Chapter 3
A Critique of Critical Reasoning

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§3.1 Scepticism

The word ‘sceptic’ comes from the Greek, σκέπτικος (skeptikos), itself from σκέπτομαι (skeptomai), with a root sense of examining, scrutinising, reflecting. Philosophers in this sense should be sceptics—indeed, we all should, if we agree with Socrates that ὁ δὲ ἀνεξέστατος βίος οὐ βιωτός ἀνθρώπως (ho de anexestatos bios ou biotos anthropos) the unexamined life is not worth living. But to examine is not to reject. It is one thing not to take over beliefs and assumptions uncritically, another thing not to accept them at all. To question is to hold oneself in readiness to accept an answer. If I just ask questions, without being willing to wait for an answer, I am like a small boy, who keeps asking ‘Why?’, whatever his father says to him. At first the tactic works, and keeps father in play, but fathers soon tire of endless repetition, and cut off all requests for explanation with a curt ‘Because I tell you’ or ‘That is the way it is’.

Philosophers too readily alternate between being small boys and impatient fathers. Obsessive questioning leads them into persistent doubt. Then common sense breaks in, and questions are given short shrift, with doubts being dismissed as absurd. Both positions are comprehensible, neither is commendable. Although the sceptic’s doubts often seem silly, they are not to be dismissed out of hand. However unreasonable they seem to us in sober daylight, they are doubts experienced by many in moods of metaphysical madness.  

1 Apology 38a5.
may suddenly find myself no longer believing the established ver-
ities of ordinary life: the people walking in the street cease to be
people, and are only automatons, robotically behaving in some pre-
set pattern; the trees in the park no longer exist if I turn my back
on them; the stairs will not support me, if I walk on them; water
will not quench my thirst, but burn out my insides, if I drink it; I
have a clear idea of what I ought to do, but still I don’t see why
I should. Doubts such as these sometimes afflict me, perhaps you,
certainly others. I cannot always pass by the sceptic on the other
side, for he is sometimes my own *alter ego*, needing to be taken
seriously, and not just ignored.

We ought to take the sceptic seriously, He is asking a perfectly
intelligible question, and we are not taking him seriously if we do
not deign to offer any answer. But if we are to take him seriously,
he must himself he be serious too. He may ask questions, but we
are entitled to question his questions, sometimes faulting them for
being idle or wrongly formulated. And when his questions are an-
swered, he should listen to the answers, and not shift immediately
to some other question. If he demands a justification, he should
be ready to indicate, at least in outline, what sort of justification
he would be prepared to accept. He may find fault with what we
say, but should be prepared to indicate, at least in outline, what
he would say in our stead.

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<td>The sceptic is entitled to ask questions</td>
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Under questioning the sceptic’s questions change: some may be
reformulated; some may reveal themselves as idle; some as not seri-
ously believed; some as not constituting a coherent critique. Often
the sceptic fails to distinguish questions, and demands a justifi-
cation that cannot in the nature of the case be given. The fiery
radical rails against the monarch, and cannot see why Elizabeth
Windsor is so marvellous that she should reign over us. Indeed, we
cannot plausibly make out that she is as beautiful as Cleopatra, as
warlike as Boadicea, as wise as the Queen of Sheba, or as wily as
Queen Elizabeth the First. What we can do is to give reasons why there should be rulers, why monarchies are less likely to go wrong than republics, why Britain has evolved as a monarchy, and why the monarch is Elizabeth the Second. More generally in politics, we are often affronted by a bad decision of a bad person, and fail to see how it could possibly be justified. But “it” cannot be justified. And, less emotively, in other areas of philosophy too we need to articulate our discontent carefully and precisely.

Questions may reveal themselves as idle, or not seriously believed. The enthusiast who after going to W.E.A. classes on philosophy told the instructor “You know, I am entirely convinced by your arguments for solipsism: the only thing I find puzzling is why there are not more of us” was perhaps particularly *naive*, but many other sceptics, although too slippery to be as easily caught, are putting on a similar act. They do not really believe that other people are automata, and their complaints that the assumption that other people really do have minds is unjustified ring hollow. “Whom do you think you are complaining to?” we retort. Unless other people have minds, it is pointless to argue with them. Locke uses this argument to dismiss the sceptic who doubts the existence of the external world. “At least, he that can doubt so far . . . will never have any controversy with me; since he can never be sure I say anything contrary to his own opinion.”

Besides those who do not doubt seriously, there are many who doubt selectively. They press some questions, and are extremely difficult to convince of the soundness of the answers that are on offer, but are quite happy to allow other inferences, which could equally well be called in question. The behaviourist finds it very difficult to argue from people’s behaviour to their conscious experience and their own point of view, but is quite happy to accept the existence of material objects on the basis of his sense-experience. Conversely, Berkeley doubted the existence of material objects, but had no difficulty with notions of God and of other conscious beings. Not that it is always wrong to be sceptical about some things, and not about others. We are, most of us, sceptical about ghost stories, but ready to accept astronomers’ accounts of remote events in the universe. For this we can give reasons, and if sceptics who are selective in their unbelief can give good reasons for their selectivity, they

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2 Essay Concerning the Human Understanding, Bk IV, ch.11, §3.
deserve a respectful hearing. There are differences between material objects and other human beings, and these differences may justify doubts in the one case which would be unreasonable in the other. Sometimes, however, differences that are visible to us ought not to be visible to the sceptic. The concepts required in order to specify the difference are concepts the sceptic does not believe in. Mathematical Intuitionists baulk at actual infinities, and demand that all procedures should be “effective”, but accept as effective operations involving such large numbers, that they could not be carried out in this universe before the Big Crunch.\(^3\) In order to draw the distinction between effective and ineffective procedures, we need to be able to say when a procedure is ineffective; and we can say that a procedure is ineffective only if no result emerges even after an infinite number of operations. Even if the difference can be specified without using terms unavailable to the sceptic, its justification may be beyond his self-reduced abilities. Sextus Empiricus speaks of climbing a ladder, and then kicking it away—a practice not to be recommended in real life, as well as being incoherent philosophically. If I need to climb the ladder in order to kick it away, its having been kicked away shows that it is climbable, and the sensible thing to do is to climb it more carefully, and having climbed it, to argue more circumspectly, so as not to be misled to destructively absurd conclusions.

The final counter to the sceptical questioner is to ask what alternative he has in mind. Since reasoning is typically two-sided, it often involves an assessment of alternatives. If alternatives are offered, we can compare them with what we ourselves have put forward, possibly finding them preferable, but more probably finding them less well supported than the position that is under attack. But if, as often, no alternative is offered, we are not engaged on a serious exercise. It is the converse of an argument of Hume’s, who concluded that “a total suspense of judgement is . . . our only reasonable resource”, arguing that, since “every attack and no

defence . . . is successful, victory must go to the man who remains always on the offensive and has himself no fixed station or abiding city which he is ever, on any occasion, obliged to defend”. But guerilla warfare wins no territory. The metaphysician is looking for a position in which he can abide, and which he would be willing to defend. His thoughts and communications may sometimes be troubled by a Humean sceptic, but he will have no incentive to abandon his position for another, if no other is on offer. For he is serieux; metaphysics is not a dilettante occupation, but a guide to life, and life is short and will not allow an indefinite suspense of judgement.

§3.2 Knowledge and Doubt

Although arguments for scepticism are often based on very general themes, particular sceptical positions often rely on some particular understanding or misunderstanding of some particular concept. Knowledge is one such. Our understanding of knowledge has been distorted by misconceptions about the logical grammar of the word ‘know’. The phrases ‘I know’, ‘you know’ ‘he knows’ ‘we know’ ‘they know’ do not merely introduce biographical statements about me, you, him, us, or them, but are “performative” locutions, committing the speaker to a certain position. The speaker is, as it were, issuing a cheque, signed either by himself or by the others mentioned, which guarantees the truth of what is said to be known. If the cheque bounces, the speaker will be held to account; sometimes he may be under some obligation to put things right for those he misinformed; at the very least, he will be obliged to eat his words: “I thought we knew that beef was safe to eat, but I was wrong.”

Plato, followed by most philosophers down to the present time, thought that knowledge must, therefore, be infallible. The argument can be put in modern terms. To say that I (or you, or he, or we, or they) know that \( p \), but \( p \) may not be true is self-contradictory.

\[
(\text{know} p) \land (\Diamond \neg p) \vdash
\]

4 David Hume, *Two Dialogues on Natural Religion*, end of §viii.

5 See above, §1.7.

So

\[(\text{know} \ p) \vdash \neg (\Diamond \neg p)\]

that is

\[(\text{know} \ p) \vdash \Box p.\]

or, again in words,

\[\text{From } p \text{ is known, it follows that } p \text{ is necessary}\]

Plato concluded that only the necessary truths of mathematics and natural science could constitute genuine knowledge, and in subsequent ages it has been widely held that where contingent things—things that could be otherwise—are involved, real knowledge is impossible, and we can do no more than have probable beliefs about them.

Descartes was similarly misled. He made the problem of what can be known a central question in philosophy, and introduced his method of doubt in order to ensure that what he thought he knew he really did know. Rather than rely on his unconsidered opinions, or take over anything from his predecessors, he wanted to think out everything for himself by incontrovertible argument from a starting point that was indubitably true. Only so could he be sure that his thoughts were free from error.

Plato and Descartes were not sceptics, but they provided the sceptic with a powerful weapon. It is easy to doubt. Almost every tenet can be called in question, and most attempts at justification can either be rejected out of hand or parried with a further demand for their premises to be justified. The realm of knowledge is cut down to very small size. Most of the things we think we know are things that could have been otherwise. I thought I knew that there was a train to London at 10.22, but it could be the case that there was not a train to London at 10.22; certainly I can imagine a world with no 10.22 to London. So it is not absolutely necessary that there should be such a train, and my belief that there is one, however well based, can never amount to knowledge, and should

\[7\text{ It is easy to confuse this argument with a comparable one, that if I (or you, or he, or we, or they) know that } p, \text{ then necessarily } p \text{ is true. The mediaeval schoolmen distinguished these, calling the latter necessitas consequentiae and the former necessitas consequentis. Some arguments for divine foreknowledge of human actions depend on a shift between these two necessities, but Plato's argument for the necessity of what is known does not.}\]
Plato and Descartes

Plato:

\((\text{know} p) \vdash \Box p.\)

From \(p\) is known, it follows that \(p\) is necessary

Descartes:

\((\text{doubt} p) \vdash \Diamond \neg p)\)

From I can doubt \(p\), it follows that \(\neg p\) is logically possible
So, it seems, \(p\) is not known if \(\neg p\) is logically possible But (with possibly one or two exceptions) if \(p\) is not an empty tautology, \(\neg p\) is logically possible So, it would follow, only empty tautologies can be known

not be represented as more than a probable belief. But trains are not the only things that may fail to run. Biology and geology are under a similar condemnation: they could have been different. The dinosaurs might not have become extinct, we humans might have evolved keeping our tails, a particular virus might mutate. Biology does not really count as genuine knowledge, because it does not have the hard necessity of chemistry and physics. But nor do chemistry and physics. The laws of nature are not analytically true. They can be denied without self-contradiction. We could live in a universe in which the velocity of light was only 186,000 furlongs a fortnight, instead of 186,000 miles a second, and Planck’s constant a hundred times larger than it is. Only the truths of deductive logic and mathematics have the logical necessity that cannot be gainsaid. And often they depend on axioms that are postulated rather than premises that are proved.

It can be a pleasing experience to show people that they do not know the things they thought they knew, and many philosophers have experienced that pleasure. But one may be sceptical of that sceptical success. There may be some special, philosophical knowledge, defined as infallible, which is beyond the ken of most mortal thinkers, but that is not the knowledge we refer to when we talk about knowledge in our ordinary life. We commonly accept locutions in which contingent matters are said to be known: it follows that it cannot be against the meaning of words to use the word ‘know’ of things that could have been otherwise. Plato
got it wrong. He failed to distinguish different degrees of necessity and possibility. It is indeed the case that I cannot consistently affirm that I know that $p$ but $p$ may not be true, but I can allow that $p$ might not be true, even while claiming to know that $p$. “I know that the post goes at 4pm,” I say. Admittedly, the postman might decide to go fishing instead of collecting the post, might go on strike, might even die; a wandering comet might blow us all to smithereens. All these are possible, but only barely possible. And bare possibilities do not detract from knowledge.

We know more than most philosophers will allow, but with less certitude than they demand. And that gives entry to sceptical arguments. We are easily led to make some claim to know, and then are asked quizically: “Are you sure?” “Are you really sure?” and, knowing our own fallibility, are forced to confess that we might be wrong, whereupon our claim to knowledge is disallowed, and we are propelled step by step towards a state of sceptical agnosticism. We feel that something has gone wrong, but cannot say precisely what. We may be tempted, like Hume, to think it is just the effect of philosophy, and putting off philosophical speculation, resume the cheerfulness of ordinary life. But the fault lies not with philosophy, but with the arguments employed. And the remedy is not to stop thinking, but to think harder and more accurately, and work out what is wrong with the arguments the sceptic employs.

The method of doubt is flawed. People may doubt. That is their privilege. But before they can expect us to share their doubts, they should themselves share with us their reasons for doubting. Maybe there are reasons: what looks like water in the distance could well be a mirage, since the day is hot, and the map shows no lake in that direction. Maybe there will not be a train to London at 10.22: heavy storms have flooded the line; the engine-drivers are on strike: the Health and Safety Executive has imposed a 20 mph speed limit throughout the network. If the doubter can substantiate his doubts, then they should be taken seriously: but if they are just idle doubts, little time should be wasted on resolving them. To put it in forensic terms: before we even try to mount a defence in the face of the critic’s questions, we ask him to say if there is a case to answer. We question whether there is a serious question to answer, and do not attempt to answer questions that need no reply.

But the method of doubt was a method. It was not just a succession of doubts raised one after another, but, rather, a programme designed to secure its conclusions against all possibility of
error. It seems a sensible idea. If I am to be confident that my conclusions really are mine, and not taken over second-hand from the received opinion of my day, I must take care to believe nothing that could not be established by the most rigorous methods; since if any premise is false, the conclusion could be false too. Anything that was not absolutely certain was to be thrown out. Just as one bad apple can corrupt all the others in the barrel, so, Descartes feared, one dubious premise, or one shaky argument, would contaminate the whole corpus of belief with dubiety. The analogy is apt if the only cogent arguments are those of deductive logic. But once we realise that arguments can be two-sided, the infection of a false belief can be contained. Our beliefs do not depend upon a chain of argument, which can be no stronger than its weakest link, but on a network of interlocking and mutually supporting arguments, where if one strand fails, there are others to take the strain. I might, quite wrongly, believe that Mendeléef was a Bohemian monk, who did chemical experiments in the monastic garden, and arranged his specimens on a table. That false belief would be countered by other true beliefs I happened to have; and my actual belief in the Periodic Table would be supported by facts I knew about the chemistry of the halogens, the alkali metals, of carbon and silicon, and of oxygen and sulphur, quite independently of any historical misinformation I might happen to have.

The method of doubt is not the one and only means of avoiding error. It is like carbolic acid. It is a good antiseptic, but, incautiously used, it can damage living tissue. It led Descartes to ever greater feats of disbelief. Appearances might be illusions, contingent truths could be suppose to be false. A malicious demon might have been systematically misleading him. The only propositions which could not be doubted even if a malicious demon were at work were those that were logically necessary, where there was not even a bare logical possibility of their being false. The sceptic’s victory is complete, but at the price of vacuity. If the only propositions to be admitted are those that follow deductively from premises that are logically necessary, the demand is that only tautologies and what follows tautologically from tautologies shall be allowed—propositions, that is, which are true solely in virtue of the meaning of the terms involved, propositions which it would be inconsistent to deny. But such propositions tell us nothing about the world. Nothing is excluded by them. If we try to ask ourselves what such propositions are ruling out, we find ourselves mired in
self-contradiction as we seek to say what it is that, according to them, is not the case.

The method of doubt is not a sensible method to adopt if we seek knowledge. It will secure us against believing anything false, but at the price of ensuring that we do not believe anything at all, except for empty tautologies. If we want to acquire any substantial knowledge, then what we come to know must be something that it is meaningful to deny. We incur the logical possibility of being wrong in achieving content. One article in the mid-twentieth-century ended with the words: “If we have not said anything much, at least we have not said anything wrong.” It is a sentence which could well be reversed: “If we have not said anything that might be wrong, we have not said anything much.”

§3.3 Autonomy

The method of doubt commends itself to us as a means of securing intellectual autonomy. Rather than take over, unexamined, received opinions from other men, I should test each item before believing it myself. Only so can I be sure that my position really is one that I can really accept. Much as Luther had protested the importance of the individual’s relationship with God, so Descartes emphasizes the importance of what I experience, and what I can know. There is a strain of egocentricity in the sceptics’ arguments that sometimes led theologians to convict them of pride. They had a point. Often the inference being questioned is an inference across some border defined in egocentric terms.8 The problem of Other Minds is the problem of how I can know minds other than my own;9 if I am a phenomenalist, I am unable to argue from my experience to the existence of an objective, external world—a world independent of, and external to, my sense experience;10 the problem of induction is the problem of predicting the future—that


9 See below, §6.12.

10 See below, §6.2.
is, the time after that at which I am speaking—on the basis of the past—that is, the time before that at which I am speaking. If I were not so self-important, I would not attach such significance to the distinction between myself and others, between my experience and the things it is experience of, and between what has happened before, and what will happen after, the time of my speaking. To that extent the theologians were right to regard scepticism as an epistemological form of original sin.

But we need to be cautious in condemning. Original sin was a concomitant with knowing good and evil, or in modern terms, moral autonomy. Intellectual autonomy is also a good. I need to be on my guard against received opinion and other men’s prejudices. But the method of doubt goes too far. The assumption that other men’s views should carry no weight with me at all is unwarranted. While it is good to be aware that other men may make mistakes, it is stupid to assume that they always do. They are fallible, as I am: but as I can sometimes get it right, so they should be allowed to be often in the right. If I spurn the aid of other men’s endeavours, I constrict my achievements to the small compass of what can be accomplished by a one-man band. I may not get very far on my own, refusing to avail myself of the benefits of other men’s experience, and other men’s thought. Newton could see far because he sat on the shoulders of giants.\textsuperscript{11} If I spurn all help from others, I may spend my life re-inventing the wheel, and discovering that two and two make four. Rather than the method of doubt, we should adopt Swinburne’s principle of credulity.\textsuperscript{12} I should be willing to accept beliefs that have commended themselves to men of discernment, though always holding myself ready to revise my opinion if need be.

\textsuperscript{11} In a letter to Robert Hook in 1675; it was said earlier by Bernard of Chartres]

\textsuperscript{12} See above, ch.1, §1.7.
§3.4 Inductive Scepticism

Hume realised, quite rightly, that inductive inferences are not deductive, and concluded, quite wrongly, that they were therefore unjustified. Many philosophers since then have asked why inductive inferences should be accepted as cogent, and have been dissatisfied with the answers on offer. Often they have been confused, and have thought that the only justification of induction would be to make it into deduction. Some extra premise has been sought—a principle of natural uniformity, or of limited variability—which would, in conjunction with the other premises already available, yield the desired conclusion with deductive certainty. But though it may well be worth articulating a principle of natural uniformity, or of limited variability, neither will serve as an extra premise for a deductive argument, because there is always room for doubt how the principle is to be applied in the particular case. To search for some premise that will turn inductive arguments into deductive ones is to pursue a will o’ the wisp. Inductive arguments are different from deductive ones—they would not be any use unless they were different, capable of being intelligibly denied, and hence informative, telling us, among the different things that could (logically could) be the case, what actually is going to be the case.

Some philosophers would leave it there. Inductive arguments are different from deductive arguments, and the fact that inductive arguments are not valid deductive arguments is neither here nor there. Inductive arguments are not valid deductive arguments but are cogent inductive arguments.\textsuperscript{13} If asked what reason we have for accepting the conclusion of an inductive argument, we can cite the evidence, and leave it at that—that just is what constitutes having good reason for believing that conclusion.\textsuperscript{14}

This response is an adequate answer to some enquirers, but not to those who want to call in question the whole practice under

\textsuperscript{13} See above, §2.1 n.1.

consideration. Their question is an intelligible one, and deserves serious consideration. But if their question is to be taken seriously, they must be serious too, and think through their question to determine what it really is asking for, and what alternative answers might be available. Too often sceptics oscillate between the general and the particular, complaining, when a general defence of a practice has been given, that it does not offer a justification of a particular instance, and when a particular difficulty is dealt with, that it does not justify the practice in general.

If a radical sceptic demands a reason why we should engage in inferring inductively at all, he needs to acknowledge at the outset that he is not looking for a deductive reason. Inductive inferences are by definition not deductive, and would be useless if they were. Their conclusions have substantial content, ruling out logically possible concatenations of events. If the sceptic is really yearning for a deductive justification of induction, he is crying for the moon. We cannot give him what he wants. It is useless to try. All we can do is to help him to see that he has himself ruled out there being any possibility of getting what he wants. If he can bring himself to see that, we may be able to help him, but until then we can only feel sorry for him in his self-imposed incomprehension.

Can there be reasons which are not deductive? There is no reason why not. Some philosophers define reason to be deductive reason, but that definition does not fit ordinary usage, according to which we often give reasons why events happen, or why people should undertake actions. In principle it should be possible to give reasons for stipulating that only deductive reasons should be reckoned genuine ones. But since those reasons themselves could not be deductive ones, the project would never get off the ground. Even a sceptic, then, should allow that there could be a justification of inductive inference which was not itself deductive.

We need to know. If we are to survive, we must read the signs of coming events, and must try to predict the consequences of our actions. Of course, we may be wrong. But better run the risk of being wrong than the certainty of not being right. But why

\[ \text{§3.4 } A \text{ Critique of Critical Reasoning } 85 \]

\[ \text{§2.4. } \]

\[ \text{This account owes much to G.H. von Wright, The Logical Problem of Induction, Acta Philosophica Fennica, Helsinki, 1941 & 1957, Fasc. III, chs.IV, VIII & IX.} \]
inductive inferences? Why not adopt a “counter-inductive” principle of inference? Instead of assuming that the future will be like the past, the unknown like the known, assume that they will be “unlike”. But unlike in which way? There are many ways of being unlike: the next swan could be blue, or green, or red? Which is it to be? The like has the advantage over the unlike in being relatively specific. The strategy of assuming that the next case will be like its predecessors, the future like the past, gives definite guidance, whereas the strategy of assuming that the next case will be unlike its predecessors, the future unlike the past, gives none. There is no feasible alternative to arguing inductively. Contrary to the way it is represented by sceptics, inductive inference is many-faceted, and refines its methods to achieve more reliable results. It is not so much the application of some principle we know to be true, as a know-how, which we learn to use with increasing sophistication and skill. It may let us down sometimes—but then we can learn from our mistakes: in any case, better be sometimes wrong than never right.

We can fault counter-inductive principles on other grounds: they do not generalise, whereas those for induction do: if it had been right yesterday to infer counter-inductively that the next swan would be not white, then there would be no basis today for inferring that tomorrow’s swan would not be white. It would have to be neither white nor not white. Indeed, it is evident today that if I had inferred yesterday counter-inductively that the next swan would be not white, I should have turned out to be wrong. Sceptics are quick to disallow the fact that induction has hitherto proved successful in making predictions subsequently vindicated by events as an argument for its validity. That, they protest, would be to beg the question. But no objection can be raised against citing previous occasions as refuting rival rules. If it is rational to make inferences, albeit risky ones, from the known to the unknown, from the present and past to the future, and if it would have been evidently wrong to have used a counter-inductive principle of inference, then inductive inference is left as the sole rational resource.

The sceptic is not done yet. The man who justifies induction on these grounds, he says, is still guilty of a petitio principii at the meta level. The argument that counter-inductive inferences

17 See above, ch.2, §2.7.
have reached the wrong results hitherto whereas inductive inferences have reached the right results is being appealed to as evidence that inductive inference works, and counter-inductive inference does not. But that is to assume that what worked in the past will continue to work in the future, which is just what is in question. Indeed, according to the counter-inductive principle, the fact that it has not worked hitherto is good reason for supposing that it will work now.

The Irish logic of this counter is beguiling, but not persuasive. Once we iterate inferences, we land ourselves in inconsistency. Thus far we have seen only white swans. Should we infer that the next swan will be non-white? If so, what about the next one after that? Perhaps we are to escape contradiction by refusing then to draw any inference. But it is a curious rule of inference which if successful, can only be used once—some genetically modified seeds are made sterile on purpose, but an un-reusable rule of inference scarcely qualifies as a rule at all.\(^\text{18}\)

The pragmatic justification of induction answers the question posed by an enquirer who realises that it would be incoherent to look for a deductive justification, and is himself willing to survey possible alternatives. It will not convince the sceptic who is permitted only to ask questions, without being obliged to think them through, or to specify exactly what his alternative rule of inference actually is. He can make out that he does not accept the cogency of inductive arguments, and nothing we can say will shake him. But if we can consort with him for a time, we may find that his actions belie his words. A man who refuses to drink hemlock when proffered it, takes out a raincoat when he sees clouds, and puts the

\(^{18}\) Hans Reichenbach, Experience and Prediction, Chicago, 1938, and The Theory of Probability, Berkeley, 1944, one of the original proponents of the “pragmatic justification of induction” expounds his argument in terms of probabilities. But probabilities are treacherous, and are by Reichenbach explicated in terms of von Mises Kollectivs whose limiting frequencies tend towards a definite limit as the number of instances tends towards infinity. It seems better to concentrate upon the simple case, and avoid needless complexity, however elegant the mathematical treatment. A simple pragmatic justification is given by W.C.Salmon, “Inductive Inference”, and criticized by J.W.Lenz, “Problems for the Practicalist’s Justification of Induction”, Philosophical Studies, 9, 1958, pp.4-7; both reprinted in R.G.Swinburne, The Justification of Induction, Oxford, 1974, pp.74-101.
kettle on the stove before making a cup of tea, may profess not to accept the cogency of inductive arguments, but we shall remain sceptical of his sceptical protestations. He may be using the words ‘reason’ and ‘cogency’ in an idiosyncratic way. But in the ordinary sense of the words, the reason for what he does or refuses to do is that on the basis of facts already known to him he predicts the likely outcome of actions he may undertake, or of the situation he finds himself in.

§3.5 Predictions Vindicated
Practically, we may have no alternative to arguing inductively, but theoretically we may still question whether inductive arguments lead to truth. Some philosophers have maintained that the history of science shows that they hardly ever do. The accepted truths of one generation are shown to be false in the next. Newton was refuted by Einstein, and quantum mechanics gives the lie to classical corpuscularianism. But that is to over-dramatize the development of scientific understanding. We still use Newtonian mechanics for building bridges and calculating trajectories and orbits. Einstein’s Special Theory refined rather than refuted Newtonian mechanics, having Newtonian mechanics as a limiting case for low velocities. Similarly, the General Theory approximates to the Special Theory on the small scale, and quantum mechanics supports the kinetic theory of gases just as much as genuinely atomic theories did. It is rare for any generally accepted scientific theory to turn out to be completely wrong, though common for it to be subsumed under a new theory and seen in a new light. Even the phlogiston theory, currently condemned as bad chemistry, can be viewed more favourably as a first attempt at thermodynamics: when things burn, they do give off something—heat, or more generally, energy. Energy is not a chemical substance, but it is something—indeed, now we allow that it does have mass, though far less than a chemical substance. The history of science gives us no reason to be pessimistic, but only to be humble: our predecessors were not badly wrong, but our own beliefs are still open to improvement. If we change the question from “Why believe inductive inferences?” to “Do they reveal truths?”, the track record suggests that the answer should be “Substantially yes”.

The claim, although vague, is a large one. Whereas the pragmatic justification was concerned only with the next case, the truths inferred by induction are natural laws and explanatory
schemata going far beyond the limits of our own experience. Can we justify sticking out our necks so far? Most thinkers reckon that the track record is justification enough. Admittedly, the claims are large. But for that very reason they are vulnerable. If they were incorrect, they would have been falsified. It is one thing to be cautious about accepting a newly constructed theory which does indeed explain the available evidence, but has not been further tested. It is quite a different thing when the theory has made numerous predictions which have in due course been found to be true. Although, of course, it is still the case that even with the added evidence of the confirmed predictions, it remains possible that the theory is false, it becomes increasingly implausible that, if the theory were false, the predictions made on the strength of it should none the less come out true.

The sceptic may seek leave to disagree. That is his privilege. We hear what he says, and cannot convict him of inconsistency. But if he is serious, he owes us an alternative explanation of the phenomena. He may offer one: it is always possible to construct a theory that will agree with all the evidence obtained hitherto, but yielding different predictions. Confident as we are of our own theory, we are ready to put the matter to the test: he could be proved right—in which case we shall have to eat our words and amend our views.\footnote{There are a few famous cases where this has happened.} If, however, the sceptic ducks the test, or having taken it, refuses to accept it as decisive, we begin to question his seriousness. Is he really concerned to know the truth? or is he merely saying yet again that inductive inferences are not deductive? But perhaps this is an unfair dilemma. Perhaps he cannot offer an alternative explanation, because there is not one. Perhaps the correctness of the predictions was just a coincidence. After all, coincidences can and do happen, and arguments against accepting them are often fallacious. Colin Howson, the most trenchant exponent of Hume’s inductive scepticism,\footnote{Colin Howson, \textit{Hume’s Problem: Induction and the justification of belief}, Oxford, 2000.} maintains that “The No-Miracles Argument” as he calls it, is fallacious, and can be seen to be so if it is cast into Bayesian form. He cites as a parallel the fallacious conclusion drawn in a test done in the Harvard Medical School for a rare condition, affecting only 0.1\% of the population, where the probability of a false negative—that is of a
patient with the condition being diagnosed as healthy—was zero, but the probability of a false positive—that is of a healthy patient being diagnosed as having the condition—was 5%. It was widely supposed that if someone had a positive result, then he had a one in twenty, 5%, chance of actually having the condition, whereas in fact he had only one in fifty chance. The fallacy is to argue from the true premise, that a healthy person has a 5% probability of being diagnosed positive, to the false conclusion that a person diagnosed positive has a 5% probability of being affected.  

We can get a more intuitive sense of what is going wrong if we consider another example, highly relevant in modern legal cases, of a DNA match. If the suspect’s DNA matches that of blood at the scene of a crime, it seems highly like that the suspect did commit the crime, for the chance against the actual criminal just happening to have the same DNA profile as the suspect is several millions to one. But if the suspect turned out to have a water-tight alibi, we should have to allow that the match was due to a remarkable coincidence, and not to the suspect’s having been at the scene of the crime. Howson discusses both examples in terms of Bayes’ theorem, which is appropriate in the case of medical statistics, but can be misleading in other cases, where the attribution of prior probabilities is subjective and arbitrary. We need rather to see such cases as two-sided arguments, in which the improbability of a coincidence has to be weighed against the implausibility of the suggested explanation. That the suspect committed the crime is extremely implausible if he was at the time under constant observation locked up in a police cell several hundred miles away. Granted that, the DNA match has to be dismissed as no more that a remarkable coincidence. Similarly, claims to telepathic powers are considered by many scientists to be so implausible, that they are prepared to attribute to coincidence data discovered by researchers into psi phenomena.  

So what is the real rationale of the No-Miracles Argument? Can the determined sceptic’s scepticism be convincingly countered? The answer is that there is no single counter to the sceptic. At any one stage, he can without evident irrationality, plead coincidence. Coincidences do happen. But they do not go on happening. If the sceptic is going to go on pleading coincidence, however many predictions turn out to be correct, then he is not taking account

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21 See further below, §5.4.
22 Howson, p.58.
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of empirical evidence at all, but is merely announcing his unshakeable determination not to allow a logical possibility to be abridged by any other rational consideration. On no single interchange can the sceptic be confuted, but in the course of a dialogue we can pin him down to outlining the circumstances in which he would be persuaded, or showing that he is not open to rational persuasion at all.

§3.6 A Gruesome Universe?

A determined sceptic can avoid the appeal to coincidence by putting forward a tailor-made theory which accommodates the available evidence, but yields different predictions. In a similar way he can avoid the inconsistencies of his simple counter-inductive rule of inference by offering a more sophisticated version. “Why not have the rule of arguing inductively hitherto, but counter-inductively from now on? Such a principle would not have been compromised by any past experience, and could, if put in some specific form, give definite guidance for the future.”

Why not? The principle is formulated in essentially egocentric terms: ‘the past’ is the time before I am speaking, ‘the future’ the time after I am speaking; and egocentric distinctions are ones I must play down if I am to communicate with you and others. Although I do not make myself unintelligible if I make particular predictions contrary to the canons of induction, I need to curb my egocentricity, if I am to communicate effectively; if I am not to be confined in my conversation to myself alone, I need to recognise the continuing relevance of what does not depend on me, the time at which I speak, or the place from which I speak. Not that I can never report on my private experience, or on the current situation at the place where I am located. But to incorporate the time of utterance into a principle of inference would run counter to our canon of rationality, introducing a needless arbitrariness into what should be universal.

Discountenancing arbitrariness rules out other counter-inductive inferences which incorporate temporal dates or spatial positions. Although many general laws apply differently at different times or in different places, it would be irrational to propose a principle of inferring inductively up to 2035 AD, and thereafter in some specified counter-inductive way; or to argue inductively in the North, but not in the South. Similarly, not every property that can be
thought up is a basis for a sound inductive inference—not, for instance, the property of being “grue”, that is green until 2400hrs on 31.1.1999 and blue from 0000hrs on 1.1.2000 onwards, or the property of being “bleen”, that is blue until 2400hrs on 31.1.1999 and green from 0000hrs on 1.1.2000 onwards.\textsuperscript{23}

But even if we exclude all egocentric and arbitrary properties, the sceptic can still put forward rival hypotheses to explain the data. Many natural laws are expressed as functional dependencies, and all can be put into that form. And although often we take it as obvious which function best fits the data, there are infinitely many other functions which fit the data equally well. We have little hesitation in rejecting them, but the sceptic questions our justification for so doing. Clearly, it is not on the basis of any empirical evidence, since all empirical evidence has been taken into consideration already: nor is there any deductive warrant for it in first-order logic. For Hume and the Logical Positivists there was no possibility of there being some further a priori justification, and it seemed that our actual inductive practices must be irrational. Once, however, we recognise that reason is not confined to analytic deductive argument, we need no longer despair of justifying our practices. On the face of it, the a priori arguments against egocentricity and arbitrariness are cogent. And although there is an enormous infinity of possible functions that fit any finite set of data, it does not have to be the case that they are all equally good.

Consider a sequence of ten tosses of a coin. If we get ten heads, $HHHHHHHHHH$, we may jump to the conclusion that the coin has heads on both sides, or is otherwise biased. The sceptic, instead of arguing that it is a simple coincidence, may point out that there is a non-denumerable infinity of infinite sequences starting $HHHHHHHHHH \ldots$, and that we have no warrant for supposing that ours is the one that has $H$ every time rather than one like $HHHHHHHHHHTTT \ldots$, or $HHHHHHHHHHHTHT \ldots$, or $HHHHHHHHHHHTHTT \ldots$, or $HHHHHHHHHHHTHTT \ldots$. But we do have some warrant. The sceptic is invoking too many possibilities. By countenancing every sequence that is logically possible, he is in effect reverting to a demand for a deductive justification of inductive inference, that is, asking for the impossible. And the all-H sequence has the opposite merit of being uniquely simple. We can measure the

“algorithmic compressibility” of rules generating sequences, and, unsurprisingly, we can specify the all-H sequence more economically than the alternatives that start with ten \( H \)'s and then have some tails.

It would be nice to leave it there. Intuitively we reject artificial predicates, such as ‘grue’ and ‘bleen’, but the sceptic can still make out that there is no valid distinction between ‘blue’ and ‘green’ on the one hand and ‘grue’ and ‘bleen’ on the other.\(^{24}\) Goodman concludes that only inferences based on “projectible” properties are inductively valid, and that blue and green are, and grue and bleen are not, projectible, but gives no adequate specification of what properties are projectible.

In practice we can defeat the sceptic: if he puts forward a gruesome alternative, we can put his hypothesis to the test. But his probing has revealed a potential hole in our theory of inductive inference: we are implicitly assuming something about the nature of reality—that we live in a non-gruesome universe.

§3.7 Degrees of Similarity

Induction carries with it metaphysical assumptions. That the universe is not gruesome may be argued for at two levels: as independently established truths, or as necessary presuppositions of inductive inference, which we must postulate on pragmatic rational grounds. We might be assured that nature is uniform—perhaps theologically by reliable revelation from God—and then we should have adequate warrant for arguing inductively. Or, again, if we were Platonists, and believed in the world of Forms, we should expect the fundamental truths to be universal truths, and think it rational to generalise from the evidence in our possession. We could reasonably use Popperian falsification to winnow likely looking hypotheses, and reckon those that survived severe testing to be substantially true.\(^{25}\) Once we have concluded that nature is uniform, the suggestion that it might cease to be so tomorrow can no longer be taken seriously. In the next section arguments will be adduced in favour of Natural Kinds, which can be seen as modern successors to Plato’s Forms. If those arguments are successful, they show not merely that, synchronically, only a limited number of combinations of features can occur together at the same time,

\(^{24}\) C. Howson, Hume’s Problem, Oxford, 2000, pp.97-100.

\(^{25}\) See further below, §4.7.
but that, diachronically, only some successions of earlier and later features are possible; thus constituting an independent argument for the uniformity of nature, in which case we do not so much answer the sceptic as bypass him.

For the present, however, we are taking the sceptic seriously, and are offering a pragmatic justification of inductive reasoning; we therefore have to buttress our argument against niggling doubts. Having to decide, under conditions of imperfect information, what to do, we must try to anticipate. If we are to know anything about what we have not as yet observed, it must be based upon what we have observed: and it must be either like it or unlike it; the assumption that what we have not as yet observed is unlike what we have observed gives no guidance because there are many ways of being unlike, and each particular way proves unsatisfactory; the assumption that what we have not as yet observed is like what we have observed makes sense, and chimes in with our untutored understanding of inductive inference; but it is open to persistent challenge by the sceptic. ‘Like’, or ‘similar to’ is a three-term relation: x is similar to y with respect to Q. For each value of Q we have an equivalence relation, grouping together all those that are similar to one another with respect to Q. They all share Q-ness. Given any equivalence relation we can pick out those things that share the common quality, and given any quality, represented by a monadic predicate, Q, we can invent an equivalence relation which holds between things that are similar in respect of both being Q. Sometimes, when the common qualities can themselves be strictly ordered, we go further, and ascribe magnitudes. Using a pair of scales we can form equivalence classes of those material objects that all weigh the same. They all have the same weight. And, using the scales again, we can order weights as being heavier and lighter, and, granted some further assumptions, assign numbers to them.

There are a very large number of equivalence relations, and corresponding sets of instances all possessing the relevant quality. At one extreme there is strict identity: \( x = y \).

By Leibniz’ Law
\[
x = y \quad \text{iff} \quad (\forall Q)(Qx \leftrightarrow Qy).^{26}
\]

At the other extreme there is the universal relation
\[
x \sim y, \quad \text{where} \quad (\forall x)(\forall y)(x \sim y);
\]

\(^{26}\) Actually, it is enough to say \((\forall Q)(Qx \rightarrow Qy)\). See n.27 in next section.
that is the universal relation holds between any two items. It is reasonable to claim that two things are more similar to each other if the identity relation holds between them than if only the universal relation does. Indeed, we can say that those things between which the identity relation holds are most similar, and those things between which only the universal relation holds are least similar. So ‘more similar to’ and ‘less similar to’ are meaningful terms. But it is difficult to go further and establish an ordering of different degrees of similarity. What we have in effect is a somewhat messy set of partly overlapping, and sometimes incompatible, natural kinds, together with some, not very well formulated, rules for reckoning which natural kinds are more significant or fundamental than others: we assess similarity in terms of natural kinds, rather than vice versa.

§3.8 Natural Kinds

For inductive arguments to be valid, the world needs to be articulated into natural kinds. It is an evident fact that natural kinds exist. The ones we first encounter, and are most familiar with, are not the pure substances and elements of modern chemistry, but the biological species manifested in the fauna and flora around us. We rapidly learn that bulls are dangerous, but it is perfectly safe to say ‘Bo’ to a cow, and that blackberries are good to eat, and bryony not. Not only do we discover that species exist, but they have to if we are to be able to discover anything. We can distinguish blackberries from elderberries and both from bryony, because there are not very many combinations of features that are actually instantiated. If elder flowers sometimes turned into multi-pipped fruits, or brambles bore large single fruits, we should be in a quandary. Again, if besides silver, there was a silvery metal, soluble in nitric acid but not in hydrochloric, but also magnetic and forming with carbon an alloy as strong as steel, we should begin to be unable to distinguish silver from iron. A doctrine of natural kinds is thus both a necessary presupposition of inductive inference and an evident empirical fact.

Our language contains substantives which refer by means of a number of different features which go together, and such that we can identify individual specimens by reference to some subset of those features. Birds of a feather can be identified either by their plumage, or by their song, or by their shape and size, or by their pattern of flight. A swallow does not sing like a thrush, nor
does a swan swoop like a swift. If every pattern of flight was co-
instantiated with every pattern of song, every shape and size, and
every pattern of colouring, we should have no alternative ways of
identifying birds: bird-books would have to be so compendious as
to be useless. If there were no natural kinds, not only would com-
unication be impossible, but even thought. Even non-human ani-
mals need to be able to classify, and recognise predators and edible
prey. Some principle of limited independent variety is necessary,
both ontologically, if species are to be distinct, and epistemologi-
cally, if species are to be distinguishable.

We are led to a principle of sub-maximality: just as not every
similarity is a likely likeness that the future might share with the
past, so not every set is a natural kind, nor does every predicate
describe a natural kind. Some restriction on set theory, and corre-
spendingly on predicate and propositional calculus, is needed when
we are dealing with natural kinds.

Twentieth-century thinkers have been in thrall to symbolic
logic, which has served them ill when trying to think clearly about
natural kinds. Predicate logic is a logic of predicates, and fails to
do justice to substantives. The thesis that all ravens are black is
not formulated in terms of ravens, but in terms of the predicate ‘be-
ing a raven’. Logicians do not formulate (∀ ravens)Black(ravens),
but (∀ x)(if x is a raven then x is black); instead of ravens, we
have merely xs, dummy substances, with all the work being done
by the predicates and the sentential connectives. But predicate
logic misleads. Logicians early concluded that negation attached
to the predicate: if I deny that the King of France is bald, I ascribe
non-baldness to the King of France, not baldness to the Non-king-
of-France; from which it follows that we can negate the predicate
but not the subject. ‘Not-bald’ is a quite-all-right predicate, and
refers to the property of non-baldness, or hirsuteness: ‘not-king-of-
France’ is not a possible subject, and does not refer to a possible
non-person. Predicate calculus does not allow individual variables
to be negated—they are only dummies, and are of no account,—, but
accepts ¬F on a par with F.\(^{27}\) It thus suggests that non-ravens
are on a par with ravens, and that since in predicate calculus

\[ (∀x)(x \text{ is a raven } → x \text{ is black}) \]

\(^{27}\) This is why, as noted in the previous section (n.26), the Identity of Indis-
cernibles can be expressed by just (∀F)(Fa → Fb), and not the more-to-
be-expected (∀F)(Fa ↔ Fb).
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is equivalent to

$$(\forall x)(x \text{ is not black } \rightarrow x \text{ is not a raven}),$$

‘all non-blacks are not ravens’ is as good a natural law as ‘all ravens are black’, and some philosophers have tried to persuade themselves that every time they see a non-black thing that is not a raven, they are confirming the law that all ravens are black. It is the wrong conclusion. What we should conclude, rather, is that deductive logic—especially as formulated in predicate calculus—is a dangerous guide in inductive inference. The main sceptical argument depends on taking logical possibilities as being serious and substantial. We are committed to the counter-principle of non-maximality: Not every logical possibility is possible.

It would be easy, but wrong, to conclude that deductive logic has no part to play in inductive inference. In fact, although inductive inferences cannot be represented as deductive ones, they have intimate connexions with deductive logic not only in working out the tests for possible causal factors, but more fundamentally in providing the schema of classification required for marshalling evidence and extrapolating from it. Granted that Nature is articulated in certain natural kinds or sorts, and that these have various causal connexions between them, we may be able to discover them by finding out, by trial and failure, which concomitances we cannot produce, no matter how hard we try. A quasi-Platonist metaphysics underwrites Popper’s falsificationist approach, whose rationale can be explicated entirely in terms of deductive logic.\(^{28}\) We should not throw over deductive logic, but need to find a formulation more sensitive to the substantiality of natural kinds.

The inductive sceptic can be answered. But to do so, we have to make assumptions about the nature of reality, assumptions which it is reasonable to make, but difficult to articulate precisely. We can show that there must be some distinction among properties—between those that Goodman calls “projectible” and those that are not; and we can give reasons why those properties that characterize natural kinds should not obey the standard logic of predicates, but one modified to be appropriate to substantives, which cannot be simply negated. But that does not take us very far, and we have to rely on experiment and observation to tell us what species of things really exist.

§3.9 Limits of Critical Reasoning

A reasonable man has reasons for trusting his reasoning. Although he can make mistakes, the arguments of the previous chapter show that our reasoning powers are not just responses that human beings happen to have, but give us guidance we do well to respect. No natural limits can be set to the power of reason, but human fallibility should make us wary of trusting it unreservedly. We need to question our reasonings, but should not conclude that since any one of them may be mistaken, it must be.

In the face of the sceptic’s questions it would be cowardice to cave in, and subside into an easy ignorance about the world we live in, and our role within it. It would be a betrayal of reason also to brush off all questions as impertinent irrelevance. Rather than dismiss all questions out of hand, we should listen to them patiently, but be prepared to question in return, probing to find out precisely what the question is, what its presuppositions are, and what alternative answers are available. Often the sceptic is giving vent to a general discontent, and when made to precisify his question, finds he has had to replace it by more mundane queries which do admit of adequate answers. Often, too, his doubts turn out to be idle rather than substantial, to be allayed by general considerations about the nature of knowledge, rather than particular knowledge of unknown facts. Or the question is revealed as one essentially unanswerable: the sceptic is bemoaning the absence of an answer that could not in the nature of the case be given. In other cases the questions are real questions, but the answers are not really believed; or the sceptic is picking and choosing what to believe and what to reject without having any firm principles to justify the difference in his treatment of them. And finally the shallowness of the sceptical position is revealed when he is asked what answers he would give to his questions, and what his own position is. It begins then to emerge that the difference between the sceptic and the ordinary reasonable man is not so much a difference in assessing particular arguments, as a difference of strategic objectives. The sceptic wants above everything else not to be mistaken: the ordinary reasonable man wants to know. Contrary to Plato’s teaching, there is a trade-off between certainty and knowledge. In his insistence on certainty, the sceptic is willing to forgo the possibility of knowledge, comforting himself with the thought that if he does not know anything, at least he does not know anything wrong. The ordinary reasonable man, by contrast, is willing to run the risk of
error in his pursuit of knowledge, holding that errors are in any case unavoidable, but are in most cases remediable.

These are good general arguments why reason should not be too critical of reason, and should not seek to abridge its scope. But doubts remain. Philosophers down the ages have questioned whether we can have knowledge of the external world, and, more recently, whether we can really know the internal experience of other men. Many of their arguments fit the schema outlined here, but with individual differences, as well as some arguments peculiar to the specific issue, that deserve individual attention.

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