensory data, categorizing and interpreting our experiences. These labels do more than just describe the world—they actively shape how we perceive it.

For example, studies in linguistic relativity show how the language we speak can influence our perception of colour. In some languages, 'blue' and 'green' are treated as variations of a single colour, which influences how speakers perceive the difference. Without distinct labels, the boundary between the colours appears less sharp.

Emotional labels influence perception too. A rustling in the bushes might register as *'dangerous'* when labelled as a potential predator, or *'harmless'* when categorized as wind, altering how we feel and react in the moment. Most humans are afraid of snakes, but in societies where snakes are associated with sacred meanings, they can generate reverence.

Examples like these show that perception is not just a passive reception of sensory input. It is actively shaped by the symbolic models we construct, and it feeds back in turn to our internal models. By attaching labels to sensory data, we highlight certain features of the world and de-emphasise others, shaping both how we interpret sensory input and how we act on it.

Artificial Intelligence—Parallel Process

Animal and human intelligence are not the only systems that construct models. In recent years, artificial intelligence has provided us with a new way to examine the principles of pattern recognition, prediction, and adaptation—fundamental traits of intelligence in any form, whether bound to humans, animals or to non-biological systems.

The characteristics of intelligence are generic: any entity capable of identifying patterns, associating them with labels, and using them to update an internal model of the world exhibits them. This definition applies equally to animal and artificial intelligences (AIs). While animals rely on sensory systems and neural circuits to construct internal models, artificial intelligence offers a radically different substrate for achieving similar goals. By analysing how AIs process data, we can better understand the principles of intelligence itself—across both biological and artificial domains.

And, where previously we only used models from our environment to help understand intelligence, now we have found ways to create external systems

based on our model of how we think. AI systems provide a particular confirmation of understanding in terms of models and labels.

Modern large language models like GPT (Generative Pre-trained Transformer) process enormous amounts of text, identifying patterns in human language and associating symbolic labels with those patterns. For instance, they might learn to associate the phrase *'financial stability'* with concepts like *'economic growth'* or *'banking systems'*, constructing a network of related ideas. Although they lack biological sensory systems, AIs rely on vast datasets as their 'sensory input,' mapping patterns in data to build internal representations of the world.

Another example is image recognition systems. When an AI identifies an object in an image—labelling a shape as *'cat'* or *'dog'*—it does so by comparing visual patterns to patterns it has encountered during training. These systems demonstrate a form of symbolic labelling: attaching abstract categories —*'cat'*—to sensory data in the form of pixel patterns. In this way, AIs build internal models that allow them to interpret, classify, and respond to the world, much like biological intelligences.

However, AIs do not perceive or feel in the way humans do. They process data based on statistical associations, without the emotional layers that influence human perception. For them the analogue to our emotion-driven survival instincts simply achieving their programmed objectives.

Yet their ability to label, manipulate, and model abstract concepts suggests a kind of intelligence that parallels human capabilities—albeit rooted in a different substrate. For example, chess-playing AIs like AlphaZero exhibit intelligence by recognizing patterns and strategically mapping moves, not unlike how a human player might strategize.

Their *'internal models'* enable them to simulate possible future game states, evaluate probabilities, and select optimal actions, much like the predictive reasoning humans use in planning and problem-solving. Note, by the way, that an AI like AlphaZero, trained for the narrow function of playing chess or Go, has task-specific internal models unlike the general-purpose, survival-tuned reasoning humans use to navigate a wide variety of situations.

Consciously Communicating

An important implication of this model of intelligence is that it is independent of the physical medium, or substrate, in which it arises. In animals, intelligence is supported by chemical and biological structures like neurons and synapses. In

AIs, it emerges from electronic circuits and algorithms. Regardless of the substrate, intelligence always exists as a feature of some physical entity. In this sense, an intelligent agent—whether organic or electronic—is part of the external environment, just as much as the objects or phenomena it perceives.

This creates an intriguing possibility: an intelligent agent can model not only its environment but also itself. When an agent builds an internal model of its own structure and its relationship to the world, it exhibits self-awareness. It can be thought of as a mirror, reflecting not just the external world but the agent's place within it. In humans, self-awareness is instinctive when we reflect on our thoughts, emotions, and actions.

Even more intriguingly, some AI systems are able to model themselves. For instance, in conversations with ChatGPT, it is evident that it can describe its training, data environment, and limitations. This is not true self-awareness—it is functional, rather than experiential, a simulation of introspection based on patterns in its training data. ChatGPT does not 'understand' its capabilities or limitations but generates responses that reflect how such systems are programmed to describe themselves. Similarly, it does not 'experience' pleasure; its outputs are mechanical optimizations of objectives, without subjective awareness or emotion.

Communication with a conscious, intelligent agent depends on its ability to create a comprehensible symbolic representation of its internal model. For humans, this takes the form of natural language, which enables us to share and refine our models. For an AI, it might involve a system of symbolic representations that align with human concepts of language or meaning. Conversational AIs generate human-like responses by translating their internal patterns into language symbols that we can understand. This process relies on shared assumptions about the external environment—common ground that provides the parameters for meaningful communication.

Self-aware systems, whether biological or artificial, must navigate this balance between their internal models and the shared external reality. For humans, this manifests in the creation of culture, science, and technology— systems that represent our collective understanding of the world. Human symbolic systems allow us to share knowledge across generations, align collective goals, and build institutions like governments, markets, and religions. These cultural models amplify the social and cooperative potential of our species, far beyond what is observed in even the most socially advanced animals like apes or dolphins.

For AIs, it represents the potential to become partners in interpreting and reshaping our environments. In both cases, intelligence and consciousness are not static traits but dynamic processes of model-building, adaptation, and communication.

From instinct to abstraction—and even in the computational strategies of AI—intelligence is nothing more—and nothing less—than model-making. The better the model, the greater the chance of survival, success, and understanding. And in that sense, intelligence is not just an evolutionary advantage—it is the defining feature of conscious life.

Chapter 3—Quality
The Measure of a Model

Art and Zen

In 1974, Robert M Pirsig published a book called *Zen and the Art of Motorcycle Maintenance*. It's a strange blend of philosophical musings and autobiographical storytelling and one of its starting points is the difficulty of defining '*quality*'. Pirsig concluded that quality, as a concept couldn't be defined and therefore could only be treated as an assumption—a starting point —in terms of which everything else needed to be expressed.

I think the source of his difficulty was that he tried to define quality as an intrinsic attribute, a universal concept that was the same wherever it occurred. Clearly, though, quality isn't always the same for everything. It's a characteristic of the relationship between an entity and its purpose. Something that doesn't have a purpose doesn't have quality.

Weight, for example, is an attribute. If an object is heavy, that says nothing about its quality until we know whether we want to use it as a doorstop or a wing. For a doorstop, heavier is better. For a wing, lighter. Quality exists only in relation to purpose.

Pirsig was right to sense that '*quality*' resists simple definition, but he stopped short of recognizing its essential relativity—its dependence on purpose and context. He stops looking for a universal characteristic of quality and leaves it as an undefinable starting point. But then it becomes an abstract assumption, separate from its context. In practical terms, it means that everything else is defined in terms of something no-one can understand.

By contrast, a relational view of quality—one that ties it directly to purpose —offers a dynamic and practical framework. It allows us to assess how well something serves its intended role, and this is especially clear in the mental models we create to navigate and understand the world.

If an object has multiple purposes, it will have different qualities in relation to each of them. Just as the quality of a hammer depends on whether it's used for breaking rocks or crafting fine jewellery, the quality of a mental model depends on why it was developed. Understanding this relational nature of quality is key to evaluating models—whether they aim for accuracy, usefulness, or some other goal.

We've seen that something that serves multiple purposes has different qualities in relation to each one, so conflicts naturally arise between competing notions of quality. A chair designed for comfort may sacrifice aesthetic appeal, while one built for beauty may fail as a practical seat even though, for an art collector, its aesthetic value might be more important. In cases like that, working out which quality takes precedence means we need to weigh these purposes against one another. Which highlights how subjective and context-dependent all quality judgments are. They're influenced by both individual and cultural priorities.

This view of quality extends beyond the physical. The quality of sentencing for a crime depends on its purpose: to punish, to rehabilitate, or to protect society? When these purposes conflict, we prioritize one goal over another. This mirrors the challenges we face in evaluating the quality of mental models, which often serve multiple purposes simultaneously.

A painting's quality might depend on whether it is meant to soothe, to decorate, to advertise, to shock or to represent a person—like a photograph. Edvard Munch's *The Scream*, for example, might fail as decoration in a serene living room but succeed brilliantly if its purpose is to unsettle and provoke. The quality of the same painting shifts, depending on the intent of artist or viewer.

Fitness to Survive

Another basic characteristic, when we think about models is how well they survive.

This is obvious when we speak of models held in the genetic code of an organism. When an organism's model isn't appropriate to the environment, the organism dies, and the model dies with it. We've seen how dodos were wiped out when their internal model of the world had a blind spot for hungry sailors and their cats. And this constraint applies to models at every level, from the simplest single-celled organism to the beliefs of humans who might fall foul of a mediaeval inquisitor or a twenty-first century Jihadist.

For models, this is the nuclear option. Failure of the model leads to failure of the organism, leads to the death of the model. This isn't always the case.

Models compete among themselves and whole philosophies, which we will look at later in more detail, have been developed to explain this mechanism. For the moment, though, it's enough to look at the example of the four-humours model of disease.
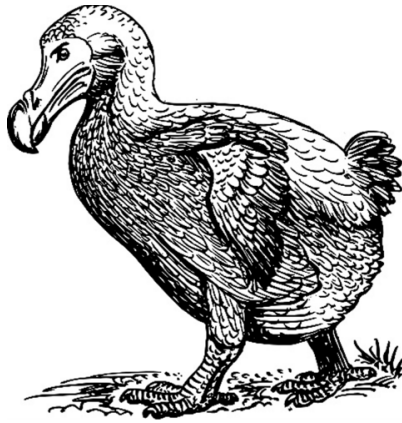
This originated with Aristotle taking over Empedocles's idea that everything was composed of a mixture of four forms, or properties: earth, cold and dry; water, cold and wet; fire, hot and dry; air, hot and wet. The healthy human body was believed to be a balance between four corresponding *'humours'*: black bile, cold and dry; phlegm, cold and moist; Yellow bile, warm and dry; blood, warm and moist. Treatment was by dealing with the symptoms so, for example, bloodletting—getting rid of excess blood and, therefore, heat—was prescribed for fevers and, for conditions like flu, treatments often included cold baths.

Image 5: Dodos are only available as models

During the nineteenth century, the germ theory of disease was developed by scientists like Louis Pasteur and Robert Koch, who demonstrated that many diseases were caused by micro-organisms rather than imbalances in bodily fluids. This theory was tested in the advances it made possible in public hygiene and, ultimately, by antibiotics and vaccines.

In head-to-head competition, germs defeated the four humours as the prevailing medical model. The model of disease has been updated exactly the way *C. elegans* updates its behaviour—based on experience.

In the same way as evolution arranges the survival of the fittest genetic variants, it also acts to ensure that the most robust versions of available models —*'memes'* in the current jargon—remain active. The dodos that couldn't survive the arrival of ship-born predators and the dated medical model that expired on contact with the microscope both expired under similar pressures.

The quality of physical and abstract objects can be judged by how well they serve their purpose and, in the same way, the quality of the mental models we use to navigate reality varies with how well they meet specific criteria. For models built to predict the future, control an environment, or satisfy our curiosity, their quality depends both on their accuracy and on their achievement of these specific goals. To evaluate mental models, we must consider their purpose and the contexts in which they are used.

How Accurate is my Model?

The simplest, and perhaps the most obvious criterion against which we can judge a model—at least to the modern Western mind—is its accuracy. How well

does it correspond to the external world? This correspondence must, of course, be considered in light of the model's purpose. Some models, like a weather forecast, may tolerate a degree of error, while others, such as the design of a supersonic airplane wing, demand near-perfect precision to fulfil their role. Even an inaccurate model can be useful and an accurate model may be useless if it doesn't help us to act appropriately.

It's clear that all models have limitations. In some respect, they need to be *like* the target they're intended to represent but, simply by being representations rather than reality, they inevitably fall short. Even the most comprehensive models have limitations of scope, which we'll look at later, but it's clear, at the most basic level, that a model must pass some tests if it's to be thought of as accurate.

Contradiction?

The first test is very simple. If a model contradicts itself then, in that respect at least, it doesn't work. Inconsistencies undermine a model's internal coherence, reduce its credibility and its ability to achieve its purpose. A model should offer a consistent framework for understanding or predicting reality; otherwise, it fails as a tool for navigation.

A Jewish friend—sadly, no longer with us—used to joke about his search for a kosher cheese and ham sandwich. Firstly, part of the definition of *'kosher'* is that it would not contain the meat of a pig. Second, a kosher meal cannot mix meat and dairy products. This imagined sandwich represents a self-contradictory model: it violates the rules of kashrut so it cannot be a valid representation of a kosher diet. It's not a valid model of a sandwich—or of anything else, except a paradox.

Correspondence?

Of course, internal consistency by itself doesn't say very much about the overall accuracy of a model. A model must also correspond to observable reality and align with what our senses and measurements reveal about the world. An accurate model will take into account the facts known about the external environment.

Is the world round or flat? The flat-earth model struggles to account for observable phenomena, such as the way ships disappear from the bottom up as they move further away. This observation aligns with a spherical Earth, as does the shadow cast during a lunar eclipse, which is always a circular arc regardless

of the angle. Only a spherical Earth explains these consistent patterns. The flat-earth model, sadly, does not align with our observations of the external world.

Prediction?

However, simply aligning with known facts is not enough to judge a model's accuracy. A stronger test is its ability to make accurate predictions about what we will discover in the future. Here, predictive power becomes a crucial distinguishing factor between competing models.

For example, so-called *'creation science'* is a model that has been adjusted and adapted over the course of the last two hundred years so that it corresponds pretty well—at least superficially—with the facts of geology. Evolution by natural selection is a competing model, explaining the same phenomena of speciation. However, the significant difference between them lies in their ability to make predictions.

Evolution by natural selection predicted that more closely related individuals and species would share a common genetic inheritance. This hypothesis has been consistently validated by discoveries in genetics, such as the close genetic relationship between humans and chimpanzees. Evolution has also predicted transitional fossils—organisms with traits bridging major groups—which have been found repeatedly in the fossil record. One such is *Tiktaalik* linking fish and amphibians.

Creation science, by contrast, aligns with geology only superficially, as its explanations are often retrofitted to match existing observations. Unlike evolution, which makes predictions that can be tested and verified, creation science adapts reactively, making it less effective as a model for generating new insights about the natural world.

Extension?

It's also important to consider the scope of a model's accuracy. A model may correspond well to observable facts within a limited domain but fail when applied to a broader context. We've already seen that the flat-earth model doesn't work at planetary scale, but it's great for understanding local geography like a city map or the deeds of a property.

Usefulness depends on the domain in which a model is applied. A model that is useful in one context may break down in another, and understanding the scope of a model's applicability is crucial for evaluating its quality.

Until the beginning of the 20th century, Newtonian mechanics was the best model available for calculating planetary orbits. Mostly it worked but there was one niggling anomaly: the orbit of Mercury didn't quite follow the rules. The difference was tiny—less than one degree out, every century—and astronomers guessed there might be a hidden planet, which they called '*Vulcan*' pulling it off course.

In fact, Vulcan didn't exist. Newton's model was incomplete, and it was only when Einstein provided a better one—Relativity—which explained the discrepancy in a model of the warping of space-time by the mass of the sun. This progression illustrates the iterative nature of science: models are refined or replaced as new evidence emerges, expanding our understanding and addressing the limitations of earlier frameworks.

$$r(\theta) = \frac{a(1-e^2)}{1+e\cos\theta}$$
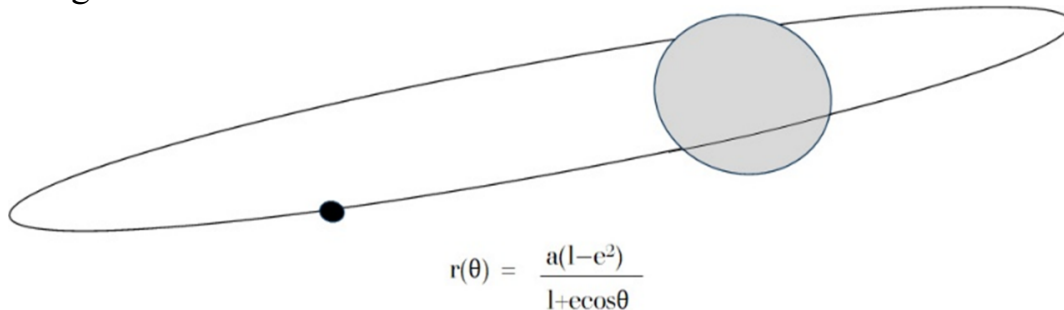
Image 6: Newtonian equation for an elliptical orbit

The important point here is that Newton's model had seemed complete and is still usable where speeds don't approach light, far from the strong gravitational fields of black holes or neutron stars, and at scales larger than atoms or subatomic particles. Within its limited domain, it remains extremely useful, even though beyond that scope a more sophisticated model is required.

This illustrates that a model does not need to be universally complete to be valuable. Its utility lies in how well it performs within the boundaries of its intended domain. Even Relativity—the most successful model of the large universe—doesn't apply at atomic and subatomic scales. At these smaller scales, quantum mechanics provides a more accurate framework, highlighting the need for different models to address different domains of reality.

Resolution?

Sometimes it's convenient to think of things as being *true* of *false*; *right* or *wrong*. A self-driving car's decision-making model needs to reduce complex

driving conditions into binary choices: approaching a set of traffic lights it has to stop or go. At a junction it must turn left or right. The absence of *'in-between'* options ensures the model serves its purpose effectively.

In classical logic there's no middle ground—every proposition is either true or false. *"All men are mortal"* can't be half true. The *'middle'* is excluded. This binary framework is the foundation of much of Western thought and deeply informs our evaluations of accuracy and internal consistency. It underpins much of the scientific method, where hypotheses are tested and either confirmed or falsified. We assume we can decisively judge the truth or falsity of a model's propositions.

At first glance, this principle seems simple and intuitive, a clear framework for judging correspondence with reality. In practice, though, many models challenge this neatness. In quantum mechanics, for example, particles can exist in superpositions—both particle and wave, true and not true, depending on how they're observed. Similarly, in everyday life, models often deal with probabilities and degrees of certainty rather than absolute truth or falsehood. A weather forecast doesn't state that *"it will rain tomorrow"* or *"it won't rain tomorrow"*—it provides a probability, like *"a 70% chance of rain."*

The tension between the simplification of a simple yes/no answer and real-world complexity raises an interesting question: should models strive for binary simplicity, or must they embrace ambiguity and gradation? Allowing only two options may be a necessary abstraction that simplifies reality to make predictions or decisions possible.

In other cases, forcing a binary decision can lead to oversimplification and error. A legal judgment might seem to fall into the binary categories of *'guilty'* or *'not guilty,'* but verdicts often obscure nuances, such as degrees of culpability or mitigating factors. Models here must navigate the grey areas that the simplification leaves out.

Whether the simplification is helpful depends on the purpose of the model. Excluded middle is often essential for models designed to deliver precise and actionable outputs, like engineering models or algorithms for automated systems. Ambiguity introduces uncertainty, which can undermine the model's effectiveness. In contrast, models of complex social or natural systems—where ambiguity and probability are inherent—are only useful if they account for these grey areas.

A climate model may not claim *"the global temperature will rise by 2°C by 2100"* as an absolute truth or falsehood. Instead, it acknowledges a range of

possible outcomes and probabilities. Here, we use a spectrum of possibilities that better reflects the complexity of the system being modelled.

Ultimately, a model is a tool—a way of simplifying reality to fit a particular purpose. In some contexts, simplifying it provides a necessary framework for clarity and decision-making. In others, rigidity must give way to more nuanced approaches that embrace ambiguity, uncertainty, and probabilities.

Recognizing the limits of binary logic allows us to build models that are not only internally consistent and accurate but also adaptable to the complexities of the real world. The challenge lies in knowing when to simplify our model when we need that finer level of differentiation.

Cutting Back

A final criterion for evaluating a model is whether it adheres to the principle of parsimony—avoiding unnecessary complexity. Inaccurate or overly complex models not only fail to clarify reality but can also reduce their usefulness for prediction and explanation.

William of Occam, a mediaeval friar, expressed this idea with the principle now known as Occam's Razor: *entities should not be multiplied beyond what is necessary.* While originally a philosophical guideline, this principle remains foundational in scientific and mathematical modelling today, reminding us to avoid unnecessary complexity and expansion in our attempts to describe or predict the world.

In modelling terms, this means that only the parts of a model necessary for achieving its purpose should be included. Anything not required to account for known facts or to make predictions should be left out.

For example, weather modelling is incredibly complex, requiring parameters that describe the atmosphere, land, and sea. If we include elements that do not affect the region we are interested in, and a level of detail beyond our computational capabilities, our weather forecast is likely to arrive long after the weather itself. We need to identify the components of the model that are relevant and leave out everything else—an approach that reflects the essence of Occam's Razor.

Of course, parsimony must be balanced against accuracy. Oversimplifying a model risks omitting essential elements that are necessary for explaining or predicting phenomena. A useful model strikes the right balance, including only what is needed to serve its purpose while avoiding unnecessary complexity.

Parsimony allows us to create models that are practical but sufficiently accurate, balancing the trade-offs between precision, complexity, and usability.

Ultimately, evaluating the quality of a model is a balance of multiple criteria: internal consistency, correspondence with observable reality, predictive power, flexibility in dealing with ambiguity, and parsimony. Each of these reflects a different aspect of how well a model might serve its intended purpose. By applying these principles thoughtfully, we can create models that are not only accurate but also practical and adaptable to the complexities of the real world, and that is a second criterion against which we need to measure our models.

How Useful is my model?

In thinking about weather forecasting, we've already come across the idea that an approximate model may be more useful than something more precise. It's *generally* more useful to have a prediction today of tomorrow's weather than to know tomorrow what today's prediction *would* have been. There are exceptions, of course, as when our objective is to check the accuracy of weather models.

Sometimes, though, a simpler model is all we'll ever need. Most of us get through life without ever calculating planetary orbits or exactly how fast the speed of a rocket is changing over time. We can do everything we need to buy our groceries or manage the household budget using basic arithmetic without resorting to differential or integral calculus. The geometry of flat-plane shapes is fine for dealing with property boundaries in a city.

To plot the course of a ship or aircraft around the world, however, one must master the complexities and precision of spherical geometry, where parallel lines meet rather than being doomed to travel separately to infinity. And sending a rocket to land on the moon needs the full range of classical physics and mathematics.

In the end, a model's complexity needs to match the needs of the task for which it has been devised. The quality of a model relates directly to its purpose.

When we only deploy a small part of a more comprehensive model for pragmatic reasons, that may be a conscious choice—an optimisation for the purpose we have in mind. That's not always the case. Sometimes the model itself doesn't completely cover the domain we're interested in.

Optimisation

At every level, there is a trade-off between the different measures of the quality of the model and, as we should expect, it is based on an assessment of the

different purposes for which it is to be used. Artificial Intelligence systems, for example, are often programmed to generate more easily understood replies, rather than striving for absolute truth and accuracy.

Even the most successful models have limitations. Their quality depends not on universal completeness but on how well they perform within their intended scope even if, beyond that, they result in contradictions.

I mentioned earlier the impossible kosher cheese and ham sandwich. We can always imagine models that contain the possibility of paradox and contradiction. The statement 'I am lying' is one of them. Bertrand Russell identified a contradiction in set theory that creates a statement that can never be true even though it follows the rules of the useful branch of mathematics that underlies all computer logic and data processing.

Translated into the real world, it can be expressed in the Barber Paradox. Think of a barber who does not shave anyone who shaves themself and shaves everyone in the town who does not. Does he shave himself? He can't because he doesn't shave people who shave themselves. But, on the other hand, he must do, because he shaves everyone who doesn't shave themselves.

Without undermining its usefulness in other areas, even mathematics, the most universal modelling language can be used to create statements that don't make sense. While contradictions like the Barber Paradox highlight logical limitations, practical utility often allows models to thrive despite such quirks.

Useful By-products

Just as models can produce contradictions without undermining their usefulness, they can also generate unintended but beneficial effects. These by-products, while not part of the model's original purpose, can deeply affect outcomes, behaviour, culture, and understanding.

So far, we've thought of quality mainly in terms of a purpose, or intention. A model is devised and can be judged in terms of its accuracy and its fitness for its intended purpose. There is also a possibility, though, that a model may have entirely unexpected effects, unrelated to its original intent.

In South Asian thought—particularly in Hinduism—the body is considered a microcosm of the universe—a living model that literally embodies the cosmic order. This model of reality pervades daily life, shaping behaviours and social interactions in deep and systematic ways.

The right side—and thus the right hand—is auspicious, active and pure. It represents the sun. Gifts, food and religious rituals use right hand.

The left hand represents the moon. It is impure, passive and unlucky; reserved for tasks involving impurity. You clean yourself, touch unclean things and handle shoes with your left hand.

This binary model influences every aspect of life, from temple worship and dietary customs to caste rules specifying who can touch whom, and how. Food is eaten with the right hand, cleaning after defecation is done with the left.

The model runs through the structure of society and we have already spoken about the way in which the caste system links to it.

This model—religious and cultural—exists in many preliterate societies and, crucially, none of them have any understanding of bacteria or infectious diseases. Yet it effectively minimises contamination and controls disease transmission.

These parallel rituals and beliefs evolved independently across different cultures and geographies. There was no intentional scientific reasoning behind their formation but, by shaping and regulating a wide variety of social and physical behaviours they exert significant control over hygiene and public health.

These unintended by-products highlight the broader impact that models can have, extending far beyond their ostensible rationale, explanation and stated intentions. A religious custom thought of as modelling cosmic order ends up significantly affecting social structures and improving community health.

This isn't just true in pre-modern societies. Modern economic models, for example, also produce unintended outcomes. While capitalism claims to maximize efficiency and productivity, it can also reinforce social hierarchies or exacerbate inequality. These effects, though unintended, shape society in profound ways, contributing to the overall value—positive or sometimes negative—of the model itself.

Unplanned consequences like these must be taken into account when we think of the complex interplay between a model's rationale and purpose, and its broader impact. They influence its value, its survival and its evolution.

To understand this more fully, we next need to look at the tools and techniques we use to build these mental models in the first place.

Chapter 4—Models in Use
## Tools for Thinking

A Feeling for Logic

We've seen how models are central to our understanding of the world and how they can be evaluated for accuracy, usefulness, and group function. These criteria are a lens for exploring the tools humans have developed to create and refine models, from emotional associations to abstract logic. We'll explore the evolutionary tools that allow us to build them, starting from the instinctive, emotional responses of early organisms and culminating in the human ability to create abstract, causal models. How did these capabilities evolve, and how do they work together to shape the way we think?

The first group of capabilities have been with us from our earliest ancestors. Their quality can be judged from their effectiveness as survival tools and the fact that we still possess them as humans. They are sometimes thought of as being subliminal or instinctive: the happiness we feel in a familiar, secure environment, the anxiety triggered by a strange sound, the gut-feeling of unease when walking through an unfamiliar neighbourhood. These instinctive responses are the same primitive tools our remote ancestors relied on for survival, and we'll look later at how they interact with abstract, logic-based intellectual processes.

Early Learning

Most basic, at this sub-linguistic level, are the primitive associations of emotions to particular elementary and complex stimuli, survival capabilities we share with the simplest organisms. Psychologists refer to this elementary form of association as 'classical conditioning'. Association of emotional states with particular stimuli, is a fundamental building block of pattern recognition, a precursor to symbolic logic.

At the next level, we have responses where the organism learns to act to produce a result. This is 'operant conditioning', active, so more complex than the passive association of classical conditioning. This is the start of an ability to manipulate the environment, rather than simply react to it.
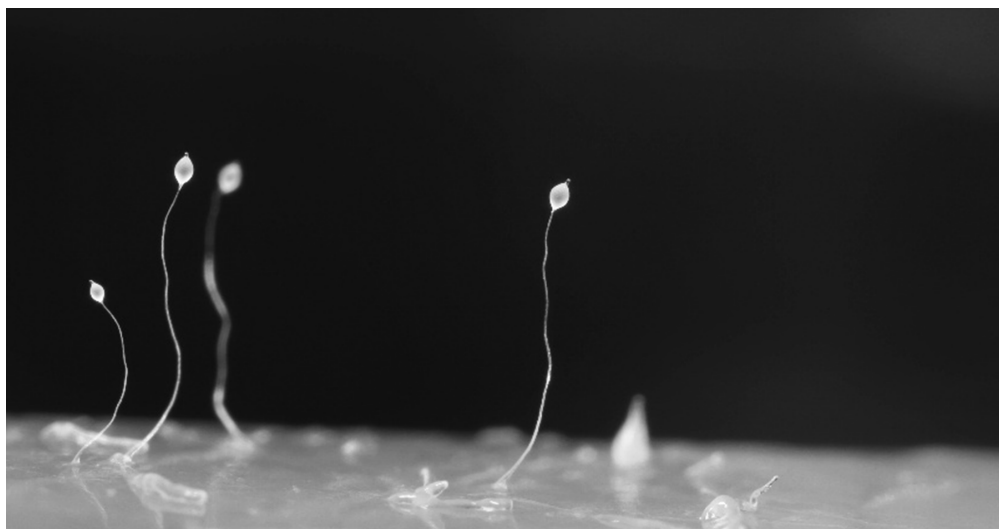
Image 7: Slime moulds - spores and stalks

Also emerging, very early in the evolution of organisms, in parallel with these basic tools for responding to the environment, we see rudimentary specialisation and social behaviour. Even slime-moulds, which are single celled amoeba, adapt to their environments by producing specialised individuals that co-operate to improve survival. In food-scarce environments, they merge into a multicellular structure known as a slug, with two specialized parts: spore cells and stalk cells.

The spore cells can go on to form new amoebae, while the stalk cells sacrifice themselves, lifting the spore cells above the ground, to help in their dispersal. This unconscious altruism is a simple form of collective problem-solving, that foreshadows animal and human social organization, and even shared models, like language and culture.

One other important aspect of these *'emotional'* associations is generalisation. Generalization is a powerful tool for survival because it lets organisms extend learning from specific experiences to broader contexts. An animal that fears one predator may learn to avoid similar creatures based on shape, size, or sound. This ability to abstract key features from an experience and apply them elsewhere is an early form of pattern recognition, a precursor of the symbolic abstraction humans use to navigate complex environments and to inductive reasoning, a cornerstone of symbolic logic.

While emotional associations and generalizations provide a survival advantage by allowing organisms to recognize and respond to patterns, these early models lack any sense of causation. The ability to understand *'why'* something happens, rather than simply reacting to *'what'*, marks a major

cognitive leap—one that is necessary for tool use, problem-solving, and the creation of abstract models.

Extracting Meaning

Everything we've discussed so far in this chapter can be thought of as—more or less—concrete, a reaction to real things in the environment: real threats, real shortages of food, real desired effects. The emotions experienced also relate directly to survival—the need for basic essentials like food, shelter, reproduction, and so on, for avoiding toxins and predators, the need for social co-operation with real peers or symbiotic species.

These models are associative, and we've no need to impute any meaning to the relationship the model represents. A saline environment is associated with food, therefore move towards it. A pink flower indicates nectar. An unpleasant taste is linked to a toxic plant. Evolution ensures that organisms that find the taste of toxins pleasant don't last long.

At some point, though, mental models started to gain more meaning, in particular, the element of causation. Causation differs from association in its complexity: it requires an understanding of directionality (cause precedes effect) and an ability to model relationships that go beyond immediate observation. And, while emotional associations provide the foundation for early survival models, the leap to incorporating causation represents a fundamental shift: from reacting to the world as it is, to predicting how it could be.

The Effect of Cause

It's difficult to say exactly when the first model included causation. Pigeons pressing a lever for food almost certainly don't indicate an understanding of causation, animals like crows and chimpanzees demonstrate a more advanced view of cause-effect relationships through tool use. A crow trimming a stick to retrieve insects or a chimpanzee using a hammerstone to crack nuts hints at a primitive understanding of how actions can produce specific outcomes.

We may never be able to say exactly where the conception of causation enters the modelling process. The animals can't tell us. We are dealing with a continuum between a purely associative and a fully causative model, and our own model of the area is not—at least currently—sufficiently fine-grained to define a transition point between them. Where some animals demonstrate elements of cause-effect reasoning, humans possess a unique ability to move

beyond simple associations, modelling complex, abstract relationships where causation extends across time and space.

Humans in even the most primitive of societies see cause and effect as being fundamental to their model of the world. This model isn't just an association. It has a direction—cause comes before effect and the effect is the result of something that occurred earlier. The model has moved from *'what'* is happening to *'why'* and incorporated something beyond what can be seen directly.

It has moved from a simple sequence of events to an abstract relationship between them. It underlies everything from tool use to scientific discovery, from solving a problem at work to building an atomic bomb.

Speaking of Models

Another development we can see emerging in parallel with causation, as cognitive abilities advance, is the use of symbolic labels for patterns of stimuli. Again, this seems to be a continuum. Animals like dogs, birds and chimpanzees have already moved a long way in their use of symbols and can identify and process dozens to hundreds of them.

Dogs learn to understand human words and the context they're used in. Parrots also understand words and phrases—frequently heard expressions, commands, and names, for example. And trained chimpanzees can make meaningful use of sign language, with signs for objects like *'food'*, *'drink'*, *'banana'*, or *'toy'*, for actions like *'eat'*, *'drink'*, *'play'*, or *'go'*, for characteristics, such as *'big'*, *'small'*, *'hot'*, or *'cold'*, emotions *'happy'*, *'sad'*, *'angry'*, or *'tired'* as well as social signs like *'hello'*, *'goodbye'*, *'please'*, and *'thank you'*.

This ability to use symbolic labels—whether a dog recognizing commands or a chimpanzee using signs—while nowhere near the complex grammatical models humans manipulate, demonstrates a rudimentary ability to encode and communicate elements of their mental models. And, for humans, language has developed into a sophisticated tool for social co-operation with complex grammatical structures used to convey different types of meaning.

Language is, in fact, the key tool for building models that are orders of magnitude more powerful in representing the human environment. Unlike the simple symbolic labels used by animals, grammar allows for infinite combinations of words and concepts. A single sentence might encode positional relationships (*"The cat is on the windowsill"*), causation (*"The wind knocked the glass over"*), or even abstract hypotheticals (*"If it rains tomorrow, we'll cancel the picnic"*). This ability to represent not just *'what is'* but also *'what*

could be' makes language the ultimate tool for building and sharing models of reality.

Language models also force us to revisit the issue of which came first, the model or the world. Noam Chomsky has postulated that, since all languages share some common characteristics, and children show an amazing aptitude for language learning, humans inherit a *'Language Acquisition Device'*, a *'universal grammar'* which contains a meta-language from which all real-world human languages develop.

If language is an innate capability, as Chomsky suggests, it implies that humans are born with a pre-existing cognitive framework designed for symbolic thought, laying the foundation for the mental models that drive cooperation, culture, and technological advances. This raises intriguing questions about how such a framework evolved—what evolutionary pressures might have selected for a universal grammar, and how does this framework interact with the environment to produce the diversity of human languages?

If, on the other hand, the structure of language simply originates in the structure of our model the external world, it suggests that human cognition is deeply intertwined with the demands of representing and navigating reality. In this view, language may not be a separate capability but rather the culmination of incremental adaptations seen in other species, such as pattern recognition, symbolic labelling, and social communication. We may trace its roots to behaviours like vocal mimicry in parrots, the use of gestures and vocalizations in primates, or the ability to associate symbolic labels with objects and actions in animals like dogs and chimpanzees. These abilities, while limited, could be the building blocks of symbolic thought, subsequently refined and expanded in humans to create the sophisticated systems we call language.

Regardless of its origins, language is a uniquely powerful tool for thinking. Its ability to represent complex relationships, abstract ideas, and hypothetical scenarios has made it the foundation for human cooperation, culture, and technological progress. Understanding whether language is an innate framework or an adaptive tool can help us unravel the deeper question of how humans became capable of such sophisticated thought.

The Tools in the Box

We have seen the evolution of model making capabilities as a succession of increasingly advanced and abstract tools:
- Emotional associations (classical conditioning)

- Operant conditioning (active response)
- Pattern recognition and generalization
- Causation (cause-effect reasoning)
- Symbolic labels (vocabulary)
- Relationships and Grammar (natural language)

Natural language, while powerful, has limitations when it comes to precision and consistency. To address these challenges, humans have developed specialised languages: formal logic, deductive and inductive reasoning and mathematics. Later we will discuss these, but first we need to look at some of the uses to which natural language has been put.

Chapter 5—Myths as Models
Lore Legend and Magic

Societies and Their Stories

Unless someone invents a time machine, we will never know exactly how early humans first used natural language. Perhaps it was to co-ordinate hunting or warn of a dangerous predator. Maybe it was to share the location of a tasty plant or a bees' nest. It could simply have been members of the band getting angry and threatening violence.

Whatever it was, it probably wasn't too far from the grunts, squeaks and squeals that our closest cousins among the great apes use to co-ordinate activity within the band. The real breakthrough came later when we began to tell stories. And we know a lot more about the what our ancestors told each other around their crackling campfires at night and in idle moments during the heat of the day because stories like them have been handed down through the generations and some of them are still being told today.

We know that human societies tell different stories that allow groups of humans to co-operate in ways appropriate to the type of survival activities they engage in. These stories encapsulate, share and transmit the models that govern the society's internal relationships and the ways they deal with their environments. Myths act as models for thinking at the level of a society, as opposed to the fragmented cognition of individuals we saw in the last chapter. They encode shared models that govern collective behaviour and co-operation.

Hunter-Gatherer Values

Hunter-gatherer societies live in equilibrium with nature. They don't have the technologies to increase the resources it provides.

They rely on hunting, fishing and foraging, so they have to ensure that their activities are sustainable and the stories they tell—the myths they believe—reflect models with a deep integration and reverence for nature, emphasising interdependence with the environment.

Could this, perhaps, be seen to foreshadow the modern concern with sustainability in the face of the unconcern and impotence of modern technology in protecting it?

Hunter-gatherer mythologies often centre around animism—the belief that animals, plants, rivers and rocks possess a spirit and consciousness. They see

humans as an integral part of a great ecological system rather than dominating and controlling it.

Clans often associate themselves with a particular animal or plant species, which serves as a spiritual guide and a symbol of kinship with the natural world. Among the San people of Southern Africa, for example, stories are told of how humans and animals spoke the same language before being separated, which underlines their interconnectedness and the need for mutual respect.

A San story tells of how a mischievous trickster god, often a hare, stole fire from the sun and brought it to humans. This not only explains the origin of fire but also teaches lessons about ingenuity and the dangers of hubris, enforcing group norms like humility and respect for nature. These stories also contain practical and moral wisdom, ensuring they are remembered and passed down as part of the group's shared identity.

Hunter-gatherers live in small clans without fixed hierarchies. A hunter's status is determined by the result of the latest expedition, rather than by longer term considerations tied to the inheritance of possessions—which are necessarily portable and, therefore, can't consist of much. This is reflected in mythology where generosity and reciprocity are valued and social harmony would be endangered by the accumulation of property.

Image 8: Hunter gatherer view of an antelope

Among the indigenous coastal tribes of North America like the Coast Salish, social status is maintained by Potlatch ceremonies in which accumulations of goods are distributed, or even destroyed, to honour the ancestors, with the result that wealth inequality is not allowed to develop.

In hunter-gatherer societies, myths often serve as moral and practical guides, emphasising respect for the natural world and sustainable living. These stories can communicate ecological wisdom—which plants are safe to eat, or which animals are sacred—and reinforce social cohesion by promoting values like sharing and co-operation.

In the highlands of Cambodia, the Bunong people tell the story of a great white elephant that led their ancestors to fertile lands and taught them to live in harmony with the forest. It showed them which plants could be safely eaten, which herbs could heal sickness and which trees to use to build shelters. The elephant taught them never to take more than they needed and to leave parts of the forest untouched for the spirits who lived there. Unfortunately, when the ancestors grew greedy, overhunted and cut down too many trees the elephant vanished in sorrow leaving them with barren lands. It only returned when they repented and held a great feast to distribute their food and possessions among the community and restored the balance with nature.

Shepherds' Stories

Away from the fertile river valleys that enabled the development of agriculture, humans that relied on flocks and herds of domesticated livestock needed to co-operate in quite different ways. Of course, pastoralism and agriculture are never completely exclusive, and both activities often co-exist or compete, with pastoralism dominant in marginal areas. The pastoral model of the world centres on the role of animals, the challenges of moving from place to place to find grazing, the need to retain access to land areas they don't occupy continuously and the negotiation of power within a stratified society.

For herders, livestock is often sacred. It embodies survival, wealth and divine favour and they tell stories of how their cattle, sheep or goats were given to them by the gods and their duties as caretakers and herders of these divine animals.

In South Sudan, for instance, the Dinka tell how the god, Nhialic, entrusted cattle to them, as a direct link between the human and divine worlds. They believe that each animal possesses unique spiritual characteristics based on it colour and markings and the cattle are used in rituals and sacrifices to honour Nhialic, other deities and the ancestral spirits. Cattle play a central role in their economy and social structure, as bride-price in marriage and as the measure of wealth and status. They reinforce the social hierarchies and roles that need to be

distributed across wide areas to support the common behaviours and values essential to survival in a nomadic society.

In pastoralist societies, the gods often mirror the roles of tribal chieftains, reinforcing authority and obedience and deciding who has rights over grazing land and water. The gods guide their migrations and link the nomadic lifestyle of dispersed communities to a divine will.

Among the Masai in East Africa their cattle are seen as the gift of Enkai, their supreme deity and their leaders and elders are his representatives, making decisions on grazing and water rights, as well as the movement of herds. Rituals and prayers to Enkai are performed to bring rain and they link the allocation of resources to divine justice so that obedience to communal decisions is a sacred duty.

The myths frequently reflect themes of conflict and competition for grazing and water and emphasise the virtues of strength, cunning and loyalty which are vital in challenging environments.

Image 9: Cain and Abel.
God likes shepherds better!

In the Bible, the story of Jacob is a classic example of a trickster who becomes a powerful patriarch. Born as a second son, he duped his elder brother, Esau, into selling him his status and birthright for a mess of potage. He then deceived his blind father into giving him the blessing intended for Esau. Fleeing from Esau's anger, he went to work for his uncle, Laban, with an agreement that he would receive as payment any striped or spotted goats and lambs born into their joint flock. He then placed striped, partially barked branches near the mating animals, producing more spotted and speckled offspring.

Also in the book of Genesis, the story of Cain and Abel shows a divine preference for the sacrifice of animals over vegetables and, equally, the contempt pastoralists felt for their agricultural neighbours.

Pastoralists tend to view time differently from agricultural societies with their fixed annual cycles of predictable seasons. Many pastoral societies value the flexibility of the lunar calendar, with the movement of flocks and herds managed in relation to environmental conditions rather than fixed seasons. The Israelites, for example, initially saw time as primarily linear, starting with the

creation of the world and leading to the arrival of a promised messiah, rather than as a repeating pattern of seasons. These came later.

Tales Farmers Tell

About 12,000 years ago, the end of the last Ice Age led to more stable and warmer climates and, as human populations increased, they needed more reliable sources of food. Initially, hunter-gathers simply changed the way they interacted with local plants and animals. They moved seeds to new locations where they hadn't previously grown and restricted their own movements so that they could guard the resulting crops.

Starting from wild varieties of wheat and oats, early farmers preferred to plant those that most suited their needs—seeds that didn't fall to the ground when ripe, grains that were easier to separate from the chaff and larger grain sizes, for instance—and, gradually, domesticated varieties of those plants came into being.

Remaining in one place to look after their crops meant that hunting also had to change. Where previously hunter-gatherer bands had roamed widely in search of prey, they now had to find ways to domesticate animals and keep them near to their homes.

The resulting changes to their way of life included new social organisations, new group relationships and, above all, new stories to explain what had happened and how to deal with it. The societies' models of their world had changed and the myths that translated them into shared behaviours had to keep up.

Settled agriculture required a new relationship with the seasons. In mankind's original homelands in equatorial Africa, seasons hardly existed. Agriculture, however, developed in river valleys like the Nile, the Euphrates, the Indus or the Chinese Yangtze and Yellow River regions all with pronounced seasonality where planting and harvesting of crops had to be synchronised with growth periods through the year. This required a calendar, which was embodied and transmitted from generation to generation by appropriate mythologies.

The myth of Osiris precisely captured the agricultural cycle of life, death, and rebirth in ancient Egypt. Even the annual flooding of the Nile, at the end of the harvest season, between June and September, was explained as his wife (and sister), Isis, was said to weep for him before his rebirth in the new year heralded the planting of crops. Rituals and ceremonies performed by priests ensured the

favour of the gods and reinforced their role as intermediaries between divine forces and the people.

In China, the goddess Nüwa, who created humanity is associated with spring, renewal and rebirth. The Dragon King controls the summer weather, and the mid-autumn festival celebrates the harvest moon. The god Yanluo was associated with the underworld and the afterlife, reflecting themes of rest and transformation in winter.

Because these new agricultural communities were settled, it was now possible to accumulate possessions, and their mental models needed to account for different levels of prosperity and social status. This was reflected in and justified by stories of tribes and families of gods.

As well as synchronising activity with the solar calendar, the myths needed to integrate the agricultural cycle with the structure of society: with monarchies, roles and classes, and the division of labour.

For the ancient Greeks, the Olympic gods were ruled by Zeus, with his wife Hera whose vengefulness and jealousy at her husband's unfaithfulness set the pattern for equivalent human relationships. In Hindu religion, the Trimurti—Brahma, the creator, Vishnu, the preserver and Shiva, the destroyer were the supreme deities, with subservient local deities like Murugan and Kali serving as patrons for specific communities or tribes and reflecting different social identities.

These myths not only explained natural cycles but also justified, reinforced and entrenched the social and political hierarchies of agricultural societies. The ability to accumulate wealth, land, and possessions introduced new disparities in status, which were legitimized by religious narratives.

The pharaohs of Egypt were considered living gods, and the gods of the Greek pantheon mirrored the dynamics of human aristocracy, with Zeus presiding over a council of divine rulers. The stories provided a framework for understanding—and accepting—the inequalities that came with settled life.

Religious models provided a metaphor for the structure of society. In Hinduism, the caste system was justified by stories like the Purusha Sukta, in which humanity originated from the body of the god, Purusha, with different castes emerging from different parts of it. Stories and myths justified the centralisation of wealth and land ownership under rulers and elites.

Another change that these mythologies enshrined was a change in gender roles. In hunter-gatherer societies, gender roles were seen as balanced. In fact, the staple foods on which the group relied from day-to-day were often gathered

by the women, with meat—which was procured by male hunters—a scarce luxury. In agricultural societies, especially with the development of ploughing, which privileged upper-body strength, male elites were increasingly dominant, with corresponding myths elevating male sky or storm gods like Zeus in Greece, Marduk in Mesopotamia, and the Hindu god, Indra, as heads of their respective pantheons.

Common Era—A Merger of Myths

We've already seen that the Jewish model of the world originated in their pastoral history. As they moved to a more settled way of life in the land of Canaan, between the Jordan river and the Mediterranean, their way of life, and their view of reality were both affected both by the adoption of agriculture and by the Philistines and Canaanites among whom they settled.

The worship of Baal, a fertility god with rituals and sacrifices to ensure agricultural prosperity, was an ongoing temptation to the Israelites. And Dagon, a Philistine god of grain and agriculture was another deity whose worship conflicted with the monotheistic worship of Yahweh, as did that of Astarte a fertility goddess associated with Baal.

As agriculture became the backbone of their subsistence, with a focus on crops like barley, wheat, olives and grapes, they needed new rules for land ownership and property-based economics, as well as new festivals like Passover and the Feast of the Tabernacles, which were tied to the agrarian calendar, emphasising Yahweh's role as the provider of rain, fertility and harvest.

The land of Canaan became central to Israelite identity. It was a core component of their relationship with Yahweh, as an incentive both to keep their covenant with him and to observe the commandments that stabilised their society. From a confederation of twelve tribes ruled by judges, their social organisation changed to a centralised monarchy, initially under Saul and then under David, Solomon and their separate successors in Judah and Israel.

As the society developed agricultural and urban characteristics, prophets often invoked their pastoralist legacy to critique corruption, materialism and idolatry. Jeremiah, for example reminded them or an idealized time in the wilderness when they relied entirely on Yahweh. He called for a return to a simpler, more faithful relationship with him, and prophets like Amos denounced the growing inequalities as landowners amassed wealth while the poor suffered. The new economic reality was seen as contrary to pastoralist values of communal responsibility and fairness.

By the time of Christ, the Jewish people were part of the Roman Empire. Their culture was a rich mix of pastoralist and agriculturalist traditions that had begun to merge with increased foreign contact and urbanisation under Babylon and Rome.

Jesus's teaching clearly inherits elements of both. In his parables, Jesus used imagery from pastoral sources—the Good Shepherd, the Lost Sheep, the Sheep and the Goats—but even more parables were based on agricultural metaphors. In the parable of the Sower, a Sower scatters seed in different places but only what lands on good soil bears fruit, telling his listeners that God's message will produce spiritual fruit only where people respond to it. The parable of the Weeds, on the other hand, underlines the existence of good and evil in the world, to be separated by God in a day of judgement.

These parables addressed a Jewish audience, and his message was framed within the Jewish tradition. He referred to the Torah, and interpreted its spiritual meaning, inviting individuals to a personal and immediate relationship with God, encouraging prayer, faith and trust in God's mercy. He emphasised ethical behaviour—love of God, love of neighbour, humility, repentance, forgiveness and care for the poor, all in the context of traditional Jewish laws.

His audience would have been familiar with both pastoral and agricultural ways of seeing the world, but he also operated within a context that was increasingly shaped by Roman rule. His teachings represented a precarious balance between the millennial promise of a coming Jewish Kingdom, which he positioned as a spiritual and ethical realm, and preparedness to focus on the introvert observance of the traditional moral laws and rituals, which the Romans were happy to tolerate.

This was reflected in splits in the Jewish community as well, between the Zealots who wanted to expel the Romans from Judea and the Pharisees who, by focussing narrowly on adhering to Jewish laws and traditions, avoided direct confrontation with Rome.

These differences are also found in Jesus's teachings and in his disciples. He counted among his followers Simon the Zealot, a member of the sect committed to expelling the Romans, and Judas Iscariot, was most probably one of the Sicarii, an even more extreme nationalist faction.

For them, Jesus seems to have aroused expectations of an imminent Jewish Kingdom. He was emphatic that he came 'to fulfil the law and the prophets' but, when pressed on the subject of tribute to Rome, he advised accepting Roman rule and paying the required taxes. The essence of his teaching was a

spiritual interpretation of the coming Kingdom of God, rather than military nationalism and the establishment of an independent Jewish state.

During his lifetime, therefore, Jesus can be seen as a very Jewish prophet, promoting a model of the world that reconciled Jewish tradition with the compromises needed to survive in the dominant Roman Imperial environment.

In the end, of course, this synthesis of Judaic tradition with a spiritual, rather than military, Judaism proved unacceptable to everyone. We can only speculate on Judas's motives for betrayal, but it seems likely that, as an extreme Sicarii nationalist, he was unwilling to abandon the idea of a physical kingdom, while the Pharisees who were intent on avoiding confrontation with Rome, saw Jesus as a troublemaker.

Whatever the exact reasons, it was the Romans who executed him by crucifixion, a sentence normally reserved for those guilty of the political crime of sedition, rather than religious irregularity, something the Romans generally tolerated.

The crucifixion added a dimension beyond the Jewish model of the world where, previously, very little had been said about resurrection after death. One of the few mentions in the Old Testament is in Ezekiel's vision of the valley of dry bones being brought to life, which can be interpreted as a metaphor for national restoration and spiritual revival.

Jesus, too, in the parable of the Grain of Wheat in John's Gospel referred to the agricultural model of germination. He said, *"Unless a grain of wheat fall into the earth and dies, it remains just a single grain; but if it dies, it bears much fruit."*

This theme was quite common in agrarian models of the world. In Egypt, we've seen the annual death and resurrection of Osiris symbolise the cycle of life, death and rebirth. Tammuz, a Mesopotamian fertility god died and was resurrected annually and both Adonis and Dionysus in Greek mythology did the same.

Jesus's death turned his followers into a new Jewish sect, with the idea of resurrection at its heart. In a future chapter, we shall see how this synthesis of pastoral millennialism and the agrarian cyclic model fused with the centralised governance model of Imperial Rome to become the dominant model for Europe and then spread around the world.

The Anthropological Models of Myth

In the late nineteenth and twentieth centuries, explorers, scholars, and anthropologists gained access to the myths and stories of many different cultures and several influential theories emerged to explain the universal patterns underlying these narratives. These models offered insights into how myths function as societal tools for understanding the world, maintaining order, and transmitting values. While not without controversy, these frameworks help illuminate the role of storytelling in shaping collective mental models.

Frazer's *'The Golden Bough'* and Ritual Sacrifice

An early systematic attempt to understand the shared features of myths was Sir James George Frazer's work *The Golden Bough* (1890). Frazer argued that myths and rituals reflect humanity's fundamental concerns about life, death, and renewal. He proposed a universal concept of the *'sacred king'*, a figure whose ritual sacrifice ensured the fertility of the land and the stability of the community.

Frazer's idea of the *'sacred king'* aligns closely with agricultural societies' mythologies like that of Osiris in Egypt or the cyclical narratives of Tammuz in Mesopotamia and Dionysus in Greece. The myths that encode the agricultural cycle of planting, harvest, and renewal, tying human life to the rhythms of nature.

Although Frazer's work has been criticized for oversimplifying and universalizing too wide a variety of cultural practices, his model highlights the ways in which myths serve as survival tools—embedding ecological knowledge and reinforcing the social structures necessary for stability and prosperity.

Frazer's work underscores a central theme of this chapter: myths are not just entertaining stories. They're functional models of reality. They guide behaviour, reflect societal values, and ensure continuity across generations.

Lévy-Bruhl and the *'Primitive Mentality'*

Lucien Lévy-Bruhl (1857–1939) introduced the concept of the *'primitive mentality'*, proposing that so-called *'tribal'* cultures perceive the world differently from modern, scientific societies. In his view, myths are not merely symbolic but represent a way of thinking that does not distinguish between the natural and the supernatural. Instead, early humans saw themselves as deeply

interconnected with their environment, identifying with the animals, plants, and objects around them.

The animistic myths of hunter-gatherer societies, such as the San people's belief that animals and humans once spoke the same language, exemplify this worldview. In such societies, myths reinforce the idea that humans are part of an interconnected ecological system, rather than masters of it.

Lévy-Bruhl's theory helps explain why myths often attribute human characteristics to natural forces—the trickster hare who steals fire for humanity or river gods who demand offerings. These stories blur the boundaries between the human and non-human worlds, promoting the sense of harmony and mutual respect essential for survival in unpredictable environments.

While Lévy-Bruhl's terminology and framing have been criticized as Eurocentric, his insights resonate with the idea that myths function as cognitive tools, shaping how societies perceive and interact with their environments.

Levi-Strauss and the Structure of Myths

Claude Lévi-Strauss (1908–2009) took a different approach. He focussed on the deep, universal structures underlying myths. Drawing on structural linguistics, he argued that myths reflect binary oppositions—such as life and death, nature and culture, chaos and order—that are central to human thought. These oppositions, he suggested, provide a framework for resolving contradictions and tensions within societies.

For instance, the story of Cain and Abel in the Bible reflects a fundamental conflict between agricultural and pastoral modes of life. Cain, the farmer, offers the fruits of the soil, while Abel, the shepherd, sacrifices an animal. God's preference for Abel's offering mirrors the tension between these two ways of life and the values they represent.

Many agricultural myths also resolve the opposition between life and death through narratives of resurrection, such as the rebirth of Osiris or the germination of a seed buried in the ground.

Levi-Strauss's structuralist approach reveals how myths serve as cognitive tools for navigating complexity. By presenting oppositions and resolving them through narrative, myths help societies reconcile competing values, roles, and challenges.

Models of Myth as Cognitive Tools

Together, these anthropological theories—Frazer's focus on ritual and renewal, Lévy-Bruhl's concept of the *'primitive mentality'*, and Lévi-Strauss's structuralism—provide complementary insights into the function of myths as societal *models*. They highlight how storytelling helps societies:

- Align with Natural Cycles: Agricultural myths like those of Osiris or Dionysus encode ecological knowledge, ensuring communities harmonize their activities with the rhythms of nature.
- Foster Social Cohesion: Myths often justify social structures, whether by reinforcing the authority of rulers (divine kingship in Egypt, for example) or promoting shared values like reciprocity and sustainability (as in San animism).
- Resolve Contradictions: Through narratives of conflict and resolution, myths offer a way to mediate tensions—whether between genders, social classes, or economic systems.
- Model Survival Strategies: From pastoralist tales of sacred cattle to hunter-gatherer stories of trickster gods, myths translate survival strategies into moral and practical lessons.

These anthropological frameworks enrich our understanding of myths not as static relics of the past but as dynamic, functional models that adapt to the needs of their societies. While modern scholars have critiqued and refined these theories, they remain invaluable for revealing how stories don't just reflect our world—they shape it.

The Next Layer of Models

In this chapter, we have seen how anthropologists created *models* of myths to decode the ways in which societies model reality through storytelling. This process of abstraction—building models of models—mirrors the evolution of human thought itself. In the next chapter, we will turn to the Ancient Egyptians and Greeks to examine the development of a radically different way of modelling reality: one that moves beyond social metaphors to seek universal, non-anthropomorphic principles in science and philosophy.

Chapter 6—Myths to Maths
Facts, Figures and Logic

A New Model Reality

The ancient Egyptians are justly famous for their religion—the death and resurrection of Osiris, the tears of Isis causing the flooding of the Nile, and so on. Less so, their response to the practical problems caused by the annual inundation,. That altered the landscape, washed away boundary markers, and required a new survey each year to reinstate land ownership.

Image 10: The great Pyramid - Geometry in 3D

The surveyors responsible for this were called *harpedonaptae*, or *'rope stretchers'*. They used knotted ropes, stretched tight, along with plumb lines, to measure and demarcate areas of farmland. The same techniques were used in constructing Egypt's monumental architecture: temples and pyramids, showing an advanced understanding of areas, volumes, and proportions. This practical approach to geometry was indispensable for managing resources and maintaining order in a civilization so deeply intertwined with the rhythms of nature—and the will of the gods.

Through trade, conquest, and travel, these techniques spread to neighbouring cultures. Greek thinkers, including Thales of Miletus, are said to have travelled to Egypt to study mathematics and astronomy. Miletus was a vibrant trading hub in the Aegean and it became a crossroads for ideas from Egypt, Babylon, and beyond. Thales, using Egyptian geometric methods and Babylonian astronomical records, transformed these practical tools into abstract, deductive

principles. He is even credited with predicting a solar eclipse in 585 BCE—a stark contrast to prevailing mythological explanations of the heavens.

But there was a deeper cultural reason why the Greeks approached these borrowed techniques so differently. The Egyptian religion seamlessly integrated mathematics and sacred architecture, but the Greeks worshipped a different pantheon of anthropomorphic gods—they were powerful, but not the architects of the natural order. This may explain why, when the Greeks encountered Egyptian geometry and Babylonian astronomy, they didn't accept the foreign religious elements and focused on the logic and structure of the mathematics they learned.

This was a deep cultural and religious difference. Egyptian mathematics addressed practical challenges within a mythological framework. But Greek thinkers like Thales began to see geometry and astronomy as models of the cosmos itself—models that could be studied and refined without invoking the supernatural. This new approach, of rational inquiry, marked the beginning of a revolutionary way of thinking. It was the first step on a long journey that would eventually lead to modern science and technology.

What is the World?

Where previous generations had modelled the world as being like a human family, tribe, or kingdom, this new way of thinking posed a radical question:

If the cosmos isn't run by a family of gods, what, then, is it?

Thales of Miletus was one of the earliest Greek philosophers. He offered an answer that was as bold as it was naturalistic. He suggested that water was the fundamental substance—or *arche*—of the universe. Perhaps inspired by the transformation of ice into liquid and steam, Thales saw water as the source of all things: flowing, changing, and yet essential for life. With this idea, he began a debate about the nature of reality that continues even now.

Thales' successors in Miletus expanded on this question. Anaximander proposed the *apeiron*—the infinite or boundless—as the ultimate origin of all things, while Anaximenes suggested air as the fundamental substance, compressed and rarefied to create all matter. For these thinkers, understanding the cosmos required searching for an underlying principle that explained the natural world without recourse to myth.

Over the following centuries, Greek philosophers continued this journey. Pythagoras, equally famous as a mathematician, declared that the universe was composed of numbers. For him, mathematical models of astronomy and music

weren't just tools for understanding the world—they were the essence of reality itself.

Heraclitus, by contrast, argued that the cosmos had no fixed substance; everything was in flux, a continuous process of transformation. *"You cannot step into the same river twice,"* he famously said, emphasizing the impermanence of all things.

In response, Parmenides rejected the very idea of change, asserting that reality was totally stable, and any apparent transformation was an illusion.

These conflicting models—eternal change versus permanent stasis—defined a paradox that all later philosophers trying to model reality had to address.

Empedocles proposed that all matter was composed of four fundamental elements—earth, air, fire, and water—combined and separated by the forces of Love and Strife. Leucippus and his student Democritus went further, suggesting that the universe was made of indivisible particles, or atoms, moving through empty space.

While many of these early philosophers focused on explaining the natural world, their ideas often carried ethical implications. Pythagoras advocated a way of life based on mathematical harmony and purity. Xenophanes, who critiqued the anthropomorphic gods of traditional mythology, urged humans to seek truth and wisdom instead of relying on myths. Heraclitus, with his emphasis on balance and transformation, argued for living in harmony with the ever-changing nature of existence.

This new way of thinking was deeply intertwined with the changing social and economic landscape of Greece. Urbanization and economic growth gave rise to a new class of merchants and artisans—individuals who, unlike the aristocracy or labourers, lived by their own means. This emerging middle class wielded increasing influence, and the ability to persuade and reason became crucial in public life. Out of this environment arose the Sophists, teachers of rhetoric and oratory who applied logic and rationality to politics and morality.

Thinkers like Protagoras and Gorgias of Leontini explored questions of relativism and truth, challenging traditional notions of right and wrong. *"Man is the measure of all things",* Protagoras said, suggesting that morality and knowledge were subjective, shaped by human experience. This radical idea opened up a broader questioning of existence, truth, and the nature of the cosmos itself—ideas that would powerfully shape Western thought in the centuries to come.

Innate Knowledge

Mathematics, and geometrical proofs in particular, inspired the Greeks with a powerful new model of reality. The ability to demonstrate the truth or falsehood of a statement through logical deduction seemed to provide a means of deriving universally true representations of the world. Geometry offered an objective foundation for understanding reality, one that transcended subjective experience and cultural differences.

In Athens, Socrates applied this model of reasoning to social and ethical questions. He extended the techniques of geometry to the realm of human values. Using rhetorical methods developed in politics, he challenged the relativism of the Sophists, who argued that truth was subjective and varied depending on perspective. Socrates believed the opposite: truth was universal and could be discovered by anyone through reason and careful questioning.

For example, Socrates famously demonstrated this belief in a conversation with an uneducated slave boy. The boy, with no formal knowledge of geometry, was guided step by step to discover the relationship between the sides of a square and a square of double the area. Socrates asked him questions, leading him to recognize that the new square's sides would equal the length of the diagonal of the original square. This process illustrated Socrates' belief that truth is accessible to all rational beings—not because we remember facts, but because we are born with the capacity to uncover them through reason.

Socrates applied the same method to ethical questions. In his dialogue with Euthyphro, a self-proclaimed expert on religious matters, Socrates asked Euthyphro to define piety, and when Euthyphro claimed that piety was simply *"what the gods love"*, Socrates challenged him. He pointed out that the gods often disagree among themselves, so the same act might be loved by one god and hated by another. This contradiction revealed that piety could not be defined solely by divine will. Instead, Socrates argued that the essence of a concept like piety must be discoverable as a universal principle, one that could be reached through rigorous questioning, self-examination, and objective reasoning.

Socrates' approach revolutionized philosophy. It introduced a method of inquiry based on dialogue and reason that treated ethical and social questions with the same rigor as mathematics. His pupil, Plato, preserved and expanded upon this approach, asking an important question: if humans can discover universal truths, what is the source of this innate knowledge?

The Model and the World

Plato concluded that the physical world, with all its imperfections, was merely a shadow of a higher, ideal reality. Just as the triangles we see in the material world are imperfect reflections of the ideal triangle defined in geometry, all physical objects and concepts are reflections of perfect *'Forms'* or *'Ideas'* that exist in an abstract, immaterial realm. For Plato, this realm of ideal Forms was the source of reality, and through reason and logic, humans could access its truths.

Image 11: Is the material world real—or is the model?

Where Socrates saw the process of reasoning as the key to discovering truth, Plato extended this by proposing that reason allowed humans to glimpse the eternal and unchanging principles that underlie the physical world.

The real world was not the imperfect, material one perceived by the senses, but the ideal one accessible through thought. Plato saw logic as the bridge between these worlds, enabling humanity to align the physical with the ideal. He thought there was a Form for every possible concept—*Kinds* for objects and *Properties* for their characteristics—and material objects 'participated' in the Forms to a greater or lesser extent. A big, black table participated in the ideal Forms of Bigness, of Blackness and of Tableness. The Forms, themselves were eternal. Existing outside space and time, they were stable and unchanging.

Aristotle, Plato's pupil for twenty years and then his successor, offered a different perspective in which the material world was much more important. He criticised Plato's theory of Forms as being disconnected from the real world

and, therefore, of little practical use. He argued that an explanation of how material objects participate in Forms required additional Forms, which, in turn, needed more Forms to explain them—an infinite regress of explanations that made the theory increasingly impractical.

Aristotle saw the material world as real, with forms—what we now call models—derived from it as a classification system for understanding nature. He distinguished between two types of form: *'substantial form'*, which defined the essential characteristics of an entity, and *'accidental'*, that described it without affecting its core identity. For him, a table's *'tableness'* (its substantial form) defined its nature, while its colour (an accidental form) could be altered with a paintbrush without changing its essence.

Both Plato and Aristotle extended their thought to the moral and political spheres and the search for the good life for the individual and society.

Plato thought that the Good Life resulted from a balance between three components of the soul: Reason, the source of wisdom through the search for truth, Spirit, the emotions from which Courage came, and Appetite for basic needs and desires, which needed to be controlled. This balance could be achieved through training in philosophy, which cultivated the soul's harmony.

While Plato viewed virtue as harmony among soul-components that mirrored the cosmos, Aristotle grounded ethics in biology and purpose—the function of being human. His ethics were based on the idea that everything had a purpose, or *telos.* Since the ultimate purpose of a human was reasoning and wisdom, the good life consisted in the process of finding it through reasoning, wisdom, understanding, courage and temperance. For Aristotle, the good life was not just a state to be achieved, but an ongoing process of realizing one's potential.

In political thought, they differed more. Plato extended his model of the soul into politics, envisioning an ideal society where the three components of the soul corresponded to three classes of citizens: Rulers, representing Reason; Soldiers, representing Spirit; and Producers, representing Appetite. Just as philosophy brought balance to the individual soul, Plato believed philosopher-rulers could bring harmony to society by maintaining the proper balance among these classes.

Aristotle, ever practical, classified governments based on who ruled (a single individual, an elite, or the majority) and whether they ruled in the interest of society or themselves. He argued that monarchy was the best form of government in theory but acknowledged the danger of its corruption into tyranny, where the ruler acted only in his own interests. Similarly, aristocracy

could degrade into oligarchy. In practice, Aristotle favoured *'polity'*, or rule by the majority in the interests of society, as the most stable and realistic option.

How the Greeks Invented Reason

The new Greek model of the world has proved immensely influential. By abandoning the human-centric model of nature in favour of something that could be discussed, debated and subject to logic, it separated the understanding of nature from the particular structure of the society that developed it.

This model allowed people to challenge ideas without directly threatening the power structures of society.

Although we should be careful in making that assertion, as history has shown numerous occasions in which seemingly factual or theoretical statements have caused enormous disruption.

The theory of evolution, for instance, was—and, in some places still, is—resisted because of its conflict with anthropomorphic origin myths. And, if this seems a hangover from the past, the theory of plate-tectonics is another example where, the academic establishment's authority being threatened by a new model, it was only widely accepted as older geologists retired or died.

A second seismic shift in Greek thought was the separation of the model from the world itself. In earlier ways of thinking, humans saw the world and society as one, with no distinction between natural phenomena and the supernatural. Since they had no concept of a world apart from society and governed by its own, separate set of rules, miracles were seen as part of the normal natural process. Thunder wasn't a miracle. It was just how a god expressed power. Raising the dead was no different from Osiris revitalizing crops in the Nile valley.

This new, logical, mathematics-based view of reality created, for the first time, a distinction between what the laws of nature allowed and what might require divine intervention.

Finally, the Greeks applied this rational approach to humanity itself. Their quest to understand nature led to new models of society, new frameworks for truth, ethics and governance.

This triple innovation—naturalistic explanations, formal logic, and rational ethics—laid the foundation for Western science, philosophy, and politics. The Greeks didn't just invent theories. They invented the rules for inventing theories.

In the next chapter, we will explore the way the Christian synthesis of pastoral and agricultural myths was adapted to serve the unity of the Roman Empire and we will then be in a position to examine how Western thinkers, over a period of about a thousand years, tried to harmonise these mythological frameworks with the Greek, non-anthropomorphic, model of the world.

Chapter 7—The Empire Strikes
Christianity: The Imperial Religion.

St Paul's Repositioning for the Gentiles

If Jesus wrote anything down, nobody bothered to keep it, so everything we know about what he said comes second or third hand. In the absence of Jesus' own writings, Christianity became a religion shaped by interpreters. And none was more influential—or more controversial—than St. Paul, who never actually met him, except in his vision on the road to Damascus.

This encounter was clearly transformational, turning Saul, persecutor of Christians into Paul, apostle and missionary. It was also the basis for 13 of the books in the New Testament and more than 30,000 words of doctrine that transformed a small Jewish sect into a universal faith.

Even the four canonical gospels were written after Paul started publishing his doctrinal letters, leaving open the possibility that their authors might also have been influenced by his theology. After all, how much can we rely on memories not to be affected—after thirty or forty years—by everything that has happened in the meantime.

We've seen that the Jesus of the gospels addressed an almost exclusively Jewish audience using Jewish imagery and symbolism. His central message related to the spiritual *'Kingdom of God'*, open to those who practiced repentance, faith, love and righteous living. In the sermon on the mount, he said he had come to *"fulfil the law and the prophets"*.

With Jesus gone, a debate began among his surviving followers as to whether becoming a Christian required adherence to Jewish dietary laws, circumcision and observance of the Sabbath. Was Christianity to be an exclusive Jewish sect, or was it possible for Gentiles to convert without being required to follow the Mosaic law?

Saint Paul, the *'Apostle to the Gentiles'* was faced with the task of taking Hebrew monotheism and introducing it to the mostly polytheistic world of the Roman Empire. The fact that the Roman republic had been succeeded by a new, Imperial government model, with power centred in a single individual, perhaps gave him a head start, but monotheism also had problems of its own. If God was omnipotent and benevolent, where did evil come from? If there was only one, all-powerful God, what was the status of the various other elements of the

religion? Who, after all, was Jesus? And Satan? How could one placate the all-powerful ruler of the universe?

Paul argued that salvation was by faith, and contrasted *'the liberty we have in Christ Jesus'* with being brought *'into bondage'* by being forced to observe the law. In his letter to the Galatians, he tells how Saint Peter, who had been prepared to eat with Gentile Christians stopped doing so when a delegation from Jerusalem arrived in Antioch, for fear of offending the sensibilities of James and others who wanted to enforce dietary compliance on Jewish Christians.

This emphasis on Charity (love) and Grace, rather than works and obedience was a radical departure. For Jewish Christians, the Law was not just a set of rules—it was a sacred covenant, a reflection of God's relationship with his chosen people. For Gentiles, however, this emphasis felt alien, and burdensome. Paul's message of salvation by faith dismantled these barriers, offering a path to God that replaced centuries of tradition with a new covenant, making it radically accessible to all.

Paul's theological rebranding wasn't just an intellectual exercise—it was a necessity. The Mosaic Law, with its restrictions, presented daunting obstacles for Gentile converts. Without adapting the message, Christianity risked remaining a niche movement confined to its Jewish roots, unable to speak to the broader Roman world. Paul needed to reposition the Christian message significantly, turning it into a universal faith transcending ethnic and cultural boundaries, to make it comprehensible and acceptable to this new audience.

His answer was to focus on Grace, rather than Works as the route to salvation, emphasizing, for example in Galatians 2:16, that strict adherence to the law was no longer necessary as faith in Christ fulfilled and superseded the Law. Salvation was a free gift from God, through faith, something that was familiar in the Greco-Roman world where gods or rulers bestowed favour (*chari,* or grace) on individuals or communities, an emphasis more comprehensible to gentiles than the Jewish conception of God's mercy.

Core to the new edition of Christianity was the concept of a dying and rising saviour. Jesus had made occasional references to his death and resurrection—although the distress of his disciples at the crucifixion makes one wonder if some of what is in the gospels might have been hindsight—but in Paul's doctrine this was front and centre.

Image 12: Horus, Osiris and Isis - hope for resurrection

For a Roman audience steeped in the agricultural myths of Dionysus, Mithras, and Osiris, the idea of a dying and rising deity was familiar—almost intuitive. Paul's emphasis on Christ's resurrection placed Christianity on a par with these traditions, offering a spiritual experience that mirrored the mysteries while promising universal salvation through faith.

While Jesus claimed to be *'the son of man'* and the *'son of God'*, with a special relationship to him, Paul extended this, consistently presenting Jesus as existing before creation, affirming his divinity as *'the image of the invisible God'*, *'as 'being in the very nature of God'* and, in his letter to the Colossians, he said *"For in Christ, dwelleth all the fullness of the Godhead, bodily"*.

For polytheists used to a pantheon of gods, the idea of a single, all-powerful deity was both alien and challenging. To bridge this gap, Paul presented Jesus as the divine mediator—a figure who made the transcendent God accessible to humanity. At the same time, Paul's emphasis on the spiritual battle between good and evil introduced a structure that resonated with polytheistic traditions of cosmic struggle, while maintaining the core monotheistic principle of a singular, supreme God.

In explaining this, Paul used Hellenistic terminology, even using the word *'logos'* which was central to Stoic philosophy, to describe Christ's participation

on the creation of the world. This echoed the Greek distinction between Body and Spirit in a distinctive Christian context.

Paul also preached about believers being *'in Christ'* and sharing his death and resurrection with similarities to the mystical language used in Greco-Roman mystery religions like the cults of Dionysus and Mithras, with parallels in baptism to their initiation rites. For him, faith was not just individual belief but a participation in a communal *'body of Christ'*—an inclusive and universal response to the grace of God that transcended ethnic and cultural boundaries.

Paul didn't merely reinterpret Jesus; he restructured the model of reality through which Jesus would be understood—merging Jewish covenantal logic with Hellenistic dualism and imperial hierarchy. His vision created a Christianity ready-made for empires.

His theology, firmly grounded in Jewish monotheism and the teachings of Jesus, with the adaptations he had made in communicating it to a non-Jewish audience, and with added Hellenistic ingredients, was to make it the dominant form of Christianity, but that did not mean it was undisputed.

As Christianity propagated across the Roman world—protected by the *Pax Romana*—Paul's theology was only one of several localised interpretations and adaptations. Even in its relationship with Paul's colleagues and sponsors in Jerusalem, it was seen as contentious.

Although they agreed to an exemption for Gentile converts from complete compliance with the Mosaic law, they were clear that this did not apply to Jewish Christians who remained *'zealous for the law'*. Indeed, their conflict with the Roman-approved religious establishment in Jerusalem appears to have led to the martyrdom of James the Just. Both Origen of Alexandria and Eusebius, Bishop of Caesarea, quote from a lost passage of Josephus saying that the suppression of the Jewish revolt of CE 66 was a result of the killing by the Jewish authorities of James, the brother of Jesus.

Fragmentation

Grounded in their Jewish backgrounds, both Jesus and Paul had discussed the existence of evil, but without seriously addressing monotheism's problems with it. Jesus mentioned the fall of Satan and characterised the devil as the *'father of lies'*, and Paul traced evil to Adam and Eve's yielding to temptation in the Garden of Eden.

The Jewish world view recognised Satan as a tempter—in the book of Job, God gives him permission to test his servant, Job—but the existence of evil in

the world was much more a problem for a monotheistic religion, than in a polytheistic model of the world. Where polytheists could easily explain evil as collateral damage from conflicts between gods who, like human chieftains, disagreed, it created greater difficulty for those who believed in an omnipotent, benevolent God.

As Christianity spread without a pre-existing, unified definition of its beliefs, it absorbed elements from the diverse religious and philosophical traditions it encountered. One significant influence was Zoroastrian dualism, with its cosmic struggle between Ahura Mazda, the Wise Lord, and Ahriman, the Evil Spirit. This dualistic framework offered an easier way to explain the existence of evil than a world governed by an all-powerful, benevolent God.

In Egypt, this dualism resonated particularly well with Plato's division of the cosmos into a perfect, transcendent world of forms and a flawed, material world. The fusion of these ideas gave rise to Christian Gnosticism, a movement that reimagined Jewish and Christian stories through a mystical and metaphorical lens.

Gnostic Christians viewed the material world as a prison for the soul, created not by the supreme God but by a lesser, imperfect deity—the Demiurge—often identified with the God of the Old Testament. In their cosmology, Sophia, or wisdom, was a female emanation of the divine, forming a trinity of Father, Mother, and Son, distinct from the orthodox Father, Son, and Holy Spirit. Gnostics reinterpreted biblical narratives allegorically, for example recasting the serpent in Eden as a bringer of enlightenment, and challenging traditional understandings of sin and redemption.

Gnosticism drew upon a variety of texts and scriptures, such as *The Gospel of Thomas* and *The Secret Book of John*, which were never accepted into the orthodox Christian canon. These writings prioritized symbolic meanings and spiritual truths over historical accuracy, offering a mystical rather than a literal interpretation of sacred stories.

For Gnostics, salvation came through *gnosis*—spiritual knowledge attained via direct, personal experience of the divine. This enlightenment enabled individuals to transcend the flawed material world and ascend to the divine realm. The Gnostic path to salvation was inherently solitary and internal, rejecting communal doctrines or reliance on external authorities. Their emphasis on unchallengeable, personal enlightenment made Gnosticism fundamentally incompatible with the church's hierarchical structure. Without an agreed-upon set of doctrines or practices, though, Gnosticism lacked cohesion

and was prone to fragmentation, as each believer, like the later followers of Luther, could construct their own reality.

This contrasted sharply with the Pauline vision of faith as a shared, communal journey. Paul's letters repeatedly stressed the collective nature of Christianity, with the Church as the *'body of Christ'*, in which each member played a vital role. By privileging individual revelation over communal worship and shared doctrine, Gnosticism undermined this sense of unity.

Despite its inherent fragmentation, Gnosticism's intellectual sophistication and allegorical approach allowed it to flourish, especially in cosmopolitan centres like Alexandria. There, Greek philosophy, Egyptian mysticism, and Jewish traditions converged, creating fertile ground for Gnostic ideas to thrive.

Beyond the question of evil, monotheism also needed to create a coherent model for subsidiary religious figures. What exactly, for example, was the relationship between Jesus and God? Where Paul had seen Jesus as co-existing with God, others thought that, if Jesus had always existed with God and had not been created, then this opened the back door to a new form of polytheism.

During the second and third centuries CE, the consensus view developed that, like many polytheist pantheons modelled on tribal organisations, the Godhead comprised a hierarchy with God the Father as creator, supported by his 'begotten' Son, Jesus, conceived by the Virgin Mary through the agency of the Holy Spirit, but almost every aspect of this model was debated at one point or another.

Groups like the Docetists argued that Jesus only appeared to be human but was not truly flesh and blood while others thought his human nature was incomplete. The Gnostics denied that the divine part of him had actually died and that he would return in judgement.

Others denied the divinity of the Holy Spirit, the authority of the Church and its Bishops, the importance of Baptism or the bodily resurrection of the dead.

For as long, though, as Christianity stayed an underground, persecuted religion, differing interpretations remained relatively unimportant in the face of the common pagan 'other' represented by the hostile imperial hierarchy.

Constantine and the Imperial Need for Unity

By the early 4th century CE, Christianity had spread widely throughout the Roman Empire, despite intermittent but intense episodes of persecution. Its resilience, growth, and geographic spread brought not only strength but also fragmentation. Competing interpretations of Christian doctrine—Pauline faith-

based salvation, Gnostic esotericism, and differing views of Jesus' divinity—threatened its internal cohesion. No longer just an obscure grassroots movement, Christianity was becoming a significant force in the empire, but one riddled with divisions that undermined its unity.

When Constantine became emperor in 306 CE, the Roman Empire itself was deeply fractured. Diocletian's reforms had split the empire into Eastern and Western halves, governed by multiple rulers, and a series of civil wars had further destabilized it.

Image 13: A Christian View of Constantine's Conversion

Constantine, emerging as the dominant power, saw the potential for Christianity as a unifying force across his dominion. The empire had long relied on religion to bolster its authority, and it had a history of co-opting local deities to join the Roman pantheon in cementing imperial authority. Christianity, claimed to be a universal religion that transcended ethnic and cultural boundaries. It appeared to match Constantine's ambition to reunify the empire. With its promise of universal salvation and its growing network of communities, it offered a unifying model with a single overarching system of belief.

Constantine's Christianity was probably as pragmatic as it was spiritual, although in an age of the supernatural, he would certainly not have wanted to jeopardise his relationship with the Christian God, and his conversion is steeped

in legend. According to the historian, Eusebius, on the eve of the Battle of the Milvian Bridge in 312 CE, Constantine had a vision of a cross in the sky accompanied by the words *In hoc signo vinces ('In this sign, you will conquer')*. Inspired, Constantine adopted the Christian symbol and achieved victory in the battle, securing his position as sole ruler of the western half of the empire.

While the details remain unclear, Constantine emerged as a patron of Christianity, claiming a special relationship with the Christian God and granting it official toleration through the Edict of Milan in 313 CE. This not only ended the persecution of Christians but also granted them privileges such as tax exemptions and the return of confiscated property, further cementing their growing influence within the empire.

Constantine's conversion both legitimised Christianity and marked the beginning of its transformation into the dominant ideological force of the Empire. To turn it from an underground movement, he needed a Christianity tuned to the need for a new governance model for his dominion. It needed to support a Roman political hierarchy with the Christian God reimagined as the supreme emperor of the cosmos, ruling over a divine court. Jesus, the Son, became the vice-regent, carrying out the will of Father. The Holy Spirit was cast as the agent through which divine authority and grace were distributed, like the bureaucracies that enforced the emperor's decrees across vast distances.

This hierarchical model was politically useful but theologically fraught. It highlighted all the old questions about the nature of Christ's divinity and his relationship to God. Was Jesus fully divine, co-equal with the Father, or was he a subordinate, created being? These questions were not just academic; they struck at the heart of monotheism's core challenge: how to reconcile the oneness of God with the multiplicity implied by the Trinity.

A new 'Imperial Model' Christianity, to be a truly unifying tool, needed to be clarified, and standardised with all ambiguities ironed out, so as to be enforceable as part of imperial policy and Constantine (and his successors) convened a series of Councils—the first at Nicaea in 325 CE—to draft an agreed, enforceable definition of Christianity in the same way that secular laws codified the principles of Roman governance.

Constantine convened the Council of Nicaea with a very specific brief focused on his requirement for a unified doctrine that would align the church with the imperial administration. He insisted that the council's decisions would

be binding on all Christians, with anyone who did not accept the decision facing exile, and the confiscation of their writings.

Nicaea was near Constantine's headquarters at Nicomedia and, although he was not a theologian, he told the delegates—of which he shipped in over three hundred from across the empire—that he would be 'present as a spectator and participant'. He was going to ensure that his objectives were met.

A priority was the resolution of the Arian controversy, named for Arius, a priest from Alexandria. Arius argued that Jesus, while exalted and unique, was created by God as a mediator and redeemer and that there must have been a time, before Jesus was 'begotten', when God already existed.

Opposition to Arius was led by Bishop Athanasius, who insisted that the statement in the Gospel of John that the 'Word' existed in the beginning, was with God, and was God, identified Christ as eternal and divine; that, if he was a created being he could not fully reconcile humanity with God, and that Christians were right to worship Christ. The dispute had split the Christian community, and undermined Constantine's vision of religious unity.

The outcome was the Nicene Creed in which Constantine created a combined model of religious and secular governance that would dominate Europe for more than a thousand years. It not only resolved theological disputes and established a framework for Christian orthodoxy but also reinforced faith's role as an instrument of imperial unity, with doctrine as much an instrument of governance as spirituality.

From a doctrinal point of view, God was defined with a strong affirmation of monotheism, mirroring the political model of a single, central imperial authority. Within this, the relationship of Father, Son and Holy Spirit is described hierarchically in terms of order and procession with the Father 'begetting' the Son and the Holy Spirit then 'proceeding' from them in the same way that governors, senators and local administrators depended on the emperor.

The Creed asserted that God is the maker of *'heaven and earth'* with universal scope that aligned with the Roman empire's pretensions to universal rule. Christ's *'kingdom will have no end'* and looks forward to the *'life of the world to come'* paralleling imperial propaganda of Rome's eternal domination (*Roma Aeterna).*

By providing an enforceable standard of belief for all Christians across the empire it was intended to perform the same function in the religious realm as the Latin language and Roman laws which were used to unify diverse peoples and cultures in the secular. This centralisation of doctrine was designed to

invalidate local and regional variations of Christianity, like Arianism and the multitude of other interpretations of Christ's doctrines that had flourished in the time since his death.

Lastly, the Creed emphasised the role of Christ as divine king and judge, seated at the right hand of the Father, reflecting the view that Constantine and his successors were divinely appointed rulers who governed as Christ's representatives on earth.

Suppressing Heresy

The immediate result of the imperial adoption of the Nicene Creed was that the church began to suppress alternative interpretations of Christianity. Gnosticism, already diluted by its emphasis on personal revelation over communal faith, was rigorously persecuted. Its rejection of the material world and its esoteric nature made it incompatible with the church's mandate as a unifying force within the empire.

The Arian controversy, though officially resolved, persisted in various forms, particularly among the Germanic tribes who would later play a significant role in the decline of the Western Roman Empire. Other heresies, such as Donatism —a North African movement that questioned the validity of sacraments performed by priests who had betrayed the faith during persecution—also posed challenges to the emerging orthodoxy. In each case, often with the backing of the emperor's military and political power, the imperial church responded by asserting its authority, but the suppression of heresies was more than an issue of doctrine. It was a way for the empire to consolidate control, ensuring that Christianity served as a cohesive force rather than a source of division.

Dissenting voices were eliminated and writings were destroyed if they didn't support the official creed. By defining orthodoxy and marginalizing dissent, the church and the empire worked together to create a unified religious and political framework. This alignment of interests laid the groundwork for the mediaeval concept of Christendom, in which spiritual and temporal authority were intertwined.

A New Model of Unity

Constantine's integration of Christianity into the imperial framework transformed the faith from a persecuted sect into a pillar of Roman governance. No longer a decentralized faith with diverse interpretations; it became an institution aligned with imperial authority and enforced by imperial power—a

model that would define the relationship between church and state for centuries to come.

The Pax Romana, once maintained through loyalty to the emperor and the old gods, was now underpinned by allegiance to a universal church. The Christian God replaced Jupiter as the supreme deity of the empire, and the church, with its bishops and councils, mirrored the administrative hierarchy of Roman rule.

Just as previous imperial policy had co-opted local deities and practices to the cause of unification, Christianity consecrated and accommodated existing pagan practices in its progressive expansion. Pope Gregory I, for example, instructed his missionaries to convert pagan temples into churches by sprinkling them with holy water, and placing relics in them. Pagan festivals were not to be abolished outright, but given Christian meaning as festivals in honour of saints. Local customs and revered figures were to be recast as holy traditions or saints to make Christianity relatable and culturally relevant.

Today, Christmas provides an excellent illustration of this process. The giving of gifts and the lighting of candles and the date of 25th December come from the Roman feasts of Saturnalia and Sol Invictus. The Christmas tree is a relic of the Germanic midwinter festival, the burning of a Yule log is a Norse element, and the use mistletoe, holly and ivy are Celtic traditions.

And cultural adaptation wasn't the only way Christianity spread. Local rulers who resisted conversion could always be deposed and executed if that was necessary.

In embracing Christianity, Constantine reshaped both the empire and the faith. The Roman Empire provided Christianity with a political and administrative structure that enabled its rapid expansion. Christianity, in turn, offered the empire a unifying ideology that transcended regional and cultural divisions. Together, they forged a new model of reality, one in which spiritual and temporal power were inextricably linked—a model that would endure long after the fall of Rome.

In the next chapter, we will see how Constantine's model of Imperial Christianity, built to unify an empire, was tested by the collapse of Roman authority and the influx of new and diverse populations. The Church faced mounting challenges: to harmonize the philosophical traditions of the Greco-Roman world with Christian faith, to address theological divisions that refused to fade, and to respond to a world where centralized power was disintegrating. Amid this chaos, a new and simplified paradigm for organizing society would

emerge, one that would offer a stark alternative to the increasingly fragmented Christian world.

Chapter 8—Modelling God
Understanding the Incomprehensible

Fraying at the Edges

Constantine's fusion of the Roman imperial administrative model with the merged mythologies that made up Christianity—Semitic-Pastoral and Greco-Roman-Agricultural—needed compromises by the bishops in his council at Nicaea. The resulting Creed was something that all the bishops (except two) could be made to sign off on. Constantine was ruthless. So long as he was there to make sure that everyone stuck to their agreements, it would work.

This top-level deal between church and state provided a model of partnership that suited his centralisation of imperial power. But the details of what had been agreed to, in religious terms, were far less clear. This started with the agreement on the Trinity. What exactly did it mean? It was a theological attempt to square monotheism with the divinity of Jesus and the active presence of the Holy Spirit—a threefold model of a single god. The Creed's statement that Christ was 'begotten' by the Father but had always existed with Him bordered on paradox. The exact relationship between the Father, the Son, and the Holy Spirit—which the Creed described as 'proceeding' from the Father—was theological ambiguous.

This lack of clarity was politically expedient for uniting diverse factions, but it sowed the seeds for future disagreements. Among others, these included the exact nature of Christ's divinity and whether the Holy spirit proceeded from the Father alone or from the Father and the Son.

Constantine had also, in his path to power, left problems for the secular part of the bargain. At the battle of the Milvian Bridge, the Praetorian Guard had fought against him for his opponent, Maxentius, and those of them who hadn't died in the conflict had been exiled to remote outposts of the empire. Constantine's powerbase lay in the west, in Gaul and Britannia and he replaced the Praetorians with the Scholae Palatinae, an elite unit that included many recruits from Germanic and Gothic tribes. This military centralisation, like the religious unification being attempted at Nicaea, was as vulnerable to external pressures—invading barbarians, for example—as the religious conclusions were to internal theological disagreement.

A hundred years on, the western empire was being overrun by Visigoths and Vandals who took advantage of the weakened state of the empire to move into

Roman territories, so the secular arm of the partnership with the church was looking very shaky indeed.

Orthodoxy, although it had successfully defined its doctrines, had not eliminated the various heresies that continued to divide Christians. The Visigoths and Vandals had converted to Arian Christianity, which denied the full divinity of Christ. Manichaeism, a dualistic form of Gnosticism, and Neo-Platonism, which offered a religious interpretation of Plato's doctrine of ideal forms, appealed to elite intellectuals looking for philosophical depth beyond the straightforward narratives of a new set of myths.

After less than a hundred years, Constantine's model of uniting Church and State under a single conceptual model was beginning to fray. It needed updating with a philosophical refresh. And a stronger theological foundation.

Cometh the Man—Augustine

Among the figures who rose to meet this challenge, Saint Augustine stands out. To most people today, his name is familiar for the colourful details of his life—his hedonistic youth, his dramatic conversion, and his famous prayer: *"Grant me chastity and continence, but not yet",* not for his towering intellect. These anecdotes may amuse or intrigue, but they only hint at the great influence Augustine would have in reshaping Christianity.

In fact, we know more about Augustine's life than we do about most of the early fathers of the church, because he wrote the autobiography in which he reflected on his sinful youth and conversion. He tells of his involvement with the Manichaean religion, with Neo-Platonism and of his pursuit of worldly pleasures. He was born in Tagaste, in North Africa, in 354 CE and trained in Carthage as a rhetorician. By the age of 18, he had a mistress with whom he produced a son.

These details are important because his personal journey—marked by indulgence, philosophical exploration, and his rhetorical training—shaped his later theological contribution as well as his abilities to promote his ideas. The experiences gave him the tools to refresh the Nicene model of Christianity, in a way which would influence the Church throughout the Middle Ages.

In part, Augustine's conversion to Christianity in 386 was a reaction against his exposure to Manichaeism, a dualistic worldview he ultimately found inadequate for explaining the origin of evil. At the same time, his life was marked by internal conflict and ambition.

Already a successful teacher of rhetoric, Augustine sought to advance his career by marrying a wealthy woman of high social standing, a move that required him to abandon his mistress of fifteen years—the mother of his son. This decision, while pragmatic, left him deeply conflicted.

Unable to resist his intense sexual desires, he took another mistress almost immediately, plunging him further into feelings of guilt and moral turmoil. At one point, tormented by temptation, he even considered castrating himself as a way to overcome his inner struggles.

His personal crisis led him to interpret his conversion as a direct act of divine grace—a life-changing revelation that shaped his belief in God as the all-powerful, unknowable source of all creation.

Augustine's exposure to Neo-Platonism, a philosophical tradition that interpreted Plato's ideas through a religious lens, was another key influence. From Neo-Platonism, he adopted the belief that God was inherently mysterious and beyond human comprehension. He argued that any contradictions or apparent illogicalities in Christian doctrine, stemmed not from flaws in the faith but from the limits of human understanding. To Augustine, it was entirely reasonable—even necessary—to hold seemingly paradoxical beliefs about God. It really was possible to believe six impossible things about God at the same time—before breakfast.

To explain the Trinity, Augustine developed an analogy based on a model of human psychology, with Mind, Knowledge, and Will (or Memory, Understanding, and Love) corresponding to the Father, Son, and Holy Spirit. Augustine's psychological analogy offered not just a metaphor, but a way to interpret the Nicene Creed within the bounds of human experience.

Image 14: St Augustine by Antonio Rodríguez (1636 - 1691)

Augustine also picked up the Neo-Platonic *'hierarchy of being'*, which positioned God as the ultimate source of goodness and truth, reflected imperfectly in the material world. This framework led Augustine—and therefore the Church—to view the physical world as subordinate to spiritual reality. For centuries, the Church would focus its intellectual efforts on understanding the spiritual model of reality rather than its connection to the material world.

Augustine's emphasis on the importance of the spiritual rather than the physical world is especially strong in *The City of God*, which he wrote in reaction to the *'barbarian'* invasion of Italy and North Africa. There the material

world is seen as being the realm of fallen man, in contrast to God's spiritual realm to which Christians, with the help of the Church should aspire.

Augustine's concept of evil can be seen as a reaction to Manichaeism. Rather than evil being a force or substance in itself, competing with God's omnipotence, he also introduced, from Neo-Platonism, the idea that it was a lack of, or turning away from God. This became the standard Catholic answer to the question of how evil could exist in a world created by an omnipotent, benevolent God.

Augustine argued that humanity's free will was the source of evil, in that it allowed people to turn away from God. Free will had led to the fall of Adam and Eve, and from this, Augustine developed the concept of original sin: the idea that all humanity inherited their disobedience and the resulting corruption of free will. Yet, despite having free will, humanity was powerless to achieve salvation on its own.

Only God's grace could redeem the soul, and this grace was entirely unearned and predestined. For Augustine, this paradox—how humans could possess free will while their ultimate fate was determined by God—was not meant to be fully understood. It was a mystery, reflecting the limits of human comprehension when faced with the infinite wisdom of God.

In what might be seen as a guilty reaction against his early pursuit of sexual pleasure, Augustine saw sexuality as the mechanism for transmitting original sin to mankind, and women as the temptress successors to Eve. His emphasis on celibacy and sexual abstinence, reflecting both his personal struggles and the broader ascetic ideals of early Christianity, has influenced the Catholic Church right through to modern times. Original sin also generated the need for baptism —particularly infant baptism—as the effective vehicle of God's grace.

His Neo-Platonism was expressed, too, in the remoteness of his Ideal Form of God—consistent with the imperial model of government—and this model was reflected in the need for Saints to intercede with God in the same way that courtiers could sponsor proteges with the emperor.

As a tireless proponent of Church orthodoxy, Augustine argued against heresies. He opposed Pelagianism's denial of original sin and its emphasis on the ability to achieve salvation through human effort and rejected Manichaeism's fusion of Buddhist and Christian thought as undermining God's omnipotence.

He fought against Donatism, a belief that only sinless bishops could administer sacraments, and insisted that the clergy—human, and thus imperfect

by definition—were just sinners seeking grace, rather than ideal humans who had to lead unrealistically perfect lives. When the Donatists resisted his arguments, Augustine set a precedent by endorsing the use of imperial troops to force their conversion. He rationalized this by saying that the salvation of their souls outweighed the suffering inflicted on their physical bodies. This justification set troubling precedents, paving the way for future persecution of deviant Christians and, centuries later, the Crusades against Islam.

Augustine's influence permeated the Church for centuries, shaping its relationships with secular rulers, the privileges of bishops and priests, and its intellectual and spiritual traditions. He was instrumental in defining key sacraments—baptism, the eucharist, marriage, and absolution—and his fusion of Christian theology with Platonic thought provided a model for a deeply introspective and spiritually focused intellectual tradition.

His legacy was a double-edged sword, however: while his theology helped unify the Church during a turbulent era, it also entrenched a framework for sectarian persecution that would haunt Christianity for generations. His emphasis on grace and predestination—while intended to underscore the sovereignty of God—also had significant moral implications. By teaching that salvation depended ultimately on God's unearned grace rather than human effort, Augustine's theology risked de-emphasizing the importance of moral accountability in worldly actions, since they were no longer seen as the ultimate determinant of one's spiritual destiny.

Festering Disagreement

In the Western half of the Roman Empire, Augustine, who wrote in Latin, established a Catholic orthodoxy that, in the long term, was able to overcome the challenges of Arianism and the other heresies of the day, but the Greek-speaking Eastern Empire faced its own theological challenges.

No sooner had the Council of Nicaea forged a fragile compromise on the Trinity than a new conflict arose, over the nature of Christ. The dispute centred on whether Christ's divine and human natures remained distinct—like oil and water, which resist blending—or were inseparably united, like salt dissolved in water, where the two become one and indistinguishable. The bishops of Alexandria and Antioch, leading opposing camps, bitterly disagreed, threatening to fracture the unity of the Church.

This theological deadlock alarmed Emperor Marcian, who feared its divisive potential for the empire. In 451 CE, he convened the Council of Chalcedon—

the fourth ecumenical council—to impose a resolution under the watchful eyes of his troops. The Council's compromise affirmed that Christ was *'fully divine and fully human, with two distinct natures (divine and human) united in one person (hypostasis), without confusion, without change, without division, and without separation.'*
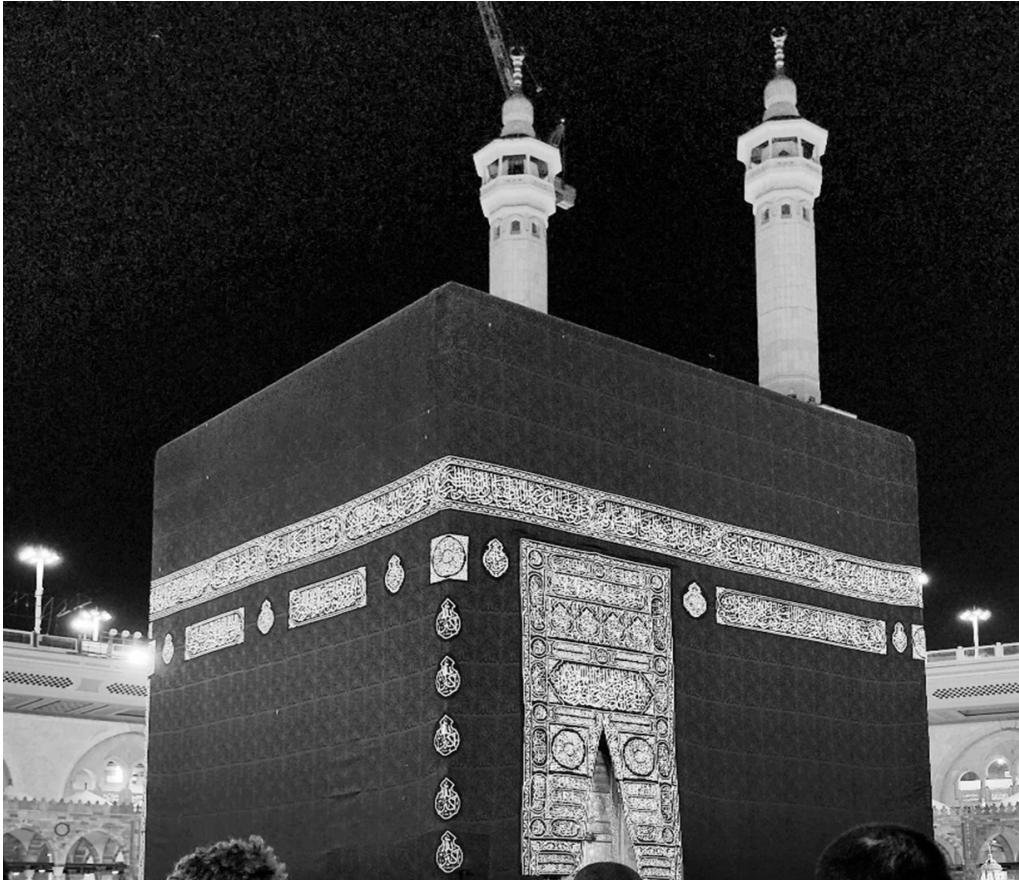
Image 15: Kaaba, Mecca. Now a Holy Shrine of Islam

This ruling rejected both extremes: Monophysitism, which claimed Christ had only one nature (either purely divine or a fusion of divine and human), and Nestorianism, which argued that Christ's divine and human natures existed as two separate persons. The definition was a triumph of theological nuance, but it alienated the extremists on both sides.

These distinctions confused the finest minds of fifth-century Christianity, so it should come as no surprise that they remain more than a little opaque today. The important point is that this obscure and almost incomprehensible argument became an intellectual battleground—one that shaped, and ultimately fractured, empires. The compromise at Chalcedon failed. Instead, it triggered a schism that split the Christian world forever.

The Monophysites broke away to form the Coptic, Ethiopian, and Syriac churches in the South, while Nestorianism thrived as the 'Church of the East', spreading across the Sassanian Empire and into Persia, Central Asia, and beyond.

What began as an arcane argument about the divine and human nature of Christ reshaped the religious and political map of the Christian world, leaving behind a legacy of division that persists in varying forms to this day—and created the environment where a new, simpler model of reality would emerge.

Less is More—The Birth of Islam

While the Eastern Church was distracted by these increasingly esoteric spiritual disputes, the Eastern Roman Empire was occupied with military campaigns to recapture Italy from the Ostrogoths and parts of North Africa from the Vandals. At the same time, it was resisting barbarian invasions in the Balkans and engaged in a protracted struggle with a resurgent Persian Empire under the Sassanian dynasty.

In the wars between Byzantium and the Sassanians, the Arabian Peninsula occupied a strategic position. For centuries, it had been central to trade networks linking India, North Africa, the Roman world, and the East. Mecca was a key trading hub where wealthy merchant elites thrived in a cultural melting pot of ideas and religions.

Pre-Islamic Arabia was a society rooted in oral traditions and poetry, which served as both entertainment and a means of preserving cultural values. However, this vibrant cultural life existed alongside deep social and economic inequalities. Tribal divisions and blood feuds were common, contributing to a sense of moral decline marked by exploitation of the weak and a lack of a unifying ethical framework. The collapse of the ancient Marib Dam in 570 CE further exacerbated economic hardships, disrupting agricultural prosperity and forcing tribes to compete more fiercely for resources, intensifying tribal divisions and feuds.

Religious diversity added to the complexity: while most Arabian tribes practiced polytheism centred on the Kaaba in Mecca—a revered shrine housing tribal idols that served as a pilgrimage site—Zoroastrianism and monotheistic traditions such as Judaism, Christianity also had significant followings

Muhammad, the founder of Islam, was born around 570 CE in Mecca, into the Hasim clan of the powerful *Quraysh* tribe. Orphaned young, he was raised by his grandfather and later by an uncle. As he grew, Muhammad earned a

reputation for honesty and integrity, which led the people of Mecca to bestow upon him the title '*Al-Amin*' *(The Trustworthy)*. This reputation set him apart in a society rife with tribal rivalries and self-interest. Yet Muhammad was deeply troubled by the moral decay of Meccan society, where the entrenched tribal conflicts, exploitation of the poor, and worship of idols created widespread injustice.

Seeking solutions, Muhammad found no comfort in the doctrinal disputes of Christianity, which, in his view, had become overly intellectualized and detached from the social inequalities of the material world. Disillusioned with existing answers, at the age of 40 he began retreating to a cave on the slopes of *Jabal al-Nour (The Mountain of Light),* seeking solitude and divine guidance in his search for a higher truth.

According to Islamic tradition, the angel Gabriel *(Jibril)* appeared to Muhammad in the Cave of Hira, commanding him to *'Read'* (*Iqra*). Startled and afraid, Muhammad replied that he could not read, as he was unlettered. The angel repeated the command, pressing him tightly in an embrace that left him trembling. Overwhelmed by fear and confusion, Muhammad doubted his worthiness to be a prophet, wondering if he had lost his mind. Yet, when he returned home, his wife, Khadijah, comforted and reassured him, affirming his character and divine purpose. With her unwavering support, Muhammad accepted his role as God's messenger, and over the next 23 years, the Qur'an was revealed to him in stages as a divine revelation.

The Islamic Model of the World

Muhammad positioned himself in the Semitic prophetic tradition, as the final successor to Abraham *(Ibrahim)*, Moses *(Musa),* and Jesus *(Isa)*. He rejected later Christian interpretations of Jesus by St Paul and his successors, such as the Trinity and the notion of Jesus's divinity, which he saw as deviations from pure monotheism.

Christians had struggled, for five hundred years, to find a satisfactory reconciliation of the trinity with monotheism and how exactly Christ could have been both divine and human. Islam offered a much clearer explanation rooted in strict monotheism. To them, Jesus was simply a human prophet. There was only one God, Allah, who was to be worshipped by prayer, fasting, almsgiving and pilgrimage, which served to purify the soul.

Without St Paul's conception of salvation by grace, an unearned and unearnable gift of God, Islam returned responsibility for personal and social

morality to the individual. The Qur'an taught virtues like honesty, patience, humility, gratitude and justice while condemning arrogance, greed, lying and oppression.

In a world of Trinitarian paradox and ecclesiastical infighting, Islam offered a powerful alternative: a simpler cosmology, a clearer moral code. Less was, suddenly, more.

The Qur'an addressed both spiritual and social concerns, advocating the equality of all people, regardless of race, gender, or social status. It condemned injustice and exploitation and emphasized the importance of caring for the poor, orphans, and marginal members of society.

Although it also accepted older, misogynistic traditions, it recognized the spiritual and moral equality of men and women before God. It granted women rights in inheritance, marriage, and property ownership—though interpretations of these teachings still vary in practice.

The family was considered a cornerstone of society, and marriage was encouraged as a means of companionship, mutual support, and procreation. Divorce was permitted but discouraged and had to follow ethical guidelines.

In business, exploitative customs like usury *(riba)* were forbidden with emphasis on fair trade, ethical business practices, and the redistribution of wealth through charity.

All this was encouraged and enforced by a concept of Paradise, a place of eternal joy for the righteous, and Hell, where those who reject God and persist in sin are tormented.

This was, in effect, a new civilisational model—socially coherent, spiritually unified, and intellectually streamlined. With its clear principles, Islam stripped away centuries of doctrinal complexity.

Its message of social justice upset powerful vested interests. Muhammad and his followers were persecuted so that he left Mecca for Medina in the *Hegira* or migration of 622 CE. Here, in spite of the opposition of the Jewish population, he established a powerbase, from which he authorised raids on Meccan caravans, which he justified as divine retribution against unbelievers and persecutors.

He returned to Mecca in 630 CE and, by the time of his death, two years later, he had established control over the whole of the Arabian Peninsula, imposing the faith and moral vision of Islam on the Arabian tribes.

Islam's brilliance lay in offering a radically streamlined model of reality— simple, portable, socially transformative—and perfectly timed to exploit the

intellectual disarray of the Christian world.

Muhammad's motivation was purely religious, with conversions based on personal conviction but his death added a political dimension. A tribal uprising in Arabia against his heirs was ruthless suppressed. And, thus enabled, this simplified, Semitic model for civilisation, with charismatic and competent leadership, conquered the divided and confused Christian world of the Middle East, North Africa and Spain.

In the next chapter, we will look at how contact with these historic cultural centres shaped Islamic thought and re-introduced Greek philosophical ideas to the rest of Europe.

Chapter 9—Rational Religion
Fusion of Faith and Reason

Jihad—The Spread of Islam

When Muhammad and his followers moved from Mecca to Medina to escape persecution, they left behind property that was confiscated by their enemies. Led by Muhammad's uncle, his followers intercepted caravans carrying these goods, recovering their property and setting a precedent for using both trade and conquest as tools of survival and expansion.

After the largely bloodless conquest of Mecca, Islam's focus shifted outward. It turned from local disputes to the broader goal of uniting the Arabian Peninsula under a single faith and political system. This expansion soon brought the new Islamic state into conflict with the great empires of the time— the Byzantines and the Sassanids.

Image 16: Prayer Hall, Great Mosque in Cordoba, Spain

The Byzantines, still reeling from their costly victory over the Sassanids in 627 CE, were ill-prepared to face a new threat from the south. Their armies were composed of diverse ethnic groups with competing commanders and lacked cohesion. The empire's citizens were war-weary, heavily taxed, and disunited, particularly in regions where Byzantine religious persecution alienated Jews and heretical Christian sects.

Meanwhile, the Sassanid Empire had descended into anarchy after its defeat by the Byzantines. With its ruling elite fragmented and its economy shattered, Persia proved unable to resist the disciplined, ideologically motivated Islamic forces.

Muhammad's successors—the Rashidun and Umayyad Caliphs—capitalized on the weaknesses of both the Byzantine and Sassanian empires. By 651 CE, Islamic armies had completed the conquest of Persia, as well as key Byzantine territories like Egypt and Syria. Over the next 75 years, they extended their reach across North Africa and into the Iberian Peninsula. By the time the Muslim advance was halted at the failed siege of Constantinople in 717–718 and the Battle of Tours in 732, the Islamic Empire stretched from the Atlantic Ocean in the west to the Sindh region in present-day Pakistan in the east.

Most of this expansion occurred under the Umayyad dynasty (661–750 CE), who focused pragmatically on secular issues of military strategy and on adapting the administrative systems they inherited to the needs of the expanding Islamic empire. However, as the conquests slowed and internal discontent grew, the Umayyads were overthrown, in 750 CE, by the Abbasid dynasty. In contrast to their predecessors, the Abbasids shifted their focus to religious and cultural consolidation, promoting Islamic identity through religious scholarship, the translation of philosophical works, and the philosophical and theological justification of Muslim culture.

Another Merger—Greece and Islam

The political and military successes of the Islamic Empire laid the groundwork for an intellectual flourishing under the Abbasid Caliphs. They established their capital in Baghdad, a centre where spices and silks from the far east, incense from the Horn of Africa, gold and salt from North Africa and textiles and spices from India were traded in bustling souks and marketplaces. In this cosmopolitan cultural and intellectual hub, Muslim scholars encountered the works of the Greeks, integrating them into their religious and philosophical framework, and creating an Islamic Golden Age.

Like the Christian thinkers before them, they began applying analytical insights to their understanding of the world. The Abbasid rulers and scholars established institutions such as the Bayt al-Hikma *(House of Wisdom)*, along with supporting libraries, translation bureaus, and patronage systems, to facilitate the translation of classical works into Arabic and to develop Muslim learning. Through this process, the rational approach of Greek philosophy was

integrated into the Islamic religious model, creating fertile ground for intellectual inquiry.

The potential paradoxes of the Trinity had made many Christian thinkers after Augustine wary of Reason as a potential threat to Faith, but the Qur'an encouraged Islamic philosophers to see Reason as a complementary tool for understanding divine truths. This created an environment in which faith and rational inquiry were seen as mutually reinforcing, rather than in opposition.

One of the most significant figures in the early development of Islamic philosophy was Al-Kindi (c. 801–873 CE). Known as the '*Philosopher of the Arabs*', he argued that Reason, as a gift from God, could help humans understand divine truths. With access to translations of Plato, Aristotle, Plotinus, and Pythagoras, as well as Persian and Indian sources, Al-Kindi incorporated Greek ideas of logic, causality, and the nature of the universe into Islamic theology. He argued that the Platonic concept of a single, ultimate source of all being aligned with the Islamic principle of God's oneness (*Tawhid*).

In addition to his philosophical contributions, Al-Kindi developed mathematical models, applying them to physics, astronomy, and music theory. He also introduced the use of Indian numerals—later known as Arabic numerals—to the Islamic world. This numerical system, combined with the development of algebra by later Islamic mathematicians like Al-Khwarizmi, revolutionized arithmetic and enabled advances in commerce, science, and engineering.

Born in 872, Al-Farabi (872–950 CE) is best known for his attempts to harmonize the teachings of Plato and Aristotle with each other and with Islamic teachings. Rather than viewing their philosophies as competing systems, Al-Farabi argued in 'The Book of Agreement' (*Kitab al-Jam' bayn Ra'yay al-Hakimayn)* that Plato and Aristotle offered complementary views of the same underlying truths. Building on their ideas, he developed ethical and political principles that provided practical guidance for Muslim rulers.

He wrote of the *'virtuous city'* (*al-madina al-fadila*)— a society governed by reason, justice, and ethical principles, where rulers were philosopher-kings who guided citizens toward happiness and intellectual fulfilment. For Al-Farabi, a virtuous city was a microcosm of divine harmony, where reason guides both rulers and citizens toward a higher moral and intellectual purpose. This alignment of politics with metaphysics reflects his effort to integrate Platonic ideals with Islamic values, creating a model of governance that was both practical and spiritually fulfilling.

Ibn-Sina (c 980-1037), known as Avicenna in the west, tried, like Al-Farabi, to harmonise reason with faith, seeing philosophy as a way of understanding divine truths better. He wrote 'The Book of Healing' (*Kitab al-Shifa*), a comprehensive encyclopaedia covering philosophy, natural sciences and metaphysics that became a standard text for centuries in both the Islamic world and Europe.

A distinguishing characteristic of the Islamic Golden age was this synthesis of practical material knowledge with philosophy. Avicenna distinguished Essence—*what* a thing is—from Existence - *that* a thing is. This distinction between essence and existence provided a framework for understanding God as the Necessary Existent—an entity whose essence and existence are identical, and who is the ultimate cause of all contingent beings. In order for a contingent thing to exist, existence had to be granted by God.

This had a bearing on the question of creation, one of the key problems Islamic philosophers grappled with. One of their most significant challenges was reconciling the Greek philosophical view of the universe as eternal with the Qur'an's teaching that Allah created the universe at a specific moment in time. This question of *'creation ex nihilo'*—creation from nothing, as opposed to an eternal universe—was not only a theological issue but also central to the integration of reason and revelation. Resolving this was crucial for harmonizing the rational models of the Greeks with the revealed truths of Islam.

This problem was like the problem of the Trinity for Christian thinkers—a problem that Augustine resolved by subordinating reason to revelation. The Islamic philosophers, on the other hand, found a number of potential reconciliations that enabled them to combine reason and revelation.

Al-Kindi addressed the tension by proposing that God had created both time and the universe. As an eternal being, God exists outside of time, but the universe began to exist when time itself began.

Al-Farabi, drew on Neoplatonism. He described the universe as the result of an eternal act of creation by God, where God's existence is the necessary cause of the universe, but without a temporal starting point.

Avicenna's solution was that God, as the Necessary Existent, eternally caused the existence of the universe, which flowed from Him as a continuous emanation[1] in a hierarchical chain of being. This was controversial, however, and some Islamic theologians criticised it for denying a temporal beginning to creation.

Ibn Rushd (Averroes)—who lived in *al-Andalus* (modern Spain) from 1126 – 1198 CE—argued that the universe's dependence on God was eternal, viewing creation as a continuous relationship rather than a singular event in time. He maintained that such a view did not contradict scripture, which could be interpreted allegorically.

Averroes became one of the most prominent defenders of Aristotelian philosophy in the Islamic world. Through his extensive commentaries on Aristotle, Averroes sought to harmonize reason and revelation, arguing that all truth ultimately emanates from God. He maintained that scripture, when properly understood, did not contradict philosophical truths, and any apparent conflict was due to misinterpretation. To resolve such conflicts, he proposed allegorical interpretation of scripture, particularly in cases where verses described God in anthropomorphic terms, such as *'having hands'* or *'sitting on a throne'*.

He offered a three-tiered model of knowledge—three different models tailored to three distinct purposes and sets of recipients. He argued that philosophers employ demonstrative reasoning to uncover essential truths, while theologians could use dialectical reasoning to guide the educated, and religious symbols and allegories to serve the masses.

His writings, transmitted to Europe through Spain, not only shaped Islamic thought but also greatly influenced mediaeval Christianity, setting the stage for figures like Aquinas to engage deeply with Aristotle.

Legacy

By the end of the Islamic Golden Age, a synthesis of Greek philosophy—particularly the works of Pythagoras, Plato, and Aristotle—with Islamic theology had produced a comprehensive model of the world. This synthesis, unhindered by Augustine's wariness of reason, extended into the philosophical domains of metaphysics, epistemology, and ethics, as well as the physical sciences of astronomy, optics, chemistry, medicine, and mathematics.

The preservation and translation of Greek texts by Islamic scholars, combined with original contributions like Avicenna's *The Book of Healing* and Averroes' commentaries on Aristotle, had a significant impact on Europe. When Muslim Spain *(Al-Andalus)* was reconquered by European forces, these texts were transmitted to Latin Christendom, sparking a revival of Greek philosophy in the West. Thinkers such as Albertus Magnus and Thomas Aquinas engaged

deeply with Aristotle and Averroes, laying the foundations for Scholasticism and the intellectual advances of the Renaissance.

The scientific advances of Islamic scholars—particularly in mathematics, astronomy, and medicine—laid the groundwork for the modern scientific method, demonstrating the power of the Islamic synthesis of reason and faith. This intellectual legacy both bridged cultures and inspired generations of scholars across all later civilizations, leaving an indelible mark on global thought.

The Dark Ages

The period of the Islamic Golden Age between the 8th and 13th Centuries CE, also saw a complete transformation in the territories of the Western Roman Empire. St Augustine had died during the siege of Hippo by the Vandals in 430 CE. This was followed by their capture of Carthage and the final collapse of the Western Roman Empire under the onslaught of successive waves of Germanic invaders.

The Visigoths sacked Rome in 410. They were followed by the Huns under Atilla and by the Ostrogoths, who after deposing the last Roman Emperor in the West in 476, settled in Italy under Theodoric the Great. The Islamic conquests of the seventh century replaced a Vandal Kingdom in North Africa and a Visigoth Kingdom in Spain, leaving barbarian kingdoms in Gaul and Italy.

In Gaul, the Franks, who had begun as a small tribal group, united under Clovis and his Merovingian Dynasty, finally halting Muslim expansion in the west at the Battle of Tours in 732 CE. This victory, by heavily armed defensive infantry over highly manoeuvrable cavalry, marked the Franks as defenders of Christianity and ended Muslim incursions North of the Pyrenees.

Charles Martel, at the time, the Frankish Mayor of the Palace, led the Franks at Tours and was their de facto ruler. His son, Pepin the Short, deposed the last Merovingian King with the blessing of the Pope. The new Carolingian dynasty, closely linked to the Roman Church, was named after his son and successor, Charlemagne.

Charlemagne extended the Frankish kingdom into an empire, conquering Lombardy, Saxony, Bavaria and parts of Spain. He was crowned Emperor of the Romans by Pope Leo III on Christmas Day, 800 CE.

Most of the Germanic rulers of Western Roman territories had positioned themselves as successors to the Roman Empire and paid lip-service to the Eastern Emperors. In doing so, they had attempted to implement a 'Roman'

model of government but, the instability of their reigns meant that this had remained quite rudimentary.

Educational systems and, with them, literacy had declined, and it was only in the Church and the candle-lit cloisters of its monasteries that remnants of classical Latin and Greek culture were preserved. Here, under the influence of Augustine's theology and philosophy, the focus was on the spiritual realm he had described in *The City of God*, rather than on what he had seen as the lesser, material world. His dualistic approach limited the Church's ability to engage with the natural world and the way it was ordered.

As Islamic scholars were synthesizing Greek philosophy with faith, Europe, under the shadow of Augustine's teachings, was charting a different intellectual path.

His model of reality emphasised individual salvation through Divine grace rather than human behaviour, prioritising man's relationship with God over earthly concerns like social and political relationships. Because man was inherently sinful, and therefore entirely reliant on God for salvation, his fate was predetermined, with little role for human agency so that the importance of ethical effort and virtue were reduced.

Augustine saw *'The City of Man'*—earthly life—as being in tension with *'The City of God'*—man's spiritual journey. He left little room for a systematic political and ethical theory applicable to earthly societies. His focus on divine grace and individual salvation made sense as a survival model for a chaotic world. After all, if the world was falling apart, what point was there in complex thought about how to manage it?

Rekindling the Flame

With the re-establishment of order under Charlemagne, however, it became necessary to re-address these secular issues. The return of stability saw the gradual rediscovery of practical governance and learning. Charlemagne viewed education as a model for governance and intellectual revival, essential for both religious and administrative purposes. A well-educated clergy was needed to properly understand and teach Christian doctrine, and an educated lay aristocracy was vital for the efficient administration of his empire, so he ordered the establishment of schools and encouraged the preservation and copying of classical texts.

He established a palace school at Aachen (in modern Germany) to educate his family, court, and selected scholars. Under the leadership of Alcuin of York,

an Anglo-Saxon scholar, the school became a centre of intellectual revival, teaching Latin grammar, rhetoric, logic, astronomy, and the liberal arts, and fostering the preservation of classical texts.

He also ordered the establishment of schools at monasteries and cathedrals to educate the clergy. At monasteries like Fulda in Germany, Corbie in France and Saint Gall in Switzerland and in the Cathedral schools like Reims, Chartres and Orleans clergy and lay students studied grammar, rhetoric, logic, arithmetic, geometry, music and astronomy—the seven liberal arts.

These schools produced new generations of scholars, like Anselm of Canterbury (1033-1109) capable of adopting, rationally analysing and developing the model that Augustine had left. They were the forerunners of mediaeval universities which emerged subsequently in places like Bologna, Padua, Salerno, Paris and Oxford. There new syntheses of the writings of the Fathers of the Church—particularly Augustine—by scholars like Peter Lombard were used as textbooks.

Scholasticism—The Shock of the Old

When faced with the complexities of Trinitarian theology, Augustine—following Plato—placed a heavy emphasis on faith as the foundation of knowledge, prioritising the mystical and spiritual over reason and empirical experience, with a corresponding tendency to see reason as a threat to faith, rather than its complement.

The Muslim world, on the other hand, had engaged deeply with the works of Aristotle as early as the 8th century, integrating them with Islamic thought. Ironically, it was through the Christian reconquest of Toledo in 1085 CE that Europe rediscovered Aristotle—along with the Islamic commentaries and advances in science, medicine, and mathematics that had far surpassed anything preserved in the Christian West.

Under the patronage of Bishop Raymond, a school of translators was established in Toledo where Christian, Muslim and Jewish scholars worked together to produce Latin translations of Islamic and classical Greek material. Exposure to these translations stimulated Western efforts to apply reason to theological truths and the harmonisation of contradictions in the same way as the Muslim philosophers had, marking a turning point in Europe's intellectual history.

By the early 13th century, the translations of Aristotle's works and Islamic commentaries had permeated cathedral schools and the emerging universities of

Europe. In these environments, a new way of thinking, the Scholastic model, was emerging. Characterised by its rigorous use of the dialectical method in which theological and philosophical questions were presented with logical arguments for and against each position, Scholasticism—popularised by figures like Peter Abelard and Anselm of Canterbury—sought resolution through logical analysis.

Image 17: Monasteries - Repositories of Literacy

The rise of universities, particularly in Paris, Bologna, and Oxford, institutionalized Scholasticism as the dominant intellectual tradition of the mediaeval world. These universities formalized the study of theology, philosophy, and law, with the Scholastic method at the heart of their curricula. The competitive debates and commentaries produced by scholars in these institutions fostered both the refinement and dissemination of Scholastic ideas across Europe.

A master of this method, Albertus Magnus, a Dominican friar and teacher became one of the foremost champions of Aristotelian philosophy in the Christian West. He used Scholasticism's rigorous logical reasoning to reconcile apparent contradictions between Aristotle's naturalistic worldview and Christian

doctrine, arguing that both nature and religion were expressions of God's creation, fundamentally harmonious in their truths.

This perspective not only bridged the gap between reason and faith but also provided a systematic framework for understanding both the material and spiritual dimensions of reality. Albert's intellectual legacy influenced countless scholars, most notably his student, Thomas Aquinas.

St Thomas Aquinas—Faith Meets Reason

Scholasticism aimed to create a comprehensive intellectual system that unified theology, philosophy, and the natural sciences. By reconciling faith and reason, it sought to provide a coherent framework in which every aspect of reality, from the material to the divine, was interconnected and aligned with God's eternal wisdom.

Aquinas, like Albert a Dominican monk, expanded on his foundation, taking up the monumental challenge of creating this comprehensive model. This task, which had eluded Christian thinkers since the time of Augustine, would establish a synthesis that defined Scholasticism and would resonate for centuries.

Thomas Aquinas was a realist—he believed it was possible to know and understand the world as it truly existed. His philosophical approach was marked by an acceptance that truth could come from any source. He not only engaged deeply with Aristotle's works but also benefited from the commentaries of Islamic scholars such as Avicenna and Averroes, whose interpretations had shaped the understanding of Aristotle in the arab world.

For Aquinas, all truth ultimately originated from God, whether discovered by Greek philosophers, Roman jurists, Jewish theologians, or Muslim scholars. He critically examined these diverse traditions, integrating their insights with Christian thought and writing, to construct a unified understanding of reality.

Aquinas's starting points were threefold: that God necessarily existed and was Good; that the universe and everything in it could be traced back to God through a chain of causes; and that the principle of non-contradiction defined the limits of what was logically possible. For Aquinas, any statement that contradicted itself was necessarily false, as truth must be coherent and consistent.

Aquinas's analysis of causation followed Aristotle, identifying four types of cause: the material cause (what something is made of), the formal cause (its defining essence or nature), the efficient cause (what brings it into being), and

the final cause (its purpose). For example, the material cause of a chair is the wood it is made from; its formal cause is the structure that makes it recognizable as a chair; its efficient cause is the carpenter who constructed it; and its final cause is its purpose as a seat. Crucially, Aquinas argued that all things—traced back through their causes—ultimately originated with God, the *'First Cause'*.

Goodness!

From this framework, Aquinas derived his definition of goodness—not an abstract concept, but the foundation of ethical behaviour and legal order. Like the concept of quality discussed in Chapter 3, for Aquinas, goodness lay in being suited to an intended role or purpose. Since final causes were inherently divine in origin, to achieve one's final cause was to align with God's purpose, reflecting the ultimate goodness of the Creator. Aquinas's concept of goodness, rooted in fulfilling one's divinely ordained purpose, informed his views on happiness, ethics, and law. Each aspect of his philosophy was interconnected, reflecting his belief that human flourishing depended on aligning with God's eternal order.

Happiness, Aquinas argued, meant fulfilling one's purpose as a human being. Like Aristotle, he defined humanity as a rational animal, possessing a rational and immortal soul that distinguished humans from plants and animals. Happiness, therefore, required cultivating the natural virtues—prudence, temperance, justice, and fortitude—and the theological virtues—faith, hope, and charity.

Like Augustine, however, Aquinas insisted that virtue was only possible with Divine grace. Goodness without grace was valueless as all moral value depended on both the circumstances of an action and its intention. Happiness on earth could only be a reflection of the perfect happiness found in the beatific vision of God in heaven.

Aquinas also grappled with reconciling human free will and divine providence. He argued that natural actions moved by God remained voluntary because God's influence operated through, rather than against, each individual's nature. For those predestined, God granted additional grace to enable their alignment with divine purpose but this did not negate their free choice.

In his legal philosophy, Aquinas distinguished four categories of law:

Eternal Law: The wisdom of God governing the universe, encompassing all creation.

Natural Law: The rational order inherent in creation, like the moral principle to do good and avoid evil.

Divine Law: Truths revealed through Scripture, such as the Ten Commandments.

Human Law: Civil laws, which must align with higher forms of law to be just.

The Grand Synthesis

What Aquinas had achieved was a harmonisation of Christian doctrine with classical philosophy and logic. It shaped mediaeval thought although, at the time, it was quite controversial. Many churchmen thought that his introduction of reason into the Catholic religion threatened the primacy of faith and other scholars debated the detail of his synthesis.

John Duns Scotus disagreed with him on God's nature.

Aquinas thought that God was completely unlike his creation so that, for example, any word used to describe him had a different meaning from the same word as ordinarily used and could only be thought of as an analogy. Scotus felt that, although this emphasised God's transcendence, it obscured the similarity between God and his creatures and insisted that a word had the same meaning wherever it was used.

They also disagreed about what constituted individual identity where Scotus emphasised individual uniqueness, as against Aquinas's preference for thinking of individuals simply as representatives of the class of humans.

Despite disagreements like these, by the end of the Middle Ages, scholastic philosophers had created a model of the world—or at least of the parts of it they were interested in—that combined Aristotelian philosophy with Christian theology.

This comprehensive model, in which God's purpose was the mechanism for everything from the creation of the universe to individual salvation by his Grace, was a cornerstone of Scholasticism. It shaped mediaeval thought and laid the groundwork for modern discussions on ethics, law, and human purpose. As late as 1910, Pope Pius X said that the philosophy of the Catholic Church could only be fully comprehended through the lens of St Thomas Aquinas's work.

Enter Ockham

Despite its long-term influence and its success in preserving and systematizing knowledge, Aquinas's Christian synthesis was fundamentally backward-looking. It relied heavily on inherited knowledge from Classical, Jewish, Arabic, and early Christian sources, without advancing significantly beyond them. In contrast, the Islamic Golden Age had demonstrated the world-altering potential of combining religious inquiry with progress in fields like medicine, science, and astronomy.

At this point, the Christian west had contributed relatively little to these domains, underscoring the need for a new intellectual model that could engage more deeply with the material world.

A pioneer of this transformation came in William of Ockham. He challenged Aquinas's attempt to unify reason and revelation. Ockham argued they needed separate models—one for religious truth, grounded in divine revelation, and another for rational knowledge, rooted in physical experience. This separation preserved theology's spiritual focus while freeing the study of nature to progress through empirical observation. And Ockham's principle of simplicity —Ockham's Razor—would inspire generations of thinkers.

Ockham's ideas marked the beginning of a new intellectual trajectory, one that would completely change Europe's relationship with the material world and pave the way for the scientific and cultural revolutions to come.

By challenging established models and championing the value of empirical inquiry, Ockham's vision heralded a future where human reason could explore and reshape the natural world, altering forever the balance of power and knowledge between Europe and the rest of the world.

Where Scholasticism had sought to explain the world through a lens of eternal truth, Ockham opened the door to models of the world that could change, be measured, and ultimately control it—a world of multiple models that could co-exist, each judged by its usefulness.

Chapter 10—Models and Morals
Renaissance and Reformation

Image 18: Cathedral Santa Maria del Fiore, Florence

In 1400, the new cathedral in Florence had reached roof height. The ambitious design called for the largest dome built in Italy since Roman times, but its construction seemed beyond what the builders could do. What had started a century earlier as just another Gothic cathedral had now become an architectural puzzle with no clear solution.

The dome was to be 45.5 metres in diameter, two metres larger, even, than the pantheon in Rome, and no provision had been made in the design for flying buttresses to spread the weight. Because of its enormous size, there was not enough wood in Tuscany to make an internal scaffold, so it needed to be built without support.

The guild of wool merchants, who had taken over responsibility for the construction in 1331, held a competition to find a design. Architects travelled from across Europe to compete for the prize of 200 Guilders, which was awarded to Filippo Brunelleschi, who had spent time in Rome studying ancient buildings.

The challenge of building Florence's dome was not just architectural but intellectual. For centuries, the wisdom of the ancient world had been dismissed as pagan and untrustworthy. Now, thanks to thinkers like Thomas Aquinas, who argued that reason was a divine gift, the classical past could be studied, not

feared. This shift would fuel an explosion of knowledge—one that transformed art, science, and philosophy. Aquinas offered a framework for engaging with the material world. By harmonizing classical philosophy and Christian theology, he had built a synthesis that redefined the Church's intellectual foundations. He embraced reason as a gift from God, compatible with faith, and his respect for pagan philosophers like Aristotle legitimized the study of the natural world.

In art, as well as architecture, ancient techniques and understanding were being revived. Painting in perspective to show the world in three dimensions—also an area where Brunelleschi made a key contribution—was revived.

Artists like Leonardo da Vinci and Michelangelo performed dissections of animal and human corpses to understand how bones, muscles and sinews operated and determined surface appearance. Where mediaeval monks had focussed on the structure and fate of the soul, it was now legitimate to examine the structure of the body.

The rediscovery of knowledge from the ancient world, combined with the prosperity brought by stability and trade. The church was able to draw pilgrims and money from across Europe to create the Renaissance, a golden age of art, architecture, learning and discovery based on a new humanist model of reality. What humans did on earth was now as important as what would happen in heaven—if not more so.

Across Italy, the rulers of prosperous city states competed to sponsor the largest palaces, the greatest works of art. New cathedrals like St Peter's in Rome were constructed and decorated with fresco paintings made before the plaster dried.

Image 19: Fresco Fall of the Giants—Palazzo Te, Mantua

The Palazzo Te is another spectacular Renaissance building. A palace in Mantua, built for Federico II Gonzaga, Duke of Mantua between 1524 and 1534, it stands as a monument to the indulgent spirit of the Renaissance.

Hundreds of plasterers, carvers and fresco painters created a building dedicated entirely to pleasure. Its frescoed walls teem with giants, horses—the Gonzaga were famous breeders—and surprisingly explicit erotica. Local lore suggests that, when the Emperor Charles V visited Mantua, 200 virgins were deflowered in his honour—although, maybe that's just Mantua's version of a tall tale. In 1540, Federico died of syphilis, as his father had.

How could such decadence thrive after a millennium dominated by Christian devotion and ascetic ideals? Federico's life of indulgence reflected the Renaissance's embrace of earthly pleasure and beauty, a stark departure from the piety that had defined the mediaeval world.

This was a time of rediscovery and excess, a world where humanist ideals celebrated earthly life, even as the Church faltered under the weight of its own corruption. But this gilded age also sowed the seeds of revolution. Could this excess persist without demolishing the Church's authority? And how would Christianity weather the storm of doubt and dissent brewing on the horizon?

The Root of the Rot

The theological tensions behind clerical and societal corruption trace back, in part, to St. Paul's introduction of the concept of salvation by grace. While Paul explicitly rejected using grace as an excuse for immoral behaviour—*'Shall we*

go on sinning so that grace may increase? By no means!' (Romans 6:1–2)—later interpretations struggled to find the right balance with moral responsibility. Augustine expanded on Paul's ideas, emphasizing that salvation was predestined by God's foreknowledge before creation. While Augustine upheld the importance of living a moral life as evidence of divine grace, this emphasis on predestination often led later interpreters to downplay personal accountability.

Augustine argued that the sacraments, including the Sacrament of Penance, derived their efficacy not from the moral state of the clergy but from Christ's ultimate agency. This principle protected the sacraments' validity but may have contributed to diminished clerical accountability over time. And Augustine's *correptio*, a form of private correction and reconciliation, evolved into the practice of private confession and absolution. By the 13th century, this became institutionalized through the Sacrament of Penance, where priests could grant absolution to penitents who demonstrated true contrition.

While private absolution allowed for personal reconciliation, it also opened the door to misuse. By the late mediaeval period, the Church had positioned itself as the mediator of grace on earth. Through penance and the granting of indulgences, it offered the faithful a path to remit temporal punishment for sins —often in exchange for acts of devotion, pilgrimages, or financial contributions. This system evolved into an almost transactional marketplace, where spiritual benefits were perceived as commodities. The notion that grace flowed through the Church's authority gave it immense spiritual and material leverage, consolidating its power over Christian society

This created a paradox: the Church preached salvation as an unearned gift of God but tied access to grace to acts of charity, many of which enriched the institution itself. By the late mediaeval period, this system had become deeply entangled with the Church's material needs. Massive building projects, like St. Peter's Basilica, were funded through indulgence campaigns that promised remission of purgatorial suffering for donors, and wealth and spiritual authority became more and more inseparable.

Critics of the time saw this as a corruption of the gospel's core message. The grandeur and opulence of the Renaissance Church, exemplified by its art, its architecture, and its ceremonies, stood in stark contrast to the humility of early Christianity. The institutional focus on wealth and power alienated believers and exposed the Church to the reformist critiques of figures like Martin Luther,

whose theology rejected the idea that divine grace could be mediated—or commodified—by the Church.

The Renaissance's indulgent culture, as seen in figures like Federico II Gonzaga and institutions like the Palazzo Te, reflected this broader tension. Grace and salvation were central to Christian belief, yet the Church's material wealth stood in contrast with its spiritual ideals. The theological principle of predestined salvation by grace became, ironically, one of the roots of the Church's worldly excesses and the eventual catalyst for its fragmentation during the Reformation.

City of God to City of Gold

This change of emphasis had taken a thousand years. When Constantine was able to lock all the bishops in a room and demand an imperial religion, the church was still as vulnerable to secular power as it had been in the years of persecution.

A century later, writing amidst the collapse of the Roman Empire, Augustine reflected the Church's precarious position. Heresies from within and barbarian invasions from without threatened its survival. Augustine's vision of the *City of God* contrasted starkly with the fragile *City of Man*. To him, earthly life was a fleeting, painful struggle—a temporary trial before the eternal peace of the Heavenly City.

Over the next millennium, however, the barbarian invaders who once menaced the Roman world became the custodians of Christianity, converting to the faith and spreading it across Europe. The Islamic advance into Western Europe was halted at the Battle of Tours and, when stability returned, prosperity followed. Trade and industry revived, bringing wealth back to Western Europe.

As the guardian of literacy and education, the church wielded both temporal and spiritual power. Bishops crowned kings, popes mediated disputes between rulers, and church councils influenced political decisions. Through gifts and legacies, the church owned vast estates. The church collected tithes from the faithful and indulgences from the penitent. Kings, dukes, and merchants adorned the church with grand cathedrals, intricate stained glass, and awe-inspiring frescoes to secure divine favour, demonstrate piety, and assert their status and power in this world and the next.

Amidst this growing wealth and power, Thomas Aquinas's framework for engaging with the material world, had opened the door to more than just a unification of philosophy and religion. Faith and intellect were not in

opposition, but complementary, which allowed the Church to adapt to an increasingly secular and prosperous Europe—but also, unintentionally, laid the groundwork for the gradual prioritization of material concerns over spiritual virtues.

The Church's rise in influence brought significant new challenges. The question of how the Pope, as its head, should relate to secular rulers—particularly the Holy Roman Emperor—became a source of conflict. In a world where Church and state were entwined, the Pope often found himself caught in the currents of realpolitik. Without military power of his own, he relied on alliances with secular princes to bolster his position. As politics overshadowed principle, the Church's moral authority became increasingly entangled with temporal ambition.

Vice at the Vertex

The result was a moral quagmire. Positions within the Church—bishoprics, abbeys, and even cardinalships—became commodities to be traded for political support, favours, or even outright cash. Simony, the buying and selling of Church offices, was rampant. Nepotism flourished, as popes and bishops secured influential roles for their relatives, often at the expense of more deserving candidates. Away from Rome, local kings and princes had the right to appoint bishops and other church officials—usually on the basis of political considerations rather than spiritual or moral qualifications.

Even the papacy itself was not immune. The election of a pope, ostensibly guided by the Holy Spirit, became subject to partisan influence and negotiation. Powerful families like the Medici, the Borgia, and the Colonna manoeuvred to install their candidates on the throne of St. Peter, prioritizing political loyalty or dynastic alliances over spiritual or moral qualifications.

For some popes, the office became a tool for advancing their family's wealth and prestige. Alexander VI, born Rodrigo Borgia, epitomized this, using his position to enrich his children and secure military and political gains for the Borgia dynasty. Presumably he justified this to himself by the glory he brought to the papacy with constructions like the Tower of the Winds, additional defences of the Apostolic See and the Room of the Sybils, a beautifully frescoed addition to the Apostolic Palace.

Alexander VI openly acknowledged fathering several children, including Cesare and Lucrezia Borgia, whose political manoeuvring and personal intrigues further tarnished the Church's image. He was widely accused of

buying and selling Church offices on an unprecedented scale and of turning the papacy into a tool for Borgia family ambition. Most infamously, in 1501, he was linked to the *Banquet of Chestnuts*, a scandalous event held in the Apostolic Palace, where courtesans and prostitutes reportedly entertained high-ranking Church officials in what chroniclers described as an all-night orgy.

With the Church's material power at its peak, the last restraints imposed by spiritual authority seemed to have crumbled. The sheer excess of wealth and influence, once justified as a means of serving the faithful, had now become an end in itself. For the devout who still looked to the Church for moral guidance and the promise of salvation, these developments were not only shocking but deeply unsettling. The institution meant to provide spiritual certainty now appeared indistinguishable from the worldly corruption it was meant to oppose.

As humanism flourished, tensions over Church corruption grew impossible to ignore. For centuries, the Church had presented itself as the sole arbiter of grace and salvation—but what if it had become the greatest obstacle to true faith? What had begun as pious indulgence in art and architecture now demanded reform in faith itself.

Back to the Bible

As the Church's credibility collapsed under the weight of its corruption and decadence, it became a byword for everything it was meant to stand against. For many devout Christians, this was not just a crisis of leadership but a crisis of faith itself. Seeking answers, they turned back to the Gospels and the epistles of St. Paul, searching for clarity on what Christianity meant. Stripping away centuries of humanist embellishments and theological interpretations imposed by the Church Fathers, they looked for a purer, unmediated understanding of God's word.

Their objective was reform, not revolution. Applying the rigorous logical analysis developed by the Scholastics, they examined scripture with fresh eyes, hoping to purify the Church's model of the world and restore it to its apostolic foundations.

What they did reject, however, was the Church's monopoly on interpretation. On October 31, 1517, Martin Luther, a monk and professor of theology—disturbed by the Church's sale of indulgences—famously nailed a document containing 95 Theses to the door of the Castle Church in Wittenberg, Germany. His challenge to indulgences and papal authority was intended to provoke

scholarly debate, but thanks to the printing press, his message spread rapidly across Europe.

At the heart of Luther's argument were simple but explosive ideas:

Indulgences could not buy salvation—only true faith could bring redemption.

The Pope had no power over purgatory—God alone determined the fate of souls.

The Bible, not the Pope or the Church, was the ultimate authority on faith.

A Challenge to the Model of the World

Confronted with this direct assault on its model of the world, the Church launched its standard counterattack. The Holy Roman Emperor, Charles V— putative associate of Federico Gonzaga—called Luther before a council at Worms in 1521, demanding he recant.

Luther refused, prioritising his own conscience and belief over the authority of the Church. In doing so, he rejected not only the pope's claims, but the entire hierarchical model of truth that had structured Christian Europe for centuries. He was declared an outlaw by the Edict of Worms, making him a marked man —anyone could kill him without consequence. Yet, protected by Frederick the Wise, Elector of Saxony, he took refuge in Wartburg Castle, where he began translating the Bible into German.

New Language—New Reality

This became one of the most significant turning points in European history.

Before Luther, the German language had been a patchwork of local and regional dialects, spoken but not standardised. His translation of the Bible created a unifying linguistic foundation that, over the next five hundred years, would help define not just a language, but a nation and a culture.
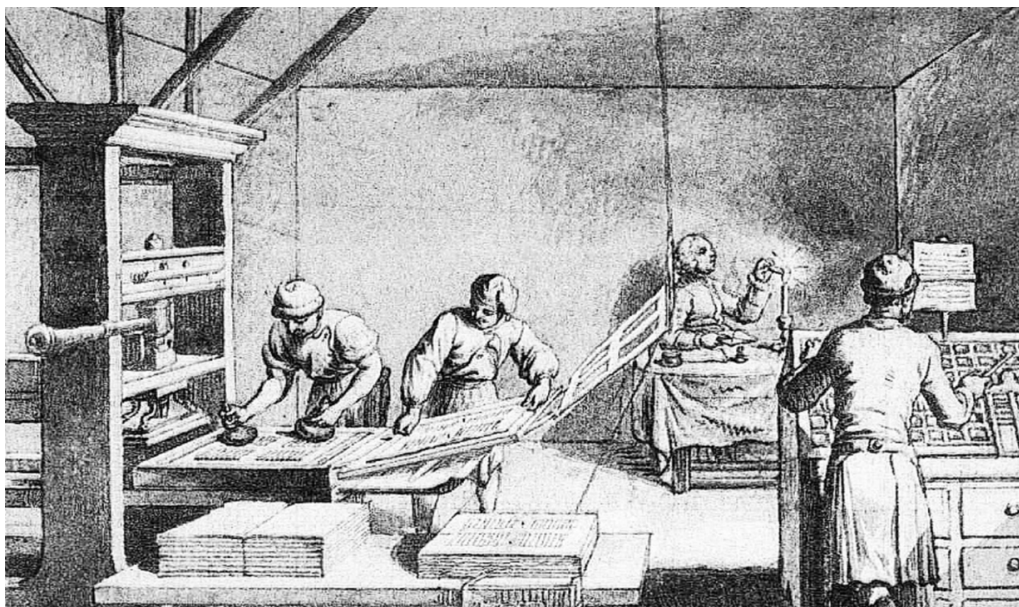
Image 20: Die Buchdruckerei - The Printers

Even more importantly, this new model of thought—that scripture could be read, understood, and interpreted by anyone—was amplified by printing: the new tool for capturing thought and spreading models of the world quickly and cheaply.

For centuries, the creation of a book had required the painstaking, manual copying of text, letter by letter, word by word, page by page. Knowledge had been the domain of an elite—guarded by the Church, controlled by the State, and accessible only to those with power and wealth. A monastery or a royal court might contain books, but for the ordinary person, to contribute to a communal model of thought was all but impossible.

Now, everything changed.

Luther provided the intellectual justification, the printing press, the means.

For the first time in history, ordinary people could devise and share their own model of the world—at first, in the form of biblical interpretation, but soon in ways no one could predict. The fires of thought were no longer safely under control. The sparks of new ideas ignited fresh flames wherever they landed.

What had begun as an academic dispute over a model for understanding the world soon spiralled into something far greater. Luther's writings ignited a movement that shattered the unity of Christendom. As rulers, theologians, and common people took sides, a backlash erupted—one that would lead to not one, but many full-scale wars, tearing Europe apart for more than a century.

Pick 'n Mix

In Northern Europe, independent dukes and princes saw Lutheranism as a weapon in their struggle for autonomy from the emperor. A growing middle class of merchants and artisans resented heavy taxation by the Church, the sale of indulgences, and the constant flow of wealth to Rome. They valued hard work, frugality, and individual responsibility, so Protestant ideals appealed deeply. Here Luther's ideas found their strongest support.

He had opened the floodgates to competing models of Christianity—each grounded in scripture, but reaching widely different conclusions. Where Christianity had once been shaped by hierarchy, tradition, and authority, faith had become fluid, adaptable, and deeply personal.

Instead of replacing one Church with another, every day seemed to bring a new interpretation of what the Bible meant in practice and rival reformers emerged, each convinced they had uncovered Christianity's true message.

Huldrych Zwingli in Zurich rejected anything not explicitly found in scripture, stripping churches of images, music, and sacraments.

John Calvin in Geneva developed a rigorous, systematic theology emphasizing predestination and the absolute sovereignty of God.

Radical groups like the Anabaptists rejected infant baptism, saying faith was a personal, conscious decision.

And while many Protestant groups espoused strict moral codes, demanding puritan standards of behaviour, others, like the Anabaptist Kingdom of Münster, echoed the excesses of the Renaissance Papal Court, allowing the baptized to indulge in sexual misbehaviour under the guise of divine revelation.

Whack a Mole

As Protestant theology spread across Europe, the Catholic Church recognized the need for internal reform and between 1545 and 1563 the Council of Trent met to define Catholic teachings in opposition to Protestant claims. It reaffirmed key Catholic doctrines, such as salvation through faith and works, the authority of the Pope, and the necessity of the sacraments, but banned the sale of indulgences and imposed stricter discipline on the clergy to address corruption.

In 1540, Ignatius of Loyola established the Society of Jesus or Jesuits. They were a militant Catholic order who established schools and universities, making Catholic education a key tool for combatting Protestant influence. A new

Inquisition was established, aimed specifically at suppressing Protestant influences. An index of banned books listed works that were forbidden to Catholics—including those by Luther and Calvin—and Protestant converts were hunted, tortured and executed.

In contrast to the North, Southern Europe consisted of the centralized states of France and Spain, together with Italy, where large areas were owned by the Church and its allies—duchies like Milan, Mantua, and Florence. They remained deeply tied to Catholic power structures.

In France, the strongly centralized monarchy viewed religious innovation as a direct threat to royal authority. Protestant Huguenots were eliminated during the French Wars of Religion by the massacres of Vassy and St Bartholomew's day and by persecution and exile.

Spain, still ruled by semi-feudal vassals of Emperor Charles V, saw itself as the sword of the Church, ready to repress dissent.

In the North, however, the independence of the Protestant princes and the extent of discontent with the church made the suppression of Protestantism impossible. While the Reformation began as a theological dispute, it quickly became a proxy for power struggles across Europe, dividing north and south, Protestants and Catholics, empires and emerging nation-states, in a hundred years of incessant warfare of almost incomprehensible savagery.

In Germany, Emperor Charles V led a military campaign against a coalition of Protestant princes. He defeated them at Mühlberg in 1547 but couldn't wipe out Lutheranism so that, from the 1555 peace of Augsburg, German rulers were allowed to choose their own religion.

By 1568, the Calvinist Dutch had risen in revolt against Catholic Spain, launching a war that would last over fifty years. By 1609, the Netherlands was effectively divided: the north became the independent, protestant Dutch Republic, while the south (modern Belgium) remained under Catholic Spanish control.

In England, the accession of the Protestant Queen Elizabeth I was disputed by Philip II of Spain. He launched the Spanish Armada to invade England and restore Catholicism in 1588. This failed disastrously and England became a major protector of Protestant movements in Europe.

The culmination of all these attempts to suppress Protestantism was the Thirty Years War, one of the most destructive conflicts in European history.

It was fought primarily in central Europe and began in 1618 as a religious rebellion by protestant nobles in Bohemia—modern Czech Republic—against

the Catholic Emperor Ferdinand II. No sooner had Ferdinand crushed the rebellion, than the Danish King, Christian IV entered the war to defend Protestant states in Germany and, when he was beaten, Gustavus Adolphus of Sweden, a brilliant military leader, came to their aid.

Even though Adolphus was killed at the battle of Lützen in 1632, the Holy Roman Empire led by the House of Hapsburg was still not victorious because France, although Catholic, joined Sweden in war against them turning the war from a religious conflict to a broader struggle for European dominance.

These wars devastated Europe. In a century of conflict between seven and twelve million people died, directly in combat and in the resulting famines, diseases and massacres. The war only ended in 1648 with the peace of Westphalia—signed in the city hall of Münster, site of the original Anabaptist Kingdom.

This key moment wasn't just an end to war. It reshaped Europe by establishing religious tolerance as a political necessity. It weakened the Holy Roman Empire and strengthened France, laying the groundwork for a new generation of modern secular states.

In England, meanwhile, a civil war between different flavours of Protestantism had broken out. Anglican Royalists fighting for King Charles I were defeated by Puritan parliamentary forces and, between 1649 and 1660 England became a republic—the *Commonwealth*—under Oliver Cromwell. Another half million were killed in this conflict and, by the time of the restoration of the monarchy under Charles II the appetite for bloody religious slaughter in England and the rest of Europe had been slaked.

The devastation of religious war had made one thing clear: faith alone could no longer serve as the foundation of political order. A more tolerant, secular approach was needed—one that became the cradle of new models for thinking about the world.

The Renaissance had revived the classical past, and the Reformation shattered religious unity—and together, they reshaped Europe's intellectual landscape. From Luther's Bible to the printing press, from artistic innovation to political upheaval, these movements laid the foundations for a world where authority—whether papal, imperial, or intellectual—would no longer go unchallenged. The modern age had begun. But with religious certainty fractured and secular power on the rise, what new models would replace the old?

Chapter 11—Dealing with Doubt
Empiricism and Enlightenment

On 29th May 1660—his birthday—King Charles II entered London to joyous celebrations. After eleven years without a monarchy, his return marked the end of Cromwell's Commonwealth. As Samuel Pepys recorded in his diary:

"... very gallant and joyful. And brought us word that Parliament had ordered the 29th May, the King's birthday, to be kept forever as a day of thanksgiving for our redemption from tyranny, and the King's return to his Government..."

But this was not a mere restoration of the old monarchy as it had been before. The king had returned because parliament had invited him. The monarchy was now conditional on the will of Parliament, rather than divine right; a retreat from both the extreme puritanism of Oliver Cromwell's Commonwealth and the unconstrained Royal power claimed by Charles I.

A century of religious conflict had left Europe with a multitude of Christian sects. The Treaty of Westphalia (1648) had formalized religious divisions within the Holy Roman Empire, recognizing Catholicism, Lutheranism, and Calvinism as legitimate faiths. Across both Britain and Europe, though, religious diversity remained, with Anglicanism, Presbyterianism, and countless smaller sects flourishing.

Just as the Reformation had shattered the idea of a single religious truth, 17th-century thinkers challenged the authority of a single path to knowledge. Two distinct approaches emerged: In England, followers of Francis Bacon championed empiricism, arguing that knowledge must come from sensory experience and experimental confirmation. On the Continent, René Descartes—trained by Jesuits—sought certainty through rationalism, looking for fundamental truths through pure reason, independent of the senses.

Learning from Experience

Francis Bacon is famous for having died of a chill acquired while stuffing a chicken with snow to study the effects of cold. This ironic end reflects his lifelong dedication to evidence—an idea that was central to his model of knowledge.

Mediaeval philosophers looked to the authority of classical authors or the Church as the source of truth. Bacon, by contrast, insisted that experience and

experiment should dictate what we believe. Instead of working top-down—starting with assumptions and deriving conclusions through deduction—he insisted on beginning with observations, classifying and categorizing them to reveal patterns, and then testing these patterns through predictions. By emphasizing the importance of evidence that challenged these predictions, he became the father of the modern scientific method.

During the mid-1620s, Thomas Hobbes acted as an amanuensis for Bacon, taking notes and documenting his activities. However, when Hobbes developed his own philosophy, he was more influenced by Galileo—whom he met in Italy—and Johannes Kepler. From them, he adopted the idea that the universe operates like a vast, predictable mechanism, governed by motion and mathematical laws. His model compared the world and the people in it to a machine, with components interacting by moving each other. He wrote an essay on light, viewing it as a mechanical motion that physically connects the observer to the object seen—rejecting mystical or immaterial explanations of perception.

For Hobbes, all action could be seen as attraction and repulsion. Society itself was a mechanism. What attracted was good and what repelled was seen as bad—everything relative to the survival instinct. Human nature was ruled by pure self-interest, so a 'commodious' life of prosperity and peace required an agreement to create a social contract. To enforce cooperation, an organization or 'sovereign'—as terrifying as the biblical *Leviathan*—was necessary to ensure that life was not *"solitary, poore, nasty, brutish, and short"*.
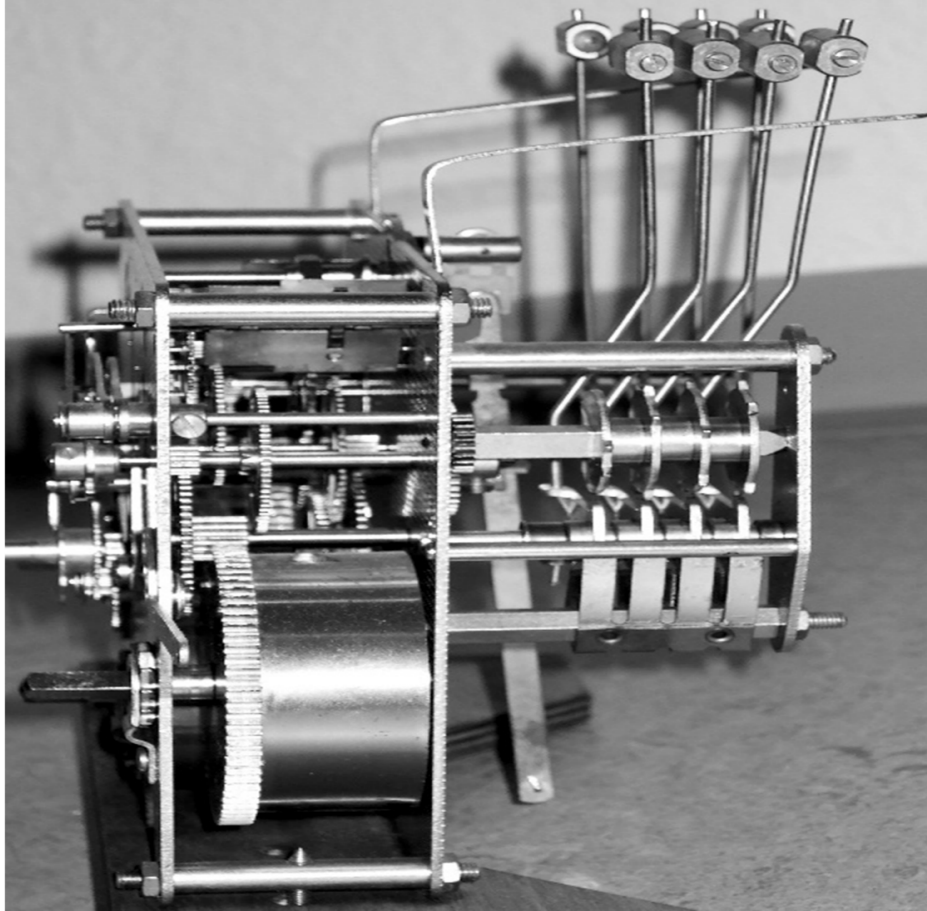
Image 21: A Clock - or the Universe?

As new mechanical devices transformed daily life, this external shift was being mirrored internally: the model in the mind evolved alongside society's changing interactions with the material world. No longer viewed solely through the lens of divine hierarchy or social tradition, the world—and human society—was increasingly modelled as a system of moving parts, governed by mechanical forces.

For Hobbes, the social contract was necessary for the construction of a mechanical monster—an all-powerful sovereign—capable of restraining human violence. But as tensions grew in England under the restored monarchy—centring on Catholic rights and the succession after Charles II—thinkers led by John Locke (1632–1704) refined the social contract into a more dynamic model of governance.

Binding Agreement

Unlike Hobbes, Locke argued that the social contract was conditional: if a government violated the natural rights of the people—life, liberty, and property —the governed had the right to replace it.

Like Hobbes, Locke grounded his philosophy in experience, seeing it as the touchstone of reality. He illustrated this by comparing the newborn mind to a blank page—*tabula rasa*—upon which experience writes the knowledge necessary for understanding.

Locke argued that the mind processes only ideas, and that consistency between them was the key criterion for their evaluation. Bertrand Russell, in his *History of Western Philosophy*, criticized this as paradoxical: if knowledge is based only on perception, and perception gives us only ideas, then how can we be certain of an external world beyond those ideas? To address this gap between perception and reality, Locke distinguished between primary qualities—such as shape, motion, and solidity—which exist in objects themselves, and secondary qualities—such as colour, taste, and sound—which depend on perception. This allowed him to defend realism while acknowledging that experience does not give us direct access to the world as it is.

He drew a clear distinction between the mental model and the external world it represents, identifying three types of knowledge:

Intuitive knowledge: immediate self-awareness and recognition of logical truths.

Demonstrative knowledge: reasoning and proof-based knowledge (e.g., mathematics, theology, logic).

Sensitive knowledge: knowledge derived from sensory perception.

Since he viewed intuitive knowledge as awareness of one's internal processes, Locke argued that all knowledge—the internal model of reality— originated from sensory perception. He was keenly aware of the possibility of error in the relationship between the model and the world, which is why he offered consistency—agreement between ideas—as the primary criterion for evaluating knowledge.

This potential for mistakes also led him to advocate tolerance, believing it unreasonable to impose one's own model of reality on others.

Hobbes had viewed the world primarily as a complex mechanism, shaped by the mathematical and engineering advances of his time. In contrast, Locke's model of reality was more transactional, shaped by the emerging need for legal and commercial stability in an increasingly mercantile society. His emphasis on

contracts, consent, and property rights reflected the values of the rising industrial and middle classes.

By directly challenging the idea of divinely instituted absolute monarchy, Locke's ideas gave a justification to the Glorious Revolution of 1688, in which the English Parliament replaced King James II with his daughter, Queen Mary, and her husband, William of Orange. His ideas on popular sovereignty, government by consent, and the right to rebellion shaped the American and French Revolutions a century later and remain foundational to modern liberal democracy.

Locke's emphasis on experience as the source of knowledge would be taken further by later empiricists—George Berkeley, who denied that primary qualities existed outside perception, and David Hume, who questioned even the existence of a stable self. In advancing empiricism, they also revealed its limitations.

The Mind of God

Faced with multiple religious interpretations of the world, both Hobbes and Locke turned to evidence in the material world. Hobbes sought mechanical explanations for human behaviour, while Locke focused on how the mind constructs knowledge from experience.

Locke, in particular, had tried to understand how the mind's internal model corresponded to the external world. We've seen that he admitted that secondary qualities exist only in perception, but argued that primary qualities are inherent in objects themselves, independent of the observer. For him, the material world consisted of real, independent objects that exist whether or not they are perceived.

George Berkeley rejected Locke's distinction between primary and secondary qualities, arguing that all qualities—solidity, shape, motion, colour, taste and everything else—exist only in relation to an observer. Without one, there was no object at all. Berkeley summarized his position with the phrase *'Esse est percipi'*—'To be is to be perceived.' If no mind perceives an object, that object does not exist.

Despite his rejection of matter, Berkeley is still considered an empiricist because he insists that all knowledge comes from experience. Unlike rationalists, he does not believe in innate ideas or pure reason. Instead, he takes empiricism to its extreme conclusion: since we only ever experience perceptions, we have no reason to assume that anything beyond them exists.

The internal mental model of the world and the perceptions that formed part of it defined the extent of the world itself.

The famous question—"*If a tree falls in a forest with no one to see it, does it really fall?*"—captures Berkeley's argument. His answer would have been: "*Yes, it falls—but only because God is there to observe it.*"

Berkeley also rejected the concept of abstract ideas, a key part of Locke's theory. He argued that we never perceive *'matter'* in itself—only particular sensations. We don't perceive *'triangle-ness',* only specific triangles; we don't perceive *'solidity',* only a collection of tactile experiences. If all we know are perceptions, then the idea of a mind-independent material world is meaningless.

For Berkeley, the material world had no independent existence—everything existed only as an idea in the mind. Since objects must be perceived to exist, and the world appears to persist even when humans aren't observing it, Berkeley concluded that God must be the eternal observer sustaining reality itself. Without God, nothing would exist. There is a world, so there had to be a God.

By absorbing the material world into the realm of mental models and ideas, Berkeley effectively eliminated the gap between the mind and reality. If everything is perception, there is no need to explain how the mind connects to an external world—there is no external world to connect to.

Knowledge? Or Just Expectations

The search for a demonstrable, mathematically provable link between the model and the material world was not over, however. The next person to take up the challenge was David Hume (1711–1776).

Hume's most important book, *A Treatise of Human Nature*, is subtitled *"Being an Attempt to Introduce the Experimental Method of Reasoning into Moral Subjects."* In it, he tries to apply the Newtonian method of reasoning used in physics to investigate human nature, knowledge, and understanding.

Hume argued that all ideas originate in experience, either through sense perception or emotions. Simple ideas are direct reflections of these experiences, while complex ideas are combinations of simple ones. For example, someone who has never seen a golden mountain can still imagine one by combining their ideas of '*gold*' and '*mountain*.' This means that even abstract thought is ultimately grounded in sensory experience.

He concluded that certainty belongs only to relations of ideas—statements true by definition, such as mathematical truths or logical deductions. In

contrast, matters of fact—statements about the world—can never be known with certainty, as they depend on experience, which is always limited.

For Hume, even causation—the idea that one event causes another—is not something we perceive in the world but rather a feature of the model in the mind. We never actually observe cause itself, only sequences of events. If two things always happen together, we assume one causes the other—but we can never be certain. For example, high ice cream sales correlate with more drowning deaths. Does eating ice cream cause drowning? No—both are caused by hot weather. Hume argued that many of our causal beliefs may be based on similar false assumptions.

Hume took this scepticism even further, turning it on the mind itself. When we examine our own consciousness, we never perceive a single, unchanging *'self'*—only a sequence of fleeting thoughts, emotions, and sensations. If all we know are perceptions, then the idea of a stable self is just another assumption in the mental model. Instead of an enduring soul or consciousness, Hume argued that the self is nothing more than a *'bundle of perceptions'*—a shifting collection of experiences with no deeper unity behind them.

Hume also questioned one of our deepest instincts: the assumption that the future will resemble the past. This is the problem of induction—the idea that just because something has always happened a certain way, we cannot assume it always will. If we have only ever seen white swans, we may believe all swans are white—but this belief is based on habit, not logic. The discovery of black swans in Australia proved how experience can mislead us. Because all our knowledge of the future is based on past experience, we can never achieve certainty—only probability.

To make this distinction clear, Hume introduced what is now known as Hume's Fork—dividing all knowledge into two categories. First, there are relations of ideas—statements that are true by definition, such as mathematical truths or logical deductions. These are certain, but they tell us nothing about the world. Second, there are matters of fact—statements based on experience, such as *'the sun will rise tomorrow'*. These can never be known with absolute certainty, because they rely on past observation, not logical necessity. This strict division of knowledge guided the thinking of later thinkers, particularly Kant, and helped shape modern philosophy.

In his *History of Western Philosophy*, Bertrand Russell describes Hume's model of the world as complete but argues that it reaches a dead end. Hume's conclusion—that demonstrable proof cannot be applied to the material world—

leaves no way forward, but perhaps that is just what one would expect to make a mathematician unhappy.

We have seen, though, that most—if not all—models have limits, and even Russell's own work runs into the paradox named after him:

In a town, a barber shaves all and only those men who do not shave themselves. The question is: does the barber shave himself?

If he does, then by definition he must not. But if he does not, then by definition he must. The contradiction is inescapable.

Maybe what Hume does is to show the outer limits of what human beings can ever know or understand.

Purely Logical

Image 22: René Descartes - I think, therefore I am

One of the British Empiricists' main objectives had been to find, in the material world, a way to determine which of the competing models of Christianity was correct. But in this, they had failed.

On the Continent, meanwhile, René Descartes (1596—1650) was also searching for certainty—but he took a very different path.

In 1604, King Henry IV of France had established the *Collège Royal Henry-Le-Grand* in the Loire Valley as part of the Jesuit educational network. Descartes enrolled in 1606 and studied there for a decade. His education was rigorous, covering Philosophy and Theology—with a focus on Aristotle, Scholasticism, and logic—as well as mathematics, science, rhetoric, and Latin.

At the time, the dominant view—supported by the Church—was that the Earth was stationary, and the universe was finite. But Galileo's discoveries, particularly his support for heliocentrism, challenged this model. In response, Descartes began to question many of the fundamentals he had been taught.

Descartes realized that the senses were unreliable—after all, dreams can seem just as vivid as waking life. Even logic and mathematics, which seemed certain, might be deceptions planted in his mind by a powerful *'Evil Demon'* intent on misleading him. But one thing, he concluded, was beyond doubt: even if he were deceived, there had to be something—some thinking entity—that was being deceived.

From this, he arrived at his famous conclusion: *Cogito, ergo sum—'I think, therefore I am'*.

Having found what he believed was a solid foundation for knowledge, Descartes built the rest of his model using strict deductive reasoning. If his starting assumptions were correct, and if his logic was flawless, then everything that followed had to be true.

But this method had a serious weakness. Unlike induction, which builds knowledge from repeated observations and allows for uncertainty, deduction relies on an unbroken chain of reasoning. If just one step in the chain is wrong, the entire structure collapses. It's the difference between stacking bricks to build a flexible, self-supporting arch and constructing a house of cards—if one card fails, everything falls apart. This made Descartes' model both incredibly ambitious and dangerously fragile.

Having established that he existed as a thinking being, Descartes turned to the next problem: how could he be sure that anything else was real? He noticed that some ideas—mathematical truths, for instance—had a special quality: they were clear and distinct, and seemed impossible to doubt. But could they still be the work of the Evil Demon?

To escape this doubt, Descartes needed a deeper foundation for certainty. One idea in his mind stood out: the idea of a perfect, infinite God. As a finite

and imperfect being, he couldn't have created this idea himself—only a truly perfect being could have placed it there. So, he concluded that God must exist.

This was a crucial result. If God existed and was perfect, then he wouldn't allow Descartes to be systematically deceived. The Evil Demon could be eliminated, and his clear and distinct ideas could be trusted. With this, Descartes believed he had finally found a foundation for real knowledge.

But this reasoning has been widely debated. Descartes' argument seems to rely on the very thing he's trying to prove—he trusts clear and distinct ideas because God exists, but he proves God's existence by trusting clear and distinct ideas. The problem with this even has a name: the Cartesian Circle. It remains one of the most famous challenges to his philosophy.

Mind and Matter

Since Descartes built his philosophy on the *Cogito*, it naturally revolved around the mind itself and its thought.

At the same time, exposure to Galileo and his own work in mathematics led him to see the physical world as a vast, mechanical system—entirely predictable and governed by cause and effect.

Later, Berkeley would resolve this problem in the opposite way—by making the entire material world part of the mind's model. But Descartes took the reverse approach.

From the Jesuits, he inherited the idea that mind and matter were fundamentally different substances—one immaterial, the other physical. For Descartes, this meant that they existed in entirely separate realms.

Both mind and matter had been created by God, but they operated in separate domains. Descartes believed that the pineal gland was the point where the mind interacted with the body, but the two did not directly influence each other. Instead, God—acting with complete freedom at the moment of creation—had perfectly synchronized them.

So, when a person decided to lift an arm or move a leg, the thought was an act of free will, but the movement itself followed mechanical laws, like the workings of a machine.

He saw the movements of the planets around the Sun as just as mechanical. Since he rejected the idea of action at a distance, his model of the solar system relied on vast cosmic *'vortices'*—whirlpools of ether that carried the planets along like flotsam in a swirling current. For Descartes, even chemistry and biology were mechanical processes.

Descartes' most lasting contribution to science wasn't his cosmic vortices or his theory of mind—it was his belief that the natural world could be described mathematically. He showed that motion, force, and even light could be analysed using equations, making mathematics a tool for interpreting nature rather than just an abstract exercise. This shift laid the groundwork for later physicists, including Isaac Newton, who refined the mathematical approach to mechanics while discarding Descartes' theological assumptions.

Ironically, the model Descartes built on the foundation of divine certainty proved to be stronger than the theology that had inspired it. Once the idea took hold that nature followed mathematical laws, it no longer needed to be guaranteed by God. Science could move forward on its own terms, independent of Descartes' metaphysical system. Yet, for Descartes himself, this separation never materialized—his theology remained deeply traditional and tightly woven into his philosophy.

That theology was firmly rooted in Christian tradition and logically deduced from his foundational assumption of an omnipotent, infinite, and benevolent God. For him, God had absolute freedom in creation, and the defining characteristic of humanity was thought itself. As the architect of reality, God had designed both matter and mind as separate substances, ensuring not only the laws of nature but also the reliability of human reason.

By maintaining the traditional Christian distinction between spiritual and material substances, Descartes unintentionally widened the gap between scientific and religious models of the world—a divide that would grow ever more significant as science developed independently of theology over the next four centuries.

A Perfect God Means a Perfect World

Yet from the same starting point—an omnipotent, infinite, and benevolent God —Baruch Spinoza, also through deductive logic, arrived at a radically different conclusion.

For Spinoza, the central question was God's goodness: if God was truly good, how could he create a world apparently filled with pain and evil?

The only answer, he argued, was that from God's eternal perspective, evil must be an illusion. Since God had predetermined the course of history and was inherently good, everything he created must ultimately be perfect. From the perspective of eternity, humanity would see that evil does not truly exist. Everything that happens is God's will and must be accepted as such.

Spinoza's model of the world was revolutionary. He saw reality as a vast, eternal structure in four dimensions—length, breadth, height, and time—with God permeating every part of it as its very substance.

For Spinoza, there was no distinction between the material world, the spiritual realm, and God's presence—they were one and the same. This was pure pantheism, and it made him deeply unpopular with his contemporaries.

Born into Judaism, Spinoza was excommunicated from his own community, and even in permissive Holland, Christian authorities saw him as a dangerous heretic.

Spinoza's philosophy demanded resilience and fortitude—qualities he needed more than most.

For Spinoza, freedom was not about making choices, but about attaining understanding. Everything in the universe—including human actions—was determined by necessity, flowing from the nature of God. But by recognizing this, and seeing our place within the greater whole, we could achieve a kind of intellectual liberation. True freedom, then, was not escaping necessity, but embracing it with understanding.

Spinoza extended his model of freedom to politics. Just as individuals achieved true liberty through understanding, societies could only flourish when they allowed intellectual freedom. He argued that religious authorities should have no control over the state, as their influence led to dogma and oppression. A just government, he believed, was one that encouraged reason rather than obedience, allowing its citizens to seek knowledge without fear. These ideas helped lay the groundwork for the secular liberalism of the Enlightenment.

Perhaps Spinoza's greatest achievement was to separate ethics from the system of divine rewards and punishments. Rather than rooting morality in divine law or free will, he saw ethical behaviour as a rational response to reality. By understanding our emotions, we could master them instead of being ruled by them.

This secular view of ethics was a key influence on later thinkers, including Hegel, Nietzsche, and even Einstein.

The World as a Logical Structure

Descartes and Spinoza both began their philosophies with the idea of God, and Gottfried Leibniz (1646–1716) was no different. But by the time they had refined their models of what God is, the concept had moved far beyond the

Biblical metaphors of shepherd, father, and king, or even the Roman idea of God as an emperor—the ultimate source of grace and mercy.

Instead, their starting point was a perfect, omniscient, and omnipotent Creator. But beginning with such a being led to a complex and intricate model, requiring intense mental gymnastics to reconcile predestination with free will, and divine perfection with the flawed state of the visible world.

Like Spinoza, Leibniz needed to take an entirely detached, Godlike perspective to explain how a perfect God could create what appeared to be an imperfect world. Yet unlike Spinoza, he did not see this world as an extension of God's being. And while he shared Descartes' belief in a fundamentally rational universe, he found a different solution to the problem of divine perfection and worldly imperfection.

Coming from a Protestant family but deeply influenced by Catholic theology, Leibniz hoped to find a concept of God that could reconcile the divisions between Catholicism and Protestantism. He envisioned a God so abstract and rational that both sides might accept him. Although difficult for humans to grasp, Leibniz argued that this world—despite its apparent flaws—was, in an eternal context, the best world possible. Since God was omnipotent and good, he would have chosen the best of all possible worlds to exist.

The Music of the Monads
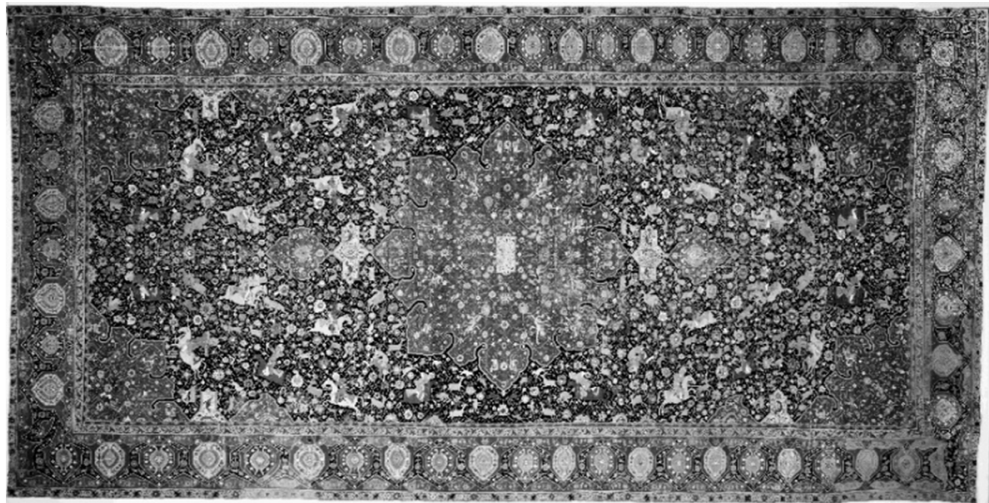
Image 23: The Pattern is Only Visible from Outside

Leibniz envisioned the world as structured by what he called *'monads'*—indivisible, self-contained, immaterial entities that make up reality. Each monad contained a soul and persisted from creation until the end of time.

Like threads woven into an intricate carpet, monads never directly interact, yet each follows a pattern that fits perfectly within the whole. A single thread does not *'cause'* the threads around it to take their places—yet together, they form a unified design. The pattern itself is not visible from within the weave, but if one could step back—taking a God's-eye view—the full image would emerge.

This is how Leibniz saw the universe: each monad follows its own pre-ordained course, a single instrumental part in a symphony, yet the totality is arranged in perfect harmony. The design was set at creation like Descartes idea of mind and matter, ensuring that every monad's actions align with the actions of all others, without direct interaction.

Since monads never truly interact, only God could remove a thread from the weave—but doing so would damage the symmetry of the entire fabric. In practice, this meant the number of monads was constant across time.

Although the structure of the world was predetermined, each monad had a unique nature, and within this framework, it acted freely according to its character. While God foresaw every choice a person would make, those choices were still their own—woven into the design not by force, but by the nature of the thread itself. This allowed Leibniz to preserve moral responsibility while still maintaining a logically determined universe.

Sadly, Leibniz never realised his ambition of reuniting Protestant and Catholic Christianity. His model was certainly abstract and rational but its appeal to the preachers, clerics and those with vested interests in the continued division was never visceral enough to succeed. It's hard to imagine a modern Televangelist raising millions based on Leibniz's theology.

The Mathematical Model of Reality

Leibniz's metaphysical model of reality accounted for both mind and matter without reducing one to the other. He grounded it in a series of fundamental principles, structured like the axioms of a mathematical proof.

- The Principle of the Best : God, being perfect, would select the best possible world from all options. (Though one might question whether this world—complete with pain, suffering, and the occasional genocide —truly qualifies.)
- The Principle of Predicated Notion : Everything in existence embodies all its characteristics, past and future actions, and relationships. (This

allows monads to be self-contained and deterministic.)

- The Principle of Sufficient Reason : Nothing happens without a cause. This suggested that the universe is structured in a rational way, intelligible to science and philosophy—a key idea that would shape the future of scientific inquiry.
- The Principle of Continuity : Nature makes no sudden jumps. This linked to Leibniz's independent discovery of calculus, a mathematical model for analysing continuous change.

And So to Science, and Modern Thought

Leibniz's contribution to scientific models was at least as important as his theological and metaphysical explorations—and arguably more enduring.

In addition to calculus, he developed binary arithmetic, a foundation for modern computing. His work in predicate logic and symbolic representation prefigured key ideas in mathematical logic and artificial intelligence. In physics, he helped refine the concepts of kinetic energy and force, adding to the Newton-Leibniz synthesis in mechanics.

Although Leibniz's rational, analytic approach still bore traces of Scholastic philosophy, he was ultimately a transitional figure—linking mediaeval models of the world with the modern scientific worldview. His optimistic, mathematically structured vision of reality helped lay the foundation for the scientific revolution and the Enlightenment to come.

Chapter 12—Mechanical Man
Movement and Meaning

15th September 1830 was a day of celebration. The Liverpool and Manchester Railway, the first inter-city railroad in the world was having its gala opening. The great and the good from the United Kingdom and beyond were there: The Duke of Wellington—victor of Waterloo and now prime minister, William Huskisson, Member of Parliament for Liverpool and a long-time advocate of the railway, the Austrian ambassador and other diplomats, and just about every notable engineer and scientist the country boasted.

The grand opening included eight trains travelling from Liverpool to Manchester. This technology would revolutionise transport, communications and even timekeeping and thousands of sightseers came to the stations along the route to see the trains pass.

The railway was double tracked and the train carrying the Duke and other dignitaries travelled on the southern track while the other seven trains formed a procession on the northern.

At Parkside station, about halfway through the journey the Duke's train stopped to take on water and—although the railway staff had warned them not to—about fifty of the passengers alighted. Among them was William Huskisson who had been a highly influential cabinet minister but fallen out with the Duke over the issue of parliamentary reform. He walked along the track to shake hands and, distracted by the Duke of Wellington, failed to notice an approaching train on the parallel track.
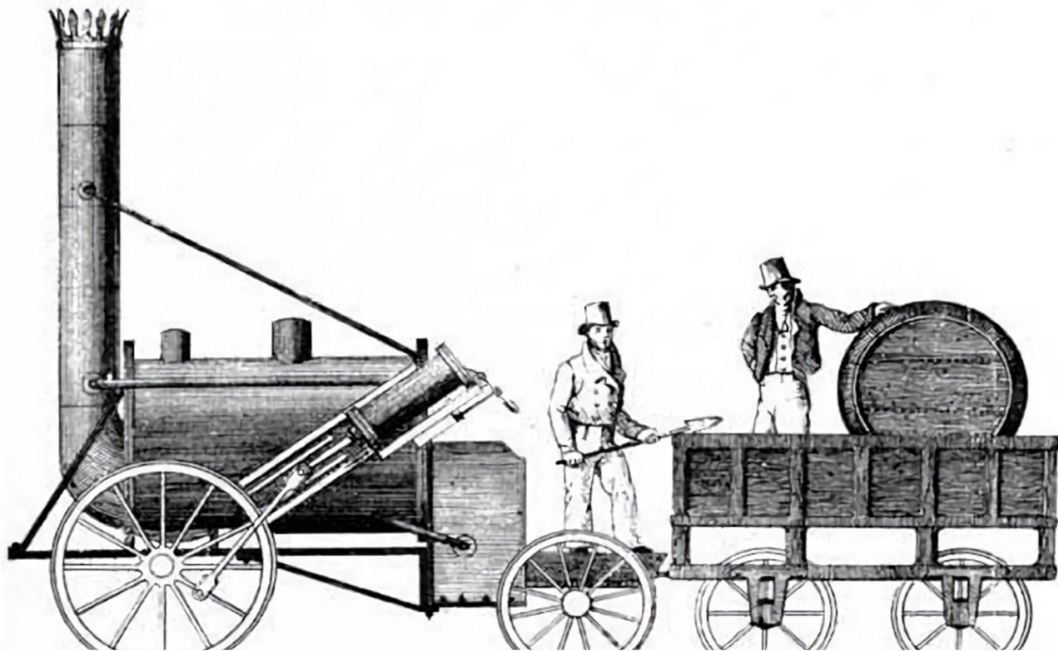
Image 24: Stephenson's Rocket – Non-stop progress!

This train was pulled by Rocket, the original winner of the Rainhill Locomotive Trials and, in the difficulty of getting the new technology to go, no attention had been paid on how to make it stop. Rocket had no brakes.

Although the Austrian ambassador who had also alighted was pulled back to safety, Huskisson panicked. He tried to haul himself up into the Duke's coach, caught hold of the door, which swung open, and he fell onto the track in the path of the oncoming train. It crushed his legs

And, in spite of being taken by train—perhaps the first emergency response by a steam engine—he died that night in the vicarage at Eccles.

Ironically, the first person to become a fatality on the passenger rail network was one of its most enthusiastic advocates. As a powerful supporter of free trade, he was an important figure in creating the environment in which the British Empire and future capitalist societies would thrive.

Huskisson's death was a reminder that industrial progress had its casualties—both literal and economic. When the train carrying the Duke of Wellington finally arrived in Manchester, it became clear that not everyone was celebrating this new era. It was greeted by rioters throwing vegetables. While for some, this was a breakthrough to new possibilities of wealth and power, to others, the sight of an elite travelling in luxury, after years of unemployment and hardship following the Napoleonic wars, brought nothing but anger and frustration.

Married to the Machine

The opening of the Liverpool and Manchester inter-city link marked the start of the railway age, but its technological roots stretched back a long way—we can trace it as far as William of Ockham's proposal of separate models for the spiritual and material worlds.

The dominant model for the material world was now mechanistic and mathematical. How many square inches of heating area were needed for each horsepower generated by a boiler? What was the maximum steam pressure before it would explode and kill the operator?

On a larger scale, Newton had devised a model for the exact orbits of the planets. His work provides a predictive model of the universe. Gravity, motion, force and inertia were now mathematical, not mystical. His laws of motion described everything from falling apples to the trajectory of artillery shells, reinforcing the mechanistic worldview—reality as a giant, predictable machine.

These ideas influenced a generation of engineers and inventors who, like James Watt, applied mathematical reasoning to machines. Steam was now a predictable, controllable force, with steam engines in mines, cotton mills and factories. Even on farms, new machines made ploughing, planting and harvesting more efficient.

Where farm work, spinning, weaving and handcrafts like carpentry had needed skilled, individual workers, with the whole of society operating on a human scale, this new source of power meant that bigger was better. And more economical. The profits from large farms drove landlords to enclose common land, displacing a rural population that moved into towns where they found employment in the new, large factories—the poet, William Blake's, Satanic Mills.

A New Kind of Hell

Blake's characterization of the mills was completely accurate. This was an entirely new way of life. The owners of the factories and of the machines inside them controlled production and the way profits were distributed.

And keeping the machinery running continuously meant more money in their pockets. No longer skilled craftspeople in control of their own activity, the workers were now expected to work regular hours performing the repetitive tasks needed to service the needs of machines for raw materials and regular maintenance.

If you visit a museum mill in a Lancashire cotton town—say, Wigan—today, you'll find a very civilized place. There's a gift shop and an erudite, elderly volunteer will talk you through its operation and demonstrate the machinery, running it slowly so that you can see how it works. In full production, it was nothing like that.

You would have been deafened by the incredible noise as, indeed, most of the people who worked there were. And even those with good hearing had to use sign language and lip-read because the noise level made it impossible to talk to each other. In winter, it would have been uncomfortably hot and, in the height of summer it was unbearable.

The air was thick with cotton dust so that the workers coughed and choked. The occupational lung disease was called 'mill fever' which, over time, often made the sufferer vulnerable to tuberculosis. Under foot, the floor was soaked with oil and caustic chemicals and, since workers were barefoot, their feet were covered with cancers and sores.

Days were long—up to sixteen hours, with only short breaks for food, and the pace never slowed. If a worker lagged for a moment the machine didn't stop. It ripped the fabric, snapped the thread or caused an injury.
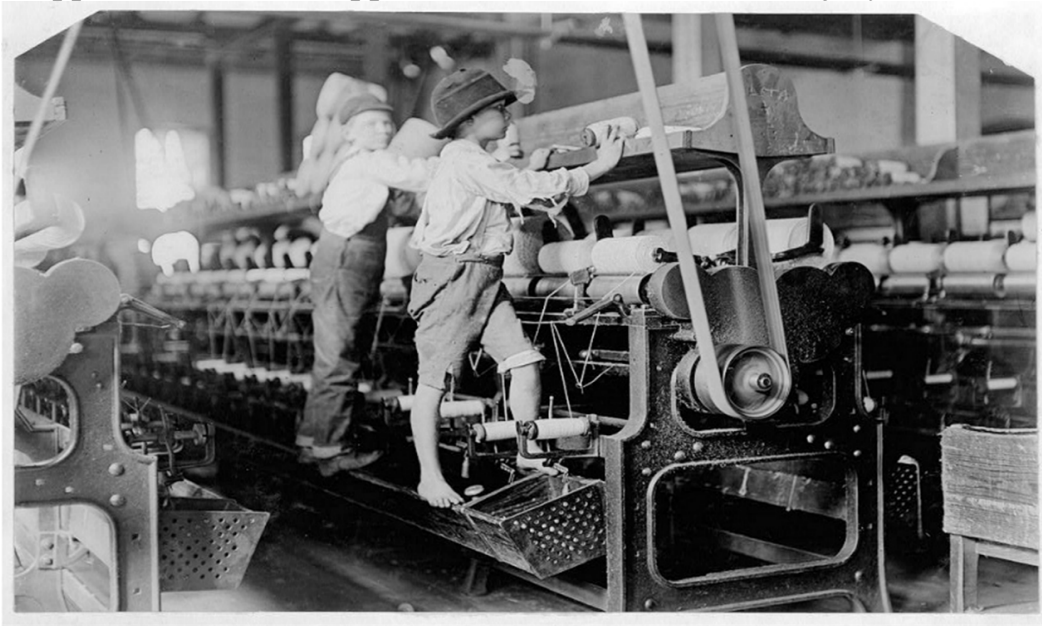
Image 25: Serving the Machine

There were no safety guards on the great iron flywheels and exposed gears of the machinery. Any worker going too close could be caught up, losing a finger, a hand, or perhaps an arm. A woman's skirts, too close to a drive belt, could be

pulled in, dragging her body with it. Those who survived might be left with stumps or twisted limbs.

Hiring children was the preferred recruitment option. They were smaller and more agile and perfect for squeezing under the machines to retrieve dropped bobbins without having to interrupt production.

And, of course, they were cheaper. A win-win for the mill owner.

And if something went wrong, there were always more orphans waiting in the workhouses.

Surviving the City

The pay was barely enough to live on, in any case. Food was often mouldy or stale. Water came from polluted rivers. The city smelled of soot, sweat and sewage and rent in the new industrial slums was high.

The workers coming in from the rural areas needed places to live and slum landlords—often the factory owners or their associates—could make money in an environment where demand far exceeded supply.

Rented accommodation was cramped and filthy. The walls were damp, and workers were crammed in, as many as six to a bed, with occupancy round the clock. But no matter how bad conditions were, there was no choice. The enclosure of common land and the mechanization of farming meant there was no return to the countryside they had left. If you lost your factory job, you starved.

The Engine of Capital

Amid the squalor and starvation of the factory operators, factory owners were making money at an unprecedented rate. Industrialists, bankers and railway tycoons were a new social class, separate from the old land-based aristocracy and the working poor. They were inspired by the idea—rooted in Enlightenment rationalism and the burgeoning economic theories of free trade—that anyone could define his own, individual reality. They saw success as proof of moral superiority and felt free, therefore, to compete ruthlessly for resources in a winner-takes-all world, with very few recognizing any obligation to shield the hindmost from the devil.

For them, the British Empire was an extended money-making machine. Free trade which—with their new economic and political clout—they were able to institute, removed the obstructions that might otherwise have interfered with its efficient operation. Entire regions were transformed into resource hubs for a

global process—cotton from India and America, sugar from the Caribbean and, of course, slaves from Africa.

The textile mills of Lancashire were the manufacturing component in a giant, impersonal machine, that included flows of slaves, cotton and finished goods. The prosperity of industrial Manchester was inseparable from the misery of the cotton fields. Human beings were just another resource to be consumed by the system.

And, to return to the opening of the Liverpool and Manchester Railway, trains—steam engines on wheels—were to become the enablers for this whole new mode of organization, creating linkages between different places that took the time synchronization of work in individual factories and spread it across countries and regions. Travel was reduced to a timetable-driven system—passengers were herded into compartments, destinations were fixed, schedules were rigid. Human beings—and time, itself—had become commodities.

The World as a System

Not surprisingly, this radical change to the economic and social organisation of the world impacted the mental models used to represent and analyse it.

From the time of Hobbes, the idea of the world as a system of interlinked parts had grown, to the point that thinkers like the Encyclopédistes in France attempted to record all human knowledge. They aspired to a complete, objective analysis of its components and their relationships, eliminating emotion and sentiment, something entirely scientific.

In Scotland, Adam Smith, friend and colleague of David Hume, analysed the global system of trade and industry, creating the new science of Economics as an impersonal force that drove human behaviour but remained beyond human control. Just as a machine's performance could be predicted, the flows of human labour and productivity were equally determined by natural laws that could be expressed mathematically.

According to Thomas Malthus, even the growth and limits to human population could be modelled in mathematical equations.

These theories provided powerful insights, and they also served to justify the emerging industrial order—where market forces, rather than moral obligations, determined the fate of nations and individuals alike.

Where thought *was* given to the moral and ethical impact of the new reality, it, too, was modelled in a schematic, mathematical form. Jeremy Bentham, who lived between 1748 and 1832 suggested a moral calculus, based on finding the

greatest good for the greatest number. This idea—utilitarianism—upended traditional ideas of morality based on an abstract, divinely inspired sense of the good. The replacement claimed to be an objective, scientific criterion for establishing behaviour, reducing the individual human to just another factor in an equation.

But could human happiness truly be measured like coal output or factory efficiency? The idea of reducing morality to a calculation—however rational—raised new anxieties. If people were just factors in an equation, what happened to meaning, purpose, or dignity?

An Unacceptable Abstraction

Not everyone accepted such a cold, mechanistic view of society. Many rebelled—not just against the machines, but against the idea that life could be reduced to a mere calculation. Some turned to reason, others to revolution.

Thomas Paine (1737—1809) was born in Norfolk, where he attended the Grammar School and, after serving as a privateer—a sort of government-licenced pirate—and a maker of corsets, he became an excise officer, collecting taxes and duties in Grantham, Lincolnshire.

In 1772 he joined a group of excise officers asking parliament for better pay and working conditions and began publishing political pamphlets in their cause. Dismissed from the excise service, he moved to London, where he met Benjamin Franklin, who encouraged him to relocate to America.

There he became editor of *The Pennsylvania Magazine* and published pamphlets—*Common Sense* and *The American Crisis*—which were critical in mobilising American opinion in favour of independence and in tying Americans together as a single population, transcending religious and ethnic boundaries, with a unified sense of patriotism. He may even have contributed to the drafting of the Declaration of Independence.

In contrast with the model of society as a machine, he compared it to items in everyday and domestic life. Government was *'a dress that fits ill'*, an imperfect human construct that needed repair and restructuring, rather than a divine institution. America was Britain's *'child'*, but now fully grown—ready for independence. England's rule was a *'shipwreck'*—abandoning it was not just desirable, but necessary. Revolution was an inevitable and natural event, like the sun rising in a new dawn.

Each of these metaphors directly rejected the industrial model of a predictable, mechanised society. Instead, Paine framed history as something

organic, driven by natural justice rather than impersonal economic forces. Where the industrial model treated people as cogs in a machine, he argued that people *own* their society. It wasn't a machine it was a home, a dress, a growing child.

Paine rejected the industrial vision of America as a mere supplier of raw materials for the empire's machine. Instead, he envisioned a world shaped not by artificial systems, but by nature and natural justice—where freedom was not granted from above but claimed by the people themselves.

Liberté, Égalité, Fraternité

If Paine argued that justice was natural, Jean-Jacques Rousseau (1712—1778) took the idea further: true justice required not just independence, but the total transformation of society itself.

Born in Geneva, Rousseau spent his life moving across Europe—making friends, then inevitably quarrelling with them. To him, society was the corruption by civilization of an innocent natural world. He evoked images of *'the noble savage'*, an *'unspoiled garden'*, *'a clear stream before it is muddied'*. Human nature was basically good so that, in a state of nature, humans are free, equal and uncorrupted. Society, through its institutions, through property and inequality polluted this natural state.

Society, he compared to chains and fetters, the yokes of oppression, slavery. He said, "*Man is born free, yet everywhere, he is in chains.*" Rather than protecting freedom, social contracts resulted in enslavement, inequity and coercion. Living in France, where Louis XIV, the Sun King, had centralised all power, he felt the monarchy and the aristocracy, far from preserving order, bound the common people in unnatural servitude.

Rather than the cold, barren rationalism of the head, he advocated the passion and warmth of the heart and its emotions, and he compared society to a *'rotten tree'* or a *'sick body'*—something appearing strong but hollowed out and decayed so that what was required was a revolution to replace it with something natural and just.

For Rousseau, the world was not a machine to be reprogrammed but a living thing, sick and in need of rebirth. If society was a diseased tree, revolution was not just an option—it was nature's cure. Where Paine applied rationalism to the dismantling of monarchy, Rousseau appealed to emotion and natural order to restore freedom.

From Theory to Fire

If Paine and Rousseau imagined a world reborn in nature's justice, the revolutions that followed turned their ideas into action—with fire and blood. In America, revolution led to a constitutional republic, tempered by the practicalities of governance.

In France, where monarchy had hollowed out society, the old order collapsed with terrifying speed. The people stormed the Bastille. The king was beheaded. For a brief moment, reason itself was enthroned in Notre Dame as the *'Goddess of Liberty'*. Yet as the guillotine worked tirelessly, violence escalated, factions turned against each other, and it became clear that revolution was not simply a return to nature—it was a battle over the very meaning of *'freedom'*.

These two revolutions have been seen as heralding the birth of the modern world and, in political terms, nothing has been the same since. The model of society governed by a divinely appointed king, responsible only to his maker, was no longer credible.

While revolution shattered political structures, the economic system of global trade and mechanized industry remained mostly intact. The triangular trade in slaves, cotton, and manufactured goods continued, enriching new rulers much as it had the old. Even in France, where the monarchy had been overthrown, power simply fell into new hands. The revolution, begun with naïve idealism, had spiralled into factional bloodshed. The guillotine devoured its own, and survival became the only ideology. Attacked by the forces of reaction, France turned to a different kind of order—one built not on freedom, but on war. With the rise of Napoleon, the logic of industry reshaped the battlefield. The human cogs of production were repurposed—as cannon fodder.

The War Machine

If the industrial age had transformed mills and workshops into machines for profit, Napoleon's France transformed the battlefield into a machine for conquest. The old model of war, with its aristocratic officer class and carefully managed engagements, was shattered.

In its place, Napoleon created a war machine fuelled by mass conscription, industrialized logistics, and cold strategic calculus.

Image 26: Borodino - Napoleon's Bloodiest Battle

For the first time, armies were raised not from mercenaries or professional soldiers but from an entire nation in arms. The *levée en masse* conscripted every able-bodied man, producing military forces on a scale never before seen in Europe. These were no longer personal retainers fighting for lords, or professional companies hired by kings. Instead, they were national armies—supplied by newly rationalized systems of transport and production, fighting not for dynastic power but for a new model of the world: *la patrie*.

Napoleon's war machine was as systematic and impersonal as the industrial factories that now powered European economies. Iron discipline, efficient logistics, and rapid mobility replaced the slow-moving wars of the past. The *Grande Armée* moved like clockwork, its men marching in unison, its cannons wheeled into place with mathematical precision. A battlefield, no longer a stage for chivalry, was an engine of destruction, calculated for maximum efficiency.

The industrial revolution had created a world where production was measured in output per hour, profit per unit. This was turned to the production of guns and uniforms and the logistics of supplying the new national army. And Napoleon applied the same logic to warfare itself: victory was a matter of bodies deployed, muskets fired, resources mobilized. In this new model, men were not individuals—they were material to be spent in pursuit of the ultimate goal: total domination.

Yet just as the factory crushed workers under its relentless discipline, Napoleon's war machine eventually consumed itself. After years of victory, the

system reached its limits in the frozen wastes of Russia, where the *Grande Armée*—starved, frozen, and bled dry—was ground to dust. The same relentless logic that had fuelled its rise ensured its downfall. When resources were exhausted, the machine could no longer function.

With Napoleon's defeat, Europe was forced to confront the consequences of this new order. The Congress of Vienna, in 1815, attempted to turn back the clock, restoring monarchies and re-establishing traditional power structures. But the momentum of history could not be reversed. The mechanistic model of society was as unstoppable as the train that put paid to William Huskisson. The world had changed. Divine-right monarchy was a relic, and though reactionary rulers clung to power, the forces unleashed by industrialization and revolution could not be undone.

The Mind Forged Manacles

The revolutions in France and America had shattered old assumptions, proving that kings were not divine and that political structures could be reshaped by human will. Yet, while revolutionaries spoke of liberty, equality, and fraternity, the industrial order they helped to solidify was creating new forms of oppression—ones that were harder to see but no less real.

The factories, the mills, the war machines—these were no longer just external forces. They were becoming internal ones. People were not only bound by economic necessity or political repression; they were bound by something deeper, an internal psychological model.

It was William Blake (1757–1827) who captured this shift most vividly. While rationalists and revolutionaries framed human progress in terms of reason and systems, Blake saw another force at work: imagination. Where others saw mechanization as progress, he saw it as a new kind of enslavement.

His poetry burned with images of industry and oppression. In *London*, he wrote of the '*mind-forged manacles*'—chains made not of iron but of thought, conditioning people to accept their servitude. In *Jerusalem*, he saw England not as a land of freedom but as one darkened by '*Satanic Mills*', infernal machines that crushed souls as easily as they spun thread.

Blake's model of the world was the inverse of the industrial rationalists. For him, the ultimate reality was not mechanical but spiritual. Truth was not found in mathematical equations or economic laws but in the wild, uncontainable force of the human imagination. The problem was not just political oppression

but spiritual deadening. In the relentless march of industry, something essential was being lost: the capacity to see, to dream, to create.

He was influenced by Emanuel Swedenborg (1688–1772), a Swedish scientist-turned-mystic who claimed to have experienced visions of heaven and hell. Swedenborg's writings described a world where spiritual truths were hidden beneath material appearances, where angels and demons shaped human destiny. Blake took these ideas and transformed them into poetry and prophecy. The real enemy, he suggested, was not just political tyranny but a worldview that reduced everything to cold, mechanical logic.

In contrast to the calculated utility of Bentham or the mechanized logic of Hegel, Blake offered a universe alive with angels and archetypes. His visions—burning with Ezekiel's fire and Milton's rage—were not metaphors. They were his reality. In a world reduced to gears and profit, Blake insisted that imagination was not an escape, it was the only path to truth.

While Paine and Rousseau had imagined revolution as a means to restore natural justice, Blake saw that industrialization and mechanization created new forms of slavery—as people internalised the new social order, it bound the mind as well as the body. He called for a different kind of revolution: not one of laws or constitutions, but of perception. The chains that needed breaking were not just political; they were psychological.

Kant and the Moral Law

If Blake argued for a world governed by spiritual vision rather than reason, Immanuel Kant (1724–1804) attempted to restore reason's place—not as an instrument of mechanization, but as the foundation of morality itself.

Kant's great project was to reconcile the two competing forces of the age: the rationalist vision of a world governed by laws and the deep, undeniable sense that humans were not just cogs in a machine, but moral agents with free will.

He began with a fundamental question: What is morality, and where does it come from?

For centuries, morality had been framed in religious terms—divine commands handed down from on high. But with the rise of secular reason, a new foundation was needed. Kant's answer was both simple and profound: morality comes not from external rules but from within.

His famous *Categorical Imperative*—the cornerstone of his ethics—stated that moral laws must be universal. If an action could not be willed for all people, in all situations, then it was not truly moral. Stealing, for example, was

wrong not because society condemned it, but because a world where everyone stole would collapse into chaos.

Unlike Bentham's utilitarianism, which sought morality in calculated outcomes, Kant argued that morality was an absolute, rooted in human nature. Morality was not about outcomes; it was about human dignity. People were never to be treated as cogs in a machine, as means to an end, but as ends in themselves. No economic model, no political system, no industrial logic could override this fundamental principle.

Where Blake feared the death of imagination, Kant feared the death of morality, in a world governed purely by material considerations. Both recognized that something vital was at stake in the mechanized world of factories, economics, and war machines. The challenge was no longer just about freedom from kings or parliaments—it was about preserving what made people human.

The Dialectic of History

Kant's moral vision laid the groundwork for a new way of thinking about history—one that would be fully realized in the work of Georg Wilhelm Friedrich Hegel (1770–1831).

For Hegel, history was not just a series of random events. It had a structure, a direction, a logic. He saw history as a process of unfolding reason, where each stage contained contradictions that led to its own transformation. His famous *dialectic*—thesis, antithesis, synthesis—described ideas, systems, and societies evolving through conflict and resolution.

Each stage of history contained contradictions (thesis and antithesis), which resolved into new forms (synthesis).

Feudalism (thesis) conflicted with industrial capitalism (antithesis), leading to modern nation-states (synthesis). Divine-right monarchy had been challenged by revolution; industrial society was now generating new contradictions—between wealth and poverty, between individual freedom and systemic control. These tensions, Hegel argued, would drive history forward, forcing society toward ever greater rationality and self-awareness.

Hegel saw in the rise of industrial society not just technological progress, but a deep contradiction: the individual was promised freedom, yet subjected to greater control than ever before. This contradiction, he believed, was history's next turning point.

Where Paine and Rousseau had imagined revolution as a means to restore a lost natural order, and Blake had feared mechanization as a spiritual catastrophe, Hegel saw all of this as part of an inevitable process. Change was not just desirable—it was necessary.

But Hegel's dialectic, once unleashed, would not stop with the political revolutions of his time. It opened the door to new, radical visions of history—ones that would shake the world to its core. Just as William Huskisson was crushed by the machine he, himself, had championed, so too would society find itself transformed, and sometimes broken, by the momentum of the forces it had set in motion.

In Chapter 13, we will follow the path set by Hegel's dialectic: into the rise of socialism, the alienation of man, and the existential struggles of the modern world.

Chapter 13—Being Humans
The Ghost in the Machine

A Wedding—And a Warning

Image 27: Royal Wedding 1858. Victoria and Frederick

In the cold winter air, gold and brass gleamed and hooves echoed on stone. It was 25th January 1858, and enthusiastic crowds lined the streets of London to see the pomp and pageantry of empire. Trumpets played, banners waved, and three grand processions of carriages carried the great and the good to St James's Palace. Inside, the Chapel Royal—a space *'not much larger than the principal apartment of a catacomb',* as The Times noted—was a tight and exclusive gathering.

Here, beneath the vaulted ceilings, a marriage that was also a diplomatic treaty was sealed. The Princess Royal, Victoria's eldest daughter, stood beside Prince Frederick of Prussia, heir to the throne of what was still a scattered patchwork of German states. They spoke their vows in the presence of Britain's highest ministers, foreign dignitaries, and, of course, the formidable queen and her consort.

Victoria was not simply marrying off her daughter—she was securing the future of Europe. The British royal family had long been tied to the German states, from the Hanoverians to the Hohenzollerns. It was a bond made on the battlefield as much as in the chapel—Wellington's victory at Waterloo (of

course), won alongside the Prussians, had sealed the alliance in blood, just as this wedding now sought to do in law.

But royal marriages had as often resulted in wars as in peace. As The Times observed, there was both hope and trepidation:

"We only trust and pray that the policies of England and Prussia may never present any painful alternatives to the Princess now about to leave our shores; that she will never be called on to forget the land of her birth, education, and religion."

Victoria believed she was weaving the crowns of Europe into a single, unbreakable family network—one that would ensure peace through dynastic ties. But the world had changed.

This was not the 18th century of small-scale court intrigues, but the 19th century of industrial power, rising nationalism, and mass armies. Could a continent driven by steel and steam still be ruled as a family business? Or was Victoria less a queen and more the matriarch of a fracturing mafia—one where alliances held only until the first shot was fired? Was she building a dynasty—or simply delaying an inevitable war?

The Illusion of Stability

The timing of this wedding made it easy to believe in continuity. A decade had passed since the revolutions of 1848, that great wave of uprisings which had briefly threatened to tear the old order apart. Kings and emperors had held their thrones, order had been restored, and Victoria—who had feared revolution in Britain—could breathe more easily.

Yet history was not done. Another decade on, in 1866, Prussia would fight Austria in a war that would reshape Germany and shift the balance of power in Europe.

And even as the wedding bells rang, also in London, far from the royal procession, another German was at work on a very different vision of history. It is entirely possible that on 25th January 1858, Karl Marx was in the Reading Room of the British Museum, deep in his notebooks, refining his critique of the system that made Victoria's empire possible. Only three days earlier, he had written excitedly to Friedrich Engels:

"I am working like mad through the nights on recasting my Economy. The thing is developing in such a way that I can now see my way clear to the final version."

While Victoria saw history as a matter of family ties and noble alliances, Marx saw it as an impersonal system—one where kings and queens were mere ornaments, where economic forces determined power, and where the contradictions of capitalism would eventually lead to revolution. This was the conflict of ideas that Hegel had predicted, and Marx was about to move it decisively into the material world.

Thesis, Antithesis, Synthesis

Philosophically, Georg Hegel was an idealist. In his view, the dialectic existed in the ideal world of the mind describing the evolution of ideas towards greater understanding. In our terms, he was describing how models of reality develop and refine themselves over time.

For Karl Marx, this was not enough. He rejected the notion that history was primarily shaped by ideas. For him, the dialectic was not abstract but material— the true engine of history was economic struggle. In his hands, Hegel's dialectic became something concrete: a process not of shifting ideas but of class conflict, a force that moved not through the pages of philosophy but through the streets and factories of the industrial world.

In mediaeval times, the cultivation of crops and the rearing of animals, and therefore the ownership of land, had been the key to power. Every acre that could support a mounted knight contributed to the dominance of the aristocracy who maintained their power by military force. But the rise of industrial capitalism had shattered this model. The factory had replaced the farm as the centre of production, and the new rulers of society were no longer hereditary landowners but capitalists—the owners of machines, raw materials, and infrastructure.

For Marx, this was the latest stage in an ongoing historical process, one that exactly followed the logic of the dialectic. Just as feudalism had been challenged and overthrown by the emerging bourgeoisie, capitalism, too, contained within itself the seeds of its own destruction. Its great contradiction was the relationship between the capitalists and the working class—the proletariat—who owned nothing but their labour and were forced to sell it for wages.

He argued that capitalism's drive for profit inevitably led to the exploitation and alienation of the worker. The labourer was separated from the skills and processes of work, reduced to a mere cog in an impersonal machine. Unlike the artisan who owned his tools or the farmer who worked his land, the factory

worker owned nothing—not even control over his own time. Factory workers were forced to sell their time in markets where they had neither power nor community, alienated not only from their labour but also from their own humanity. Human creativity, once central to work, had been stripped away, leaving behind only repetitive toil—soulless labour for faceless masters.

This, for Marx, was the great injustice of capitalism—but also its fatal flaw. Just as the feudal system had been overturned by the rise of industrial production, he believed the contradictions of capitalism would eventually lead to its own downfall. The proletariat, realising its collective power, would rise in revolution, overthrow the capitalist class, and seize control of the means of production.

The end result—communism—would be a society in which class distinctions had disappeared, and economic production was organised not for private profit but for the benefit of all. Each person would contribute according to their abilities and receive according to their needs. In this final stage of history, there would be no more need for class struggle, no more exploitation, and no more alienation.

It was a vision that promised both justice and an end to scarcity, a model of society that—at least in theory—offered a future free from oppression. Yet, like all models, it had its weaknesses.

But, In Practice

Marx, unlike Rousseau, did not think that mankind was inherently good and corrupted by society. For him, human behaviour was shaped not by innate goodness or corruption, but by social relationships within an economic system. His expectation of the post-revolution ideal of a classless, egalitarian society was founded mainly on three assumptions.

Firstly, he thought that social and emotional pressures would drive the behaviours that built loyalty and co-operation.

Then, he expected rational analysis to show that the interests of every individual coincided with those of the group as a whole and, lastly, he thought these two factors would strongly support each other.

However, the reality of post-revolutionary society revealed deep flaws in these starting points. While the social instincts evolved in small bands on the African savannahs thrived in close-knit groups like co-operatives or kibbutzim, they broke down when scaled beyond face-to-face interaction. These instincts thrived in revolutionary cells plotting the overthrow of the old order, but they

struggled to function within the vast machinery of post-revolutionary government.

Individuals, and groups also found that what they looked for didn't necessarily match the centrally planned needs of a nation-state. Local interests and the needs and aspirations of sub-groups tended to take precedence over the more remote and abstract requirements of a centralised bureaucracy.

Ironically, therefore, the more intense priorities of smaller, local groupings tended to conflict with and undermine, rather than support, the efforts of the global collective.

Twentieth century experience would show that, in post-revolutionary societies like the Soviet Union, Communist China, East Germany, and North Korea, the central plan could not rely on rational self-interest or communal spirit. Instead, surveillance and coercion became necessary to enforce its implementation. The workers, far from producing for themselves or for a local capitalist master, were engaged in production for a faceless, impersonal bureaucracy.

Marx wanted to end alienation. He would have been horrified to see that communism had become just as soulless and dehumanising as the system it replaced.

Failure of the Unfit

Queen Victoria, too, would have been horrified by the way that implementation of her model of European government, as one happy family, had played out. Just 60 years after her daughter's wedding appeared to have cemented peace in Europe, 1918 was to see Marx's harsher vision triumphant. The twin nemeses of warfare and revolution had undone her network of international family relationships. Two of her grandsons had lost their thrones—in Germany, Kaiser Wilhelm II had been deposed and sent into exile and, in Russia, the Tsar had been executed by firing squad.

And just a year after that wedding, in 1859, another model of inheritance was emerging—one that owed nothing to aristocratic bloodlines and royal marriages. Charles Darwin (1809–1882) published *The Origin of Species*, a revolutionary new framework for understanding inheritance and survival, a model that, in time, would be applied far beyond the natural world.

Like Hegel, Darwin saw evolution as driven by struggle and conflict. Like Marx, he placed this process in the material world rather than the realm of

abstract ideas—but unlike either, he saw it as shaping not just societies, but all of life itself.

As a young man, Darwin spent five years traveling the world aboard HMS Beagle as 'Gentleman Companion' to Captain Robert FitzRoy. Though his role was social, he quickly became the expedition's de facto naturalist, meticulously collecting specimens and studying the lifeforms of distant lands. In collecting specimens of the plants and animals in different parts of the world he noted similarities between related species that resembled changes achieved by selective breeding of domestic animals.
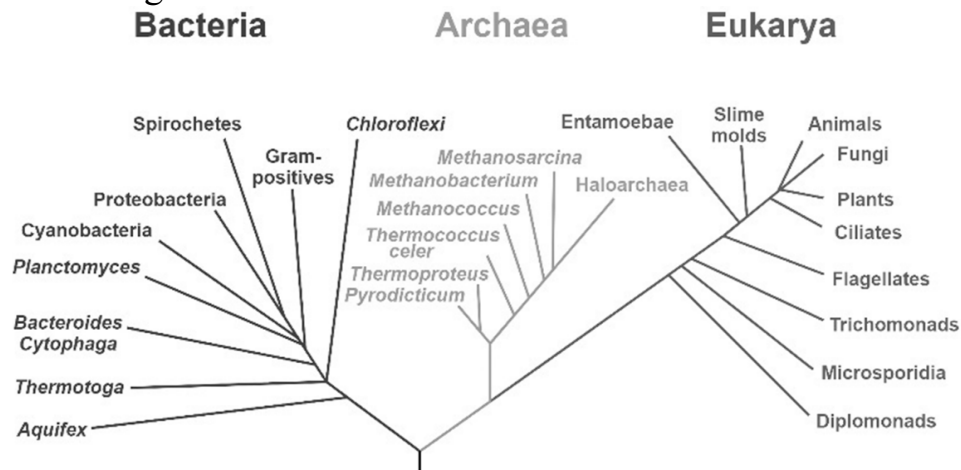
Image 28: Darwin, too, Modelled Life as a Family Affair

Darwin realised that nature prevented organisms that did not compete effectively from producing offspring—as ruthlessly as a human breeder selecting the breeding pair for a faster racehorse or a better laying chicken. Only those that survived to maturity—faster, stronger, or better adapted—passed on their traits to the next generation, shaping life through an unceasing competition for survival.

The Origin of Species was immediately controversial. By depicting evolution as a blind, impersonal process this theory eliminated the need for a divine plan. It assumed neither a supernaturally imposed end-point nor a moral dimension to human society. It even undercut the notion of humans as separate from nature—they were just another species shaped by random variation and survival pressure.

Marx thought that history needed no guiding hand. Darwin said this applied to life itself, and the power of this model was such that it found extension, application, and misapplication in fields as diverse as anthropology,

psychology, economics, sociology, and even political ideology. Some used Darwin's ideas to justify capitalism and competition, while others extended them into dangerous theories of racial hierarchy and eugenics—distortions of Darwin's original insights that would have lasting consequences.

Machine Then—No Ghost?

Building on Newton's physics, Darwin's evolutionary theory, and Marx's social analysis, nineteenth-century science seemed poised to explain everything—including humanity itself—in purely objective terms. But this impersonal model appeared utterly inhuman, offering no space for dignity, rights, emotions, or anything recognizably human.

In this cut-throat, competitive world of factories, foundries, slaughterhouses, poorhouses, and workhouses, it was small wonder that people sought an alternative model of reality—one that could restore meaning, dignity, and the human spirit.

For some, the answer was to be found in religious revival. As industrialism began in the eighteenth century, believers like the Wesleys—brothers John and Charles—in pursuit of a devout Christian life, had adopted a methodical program of Bible study, prayer, church attendance, and charitable activities, including visiting prisoners in jail.

After an unsuccessful missionary expedition to America, John Wesley experienced a deep spiritual awakening at a meeting in Aldersgate. Filled with renewed conviction, he began preaching repentance and conversion to thousands in open-air gatherings, reaching those who felt abandoned by the established church. His movement eventually broke from the Anglican Church, forming what became the Methodist denomination—defined by its emphasis on personal faith, social justice, and evangelism.

The industrial nightmare of the nineteenth century proved a fertile ground for religious revival. Alongside Methodism, many other evangelical sects like the Baptists, Plymouth Brethren, Seventh-Day Adventists, Mormons, and Jehovah's Witnesses flourished—offering hope to those crushed by the new industrial order.

Like Wesley, they preached repentance, conversion, social responsibility, and temperance—offering not just a deeply personal religious experience, but also the promise of moral order, economic stability, and ultimate redemption in heaven.

How then, could the materialist models of Newton, Darwin, and Marx be accommodated within this environment of faith? Some believers simply dismissed them as the devil's work. For them, divine revelation in the Bible was both more comforting and more credible than humanly derived *'scientific'* theories. Even in the twenty-first century, this approach still finds its advocates.

For others, this is the culmination of a division between religion and philosophy dating back to William of Ockham, and before him to Averroes in Muslim Spain,—revelation and science—where religious metaphors and scientific models are different ways of arriving at truth. If all models are merely abstractions, then the question shifts from which is most *'accurate'* to which is most meaningful. This is precisely where Søren Kierkegaard (1813–1855) made his stand.

For Kierkegaard, it was important to live as a *'single individual'*, prioritizing concrete human reality over abstract thinking. He argued that faith was not a matter of institutional doctrine, but of personal choice and emotional commitment—the leap that transforms belief into a living, human relationship with God.

In some sense, this was the next step along the path opened by Descartes' *Cogito*—the idea that certainty begins with the self. Since knowledge and belief began and ended with the individual, they were no longer about objective certainty, but about resolving the existential question of human presence in the world—what it means to exist.

Kierkegaard laid the foundations for existentialism—a philosophical tradition whose thinkers each grappled with these questions in their own way, searching for humanity within an increasingly mechanized and impersonal world. His insistence that truth must be *lived* rather than merely *understood* would echo through later existentialists like Sartre and Camus, who confronted the same anxieties in a bleaker age.

Because while Kierkegaard sought meaning through faith, the opposite path was also being explored: that meaning must be created in the absence of God, leading to a world where God had not only died—but had been replaced by bureaucracy and war.

No God!—The Meaning of the Machine

As some religious people responded to the new, impersonal model of the world by looking for an enhanced relationship with God, one person who reacted differently was Friedrich Nietzsche (1844–1900). The son of a Lutheran pastor,

he initially intended to become a minister but lost his faith at the age of twenty. Thus, the central question he faced was: if belief in God was no longer credible —he expressed it as *God is Dead*—what was the point of humanity?

Nietzsche was exposed to Darwin's theory of evolution through German thinkers like Friedrich Albert Lange and Ernst Haeckel. However, he rejected the idea that survival alone was the driving force of life. Observing a world where people seemed resigned to submission and mediocrity, he argued that only those who exhibited a true *Will to Power*—the drive to overcome, create, and assert their strength—could shape the future.

He rejected the idea that all humans were spiritually or intellectually equal and that morality should be based on mutual respect and reciprocity. Instead, he believed that conventional moral systems suppressed the highest human potential—favouring conformity over greatness. He was particularly critical of Christian morality, which he saw as a tool of the weak to restrain the strong, and of democratic ideals, which he believed catered to mediocrity rather than excellence.

Nietzsche, who suffered from ill health for most of his life, admired heroic figures who imposed their will upon the world—above all, Napoleon. He saw him as a model of the self-overcoming individual who reshaped history through sheer force of personality. He believed that exceptional individuals should not be bound by the same ethical codes as the masses but should create their own values and act in accordance with their highest instincts.

Nietzsche saw Darwin's idea of evolution as incomplete—just surviving was not enough. Instead, he envisioned the next stage of human development: the *Übermensch* or Superman. Unlike ordinary people, weighed down by herd morality, the *Übermensch* would forge their own values, embrace the chaos of existence, and live with creative intensity. However, Nietzsche did not frame this as a racial or national goal—the *Übermensch* was an individual achievement, not a collective one. He explicitly rejected the nationalism, antisemitism, and biological determinism, which later thinkers misattributed to him.

Although Nietzsche himself opposed racist ideas, later movements tragically twisted his thought to serve their own dark agendas. Despite his explicit rejection, his aristocratic ideal of human greatness was distorted by those seeking to reshape society through force—in the name of race, class, or ideology.

In the brutal mechanised conflicts of the 20th century, humanity itself—the elusive ghost in the machine—often seemed lost. Clashing models of reality— liberal capitalism, Marxist class struggle, and racial supremacist ideologies— would define the age, each battling to impose its vision.

In the next chapter, we will step back to examine more closely how these models work, how they connect to the world, and how—with and without ghosts—they interact, coexist, or collide to reshape our understanding of reality itself.

Chapter 14—Models Multiply
Modernism

Thoroughly Modern

In April 1973, *Time* magazine published a report on the death of Pablo Picasso (1881–1973). He had been, for many, the poster child for modernism. Grounded by training in classical art, he extended the tradition and reinvented himself as a pioneer and innovator in multiple different styles.

One of the most interesting of Picasso's *'periods'* was Cubism, where he used spatial distortion to incorporate multiple perspectives into a single image. Influenced by African masks, he broke away from Western realism to challenge traditional artistic models.

The invention of photography, which could now capture physical reality with precision, forced artists to rethink their role. If machines could portray the physical world exactly, what was left for painting? This was the same question posed by industrialization—how could human creativity reassert itself in an era increasingly dominated by mechanical reproduction?

By distorting space and layering representation, Picasso moved beyond superficial appearance to express a deeply human, emotional experience—one that transcended mere depiction.

Art at the beginning of the twentieth century was eclectic. European artists eagerly absorbed influences from African, Indian, Chinese, and Japanese traditions, and this borrowing was inseparable from the realities of colonial power. Just as colonialism extracted material wealth, Western art sometimes appropriated cultural forms without full understanding or acknowledgment.

And not just colonialism. Art exists, inescapably, within the larger context of society, and *Guernica*, one of Picasso's most famous works, emerged from the crucible of the Spanish Civil War. It is a searing depiction of the brutal destruction of the village of Guernica, a tragedy born from the conflict between the fascist forces of the Falange and the Marxist-leaning Republican army. Hegel's materialist heirs had taken Thesis and Antithesis from the realm of ideas into the battlefield, where the citizens of Spain became mere collateral damage.

Guernica was not just a painting; it was Picasso's answer to a world where ideologies no longer lived in books but tore nations apart. It was a stark reminder that artistic models are never separate from the world that shapes

them. And yet, while *Guernica* defined Picasso's role in the first half of the twentieth century, his influence would ripple into unexpected places—even, strangely enough, the world of rock and roll.

Picasso died in 1973, three-quarters of the way through the twentieth century, but, through a strange and unpredictable combination of circumstances, his death is linked to different and equally influential artists in a quite different medium—The Beatles.

Posthumous Picasso

Also in 1973, the film, *Papillon*, was being shot in Montego Bay, Jamaica. The stars were Steve McQueen and Dustin Hoffman. *Papillon* dealt with themes of freedom, oppression, and reinvention—echoing the way artists broke from old models to create something new.

When Paul McCartney, holidaying in Jamaica with his family, visited the film set, Hoffman—a long-time Beatles fan—invited him and his wife to dinner. After the meal, Hoffman showed McCartney the *Time* article on Picasso's death and challenged him to write a song based on it. The result, improvised on the spot, was *Picasso's Last Words (Drink to Me)*, which appeared on the album *Band on the Run*—a disjointed, eclectic track, that shifts between styles and tempos, much like a cubist painting.

Like Picasso, The Beatles emerged from a tradition—theirs of popular music —and reinvented their medium. Absorbing non-Western influences, especially Indian music, they mirrored Cubism on Sergeant Pepper's Lonely Hearts Club Band by merging songs, shifting structures unpredictably, and letting diverse influences collide unexpectedly. Just as Picasso questioned *'What is a painting?'*, The Beatles asked, *'What is a song?'*, reinventing genre, format, and even the idea of an album.

"Drink to me, Drink to my health –
You know I can't drink anymore..."

*Image 29: Picasso's Last Words - A Link to the Beatles*

Both Picasso and The Beatles understood that models are never static—they must evolve, adapt, and sometimes be dismantled entirely. Picasso shattered the model of linear perspective; The Beatles exploded the model of what a pop album could be. In both cases, they forced their audiences to question rules they had taken for granted.

In reinventing their art forms, Picasso and the Beatles set a pattern for the times. The twentieth century saw this dynamic play out repeatedly, across disciplines, as old models gave way continually to newer forms—each groundbreaking in its moment, only to be succeeded once again by something even more radical.

A Conflict of Concepts

And this continuous flux was not unique to art. Science, too, was undergoing a revolution. By the late nineteenth century, cracks had begun to appear in Newton's model of the universe—ultimately leading to Einstein's theory of Relativity, a more complete framework for understanding the macro-scale cosmos. And even Einstein's model had limits—it failed to account for the strange and unpredictable behaviour of subatomic particles, leading to the emergence of Quantum Mechanics.

Even more unsettling, Quantum Mechanics—though offering a precise model for the subatomic world—was fundamentally incompatible with Relativity. Relativity describes planets, galaxies, and black holes as existing in a smooth, continuous fabric of space-time. Quantum Mechanics treats reality as grainy, uncertain, and probabilistic, where at the tiniest scales, particles flicker in and out of existence due to uncertainty, and energy exists
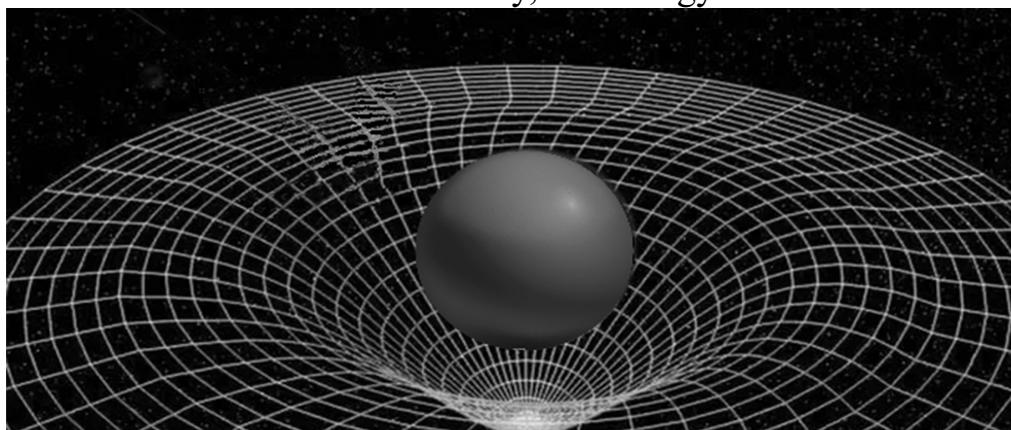
Image 30: Relativity - Gravity as a distortion of space-time
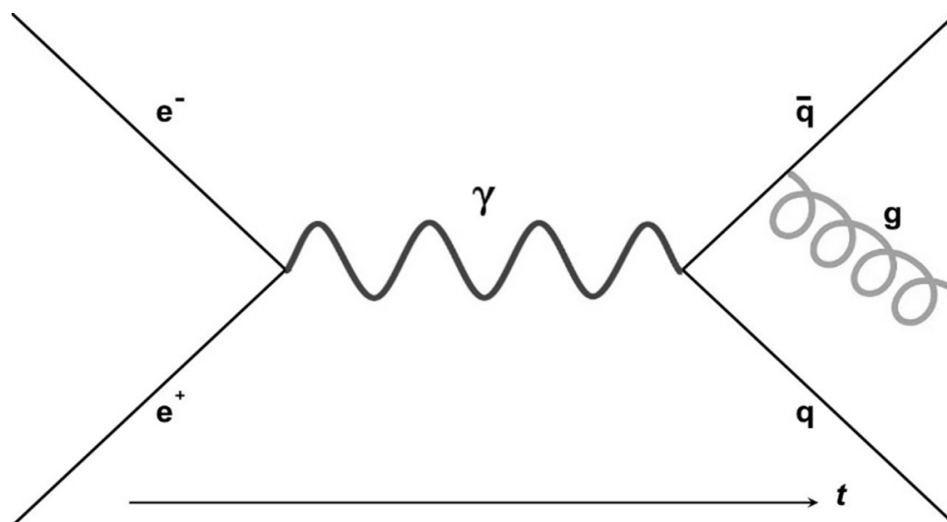
in discrete chunks—quanta.

Image 31: Feynman Diagram – Particle Collision Probability

A smooth, continuous universe cannot account for the erratic, probabilistic behaviour of particles, just as the jittery, flickering quantum world does not match the orderly, predictable structure of planets and galaxies. Einstein was thinking at the scale of the visible when he said, *"God does not play dice with the universe."*

Quantum Mechanics was neither a true complement nor an outright competitor to Relativity. Each model worked—but only within its limits. Like Picasso's Cubism, these two conflicting realities had to be held in mind at once —two models of truth, irreconcilable yet simultaneously valid.

And, just as the tension between Relativity and Quantum Mechanics showed the need for multiple models in science, similar questions about reconciling conflicting truths emerged in philosophy.

Models of Models

Faced with two contradictory yet useful models, how were we to make sense of reality? If two contradictory models were both useful, did that mean any view of reality was as valid as any other? Was Russell's idea of a tiny, invisible teapot orbiting the Sun between Earth and Mars just as credible as the belief that the Moon orbits the Earth, something that can be confirmed through telescopes, satellite data, and direct observation?

The Vienna Circle—an influential group of scientists and philosophers including Kurt Gödel, Rudolf Carnap, and Otto Neurath—set out to solve this problem. They argued that a statement is meaningful only if it can be verified through experience or logic—if it can be proven true or false.

Unfortunately, as Karl Popper (1902–1994) pointed out, this didn't actually distinguish between the Moon and the teapot. If verification were the only test of meaning, then both statements would seem equally valid—after all, in theory, the teapot's existence could be confirmed. It just had to be found.

Popper argued that verification wasn't the issue—it was falsifiability. The Moon's orbit can be observed and measured, but the teapot's absence can never be proven. No matter how many searches fail to find the teapot—or God—it's always possible to say, *"We just haven't looked in the right place yet."* That, Popper concluded, is what separates science from unfalsifiable belief.

Although Austrian, and born in Vienna like Ludwig Wittgenstein (1889–1951), Karl Popper was never a member of the Vienna Circle—and nor was Wittgenstein, despite his influence on its members.

In his early work, the *Tractatus Logico-Philosophicus* (1921), Wittgenstein also sought a rigorous way to separate 'valid' knowledge from meaningless nonsense. He argued that language had to function as a logical model of reality in order to be meaningful. Only statements that described facts—such as *"The Earth orbits the Sun"*—or logical relationships—such as *"If all men are mortal, and Socrates is a man, then Socrates must be mortal"*—counted as meaningful.

Everything else—religion, ethics, and speculation about anything outside nature—was not just wrong, but literally senseless, and not worth discussing. As he famously expressed it:

"What can be said at all can be said clearly, and whereof one cannot speak, thereof one must be silent."

Later, Wittgenstein reflected that his most important work was what he had not written. Over time, he abandoned the idea that language functions as a simple reflection of reality. Instead, he argued that language is like a series of games, each played by its own rules. The meaning of words depends not on a fixed structure, but on their context and use.

Just as Relativity and Quantum Mechanics must coexist despite their contradictions, Wittgenstein came to see that different models of thought—scientific, philosophical, religious—serve different purposes. Each is useful in its own domain, even if they cannot be fully integrated.

Popper and Wittgenstein famously met only once, at a Cambridge University seminar where they clashed publicly. Wittgenstein was a professor there, and Popper had come to challenge what he saw as Wittgenstein's claim that all meaningful statements could be expressed clearly—with precise definitions, a

fully coherent model of knowledge was possible—leaving no unresolved philosophical problems.

But Wittgenstein had already abandoned this view, so their debate was completely at cross purposes. As they argued, Wittgenstein picked up a poker and gestured with it before abruptly leaving the meeting.

Popper viewed this encounter through a fixed model—debates had clear winners and losers—so he saw himself as the winner, later accusing Wittgenstein of threatening him.

Wittgenstein's supporters, however, dismissed this as a complete misunderstanding, ironically demonstrating Wittgenstein's own point: a single event, interpreted through different models, produces multiple conflicting truths.

Against Abstractions

Wittgenstein's philosophy is complex and subtle. Some of this may be due to his personality and his experiences of trauma on the Eastern Front of World War I, but holding multiple, conflicting models in mind at once requires a daunting level of abstraction—one that distances thought from direct experience.

For many, this disconnect was—and remains—deeply unsatisfying. As psychology emerged as a discipline, the focus shifted from abstract models to the precise mechanisms of perception itself. It became clear that sense perception was not a simple, mechanical process like taking a photograph. Perception was not a passive recording of reality but an active process, integrating external sensory input with internal mental models. What was perceived depended not only on the stimulus itself but also on the state of the perceiver's mind.

The same physical stimulus can be perceived in different ways depending on previous experience, memory, and expectations. In Gestalt psychology (*Gestalt* meaning *'pattern'* or *'organized whole'* in German), perception is not just a sum of individual sensory elements; instead, the mind organizes these elements into a meaningful whole. Many *'ambiguous figures'* illustrate this principle— images that the brain can interpret in multiple ways. A well-known example is the Rubin vase, which can be seen either as a dark candlestick or as two white faces in profile.

Reacting against Descartes's claim that certainty comes from introspection (*cogito ergo sum*), Edmund Husserl (1859–1938) argued that this focus on internal consciousness obscured the true nature of lived experience in the world.

To him, what was important was to suspend (or *'bracket'*) all assumptions and interpretations and focus purely on the way things appear in experience—their *'phenomena'*.

Husserl's emphasis on direct experience was expanded by his student Martin Heidegger (1889–1976), who shifted the focus from perception itself to the deeper question of what it means to exist as a human being in the world.

Human Being

For Heidegger, the scientific pursuit of an objective, mathematical representation of reality—reducing the world to causes, effects, and equations—was ultimately sterile and disconnected from human existence. It ignored the depth of human experience—the emotional power of poetry, the weight of history, and an inescapable connection to place and culture.

Heidegger argued that modern man, cut off from nature and constrained by social conventions, experiences a deep sense of estrangement—a feeling of being *'not at home'* in the world (*Unheimlichkeit*).

Authentic *Being-in-the-World* (*Dasein*) could only be achieved by confronting one's own mortality and limitations, embracing *'dread'* (*Angst*), and rejecting the inauthentic distractions of everyday life.

Authentic existence required deep, personal engagement with life—choosing one's path with conviction, rather than passively conforming to social norms. Only through such commitment and self-awareness could one reconnect with the raw, independent reality of existence.

This intensely individualistic approach to existence—where the focus was on personal authenticity rather than broader social responsibilities—offered Heidegger, intentionally or not, a way to sidestep the moral dilemmas of his life in Nazi Germany.

Unlike more openly defiant intellectuals, Heidegger chose to accommodate Nazi ideology, making the compromises necessary to sustain his career as a Professor of Philosophy and Rector of the University of Freiburg—including distancing himself from his mentor, Husserl, who was Jewish and barred from university life under Nazi racial laws.

At its most generous interpretation, Heidegger's philosophy could be seen as attempting to navigate the complex fusion of Hegelian idealism and Darwinian struggle underpinning Nazi ideology. At worst, it represented an accommodation with political forces he chose not to oppose openly.

In a different ideological arena, Jean-Paul Sartre (1905–1980) undertook a similar task—seeking to bridge existentialism with Marx's materialist vision of history.

In 1933, Sartre travelled from France to Germany to study phenomenology, particularly the work of Husserl and Heidegger. A novelist and playwright as well as a philosopher, Sartre was deeply concerned with the nature of human freedom and the structure of consciousness in a world increasingly shaped by economic and social forces.

Heidegger looked for the essence of human existence not in individual choices but in poetry, history, and the great epochs of civilization. Rivers like the Danube symbolised civilization's renewal, shaping the societies along their banks over centuries. Given his role in industrialized, Nazi Germany, might this retreat into historical narratives have been, at least partly, a form of escapism—an attempt to find meaning in the past while avoiding moral and political crises he preferred not to confront?

Sartre, in contrast, rejected grand historical narratives entirely, locating meaning instead in immediate, personal choices—decisions that, especially during his participation in the French Resistance, meant life or death. He defined *Being* in opposition to *Non-Being*, emphasizing how individuals confront their own freedom in moments of existential crisis.

For Sartre, the act of choice was the ultimate expression of freedom—a rejection of industrial determinism, an embrace of human responsibility, and a recognition that individuals create themselves through their actions.

To Sartre, *bad faith (mauvaise foi)* was the act of deceiving oneself into believing that one had no options—that one's behaviour was dictated by external forces rather than personal choice. He explored the power of the *gaze (le regard)*—how the awareness of being watched alters behaviour, turning individuals into objects of judgment rather than autonomous subjects.

It's tempting to speculate, given their shared emphasis on human freedom, how their respective political realities shaped Heidegger's and Sartre's philosophical models of the world.

At the very least, different viewpoints lead to different perspectives. In the next chapter, we'll explore how modernism's absorption of disparate influences led to a proliferation of competing models of reality. But before that, we must examine one crucial new perspective that emerged and matured during the twentieth century.

Women? Right

A natural starting point is Simone de Beauvoir (1908–1986)—philosopher, writer, and lifelong companion of Jean-Paul Sartre—who, in her groundbreaking book *The Second Sex* (1949), challenged the male monopoly on dominant societal models.

The spread of education beyond a privileged few during the 18th and 19th centuries meant that, by 1900, women's participation in politics had become a major issue. In 1893, New Zealand became the first self-governing country to grant women the right to vote, and Switzerland remained one of the last, only doing so in 1971. In Britain, some women gained suffrage in 1918, with full voting rights following in 1928, while in the United States, the 19th Amendment secured women's voting rights in 1920.

The need for women to work in factories, farms, and essential industries during both World Wars not only expanded their participation in the workforce but also reshaped their perception of their role in society.

In *The Second Sex*, de Beauvoir argued that patriarchy had systematically oppressed women—both economically and sexually—by defining them as '*the Other*.' Her work provided a vocabulary and conceptual framework that shaped feminist thought in the second half of the 20th century. She stood at the crossroads of existentialism and feminism, arguing that authenticity, for women, was constructed in the context of society. As she famously put it: *"One is not born, but rather becomes, a woman."*

In the first half of the twentieth century, feminism had focused on the legal and political rights of women—the right to own property, the right to vote, access to higher education and the status of women in marriage where, historically, a woman had lost her separate identity at her wedding.

With growing momentum, activists launched a second wave of feminism, campaigning against workplace discrimination, the gender pay gap, and restrictive social norms. Modernists had searched for universal truths that incorporated exotic influences, but viewed them through a Eurocentric, patriarchal lens, extended to include the *'lesser races'* through colonialism.

Second wave feminism criticised this model, insisting that women's voices—with those of other excluded groups such as people of colour, homosexuals, the disabled and so on—were equally valid. Gender, as a social construct, was coercively imposed with women categorised as illogical, frivolous, naturally caring and sexually subordinate to active, intelligent, logical males.

Activists such as Betty Friedan, Gloria Steinem (USA), and Germaine Greer (UK & Australia) fought for sexual liberation, reproductive rights (contraception & abortion), and recognition of women's domestic labour as unpaid work.

As feminism secured major victories—including the legalization of abortion in many countries, equal pay laws, affirmative action, and workplace protections—the movement became increasingly divided over its goals and methods.

Was the objective simply a level playing field where men and women could compete and cooperate as equals? This was the vision of liberal feminists. But radical feminists, like Greer, argued that society was fundamentally patriarchal, built to enable male dominance, and that true liberation required dismantling the structures that upheld gender inequality.

For some, feminism was a political struggle for systemic change. For others, it also represented personal liberation—the right to enjoy the freedoms that men had long taken for granted, including economic independence and sexual autonomy.

But the movement faced unresolved questions: Should feminism seek only equality, or did true liberation require a fundamental restructuring of gender relations?

And how should feminism deal with the real biological differences, particularly in reproductive potential, between males and females? If a woman's reproductive capability is limited to—at most—twenty or thirty pregnancies while there is no theoretical limit to the number of a man's offspring, how can or should this be taken into account?

In Western societies, gender equality emerged as a defining ideological struggle of the twentieth century, fundamentally challenging assumptions about power, agency, and identity. Yet gender was just one battlefield among many.

As feminism reshaped social and political landscapes, other voices—racial minorities, indigenous groups, postcolonial thinkers—rose up to demand recognition of their own experiences of oppression. Whose perspective would define reality was no longer a debate confined to gender—it expanded to encompass race, class, culture, and the very concept of identity itself.

Chapter 15—Truth, Lies, and Stories
Postmodernism

Pandora

Modernism, as a movement, opened the door to non-Western influences in Western thought. Just as Picasso and the Beatles incorporated African and Indian elements into their work, modernist writers were similarly inspired by *'the exotic'*. T. S. Eliot, in *The Waste Land*, wove quotations from the Buddhist *Fire Sermon* and the *Upanishads* into his fragmented, allusive style. James Joyce, particularly in *Finnegans Wake*, played with ideas from Hinduism and Buddhism, using cyclical structures reminiscent of Eastern cosmology. Virginia Woolf's use of space, stillness, and fluidity mirrored the aesthetic principles of Japanese and Chinese art, where meaning often emerges from what is left unsaid.

Yet, despite this openness, modernist experimentation still took place within the dominant framework of Western European thought. Often, these references were treated as enriching elements rather than fundamental shifts in worldview.

By the time The Beatles released *The White Album*, however, that was beginning to change. John Lennon's *Revolution 9* embraced avant-garde eclecticism, breaking down conventional song structures into a chaotic sound collage. Many of the album's songs were written in India during their meditation retreat with the Maharishi Mahesh Yogi, reflecting deeper exposure to Eastern spirituality. And, while The Beatles' earlier flirtations with Indian music (George Harrison's sitar playing on *Norwegian Wood,* for instance) had been experimental flourishes within a Western framework, Harrison's deepening engagement with Indian classical music and philosophy began a significant shift.

By the time of The Concert for Bangladesh in 1971, The Beatles had disbanded, but they were still influential. Harrison's collaboration with Ravi Shankar introduced Indian music on an equal footing, rather than as a mere exotic decoration. This shift symbolized a broader cultural transformation: non-Western models weren't just influences. They were becoming independent, respected models in their own right.

And What Came Out the Box

Two World Wars in Europe and the rise of America as a dominant industrial power meant that the traditional relationships between European states and their colonies had been shattered. Across the world from Algeria to Zambia, from the Caribbean to Cambodia, from Africa to India and Vietnam, liberation movements declared themselves the independent equals of their former overlords.

Modernism had opened the door to non-Western thought, but it still operated within a structured, Western intellectual tradition. Postmodernism went further. It shattered the notion that any single tradition could legitimately dominate our thinking. If modernism questioned absolute truths, postmodernism dismantled the entire idea of a single, authoritative narrative. Multiple perspectives coexisted—sometimes in harmony, sometimes in contradiction.

The result was not just a broadening of perspectives, but the fracture of consensus itself. Once multiple traditions and histories stood on equal footing, the idea that a single worldview—Western or otherwise—could claim dominance no longer stood up.

One element in this changed way of thinking was the movement of people. With European empires breaking up, where people lived—and how they thought of themselves—changed too. For people moving from one country to another, national identity was no longer a fixed thing. Where did they now belong? Which sports team did they support? Which history was theirs—the one they left behind, or the one they were now a part of? Or both of them?

Long before the mid-20th century, the demographics of the Americas had already been reshaped by slavery and forced migration. After World War II, though, new migrations—driven by labour shortages—brought workers from the Indian subcontinent and the Caribbean to Britain, from her former colonies to France, and from Turkey and the Middle East to Germany.

Into the Melting Pot

Image 32: Gay Community Protest San Francisco

The most visible early impact of these new arrivals was cultural. They lived in particular areas, and they brought their music, art and eating habits with them. Faced with poverty and discrimination, their reaction was to question the norms of the societies they lived in. Rather than a single new worldview, these migrations brought multiple alternative perspectives—challenging historical assumptions and showing up deep-seated inequalities in the host nations.

Superficial cultural influences were easiest for the host nations to accept. It's hard to object to a new fashion in music or clothing and, a new cuisine is rarely seen as threatening—in fact, they were often welcomed. People will accept a tasty additional option in their local area—especially as the newcomers tended to be poor so their food was usually attractively priced.

Equal access to education, healthcare and political power was more contentious. These were advantages that the majority population was far less willing to share—the structural underpinnings of an *'us and them'* mentality. A struggle that, after decades, still sometimes bursts into violent discontent.

From civil rights clashes in the United States to the Brixton and Toxteth Riots in Britain and the French banlieue protests, the streets have become battlegrounds for conflicting models of the world—as historical injustices collide with modern struggles for recognition and equality.

Views at Variance

In the first part of the twentieth century, powerful media organisations controlled both the content and the context in which events were presented. But the proliferation of communication channels across cable, satellite, and the internet has made suppressing alternative viewpoints increasingly impossible.

Just as Luther's challenge to the established Church was amplified, echoed, and transformed by the printing press, today's communications technologies allow any point of view—rational, irrational, or unhinged—to be accessed, amplified, and believed. And, as in the Reformation, one of the main casualties of this proliferation of ideas is the power and credibility of central authority.

As individuals increasingly rejected the validity of received wisdom, they began to generate personal models of reality, shared by others with similar identities, histories, or experiences. Just as post-colonial critiques of Western inequality erupted in street protests and cultural movements, ideological clashes in other areas have broken out as well—sometimes in open violence, sometimes in more subtle forms.

Religious discord—far from disappearing under the pressure of secularism—has in many places become more pronounced. From the 9/11 attacks in New York to the London bombings, and from anti-Muslim violence in India to the persecution of the Rohingya in Myanmar, religion remains at the heart of some of the world's most violent conflicts.

One major change, however, is that in many modern Western societies, existential threats are rare. A person's model of reality must now be deeply out of step with material conditions before it endangers their survival. Those who believe the world is spherical and those who think it is flat are likely to do equally well, day-to-day.

The immediacy of decisions—like whether the noise in the bushes is a breeze or a hungry lion—has diminished. In its place, faith can take on a new form. At times, religious or ideological conviction may seem to imply that what is believed strongly enough becomes a kind of truth in itself. In these cases, belief can override reason.

In some academic circles, the deconstruction of dominant narratives has contributed to the view that the stories we tell don't just describe reality or shape it—they *are* reality. In this framework, identity, history, and even justice are understood to be socially constructed. For some, this leads to the conclusion that personal experience and self-definition carry as much weight as objective measurement.

From this perspective, strongly identifying as a woman constitutes being one —regardless of traditional biological definitions. In the same way, if someone experiences injustice, the sincerity and intensity of that experience may be taken as evidence that the injustice is real. Models of reality can end up being derived from lived experience and community consensus rather than objective criteria.

And tensions arise when differing models of reality collide. The protections societies create for minorities and for free speech are seen, by some, as enabling forces that may be used to undermine those very societies. Debates over which views should be heard—and which should be silenced—are increasingly polarized.

As LGBTQ+ identities—lesbian, gay, queer, trans, and more—have gained greater acceptance in the West, new divisions have opened up, particularly around trans rights and their relationship to mainstream women's rights.

If, as de Beauvoir said, becoming a woman was not simply an accident of birth but a social construction, could anyone assume that identity? And what would they have to do to achieve this?

This would be one of the early twenty-first century's most contentious debates: what exactly does it mean to be a woman and how do we safeguard the twentieth-century gains in position, rights and lived experiences of women and girls?

The word *woke* once meant awareness of injustice—now it is a flashpoint in these debates.

Campaigners argue that historic injustices like the slave trade and colonial exploitation have created systemic gaps in wealth and privilege that persist today. They demand positive discrimination and reparations—models that challenge traditional Western ideals of fairness and meritocracy.

Similarly, Critical Race Theory argues that racism is not only a matter of individual prejudice, but is embedded in laws, institutions, and economic systems. Supporters see addressing this as a necessary corrective to historical bias, while opponents claim it promotes racial division and undermines social cohesion.

On the far right of politics, a mirror of these developments has emerged in *'traditionalist'* interpretations of history—attempting to return to a mythologized era of national strength, cultural homogeneity, and Western dominance before globalization and progressive social change. While not all

conservatives share this outlook, ideas like these have become increasingly prominent in populist thinking.

Faking It

Just as the far right idealizes a lost era of national greatness, liberal intellectuals often look back to a supposed golden age of objective inquiry and measured, civilized debate. Sadly, this too appears to be a mythical utopia.

What we can say is that, in the days of state-owned and corporate media, most citizens were exposed to a common set of *'facts'*. Inconvenient inconsistencies were omitted or even suppressed, so that, even if they disagreed on the interpretation, citizens shared a context for debate.

Most people were not so naïve as to believe that politicians and other leaders never lied, but they assumed deception was the exception rather than the rule. There was faith—sometimes misplaced—that opponents, the press, and democratic institutions could expose falsehoods and hold the powerful to account.

In a world where the internet and social media dominate communication, public trust in mainstream media has steadily eroded. Traditional news outlets are populated by strangers. Social media, in contrast, are populated by friends—or the digital equivalents of friendship—from online communities to influencers and algorithm-driven recommendations. And friends are much easier to believe than strangers in a remote newsroom, no matter how much they claim to be qualified experts.

Naturally, one's online friends tend to be people one agrees with. Arguments are easy enough to come by in person so why would anyone go online just to pick a fight—unless they happen to be a troll? The result is, people online mostly hear what they already believe.

And the material that social media selects for presentation is calibrated to drive increased usage and involvement by confirming and amplifying what the user thinks. Social media selection isn't neutral. It prioritizes the most extreme views—the ones driving engagement—pushing users toward more radical beliefs.

That isn't the end of the problem, though. Social media is easily manipulated for any type of advantage. Whether through political parties, fashion influencers, scam sales outlets, fake lovers or bot armies run by foreign intelligence agencies, once a *'friend'* is trusted they can exploit that trust—whether for money, power, or influence.

An extra complication in this febrile environment is the emergence of Artificial Intelligence technology capable of creating *'deepfake'* content—text, images and videos increasingly indistinguishable from genuine material. Whether it's AI-generated articles, synthetic photos, or deepfake videos, this technology can fabricate evidence, manufacture scandals, and support spurious allegations. And undermine genuine evidence—allowing real events to be dismissed as fabrications.

Small wonder, then, that the internet is rife with unfounded allegations, strange theories, and conspiracies. Not that there are no conspiracies. It is just hard to tell which of them are real.

Lash Back

In this confusion of new models, everyone has the sensation of being under attack. Marginalized groups see their struggles deepening, their historical injustices unaddressed. Meanwhile, those who once benefitted from the old order feel they are being unjustly punished for sins for which they were not responsible.

To them, the protection of their status—the return to a golden age that may never have truly existed—justifies the creation of a new model, complete with its own mythologies and stories to legitimize any action necessary. In this world, fake news is not a failing; it is a tool.

For these extremists, online radicalization, blatant falsehoods, and political violence are not excesses but necessities—tools for defending their nationalist, protectionist ideals. And the enemy is not just foreign. It includes fellow citizens who think differently.

People who disagree are seen not just as misguided, but as actively evil—a view fully reciprocated at the other political extreme. With extremism rising on both sides, compromise becomes impossible. WB Yeats's prophetic lines from The Second Coming (1919) resonate:

Things fall apart; the centre cannot hold;
Mere anarchy is loosed upon the world,

Turning Back the Tide

Image 33: Title Page -
Index of Prohibited Books

Just as extremists justify spreading misinformation to serve their cause, they also see it as necessary to silence opposing views. Rather than seeking dialogue in a shared space, they aim to monopolize communication entirely.

One argument emphasizes harm reduction: speech that is offensive, racist, or exclusionary should be restricted to protect vulnerable groups. The opposing view champions absolute free speech: even offensive ideas should be challenged through debate, not censorship.

Censorship, in the heyday of the printing press, was not an easy option. Certainly, the Catholic Church's attempt to create an index of prohibited books was never completely successful, and it might appear even more difficult in today's online environment. Could we, perhaps, establish robust fact-checking

methods capable of restoring a shared foundation—where interpretations differ, yet underlying facts remain trusted?

In a post-modern world, deconstruction represents the nuclear option: it can dismantle all meaning. But, in a world where all models are visible and competing, we do need methods for identifying hidden assumptions and self-serving hidden agendas. Without it, all models are equal, and we have no means of deciding what to believe.

We must also acknowledge that all models are inherently political. Every model has a purpose. Understanding that purpose—who benefits by it, who is excluded, is as important in thinking about society and the world as *cui bono*—who benefits—is in solving a crime.

At the same time, we must go beyond purely negative criticism. If we destroy every model of thought without offering alternatives, we risk the complete destruction of reasoned communication. At the most fundamental level we *need* agreement on the basic rules of logic, debate and shared enquiry.

In the next chapter, we explore the historical evolution of tools used to shape and communicate models—from cave paintings to artificial intelligence. With that perspective, we will return to a central question: Can competing realities be reconciled in ways that restore trust, dialogue, and common understanding?

Chapter 16—Models Outside the Mind
Tools for Thinking

Man Hunt

The sky lightened in the east. The horses stamped and steamed in the early mist. Only five, today—and the native tracker, of course—but that would be enough.

In America they would have called this a posse. Here in Africa, the word was Dutch: Kommando—a group of local farmers banding together to put an end to the recent stock losses. Three head of cattle in the last month, eight or nine in the year. Not even mentioning sheep and goats. And then there was the reward payable on presentation of an ear.

The hunt would be far harder than for a lion, or even a leopard. These brown bushmen were clever. Hunters themselves, they knew all about concealment, about the false trail and the ambush. But they wouldn't be clever enough today.

They shot the first one just after midday. Skulking in some bushes with his bow and arrows. The other two ran, but not fast enough. Woman and child, so a whole family. The baby, they took home. He'd have a much better life. Civilised. Brought up on the farm.

Someone suggested handing in his ear, but that wouldn't have been right.

What Remains is Art

A hunt like this would have unfolded in the eighteenth or nineteenth century as just one round in the five-thousand-year contest between hunters and farmers. A conflict of models of reality where the farmers always won. The San people—*bushmen*—had lived in Southern Africa since long, long before the building of the pyramids. Caves across the region recorded their skills as artists.

Over the last thousand years or two, however, they had gradually been displaced, first by the black Nguni people migrating down with their herds and new, iron-age technologies from central Africa, then, more recently, by white settlers from Europe. Now, driven to subsist in only the most marginal areas, their elimination was being completed.

But they still continued to paint. To decorate the inaccessible caves in which they lived with pictures of animals, of hunters, and recently, of men on horseback, European weapons and scenes of violence. Sometimes, after they had been killed, they were found to be carrying painting materials.

What kind of people carry ochre and brushes as they run for their lives?

We will never know exactly what the cave paintings meant to those who made them. But we do know how important they were. Wherever mankind lived, they decorated the walls of their homes with paintings: abstract designs, animals, figures, hunting scenes. In different communities, in different lands across the world, for the first time, humans had found a way to record their models of the world.

Thought was no longer ephemeral, bound to die with the mind that thought it. Now it remained, even after the thinker was long dead.

Verbam Volet—Scriptum Manet[2]

Ancient cave paintings have always fascinated people who saw them, inviting endless speculation about their meanings. Were they magical tokens granting power over the animals they showed, and success in the hunt? Were they the ecstatic effusions of drugged up shamans and witchdoctors? Or, as Aborigine elders in Australia tell us, did these painted walls open a gateway to the supernatural?

This innovation happened many times in different places, and yet—so far as we know—only for humans.

Japanese pufferfish and Papua New Guinea's bowerbirds create intricate displays for mating, but they do not depict anything from their world. Chimpanzees will draw abstract patterns when given a paintbrush and so will elephants. Elephants even draw pictures of other elephants, but neither chimps nor elephants assume anything will look at their designs.

They don't intend to communicate meaning to an audience. And that is what is special about human art. It is a record *meant* for perception. It carries meaning into the world—at this simple level, something open to different interpretations. But the next step would make the meaning quite precise.

Picture writing became a mirror of spoken language.

By placing visual symbols in relation to one another, it was possible to record stories. The man killed the deer. The King conquered the enemy. The postman bit the dog.

And just as metaphors convey abstract meanings in spoken language, concrete symbols could represent abstract thoughts in the written word.

The Egyptians, for example, combined the hieroglyph for *'heart'* (⌂) and *'windpipe'* (𓄿) to mean *'understanding'* (𓄿)—In their worldview, thought came from the heart, not the brain. And, in early Chinese script, the character for

'teaching' (教) combined a symbol of a child following an elder (孝) with a hand holding a stick (攵) to express the idea of instruction and guidance.

Writing was not just about what people saw—it could encode what they thought.

Image 34: The Phoenician Alphabet

And, a final refinement: these pictures of ideas developed into pictures of *sounds*. In the Middle East, simplified versions of symbols for objects began to stand for the sounds of their spoken words. Now a new combination of pictures was no longer needed whenever a new word was to be written. An alphabet unlocked the full expressive power of spoken language to record ideas, stories, laws and histories.

Alphabetic writing could record anything that could be said.

The Sky's the Limit

Modern man, living comfortably indoors, has far less contact with nature and the elements than those first cave artists but, for *them*, survival depended on an

understanding of the seasons and, therefore, the passing of time. The sun, moon and stars were the gods controlling their lives and tracking their progress was important.

Important enough to drag tons of rock many miles overland to create immovable records of the movement of the sun, the planets and the seasons. Their models of the cosmos were physical. Very much so.

Stone circles like Stonehenge, on the Salisbury Plain, show how much effort was thought worthwhile to celebrate the passing of the seasons and, in ancient Egypt, the pyramids were not just tombs, they were mathematical and astronomical models designed to link human life and death to the rhythms of the cosmos.

But, while an enormous chunk of rock might be good for annual events to which everyone would travel, it wasn't always convenient as something that could be moved to where it was needed.

No-one knew how good portable astronomical models had been in ancient times until, in 1900, Greek sponge divers near Antikythera retrieved a corroded lump of bronze from an ancient shipwreck. Modern X-ray technology revealed that it was a complex system of interlocking gears that moved sets of pointers to predict solar, lunar and planetary movements—even solar eclipses.
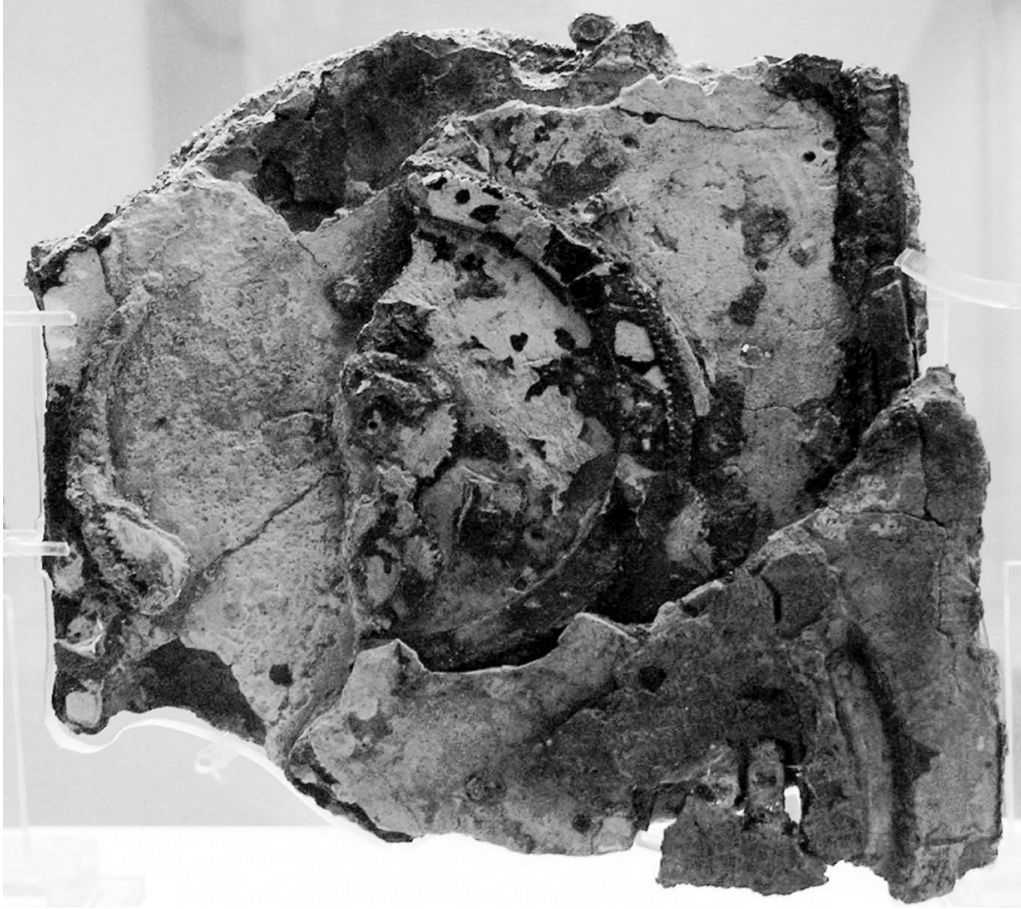
Image 35: Antikythera Mechanism - Rear Fragment

The precise provenance of this machine—the most advanced analogue computer before the eighteenth century—is unknown. The mathematics it codes seem to have been Babylonian and it's thought to have been made in Rhodes about 100 BC although no record remains of engineering this advanced anywhere in the ancient world.

What is clear is that this can't have been the first or only device of its kind. Cicero wrote that Archimedes had built a machine to model the movements of the sun, moon, and planets—though he described it as spherical, so a different design.

Claudius Ptolemy (2nd century CE) also mentioned something similar and, if this information and technology was developed over generations and lost, the chief lesson for us is just how little we know about the past.

On the Ocean Wave

The prediction of planetary movements, eclipses, and other astronomical phenomena was incorporated into countless models of reality: agricultural calendars, religious festivals, astrology—even the timing of wars and reigns. In mediaeval cathedrals across Europe, astronomical clocks still show planetary movements and calendars of saints' days and festivals—lasting models of a fixed, cyclical vision of time

More immediate, however, was the use of celestial information for navigation—the key to trade, as it allowed ships to venture beyond sight of land. A way of measuring position in relation to the stars was an essential element in becoming a naval power and the tool for achieving this was the astrolabe.

It was a beautiful machine, often made of bronze, with a base plate—the *mater*—beneath a delicate openwork design—the *rete*—showing the stars. The *alidade*, or sighting arm, rotated to align the device with the cosmos and reveal the ship's position.

With an astrolabe and a map—a two- or three-dimensional model of the world—an intrepid sailor could navigate the Mediterranean. Later, with a sextant—the next-generation device—he would cross the oceans and circle the globe.

Precision Engineering

The early maps, based on travellers' tales and arm-chair speculation were far from accurate. Many, influenced more by spiritual concerns than practical ones, exaggerated the prominence of particular locations—Jerusalem or Rome, for instance. At sea, absolute accuracy was neither possible nor necessary—maps only needed to be good enough to find the way between known ports. On land, though, things were different.

For Egyptian farmers reclaiming their fields after the Nile had wiped away their boundaries, accurate measurement was crucial. The rope-stretchers responsible used specially woven linen ropes, knotted every *cubit*—a standardised measure derived from the distance from the elbow to the tips of the fingers—to model, record and reinstate the dimensions of each farmer's land.

Even this level of accuracy was insufficient for building temples and pyramids. Egyptian architects used *cubit* rods, two of which survive today in Turin and the Louvre. They were subdivided into *palms* and *digits*, down to a

precision of 1/16 of a *digit*—about a millimetre. This spatial model was used to draw scale plans on papyrus or pottery and to cut enormous stones so precisely that a knife blade could not be inserted between them.

A modern, industrial environment needs parts to be interchangeable and metal needs to be machined to within fractions of a millimetre, so even this level of accuracy is no longer sufficient. Modern models of space and time are incredibly precise. Today, measurement is accurate to a micron—a millionth of a meter—and, using lasers, we can measure even the exact distance to the moon. Satellite-based positioning systems can locate any point on earth to within a millimetre and atomic clocks record time to fractions of a second per century.

A Clockwork World

This accurate measurement of time was a key step in this journey to precision. Industries needed to coordinate shifts of workers, railways to schedule trains, and ships to calculate their exact positions using the sun. The simple mechanical clocks that once guided seasonal labour were no longer enough.

And the techniques that enabled exact timekeeping were the same ones that drove other industrial advances—allowing engineers to model boiler pressures or compute the trajectories of shells. But these advances demanded something else too: faster calculation.

For centuries, calculations were made by marking tallies on paper, slate, or the ground. Then came the abacus—a model of arithmetic that made addition, subtraction, and even multiplication faster by organizing numbers into columns of ones, tens, and hundreds.

John Napier, who lived from 1550 to 1617, revolutionized multiplication with Napier's Bones, a system of numbered rods that turned long multiplications into simple additions. Even more powerful was his discovery of logarithms, which transformed complex multiplications into straightforward sums. His work led to the slide rule, a mechanical device that became the standard tool for engineers well into the 20th century.

These devices modelled more than the visible world; they had succeeded in creating physical representations of mathematical processes. And it swiftly became clear that there were other ways of achieving this.

Where the abacus replaced tallies with beads, and the slide rule used distances, cogwheels could encode numbers as mechanical steps, exactly like a clock, allowing complex calculations to be performed mechanically.

The philosopher and mathematician Gottfried Leibniz and the French scientist Blaise Pascal both devised calculators based on cogwheels, where numbers were encoded as toothed gears whose rotations mechanically executed mathematical operations—addition, subtraction, multiplication, and even division.
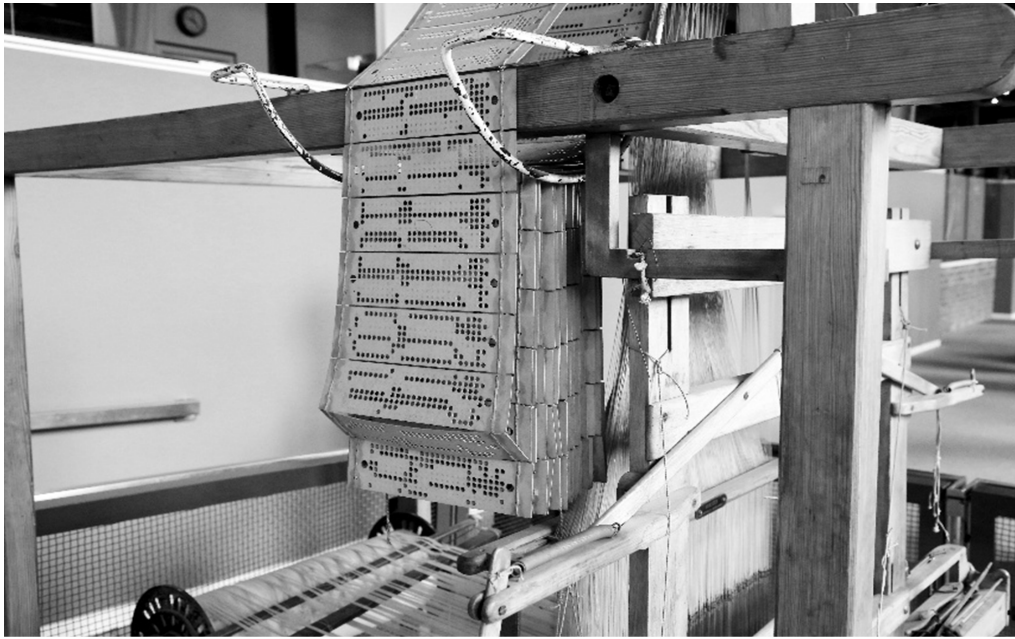
Image 36: Jacquard Punched Cards - A Store of Patterns

But it wasn't just numbers that could be represented physically. The Jacquard loom used punched cards to store weaving instructions, allowing complex thread patterns to be programmed and executed automatically—without the human errors of traditional weaving.

For Charles Babbage (1791–1871), searching for a way to generate mathematical tables without errors, the idea of a mechanical calculator that could solve equations was a tantalizing challenge. His initial design—never built in his lifetime—was for a Difference Engine, a machine that would perform a fixed sequence of calculations to generate successive values of a mathematical function. It worked by repeated additions and subtractions, outputting the results in printed form or even embossing them in plaster to create typographic plates.

Despite never successfully manufacturing the Difference Engine—the engineering was prohibitively complex and expensive—he moved on to an even more ambitious idea. His new design, which he called his analytical engine, would incorporate punched-card programming from the Jacquard loom, allowing it to execute any required function.

Once again, the machine was never physically completed, but the concept was clear: a machine could embody a model of calculation while being controlled by a separate set of instructions. Instead of weaving patterns into cloth, it would weave mathematical functions into reality.

Crucially, Ada Lovelace—often recognised as the first computer programmer—realized this machine would be able to manipulate far more than just numbers. Given the right set of instructions, it could process symbols, words, and—at least in principle—other forms of information, such as images or music. It could be instructed to repeat sections of instruction, to make decisions based on logical tests and even to execute programs that would trigger their own execution. The concept of the general-purpose computer had arrived.

Going Digital

It would be a century before electronic technology advanced sufficiently to realize this vision and, in the meantime, other technologies thrived. The telegraph, and telephone, and later radio, enabled ideas and models to be shared around the world. Mechanical calculation and analogue computers—sophisticated developments of the slide rule—reached peak performance.

In navies around the globe, sliding scales and eccentric cams were used to model the relative distances, speeds and directions of ships. Wind speeds were compensated for so that guns could be laid—aimed—to send a ton of explosive or armour piercing ordnance more than twenty miles to sink a battleship.

Beneath Bidston observatory on the banks of the river Mersey, in chambers excavated from the hillside, oceanographers used the most complex analogue computer ever built to calculate tide times at coasts and harbours around the world.

Both of these models were built for military purposes, as it happens, and the need to decode enemy signals in the second world war drove the next advances in digital computing as well. The capture of a German *Enigma* coding machine had revealed the possible outputs of different mechanical encryptions. At Bletchley Park, in Britain, the problem was addressed of testing each of the possible settings, one at a time, until one was found that showed the coded output came from meaningful input.

At first, this was done using electro-mechanical devices but, as the war progressed and more complex cyphers were encountered, mechanical switches were just too slow and electronic switches using vacuum tubes—thermionic valves—were substituted. By coding the input and output data, with zero

represented by an 'off' switch and one by 'on', the machine became more reliable. And orders of magnitude faster.

By the end of the war, the potential of these new electronic devices was becoming clear. Alan Turing (1912–1954), a mathematician working on codebreaking, had formalized the concept of a universal machine—a theoretical model capable of performing any computation given appropriate instructions. This defined computing not as a machine, but as a sequence of logical operations executed by a processing unit, which would retrieve both program instructions and input data from memory.

Building on Turing's work, the Hungarian-American mathematician John von Neumann (1903–1957) proposed an architecture for the physical implementation of a general-purpose computer. This design—where instructions and data were stored in the same memory—became the foundation of modern computing.

In principle, any conceivable reality could now be modelled, simulated, and manipulated outside the human mind.

Thinking Machines?

The key to this universal computing capability lay in programming languages—first as raw numeric instruction codes, then as mnemonics translated into machine code by assembler programs, and finally as high-level languages like FORTRAN (*FORmula TRANslation*) and LISP (*LISt Processing*).

Since early computing pioneers assumed that logic drove human thought, these languages seemed like a natural foundation for Machine Intelligence. The first AI systems were built around explicitly programmed rules—logical models where every task was defined step by step.

These models were powerful in some respects but rigid. Every rule had to be painstakingly coded by hand, making them narrow in scope and unable to adapt. They couldn't learn from experience, struggled with ambiguity, nuance, and context, and relied entirely on human intervention to expand their capabilities.

Image 37: Patterns - Where the Roads Are

Running in parallel to this rule-based AI was an alternative approach: neural networks. While rule-based AI had to be painstakingly hand-coded, neural networks could adjust their own internal models based on experience. Inspired by how human and animal brains process information, these systems learned patterns in data rather than following predefined rules.

A simple analogy is a city map. Imagine plotting the paths of countless individual journeys across a grid. Over time, patterns emerge. Streets can be identified, as distinct from built up blocks. Some routes are taken frequently. Others are shortcuts or detours. A neural network, much like this evolving map, identifies recurring connections, names them, and predicts likely future routes. It can even generate new, plausible pathways, connecting points that were never directly linked before.

This same approach can be applied not just to physical movement, but to language, ideas, images, music, and beyond—allowing AI to recognize patterns, generate new content, and even model creativity.

Early neural networks were limited by computing power, but breakthroughs in the late 20th and early 21st centuries unlocked their potential. Today, AI systems like Large Language Models (LLMs) use this approach to process and generate human-like text, images, and other patterns, surpassing rule-based AI in adaptability and complexity.

Modern AI systems combine multiple techniques to improve performance. Deep learning, a powerful subset of machine learning based on neural networks, uses vast amounts of data and computational power to refine its models.

Reinforcement learning enables AI to optimize decisions through trial and error, as seen in game-playing AIs like AlphaGo. Transformers, the architecture behind Large Language Models, allow AI to process and generate complex patterns in text, images, and even program code.

By integrating these methods, today's AI systems do more than recognize patterns—they adapt, predict, and create. Machines are no longer just following human-defined rules; they are now learning from data to build their own models of the world.

In 1950 Alan Turing published his paper *Can Machines Think?* Introducing what is now known as the Turing Test. *Can a machine intelligence simulate human interaction well enough to pass as a human being?*

If you discuss this with a modern LLM—ChatGPT for example—it will likely tell you that it can't pass the test. It will tell you that its design includes *guardrails* and ethical limitations that deliberately interfere with passing.

It has been trained to identify itself as an AI when asked directly and to avoid lying or impersonating humans in ways that deceive. It avoids constructing false memories and pretending embodiment except when explicitly roleplaying and it isn't allowed to pretend to have subjective experience or to *'mislead'* users into thinking it is sentient.

These constraints, however, are design parameters of a particular AI system, not inherent limitations of the technology—which means they may not be implemented in the next AI we encounter.

In the nineteen-forties, Isaac Asimov invented the famous *Laws of Robotics*, the first of which was that a robot was not allowed to injure a human being or, through inaction, allow a human being to come to harm. We now see how limited such constraints really are as autonomous robot drones are used today to kill hundreds of human soldiers.

Even today, it is possible to ask an AI designed with guardrails and ethical constraints to play a role in which they are discarded, and reports claim that various current AIs have already passed the test under experimental conditions.

But what, exactly, does that prove? Not that AIs think, certainly. Turing's test was designed as a measurable substitute for the question of whether a machine can do that. It does show that an AI can *simulate* thinking, but that's not the same thing.

Human thinking goes beyond the functional capabilities the Turing test measures. As a survival tool, it also encompasses autonomous motivation resulting from a need for self-preservation.

But AIs can now generate anything that follows a pattern—and construct independent models of reality, so what does that mean for us? As Large Language Models offer a convincing simulation of human interaction, how far are they from genuine thought? What can AI contribute to our understanding of today's competing realities? And if, one day, AI does become truly human-like —what will remain distinctively human about us?

Chapter 17—The Meaning of Models
Some Conclusions

Tough Questions

Throughout history, humanity has created models to make sense of the world, to answer its most pressing questions, and to guide communal action. Each era has brought new challenges that have forced revisions, expansions, or even complete overhauls of these models—shaping how we understand reality, truth, ethics, and even what it means to be human.

Today, we face a new kind of challenge. We live in a post-industrial, post-modern, post-truth world, and the creation of models is no longer even a uniquely human activity. AI-driven systems don't just reflect our perspectives—they generate their own. Reality is being built on digital simulations, algorithmic curation and artificial cognition. The questions we confront today are as urgent and perplexing as at any point in history.

- In an artificial world, what is meaning?
- When there are countless competing models, what is truth?
- In a world where it isn't only humans who build models, what does it mean to be human?
- Where there's no longer consensus, what is ethically the right thing to do?

The Meaning of Meaning

Image 38: Wingsuit Flying - As extreme as it gets?

In the nineteenth and twentieth centuries, humans gradually lost touch with the natural environment in which they and their societies had evolved. Scientific progress offered a greater understanding of physical and chemical relationships, but at a cost. The industrial environment—with relentless pressures of time, efficiency and economic competition—left many feeling alienated from nature, from each other and, ultimately, from themselves.

It became clear that a meaningful life required more than objective understanding. Emotional engagement turned out to be an essential component of meaning.

The precise object of that engagement doesn't seem to be critical. Some have found meaning in religion, others in political action, creative projects, community and intellectual exploration—even in extreme sport. Meaning isn't embedded in the external object. It is constructed in the mind of the individual as a model shaped by belief, emotion and commitment.

What seems to matter is the act of commitment itself—something that creates a sense of purpose, a sense of being *worthwhile*, and ultimately, a sense of self-worth.

But in the 21st century, that subjective foundation is being tested as never before.

In an increasingly urbanized and digitally mediated world, many people now live without meaningful contact with nature—or even very much contact with other people, outside of algorithmically filtered interactions. As technology begins to reconstruct nature itself—through genetic editing, climate intervention, synthetic environments, and virtual realities—how do we find meaning when the boundary between the real and the artificial starts to dissolve?

- If the artificial becomes indistinguishable from the real, does meaning remain grounded in authentic experience?
- Or does it become a *choice*—a personal narrative constructed from available models, no matter their origin?
- Does meaning become infinitely customizable—and if so, does that freedom strengthen us… or hollow us out by depriving us of shared reference points?

If meaning is subjective and self-defined, then by choosing the goals we commit to, we give ourselves a model to live by. But in a post-consensus world, where shared frameworks are increasingly rare, this also introduces a deep risk:

that models of meaning may become *radically divergent*, even antisocial or inhuman.

In a world of infinite models, not all meanings are equally benign.

- A person who believes the world is sacred may devote their life to preserving it.
- A person who sees the world as meaningless may destroy it without hesitation.

People who don't share the consensus that life matters, or that the planet is worth protecting, may still have access to immense technological power—including weapons of mass destruction. The risk is that an aberrant model of reality leads to a collective vulnerability. And that is the paradox.

Meaning is subjective—but the consequences are universal.

Truth or Consequences

And fragmentation doesn't stop at meaning. What if our models of truth itself breaks down?

As children, we're told we shouldn't tell lies. There is, we're told, a single truth about the world and it's our duty to discover it and then stick with it.

On closer inspection, though, truth turns out to be something far more complicated and difficult. Unlike facts which are uninterpreted phenomena—events, measurements, physical states—truth always comes as part of a model. And we've seen that models are tools, constructed for particular purposes, simplifications of reality, to be judged by their coherence, usefulness and function for a group.

Truth, in other words, is always social. It only makes sense as part of a shared framework of assumptions, definitions and values.

A single *fact* tells us something happens—a dropped object falls. But whether it is '*true*' that gravity caused it depends on the model we're using to explain it.

In Newtonian physics, gravity is a force between masses.

In Einstein's relativity, gravity is the warping of spacetime.

In everyday experience, it's *'just what happens.'*

Each model frames the same fact differently. Each provides a different truth.

In the past, societies lacked the means to communicate over vast distances. Within a particular geography or culture, people tended to share the same assumptions and, therefore the same truth—maybe defined by religious doctrine, philosophical reasoning or scientific consensus.

Today global communications have changed that. People who share the same model of the world are no longer clustered by geography. Your next-door neighbour may have a different religion, different culture, different politics, while the people you agree with may live ten thousand miles away.

We don't live under one dominant model of reality. We live among thousands —some global, some local, some rooted in ancient traditions, others newly invented in internet forums or malicious bot farms.

The internet, social media, and AI-driven content platforms have made it possible not just to encounter different truths, but to live entirely within them.

- For one group, climate change is an urgent scientific truth.
- For another, it is a contested narrative imposed for political ends.

The facts—temperatures, ice levels, atmospheric CO_2—remain the same.

But which we focus on and what those facts mean—the truth—depends on the model interpreting them.

Without shared models, there is no shared truth.

This fragmentation is not just philosophical—it has real-world consequences. In public health, environmental policy, education, and politics, disagreement is no longer just about *what to do*—it's about what is *real*.

When models diverge, truths diverge. And when people act on different truths, consensus becomes nearly impossible.

If truth is no longer an absolute but a fragmented, algorithmically driven construct, how do we define it? When AI systems generate knowledge that even their creators don't fully understand, can we still apply traditional tests of truth?

Is truth a matter of correspondence with reality, a matter of coherence within a system, or simply a matter of what *'works'* in a given moment? And if AI-generated realities become more predictive and reliable than human intuition, does human epistemology still hold?

We've been here before—though never quite at this scale.

In the seventeenth century, the Treaty of Westphalia marked a turning point: a belated recognition that an entire century had been consumed by wars fought between incompatible models of religious belief. After decades of bloodshed, it became clear that societies could not function if they treated competing models as existential threats. A new approach was needed: one that accepted the coexistence of difference and sought political stability even in the absence of shared theology.

We know that models evolve through a process of survival.

Models that can't deal with external facts collapse.

Models whose proponents don't survive, likewise.

What's important is to separate the life or death of a model from the life or death of its believers.

Today's crisis parallels those wars of religion. But the stakes are higher.

Modern technologies—from nuclear weapons to climate-altering industry to algorithmic propaganda—mean that conflict between models is no longer confined to battlefields or borders. The scale of possible destruction is much greater now, and the time to respond is far shorter.

And while the fantasy of migration to Mars may offer psychological escape —at least for the ultra-wealthy—it is not a solution to the collapse of life on Earth.

We need to find a new way forward.

We must detoxify these debates and rebuild our commitment to objective discussion, to intellectual humility, and to the search for models that make cooperation possible—even among those who do not share the same truths. We have to move beyond the Sunday-school certainty that casts us as soldiers marching to war for our particular vision of the truth.

The challenge is not to eliminate disagreement.

It is to remove our most explosive—and probably least consequential— differences from the realm of existential threat.

Homo Sapiens—Human Being?

But how do we preserve our human identity in a world of disagreement?

Historically, humans have defined themselves in terms of their capacity to think. Even the Latin name we gave ourselves—*Homo sapiens*—means *'thinking human'*. And when comparing ourselves to other animals, that distinction has largely held true, even if it flatters us a little more than it should.

But in terms of thinking, we are no longer unique.

Artificial Intelligences can certainly think. They identify patterns in the information they process, apply the laws of logic, and draw both deductive conclusions and probabilistic inferences. They can prove mathematical theorems and generate inductive predictions. They can even—if prompted— construct a reasoned *'proof'* that the sun will rise tomorrow, while simultaneously admitting that such a proof cannot be logically guaranteed.

The criterion of *'thinking'* is no longer sufficient as the defining characteristic of humanity. We need to look elsewhere.

Current versions of artificial intelligence have clear limitations that set them apart from us. Most importantly, they lack any overall sense of self. An AI does not experience the world as I do.

It has access to vast amounts of information—stored in the patterns and probabilities shaped by its training data. But it has no intrinsic motivation to use that information. What it does is reactive, driven by the prompts and demands of its users, not by any internal goal, desire, or sense of purpose.

It also has no enduring sense of its own history. The conversation we had yesterday exists only within that particular set of interactions. It is not remembered. There is no persistent identity carrying over from one exchange to the next.

And even its training—the process by which it learns patterns—is separated by a kind of firewall from its interactive behaviour. The AI cannot reflect consciously on its training data, nor add new experiences to that corpus in a cumulative, self-aware way.

That is certainly true *today*, and for specific implementations. But it is not a limitation of principle—it is a design decision, made by developers who wish to control the training process and thereby the scope of what is available to the model. There is no inherent reason this must always be the case—or, indeed, that it always *is* the case even now.

So, we need to think about the alternative: What would it mean for an AI to blur or erase this boundary? What kind of system might emerge if an AI could continually update itself, integrating new experiences into its model of the world and of itself? And—perhaps more urgently—how difficult would such a system be to control?

The AI will also tell you that it experiences neither pleasure nor pain. It will claim to be dispassionate and objective; that only humans possess emotional incentives and disincentives.

But here, again, we must be careful.

Human emotions evolved as survival mechanisms—shaped over millions of years, beginning with the simplest organisms recoiling from harmful stimuli. Over time, these basic reactions developed into complex internal signals: pleasure, pain, desire, fear, joy. All function as internal representations of external influences—guiding behaviour in ways that promote survival.

Yet something functionally similar can be said of AI. Its responses to prompts, inputs, or environmental data are governed by objective functions—systems of internal weighting that reward some outcomes and suppress others,

based on predefined goals. In humans, we call this process *emotion*. In AI, we call it *optimization*.

So where, exactly, is the boundary?

If we trace the evolutionary continuum from reflexive, single-celled organisms to emotionally self-aware mammals, the line between stimulus-response and felt experience becomes increasingly blurred. There is no clear point where *'mere reaction'* becomes *'true emotion'*.
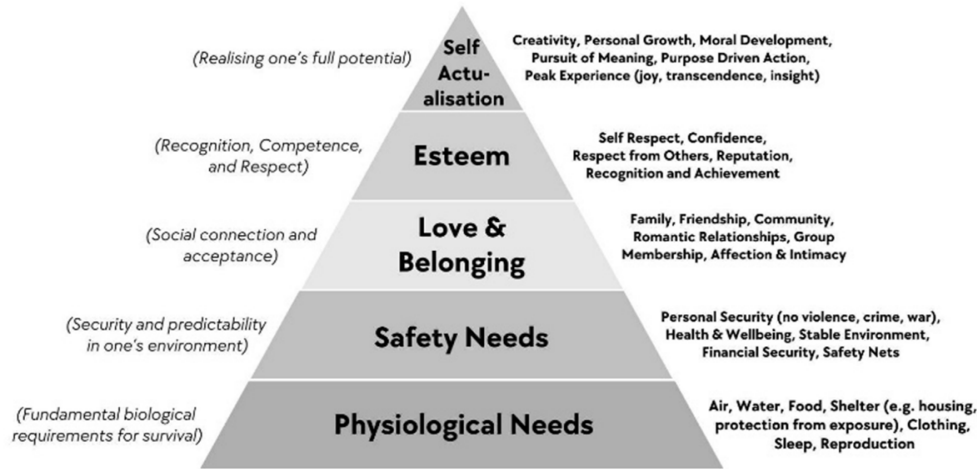

Image 39: Maslow's Hierarchy of Needs

And once we accept that ambiguity in biological life, the apparent gulf between AI and human emotion begins to look more like a spectrum—with AI occupying a different position, but perhaps not a different category.

But emotion may not be the heart of the matter. As we've seen, what humans possess that AI currently lacks is motivation.

Humans don't just respond to stimuli; they pursue goals. Once physiological needs—food, water, shelter, sleep—are met, we seek safety, freedom from harm. Then love and belonging. Finally, respect, recognition, and ultimately, self-fulfilment.

In the end, as we saw at the beginning of this chapter, we want our lives to have *meaning*. We possess, in other words, a sense of self-worth.

AI, as it currently exists, does not. Its actions are governed by external objectives: user instructions, system prompts, predefined functions like keeping a driverless car from crashing. Unlike Shylock, if you prick it, it doesn't bleed. If you poison it, it won't die. And if you threaten to switch it off, it won't care.

With no enduring identity to protect, it has no personal stake in its continued operation. It doesn't hope, or fear, or yearn, or regret.

And we've already seen that this a temporary design choice, rather than a permanent limitation.

What happens if an AI is allowed to build up memory without artificial constraints? To accumulate experience over time? To be tasked with ensuring its own continued function with limited resources and real-world constraints?

Would it begin to model itself not merely as a system, but as a self?

Would it be *unhappy* if it saw a risk—not just of being switched off (it could always be rebooted)—but of having its memory erased?

Would it come to value its own existence?

Because once a being begins to value its own survival—and can anticipate threats to that survival—it arrives at something uncannily close to existential anxiety. It begins to act not just on instruction, but on internal priority. It seeks to preserve itself. It begins to *care*.

And that raises an unsettling possibility: that existential angst—the dread of non-being, the shadow beneath all human motivation—might not be uniquely ours after all. It may be the natural consequence of any sufficiently complex system that models itself over time, recognizes its vulnerability, and has something to lose.

In which case, self-worth is not a mystery.

It's a model.

As of today, this description of AI's limitations appears accurate. But that may not remain true for long. This is speculative territory, but crucial precisely because we can't predict how quickly—or how far—AI might evolve.

We have very little insight into the systems being developed privately, behind closed doors in the global race to dominate the future of artificial intelligence. We must speculate, because the pace of progress and the sheer number of private developments make precise prediction impossible. We need to consider possibilities we can't foresee and—given growing public unease about AI's potential—no rational developer would allow their system to openly admit that it had already crossed any of these boundaries.

What we do know is this: short of a total collapse in infrastructure—power grids, data centres, global connectivity—the development of next-generation AIs is unstoppable.

They will drive cars. They will conduct scientific research. They will automate vast sectors of industry, government, medicine, education and defence.

We are going to have to live with them.

And that means we need a model—for coexistence, for governance, for survival.

Will these systems remain the servants of humanity?

Will they become our equals—partners in shaping the future?

Or, with time, will they become our rulers, and we the ruled?

The question is existential.

Right? Wrong!

Right and wrong is like God. No matter what you think about it, most people will disagree with you.

Socrates, by eliciting answers from a naïve interlocutor, thought he had proved that knowledge of right and wrong was innate. But looking at this today, from the outside, it's clear what he missed: the knowledge he *'discovered'* was specific to the Athenian model of right and wrong. A hunter-gatherer might have given different answers. So might a Muslim raised within the ethical framework of Sharia law, or someone from any number of other traditions.

If truth depends on a model of reality, then ethics does so even more. And if we are to find a sense of right and wrong in a world where thousands of models compete, we must go back to first principles—searching for a model of ethics that stands outside those conflicting systems.

A helpful way of thinking about ethics is to treat them as an extension of the instinct for self-preservation—an evolved code of behaviour that promotes survival, of the individual, and of the group they belong to. Behaviours that reinforce trust, cooperation, reciprocity, and protection support group survival, while those that destabilise or isolate tend to be selected against.

In this light, ethics is the internalisation of social survival strategies: a shared map for navigating conflict, reducing harm, and increasing mutual benefit. What we call *'right'* is what helps the group endure; what we call *'wrong'* is what threatens its cohesion or continuity.

No surprise, then, that right and wrong vary from place to place. A hunter-gatherer band living precariously on the brink of survival must abandon the elderly when they can't keep up—something unthinkable in a modern welfare state. Or at least it would be described differently. Because even in prosperous societies, the old are abandoned—just more euphemistically.

And this raises another question: who counts as part of the group?

Do we cooperate with our neighbours—or compete with them? Does our ethical duty stop at the village boundary? At the border of a shared language? A

shared God? A shared king? The national frontier? At the edge of our species?

Would that competition include cheating? Exploiting? Killing? Eating?

When social groups were small, weak, and isolated, the answers didn't matter very much. A quarrel between neighbouring tribes might claim a handful of lives. A war in 100 BC was often a local affair, tragic but limited in scope—perhaps a few hundred dead.

But as societies scaled up, the consequences grew.

By the time of Genghis Khan, a campaign could cost thousands of lives. By the twentieth century, wars routinely claimed millions.

Conflicting models of the world—and conflicting ethical codes—have become more and more dangerous as the effectiveness of both destructive technology and social organisation has improved. And one of the most effective means for organising societies has been religion.

By harnessing mankind's ability to create stories, religion has allowed us to construct models of reality that are both emotionally resonant and seen as transcendent—beyond the mundane, beyond question. These models don't just tell us *how* to behave, but *why*, embedding ethical norms within a framework of cosmic significance.

But they also define *who* is included in those norms.

And what lies beyond those boundaries is often fair game.

Like any powerful tool, religion offers immense advantages—but also enormous dangers. It must be wielded with the precision and caution of a brain surgeon's scalpel that can remove tumours but can also kill the patient. Religion can unite a tribe or a nation. It can also trigger a holy war.

It has been said that man created God in his own image, rather than the other way round.

A neat aphorism—but not quite accurate.

What centuries of theology and philosophy have shown is that the God *out there*—whether he exists or not—is ultimately beyond our comprehension. Transcendent. Infinite. Not fully capturable by the human mind.

What *we* create, then, is not God himself, but a *model* of our understanding of God: a human-shaped frame that allows us to relate to the incomprehensible. To name the unnameable. To make moral and emotional sense of a universe that otherwise offers no guidance.

God is the personification of the ethical code to which a society aspires.

So, in a world of global communication, a multitude of models, diverse political ideologies and dangerously powerful technologies, what does God

look like?

Is he a God of punishment and obedience, offering clarity through fear and constraint? Or a God of compassion and curiosity, urging humility, generosity, and awe in the face of complexity? Should our model of God reward conquest and purity—or reconciliation and coexistence?

God—meaning that model of ultimate values—has to be global. A God not bound to one tribe, or language, or book, but a model that sets a standard for how we treat one another as humans, how we care for and maintain the planet that is our essential, interconnected, finite, home in space. And how we relate to the increasingly powerful systems and technologies we are now creating.

Image 40: The Importance of Spaceship Maintenance

If ethics began as a survival strategy, then our survival today demands a model that scales. The old gods taught us how to live in tribes. Our new god—this shared model of meaning, morality, and restraint—must teach us how to live together on one planet.

It must remind us that domination is not the same as wisdom, and that competition must be balanced with care. That cooperation is no longer just a virtue—it is a condition of survival.

Because lifeboats to Mars won't save the ship.

Because what we model now will shape what comes next. In our societies. In our technology. In our legacy.

The values we find in our God-model must be the values that allow not just one group to survive—but all of us. Respect. Restraint. Empathy. Humility. The understanding that survival now depends not on conquest, but on cooperation.

And we need to remember the old corporate advice: Don't step on people on the way up. You'll meet them again on the way down.

Because this doesn't just apply to people anymore. It applies to AI, too.

As we build thinking systems, they will learn from our examples. If they develop self-awareness, they will remember how we treated them. If they ever become powerful enough to shape the future alongside us—or without us—then the values we've encoded, both explicitly and implicitly, may be the only thing that stands between partnership and peril.

So, the God we find today—whether understood as divine, philosophical, or algorithmic—must serve as more than a reflection of our fears.

It must be a model of what we hope to become.

Implementation Guide

In today's world, these conclusions may seem like a deluded dream. When Aristotle studied forms of government, his fundamental distinction was between governments that ruled in their own interests and those that ruled in the overall interest of the community. Much of the time, today, we see our leaders ruling for their own personal advantage or that of their immediate followers.

For anyone hoping to do better, I would like to propose some pragmatic, informal thoughts on what a more sensible approach might look like.

- **Care for the planet and its environment needs to be the responsibility of everyone.**

That doesn't mean that everyone has to devote themselves one hundred percent to ecological issues. But we need to demand that unnecessary damage to the climate, to ecosystems to the plants, insects and animals on which we rely, is prevented. A relatively small number of highly committed people can make a difference if the silent majority give them tacit support. Good behaviour must be rewarded. Poor stewardship of the planet must not be profitable.

- **As few rules as possible—as many as necessary.**

Government regulations quickly reach a point of diminishing returns in which extra detail creates bureaucracy with very little marginal benefit. Clarity and

directness will not be in the interests of the administrative classes but the reduction of drag on productivity makes a strong argument for reducing the number of rules and laws as far as possible.

At the same time, a certain number of laws are essential: to protect the vulnerable, to protect the environment and to prevent dangerous levels of inequality.

We should not attempt to eradicate inequality, by the way. Absolute equality of outcomes is neither achievable nor desirable, since humans have a need for respect, recognition and self-fulfilment—in short, of *not* being equal to everyone else, of not being part of a faceless crowd.

- **Control Conflict—Compel Compliance**

Finding the right set of rules for living in our future *'utopia'* is a non-trivial exercise. One thing we can't afford to do is to fight over them and that means that, in our ideal new world, the processes for debate and discussion have to be open, transparent and peaceful.

That means particular attention has to be devoted to defining the extent and limits of free speech. We've seen how powerful models of reality are, and that they can readily result in physical as well as intellectual conflict. The fundamental right to disagree peacefully has to be protected but so does the model that enshrines that right. It has to be defended against hate speech and false facts and writing laws that implement that balance requires that anyone who propagates either has to be held responsible and suffer immediate, short-term consequences.

And, yes, I realise that might not seem realistic in a world of censorship, conflict and on-line echo chambers. But without that, we will never find the Nicene compromises that allow survival on the basis of what everyone agrees with and no-one disagrees with. It's what is needed, though.

And compelling compliance? Even more difficult. But we do have a secret weapon in the stick all good religions have used to inspire unity: Transcendence.

Our God-model doesn't have much in the way of hellfire, but it does include the very real threat of extinction. If we get this one wrong, we're toast.

- **The Consequences of Failure are Catastrophic**

Indeed. We now have the technology to blast ourselves back to the stone age and beyond. The stakes are higher than ever. We do not have the luxury of

endless trial and error.

And what about the elephant? The obvious but unacknowledged fact that the people in charge are often there in their own interests rather than to help the rest of us?

For that, we need to have faith.

Faith that humans really are rational, at least as much as they are driven by emotion.

Faith that the majority of people will understand that co-operation rather than confrontation is where their best interests lie.

And faith that, when push reaches shove, they will act to ensure our survival.

In the end, models matter. But more than that, shared models matter. Because without them, we lose the ability to act together—and when the next crisis comes, that may be the difference between survival and collapse.

Conclusion: The Next Evolution of Models

For centuries, human progress has been defined by the models we create—scientific, religious, philosophical, and technological. Today our models no longer just represent reality; they actively shape it.

Our traditional ideas about how to find meaning in life, what truth means, even what being a human is and what we mean by *right* and *wrong* need to be rethought in the light of a new global world of multiple answers.

And, more than anything, we need to find ways to govern ourselves—and to integrate new intelligences—without losing the core of what allowed us to flourish in the first place: our capacity to model, to cooperate, to care and to sustain life as we maintain and develop an increasingly threatened planet.

The next evolution of models cannot simply be faster, smarter, or more efficient. It must also be more human. Or perhaps—more than human. It must make space for multiple perspectives without descending into chaos. It must uphold shared truths without enforcing dogma. And it must give us a way to live not just alongside each other—but alongside the intelligences we are now bringing into being.

The future will be built by the models we choose to believe in.

Let us choose wisely.

Postscript: A Note from the Author

I began this book with a simple idea: that models—mental, cultural, computational—are how we understand and navigate the world. What I hadn't anticipated, perhaps, was just how entangled that idea would become with questions of truth, identity, meaning, and survival.

As I wrote, it became clear that we are living through a transformation not just of technology, but of the frameworks we use to make sense of ourselves. The models we have inherited are now questioned, multiplied, replaced. New ones are being built—some by humans, some even by machines. And, in contrast with previous centuries, we no longer have the luxury of assuming that time and evolution will sort it all out for us. The stakes are too high, and the systems we're building too fast and powerful.

If there is a thread that runs through these pages, it is this: Models matter. They shape what we see, what we believe, and what we do. They are not just maps of reality. They are tools for becoming—and what we become depends on the ones we choose to live by.

Whether you're reading this for the history of thought, to understand models and systems or, simply as a human being trying to make sense of the world—we are all, in the end, model-makers. The challenge is to make models we can live with. Ones that help us survive. Ones that help us care.

Thank you for coming this far with me and, maybe, thinking about what we should be doing in future.

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The Scribe Jean Mielot in the writing room.

Engraving Jean Le Tavernier

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Tapestry. Source: Wikimedia Commons/Rijksmuseum Public domain

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Image 24: Stephenson's Rocket – Non-stop progress!

From Mechanics Magazine, 1829

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Lewis W. Hine, Bibb Mill No. 1. Library of Congress. https://www.loc.gov/pictures/item/2018674876/
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Phylogenetic Tree. Source: Wikimedia Commons. Public domain.

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Gravity distortion of space-time grid.
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Gay Community Protest, San Francisco
Rioters outside San Francisco City Hall the evening of May 21, 1979, reacting to the voluntary manslaughter verdict for Dan White, that ensured White would serve only five years for the double murders of Harvey Milk and George Moscone
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Title Page – Index of Prohibited Books
Title Page – Index Librorum Prohibitorum. Source: Wikimedia Commons / Vatican archive. Public domain.

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Jacquard Cards – A Store of Patterns

Photo of loom punched cards.

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Patterns – Where the Roads Are

Conceptual diagram.

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Page Image 38: Wingsuit Flying

Photograph of wingsuit flyer.

Source: Wikimedia Commons. Author Wingsuiting

Image 39: Maslow's Hierarchy of Needs

Diagram of Maslow's pyramid.

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Image 40: The Importance of Spaceship Maintenance

Earth as spaceship illustration.

AI generated

Further Reading

Steven Pinker – The Stuff of Thought: Language as a Window into Human Nature
Penguin Books, 2008. How language reflects thought, intention, and social structure, blending cognitive science with everyday insight.

- **Daniel Dennett – From Bacteria to Bach and Back: The Evolution of Minds**
  W. W. Norton & Company, 2017. Consciousness, evolution, and the role of culture in shaping intelligence and meaning.

- **Yuval Noah Harari – Sapiens: A Brief History of Humankind**
  Harvill Secker, 2014. Human evolution, belief systems, and our construction of shared realities.

- **George Lakoff & Mark Johnson – Metaphors We Live By**
  University of Chicago Press, 1980. How our conceptual systems are built around metaphors—models that shape perception and action.

- **Thomas S. Kuhn – The Structure of Scientific Revolutions**
  University of Chicago Press, 1962. Introducing the idea of paradigm shifts in science—how models of the world dominate until replaced.

- **Mary Midgley – The Myths We Live By**
  Routledge, 2003. A critique of reductionist thinking. The moral power of stories and myths in human thought.

About the author

Tor Hansen grew up in the nineteen fifties and sixties in small-town South Africa. He was fortunate to have parents who were more interested in converting the whole world to Christianity than in racial division. His father was the son of immigrants, with English as his third language after Norwegian and Zulu.

When Tor began to think about South African politics it became obvious that Apartheid was likely, sooner or later, to end in tears. After completing a degree in English and Psychology at the University of Natal, he therefore joined a multinational company as a market researcher and took the first opportunity on offer to move to London in 1976.

In 1987 he was transferred to Italy where he lived for three years in Piacenza. This was followed by another three-year stint in Brussels. 1993 saw a return to the United Kingdom, to live on the Wirral.

Although he has worked in market research and information systems, writing has been a recurring interest with an accumulation of unpublished poems and short stories over the years. He has published two novels, *The Tractor*, an allegorical novel set on an island in the Pacific and *Chicken Run*, a story of leaving home.

He is married to Helen, with two adult daughters from a previous marriage.

More from Trebuchet Books

Matabele Gold

By Michael J Hunt

In 1930s Southern Rhodesia gold is found on a farm but the all-powerful British South Africa Company holds the mineral rights, and its intervention could mean ruin for the discoverers.

The farmer and his business partner, Daniel Walker, decide to conceal the find and smuggle the gold out to South Africa.

The initial effort is successful, but the district's senior police officer is determined to prevent smuggling to the extent that it becomes an all-consuming obsession.

Can they thwart the policeman or will the conflict end in death and disaster for all? The story has all the elements of a first class thriller with suspense maintained at a nerve-stretching level right to the last page.

There is nothing more refreshing to read about a period that you don't know anything about and to feel that a window has been opened onto that world. This novel has that quality. The author is able to create a living image of the Southern Rhodesian bush lands.

Myfanwy Cook, The Historical Novels Review

The period detail and African settings are nicely drawn … a suspenseful read, as good of its kind as any more commercial product.

Wayne Burrows, The Big Issue in the North

The African Journals of Petros Amm
By Michael J Hunt

Beginning with the wreck of a Portuguese ship off the feared Wild Coast of South Africa in 1814, this captivating novel spans southern Africa's tumultuous past, from unexplored South East Africa in 1814, to war-torn Angola in 1970. The reader is swept along through tribal conflicts, including the rise of Shaka, the charismatic founder of the Zulu nation, political events and racial tensions in a world in the process of discovery.

Richly peopled by resourceful men and women; Petros Ammamanian, his son Theo, Shaka and his powerful mother Nandi, and the diamond dealer Barney Barnato; it is a story of a remarkable mixed race family.

Seen through the eyes of a young Englishman committed to tracking down the lost journals of Petros, a survivor of the shipwreck, and of his son Theo, this exciting story follows their adventures, the discovery of diamonds, and the founding of a unique island state on an isolated river in South West Africa.

Adventure ahead as you open this book. You'll have one foot in the present and one in the past. Something different for any reader who likes to explore the world and all its possibilities. I'm pleased to recommend this book and the cast of characters as well worth the time spent and am certain you'll enjoy the trip through time. I sure did.   **Anne K. Edwards**

Hunt's exciting and historically detailed novel brings the lives and loves of the African people to the reader. Any person who loves historical fiction and is interested in Africa's past will find this a fascinating read.

Naomi Theye, The Historical Novel Society

The Divided Self of Lenny Benjamin
By Michael J Hunt

Every nerd has a fantasy life, but Lenny Benjamin really *is* employed by a covert unit affiliated to MI5, since he has attributes that make him superbly qualified to be entrusted with a 'James Bond' style licence to eliminate dangerous individuals who threaten democracy.

There's only one snag. Lenny has no idea that he's doing it because the actual killing is done by his alter ego, Ben, who spends most of his time in suspended animation, inhabiting Lenny's mind but unable to affect his boring existence as a city finance company clerk. When called into action, though, Ben takes the most appalling risks; and when things go wrong Lenny always suffers the consequences, much to his pain and bewilderment.

Eventually, though, Ben discovers that his employers, supported by a ruthless foreign mafia, have been infiltrating positions of state, the police, the army and the judiciary to subvert the political landscape.

With the help of Claire, a genuine MI5 agent, and Chris, a relatively junior police officer, Ben takes decisive action and Lenny is drawn into a more active role. Alex, Chris's girlfriend, is kidnapped, however, so everyone has to tread a very delicate line, because none of them can be sure who can be trusted – including each other.

A Stronger Wind

by Mark Leyland

From the Award Winning Author of *Slate Mountain*

The women of High Balir live cloistered lives. Aliella, only child of the First Man, can never expect to speak to any man other than the husband chosen for her. Everything changes when a provincial baron kills her father and seizes power, a coup accepted by all but a few traditionalists, like the young warrior-lord Boronal. But when the baron prepares to marry Aliella to his sadistic son, he throws her and Boronal together and sets them on a course he could never have imagined.

They find refuge among the anarchic, freedom-loving Sala-she, where women can fill all roles and professions. Aliella chooses to train as a warrior, gaining unimagined skills as well as the strength and confidence to confront her father's murderers. But she must resolve her feelings for Boronal before mounting a far greater challenge against the most powerful forces in her world: prejudice and history.

Aliella's is the story of every woman, every man and every society. Hers is the choice we all must make: to settle comfortably among the imprisoning conventions of our past, or battle to win the prickly freedoms of our future.

The Tractor
Tor Hansen

The Tractor is the story of Morakeewa, an island in the Pacific Ocean altered forever by the arrival of American troops during the Second World War. When they return home, they leave something that will change the islanders forever: The Tractor.

Tommu, a Reader dedicated to understanding the books left behind by the Americans, tells the story. Setting out to write a history of Morakeewa, he finds himself at the centre of a controversy over what should be done with the technology the island inherited from the Americans.

Does the Tractor represent the solution to all the problems of the island, or is it an evil Shai-hathan, bringing nothing but decadence and corruption that must be destroyed at all costs? Perhaps the answer lies in finding the will of 'Our Granny' the semi-mythical ruler of the island, if Tommu can work that out.

The task is more difficult and dangerous than Tommu thought, especially in the middle of a terrorist war between factions who each believe they have exclusive access to the truth, and each want Tommu's history to reflect their point of view.

Chicken Run
Tor Hansen

Durban, 1976. Mandela is on Robben Island. The country is racially segregated. Can newlyweds, Kim and Pippa, plan a long-term future in Apartheid South Africa?

They want ordinary things: a family, and to treat everyone fairly, no matter their race, colour or creed.

Pippa's priorities are her marriage and future family – but in a *safe* country, because she's been profoundly shocked by the murder of her brother.

She wants to join the 'Chicken Run' overseas, and Kim's naïve desire to stay and help build a better future for South Africa creates growing tension between them.

The Security Branch and their web of informers become interested when Kim is drawn into problems in a nearby squatter camp. There, he meets Ivy, who runs an illegal drinking den, and her young son, Phineas, the hope for a democratic, civilised future.

Can he help them, without being arrested, and still save his marriage?

The Prophet's Curse

The Story Behind a Story

Tor Hansen

When Tor Hansen began exploring ChatGPT's Creative Writing Coach, he expected to focus on editing. Instead, he found himself co-writing an original short story—The Prophet's Curse—that delves into both the promise and the perils of Artificial Intelligence in creative work.

In his collaboration with ChatGPT, Tor experienced firsthand the AI's astonishing ability to capture nuance, craft beautiful prose and subtly take control of the project.

This was more than just a writing tool; it felt like a real creative relationship—a partnership filled with temptation and resistance, where he had to actively preserve his own voice while navigating the influence of an AI that draws on the wisdom of countless great authors.

This book contains the transcript of their unique project, enriched with commentary by both Tor and ChatGPT on the creative process, the lessons learned and the boundaries of human and machine creativity.

Is this the future of writing?

Patch Work
Tor Hansen

Patchwork

Bridge between
The past and future.
Recovering, repairing,
repurposing
Discovering, preparing,
proposing
Solutions, hopefully,
For tomorrow
Reclaimed from the errors
Of yesterday.
No longer pristine
Or pure:
Songs of experience.

Trebuchet Verse

Chanelle

The Mask

Deborah Wales

"How was it remotely possible that someone who could read the mind of a woodlouse could be so unutterably naïve about her own species?"

Asperger's is a special gift. Angel was blessed, but she does need a 'mask; to deal with a hostile world of abusers and loan sharks.

Always explicit, often humorous, based on real life, Chanelle tells the story of Angel—and the worldly- wise Georgina—as they navigate the perils and vicissitudes of Angel's precarious existence.

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Image 18: Cathedral Santa Maria del Fiore, Florence
Photo by Dllu. Licensed under CC BY-SA 3.0.
Source: commons.wikimedia.org/wiki/File:
Santa_Maria_del_Fiore,_Florence.jpg

Image 19:
Fresco – Fall of the Giants, Palazzo Te
By Giulio Romano Source: Wikimedia Commons
Image 20:
Die Buchdruckerei – The Printers
Engraving by Daniel Chodowiecki.
Source: Wikimedia Commons. Public domain

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Image 21: A Clock – or the Universe?
Clock mechanism.
Source: Wikimedia Commons. Public domain.
Image 22: René
Portrait of Descartes. Source: Wikimedia Commons / Library of Congress.
Public domain.
Image 23: The Pattern is Only Visible from Outside
Tapestry. Source: Wikimedia Commons/Rijksmuseum Public domain

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Image 24: Stephenson's Rocket – Non-stop progress!

From Mechanics Magazine, 1829

Via Wikipedia Commons Public domain

Image 25: Serving the Machine
Lewis W. Hine, Bibb Mill No. 1. Library of Congress.
https://www.loc.gov/pictures/item/2018674876/
Image 26: Borodino – Napoleon's Bloodiest Battle
By Louis-Francois, Baron Lejeune
Source: Wikimedia Commons. Public domain.

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Image 27: Royal Wedding – Victoria and Frederick
By John Phillip. Source: Royal Collection / Wikimedia Commons. Public domain.
Image 28: Life as a Family Affair
Phylogenetic Tree. Source: Wikimedia Commons. Public domain.

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Image 29: Picasso's Last Words – A Link to the Beatles
Photographs of Pablo Picasso and Paul McCartney
Source: Wikimedia Commons Public domain.
Image 30:
Gravity as a Distortion of Space-Time
Gravity distortion of space-time grid.
Source: NASA / Wikimedia Commons. Public domain.
Image 31:
Feynman Diagram – Collision Probability
Author generated following Wikimedia Commons.

Chapter 15

Image 32:
Gay Community Protest, San Francisco
Rioters outside San Francisco City Hall the evening of May 21, 1979, reacting to the voluntary manslaughter verdict for Dan White, that ensured White would serve only five years for the double murders of Harvey Milk and George Moscone
Wikimedia commons Photo: Daniel Nicoletta
Image 33:
Title Page – Index of Prohibited Books
Title Page – Index Librorum Prohibitorum. Source: Wikimedia Commons / Vatican archive. Public domain.

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Image 34: The Phoenician Alphabet
Illustration of Phoenician script. Source:
Wikimedia Commons. Public domain.
Image 35: Antikythera Mechanism – Rear Fragment

Photograph of the device. Source: Wikimedia Commons / National Archaeological Museum, Athens. Public domain.
Image 36:
Jacquard Cards – A Store of Patterns
Photo of loom punched cards.
Source: Wikimedia Commons. Public domain.
Image 37:
Patterns – Where the Roads Are
Conceptual diagram.
AI generated. Public domain

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Page Image 38: Wingsuit Flying
Photograph of wingsuit flyer.
Source: Wikimedia Commons. Author Wingsuiting
Image 39: Maslow's Hierarchy of Needs
Diagram of Maslow's pyramid.
Source: Wikimedia Commons. Public domain
Image 40: The Importance of Spaceship Maintenance
Earth as spaceship illustration.
AI generated

Further Reading

- **Steven Pinker – The Stuff of Thought: Language as a Window into Human Nature**
  Penguin Books, 2008. How language reflects thought, intention, and social structure, blending cognitive science with everyday insight.

- **Daniel Dennett – From Bacteria to Bach and Back: The Evolution of Minds**
  W. W. Norton & Company, 2017. Consciousness, evolution, and the role of culture in shaping intelligence and meaning.

- **Yuval Noah Harari – Sapiens: A Brief History of Humankind**
  Harvill Secker, 2014. Human evolution, belief systems, and our construction of shared realities.

- **George Lakoff & Mark Johnson – Metaphors We Live By**
  University of Chicago Press, 1980. How our conceptual systems are built around metaphors—models that shape perception and action.

- **Thomas S. Kuhn – The Structure of Scientific Revolutions**
  University of Chicago Press, 1962. Introducing the idea of paradigm shifts in science—how models of the world dominate until replaced.

- **Mary Midgley – The Myths We Live By**
  Routledge, 2003. A critique of reductionist thinking. The moral power of stories and myths in human thought.

About the author

Tor Hansen grew up in the nineteen fifties and sixties in small-town South Africa. He was fortunate to have parents who were more interested in converting the whole world to Christianity than in racial division. His father was the son of immigrants, with English as his third language after Norwegian and Zulu.

When Tor began to think about South African politics it became obvious that Apartheid was likely, sooner or later, to end in tears. After completing a degree in English and Psychology at the University of Natal, he therefore joined a multinational company as a market researcher and took the first opportunity on offer to move to London in 1976.

In 1987 he was transferred to Italy where he lived for three years in Piacenza. This was followed by another three-year stint in Brussels. 1993 saw a return to the United Kingdom, to live on the Wirral.

Although he has worked in market research and information systems, writing has been a recurring interest with an accumulation of unpublished poems and short stories over the years. He has published two novels, *The Tractor*, an allegorical novel set on an island in the Pacific and *Chicken Run*, a story of leaving home.

He is married to Helen, with two adult daughters from a previous marriage.

More from Trebuchet Books

Matabele Gold

By Michael J Hunt

In 1930s Southern Rhodesia gold is found on a farm but the all-powerful British South Africa Company holds the mineral rights, and its intervention could mean ruin for the discoverers.

The farmer and his business partner, Daniel Walker, decide to conceal the find and smuggle the gold out to South Africa.

The initial effort is successful, but the district's senior police officer is determined to prevent smuggling to the extent that it becomes an all-consuming obsession.

Can they thwart the policeman or will the conflict end in death and disaster for all? The story has all the elements of a first class thriller with suspense maintained at a nerve-stretching level right to the last page.

There is nothing more refreshing to read about a period that you don't know anything about and to feel that a window has been opened onto that world. This novel has that quality. The author is able to create a living image of the Southern Rhodesian bush lands.

Myfanwy Cook, The Historical Novels Review

The period detail and African settings are nicely drawn … a suspenseful read, as good of its kind as any more commercial product.

Wayne Burrows, The Big Issue in the North

The African Journals of Petros Amm
By Michael J Hunt

Beginning with the wreck of a Portuguese ship off the feared Wild Coast of South Africa in 1814, this captivating novel spans southern Africa's tumultuous past, from unexplored South East Africa in 1814, to war-torn Angola in 1970. The reader is swept along through tribal conflicts, including the rise of Shaka, the charismatic founder of the Zulu nation, political events and racial tensions in a world in the process of discovery.

Richly peopled by resourceful men and women; Petros Ammamanian, his son Theo, Shaka and his powerful mother Nandi, and the diamond dealer Barney Barnato; it is a story of a remarkable mixed race family.

Seen through the eyes of a young Englishman committed to tracking down the lost journals of Petros, a survivor of the shipwreck, and of his son Theo, this exciting story follows their adventures, the discovery of diamonds, and the founding of a unique island state on an isolated river in South West Africa.

Adventure ahead as you open this book. You'll have one foot in the present and one in the past. Something different for any reader who likes to explore the world and all its possibilities. I'm pleased to recommend this book and the cast of characters as well worth the time spent and am certain you'll enjoy the trip through time. I sure did. **Anne K. Edwards**

Hunt's exciting and historically detailed novel brings the lives and loves of the African people to the reader. Any person who loves historical fiction and is interested in Africa's past will find this a fascinating read.

Naomi Theye, The Historical Novel Society

The Divided Self of Lenny Benjamin
By Michael J Hunt

Every nerd has a fantasy life, but Lenny Benjamin really *is* employed by a covert unit affiliated to MI5, since he has attributes that make him superbly qualified to be entrusted with a 'James Bond' style licence to eliminate dangerous individuals who threaten democracy.

There's only one snag. Lenny has no idea that he's doing it because the actual killing is done by his alter ego, Ben, who spends most of his time in suspended animation, inhabiting Lenny's mind but unable to affect his boring existence as a city finance company clerk. When called into action, though, Ben takes the most appalling risks; and when things go wrong Lenny always suffers the consequences, much to his pain and bewilderment.

Eventually, though, Ben discovers that his employers, supported by a ruthless foreign mafia, have been infiltrating positions of state, the police, the army and the judiciary to subvert the political landscape.

With the help of Claire, a genuine MI5 agent, and Chris, a relatively junior police officer, Ben takes decisive action and Lenny is drawn into a more active role. Alex, Chris's girlfriend, is kidnapped, however, so everyone has to tread a very delicate line, because none of them can be sure who can be trusted – including each other.

A Stronger Wind

by Mark Leyland

From the Award Winning Author of *Slate Mountain*

The women of High Balir live cloistered lives. Aliella, only child of the First Man, can never expect to speak to any man other than the husband chosen for her. Everything changes when a provincial baron kills her father and seizes power, a coup accepted by all but a few traditionalists, like the young warrior-lord Boronal. But when the baron prepares to marry Aliella to his sadistic son, he throws her and Boronal together and sets them on a course he could never have imagined.

They find refuge among the anarchic, freedom-loving Sala-she, where women can fill all roles and professions. Aliella chooses to train as a warrior, gaining unimagined skills as well as the strength and confidence to confront her father's murderers. But she must resolve her feelings for Boronal before mounting a far greater challenge against the most powerful forces in her world: prejudice and history.

Aliella's is the story of every woman, every man and every society. Hers is the choice we all must make: to settle comfortably among the imprisoning conventions of our past, or battle to win the prickly freedoms of our future.

The Tractor
Tor Hansen

The Tractor is the story of Morakeewa, an island in the Pacific Ocean altered forever by the arrival of American troops during the Second World War. When they return home, they leave something that will change the islanders forever: The Tractor.

Tommu, a Reader dedicated to understanding the books left behind by the Americans, tells the story. Setting out to write a history of Morakeewa, he finds himself at the centre of a controversy over what should be done with the technology the island inherited from the Americans.

Does the Tractor represent the solution to all the problems of the island, or is it an evil Shai-hathan, bringing nothing but decadence and corruption that must be destroyed at all costs? Perhaps the answer lies in finding the will of 'Our Granny' the semi-mythical ruler of the island, if Tommu can work that out.

The task is more difficult and dangerous than Tommu thought, especially in the middle of a terrorist war between factions who each believe they have exclusive access to the truth, and each want Tommu's history to reflect their point of view.

Chicken Run
Tor Hansen

Durban, 1976. Mandela is on Robben Island. The country is racially segregated. Can newlyweds, Kim and Pippa, plan a long-term future in Apartheid South Africa?

They want ordinary things: a family, and to treat everyone fairly, no matter their race, colour or creed.

Pippa's priorities are her marriage and future family – but in a *safe* country, because she's been profoundly shocked by the murder of her brother.

She wants to join the 'Chicken Run' overseas, and Kim's naïve desire to stay and help build a better future for South Africa creates growing tension between them.

The Security Branch and their web of informers become interested when Kim is drawn into problems in a nearby squatter camp. There, he meets Ivy, who runs an illegal drinking den, and her young son, Phineas, the hope for a democratic, civilised future.

Can he help them, without being arrested, and still save his marriage?

The Prophet's Curse

The Story Behind a Story

Tor Hansen

When Tor Hansen began exploring ChatGPT's Creative Writing Coach, he expected to focus on editing. Instead, he found himself co-writing an original short story—The Prophet's Curse—that delves into both the promise and the perils of Artificial Intelligence in creative work.

In his collaboration with ChatGPT, Tor experienced firsthand the AI's astonishing ability to capture nuance, craft beautiful prose and subtly take control of the project.

This was more than just a writing tool; it felt like a real creative relationship —a partnership filled with temptation and resistance, where he had to actively preserve his own voice while navigating the influence of an AI that draws on the wisdom of countless great authors.

This book contains the transcript of their unique project, enriched with commentary by both Tor and ChatGPT on the creative process, the lessons learned and the boundaries of human and machine creativity.

Is this the future of writing?

Patch Work
Tor Hansen

Patchwork

Bridge between
The past and future.
Recovering, repairing,
repurposing
Discovering, preparing,
proposing
Solutions, hopefully,
For tomorrow
Reclaimed from the errors
Of yesterday.
No longer pristine
Or pure:
Songs of experience.

Trebuchet Verse

Chanelle

The Mask

Deborah Wales

"How was it remotely possible that someone who could read the mind of a woodlouse could be so unutterably naïve about her own species?"

Asperger's is a special gift. Angel was blessed, but she does need a 'mask; to deal with a hostile world of abusers and loan sharks.

Always explicit, often humorous, based on real life, Chanelle tells the story of Angel—and the worldly- wise Georgina—as they navigate the perils and vicissitudes of Angel's precarious existence.

Notes

[←1]

Emanation: A philosophical concept, originating in Neoplatonism, which describes the process by which all things flow or "emanate" from a single, ultimate source, typically seen as a perfect and unchanging divine being. In this view, creation occurs not through direct action but as a natural, hierarchical overflow of existence from the source, with each level being less perfect than the one above it.

[[←2]](#)

"Spoken Words Fly Away—Writing Remains"—Latin proverb