Our Fundamental Problem

A Revolutionary Approach to Philosophy

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For Extinction Rebellion

Contents

Preface

How can our human world – the world we experience and live in – exist and best flourish embedded as it is in the physical universe? That is our fundamental problem. It encompasses all others of science, thought and life. This is the problem I explore in this book. I put forward some suggestions as to how aspects of this problem are to be solved. And I argue that this is the proper task of philosophy: to try to improve our conjectures as to how aspects of the problem are to be solved, and to encourage everyone to think, imaginatively and critically, now and again, about the problem. We need to put the problem centre stage in our thinking, so that our best ideas about it interact fruitfully, in both directions, with our attempts to solve even more important more specialized and particular problems of thought and life.

The book is intended to be a fresh, unorthodox introduction to philosophy - an introduction which will, I hope, interest and even excite an intelligent 16 year old, as well as any adult half-way interested in intellectual, social, political or environmental issues. Scientists and professional philosophers should find it of interest as well. The idea of the book is to bring philosophy down to earth, demonstrate its vital importance, when done properly, for science, for scholarship, for education, for life, for the fate of the world.

If everything is made up of fundamental physical entities, electrons and quarks, interacting in accordance with precise physical law, what becomes of the world we experience – the colours, sounds, smells and tactile qualities of things? What becomes of our inner experiences? How can we have free will, and be responsible for what we do, if everything occurs in accordance with physical law, including our bodies and brains? How can anything be of value if everything in the universe is, ultimately, just physics? These are some of the questions we will be tackling in this book.

These questions arise because of this great fissure in our thinking about the world. Our scientific thinking about the physical universe clashes in all sorts of ways with our thinking about our human world. The task is to discover how we can adjust our ideas about both the physical universe, and our human world, so that we can resolve clashes between the two in such a way that justice is done both to what science tells us about the universe, and to all that is of value in our human world – the miracle of our life here on earth – and the heart-ache and tragedy.

It is all-but inevitable that even the smallest adjustments to what we take science to tell us about the universe, or to what we hold to be the nature and value of our human world, will have all

sorts of repercussions, potentially, for all sorts of fields outside philosophy – for science, for thought, for life. And indeed revolutionary ideas do emerge in this book from the exploration of our fundamental problem.

There is, first, a revolution for philosophy. A new kind of philosophy emerges which I call *Critical Fundamentalism*. This tackles our fundamental problem, and in doing so seeks to resolve the fundamental fissure in the way we think about the universe and ourselves in such a way that this resolution has multiple, fruitful implications for thought and life. Second, there is a revolution in what we take science to tell us about the world: it is concerned, not with everything about everything, but only with a highly specialized aspect of everything. This is the subject of chapter 3. Third, there is a revolution in our whole conception of science, and the kind of science we should seek to develop – the subject of chapter 4. Fourth, there is a revolution in biology, in Darwin's theory of evolution, so that the theory does better justice to helping us understand how life of value has evolved. This is the subject of chapter 5. Fifth, there is a revolution in the social sciences. These are not sciences; rather, their proper basic task is to promote the cooperatively rational solving of conflicts and problems of living in the social world. In addition, they have the task of discovering how progress-achieving methods, generalized from those of natural science (as these ought to be conceived) can be got into social life, into all our other social endeavours, government, industry, the economy and so on, so that social progress towards a more enlightened world may be made in a way that is somewhat comparable to the intellectual progress in knowledge made by science. Social inquiry emerges as social *methodology* or *philosophy* and not, fundamentally, social science. Sixth, there is a much broader revolution in academic inquiry as a whole. We need a new kind of academic enterprise rationally designed and devoted to helping us resolve the grave global conflicts and problems that confront us: habitat destruction, loss of wild life, extinction of species, the menace of nuclear weapons, the lethal character of modern war, gross inequality, pollution of earth, sea and air, and above all the impending disasters of climate change. These problems have arisen in part because of the gross structural irrationality of our institutions of learning devoted as they are to the pursuit of knowledge instead of taking, as their basic task, to help humanity resolve conflicts and problems of living in increasingly cooperatively rational ways, thus making progress towards as good, as wise, a world as possible. Seventh, there is the all-important social revolution that might gradually emerge if humanity has the wit to develop what it so urgently needs: academic inquiry rationally devoted to helping us make progress towards a better, more civilized world. These fifth, sixth and seventh revolutions are the subject of chapter 7.

Academic philosophy, whether so-called analytic or Continental philosophy, is not noted for its fruitful implications for other areas of thought and life. How come, then, that philosophy as done here, Critical Fundamentalism, has these dramatic revolutionary implications for science, for academic inquiry, for our capacity to solve the global problems that menace our future? I do what I can to answer this question in chapters 2 and 9.

Why has academic philosophy, lost its way so drastically that it has failed to put the richly fruitful conception of philosophy, as done here, into practice? What caused academic philosophy to lose its way? I give my answer to this question in the appendix.

My chief hope, in writing this book, however, is that the reader will be beguiled or provoked into thinking imaginatively and critically – that is, rationally – about our fundamental problem, not obsessively, but from time to time.

Chapter One

Our Human World in the Physical Universe

Introductory discussion of the problem

How can our human world, the world as it appears to us, the world we live in and see, touch, hear and smell, the world of living things, people, consciousness, free will, meaning and value - how can all of this exist and best flourish embedded as it is in the physical universe?

This is the problem we are going to explore in this book. It is our fundamental problem, of both thought and life. All other problems, I will argue, are parts or aspects of this most fundamental of all problems. Because it is so important, so basic, so all-embracing, it deserves a name. Let us call it "the human world/physical universe" problem, or just "our fundamental problem".

Not everyone will agree that this is our fundamental problem. For example, those who believe in God may not agree. I will say more about that below.

Here is the problem, expressed a bit more vividly and dramatically, as it arises for me one Summer afternoon:-

"I sit in my garden in north London with my wife, Christine. Behind me, honeysuckle tumbles over the garden wall, and fills the air with its sweet scent. Bumble bees buzz and blunder among the honeysuckle flowers. A gentle breeze sifts through the tree above, and sunlight filters through the leaves. It is Summer. The sky is dark blue. I stretch and say “This is heaven,” and Chris replies “How right it is to take the garden as an image of Paradise”.

"Put all this into the physical universe and what do we have? Both I and Chris seem to disappear altogether. I am made up entirely of billions of cells, which are in turn made up of billions of highly complex molecules, in turn made up of atoms, in turn made up of tiny, mysterious particles called electrons, protons and neutrons, the protons and neutrons in turn made up of even tinier particles called quarks.[1] Everything I am, everything I do, think, experience, see, feel, imagine, decide, understand is just billions of electrons and quarks interacting with each other in accordance with the laws of physics. And likewise for Chris. I see the blue sky, the green leaves, flowers and ferns; I smell the honeysuckle, and hear bees buzzing, and say “This is heaven.” But what has really happened? Light of various wavelengths, reflected from various surfaces, enters my eyes where it causes molecular processes to occur in my optic nerves; these in turn cause more such molecular processes to occur in the back of my brain, which lead to more such processes occurring in my brain which, in turn, lead to muscles being contracted, air being expelled, vocal chords vibrating, vibrations of molecules in the air, which cause Chris's eardrums to vibrate, in turn causing tiny bones in her middle ear to vibrate, leading to complex molecular processes to occur in her brain. Ultimately, all that has occurred is that

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[1] Quarks are electrically charged particles, either 1/3 or 2/3 of the charge of the electron. Three quarks go to make up a proton, and three different quarks to make up a neutron. They interact with one another via the exchange of particles called gluons. Gluons stick quarks together to form protons and neutrons, and they do this so firmly that it is impossible to isolate individual quarks.

billions upon billions of electrons and quarks interacting with one another have produced light of such and such frequency which, after travelling short distances, have affected the way further billions of electrons and quarks interacted. Colours disappear; sounds and smells disappear; perceptions, experiences, sensations, feelings, consciousness, intentions, decisions and actions disappear, *we* disappear, and there remain merely electrons and quarks interacting, these interactions being mediated by forces such as electromagnetism, the nuclear weak and strong forces, and gravitation, vibrations in the electromagnetic force travelling from one vast conglomeration of electrons and quarks to another. All meaning and value, everything required to have anything meaningful or of value, have vanished, leaving only cold physics behind.....

"How is our precious human world to be rescued from this insidious and terrifying assault from physics?"

That is our problem.[2]

It is your problem too. Here you are, reading this book, wondering, perhaps, what on earth it is going to be about. But again, both the book and you are made up of molecules, in turn made up of atoms, each in turn made up of electrons spinning around a central nucleus made up of protons and neutrons, which are in turn made up of quarks. Light - or rather, waves in the electromagnetic field - spread out from the book. Some, right now, enter your eyes, and cause neurological processes to occur in your brain which lead you to cough, or turn the page, or scroll down the screen if you are reading this on Kindle. You, your thoughts and feelings, seem to disappear, leaving behind this vast, complex system of electrons and quarks interacting with one another in extraordinarily complex ways.

How can we exist and live lives that are meaningful and of value if the world really is as modern physics seems to tell us it is?

This is our fundamental problem because all other problems we encounter, in thought and life are, as I have already indicated, more or less specialized versions of this most basic problem. First of all, problems of physics are included. It is physics that poses the fundamental problem in the first place. But problems from other branches of natural science are included as well: cosmology, astronomy, geology, biology, chemistry, palaeontology, ecology, neuroscience, the study of animal behaviour.[3] All these sciences play a crucial role in filling in details of our

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[2] Philosophers tend to discuss components of this fundamental problem such as: What does science tell us about the world? Does it provide knowledge of unobservable, fundamental physical entities? Or does it provide knowledge about observable phenomena only? How is the mind, or consciousness, related to the brain? What knowledge do we acquire as a result of perception? Can we have free will if the universe is deterministic? How are moral statements to be analysed? What is it for something to possess intrinsic value? Three books by philosophers that do discuss many aspects of the fundamental problem are: Smart (1963); Nagel (1986); and Chalmers (1996). For my own earlier efforts at tackling the fundamental problem see Maxwell (2001a; 2010a; 2019a). For even earlier efforts see my first three published papers: Maxwell (1966; 1968a; 1968b), extracted from my MA thesis: *Physics and Common Sense: A Critique of Physicalism*, 1965, Manchester University. I differ from many of my philosophy colleagues in that, unlike them, from the outset I have put the fundamental problem at the heart of all my work: see Maxwell (2019a, chs. 1 and 2).

[3] Palaeontology is the study of fossils; ecology is the study of interactions between different living things, and between them and the environment; neuroscience is the study of the brain.

fundamental problem, in helping us to get clearer about the nature of the problem, and in helping us to grope towards the solution to the problem. Evolutionary biology in particular, as we shall see, has a crucial role to play in helping us to understand how we can exist, embedded as we are in the physical universe, in part, at least, tiny fragments of the universe. All of natural science is included in our fundamental problem. Furthermore, the problems of mathematics and logic are included: natural science is inconceivable without them. But in addition, the problems of the social sciences and the humanities are included as well: anthropology, archaeology, sociology, psychology, history, cultural studies, philosophy. The nature of our human world, our human life on earth, is as crucial a part of the fundamental problem as the nature of the physical universe, and we need the social sciences and humanities to improve our understanding of the nature of our human world. And we need more: we need literature, biography, drama, poetry, and other art forms as well.

The problems of all these branches of science, thought and art are components of our fundamental problem. They are inherent in our fundamental problem. But all that is only a part of what is involved. For this human world/physical universe problem also concerns how human life can best *flourish* - how we can best realize what is genuinely of value to us in life. All the problems, the struggles, the suffering, the heart-ache and aspirations of humanity are inherent in our problem as well. Our fundamental problem concerns, not just how we can exist, but also how we need to act, to live, to flourish, to achieve what is of value in life. And that brings in, as well, ideas, techniques and problems that arise in connection with efforts to help solve problems of living: problems of medicine, psychiatry, technology, politics and political philosophy, law, industry and agriculture, education. All our problems of living are included, personal, social, national and global; problems of politicians, office workers, parents, children, lovers, creative artists, bus drivers: every section and aspect of life is included.

If our fundamental problem does indeed incorporate all other problems - this multitude of more and less specialized and particular problems of human knowledge and human life - how can anyone hope to think intelligently, or at all, about the fundamental problem? Would this not require a vast knowledge of human thought and human life, beyond the capacity of any one person to acquire in a lifetime? No! In order to think intelligently about our fundamental problem, in a way which can be fruitful, it is essential to pare away detail - just as I have done in formulating the problem at the beginning of this chapter. Everyone should be introduced to the problem at school, when young, to be given the opportunity to think about the problem whatever background knowledge or ignorance one may have. We are all, essentially, in the same boat, the erudite scientist or scholar burdened with a great weight of expertise, and the five year old blithely unaware of almost everything: we all share immense ignorance. In fact, in order to learn as we should learn, it is vital that we do have before us our fundamental problem, so that we may organize what we learn, sift out what is significant from what does not matter so much, and direct our learning to help us improve our tentative attempts at solving our fundamental problem as best we can. Without our fundamental problem before us, we may well lose our way, become lost in detail or lose interest altogether. It is a scandal that education, in schools and universities, is not conducted in this way. I shall have more to say about this scandal in chapters seven and nine.

Anyone can think in a worthwhile way about this most fundamental physical universe/human world problem. And we should all think about it - from time to time at least. Rich rewards are to be gained from exploring the problem intellectually, in our imagination.

There is, to begin with, all that modern science has to tell us about this strange universe we inhabit. Long ago, in 1610, Galileo discovered that the milky way, that faint wisp of misty light that stretches across the sky, is made up of stars, each a sun more or less like our sun.[4] The milky way is our local galaxy, a great spiral disk of 300 billion[5] stars, some 120,000 light years[6] across, slowly rotating so that it takes our sun some 220 million years to go round once. The universe is very, very big. Light, travelling at a velocity of 186,000 miles a second, takes 1.3 seconds to travel from the moon to the earth, 8.3 *minutes* to travel from the sun to the earth, 4.32 *years* to travel from the nearest star to earth, and 120,000 years to travel across our galaxy! Not so very far away in cosmic terms, there is another galaxy called Andromeda, much like ours: light takes 2.5 *million years* to travel from Andromeda to earth. And it would take light some 46.5 *billion years* to travel from the edge of the observable universe to us.

Scattered about in this vast cosmos, there are some 170 billion other galaxies, each composed of hundreds of billions of suns. Very recently, we have discovered that some nearby stars in our galaxy, a mere 40, 50 or 60 light years away, have planets rotating around them, as the planets of our solar system rotate around our sun. The universe, it seems, contains billions upon billions of planets rotating around stars. Do some of these planets support life, even conscious beings, societies and civilizations? We do not know. And everywhere we look, there are mysteries.

One baffling mystery is the rotation of our galaxy. It may rotate so slowly that that it takes 220 million years to complete one revolution, but actually it rotates much too quickly. Our sun travels round the galaxy at a velocity of 483,000 miles an hour: this rate of rotation of the galaxy is so fast that gravitation is not strong enough to hold it together. Our galaxy should fly apart. And the same goes for other galaxies as well. Scientists speculate that each galaxy, including ours, is immersed in a great ball of invisible matter, mistakenly called "dark" matter, which provides the extra mass and gravitational pull to hold the galaxy together. Dark matter goes to make up roughly 85% of the total mass of matter in the universe; all the matter we ordinarily know, that goes to make up the earth and everything on it, the moon, the planets, the sun, and all the other stars, gas and interstellar dust, consists of a mere 15% of the total. What is this mysterious dark matter, 85% of all that there is? No one knows.

And there are other mysteries. We have discovered that the universe is expanding. Light from distant galaxies is "stretched" towards the red end of the spectrum, the further away the galaxies are, the more the wavelengths of light are increased. This means other galaxies are receding from us, the further away they are, the faster they recede. All galaxies recede from each other everywhere: the entire universe is expanding. This means that in the past, galaxies were much closer together, so much so that once upon a time, some 13.8 billion years ago, the entire universe, now over 90 billion light years across, was compressed into a space no bigger than an atom. Our universe began with the "big bang", as it is called, and we have detected radiation, not from the big bang itself, but from a time a mere 377,000 years after the big bag. But what caused the big bang? And what existed before the big bang? No one knows.

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[4] Galileo reinvented the telescope, pointed it at the night sky, and made many discoveries, including the one about the milky way, which he reported in his book *The Starry Messanger*, published in 1610: see Galileo (1957, pp. 21-58).

[5] I billion = 1 thousand million = 1,000,000,000 = 10^9.

[6] A light year is the distance light travels in one year. In one second light travels 186,000 miles. A light year is roughly 6 million million miles (10^{12} miles).

Another profound mystery concerns the rate of expansion of the universe. It has been discovered, by means of observations of very distant galaxies, that the rate of expansion is *increasing*! This is baffling, because gravitational pull of galaxies on each other should be slowing the rate of expansion down. All of space, it seems, must be imbued with energy - called "dark" energy - which has the effect of exerting an increasingly repulsive force on galaxies, to counteract gravitation, and cause them to fly apart ever more rapidly. But what is this dark energy? No one knows. What we do know is that if we invoke Einstein's famous equation, $E = mc^2$, which tells us what the mass equivalence is of a body of energy, then dark energy amounts to 68% of the total mass, dark matter 27%, and the matter we know, the whole world we know of planets, suns, stars and galaxies, a mere 5%. Almost everything that exists, 95% in fact, is unknown to us, a mystery.

And there are even stranger mysteries when we come to consider what science tells us about, not the very big, the cosmos, but the very small, the atoms, the electrons, protons and neutrons, the quarks and gluons, out of which everything we do know is made.

Since the middle of the 18th century we have discovered that all the myriads of different sorts of substances there are on earth, and many in the heavens, are made up of no more than 98 elements.[7] We have discovered that elements are composed of atoms, each atom a tiny solar system composed of protons and neutrons in a minute nucleus in the centre surrounded by a cloud of electrons. And each proton and neutron is composed of three quarks, held together by the so-called "strong" force which operates by exchanging between quarks particles called "gluons" - particles which "glue" the quarks together. (So strong is this glue that it does not permit individual quarks to escape its strong grip.) The atom of each element has its own specific number of positively charged protons in the nucleus (and the same number of surrounding, negatively charged electrons, if the atom is electrically neutral overall). We understand why atoms combine together in specific ways to form molecules, the constituents of chemical compounds. We know why substances, in appropriate conditions, form gases, liquids and solids. We have a good understanding of why different compounds have the diverse properties that they do have. We have discovered that electricity and magnetism are two aspects of one force, the electromagnetic force. We have discovered that light is just waves in the electromagnetic field of force, these waves being light of different colours from red to violet, or a vast range of invisible rays, from radio waves, infra-red rays, ultra-violet rays, X-rays to gamma rays, as we go from very long to very short wavelengths.

But what are all these particles - electrons, protons, neutrons, quarks, gluons, and photons (particles of light)? No one knows. Their behaviour is utterly mysterious. Send one electron at a photographic plate, and it will be recorded as a tiny dot. Direct the electron at a screen with two slits in it and, if the electron travels past the screen and hits the photographic plate beyond, it will again be recorded as a tiny dot. So far, the electron behaves as a respectable particle. But now send many electrons at the two-slitted screen, one after the other, all with the same velocity, and beyond on the photographic plate the dots accumulate into a pattern of bands, regions where there are lots of dots interleaved with places where there are very few, if any. This can, it seems, only be explained if the electron is really a wave-like entity before it hits the photographic plate. This wave-like entity goes through both slits; at the photographic plate, there are regions where

[7] There are 118 elements, but elements at the top end of the scale – elements that have the greatest number of protons in their nuclei – tend to decay rapidly, being short-lived. 98 elements are found naturally on earth, some in minute quantities.

the waves reinforce each other (because a crest from one slit arrives simultaneously with a crest from the other slit); there are interleaved regions where the waves cancel each other out (because a crest from one slit arrives simultaneously with a trough from the other slit): where the waves reinforce each other there, it is most likely, the electron will be detected as a dot. The overall effect is one of alternative bands of lots of dots, interleaved with bands of few dots.

Just this "interference" effect (as it is called) can be obtained with *any* wave-like motion, with waves of light, for example, or waves of water. This two-slit experiment (as it is called) can be done in the bath, or in a harbour with two entrances. Ocean waves come into the harbour via both entrances. At some places on the beach, waves are high, because whenever a crest from one entrance arrives, so too a crest from the other entrance arrives as well. At other places on the shore, whenever a crest arrives from one entrance, a trough arrives from the other entrance, the two cancel each other out, and the water is permanently still.

The electron is a particle. But it is also a wave. But we only ever detect the wave aspect of the electron via a great number of particle-like detections. Miraculously, it is both. And this is true of all these fundamental particles: not just electrons, but protons, neutrons, quarks, gluons, nuclei, atoms, even molecules (groups of atoms stuck together). In the case of the photon, the "particle" of light, it may become one of the biggest objects in the universe - indeed, so big that it is almost as big as the universe itself. Consider a photon emitted by an early star not long after the big bang. It travels off in different directions, at the speed of light, for some 13 billion years, reaching the gigantic size of over 26 billion light years across until some thoughtless person, looking up at the night sky absorbs it into her eye and, across the universe, it vanishes. Can we really believe that there can be such physical entities, minute particles that also stretch right across the universe, but which, at any moment, might be detected as a tiny particle, or might just vanish?

What are these fundamental particles of physics: electrons, protons, photons, gluons, atoms, molecules? No one knows. The more fundamental our scientific knowledge becomes, the more bafflingly mysterious things seem to be. What is everything made up of? We know - but we don't know, because we don't know what these fundamental "particles" really are.[8] Even worse, as I have said, 95% of what exists is entirely unknown. And we don't know what caused the big bang, and what existed beforehand.

In view of all this scientific mystery, do we really know enough to know that what physics tells us about the world poses a threat to the meaning and value - even the existence - of our human world? We do, as will become clear in later chapters. Scientific mysteries mainly arise in connection with the most fundamental aspects of science, at the edges of scientific knowledge as it were. There is an enormous amount that we do know about the universe, and ourselves as a part of the universe.

We have discovered that all of life on earth has evolved by means of the Darwinian mechanisms of inherited variations and natural selection during some 3.8 billion years from some original, primitive cell. Variations that are well-adapted to survive, do survive and reproduce; variations less well-adapted, fall by the wayside and fail to reproduce. But how life

[8] For non-technical introductions to the mysteries of wave/particle duality and quantum theory, see: Al-Khalili, (2003); Kumar (2008); Rae (1992); Squires (1986). For my own views about how to solve the quantum wave/particle mystery see Maxwell (1976b; 1988; 1994; 2017b, pp. 135-51; 2018).

began is still a mystery, although there are tantalizingly plausible speculations about the matter.[9] We have vastly enhanced our knowledge of the millions of diverse species living on earth, and our knowledge of extinct species alive in the past, and how evolution has taken place. We have an amazingly detailed knowledge of processes taking place in living things. We have a good understanding of the workings of muscles, nerves, the eye, the ear, the immune system, and so on. Recently, we have come to understand electronic and molecular processes associated with photosynthesis, that astonishing process that goes on all around us in every green leaf and grass blade, transforming sunlight and carbon dioxide into sugar and oxygen, upon which almost all life depends.[10] We know that all living things, apart from viruses, consist of cells, the nucleus of

[9] See Lane (2009, ch. 1).

[10] For a fascinating account of the evolution of photosynthesis on earth, together with an account of the history of the scientific work struggling to understand how it works, see Morton (2009). See too Lane (2009, ch. 3).

Chapter Two: Some Ideas as to How Our Fundamental Problem is to be Solved

Five Approaches to its Solution: Physicalism, Dualism, Idealism, Naïve Realism, and the Two-Aspect View

Philosophy can only hope to solve a very meagre *aspect* of all that is involved in our fundamental problem.

For consider: the human world/physical universe problem is made up of all our problems of living - the problems we encounter as we live - and all our problems of thought. The second lot are, in a sense, a sub-section of the first. We *think* as a part of *life*. Problems of living are solved by what we do, or what we refrain from doing: they will remain open and unresolved for as long as there are people around to continue to live. Problems of thought can arise out of a concern to solve problems of living; they may arise as we explore imaginatively possible actions in an attempt to discover what to do in order to achieve some desirable, or at least desired, objective. Problems of thought may also arise, however, out of curiosity, the desire to know, to understand, for its own sake, without this impulse being tied too specifically to any problem of *action* or *living*. Problems of thought, like problems of living, will remain open and unresolved as well to a considerable extent as long as there are still people to live, think, imagine and wonder.

In other words, almost *everything* associated with our fundamental problem must inevitably remain untouched and unresolved by what follows in this book - and what is contained in all philosophical books ever to be published in the future! Our concern here is only with a very, very thin slice of our fundamental problem - the *abstract, philosophical* aspect, that aspect of the problem which remains when all life, detail and substance has been drained away, and only a whisper of the problem remains. We are concerned here, above all, with *possibility*: How is it

possible that our human world can exist and best flourish embedded as it is in the physical universe? Everything singular, specific, detailed must be pared away until just enough remains for us to highlight and concentrate on this important issue of *possibility*.

The really important problems we face are the particular problems that confront us as we grapple with difficulties in life; but our fundamental philosophical problem is significant too, in part because how good or bad our answer is to it, given implicitly in what we do in life, may well have a bearing on our capacity to solve our particular, urgent problems of living – a point I will seek to emphasize in what follows. As a result of improving our tentative solution to our fundamental philosophical problem we may be able to improve our capacity to solve much more specific and urgent problems of living, and thus improve our lives.

Our concern is with the collision of two continents. On the one hand there is the continent of science - the universe as depicted by science, including ourselves and everything around us conceived of as a part of the physical universe. On the other hand there is the continent of human life and human experience, the world of consciousness, free will, meaning and value. These two continents collide. They clash. It is all but impossible to see how these two worlds can coexist in one coherent world. That this basic clash of continents exists indicates that there are some very serious and pervasive things wrong with the way we think about the world - either the universe of physics, or our human world, but much more likely, both worlds together, both aspects of the universe. Exploring this clash of continents can be fruitful because it can lead us to uncover systematic mistakes we are making in the way we think about vast domains of existence: the physical universe, and our human world. We may be able to improve our ideas about the universe, our human existence, what is of most value in life and how it is to be achieved.

We need to represent this clash of continents in as accurate and rich a way as possible, to do justice to the nature of the clash; at the same time we need to represent the clash in as simple and spare a way as possible, uncluttered by irrelevant detail, so that we can go straight to the heart of the clash, and so that we can play around with our simplified representations of these two continents, bend them and mould them this way and that until we find shapes which fit beautifully together to stand potentially for our one coherent actual world.

Two final remarks about the nature of our problem before we plunge into the investigation into how to solve it!

First, I have emphasized that the correct solution to the *philosophical* aspect of the problem - the solution that specifies correctly how it is *possible* for our human world and the physical universe to co-exist in a coherent whole - would leave almost everything else untouched and unresolved. But this emphasis on the sterility of philosophy, its uselessness as far as everything else is concerned, can be taken too far (as I have also indicated). Any modification in one or other continent, however slight, that takes us a bit nearer to a reconciliation of the two continents, is almost bound to have far-reaching fruitful implications for the continent that is modified. The problem we are tackling takes us to the very heart of our understanding of our world. It concerns a quite fundamental fissure in our thinking. Even a minor modification to one or other continent is almost bound to have far reaching implications, for thought or for life – or for both. What are I hope fruitful implications will emerge from the discussion of this book - fruitful implications for our understanding of the universe, our understanding of science, our understanding of how we can learn to make progress towards a better, wiser world. These implications, mentioned in the Preface and indicated during the course of the book, are gathered

together and summarized in chapter 9 – implications for physics, for natural science, for Darwinian theory, neuroscience, quantum theory and mathematics (or at least the philosophy of mathematics), for social science and the humanities, for academic inquiry as a whole, and ultimately for our whole social world. Orthodox philosophy in the main does not have fruitful implications for other disciplines, or for life, and does not claim to have such implications. But philosophy devoted to trying to help solve aspects of the physical universe/human world problem can hardly avoid having such implications! We may even attempt to assess the relative merits of different approaches to solving the fundamental problem by comparing the fruitfulness of their implications for other disciplines and aspects of life.

A profitable way of thinking about the relationship between problems that are more and less fundamental is to represent all our problems in the form of a pyramid. At the apex of the pyramid we have the fundamental philosophical problem, the problem about *possibility*. As we descend the pyramid, more and more increasingly diverse, particular, specialized problems arise until, when we reach the base of the pyramid we arrive at our actual, specific problems of life and research. The all-important point to appreciate is that we need an interplay, an interchange, in both directions, between more abstract and general problems, higher up, and more specific and particular problems, lower down. Thinking about our most fundamental *philosophical* problem needs to interact persistently with thinking about somewhat less general, more specific problems of living and problems of thought. There needs to be a constant interplay between thinking at different levels that goes in both directions. In thinking about our fundamental problem we need to attend to what is going on in physics, in neuroscience, in evolutionary biology, in history and literature, but also in the world - the problems people face in their lives. And thinking about specific problems that confront us, in life and thought, needs now and again to consider the broader context; our best ideas about how to solve our fundamental philosophical problem may have fruitful implications for our particular, immediate concerns.[10]

The second point I have to make has to do with the status of philosophical ideas that may emerge from trying to solve our fundamental philosophical problem. One reaction to the programme I have indicated might be: *horror*. Is the idea that the philosopher, sitting in his study, will come up with *solutions* to all our problems which the rest of us must just accept? (The philosopher, these days, is almost bound to be an academic, a professor in some university.) Such a state of affairs would amount to sheer intellectual tyranny - the academic philosopher ruling the world! The very idea is as ludicrous as it is obscene. If this is what professors of philosophy set out to do, they need to be, not listened to, but locked up and treated as power-mad lunatics!

It is of interest that the philosopher who many consider to be the greatest ever, namely Plato, did indeed have such power-mad aspirations. Plato thought that only philosophers could know the truth of things: only they could discern clearly such things as justice, reason, truth, knowledge and what is good. Therefore, Plato held, they should be put in charge. The philosopher should become king.[10]

My view, however, is that philosophers should come up with, and can only come up with *suggestions, possibilities, proposals, conjectures*. Philosophers need to come up with *arguments* too, designed to show that this or that *proposal* or *conjecture* really does solve the problems it is claimed to solve, and does not create even more serious unsolved problems. But even if these arguments are entirely valid, they cannot establish the truth of the conjecture in question, if this conjecture is about substantial matters of fact. In the end all our knowledge, even scientific

knowledge, is conjectural in character. A proper task of philosophy is to put forward and critically assess conjectures intended to help solve our fundamental problem - conjectures which, we may hope, are true, and which have fruitful implications for thought and life. Any one may make a contribution to thought about our fundamental problem, and we should all ponder the problem, and its possible solutions, from time to time at least.[10]

The proper task of philosophy, in short, is to keep alive thinking about our fundamental problem, encourage everyone to think about it, now and again, try to improve attempts at solving aspects of the problem, and try to ensure that thinking about the fundamental problem interacts fruitfully, in both directions, with more specialized and particular problems of research and life. Philosophy pursued in this inter-disciplinary spirit is rather different from most current academic philosophy which conceives of itself as a specialized academic discipline alongside other specialized disciplines. We need a name for philosophy as done here. In the Preface I suggested we call it *Critical Fundamentalism*.[10] I will have more to say about Critical Fundamentalism in chapters 9 and 10.

Enough of preliminaries! Let us begin our exploration of our fundamental problem, this great fissure in our thinking, this clash of continents.

In order for anyone to be aware of the human world/physical universe problem, it is necessary for something like the scientific vision of the universe to have emerged, at least as a possibility, as a view of things that just might be true. This first happened nearly two and a half thousand years ago, in ancient Greece, when Leucippus (5th century BC) and Democritus (460-370 BC) invented atomism. Unfortunately, almost nothing is known of Leucippus, and little of Democritus. Their books were destroyed.[10] What we know of Democritus comes in the main from quotations from Aristotle (who opposed Democritus' atomism).

According to the atomism of Leucippus and Democritus, atoms are eternal, rigid, variously shaped, and devoid of perceptual qualities like colour, sound and smell. Some are spherical, others are like needles, and others have hooks so that they hook together to form cohesive solids. All phenomena are the outcome of atoms in motion through the void.

Richard Feynman, a famous 20th century physicist, once said that if all scientific knowledge was destroyed, and one had to capture what was most important in one sentence, that sentence should be: "all things are made of atoms".[10] Leucippus and Democritus, in other words, discovered the most important nugget of scientific knowledge that there is. But this discovery came about in a most extraordinary way. An earlier ancient Greek philosopher, Parmenides (late 6th - early 5th centuries BC), became baffled by the very idea of change. He argued that it embodied a contradiction. If there is change, then that which initially does not exist - *nothing* - subsequently becomes something that does exist. But that means that, initially, the *nothing* exists - that which does not exist exists - a straight contradiction. The very idea of change is a contradiction. All change is impossible. Reality, Parmenides concluded, is an unchanging, homogeneous sphere, with nothing outside it, and all change and diversity are illusions.

Leucippus and Democritus, evidently, decided that this conclusion is absurd. Change and diversity are all too real features of the world. Therefore Parmenides' basic assumption must be false. The nothing - the void - must exist. It must surround Parmenides' unchanging, homogeneous sphere. Shrink this sphere down to a tiny size, populate the void with other such spheres: and one has atomism. Each atom is a tiny, Parmenidean universe, homogeneous and unchanging (internally). All change is simply relative motion of atoms.[10] Thus was born one of the most fruitful scientific ideas ever!

The nub of atomism, and the nub of one possible solution to the human world/physical universe problem, is contained in one of the statements of Democritus that has come down to us:-

> Colour exists by convention; sweet and sour exist by convention: atoms and the void alone exist in reality".[10]

This sums up, in one sentence, the scientific view of the universe - even if scientific details about the nature of atoms and other matters need today a bit of elaboration. But can we really believe that the world we experience, colours, sounds and smells, and our inner sensations, feelings and thoughts are all illusory, features that exist only "by convention", there being in reality nothing more in existence than impersonal, colourless physics?

Roughly two thousand years after Leucippus and Democritus, something like their vision of things emerged again as a viable option with the birth of modern science as a result of the work of Copernicus,[10] Kepler,[10] Galileo,[10] Descartes,[10] Huygens,[10] Hooke,[10] Boyle,[10] Newton,[10] and others.[10] Almost all those associated with the birth of modern science accepted some version of what I have called *the scientific vision of the universe*. This can be regarded as being composed of three basic ingredients.

(1) Natural phenomena obey mathematically precise physical laws.
(2) Everything is composed of atoms.
(3) Colours, sounds, smells, tactile qualities, as we experience them, do not exist objectively; they are not real properties of things.

There was disagreement about some of the finer details. Descartes was perhaps the most radical in depriving physical entities of properties. For him, atoms possess only extension and motion: atoms are, for Descartes, indistinguishable from fragments of empty space. Newton, on the other hand, scornfully rejected any such view. For him, atoms are "solid, massy, hard, impenetrable, moveable Particles",[10] certainly distinct from empty space. These "particles" attract and repel one another by means of forces that act at a distance - forces such as gravitation, electricity and magnetism. However, Newton had grave doubts about the actual physical reality of forces. Even though he claimed to derive his law of gravitation from the phenomena by induction, he nevertheless declared “That gravity should be innate, inherent, and essential to matter, so that one body may act upon another, at a distance through a vacuum, without the mediation of anything else . . . is to me so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking can ever fall into it”.[10] Newton may have believed that gravitation arose as a result of the moment by moment direct actions of God. Newton certainly believed God intervened to adjust the solar system from time to time to ensure its stability.[10] Despite these disagreements about the nature of the physical universe, there was much more widespread agreement among natural philosophers associated with the birth of modern science about the non-reality of sensory qualities as we perceive them.

Thus Galileo, in 1632, two thousand years after Democritus, expressed the point like this:

> whenever I conceive any material or corporeal substance, I immediately feel the need to think of it as bounded, and as having this or that shape; as being large or small in relation to other things, and in some specific place at some specific time; as being in motion or at rest; as touching or not touching some other body; and in being one, or few, or many. From these conditions I cannot separate such a substance by any stretch of my imagination.[10] But that it must be white or red, bitter or sweet, noisy or silent, and of sweet or foul odour, my mind does not feel compelled to bring in as necessary accompaniments. Without the senses as our guides, reason or imagination unaided would probably never arrive at qualities like these. Hence I think that tastes, odours, colours, and so on are no more than mere names so far as the object in which we place them is concerned, and that they reside only in the consciousness. Hence if the living creature were removed, all of these qualities would be wiped away and annihilated.[10]

Galileo goes on to point out that if a feather tickles us we hold that the tickling is in us, not in the feather. In a similar way, colours, sounds and smells are a kind of tickling in us, and are not objective features of things external to us.

And Newton, for one, agrees. He writes:

> if at any time I speak of light and rays as coloured or endued with colours, I would be understood to speak not philosophically and properly, but grossly, and accordingly to such conceptions as vulgar people in seeing all these experiments would be apt to frame. For the rays to speak properly are not coloured. In them there is nothing else than a certain power and disposition to stir up a sensation of this or that colour. For as sound in a bell or musical string, or other sounding body, is nothing but a trembling motion, and in the air nothing but that motion propagated from the object, and in the sensorium 'tis a sense of that motion under the form of sound; so colours in the object are nothing but a disposition to reflect this or that sort of rays more copiously than the rest; in the rays they are nothing but their dispositions to propagate this or that motion into the sensorium, and in the sensorium they are sensations of those motions under the forms of colours.[10]

Almost all scientists today would agree. Thus Semir Zeki, a present day neuroscientist who has done much to unravel the neurology of colour perception, writes "Ever since the time of Newton, physicists have emphasized that light itself, consisting of electromagnetic radiation, has no colour"; and Zeki goes on to quote a part of the above passage from Newton with approval.[10]

There is here an astonishing paradox. Almost all scientists, from the very few pioneer natural philosophers of the 17th century, via the ever growing community of scientists through the 18th, 19th and 20th centuries down to the thousands upon thousands of scientists world-wide today, agree almost without discussion that colours, sounds and other perceptual qualities do not really exist objectively out there in the world. But science, by common consent, is based on experiment and observation. And the most trivial observation one could make verifies that colours and sounds do exist. Open your eyes, look around and, depending where you are, you will see green fields, red-brick houses, yellow sand, blue sky - assuming it is daytime and you have normal sight. Is not the theory that the world is devoid of colour and other perceptual qualities refuted by the most elementary observation conceivable? How can empirically based science ignore such an obvious refutation?

The solution to this paradox is to note that the scientific view of the world, when applied to processes associated with perception, cunningly undermines the very idea that perception can have any power whatsoever to verify the existence of perceptual qualities in the world! For note what occurs. Light of various wavelengths is reflected from the object perceived, enters the eye, and forms an image of the external object on the retina at the back of the eye.[10] Sensory cells react, and cause nerve cells to respond. These send signals along the optic nerve to the back of the brain, and it is only then, as a result of complex neurological processes occurring in the brain, that the miracle occurs and we have the experience of seeing. What we are directly aware of, in perception, is not the external object, but our inner mental representation of the object. And we have every reason to suppose that this will be quite different from its external cause, the perceived object. Just think of the many transformations that are involved as we go from perceived object, a daffodil say, to mental "perception" of it. There is (1) the daffodil itself. Then there is (2) light absorbed and reflected by the daffodil. A minute fraction of the reflected light is (3) focused by the lens of the eye so that it falls as an image on the retina at the back of the eye. There, as a result, (4) complex chemical processes occur in light sensitive cells of the retina. These processes then (5) cause neurons of the optic nerve to fire, so that a wave of exchange of potassium and sodium ions across the membranes of these neurons travels from the eye to the brain. This in turn (6) causes complex neurological processes to occur in the back of the brain, progressively analysing the stimuli. Finally, the miracle occurs, and these neurological processes (7) create or become *perceptual awareness of the daffodil*. This long chain of causal processes, involving at least seven major transformations, all but ensures that the final mental *visual experience of seeing the daffodil* must be radically different from the external *daffodil* itself. Daffodil; light; chemical processes in retina; neurological processes in optic nerve; neurological processes in brain; visual experience of seeing daffodil: each event in this chain of events is of a character profoundly different from the one that came before, and so the final event is bound to differ radically from the first one, and can hold few clues as to the nature of the first one - the daffodil out there in the world.

Let us call this *the argument from the causal account of perception*.[10] I take this argument to establish, if valid, two vital points. First, what we really see, what we really know about, in perception, is not the external object, the daffodil, but rather the final event in the above causal chain of events, our inner mental, visual representation of the daffodil. Second, we don't directly perceive objects external to us, and so our perception of objects, such as daffodils, may be systematically deceptive, so that we think we see daffodils to have properties, such as yellowness, which actually they don't possess at all.

The argument from the causal account of perception, if valid, leads remorselessly to something like the following picture. We are, as it were, locked inside our heads. We have a television screen which we take to depict what is going on around us, outside our heads. But we can never leave the privacy of our skull. We can never compare the images on the television screen with the real external objects that these images are supposed to represent. There is always the possibility that the images on the screen systematically misrepresent the external objects they are supposed to depict.

This argument from the causal account of perception cunningly uses the scientific view of the world, as I have said, to save it from observational refutation. The scientific view of the world itself implies that our senses are almost bound to lead us astray systematically about the real nature of things.

But the argument established more. It seems to provide overwhelming grounds for believing in *Cartesian Dualism*.

Cartesian Dualism is one of five major attempted solutions to our fundamental problem. It seeks to solve the great fissure, the clash of continents, by declaring that there are two worlds, two realms of existence: there is, on the one hand the physical universe, composed exclusively of physical entities with physical properties; and on the other hand there is the world of Mind, the world of consciousness, that accommodates everything that the physical universe excludes, and is quite different in character from anything physical. Our Mind contains our experiences, our thoughts, our feelings, our desires, everything we consciously experience. Minds are linked to living brains, and there may be a two-way interaction between brains and Minds.[10]

Cartesian Dualism attempts to solve the human world/physical universe problem by sharply separating out the human world from the physical universe. The former is to be associated exclusively with this Cartesian entity, the conscious Mind.

Cartesian Dualism may strike one as wildly implausible just because it postulates this weird, ghostly entity, the Mind, somehow entirely distinct from anything material or physical and yet, mysteriously, floating in some way within, or above, the brain. What possible grounds could we have for believing in such a fantastical, ghostly entity?

The argument from the causal analysis of perception provides us with such grounds. According to this argument, when you look at things in the world, what you are really, directly perceiving - what you really know about - are the visual experiences you have, your inner visual experiences of trees, fields, sky, people, buses, houses, or whatever your visual experiences may be composed of. You don't directly perceive the external objects, the trees, the fields, and so on. At best, you infer that that is what you are looking at. What you directly perceive, and most immediately know about, are your inner visual experiences of these external things.

There is one point, then, about which we can be absolutely certain. These inner visual experiences are utterly different from anything going on in our brain. Our brain is made up of soggy grey matter creased and folded, in turn made of billions of neurons, synaptic junctions and glial cells. All that is utterly different from our inner visual experiences, composed of perceived vistas of green grass, the sight of people walking, a perceived dome of blue sky. In so far as we know anything, when we see (or hear, touch, smell or taste), we know utterly and intimately the real nature of our inner perceptual experiences - according to the argument from the causal account of perception - and what we know tells us that these inner experiences are wholly different from all that there is in the brain. Mysteriously, furthermore, these inner experiences are wholly private to us. If anyone else opens up my skull and looks inside, without killing me or rendering me unconscious, they certainly won't come across anything that remotely resembles my inner experiences. My brain is a part of the public material world, the physical universe; my Mind is private to me and utterly distinct from the public material world.

Thus, to update slightly what I said earlier, the argument from the causal account of perception performs two functions. It saves the scientific view of the world from obvious observational refutation. And it provides a convincing argument for Cartesian Dualism. It does these things, at least, just as long as the argument is *valid*. Whether the argument is valid or not will be examined in the next chapter.

The argument from the causal account of perception has played a quiet but key role in persuading many scientists and non-scientists, from the beginnings of modern science, that both the scientific view of the world and Cartesian Dualism (or something like it) deserve to be

accepted. It is striking that Galileo in the quoted passage does not - quite - appeal to the argument, although his remarks about tickling and the feather get close. Descartes, who first clearly enunciated what later came to be called *Cartesian Dualism*, did not appeal to the argument in expounding and defending the view. Nevertheless, the logic of the situation is such, I suggest, that it is this *argument from the causal account of perception* that plays a key role in rendering acceptable both the scientific view of the world, and the doctrine so closely linked to it, Cartesian Dualism.

But Cartesian Dualism presents us with horrendous problems.

First, this irredeemably private, ghostly Cartesian Mind has such weird properties that it is very difficult to believe it actually exists. Can we really believe there are all these Minds floating about in the world, utterly distinct from brains but nevertheless mysteriously linked to brains? When in evolution did they first emerge? How could a step in evolution, a mutation perhaps, abruptly create this entirely new kind of non-material entity, the Cartesian Mind? It all seems like the most ludicrous spiritual nonsense.

Second, there is the problem of how Mind and Brain interact, or are inter-related - the so-called Mind-Body Problem. The brain must cause things to occur in the Mind, or we would not perceive anything at all. But does the Mind cause things to occur in the brain? If it does, then purely physical explanations of what goes on in the brain must be incomplete, or false. Those events caused by the Mind cannot be explained physically. This would amount to poltergeist-type events persistently occurring in the brain, events that are not as dramatic, but just as implausible, as scenes depicted in horror movies, when a disturbed child causes furniture to be hurled about the room by thought alone. On the other hand, if our Mind does not cause events to occur in the brain, then there can be no such thing as free will. We are bereft of the power to act. Our Mind is utterly impotent.

Third, there is the horrendous problem of how we can ever know anything about the external world whatsoever, if Cartesian Dualism is true. For Dualism locks us up inside our Cartesian Mind. All we ever perceive are our inner perceptual experiences of things external to us, the flickering images on our internal television screen. How, then, can we possibly know that our inner perceptual representations of external objects resemble these external objects? We can never hold a daffodil in one hand, and our inner perceptual Cartesian Mental representation of it in the other hand, to compare the two. Any such comparison can never be made. We are, according to Cartesian Dualism, condemned to be stuck forever inside our skulls, inside our Cartesian Minds, staring at the flickering images on our internal TV screens.

John Locke (1632-1704) tried to solve this problem with his *representational theory of perception*, as it came to be called.[10] Physical objects external to us do really possess some properties, such as shape, size and number. These Locke calls primary qualities. Our inner perceptual representations of these features of things, do genuinely and accurately depict the real features of things external to us, the primary qualities. But all the other perceptual features we seem to experience - the colours, sounds, smells, tastes, and tactile qualities - do not accurately represent their external cause. Some combination of primary qualities correspond to these perceptual experiences of colour, etc., very different from what we seem to see, hear, smell, taste and feel. Locke called these combinations of primary qualities *secondary qualities*. According to Locke, then, we see clearly the nature of primary qualities in perception, but have only a massively delusive experience of the nature of secondary qualities.

It did not take long for a philosopher to come along and detect the fatal flaw in Locke's theory. That philosopher was bishop Berkeley (1685 - 1753). He pointed out that there could be no reason whatsoever to distinguish primary qualities (which we can see accurately) and secondary qualities (which we wholly misrepresent). All we ever know are our inner perceptual experiences. Confined remorselessly to our Cartesian Minds, we can only know about the contents of our Cartesian Minds. We cannot know anything else at all. Thus Berkeley came to defend the *second* of the five attempted solutions to our fundamental problem: *Idealism*. There are only perceptual experiences and ideas: the material world does not exist at all. As we can only ever experience our inner experiences, and can never experience anything material and external at all, we can have no evidence in support of the material world at all. And Berkeley summed it up in a succinct phrase: *esse est precipe - to exist is to be perceived*.[10]

One can argue that it is not just that we can have no *evidence* in support of the existence of a material world, no *reason* to believe in its existence: even more serious, all propositions about the material world must be *meaningless*. We can describe meaningfully what we have had experience of, our visual, auditory and tactile experiences. And we can describe meaningfully what we can compare with these inner perceptual experiences. But we can say nothing meaningful whatsoever about that which cannot, even in principle, be compared with our inner experiences. And that means we can say nothing meaningful about a hypothetical external material world. For that would require we can make the comparison between a perceptual experience, and what it is supposed to be the perception of, a bit of the material world, a daffodil for example. But it is just that comparison that is inherently impossible to perform. Hence, not only can we have no evidence or reason whatsoever to believe the external material world exists. The very hypothesis that it does exist is meaningless. We have no choice other than to adopt Idealism.

There is, of course, something seriously fishy about this argument. We begin with the scientific vision of the universe. We are then led to adopt Cartesian Dualism, which in turn leads us to conclude that there is only Mind, the physical universe vanishing from the scene. This argument is, at best, a *reductio ad absurdum*. It begins with the scientific vision of the universe and ends with the conclusion that there is no such thing as the material universe at all - a contradiction. The argument does not establish Idealism, it is at most a refutation of the scientific view of the universe. It could be argued, however, that if we reject this view, then Idealism remains as the only option.

Idealism solves our fundamental problem with drastic simplicity: eliminate the physical universe, and the problem disappears!

One might think, however, that Idealism is such an absurdity that no one, other than bishop Berkeley himself perhaps, could possibly take it seriously for a moment. Not the case at all. Berkeley's Idealism, watered down and transformed in various ways, exercised a profound and far reaching influence on subsequent philosophy, and on subsequent thought more generally.

It profoundly influenced David Hume.[10] His entire philosophy assumes that all our knowledge consists of *sense impressions* (what I have called perceptual experiences) and *ideas* - the latter pale echoes of combinations of the former. Hume goes on to argue that an idea, in order to be meaningful, must be such that it can be traced back to some combination of sense impressions. The idea that there exists a *necessary connection* between cause and effect cannot, for example, be traced back to sense impressions; hence, Hume argues, it is meaningless. Cause and effect may be constantly conjoined, but there is no objective *necessity* ensuring that if one occurs, the

other will also occur *necessarily* (or if there is such an objective necessity, we cannot have an idea as to what it is).

Berkeley's Idealist outlook profoundly influenced Immanuel Kant,[10] - partly via Hume. Kant, like Hume, thought all our knowledge is built up from sense experience, but he also thought that experiences, in order to be conscious, had to exhibit a certain *order* or *coherence*, and that means that there are certain basic principles which we can be absolutely certain all conscious experiences will verify - because if they don't, they won't be conscious! Kant differed from Berkeley in holding that the real world, the world external to our Minds, does exist, but he also held that there is nothing meaningful that we can say about it, because it lies beyond all possible experience. All we can say is that it exists.

Hume and Kant, in turn, exercised a profound influence on subsequent philosophy and thought. Hume influenced John Stuart Mill,[10] Bertrand Russell,[10] Ernst Mach,[10]Albert Einstein,[10] the Logical Positivists and Logical Empiricists[10], A.J. Ayer,[10] and a vast host of more modern philosophers at work in Britain, north America and Australasia in so-called *analytic* philosophy. Analytic philosophy holds that the task of philosophy is to analyse language and concepts - an idea that goes back at least to Hume, as we have seen. Kant influenced a host of philosophers in Europe who took seriously the Kantian idea that there is this world of structured experience that needs to be studied by direct contemplation and thought alone, untouched by natural science. There emerged much obscure work in metaphysics, often idealist, anti-rationalist, and indifferent to, if not hostile towards, natural science. Kant led to Fichte, Schelling, [10] Schleiermacher,[10] Hegel,[10] Schopenhauer,[10] Husserl,[10] and Heidegger.[10] This post-Kantian metaphysics even spread to Britain with the work of Green, Bradley and McTaggart,[10] and to France with Existentialism, Structuralism, Post-Structuralism, and the work of Jean-Paul Sartre,[10] (1905-1980), Maurice Merleau-Ponty,[10] Michel Foucault,[10] Jacques Derrida,[10] and many others belonging to the so-called *Continental* school of philosophy. And these two schools, analytic and continental philosophy, broadly speaking, still dominate down to today (2017 at the time of writing).

Philosophy lost the plot. The story I have just sketched began well, with Descartes and Locke making a good, initial stab at solving philosophical aspects of the human world/physical universe problem. It should, however, have rapidly become apparent that Cartesian Dualism creates more problems than it solves, and so a better attempt at the solution to the fundamental problem needs to be found. Initially, this did happen. Both Leibniz[10] and Spinoza[10] put forward alternatives to Cartesian Dualism. But then the original problem - the human world/physical universe problem - got increasingly lost sight of. Instead of returning to it, philosophers for centuries, paradoxically and absurdly, continued to grapple with problems generated by Cartesian Dualism *even though they rejected this very doctrine, the doctrine that created these problems in the first place*. What they failed lamentably to do was return to the original human world/physical universe problem that Cartesian Dualism fails to solve, try to get clearer about what the problem amounts to, and what alternative possible solutions there may be that do justice *both* to what seems to be of most value about our human world, *and* what science seems to tell us about the universe. Very strikingly, granted the views of Berkeley, Hume, Kant, and many of their successors, one cannot even *state* the human world/physical universe problem properly, let alone put forward possible solutions for consideration. Berkeley eliminates one half of the problem: the physical universe. Hume renders it impossible to talk meaningfully about it, in so far as the physical universe lies beyond the reach of human experience. And Kant declares that the real

each cell consisting of DNA, that miraculous, molecular spiral that determines the characteristics of the individual in question. We know what the composition and structure of the DNA molecule is, and what the mechanisms are that translate information from the DNA molecule to specific proteins that go to make up multi-cell plants and animals - why, in plants, some cells form leaves, others roots, others stems, and why, in animals, some cells form muscles, others skin, others bone, and so on. We know what occurs when a new individual mammal or person is conceived, and what goes on in the womb to transform the fertilized egg into an infant. We have vastly increased our knowledge of disease, whether infectious like polio, or non-infectious like cancer, and we have transformed our capacity to cure and prevent disease. We have discovered a great deal about the structure and history of the earth. We know the continents float on semi-molten rock and slowly move with respect to each other, creating oceans when they move apart, and pushing up mountains when they collide. We know why there are earthquakes and volcanoes. We know that conditions on earth have changed dramatically in the past over billions of years: there have been ice ages, and times of tropical heat. We know that the oxygen in the atmosphere was created in the distant past by algae as a result of photosynthesis. It took these blue-green algae a billion years to transform the atmosphere in this way, and thus make it possible for us and other animals, billions of years later, to breathe and live.

Our fundamental problem, then, is to understand how our miraculous and tragic human world can exist and best flourish immersed as it is in this fascinating but coldly impersonal universe of science. And in order to enhance our understanding of this problem, its scope and import, we need to ransack, not just the scientific picture of the universe, but also our human reality, in all its rich diversity, its heart-ache, its splendour. We need to explore the glorious achievements of humanity, the cathedrals, the gardens, the magnificent cities, the music, the art, the drama, the joy, the laughter, good times and bad times, families, institutions of liberty, democracy and justice, the habits of friendliness and civilization - this whole caboodle of the miraculous, the mundane, and the unspeakable. In our quest for the human heart we need above all to plunge into literature: Shakespeare, Tolstoy, Jane Austen, Dostoevsky, Stendhal, D.H. Lawrence, Chekhov, Flaubert, Proust, Kafka, Scott Fitzgerald, George Orwell, Turgenev, Thomas Hardy, James Joyce, George Eliot - and so many others. We need to enter imaginatively into the lives of others so that we feel at least a whisper of their joy, their pain, their hopes and fears, what they think and experience as they struggle to make something out of their lives. We need to try to acquire some empathic understanding, not just of those who live lives like ours, but also of those whose lives are very different: much poorer, perhaps, or wealthier, or enmeshed in traditions, cultures or circumstances very different from ours. We need to ransack the past: ancient civilizations, the Babylonians, the ancient Egyptians, the ancient Greeks, the latter so civilized and so barbaric, the inventors of mathematics, philosophy, theatre, and democracy. We need to be prepared to confront the dark places of the past: the wars, the massacres, the torture, the Nazi death camps. But we also need to consider those who struggled to care for others, those who provoked happiness and joy in others, those who fought for justice, for an end to slavery, exploitation, unnecessary suffering, deprivation, and death. Somehow, we need to embrace in our imagination the good, the bad and the indifferent, the noble souls and the monsters, that which is miraculous in existence, and that which provokes dismay, or horror.

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world, the noumenal word as he called it, does exist but nothing meaningful can be said about it (apart from that it exists).

We need to consider, too, what we might one day be able to achieve. Is it realistic to hope that one day we might have a world free of war, starvation, dictatorships, gross inequality, suffering and death that need not be - a world in which people care for the environment and each other, and everywhere have the opportunity to realize the wonderful things life has to offer? Could the physical universe permit such a human world one day to come into existence? Or is this an utopian fantasy, something our human nature, inherited from our evolutionary past, will not permit us to create? This possibility of a better world needs to be pondered especially in view of doubts we may well have about the reality of free will in view of the fact that we are, whatever else we may be, integral bits of the physical universe.

We need, too, to put our human world into the broader context of all sentient life. We are not the only beings who see and act, experience joy, pain and terror. So do foxes, otters, rabbits, elephants, sheep, and mammals of thousands of other species. We humans are mammals too, and we share this planet with our fellow mammals, our fellow sentient beings - except that there is this long history of our horrific casual brutality to our fellow sentient beings. Those of us who eat meat are mammalian cannibals. And then there are birds, and reptiles, and even fish to consider. They may be sentient too. We ought not to dissociate ourselves from the rest of life on this planet.

This precious life, this sparkling wonder of conscious and sentient living in a universe almost everywhere bereft of life: it is this miracle immersed in lifeless physics that we have to understand: how it can exist and best flourish.

There is a tendency these days for scientists to present science to the public as something that is full of excitement, astonishment, and mystery. Having discovered, perhaps, that the public these days listens only to pop stars and comedians, scientists now assume the garb of the pop star or the comedian, and present science as space opera. Perhaps I have given in to this tendency a little myself, in this chapter. Actually doing science mostly involves lots of painstaking hard work and repeated failure, with only very occasional glimpses of something exciting and new. It is true, however, as I have tried to show, that modern science does present us with an astonishing vision of the universe around us, its history, the history of our earth, the history of life and our life. There is much that we know, and much that remains a mystery.

But what tends not to be emphasized is the very grim message that science seems to bring to us about the reality of our human world. It seems to drain away all the colour, the sound and fury, the meaning and value, our whole world of inner experience, feeling, sensation and thought, our very capacity to act, to decide ourselves what we will do and then do it, and leaves only a pale simulacrum of these things behind - ultimately, the lawful, lifeless dance of electrons, photons, protons and the rest. Everything that gives colour, meaning and value to life seems to become a mere will-o-the-wisp, a thin illusion, a dream that fades as science awakens us. It is simply dishonest not to acknowledge this nightmare threat from science. It is dishonest to pretend the threat does not really arise.

This threat that comes from science is, it has to be admitted, weirdly philosophical and esoteric in character. We follow the argument, and are appalled. We blink, and it is the argument that becomes a will-o-the-wisp, and life returns as a reality, in all its richness and frustrating complexity. But there is another threat to our existence that stems from science that is of a kind that is much more substantial and down to earth, much more difficult to deny.

We are confronted by grave global problems: population growth, the destruction of natural habitats and the extinction of species, the lethal character of modern war and terrorism, extreme inequality of wealth and power around the globe, the threat of modern armaments, conventional,

chemical, biological and nuclear, threats to democracy posed by social media, pollution of earth, sea and air and, above all, the impending menace of climate change. These global problems, taken together, are so severe they threaten what shards of civilization we have managed to put together so far. Millions, possibly billions, may die if we do not discover how to resolve our conflicts and problems a bit more intelligently, effectively and humanely than we have managed so far.

A decisive point to notice is that all these problems have been made possible by the astonishing intellectual successes of modern science and technology. Much that is of great benefit has come from science. It has made the modern world possible. But science and technology have made possible modern industry and agriculture, modern hygiene and medicine, modern armaments and the internet, and these in turn have led to population growth, destruction of habitats, lethal modern war, global warming, and the other global problems we face. None of these global problems would have come to be without modern science.

We should not be surprised by this outcome. Modern science and technology give, to some of us, unprecedented powers to act. This can have great benefit, in medicine or agriculture, for example. But, without the capacity to act *wisely*, it will, as often as not lead, not to human welfare, but to human suffering and death - whether intended, as in modern war, or unintended, initially at least, in the impending disasters of climate change.

In concerning ourselves with how our human world can best flourish immersed as it is in the world as depicted by science, we cannot ignore these global problems, and the role that science has played in the genesis of these problems. Science enhances our power to act, but not our power to act *wisely*, and therein lies the key disaster of our times, the disaster behind all the others. Before the advent of modern science, lack of wisdom did not matter too much. We lacked the power to do too much damage to the planet and ourselves. Now that we have science, and the powers to act it has bequeathed to us, wisdom has become, not a private luxury but a public necessity.

Essentially, we need to *learn* how to solve these problems. And for that, we need *new institutions of learning*. We need to bring about a revolution in our schools and universities so that they become rationally devoted to helping us learn how to make progress towards as good a world as possible. Science, the pursuit of knowledge, needs to be transformed into something I shall call "wisdom-inquiry". That is the subject of chapter seven.

Chapter Two: Some Ideas as to How Our Fundamental Problem is to be Solved

Five Approaches to its Solution: Physicalism, Dualism, Idealism, Naïve Realism, and the Two-Aspect View

Philosophy can only hope to solve a very meagre *aspect* of all that is involved in our fundamental problem.

For consider: the human world/physical universe problem is made up of all our problems of living - the problems we encounter as we live - and all our problems of thought. The second lot are, in a sense, a sub-section of the first. We *think* as a part of *life*. Problems of living are solved by what we do, or what we refrain from doing: they will remain open and unresolved for as long as there are people around to continue to live. Problems of thought can arise out of a concern to solve problems of living; they may arise as we explore imaginatively possible actions in an attempt to discover what to do in order to achieve some desirable, or at least desired, objective.

Problems of thought may also arise, however, out of curiosity, the desire to know, to understand, for its own sake, without this impulse being tied too specifically to any problem of *action* or *living*. Problems of thought, like problems of living, will remain open and unresolved as well to a considerable extent as long as there are still people to live, think, imagine and wonder.

In other words, almost *everything* associated with our fundamental problem must inevitably remain untouched and unresolved by what follows in this book - and what is contained in all philosophical books ever to be published in the future! Our concern here is only with a very, very thin slice of our fundamental problem - the *abstract, philosophical* aspect, that aspect of the problem which remains when all life, detail and substance has been drained away, and only a whisper of the problem remains. We are concerned here, above all, with *possibility*: How is it *possible* that our human world can exist and best flourish embedded as it is in the physical universe? Everything singular, specific, detailed must be pared away until just enough remains for us to highlight and concentrate on this important issue of *possibility*.

The really important problems we face are the particular problems that confront us as we grapple with difficulties in life; but our fundamental philosophical problem is significant too, in part because how good or bad our answer is to it, given implicitly in what we do in life, may well have a bearing on our capacity to solve our particular, urgent problems of living – a point I will seek to emphasize in what follows. As a result of improving our tentative solution to our fundamental philosophical problem we may be able to improve our capacity to solve much more specific and urgent problems of living, and thus improve our lives.

Our concern is with the collision of two continents. On the one hand there is the continent of science - the universe as depicted by science, including ourselves and everything around us conceived of as a part of the physical universe. On the other hand there is the continent of human life and human experience, the world of consciousness, free will, meaning and value. These two continents collide. They clash. It is all but impossible to see how these two worlds can coexist in one coherent world. That this basic clash of continents exists indicates that there are some very serious and pervasive things wrong with the way we think about the world - either the universe of physics, or our human world, but much more likely, both worlds together, both aspects of the universe. Exploring this clash of continents can be fruitful because it can lead us to uncover systematic mistakes we are making in the way we think about vast domains of existence: the physical universe, and our human world. We may be able to improve our ideas about the universe, our human existence, what is of most value in life and how it is to be achieved.

We need to represent this clash of continents in as accurate and rich a way as possible, to do justice to the nature of the clash; at the same time we need to represent the clash in as simple and spare a way as possible, uncluttered by irrelevant detail, so that we can go straight to the heart of the clash, and so that we can play around with our simplified representations of these two continents, bend them and mould them this way and that until we find shapes which fit beautifully together to stand potentially for our one coherent actual world.

Two final remarks about the nature of our problem before we plunge into the investigation into how to solve it!

First, I have emphasized that the correct solution to the *philosophical* aspect of the problem - the solution that specifies correctly how it is *possible* for our human world and the physical universe to co-exist in a coherent whole - would leave almost everything else untouched and unresolved. But this emphasis on the sterility of philosophy, its uselessness as far as everything else is concerned, can be taken too far (as I have also indicated). Any modification in one or

other continent, however slight, that takes us a bit nearer to a reconciliation of the two continents, is almost bound to have far-reaching fruitful implications for the continent that is modified. The problem we are tackling takes us to the very heart of our understanding of our world. It concerns a quite fundamental fissure in our thinking. Even a minor modification to one or other continent is almost bound to have far reaching implications, for thought or for life – or for both. What are I hope fruitful implications will emerge from the discussion of this book - fruitful implications for our understanding of the universe, our understanding of science, our understanding of how we can learn to make progress towards a better, wiser world. These implications, mentioned in the Preface and indicated during the course of the book, are gathered together and summarized in chapter 9 – implications for physics, for natural science, for Darwinian theory, neuroscience, quantum theory and mathematics (or at least the philosophy of mathematics), for social science and the humanities, for academic inquiry as a whole, and ultimately for our whole social world. Orthodox philosophy in the main does not have fruitful implications for other disciplines, or for life, and does not claim to have such implications. But philosophy devoted to trying to help solve aspects of the physical universe/human world problem can hardly avoid having such implications! We may even attempt to assess the relative merits of different approaches to solving the fundamental problem by comparing the fruitfulness of their implications for other disciplines and aspects of life.

A profitable way of thinking about the relationship between problems that are more and less fundamental is to represent all our problems in the form of a pyramid. At the apex of the pyramid we have the fundamental philosophical problem, the problem about *possibility*. As we descend the pyramid, more and more increasingly diverse, particular, specialized problems arise until, when we reach the base of the pyramid we arrive at our actual, specific problems of life and research. The all-important point to appreciate is that we need an interplay, an interchange, in both directions, between more abstract and general problems, higher up, and more specific and particular problems, lower down. Thinking about our most fundamental *philosophical* problem needs to interact persistently with thinking about somewhat less general, more specific problems of living and problems of thought. There needs to be a constant interplay between thinking at different levels that goes in both directions. In thinking about our fundamental problem we need to attend to what is going on in physics, in neuroscience, in evolutionary biology, in history and literature, but also in the world - the problems people face in their lives. And thinking about specific problems that confront us, in life and thought, needs now and again to consider the broader context; our best ideas about how to solve our fundamental philosophical problem may have fruitful implications for our particular, immediate concerns.[11]

The second point I have to make has to do with the status of philosophical ideas that may emerge from trying to solve our fundamental philosophical problem. One reaction to the programme I have indicated might be: *horror*. Is the idea that the philosopher, sitting in his study, will come up with *solutions* to all our problems which the rest of us must just accept? (The philosopher, these days, is almost bound to be an academic, a professor in some university.) Such a state of affairs would amount to sheer intellectual tyranny - the academic philosopher ruling the world! The very idea is as ludicrous as it is obscene. If this is what professors of philosophy set out to do, they need to be, not listened to, but locked up and treated as power-mad lunatics!

[11] I suggested this pyramid structure of problems and their attempted resolution in Maxwell (1980).

It is of interest that the philosopher who many consider to be the greatest ever, namely Plato, did indeed have such power-mad aspirations. Plato thought that only philosophers could know the truth of things: only they could discern clearly such things as justice, reason, truth, knowledge and what is good. Therefore, Plato held, they should be put in charge. The philosopher should become king.[12]

My view, however, is that philosophers should come up with, and can only come up with *suggestions, possibilities, proposals, conjectures*. Philosophers need to come up with *arguments* too, designed to show that this or that *proposal* or *conjecture* really does solve the problems it is claimed to solve, and does not create even more serious unsolved problems. But even if these arguments are entirely valid, they cannot establish the truth of the conjecture in question, if this conjecture is about substantial matters of fact. In the end all our knowledge, even scientific knowledge, is conjectural in character. A proper task of philosophy is to put forward and critically assess conjectures intended to help solve our fundamental problem - conjectures which, we may hope, are true, and which have fruitful implications for thought and life. Any one may make a contribution to thought about our fundamental problem, and we should all ponder the problem, and its possible solutions, from time to time at least.[13]

The proper task of philosophy, in short, is to keep alive thinking about our fundamental problem, encourage everyone to think about it, now and again, try to improve attempts at solving aspects of the problem, and try to ensure that thinking about the fundamental problem interacts fruitfully, in both directions, with more specialized and particular problems of research and life. Philosophy pursued in this inter-disciplinary spirit is rather different from most current academic philosophy which conceives of itself as a specialized academic discipline alongside other specialized disciplines. We need a name for philosophy as done here. In the Preface I suggested we call it *Critical Fundamentalism*.[14] I will have more to say about Critical Fundamentalism in chapters 9 and 10.

Enough of preliminaries! Let us begin our exploration of our fundamental problem, this great fissure in our thinking, this clash of continents.

In order for anyone to be aware of the human world/physical universe problem, it is necessary for something like the scientific vision of the universe to have emerged, at least as a possibility, as a view of things that just might be true. This first happened nearly two and a half thousand

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[12] For Plato's actual arguments for the idea that philosophers should rule, see Plato (1970). For a devastating criticism, see Popper (1962, vol. 1).

[13] These introductory remarks (amplifying what I said in the Preface) are intended to indicate how philosophy, as I conceive of it, differs from, is related to, and can contribute to, and receive contributions from, other disciplines. A fundamental task of philosophy is to combat what I have called *specialism* - the doctrine that only specialized intellectual standards and disciplines are worthwhile. The basic task of philosophy is to keep alive awareness of our fundamental problem - awareness of its unsolved character, the impact that ideas about how it is to be solved, good and bad, can have on other departments of thought, and on life too: see Maxwell (1980; 2017b; 2019a). This issue will be taken up again in chapters 9 and 10.

[14] All my work, from my first paper published in 1966, has been done in the spirit of Critical Fundamentalism: see Maxwell (2019a) for an account of it. For an earlier exposition of the argument that this is what philosophy ought to be, see Maxwell (2014b, especially ch. 2). See also Maxwell (2019a, pp. 145-157), where I refer explicitly to “Critical Fundamentalism”; and see Maxwell (2017b; 2019e).

years ago, in ancient Greece, when Leucippus (5th century BC) and Democritus (460-370 BC) invented atomism. Unfortunately, almost nothing is known of Leucippus, and little of Democritus. Their books were destroyed.[15] What we know of Democritus comes in the main from quotations from Aristotle (who opposed Democritus' atomism).

According to the atomism of Leucippus and Democritus, atoms are eternal, rigid, variously shaped, and devoid of perceptual qualities like colour, sound and smell. Some are spherical, others are like needles, and others have hooks so that they hook together to form cohesive solids. All phenomena are the outcome of atoms in motion through the void.

Richard Feynman, a famous 20th century physicist, once said that if all scientific knowledge was destroyed, and one had to capture what was most important in one sentence, that sentence should be: "all things are made of atoms".[16] Leucippus and Democritus, in other words, discovered the most important nugget of scientific knowledge that there is. But this discovery came about in a most extraordinary way. An earlier ancient Greek philosopher, Parmenides (late 6th - early 5th centuries BC), became baffled by the very idea of change. He argued that it embodied a contradiction. If there is change, then that which initially does not exist - *nothing* - subsequently becomes something that does exist. But that means that, initially, the *nothing* exists - that which does not exist exists - a straight contradiction. The very idea of change is a contradiction. All change is impossible. Reality, Parmenides concluded, is an unchanging, homogeneous sphere, with nothing outside it, and all change and diversity are illusions.

Leucippus and Democritus, evidently, decided that this conclusion is absurd. Change and diversity are all too real features of the world. Therefore Parmenides' basic assumption must be false. The nothing - the void - must exist. It must surround Parmenides' unchanging, homogeneous sphere. Shrink this sphere down to a tiny size, populate the void with other such spheres: and one has atomism. Each atom is a tiny, Parmenidean universe, homogeneous and unchanging (internally). All change is simply relative motion of atoms.[17] Thus was born one of the most fruitful scientific ideas ever!

The nub of atomism, and the nub of one possible solution to the human world/physical universe problem, is contained in one of the statements of Democritus that has come down to us:-

Colour exists by convention; sweet and sour exist by convention: atoms and the void alone

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[15] For a brilliant account of the devastating Christian destruction of the classical world – its art, architecture, literature, philosophy and civilization see Nixey (2018).

[16] Feynman (1963, ch. 1, p. 1-2)

[17] Atomism solves the problem of change by segregating sharply that which does not change (the internal properties of atoms) from that which does change (the relative positions of atoms to each other). It is not a very good solution to the philosophical problem of change, however, because it is much too specific. All that is required to solve the problem of how something can both persist and change, which might be thought to be a contradiction, is the observation that we can, in any way we wish, distinguish what may be called *essential* and *accidental* properties of a thing. The essential properties are those we decide the thing must possess if it is to be this particular thing in question. Accidental properties are those the thing may lose without ceasing to be this specific thing. We can now make perfect sense of the idea that the thing changes but preserves its identity through these changes. This will be the case if only accidental properties change, or are lost.

exist in reality".[18]

This sums up, in one sentence, the scientific view of the universe - even if scientific details about the nature of atoms and other matters need today a bit of elaboration. But can we really believe that the world we experience, colours, sounds and smells, and our inner sensations, feelings and thoughts are all illusory, features that exist only "by convention", there being in reality nothing more in existence than impersonal, colourless physics?

Roughly two thousand years after Leucippus and Democritus, something like their vision of things emerged again as a viable option with the birth of modern science as a result of the work

[18] A slightly different translation is quoted in Guthrie (1978), p. 440.

of Copernicus,[19] Kepler,[20] Galileo,[21] Descartes,[22] Huygens,[23] Hooke,[24] Boyle,[25] Newton,[26] and others.[27] Almost all those associated with the birth of modern science accepted some version of what I have called *the scientific vision of the universe*. This can be regarded as being composed of three basic ingredients.

(1) Natural phenomena obey mathematically precise physical laws.
(2) Everything is composed of atoms.
(3) Colours, sounds, smells, tactile qualities, as we experience them, do not exist objectively; they are not real properties of things.

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[19] Nicolaus Copernicus (1473-1543), Polish mathematician and astronomer, put forward the theory that the sun is at the centre of the solar system, and the planets, including the earth, go round it - a theory put forward over one and a half thousand years earlier by Aristarchus (310-230 BC), an ancient Greek. Copernicus was horrified by the complexity of the generally accepted theory due to Ptolemy (AD 100-170), which put the earth at the centre, with the sun and other planets going round the earth. Unfortunately, as Copernicus developed his own theory to take observations of the planets into account, it became increasingly complicated, and in the end, according to his theory, the planets went round, not the sun, but a point in space some distance from the sun! Copernicus published his theory more or less when on his death bed in a book called *On the Revolutions of the Celestial Spheres*.

[20] Johannes Kepler (1571-1630), a German astronomer and mathematician, discovered three key laws of planetary motion. He discovered that the planets move in ellipses around the sun, and that the line joining a planet to the sun sweeps out equal areas in equal times. There is a wonderful account of Kepler in Koestler (1964).

[21] Galileo Galilei (1564-1642), Italian astronomer, physicist, mathematician and philosopher, played a major role in bringing about the scientific revolution that led to the birth of modern science. He discovered the moon has craters and mountains, Jupiter has moons, and, as I mentioned in chapter one, the milky way is made up of stars - all reported in his *The Starry Messenger* which became famous throughout Europe when first published in 1610: see Galileo (1957, pp. 21-58). He discovered and demonstrated that objects fall with constant acceleration and projectiles trace out the path of a parabola near the earth's surface. He was accused by the Inquisition of defending Copernicus's theory, and spent the remaining years of his life under house arrest. At his trial he denied he defended the view that the earth goes round the sun, but is supposed to have muttered under his breath "And yet it moves".

[22] René Descartes (1596-1650), French philosopher, mathematician and scientists, is famous for engaging in a programme of systematic doubt to discover a residue of certainty, beyond doubt, upon which the new edifice of knowledge could be built. He hit upon "I think, therefore I am". The very activity of doubting meant he could not deny that he doubted, and therefore that he himself existed. The existence of God, and that which corresponds to "clear and distinct ideas" soon followed. Descartes' physics was soon superseded by Newton's - although it continued to linger on in France until 1750 - but Descartes' philosophy is still influential today. His most notable contribution to philosophy is what became known after him *Cartesian Dualism*: see Descartes (). According to David Wootton, Descartes stole most of his ideas from a Dutch natural philosopher, Isaac Beeckman: see Wootton (2016, pp. 361-364).

[23] Christiaan Huygens (1629-1695), Dutch physicist, mathematician and astronomer, sought to develop and apply Descartes' physics. He put forward a wave theory of light.

There was disagreement about some of the finer details. Descartes was perhaps the most radical in depriving physical entities of properties. For him, atoms possess only extension and motion: atoms are, for Descartes, indistinguishable from fragments of empty space. Newton, on the other hand, scornfully rejected any such view. For him, atoms are "solid, massy, hard, impenetrable, moveable Particles",[28] certainly distinct from empty space. These "particles" attract and repel one another by means of forces that act at a distance - forces such as gravitation, electricity and magnetism. However, Newton had grave doubts about the actual physical reality of forces. Even though he claimed to derive his law of gravitation from the phenomena by induction, he nevertheless declared "That gravity should be innate, inherent, and essential to matter, so that one body may act upon another, at a distance through a vacuum, without the mediation of anything else . . . is to me so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking can ever fall into it".[29] Newton may have believed that gravitation arose as a result of the moment by moment direct actions of God. Newton certainly believed God intervened to adjust the solar system from time to time to ensure

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[24] Robert Hooke (1635-1703), English physicist, astronomer, biologist, palaeontologist and inventor, made major discoveries in a range of disciplines. For much of his working life, Hooke was employed as curator of experiments by the newly formed Royal Society. It was Hooke's job to prepare experiments for the Society's meetings. Hooke was the first to grasp the basic principles of the solar system: objects travel with uniform velocity in straight lines unless impressed by a force; the planets move round the sun because of the attractive force of gravitation between sun and planets. Newton got the idea from Hooke, but failed to acknowledge Hooke's role in the *Principia*. For a magnificent account of Hooke's life and work see Inwood (2003).

[25] Robert Boyle (1627-1691), Anglo-Irish chemist and physicist, best known today for Boyle's law, which states that pressure and volume are inversely related for a given quantity of gas. Boyle all-but founded modern experimental chemistry with his *The Sceptical Chymist* published in London in 1660.

[26] Isaac Newton (1642-1727), one of the greatest scientists ever but really, like his contemporaries, a natural philosopher. It was Newton's great achievement to formulate the basic principles of what we now call "Newtonian mechanics", and then demonstrate that these principles, plus his law of gravitation, were able to predict very precisely the motions of planets, moons and comets, and other phenomena, in his *Principia Mathematica* published in 1687. Newton claimed to have derived his law of gravitation from the phenomena by induction, but this claim is a bit dubious, especially as the phenomena amounted to applications of Kepler's laws, which Newton went on to *correct*! Newton's *Principia* is, nevertheless, a brilliant work of profound significance. Newton himself was, however, in many ways an unpleasant character. He quarrelled with both Hooke and Flamstead (astronomer royal) and did everything in his power, as President of the Royal Society, to destroy their work and scientific reputation.

[27] For two excellent, recent accounts of the scientific revolution of the 16th and 17th centuries, see: Cohen (2010); Wootton (2016). Both fail, however, to emphasize sufficiently the key role that empirically untestable metaphysics played in the scientific revolution; for that see Maxwell (2017b, chs. 1-2).

[28] Newton (1952, p. 400).

[29] Burtt (1932, pp. 266).

its stability.[30] Despite these disagreements about the nature of the physical universe, there was much more widespread agreement among natural philosophers associated with the birth of modern science about the non-reality of sensory qualities as we perceive them.

Thus Galileo, in 1632, two thousand years after Democritus, expressed the point like this:

> whenever I conceive any material or corporeal substance, I immediately feel the need to think of it as bounded, and as having this or that shape; as being large or small in relation to other things, and in some specific place at some specific time; as being in motion or at rest; as touching or not touching some other body; and in being one, or few, or many. From these conditions I cannot separate such a substance by any stretch of my imagination.[31] But that it must be white or red, bitter or sweet, noisy or silent, and of sweet or foul odour, my mind does not feel compelled to bring in as necessary accompaniments. Without the senses as our guides, reason or imagination unaided would probably never arrive at qualities like these. Hence I think that tastes, odours, colours, and so on are no more than mere names so far as the object in which we place them is concerned, and that they reside only in the consciousness. Hence if the living creature were removed, all of these qualities would be wiped away and annihilated.[32]

Galileo goes on to point out that if a feather tickles us we hold that the tickling is in us, not in the feather. In a similar way, colours, sounds and smells are a kind of tickling in us, and are not objective features of things external to us.

And Newton, for one, agrees. He writes:

> if at any time I speak of light and rays as coloured or endued with colours, I would be understood to speak not philosophically and properly, but grossly, and accordingly to such conceptions as vulgar people in seeing all these experiments would be apt to frame. For the rays to speak properly are not coloured. In them there is nothing else than a certain power and disposition to stir up a sensation of this or that colour. For as sound in a bell or musical string, or other sounding body, is nothing but a trembling motion, and in the air nothing but that motion propagated from the object, and in the sensorium 'tis a sense of that motion under the form of sound; so colours in the object are nothing but a disposition to reflect this or that sort of rays more copiously than the rest; in the rays they are nothing but their dispositions to propagate this or that motion into the sensorium, and in the sensorium they are sensations of those motions under the forms of colours.[33]

Almost all scientists today would agree. Thus Semir Zeki, a present day neuroscientist who has done much to unravel the neurology of colour perception, writes "Ever since the time of

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[30] Newton was, in many ways, at odds with most of his contemporary natural philosophers, in having an almost medieval cast of mind.

[31] Modern atomic physics and quantum theory require us to stretch our imaginations considerably beyond what Galileo here thought he was capable of.

32 Galileo (1957, p. 274).

33 Newton (1952), pp. 124-5.

Newton, physicists have emphasized that light itself, consisting of electromagnetic radiation, has no colour"; and Zeki goes on to quote a part of the above passage from Newton with approval.[34]

There is here an astonishing paradox. Almost all scientists, from the very few pioneer natural philosophers of the 17th century, via the ever growing community of scientists through the 18th, 19th and 20th centuries down to the thousands upon thousands of scientists world-wide today, agree almost without discussion that colours, sounds and other perceptual qualities do not really exist objectively out there in the world. But science, by common consent, is based on experiment and observation. And the most trivial observation one could make verifies that colours and sounds do exist. Open your eyes, look around and, depending where you are, you will see green fields, red-brick houses, yellow sand, blue sky - assuming it is daytime and you have normal sight. Is not the theory that the world is devoid of colour and other perceptual qualities refuted by the most elementary observation conceivable? How can empirically based science ignore such an obvious refutation?

The solution to this paradox is to note that the scientific view of the world, when applied to processes associated with perception, cunningly undermines the very idea that perception can have any power whatsoever to verify the existence of perceptual qualities in the world! For note what occurs. Light of various wavelengths is reflected from the object perceived, enters the eye, and forms an image of the external object on the retina at the back of the eye.[35] Sensory cells react, and cause nerve cells to respond. These send signals along the optic nerve to the back of the brain, and it is only then, as a result of complex neurological processes occurring in the brain, that the miracle occurs and we have the experience of seeing. What we are directly aware of, in perception, is not the external object, but our inner mental representation of the object. And we have every reason to suppose that this will be quite different from its external cause, the perceived object. Just think of the many transformations that are involved as we go from perceived object, a daffodil say, to mental "perception" of it. There is (1) the daffodil itself. Then there is (2) light absorbed and reflected by the daffodil. A minute fraction of the reflected light is (3) focused by the lens of the eye so that it falls as an image on the retina at the back of the eye. There, as a result, (4) complex chemical processes occur in light sensitive cells of the retina. These processes then (5) cause neurons of the optic nerve to fire, so that a wave of exchange of potassium and sodium ions across the membranes of these neurons travels from the eye to the brain. This in turn (6) causes complex neurological processes to occur in the back of the brain, progressively analysing the stimuli. Finally, the miracle occurs, and these neurological processes (7) create or become *perceptual awareness of the daffodil*. This long chain of causal processes, involving at least seven major transformations, all but ensures that the final mental *visual experience of seeing the daffodil* must be radically different from the external *daffodil* itself. Daffodil; light; chemical processes in retina; neurological processes in optic nerve; neurological processes in brain; visual experience of seeing daffodil: each event in this chain of events is of a character profoundly different from the one that came before, and so the final event

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[34] Zeki (1993, p. 238).

[35] Kepler discovered that the image on the retina of the eye is upside down. Initially, there was bafflement as to how we can see the world the right way up, if this is the case. But then the thought dawned that, just as we don't see the world external to us directly, so also we don't see the image of the world on our retina. It is only when signals transmitted along the optic nerve have delivered their message to the brain that the miracle occurs, and we have the experience of seeing.

is bound to differ radically from the first one, and can hold few clues as to the nature of the first one - the daffodil out there in the world.

Let us call this *the argument from the causal account of perception*.[36] I take this argument to establish, if valid, two vital points. First, what we really see, what we really know about, in perception, is not the external object, the daffodil, but rather the final event in the above causal chain of events, our inner mental, visual representation of the daffodil. Second, we don't directly perceive objects external to us, and so our perception of objects, such as daffodils, may be systematically deceptive, so that we think we see daffodils to have properties, such as yellowness, which actually they don't possess at all.

The argument from the causal account of perception, if valid, leads remorselessly to something like the following picture. We are, as it were, locked inside our heads. We have a television screen which we take to depict what is going on around us, outside our heads. But we can never leave the privacy of our skull. We can never compare the images on the television screen with the real external objects that these images are supposed to represent. There is always the possibility that the images on the screen systematically misrepresent the external objects they are supposed to depict.

This argument from the causal account of perception cunningly uses the scientific view of the world, as I have said, to save it from observational refutation. The scientific view of the world itself implies that our senses are almost bound to lead us astray systematically about the real nature of things.

But the argument established more. It seems to provide overwhelming grounds for believing in *Cartesian Dualism*.

Cartesian Dualism is one of five major attempted solutions to our fundamental problem. It seeks to solve the great fissure, the clash of continents, by declaring that there are two worlds, two realms of existence: there is, on the one hand the physical universe, composed exclusively of physical entities with physical properties; and on the other hand there is the world of Mind, the world of consciousness, that accommodates everything that the physical universe excludes, and is quite different in character from anything physical. Our Mind contains our experiences, our thoughts, our feelings, our desires, everything we consciously experience. Minds are linked to living brains, and there may be a two-way interaction between brains and Minds.[37]

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[36] Viewed from the standpoint of Critical Fundamentalism, it is what physics seems to tell us about the universe, and what the causal account of perception seems to imply, that go to the heart of the philosophical problem of perception. Perception constitutes a key link between the two continents of the human world/physical universe problem, the physical universe on the one hand, our human world on the other. Not all philosophers agree. Tim Crane and Craig French, in their survey article "The Problem of Perception" interpret the problem to be about illusions and hallucinations, and make no mention of the implications of physics for perception at all: see Crane and French (2017). But other philosophers disagree. Barry Maund, in his survey article on the related subject of colour, appreciates that a major problem "with color has to do with fitting what we seem to know about colors into what science (not only physics but the science of color vision) tells us about physical bodies and their qualities": see Maud (2017). Unfortunately, Maud fails to go on to discuss the crucial question as to what it is precisely that physics does tell us about physical bodies: see Maxwell (2019a, p. 61).

[37] Descartes suggested that the brain and mind interact via the pineal gland - not a very plausible idea given our modern knowledge of the brain. For a more recent advocacy of interactionism see

Cartesian Dualism attempts to solve the human world/physical universe problem by sharply separating out the human world from the physical universe. The former is to be associated exclusively with this Cartesian entity, the conscious Mind.

Cartesian Dualism may strike one as wildly implausible just because it postulates this weird, ghostly entity, the Mind, somehow entirely distinct from anything material or physical and yet, mysteriously, floating in some way within, or above, the brain. What possible grounds could we have for believing in such a fantastical, ghostly entity?

The argument from the causal analysis of perception provides us with such grounds. According to this argument, when you look at things in the world, what you are really, directly perceiving - what you really know about - are the visual experiences you have, your inner visual experiences of trees, fields, sky, people, buses, houses, or whatever your visual experiences may be composed of. You don't directly perceive the external objects, the trees, the fields, and so on. At best, you infer that that is what you are looking at. What you directly perceive, and most immediately know about, are your inner visual experiences of these external things.

There is one point, then, about which we can be absolutely certain. These inner visual experiences are utterly different from anything going on in our brain. Our brain is made up of soggy grey matter creased and folded, in turn made of billions of neurons, synaptic junctions and glial cells. All that is utterly different from our inner visual experiences, composed of perceived vistas of green grass, the sight of people walking, a perceived dome of blue sky. In so far as we know anything, when we see (or hear, touch, smell or taste), we know utterly and intimately the real nature of our inner perceptual experiences - according to the argument from the causal account of perception - and what we know tells us that these inner experiences are wholly different from all that there is in the brain. Mysteriously, furthermore, these inner experiences are wholly private to us. If anyone else opens up my skull and looks inside, without killing me or rendering me unconscious, they certainly won't come across anything that remotely resembles my inner experiences. My brain is a part of the public material world, the physical universe; my Mind is private to me and utterly distinct from the public material world.

Thus, to update slightly what I said earlier, the argument from the causal account of perception performs two functions. It saves the scientific view of the world from obvious observational refutation. And it provides a convincing argument for Cartesian Dualism. It does these things, at least, just as long as the argument is *valid*. Whether the argument is valid or not will be examined in the next chapter.

The argument from the causal account of perception has played a quiet but key role in persuading many scientists and non-scientists, from the beginnings of modern science, that both the scientific view of the world and Cartesian Dualism (or something like it) deserve to be accepted. It is striking that Galileo in the quoted passage does not - quite - appeal to the argument, although his remarks about tickling and the feather get close. Descartes, who first clearly enunciated what later came to be called *Cartesian Dualism*, did not appeal to the argument in expounding and defending the view. Nevertheless, the logic of the situation is such, I suggest, that it is this *argument from the causal account of perception* that plays a key role in rendering acceptable both the scientific view of the world, and the doctrine so closely linked to it, Cartesian Dualism.

But Cartesian Dualism presents us with horrendous problems.

Popper and Eccles (1977).

First, this irredeemably private, ghostly Cartesian Mind has such weird properties that it is very difficult to believe it actually exists. Can we really believe there are all these Minds floating about in the world, utterly distinct from brains but nevertheless mysteriously linked to brains? When in evolution did they first emerge? How could a step in evolution, a mutation perhaps, abruptly create this entirely new kind of non-material entity, the Cartesian Mind? It all seems like the most ludicrous spiritual nonsense.

Second, there is the problem of how Mind and Brain interact, or are inter-related - the so-called Mind-Body Problem. The brain must cause things to occur in the Mind, or we would not perceive anything at all. But does the Mind cause things to occur in the brain? If it does, then purely physical explanations of what goes on in the brain must be incomplete, or false. Those events caused by the Mind cannot be explained physically. This would amount to poltergeist-type events persistently occurring in the brain, events that are not as dramatic, but just as implausible, as scenes depicted in horror movies, when a disturbed child causes furniture to be hurled about the room by thought alone. On the other hand, if our Mind does not cause events to occur in the brain, then there can be no such thing as free will. We are bereft of the power to act. Our Mind is utterly impotent.

Third, there is the horrendous problem of how we can ever know anything about the external world whatsoever, if Cartesian Dualism is true. For Dualism locks us up inside our Cartesian Mind. All we ever perceive are our inner perceptual experiences of things external to us, the flickering images on our internal television screen. How, then, can we possibly know that our inner perceptual representations of external objects resemble these external objects? We can never hold a daffodil in one hand, and our inner perceptual Cartesian Mental representation of it in the other hand, to compare the two. Any such comparison can never be made. We are, according to Cartesian Dualism, condemned to be stuck forever inside our skulls, inside our Cartesian Minds, staring at the flickering images on our internal TV screens.

John Locke (1632-1704) tried to solve this problem with his *representational theory of perception*, as it came to be called.[38] Physical objects external to us do really possess some properties, such as shape, size and number. These Locke calls primary qualities. Our inner perceptual representations of these features of things, do genuinely and accurately depict the real features of things external to us, the primary qualities. But all the other perceptual features we seem to experience - the colours, sounds, smells, tastes, and tactile qualities - do not accurately represent their external cause. Some combination of primary qualities correspond to these perceptual experiences of colour, etc., very different from what we seem to see, hear, smell, taste and feel. Locke called these combinations of primary qualities *secondary qualities*. According to Locke, then, we see clearly the nature of primary qualities in perception, but have only a massively delusive experience of the nature of secondary qualities.

It did not take long for a philosopher to come along and detect the fatal flaw in Locke's theory. That philosopher was bishop Berkeley (1685 - 1753). He pointed out that there could be no reason whatsoever to distinguish primary qualities (which we can see accurately) and secondary qualities (which we wholly misrepresent). All we ever know are our inner perceptual experiences. Confined remorselessly to our Cartesian Minds, we can only know about the contents of our Cartesian Minds. We cannot know anything else at all. Thus Berkeley came to defend the *second* of the five attempted solutions to our fundamental problem: *Idealism*. There are only perceptual experiences and ideas: the material world does not exist at all. As we can

[38] Locke (1961).

only ever experience our inner experiences, and can never experience anything material and external at all, we can have no evidence in support of the material world at all. And Berkeley summed it up in a succinct phrase: *esse est precipe - to exist is to be perceived*.[39]

One can argue that it is not just that we can have no *evidence* in support of the existence of a material world, no *reason* to believe in its existence: even more serious, all propositions about the material world must be *meaningless*. We can describe meaningfully what we have had experience of, our visual, auditory and tactile experiences. And we can describe meaningfully what we can compare with these inner perceptual experiences. But we can say nothing meaningful whatsoever about that which cannot, even in principle, be compared with our inner experiences. And that means we can say nothing meaningful about a hypothetical external material world. For that would require that we can make the comparison between a perceptual experience, and what it is supposed to be the perception of, a bit of the material world, a daffodil for example. But it is just that comparison that is inherently impossible to perform. Hence, not only can we have no evidence or reason whatsoever to believe the external material world exists. The very hypothesis that it does exist is meaningless. We have no choice other than to adopt Idealism.

There is, of course, something seriously fishy about this argument. We begin with the scientific vision of the universe. We are then led to adopt Cartesian Dualism, which in turn leads us to conclude that there is only Mind, the physical universe vanishing from the scene. This argument is, at best, a *reductio ad absurdum*. It begins with the scientific vision of the universe and ends with the conclusion that there is no such thing as the material universe at all - a contradiction. The argument does not establish Idealism, it is at most a refutation of the scientific view of the universe. It could be argued, however, that if we reject this view, then Idealism remains as the only option.

Idealism solves our fundamental problem with drastic simplicity: eliminate the physical universe, and the problem disappears!

One might think, however, that Idealism is such an absurdity that no one, other than bishop Berkeley himself perhaps, could possibly take it seriously for a moment. Not the case at all. Berkeley's Idealism, watered down and transformed in various ways, exercised a profound and far reaching influence on subsequent philosophy, and on subsequent thought more generally.

It profoundly influenced David Hume.[40] His entire philosophy assumes that all our knowledge consists of *sense impressions* (what I have called perceptual experiences) and *ideas* - the latter pale echoes of combinations of the former. Hume goes on to argue that an idea, in order to be meaningful, must be such that it can be traced back to some combination of sense impressions. The idea that there exists a *necessary connection* between cause and effect cannot, for example, be traced back to sense impressions; hence, Hume argues, it is meaningless. Cause and effect

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[39] Berkeley (1957).

[40] David Hume (1711-1776), Scottish philosopher, was a leading member of the Scottish Enlightenment. When 27, he published *A Treatise of Human Nature* which, he said, "fell dead-born from the press". In his lifetime he was better known for his multi-volume *History of England* than he was for his philosophical works. He is now generally regarded as one of the greatest philosophers ever. His masterpiece, the *Treatise*, is an unwitting *reductio ad absurdum* of extreme empiricism - the doctrine that everything can be derived from sense impressions. The *Treatise* gets everything wrong, but with such scrupulous honesty that Hume's reputation as one of the greatest philosophers ever is richly deserved.

may be constantly conjoined, but there is no objective *necessity* ensuring that if one occurs, the other will also occur *necessarily* (or if there is such an objective necessity, we cannot have an idea as to what it is).

Berkeley's Idealist outlook profoundly influenced Immanuel Kant,[41] - partly via Hume. Kant, like Hume, thought all our knowledge is built up from sense experience, but he also thought that experiences, in order to be conscious, had to exhibit a certain *order* or *coherence*, and that means that there are certain basic principles which we can be absolutely certain all conscious experiences will verify - because if they don't, they won't be conscious! Kant differed from Berkeley in holding that the real world, the world external to our Minds, does exist, but he also held that there is nothing meaningful that we can say about it, because it lies beyond all possible experience. All we can say is that it exists.

Hume and Kant, in turn, exercised a profound influence on subsequent philosophy and thought. Hume influenced John Stuart Mill,[42] Bertrand Russell,[43] Ernst Mach,[44]Albert

[41] Immanuel Kant, (1724-1804) was a German philosopher of almost impenetrable obscurity who tried to answer Hume in his most famous and most obscure work *The Critique of Pure Reason*, first published in 1781. In his *Prolegomena to any Future Metaphysics* Kant says that it was Hume who awoke him from his "dogmatic slumber" in convincing him that there is a serious problem as to how there can be knowledge of the natural world: see Kant (1959, p. 9). Many hold Kant to be one of the very greatest philosophers, an opinion I do not share. He lacks the clarity and honesty of Hume. The problem Kant tried to solve - How can we have absolutely certain knowledge of the natural world? - is the *wrong* problem. It cannot be solved. We cannot have such knowledge: all our knowledge is ultimately conjectural, although some is more conjectural than others of it: see Maxwell (2017a). Furthermore, Kant's great idea that our experiences must have a certain order to be conscious does not achieve what Kant wants it to achieve. The world might be sufficiently orderly for us to be conscious, and yet objects might appear and disappear, from time to time, in a way which violates all physical laws. To his credit, Kant did argue for world democracy and peace, and held that persons should be treated as ends, and not as means to other ends (that is, should never be exploited).

[42] John Stuart Mill (1806-1873) was an influential English philosopher and MP who wrote powerfully in defence of the freedom of the individual.

[43] Bertrand Russell (1872-1970), was a famous English philosopher, logician, and campaigner for peace and against nuclear weapons. He wrote with clarity and wit on a wide range of topics, but never really managed to escape from the constraints of British empiricism.

[44] Ernst Mach (1838–1916), an Austrian physicist and philosopher who criticized Newton's metaphysical ideas about space and time, and held physics should be interpreted in terms of sense data (that is, sense impressions).

Einstein,[45] the Logical Positivists and Logical Empiricists[46], A.J. Ayer,[47] and a vast host of more modern philosophers at work in Britain, north America and Australasia in so-called *analytic* philosophy. Analytic philosophy holds that the task of philosophy is to analyse language and concepts - an idea that goes back at least to Hume, as we have seen. Kant influenced a host of philosophers in Europe who took seriously the Kantian idea that there is this world of structured experience that needs to be studied by direct contemplation and thought alone, untouched by natural science. There emerged much obscure work in metaphysics, often idealist, anti-rationalist, and indifferent to, if not hostile towards, natural science. Kant led to Fichte, Schelling, [48] Schleiermacher,[49] Hegel,[50] Schopenhauer,[51] Husserl,[52] and Heidegger.[53] This post-Kantian metaphysics even spread to Britain with the work of Green, Bradley and McTaggart,[54] and to France with Existentialism, Structuralism, Post-Structuralism, and the work of Jean-Paul

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[45] Albert Einstein (1879-1955), the great German natural philosopher of the modern period who put forward special and general relativity, and made significant contributions to the development of quantum theory. In his paper expounding special relativity he remarked that he had been influenced by Hume.

[46] The Logical Positivists were a group of philosophers based mainly in Vienna between the two world wars who held that a proposition, in order to be meaningful, must be verifiable. They hoped in this way to eliminate all metaphysics as unverifiable meaninglessness, but were defeated by the realization that much of science, which they sought to defend, cannot be verified either. With the rise of Hitler, many Logical Positivists fled to the USA where they defended a weakened form of their doctrine, Logical Empiricism, which asserts merely that terms of a scientific theory, in order to be meaningful, must be linked to observation statements by means of so-called "bridge statements". This doctrine succumbed to criticism as well.

[47] A.J. Ayer (1910-1989) was a well-known English philosopher who expounded Logical Positivism to an English audience in a famous book *Language, Truth and Logic* (1936).

[48] Johann Gottlieb Fichte (1762-1814) and Friedrich Wilhelm Schelling (1775-1854) were both German idealist philosophers.

[49] Friedrich Schleiermacher (1768-1834), German philosopher and biblical scholar.

[50] Georg Wilhelm Friedrich Hegel (1770-1831) was an immensely influential German philosopher, often characterized as holding that history advances by means of a process of thesis, antithesis, synthesis. For a scathing criticism, see Popper (1962, vol. 2, ch. 12).

[51] Arthur Schopenhauer (1788-1860), an influential German philosopher who held that the world as we experience it is the outcome of a fundamental blind *will* - a view expounded in his *The World as Will and Representation* published in 1818.

[52] Edmund Husserl (1859-1938) was a German idealist philosopher concerned with the nature of consciousness. He held that intentionality is a key feature of the contents of consciousness: perceptions, ideas, desires are always about some object beyond themselves.

[53] Martin Heidegger (1889-1976) was a German idealist philosopher, still influential today. His best known work is *Being and Time*, published in 1927, concerned with our *Being*, characterized by *care*, and deeply affect by its relationship to *time*; it is too obscure to summarize in this brief note. Heidegger was sympathetic towards, and a member of, the Nazi party.

[54] T. H. Green (1836-1882), F. H. Bradley (1846-1924) and J.M.E. McTaggart (1866-1925) were three English idealist metaphysical philosophers, the first two at Oxford, the last at Cambridge.

Sartre,[55] (1905-1980), Maurice Merleau-Ponty,[56] Michel Foucault,[57] Jacques Derrida,[58] and many others belonging to the so-called *Continental* school of philosophy. And these two schools, analytic and continental philosophy, broadly speaking, still dominate down to today (2017 at the time of writing).

Philosophy lost the plot. The story I have just sketched began well, with Descartes and Locke making a good, initial stab at solving philosophical aspects of the human world/physical universe problem. It should, however, have rapidly become apparent that Cartesian Dualism creates more problems than it solves, and so a better attempt at the solution to the fundamental problem needs to be found. Initially, this did happen. Both Leibniz[59] and Spinoza[60] put forward alternatives to Cartesian Dualism. But then the original problem - the human world/physical universe problem - got increasingly lost sight of. Instead of returning to it, philosophers for centuries, paradoxically and absurdly, continued to grapple with problems generated by Cartesian Dualism *even though they rejected this very doctrine, the doctrine that created these problems in the first place*. What they failed lamentably to do was return to the original human world/physical universe problem that Cartesian Dualism fails to solve, try to get clearer about what the problem amounts to, and what alternative possible solutions there may be that do justice *both* to what seems to be of most value about our human world, *and* what science seems to tell us about the universe. Very strikingly, granted the views of Berkeley, Hume, Kant, and many of their successors, one cannot even *state* the human world/physical universe problem properly, let alone put forward possible solutions for consideration. Berkeley eliminates one half of the problem: the physical universe. Hume renders it impossible to talk meaningfully about it, in so far as the physical universe lies beyond the reach of human experience. And Kant declares that the real world, the noumenal world as he called it, does exist but nothing meaningful can be said about it (apart from that it exists).

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[55] Jean-Paul Sartre, (1905-1980), famous French Existentialist philosopher whose best known philosophical work, *Being and Nothingness*, published in 1943, was massively influenced by Heidegger. Sartre was also a novelist, playwright and political activist.

[56] Maurice Merleau-Ponty (1908-1961), French idealist philosopher concerned with perception and how experience acquires meaning, he wrote about art, literature and politics.

[57] Michel Foucault (1926-1984), was a French philosopher and historian of ideas who wrote about the relationship between knowledge and power.

[58] Jacques Derrida (1930-2004), a French philosopher, engaged in a kind of analysis called deconstructionism. He is regarded by some as a major figure in the fields of post-structuralism and post-modern philosophy.

[59] Gottfried Wilhelm Leibniz (1646-1716), German philosopher and mathematician, invented the differential calculus independently of Newton. He put forward a strange view in his *Monadology*, according to which the universe is made up of point-like monads which contain, within themselves, images of what is in other monads, some monads barely conscious, others being the minds of conscious persons: see Leibniz (1956, pp. 3-20).

[60] Baruch Spinoza (1632-1677) was a Dutch philosopher who worked humbly as a lens grinder. His magnum opus, *Ethics*, published posthumously in 1677, takes as its model Euclid's *Elements*. It begins with a few definitions and axioms, and then proceeds to derive theorems. Spinoza defends the two-aspect view. The mental aspect of Nature is God, the mental aspect of our brain is our consciousness.