

An Inquiry into the Human Mind

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[Brackets] enclose editorial explanations. Small ·dots· enclose material that has been added, but can be read as though it were part of the original text. Occasional •bullets, and also indenting of passages that are not quotations, are meant as aids to grasping the structure of a sentence or a thought. Every four-point ellipsis indicates the omission of a short passage that seems to present more difficulty than it is worth. Longer omissions are reported between square brackets in normal-sized type.

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Chapter 1: Introduction

1. The subject's importance, and how to study it

The structure of the human mind is intricate and wonderful, like the structure of the human body. The faculties of the mind are just as well suited to their various purposes as are the organs of the body. Indeed, because the mind is nobler and of a higher order than the body, it is reasonable to think that even *more* of God's wisdom and skill went into its structure than into that of the body. So the human mind is a subject well worth investigating—on its own account but even more on account of how extensively the knowledge of the mind affects every other branch of science. [Throughout this work, 'science' means something like 'knowledge that is well established and theoretically organised'; and 'arts' covers the whole range of activities—from agriculture and government to painting and architecture—that involve practical skill, practical techniques and the like.]

This applies even to the arts and sciences that have least connection with the mind, because even with them we have to employ the faculties of the mind; and the better we understand what they are and how they work, and what defects and disorders they are prone to, the more skillfully and successfully we shall apply them. But in the noblest arts the mind is not only what we *use* but also what we *affect*. The painter, the poet, the actor, the orator, the moralist, and the statesman all try to affect the mind in different ways and for different purposes; and how well they succeed depends on how skillfully they touch the strings of the human frame. And their various arts can't ever stand on a solid foundation or rise to the dignity of sciences until they are built on the principles of the human constitution.

Wise men now agree (or ought to!) that there is only one route to knowledge of nature's works; namely the path of observation and experiment. We have built into us a strong propensity for bringing particular facts and observations under general rules, and applying such general rules to explain other effects or to show us how to produce them. This intellectual process is familiar to every human creature in the common affairs of life, and it is the only one by which any real discovery in philosophy can be made. [In this work, 'philosophy' is used in a broad sense in which it also covers science. Many of Reid's references to 'the philosophers' could as well be to 'the scientists', but there is no clean line to be drawn between the two in his text, so 'philosophy' and its cognates are left untouched, though an occasional reminder will be supplied.]

The man who first discovered that cold freezes water and that heat turns it into vapour was using the same general principles and the same method as Newton did in his discovery of the law of gravitation and the properties of light. His *regulae philosophandi* [= 'rules for scientific and philosophical thinking'] are maxims of common sense, and are practised every day in common life; and anyone who philosophizes by other rules, whether concerning the material system or the mind, will get nowhere.

Conjectures and theories are created by men, and will always be found to be very unlike the things created by God. If we want to know the works of God, we must consult *them* with attention and humility, not daring to add anything of our own to what *they* declare. An accurate interpretation of nature is the only sound and orthodox philosophy; anything we add to that is spurious and carries no authority.

All our ingenious *theories* about •the formation of the earth, •the generation of animals, •the origin of natural and moral evil, when they go further than what can be soundly derived from *facts*, are empty folly, as much so as the ‘vortices’ of Descartes and the ‘Archæus’ of Paracelsus. The philosophy of the •mind may have been as much adulterated by *theories* as has the philosophy of the •material world. The theory of ideas is indeed very ancient, and has been very widely accepted; but neither age nor acceptance can •give it authenticity, so they oughtn’t to •shelter it from being examined freely and frankly—especially at the present time, when the theory of ideas has produced a system of scepticism that seems to triumph over all science and even over the dictates of common sense.

All our knowledge of the ·human· body comes from anatomical dissection and observation; so if we are to discover the powers and principles [= ‘driving forces’] of the mind we must subject it to anatomical investigation. [From now on, when Reid uses ‘principle’ in that meaning—which was common in his day—this version will substitute ‘force’ or a phrase including ‘energy’. The equivalence may not be quite exact; on page 124, for instance, it has Reid speaking of the ‘inductive force’ as casting *light*. But ‘force’ is much nearer to his meaning than is ‘principle’ in our present sense of that word.]

2. Obstacles to our knowledge of the human mind

It is much harder to anatomize the mind than to anatomize the body; so it needn’t seem strange that mankind have made less progress with the former. To attend accurately to the operation of our minds—to think *about* them—is not easy even for thoughtful people, and for most of mankind it is next to impossible.

An anatomist may be fortunate enough to have opportunities to examine—accurately, •with his own eyes—bodies of different ages, sexes, and conditions, so that what is defective, obscure, or abnormal in one may be clearly seen in its most perfect state in another. But the anatomist of the mind can’t have the same advantage. All that he can examine with any degree of accuracy and clearness is *his own* mind. This is the only subject he can •look into. He may from outward signs infer what is going on in other minds; but these signs are mostly ambiguous, and must be interpreted in terms of what the anatomist perceives within himself.

No man has ever been able to set out for us, distinctly and methodically, all the operations of the thinking principle within him [here = ‘of whatever it is in him that drives his thought’]; but if some philosopher *did* achieve this feat, this would reveal only the anatomy of •one particular subject; and if applied to •human nature in general it would be both incomplete and wrong. For you don’t have to think very hard to realise that the differences amongst ·human· minds are greater than the differences amongst any other beings that we regard as belonging to the same species.

Some of our various powers and faculties seem to have been planted and developed by nature, with nothing left for human industry to do about them. Of this kind are the powers that we have in common with the brutes [= ‘nonhuman animals’]—the ones that are necessary for the preservation of the individual or the continuance of the kind. Of some other powers nature has only planted the seeds in our minds, leaving their growth to human care. The proper development of these powers is what makes us capable of all those improvements in intellectual power, taste, and morals that exalt and dignify human nature; while on the other hand the neglect or perversion of them make us degenerate and corrupt. The two-legged animal that

eats of nature's dainties what his taste or appetite asks for,
 satisfies his thirst at the crystal fountain,
 propagates his kind whenever he has the opportunity and the urge,
 fights back against injuries, and
 takes alternate labour and repose,

is, like a tree in the forest, purely of nature's growth. But this same savage has within him the seeds of the logician, the man of taste and breeding, the orator, the statesman, the man of virtue, and the saint. But these seeds, though planted in his mind by nature, are not developed and used and so must lie for ever buried and be hardly perceivable by himself or by others.

Even the most minimal kind of social life will bring to light some of those 'seeds' that lay hidden in the savage state; and—according to the person's training, the company he keeps, and his way of life—some of them will •thrive and grow up to great perfection, either through their native vigour or through being deliberately developed; others will •be perverted from their natural form; and yet others will •be checked or perhaps quite eradicated.

This makes human nature so diversified in the individuals who have it that it fills up all the moral and intellectual gap that we conceive to be between brutes and devils below and the celestial orders above. That is, some men are not much stupider or morally worse than the lowest angels, and some are not much brighter or morally better than the best of the lower animals. This enormous diversity of minds must make it extremely difficult to discover what is common to the workings of all human minds.

The language in which philosophers discuss the original faculties of the mind is so thoroughly designed to fit the

currently accepted theory that it can't fit any other; like a coat that fits the man for whom it was made and makes him look good though it sits very awkwardly on a differently shaped man, even one as handsome and as well proportioned as the man for whom it was made. It is hardly possible to present any new discovery in our philosophy concerning the mind and its operations without using new words and phrases, or taking terms that are already in use and giving them different meanings; and taking that liberty with language, even when it is necessary, creates prejudice and misunderstanding, so that it takes time for it to be generally accepted. For innovations in language, like innovations in religion and government, are always suspected and disliked by people in general until use has made them familiar and long-time acceptance has made them legitimate.

[In this paragraph and throughout the rest of the work, Reid uses 'reflection' as Locke did, to mean 'looking in on the events in one's own mind'.] If the original perceptions and notions of the mind made their appearance •single and unmixed, as we first received them from the hand of nature, someone who was accustomed to reflection would have less difficulty in tracking them; but before we are capable of reflection our perceptions and notions are so •mixed, combined and recombined by habits, associations and abstractions, that it is hard to know what they were originally. The mind may in this respect be compared to a pharmacist or a chemist: his materials are indeed provided by nature; but for the purposes of his art he mixes, compounds, dissolves, evaporates, and vaporises them until they have a quite different appearance, making it very hard to know what they were at first, and even harder to bring them back to their original and natural form. The mind doesn't do this work by deliberate acts of mature reason, which we might recollect, but by means of instincts, habits, associations, and other sources of mental energy that operate

before we come to the use of reason; so that it is extremely difficult for the mind to retrace its own steps and track down the operations that it has been busy with since it first began to think and to act.

If we could obtain a clear and full history of everything that has happened in the mind of a child, from the beginning of life and sensation until it grows up to the use of reason—how its infant faculties began to work, and how they brought out and ripened all the various notions, opinions, and feelings that we find in ourselves when we come to be capable of reflection—this would be a treasure of natural history, and would probably throw more light on the human faculties than all the theories of philosophers since the beginning of the world. But there's no point in wishing for something that nature hasn't put within our reach. Our only way of detecting the powers of the mind is *reflection*, and that comes too late to be of any use in observing the whole process through which nature brings the infant mind to maturity.

A man who has grown up in all the prejudices of education, fashion, and philosophy will need great caution and great concentration if he is to unravel his notions and opinions until he finds out the simple and original forces of his constitution, which can't be explained in their turn except in terms of the will of God our maker. This may be truly called an *analysis* of the human faculties; and until it is performed we have no chance of finding a sound theoretical account of the mind—that is, a list of the original powers and laws of our constitution, and an explanation in terms of them of the various phenomena of human nature.

Success in an inquiry of this kind isn't something we can just *choose* to have; but perhaps it is possible for us by caution and humility—which we *can* choose—to avoid error and delusion. The labyrinth may be too intricate and

the thread too fine to be traced through all its windings; but if we stop where we can trace it no further, and secure the ground we have gained, no harm is done; and at some later time someone with a quicker eye may trace it further.

What adulterates philosophy and fills it with error and false theory is high-level intellectual ability—not the lack of it! A creative imagination despises the low-level tasks of digging for a foundation, removing rubbish, and carrying materials for the new structure that is to be built. It leaves these lowly tasks to the drudges in science, while it plans a design and erects a structure. When more materials are needed, it *invents* them, and imaginatively adds colouring and every suitable ornament. The work pleases the eye; it has everything except solidity and a good foundation! It even seems to compete with the works of nature, until some later architect blows it into rubbish and builds in its place a structure of his own—one that is no worse than the other. It is a fortunate thing for us that the present-day builders of castles in the air are engaged more in writing fiction than in doing philosophy. The writing of romances is undoubtedly their province, and in those regions the children of the imagination are legitimate, whereas in philosophy they are all spurious.

3. The present state of this part of philosophy: Descartes, Malebranche and Locke

Even those who have never closely examined it have grounds for conjecturing that contemporary philosophy concerning the mind and its faculties is in a very low state. Are any principles regarding the mind *settled* with the clarity and evidentness that the principles of mechanics, astronomy and optics have? These really are sciences built on laws of nature that hold good always and everywhere. When such a law is

discovered it is no longer a matter of dispute: future ages may add to it, but once it has been established it can never be overturned—until the course of nature changes! But when we turn our attention in on ourselves and consider the phenomena of human thoughts, opinions, and perceptions, and try to bring them under the general laws and basic forces in our constitution, we are immediately involved in darkness and perplexity. And if our common sense or the results of our upbringing happen not to be stubborn, we are likely to end up in absolute scepticism.

In this part of philosophy Descartes found nothing established that could serve as a deep foundation; so he resolved not to believe in *his own existence* until he could give a good reason for it. He may have been the first person to make such a decision; but if he could have actually *done* what he resolved to do—if he could have become genuinely unsure that he existed—his case would have been deplorable, and there would have been no remedy for it from reason or philosophy. A man who disbelieves his own existence is surely as unfit to be reasoned with as a man who thinks he is made of glass. There may be physical disorders that can produce such absurdities, but they won't ever be cured by *reasoning*. Descartes wants us to think that he got out of this craziness through this logical argument: *Cogito, ergo sum* [= 'I think, therefore I exist']. But obviously he was in his right mind all the time, and never seriously doubted his own existence. That argument doesn't •prove his existence—it •takes it for granted. 'I am thinking', he says, 'therefore I am'; and isn't it just as good reasoning to say, 'I am sleeping, therefore I am'? or 'I am doing nothing, therefore I am'? If a body moves it must exist, no doubt; but if it is at rest it must exist then too.

Descartes's argument is an enthymeme [= 'an argument in which one or more premises are left unstated']. Perhaps what he

was relying on •as an unstated premise• was not •his own existence but rather •the existence of thought; and was inferring from that the existence of a mind, something that *had* the thought. But why didn't he prove the existence of his thought? You may say 'Consciousness assures him of that'. But who assures him that consciousness is truthful? Can any man *prove* that his consciousness can't deceive him? No man can; and we can't give a better reason for trusting consciousness than that every man, while his mind is sound, is caused by the constitution of his nature to believe it unquestioningly, and to laugh at or pity anyone who doubts its testimony. And isn't every sane man as firmly caused to take his existence on trust as his consciousness?

The other proposition assumed in this argument •that I am conjecturing Descartes had in mind•, namely that there can't be thought unless there is something that *has* it, is open to the same objection: not that it isn't evidently true, but that it isn't *more* clearly evident than the proposition that is supposed to be proved by it. And taking all these propositions together—

I think,
I am conscious,
everything that thinks exists,
I exist

—wouldn't every serious person form the same opinion of a man who seriously doubted any one of them? If he were your friend, wouldn't you hope for his cure from medicine and good food and exercise rather than from metaphysics and logic?

Furthermore, supposing it has been proved that my thought and my consciousness must be *had* by •something, and consequently that •I exist, how do I know that all the series of thoughts that I remember belong to one subject, and that the *I* of this moment is the very same individual *I*

of yesterday and of times past? Descartes didn't see fit to start this doubt; but Locke did, and in order to resolve it he solemnly laid it down that personal identity *consists in* consciousness; that is, if you are conscious that you did x a year ago, this consciousness makes you the very person that did x. Now, consciousness of what is past can only mean remembering it; so that Locke's principle must be that identity consists in remembering, and consequently a man must lose his personal identity with regard to everything he forgets.

These aren't the only cases where our currently accepted philosophy concerning the mind seems to be very fruitful in creating doubts while doing a miserable job of resolving them.

Descartes, Malebranche and Locke have all used their talents and skill to prove the existence of a material world; and with very little success! Poor uneducated folk believe unquestioningly that there is a sun, moon and stars; an earth that we inhabit; country, friends and relations that we enjoy; land, houses and furniture that we possess. But philosophers, pitying the credulity of the vulgar, resolve not to trust anything that isn't founded on *reason*. [Throughout this work, the 'vulgar' are just common folk with not much education; they needn't be guilty of 'vulgarity' in our sense.] These philosophers ask philosophy to supply them with reasons for believing things that all mankind have believed without being able to give any reasons for doing so. One might expect that in matters of such importance the proof would be easy; but in fact it is the most difficult thing in the world. For these three great men, with the best good will, have not been able to draw from all the treasures of philosophy *one argument* that is fit to convince a thinking man of the existence of anything other than himself. Admired Philosophy! daughter of light! parent of wisdom and knowledge! if that's what you

are, then surely you haven't yet risen and started to shine on the human mind, or blessed us with more of your rays than are sufficient to cast a 'darkness visible' on the human faculties, and to disturb the peace and security enjoyed by happier people who never approached your altar or felt your influence! But if indeed you aren't able to dispel those clouds and phantoms that you have revealed or created, withdraw this skimpy and malignant ray: I despise philosophy and renounce its guidance; let my soul dwell with common sense. [Reid was quoting from Milton's *Paradise Lost*, where hell has 'no light, but rather darkness visible'.]

4. In defence of those philosophers

But instead of despising the dawn of light, we ought rather to hope for its increase; instead of blaming the philosophers I have named for the defects and blemishes of their system, we ought rather to honour their memories as the first discoverers of a previously unknown region in philosophy. However lame and imperfect their system may be, they have opened the way to future discoveries and are entitled to a great share of the credit for them. They have removed a vast amount of dust and rubbish that had collected in the ages of bad reasoning by the scholastics [= 'the Roman Catholic Aristotelians'], and had blocked the path forward. They have put us on the right road, that of experience and accurate reflection. They have taught us to avoid the traps of ambiguous and ill-defined words, and have spoken and thought about this subject with a sharpness and clarity formerly unknown. They made many openings that may lead to the discovery of truths that they didn't reach, or to the detection of errors in which they were entangled.

It may be observed that of all the defects and blemishes in the accepted philosophy concerning the mind, the ones

that have most exposed it to the contempt and ridicule of sensible men have chiefly come from this:

The adherents of this philosophy, led by a natural prejudice in her favour, have tried to extend her jurisdiction beyond its proper limits by setting her up as a judge of the dictates of common sense.

But these dictates refuse to be judged in this way; they despise the trial of reasoning, and disown its authority; they don't look to reason for help or fear its attacks.

In this unequal contest between common sense and philosophy the latter will always come off with both dishonour and loss; nor can she ever prosper until this rivalry is dropped, philosophy gives up encroaching on the territory of common sense, and a cordial friendship is restored; for the fact is that common sense doesn't need philosophy's permission to say what it does, nor does it need philosophy's help. On the other side (if I may be permitted to change the metaphor), philosophy's only root is the principles of common sense; it grows out of them, and draws its nourishment from them; when it is cut off from this root its honours wither, its sap is dried up, it dies and rots.

The philosophers of the recent past whom I have mentioned did not attend to preserving this union and subordination as carefully as the honour and the interests of philosophy required; but philosophers of the present time have openly waged war with common sense, and hope to make a complete conquest of it through the subtleties of philosophy—as audacious and futile as the attempt of the giants to dethrone almighty Jove!

5. Bishop Berkeley. ·Hume's· *Treatise of Human Nature*. Scepticism

I don't think that the present age has produced two more acute or more skillful workers in this part of philosophy than the Bishop of Cloyne and the author of the *Treatise of Human Nature*. [These are Berkeley and Hume respectively. Hume's *Treatise* had been published anonymously, and Reid accordingly writes of 'the author of the *Treatise of Human Nature*' without identifying him. This was a courtesy; he knew quite well who the author was. In this version Hume will be named often.] Berkeley was no friend to scepticism, and had that warm concern for religious and moral principles that was fitting for his rank in the church; yet the result of his inquiry was a serious belief that there is no such thing as a material world—nothing in nature but spirits [= 'minds'] and ideas—and that the belief in material substances and in abstract ideas are the chief causes of all our errors in philosophy, and of all disbelief and heresy in religion. His arguments are based on the principles that had been laid down by Descartes, Malebranche and Locke, and that have been very generally accepted. And the opinion of the ablest judges seems to be that his arguments haven't been and can't be blocked—that he has proved by unanswerable arguments things that no man in his senses can believe.

Hume proceeds on the same principles, but takes them the whole way: as Berkeley undid the whole material world, Hume on the same grounds undoes the world of spirits, and leaves nothing in nature but ideas and impressions, without any subject on which they may be impressed [= 'without anything that can *have* them'].

It seems to be a peculiar streak of humour in this author to start off with an introduction in which he promises—keeping his face straight—nothing less than a complete system of the sciences, on an entirely new foundation,

namely •human nature; when the intention of the whole work is to show that there is no •human nature and no •science in the world. It may perhaps be unreasonable to complain of this conduct in an author who can't mean to disappoint his reader or laugh at his credulity, because he doesn't believe that he or his reader exists! Yet I can't imagine that the author of the *Treatise of Human Nature* is so sceptical that he would defend himself in this way. He believed, against his own principles, that he should be read and that he should retain his personal identity until he reaped the honour and reputation that his metaphysical skill entitled him to. Indeed he openly admits that it was only when he was alone in his study that he could accept his own philosophy; being in the company of others had the effect of daylight, dispelling the darkness and fogs of scepticism and making him give in to the rule of common sense. And I have never heard him being accused of doing anything, even in solitude, that indicated such a degree of scepticism as his principles maintain. Surely if his friends had feared that he would, they would have the kindness never to leave him alone!

Pyrrho of Elis, the father of this philosophy, seems to have embraced it more thoroughly than any of his successors; for it is reported. . . .that his life corresponded to his doctrine. Thus, if a cart ran against him or a dog attacked him. . . .he wouldn't stir a foot to avoid the danger, giving no credit to his senses. Luckily for him he had servants who weren't such great sceptics; they took care to keep him out of harm's way, so that he lived to be ninety years old. And it can't be doubted that Hume's friends would have been equally careful to keep him from harm, if ever his principles had taken too strong a hold of him.

The *Treatise of Human Nature* was probably all written in solitude; yet it contains clear indications that the author

every now and then relapsed into the faith of the vulgar, and could hardly keep up the sceptical character for half a dozen pages.

Similarly the great Pyrrho himself sometimes forgot his principles. He is said once to have been in such a rage with his cook—probably for not roasting his dinner to his liking—that he chased the cook even into the market-place, holding the spit with the meat on it.

It is a bold philosophy that unceremoniously rejects principles which irresistibly govern the belief and the conduct of all mankind in the common affairs of life—principles to which the philosopher himself must surrender after he imagines he has refuted them. Such principles are older than philosophy, and have more authority than she does; she is based on them, not they on her. If she *could* overturn them, she would inevitably be buried in their ruins; but all the siege-machines that philosophical subtlety can create are too weak for this purpose; and the attempt is just as ridiculous as it would be for a mechanic to construct a windlass for winching the earth out of its circuit, or for a mathematician to claim he could demonstrate that things equal to the same thing are not equal to one another.

Zeno tried to demonstrate the impossibility of motion; Hobbes, that there was no difference between right and wrong; and Hume, that no credit is to be given to our senses, to our memory, or even to demonstration. Such a philosophy is truly ridiculous, even to those who can't put a finger on *where* it has gone wrong. All it could succeed in is showing the acuteness of the sophist at the cost of disgracing reason and human nature, and turning mankind into Yahoos [brutish human-shaped creatures in Swift's *Gulliver's Travels*].

6. The *Treatise of Human Nature*

Even on a general view of this system of human nature ·of Hume's·, one forms some quick preliminary judgments that make one suspicious of it.

Descartes, Hobbes and Hume have each of them given us a ·supposedly complete· system of human nature, which is an undertaking too vast for any one man, no matter how able and creatively thoughtful he may be. Surely we have reason to suspect that many parts of human nature never came under their observation; and that others were stretched and distorted so as to fill up blanks and complete the system. Christopher Columbus. . . might almost as reasonably have undertaken to give us a complete map of America.

Nature's works have a certain character and style that is never attained in the most perfect imitation of them. This seems to be lacking in the systems of human nature I have mentioned, especially in Hume's. We see a puppet move and gesture in various ways, and at first we are impressed; but when we look more closely and analyse it our admiration ceases; we see exactly how the puppet-maker did it. How *unlike* a real man it is! What a poor piece of work compared with the •body of a man, about which this is true: the more we know of its structure, the more wonderful we find it to be, and the more aware we are of our ignorance! Is the mechanism of the •mind so easy to understand when that of the body is so difficult? Yet according to Hume's system, the whole mechanism of sense, imagination, memory, belief, and all the actions and passions of the mind are explained by three laws of association together with a few original feelings. Is *this* the man that nature made? I suspect it is not so easy to look behind the scenes in nature's work. This ·system of Hume's· is a puppet, surely, constructed by an over-bold apprentice of nature in mimicry of nature's own

work. It looks good by candle light, but when it is brought into daylight and taken to pieces it will appear to be a man made with bricks and mortar! The more we know of other parts of nature, the more we like and approve them. The little that I know of

the planetary system,
the earth that we inhabit,
minerals, vegetables and animals,
my own body, and
the laws that govern all these parts of nature

opens to my mind grand and beautiful scenes, and contributes equally to my happiness and power. But when I look into myself and consider the mind that makes me capable of all these views and pleasures, if it is indeed what the *Treatise of Human Nature* says it is then it turns out that I have merely been in an enchanted castle, deceived by spectres and apparitions. I blush inwardly to think how I have been deluded; I am ashamed of the kind of thing I am, and can hardly refrain from protesting against my destiny: Is this how you amuse yourself, O Nature, playing such tricks on a silly creature and then to taking off your mask and showing him how he has been fooled? If *this* is the philosophy of human nature, I tell my soul: don't enter into her secrets! It is surely the forbidden tree of knowledge; I no sooner taste of it than I see myself as naked, stripped of everything—even of my very *self*. I see myself and the whole universe shrink into fleeting ideas, dancing about in emptiness like Epicurus's atoms.

7. The system of all these authors is the same, and it leads to scepticism

But what if these profound investigations into the basic forces in human nature do naturally and necessarily plunge

a man into this abyss of scepticism? And can't we reasonably think that this *is* so, judging by what has happened? Descartes no sooner began to dig in this mine than scepticism was ready to break in on him. He did what he could to shut it out.

Malebranche and Locke, who dug deeper, found it even harder to keep out this enemy, but they honestly worked at doing so. Then the work was carried on by Berkeley, who despaired of saving everything but thought of a way out: give up the material world (which he thought would be no loss, and an advantage, he hoped), and set up an unbreakable wall to secure the world of spirits. But, alas! the *Treatise of Human Nature* recklessly undermined the foundation of this wall, and drowned everything in one universal flood of scepticism.

These facts, which are undeniable, do indeed give us reason to suspect that •Descartes's system of the human understanding, which with some improvements made by later writers is now generally accepted, had some defect right at the outset; that •this scepticism is embedded in the system •because of that defect• and has grown up with it; and, therefore, •that we'll have to open it up right down to its foundation and examine the materials •of which it is made• if we are to have any chance of raising any solid and useful fabric of knowledge on this subject. (In what follows, I shall call this system that derives from Descartes 'the ideal system', •because of its emphasis upon 'ideas'.)

8. We ought not to despair of finding a better system

But is this to be despaired of because Descartes and his followers have failed? By no means. To give up, feebly, would be injurious to ourselves and to truth. •And we shouldn't

be daunted by the undeniable ability of those philosophers. Useful discoveries *are* sometimes found by superior minds, but more frequently they come from the passage of time and from accidental events. A traveller who has good judgment may mistake his way, and be led unawares onto a wrong route; and for as long as the •wrong• road in front of him is open and passable he may go on without suspicion, and be followed by others; but when the road ends at a coal-pit, he doesn't need much judgment to know that he has gone wrong, and perhaps to find out what has led him astray.

This part of philosophy is in miserable state; and that has had an effect that might discourage one from trying to find the right road. . . . Sensible men, who won't ever be sceptics about everyday matters, are apt to treat with lordly contempt everything that has been or can be said on this subject. They say:

It's metaphysics—who listens to *that*? Let scholastic fallacy-mongers entangle themselves in their own cobwebs; I'm determined to take on trust my own existence and that of other things, and to believe that snow is cold and honey sweet, whatever they may say to the contrary. Someone who tried to •budge me from this position by argument would be trying to• reason me out of my reason and senses. He would have either to be a fool or to be wanting to make a fool out of me.

I don't know what answer a sceptic can make to this, or by what good argument he can plead even for a hearing; for either •his reasoning is fallacious, and so ought to be ignored, or •there is no truth in the human faculties, and then why should we reason? So if a man should find himself entangled in this metaphysical net and be unable to find any other way to escape, let him bravely •cut the knot that he can't •untie, and curse metaphysics. (And dissuade everyone from having anything to do with it. For if I have been led into

bogs and quagmires by following a will-o'-the-wisp, oughtn't I to warn others to beware of it?) If philosophy contradicts herself, makes fools of her devotees, and deprives them of every object worth pursuing or enjoying, let her be sent back to the infernal regions from which she must have started out.

But is it absolutely certain that this fair lady—·philosophy, I mean—·does belong to the scepticism party? Isn't it possible that she has been misrepresented? Haven't

brilliant men in earlier times often passed off their own dreams as philosophy's pronouncements? Should we, then, condemn her without any further hearing? This would be unreasonable. I have found her in all other matters to be an agreeable companion, a faithful counsellor, a friend to common sense and to the happiness of mankind. In fairness, this entitles her to have me stay in touch with her, and to trust her until I find infallible proofs that she is not to be trusted.

Chapter 2: Smelling

1. The order in which I shall take things. The medium of smelling and the organ of smell

It is so hard to unravel the operations of the human understanding, to sort them out into their elementary forces or drives, that we can't expect to succeed in this unless we start with the •simplest and proceed by very cautious steps to the more complex. So the five external senses can claim to be considered first in an analysis of the human faculties; and amongst those five we should start not with the noblest or the most useful but with the •*simplest*, the sense whose objects are least likely to be mistaken for other things. On this view, the clearest and easiest way of analysing our sensations is to take them in this order: smelling, tasting, hearing, touch, and, last of all, seeing. ·I shall give these a chapter each; chapter 6, on seeing, will constitute more than half of the book. The many facets of the human mind other than the senses are touched upon in the book's final paragraph·.

Natural philosophy [= 'natural science'] tells us that all animal and vegetable bodies (and probably all or most other bodies) while exposed to the air are continually giving off effluvia—emanations of enormously finely divided matter—doing this not only when they are alive and growing but also when they are fermenting and rotting. These volatile particles probably repel each other, and so scatter themselves in the air until they meet with other bodies to which they have some chemical affinity, and with which they unite and form new combinations. All the smell of plants and of other bodies is caused by these volatile parts, and is smelled wherever they are scattered in the air; and the acuteness of smell in some animals shows us that these effluvia spread far, and that the particles making them up must be inconceivably small.

Some chemists think that each species of body has a *directing spirit*, a kind of soul, which causes the smell and all the properties of that species; the spirit is extremely

volatile, they think, and flies about in the air searching for a proper place to land. [For Reid and his contemporaries, 'soul' often meant simply 'mind', with no essential religious implications.] I shan't inquire into this. Like most other theories, this one perhaps comes more from imagination than from sound induction. But there is no reason to doubt that all bodies are smelled by means of effluvia that they give off and that are drawn into the nostrils along with the air. So there is a clear appearance of *design* in the fact that the organ of smell is placed inside the canal through which the air is continually passing when we breathe in and out.

Anatomy tells us that the wisdom of nature has assigned the mucus membrane, and the olfactory nerves that are run to the hairy parts of this membrane, to the sense of smell; so that a body can't be smelled when it doesn't emit any effluvia, or it does but they don't enter the nose, or they do enter but the mucus membrane or olfactory nerves have become unfit to do their work. Despite all this ·knowledge that we have·, it is obvious that neither the •organ of smell, nor the •medium, nor any •motions we can conceive to be caused in the mucus membrane or in the nerve or animal spirits, have the faintest resemblance to *the sensation of smelling*. That sensation could never by itself have led us to think of nerves, animal spirits, and effluvia. [The 'medium' to which Reid refers consists in the effluvia, the tiny particles of matter that the cheese (say) gives off, connecting the cheese with the nose—*mediating* between them. 'Animal spirits' were thought to be an extremely finely divided fluid or gas that acted as, so to speak, the body's hydraulic system.]

2. The sensation ·of smell· considered abstractly

Having set out these facts about the medium and organ of this sense, let us now attend carefully to what the mind is conscious of when we smell a rose or a lily. Because our

language provides no other name for this sensation, I'll call it a 'smell' or 'odour', being careful to use those names only for the sensation itself, at least until we have examined it.

Suppose that someone who has never had the sense of smell suddenly comes to have it, and to smell a rose: can he perceive any similarity or agreement between the smell and the rose? or indeed between the smell and any other object whatsoever? Certainly he cannot. He finds himself affected in a new way, and he doesn't know why or from what cause. Like a man who feels some pain or pleasure for the first time, he is conscious that *he* isn't the cause of it; but he can't from the nature of the thing work out whether it is caused by body or spirit, by something near or something distant. It isn't *like* anything else, so there is nothing to compare it with; and therefore he can't infer anything about it except perhaps that there must be some unknown cause of it.

It would obviously be ridiculous for him to think of the smell as having •figure [= 'shape'], •colour, •extension or any other quality of bodies. He can't give it a •place, any more than he can give a place to sadness or joy; and he can't conceive it to have any existence except while it is smelled. So it appears to be a simple and original [here = 'basic'] state or feeling of the mind, altogether inexplicable and unaccountable. It can't possibly be *in* any body: it is a sensation; and a sensation can only be in a sentient thing.

The various odours have each their different degrees of strength or weakness. Most of them are agreeable or disagreeable; and frequently those that are agreeable when weak are disagreeable when stronger. When we compare different smells with one another we can perceive very few resemblances or contrarieties (or indeed relations of any kind) between them. They are all so simple in themselves and so different from each other that it is hardly possible to divide them into genera and species. [This is meant to contrast smells

with (for example) *shapes*, which can be divided into genera and species: taking *closed plane figure* as a genus, it has the species *straight-sided* and *curved-sided*; the former of those divides further into *three-sided* and *four-sided* and so on; the last of those divides into *equal-sided* and *unequal-sided*, and so on. This goes with the fact that squareness (for example) is obviously a complex or compound property, not a simple one: for a thing to be square is for it to be plane *and* closed *and* four-sided *and* equilateral. Reid's point is that we seem to have no comparable way of saying of any smell that for a thing to have this smell is for it to be F and G and H; we can't break a smell down into its simpler constituents; each smell seems to be simple just in itself.] Most of the names we give to smells are particular—the smell 'of a rose', 'of jasmine', and the like. Yet they also have some general names—'sweet', 'stinking', 'musty', 'putrid', 'cadaverous', 'aromatic'. Some smells seem to refresh and animate the mind, others to deaden and depress it.

3. Sensation and memory: natural producers of belief

So far we have considered the sensation of smell abstractly. Let us next compare it with other things to which it has some relation. And first I shall compare this sensation with •remembering it and with •imagining it.

I can think of the smell of a rose when I don't smell it; and I could think of it at a time when there was no rose or smell-of-a-rose anywhere in the universe. But when I smell it, I am forced to believe that the sensation really exists. This is common to all sensations: just as

they can't exist without being perceived,
so also

they can't be perceived unless they exist.

I could as easily doubt my own existence as the existence of my sensations. Even those profound philosophers who

have tried to disprove their own existence have still left their sensations to stand on their own feet with no that *has* them, rather than question whether they really exist.

So a sensation such as a smell can be presented to the mind in three different ways: it may be •smelled, it may be •remembered, it may be •imagined or thought of. In the •first case, it must be accompanied by a belief that it exists right now; in the •second, it must be accompanied by a belief that it did exist in the past; and in the •third it isn't accompanied by any belief, and is instead what the logicians call a 'simple apprehension'.

I don't think that any philosopher can give a shadow of a reason *why* sensation should compel our belief in the present existence of the thing, memory a belief in its past existence, and imagination no belief at all. All we can say is that such is the nature of these operations. They are all •simple and •original and therefore inexplicable acts of the mind. •If they weren't •simple, they might be 'explained' at least in the sense of being analysed into their constituent parts; and if they weren't •original—meaning *basic*—they might be explained by being traced back to the mental processes that underlay them.

Suppose that just once I smelled a tuberose in a certain room where it grew in a pot and gave off a very pleasant perfume. Next day I report what I saw and smelled. When I attend as carefully as I can to what happens in my mind when I do this, it seems evident that the very thing I saw yesterday, and the fragrance I smelled then, are now the *immediate* objects of my mind when I remember it. Furthermore, I can imagine this pot and flower carried to the room where I am now sitting and giving off the same perfume; and here again it seems that the individual thing that I saw and smelled is the *immediate* object of my imagination. Here is why I stress 'immediate'.

Philosophers tell me that in a case like this the immediate object of my memory and imagination is not •the past sensation but •an idea of it, an image or ‘phantasm’ or ‘species’ of the odour I smelled: this idea now exists in my mind, or in my sensorium; and when the mind contemplates this pleasant idea it finds it to be a *representation of* •what is past or of •what may exist, and accordingly calls it ‘memory,’ or ‘imagination’.

[‘Phantasm’ and ‘species’ are technical terms in some philosophies; they don’t play a significant role in this work, though they are mentioned again on page 130. The ‘sensorium’ was supposed to be the part of *brain* where sensations are recorded and perhaps stored.] This is the doctrine of the ideal philosophy; I shan’t go into it now, because that would interrupt the thread of the present investigation. Memory, when I attend to it as carefully as I can, seems to me to have as its object *things that are past* rather than *present ideas of them*. I shall examine this system of ‘ideas’ later, and will try to convince you that •no solid proof has ever been advanced of the existence of ideas; that •they are a mere fiction and hypothesis invented to explain the phenomena of the human understanding; that •they don’t in fact explain anything; and that •this hypothesis of ideas or images of things in the mind or in the sensorium is the parent of those many paradoxes (so shocking to common sense) and of the scepticism that disgrace our philosophy of the mind and have brought on it the ridicule and contempt of sensible men.

In the meantime, permit me to join the vulgar in thinking that when I remember the smell of the tuberose, the immediate object of my memory is that very sensation that I had yesterday and that now doesn’t exist; and that when I imagine it as present, the object of my imagination is the sensation itself and not any idea of it. But though the •object

of my sensation, memory and imagination is in this case the same, these •acts or operations of the mind are as different and as easy to tell apart as are smell, taste and sound. I am conscious of a difference in kind between sensation and memory, and between both and imagination. I also find this: the sensation compels my belief in the present existence of the smell, and memory compels my belief in its past existence. The immediate testimony of sense is: *There is a smell*. The immediate testimony of memory is: *There was a smell*. ‘Why do you believe that the smell exists?’ The only answer I will ever be able to give is: ‘Because I smell it.’ ‘Why do believe that it existed yesterday?’ I can only answer: ‘Because I remember it.’

•Sensation and •memory therefore are simple, original, and perfectly distinct operations of the mind, and both are original generators of belief. Imagination is distinct from both, but doesn’t generate belief. Sensation implies the present existence of its object; memory its past existence; but imagination views its object nakedly, without any belief in its existence or its non-existence, so imagination is what the •Aristotle-influenced• universities call ‘simple apprehension’.

4. Sometimes judgment and belief precede simple apprehension

But here again the ideal system shoulders its way forward, and tells us that the mind’s first engagement with its ideas is *simple apprehension*—that is, the bare conception of a thing without any belief concerning it—and that after we have acquired simple apprehension we compare our ideas and perceive agreements or disagreements between them; and—according to Locke—that what we call ‘belief,’ ‘judgment’ or ‘knowledge’ is nothing but this perception of the agreement or disagreement of ideas. This whole story seems

to me to be fiction with no basis in nature, and here is why. [Reid's very compressed statement of the reason depends on two equations:

- (1) imagining x = (2) having a simple apprehension of x [see page 13], and
- (3) having a sensation of something = (4) being in a certain state that involves belief.

The second equation conflicts with much of what Reid says about sensation, but perhaps he thinks it follows from his recent statement that 'Sensation implies the present existence of its object'. Anyway, with those equations in hand, Reid argues

- You can't have (1) unless you first have (3) (everyone agrees about this), so
- You can't have (2) unless you first have (4).

In his words:] (4) apprehension accompanied by belief and knowledge must go before (2) simple apprehension, at least in the matters we are now speaking of. So that in the present context instead of saying that •we get belief or knowledge by putting together and inter-relating simple apprehensions, we ought to say that •simple apprehension is done by resolving and analysing a natural and original judgment. The operations of the mind in this context are like natural bodies. Bodies are compounded of simple elements, but nature doesn't exhibit these elements separately leaving it to us to make compounds of them; rather, she exhibits them mixed and compounded in concrete bodies, and it is only by art and chemical analysis that they can be separated.

5. Two theories of the nature of belief refuted. Conclusions.

But what is this *belief* or *knowledge* that accompanies sensation and memory? Every man knows what it is but no

man can define it. Does anyone claim to define *sensation* or to define *consciousness*? It's just as well that nobody does! And if no philosopher had ever tried to define and explain *belief*, some paradoxes in philosophy—more incredible than ever emerged from the most abject superstition, or the most frantic fanaticism—would never have seen the light. An example of this, surely, is that modern revelation of the ideal philosophy—specifically, in Hume's version of it—that •sensation, •memory, •belief and •imagination, when they have the same object, are only different degrees of strength and liveliness in the idea. Take the example of *the idea of a future state after death*. One man believes it firmly; this means merely that he has a strong and lively idea of it. Another man neither believes nor disbelieves, i.e. he has a weak and faint idea. Suppose now a third person believes firmly that there is no life after death; I am at a loss to know whether his idea is faint or lively: if it is faint, then there can be a firm belief where the idea is faint; if the idea is lively, then the belief in a future state and the belief that there is no future state must be one and the same! The same arguments that are used to 'prove' that •belief implies only a stronger idea of the object than •simple apprehension could just as well be used to 'prove' that •love implies only a stronger idea of the object than •indifference. And then what shall we say of hatred? On this hypothesis it must be a degree of love or a degree of indifference—which should we choose? You may say 'In love there is something more than an idea, namely an affection of the mind'; but then can't it be said with equal reason that in belief there is something more than an idea, namely an assent or conviction of the mind?

But perhaps it may be thought that arguing against this strange opinion is as ridiculous as maintaining it. If someone maintained that

a circle, a square and a triangle differ only in size and not in shape,

I don't think he would find anyone willing either to believe him or to argue against him; but it is at least as shocking to common sense to maintain that

sensation, memory and imagination differ only in degree and not in kind.

I know it is said that in a delirium or in dreaming men are apt to mistake one for the other. But does it follow from this that men who are *not* dreaming or in a delirium can't distinguish them? 'But *how* does a man know that he isn't in a delirium?' I can't tell, any more than I can tell *how* a man knows that he exists. But if any man seriously wonders whether he is in a delirium, I think it highly probable that he is, and that it's time to look for a cure—which I'm sure he won't find in the whole system of logic!

In section 4 I mentioned Locke's notion of belief or knowledge: he holds that it consists in a perception of the agreement or disagreement of ideas; and prides himself on this as a very important discovery. [Here and elsewhere, 'comparing' two ideas is attending to them both at once, setting them side by side, so to speak, not necessarily likening them to one another. We still use 'compare' in that sense in just one locution—'Let us get together and compare notes'.] We shall have occasion later to examine in more detail this grand principle of Locke's philosophy, and to show that it is one of the main pillars of modern scepticism, although he didn't *intend* to make that use of it. At present let us only consider •how it agrees with the instances of belief we are now considering, and •whether it throws any light on them. I believe that the sensation I have exists, and that the sensation I remember doesn't now exist but did exist yesterday. Here, according to Locke's system, I compare the idea of a sensation with the ideas of

past and present existence: at one time I perceive that this idea agrees with that of present existence, but disagrees with that of past existence; but at another time it agrees with the idea of past existence, and disagrees with that of present existence. Truly these ideas seem to be very capricious in their agreements and disagreements! Besides, I can't for the life of me conceive what is meant by either. I say *a sensation exists*, and I think I understand clearly what I mean. But you want to make the thing clearer, so you tell me that *there is an agreement between the idea of that sensation and the idea of existence*. To be candid about it, this conveys to me no light, only darkness. The only sense I can make of it is as a quaint long-winded way of saying that the sensation exists. I conclude, then, that the belief that accompanies sensation and memory is a simple act of the mind which can't be defined. It is in this respect like seeing and hearing, which can never be so defined as to be understood by those who can't see or hear; and to those who *can* see and hear no definition can make those operations clearer than they are already. Similarly, every man who has any belief (and it would be a strange man who had none!) knows perfectly well what belief is, but can never define or explain it. I conclude also that sensation, memory and imagination, even where they have the same object, are operations of quite different kinds, and are perfectly distinguishable by people who are sound and sober. Someone who is in danger of confusing them with one another is indeed to be pitied; but whatever relief he may find from another art •such as medicine•, he can get no help from logic or metaphysics. I conclude further that our believing in the •present existence of our •sensations and in the •past existence of what we •remember is as thoroughly built into the human constitution as is our believing that twice two make four. The evidence of the senses, the evidence of memory, and the evidence of the necessary relations of

things are all distinct and original kinds of evidence, equally grounded in our constitution; none of them depends on, or can be resolved into, any other. [In that sentence, 'evidence' means 'evidentness'. Reid is saying that these different faculties make things evident in different ways.] To reason against any of them is absurd; indeed, to reason *for* them is absurd! They are *basic* principles, and thus fall within the province not of reason but of common sense.

6. In defence of metaphysical absurdities. The theory of ideas implies that a sensation can exist without there being anything that *has* it. Consequences of this strange opinion

Having considered how the sensation of smelling relates to remembering and imagining it, I proceed to consider how it relates to a mind. . . . It is certain that no-one can conceive or believe smelling to exist by itself, without a mind or something that has the power of smelling—something *of* which the smelling is called a sensation, an operation or a feeling. But if you ask for a proof that sensation can't exist without a mind or sentient being, I confess that I can't give one, and that to purport to •prove this seems to me almost as absurd as to •deny it.

This might have been said without any apology before the *Treatise of Human Nature* appeared in the world. For until then no-one, as far as I know, ever thought of •calling in question the principle •that sensation can't exist without a mind•, or of •giving a reason for believing it. There were disputes about whether thinking beings are like gas or like fire, whether material or immaterial; but that thinking is an operation of some kind of being or other—•some *thing* that thinks—was always taken for granted as a principle that couldn't possibly be called into question.

However, Hume has treated it as a vulgar prejudice, and maintained that the mind is only a series of ideas and impressions without any *thing* that has them; and as he is undoubtedly one of the most acute metaphysicians that this or any age has produced, his opinion deserves respect, however contrary it is to what mankind commonly believes. So I make this plea here, once and for all: When I accuse this or that •metaphysical notion with being 'absurd', or with being 'contrary to the common sense of mankind', please don't take offence. I don't mean to disparage the intellects of those who invented •such opinions or those who maintain them. Indeed, the opinions or notions in question often come not from any defect of understanding, but rather from an excess of refinement: the reasoning that leads to them often throws new light on the subject, showing real genius and deep penetration in the author, and the •insights of the premises do more than compensate for the •absurdity of the conclusion.

I think that the constitution of our nature leads us to believe certain principles that we are compelled to take for granted in the common concerns of life, without being able to give a reason for them. If I am right about this, then *those* are what we call 'the principles of common sense', and we dismiss as obviously 'absurd' anything that obviously conflicts with them.

Indeed, if it is true, and to be accepted as a principle of philosophy, that sensation and thought can exist without a thinking being, we must recognize this as the most wonderful discovery that was ever made. The principle from which it is deduced is the accepted *doctrine of ideas*, and it does indeed seem to follow validly and smoothly from that. (It probably wouldn't have had to wait so long to be 'discovered' if it hadn't been so shocking, and so much in conflict with the common beliefs of mankind, that an uncommon degree

of philosophical courage was needed to introduce it to the world.) It is a fundamental principle of the ideal system that every object of thought must be either an impression or an idea, an idea being a faint copy of some earlier impression.

This principle is so commonly accepted that Hume, although his whole system is built on it, never offers the least proof of it. It is on this principle, as a fixed point, that he erects his metaphysical siege-engines to overturn heaven and earth, body and spirit; and so far as I can see it is altogether sufficient for that purpose. For if all we can think about are *impressions* and *ideas* then 'heaven' and 'earth', and 'body' and 'spirit', and anything else you care to add to the list, must either •signify only impressions and ideas or else •be words with no meaning. So it seems that this notion, however strange, is closely connected with the accepted doctrine of ideas, and that we must either accept the conclusion or challenge the premises.

Ideas seem to have something in their nature that is unfriendly to other existences! They were first introduced into philosophy in the humble role of *images* or *representatives* of things; and in this role they seemed not only to be inoffensive but to serve admirably well for explaining how the human mind works. But since men began to reason clearly and distinctly about them, they have gradually supplanted their constituents, and undermined the existence of everything but themselves. [Reid's word 'constituents' here is a little joke—pretending that in the preceding sentence the word 'representatives' was used in its political sense.] •First, they discarded all the secondary qualities of bodies—they 'showed' that fire isn't hot, or snow cold, or honey sweet; and in short that heat and cold, sound, colour, taste and smell are nothing but ideas or impressions. •Bishop Berkeley raised them a step higher, and 'discovered'—by valid reasoning from the

same principles—that extension, solidity, space, figure, and body are ideas, and that there is nothing in nature but ideas and spirits. •But the triumph of ideas was completed by the *Treatise of Human Nature*, which discards spirits also, leaving ideas and impressions as the only things in the universe. What if at last, having nothing else to battle against, they should come to blows with one another and leave *nothing at all* existing in nature? That would surely bring philosophy into danger, for what would it leave us to talk or to dispute about? However, these philosophers have so far acknowledged the existence of impressions and ideas; they accept certain laws of attraction, or rules of precedence, according to which ideas and impressions sort themselves into various forms and succeed one another; but they have found it to be a vulgar error to suppose that they belong to a mind as its proper goods and chattels. [The force of 'proper' here is this: a given idea belongs to one particular mind, and could not belong to any other.] These ideas are as free and independent as the birds of the air, or as Epicurus's atoms when they journeyed through the vastness of space.

Shall we conceive them as being like the 'films' of things in the Epicurean system? . . . Or do they rather resemble Aristotle's 'intelligible species' after they are shot out from the object and before they have reached the passive intellect? But why should we try to *compare* them with anything, since they are the only things that exist? They •constitute the entire content of the universe; they •come into existence and go out of existence without any cause; they •combine into packages that the vulgar call 'minds'; and they •follow one another according to fixed laws, without being at any time or in any place, and with no author of those laws.

Yet, after all, these self-existent and independent ideas look pitifully naked and destitute when in this way they are left alone in the universe; they seem on the whole to

be in a worse condition than they were before. Descartes, Malebranche and Locke made much use of ideas, and in return treated them handsomely, providing them with decent accommodation—in the pineal gland, or in the pure intellect, or even in the divine mind. They moreover clothed them with a commission [= ‘rescued them from their “nakedness” by giving them a job’] and made them *representatives* of things, which gave them some dignity and character. But the *Treatise of Human Nature*, though no less indebted to ideas, seems to have repaid them poorly by giving them this independent existence. Because of that they are turned out of house and home, and set adrift in the world without friend or connection, without a rag to cover their nakedness; and who knows whether the whole system of •ideas will perish through the indiscreet zeal of their friends to exalt •them?

However this may be, it is certainly a most amazing ‘discovery’ that thought and ideas can exist without any thinking being: a discovery full of consequences that can’t easily be followed by those deluded folk who think and reason in the ordinary way. We were always apt to imagine that thought presupposes a thinker, and love a lover, and treason a traitor: but it seems that this was all a mistake; and it has been ‘discovered’ that there can be treason without a traitor, love without a lover, laws without a legislator, punishment without a sufferer, succession without time, and motion without anything that moves or space for it to move in; or if in these cases ideas *are* the lover, the sufferer, the traitor, I wish the author of this ‘discovery’ had done us the favour of telling us whether ideas can converse together and be under obligations of duty or gratitude to each other; whether they can make promises and enter into leagues and covenants, and fulfil or break them, and be punished for the breach? If one set of ideas makes a covenant, another breaks it, and a third is punished for it, there is reason to think that this

system doesn’t have the virtue of justice built into it!

It seemed very natural to think that the *Treatise of Human Nature* required an author, and a very ingenious one at that; but now we learn that it is only a set of ideas that came together and arranged themselves by certain associations and attractions.

After all, this curious system seems not to be appropriate to the present state of human nature. How far it may suit some •rare spirits who have been cleansed of the dregs of common sense I can’t say. I think it is agreed that even •these can go along with this system only at times when they are intensely theorizing, when they soar so high in pursuit of those self-existent ideas that they lose sight of everything else. But when they condescend to mingle again with the human race, and to chat with a friend, a companion or a fellow citizen, the ideal system vanishes; common sense like an irresistible torrent sweeps them along; and, in spite of all their reasoning and philosophy they believe in their own existence and in the existence of other things.

Indeed, it’s just as well that they do so; for if they *did* take their closet belief with them out into the world, the rest of mankind would think them diseased and send them to a hospital. Therefore, just as Plato required certain previous qualifications for those who entered his school, I think it would be prudent for the teachers of this ‘ideal’ philosophy to do the same: they should refuse to admit anyone who is so weak as to think that •he ought to have the same beliefs in company as in solitude, or that •his principles ought to have some influence on his conduct. For this philosophy is like a child’s toy horse which a man who is in bad health (•and so unable to ride a real horse•) may ride in his bedroom without hurting his reputation; but if he rode it to church or the stock-market or the theatre his heir would immediately call a jury •to declare the man insane• and seize his estate.

7. The conception of and belief in a sentient being or mind is suggested by our constitution. The notion of relations is not always acquired by comparing the related ideas

Leaving this philosophy to those who have occasion for it, and can use it discreetly as a private exercise, we can still ask:

How have the rest of mankind—and even the ‘ideal’ philosophers themselves, except in some solitary moments—come to have such a strong and irresistible belief that thought must have a subject, must be the act of some thinking thing? How does it happen that every man believes *himself* to be something distinct from *his ideas and impressions*; something that continues to be the same identical self when all his ideas and impressions are changed?

It is impossible to trace the origin of this opinion in history, for all languages have it interwoven in their original construction. All nations have always believed it. The constitution of all laws and governments, as well as the common transactions of life, presuppose it.

It is equally impossible for any man to recollect when he himself came by this notion; for as far back as we can remember we already had it, and were as fully convinced of our own existence and the existence of other things as we were that one and one make two. So it seems that this opinion preceded all •reasoning and •experience and •instruction; and this is the more probable because we couldn’t get it by any of •these means. It appears, then, to be an undeniable fact that all mankind, constantly and invariably from the first dawning of reflection, infer from •thought or sensation that there is a •power or faculty of thinking and a permanent •thing or mind which *has*

that power; and that, just as invariably, we ascribe all the various sensations and thoughts we are conscious of to one individual mind or self.

But by what rules of logic we make these inferences it is impossible to show. Indeed, it isn’t even possible to show how our sensations and thoughts can so much as *give us the notion and conception of* either a mind or a •power or •faculty. The •faculty of smelling is something very different from the actual •sensation of smelling; for the faculty can remain when we have no sensation. [The next sentence corrects what was evidently a slip on Reid’s part; he writes of the mind’s being different from ‘the faculty’, but that is not what his line of thought requires.] And the •mind is just as different from the •sensation; for it continues to be the same individual thing when the sensation ceases. Yet this sensation *suggests* to us both a faculty and a mind; and as well as suggesting the notion of them it creates a belief in their existence; although it is impossible to discover by reason any tie or connection between one and the other.

What shall we say, then, about those inferences that we draw from our sensations, namely the existence of a mind and of powers or faculties belonging to it? Are they (1) prejudices of philosophy or education, mere fictions of the mind, which a wise man should throw off as he does the belief in fairies? or (2) judgments of nature, judgments that don’t come from setting ideas side by side and perceiving agreements and disagreements, but are immediately inspired by our constitution?

If (2) is the case, as I think it is, it will be impossible to shake off those opinions, and we must eventually give in to them even if we struggle hard to get rid of them. And if we *could* through determined obstinacy shake off the principles of our nature, doing this would be the act not of a philosopher but of a fool or madman. Those who think that these are *not* natural principles have an obligation to show •how else

we can have acquired the notion of a mind and its faculties, and •how we come to deceive ourselves into the opinion that sensation can't exist without a sentient being.

It is the accepted doctrine of philosophers that our notions of relations can only be had by comparing the related ideas [see the explanation of 'compare' on page 16]; but our present topic seems to provide be a counterexample to that. It is not by first having the notions of •mind and •sensation and then comparing them together that we perceive that

mind involves the relation of a subject or substratum of. . . , and

sensation involves the relation of an act or operation of. . . .

On the contrary, *one* of the related things, namely sensation, •suggests to us both the other thing and the relation between them. Let me use the word •'suggestion', because I don't know of a more suitable one to express a power of the mind that seems entirely to have escaped the notice of philosophers—a power to which we owe many of our simple notions that are neither impressions nor ideas, as well as many original principles of belief. I shall try to illustrate what I mean by this word through an example. We all know that a certain kind of sound suggests immediately to the mind *a coach passing in the street*; and it makes us not only •imagine a coach passing but also •believe that a coach is passing. But this belief doesn't come from any comparing of ideas, or perception of agreements or disagreements. •If it did, it would have to be an •*agreement*•; but there isn't the slightest •likeness between the sound we hear and the coach we imagine and believe to be passing.

It is true that this suggestion isn't natural and original; it is the result of experience and habit. But I think it appears from what I have said that there are also natural suggestions, •of which the following three are notable•:

- Sensation suggests the notion of present existence, and the belief that what we perceive or feel does now exist;
- memory suggests the notion of past existence, and the belief that what we remember did exist at a past time; and
- our sensations and thoughts also suggest the notion of a mind, and the belief that it exists and relates in a certain way to our thoughts.

A similar natural thought brings it about that

- something's coming into existence or altering in some way suggests to us the notion of a cause, and forces us to believe in its existence.

Similarly, as I'll show when we come to the sense of touch, our nature is so constituted that certain sensations of touch suggest to us extension, solidity and motion, which are in no way *like* sensations though they have been hitherto confused with them.

8. There is a quality or virtue in bodies which we call their smell. How this is connected in the imagination with the sensation

[Here and later, Reid uses 'virtue' in a sense in which it means about the same as 'power'. He presumably sees *some* difference, because three times he writes of 'power or virtue'.] We have considered smell as signifying a sensation, feeling or impression on the mind, and in this sense it can only be in a mind or sentient being; but obviously mankind give the name 'smell' much more often to something that they think of as external, as being a quality of a body. They understand by 'smell' something that doesn't at all imply a mind, and they have no difficulty in conceiving the air perfumed with aromatic odours in the deserts of Arabia or on some island where human feet never trod. . . .

Suppose that an ordinary person meets with a modern philosopher and asks: 'What is the smell in plants?' The philosopher answers: 'There isn't any smell in plants, or in anything but the mind. There couldn't possibly be smell anywhere except in a mind; and all this has been demonstrated by modern philosophy.' The plain man will probably think he is joking; but if he finds that he is serious, his next conclusion will be that the philosopher is mad; or that philosophy, like magic, puts men into a new world and gives them different faculties from common men. In this way philosophy is set at variance with common sense. But who is to blame for it?

In my opinion the philosopher is to blame. For if he means by 'smell' what the rest of mankind usually mean, he is certainly mad. But if he gives the word a different meaning without abiding by it himself or warning others, he is misusing language and disgracing philosophy, without doing any service to truth; like someone who switches the meaning of the words 'daughter' and 'cow', and tries to prove to his plain neighbour that his cow is his daughter, and his daughter his cow. I believe there is not much more wisdom than *that* in many of the paradoxes of the ideal philosophy that strike plain sensible men as obvious absurdities, but are counted by the devotees as profound discoveries. For my part, I am determined always to pay a great regard to the dictates of common sense, and not to depart from them unless I absolutely have to; so I'm inclined to think that in the rose or lily there really is something that the vulgar call 'smell' and that continues to exist when it isn't smelled; and I shall proceed to inquire what this is, how we come by the notion of it, and what relation this •quality of smell has to the •sensation that we also call 'smell' for lack of another name for it.

So let us return to our supposition of a person who has just begun to exercise the sense of smell. A little experience will reveal to him that the nose is the organ of this sense, and that the medium of it is the air or something in the air. And finding by further experience that when a rose is nearby he has a certain sensation, and when it is moved away the sensation goes, he finds a connection in nature between the rose and this sensation. He considers the rose as a cause, occasion or antecedent of the sensation; and considers the sensation as an effect or consequent of the presence of the rose. They are associated in the mind, and constantly found conjoined in the imagination. [In the phrase 'cause [or] occasion or antecedent' Reid goes from the strong 'x caused y' to the weaker 'x occurred before y' through the intermediate 'x was the occasion of y'. This use of 'occasion' expresses this idea: it wasn't x but *God* that caused y, but God was prompted to do this by the occurrence of x, which provided him with an *occasion* for producing y. This makes x less than a cause but more than a mere antecedent.]

But we should pay attention to this fact:

The sensation may seem more closely related to •the mind (that has it) or to •the nose (its organ) than to •the rose (which accompanies it); but it's the third of those connections—the connection with the rose—that operates most powerfully on the imagination.

This seems to be because the sensation's connection with the mind is more •general, and doesn't distinguish it from other smells, or even from tastes, sounds and other kinds of sensations. Its relation to the organ, the nose, is also •general, and doesn't distinguish it from other smells. But its connection with the rose is •special, and also constant, so that the sensation and the rose become almost inseparable in the imagination as do thunder and lightning, freezing and cold.

9. There is a force at work in human nature from which the notion of a body's smell is derived, along with all other natural virtues or causes

In order to illustrate further how we acquire the concept of a quality or virtue in the rose that we call 'smell', and what this smell is, we should bear in mind that the ·human· mind begins very early to thirst after principles that can direct it in the use of its powers. The smell of a rose is a certain state or feeling of the mind; it isn't constant, but comes and goes, so we want to know when and where to expect it, and are uneasy until we find something whose presence brings this feeling along with it and whose absence removes it. When we find this we call it the 'cause of' the smell, not meaning 'cause' in a strict and philosophical sense implying that feeling was really effected or produced by that cause, but in a popular sense meaning only that there is a constant conjunction between them. Such 'causes' are in reality nothing but laws of nature, but the mind is satisfied with them. Having found the smell thus constantly conjoined with the rose, the mind is at peace, without considering whether this conjunction is due to a *real effectiveness* or not—that being a philosophical question that doesn't matter in ·everyday· human life. But every discovery of such a constant conjunction is really important in life, and makes a strong impression on the mind.

We earnestly want to connect everything that we observe to happen with something else as its cause or occasion; so much so that we are apt on *very* slender evidence to think that we have found connections. This weakness is most clearly to be seen in ignorant people who know least of the real connections established in nature. A man meets with an unlucky accident on a certain day of the year, and knowing no other cause of his misfortune he is apt to think there is something unlucky about that day of the calendar; and

if he has bad luck on a second occurrence of that date he will be strongly confirmed in his superstition. [Reid then gives an example.] However silly and ridiculous this opinion was, it grew from the root in human nature from which all natural philosophy grows—namely, an eager desire to discover connections in things, and a natural, basic and inexplicable tendency to believe that the connections that we have observed in times past will continue in the future. **(1)** Omens, portents, good and bad luck, palmistry, astrology, all the numerous arts of divination and of interpreting dreams, false hypotheses and systems are all built on the same foundation in the human constitution as **(2)** true principles in the philosophy of nature. All that distinguishes them is that in **(1)** we conclude rashly from too few instances whereas in **(2)** we conclude cautiously from a sufficient induction.

As it is only experience that reveals to us these connections between natural causes and their effects, we without further inquiry credit the 'cause' with having some vaguely and unclearly conceived power or virtue to produce the effect. In many cases the concerns of ·everyday· life don't make it necessary to give different names to the cause and the effect; and so it comes about that one name is used for both, because although they are very unlike one another they are closely connected in the imagination. (In ordinary talk the common name is most frequently applied to the one of the two that happens to be the main object of our attention.) This leads to an ambiguity in many words, a kind of ambiguity that turns up in all languages, because the causes of it are present in all. This kind of ambiguity is apt to be overlooked even by philosophers. Some instances will serve both to illustrate and confirm what I have been saying about it. 'Magnetism' signifies both •the tendency of the iron toward the magnet, and •the power of the magnet to produce that tendency. If we were asked 'What is magnetism—a quality of

the iron or a quality of the magnet?’ we would perhaps be puzzled at first; but a little attention would reveal to us that we conceive a •power or virtue in the magnet as the cause, and a •motion in the iron as the effect; and although these things are quite unlike, they are so united in the imagination that we give the common name ‘magnetism’ to both. The same thing may be said of ‘gravitation’, which sometimes signifies the tendency of bodies toward the earth, sometimes the attractive power of the earth that we conceive as the cause of that tendency. We may observe the same ambiguity in some of Sir Isaac Newton’s definitions—even in words that he himself coined. In three of his definitions he explains very clearly what he understands to be

the absolute quantity of a centripetal force,
the accelerative quantity of a centripetal force, and
the motive quantity of a centripetal force.

The first of these three definitions makes ‘centripetal force’ name the •cause, which we think of as some power or virtue in the central body; in the second and third definitions the same phrase is used to name the •effect of this cause, in producing velocity or in producing motion toward the centre.

‘Heat’ signifies a sensation, and ‘cold’ a contrary one. But ‘heat’ *also* signifies a quality or state of bodies that has no contrary but does have different degrees. When a man feels the same water hot to one hand and cold to the other, this gives him occasion to distinguish the feeling from the heat of the body; and although he knows that the •sensations are contrary, he doesn’t imagine that the •body can have contrary qualities at the same time. And when he finds that the same body tastes different when he is sick from how it tastes when he is well, he is easily convinced that the quality in the •body called ‘taste’ is the same as before although the •sensations he has from it—which are also called ‘taste’—are perhaps opposite.

The vulgar are commonly accused by philosophers of absurdly imagining the smell in the rose to be somehow *like* the sensation of smelling: but the accusation is unfair, I think, because the vulgar don’t give the same name to both the objective smell and the sensation, nor do they reason in the same manner from them. •What is smell in the rose? It is a quality or virtue of the rose, or of something given off by the rose, which we perceive through the sense of smelling; and this is all we know of the matter. •What is smelling? It is an act of the mind, but is never imagined to be a quality of the mind. Again, the sensation of smelling is conceived to imply necessarily a mind or sentient being; but smell in the rose implies no such thing. We say ‘This body smells sweet’, ‘That body stinks’; but we *don’t* say ‘This mind smells sweet’ or ‘That mind stinks’. So •smell in the rose and •the sensation that it causes are not thought of, even by the vulgar, as things of the same kind, although they have the same name.

From what I have said we can learn that ‘the smell of a rose’ signifies two things:

- (1) A sensation, which can’t exist except when it is perceived, and can exist only in a sentient being or mind.
- (2) Some power, quality or virtue in the rose, or in effluvia that it gives off, which has a permanent existence independently of the mind and which by the constitution of nature produces the sensation in us.

We are fundamentally so built that we are •led to believe that there is a permanent cause of the sensation, and are •prompted to look for it; and experience leads us to locate it in the rose. The names of all smells, tastes and sounds, as well as heat and cold, are similarly ambiguous in all languages; but we should note that in common languages these names aren’t *often* used to signify (1) the sensations;

for the most part they signify (2) the external qualities that are indicated by the sensations. Here is what I think to be the cause of this phenomenon.

Our sensations vary greatly in strength. Some are so quick and lively that they give us a great deal of pleasure or of discomfort. When this is the case, we are compelled to attend to the sensation itself—to think and talk about *it*—so we give it a name that stands for the sensation and nothing else; and in this case we accept that what the name stands for is only in the mind and not in anything external. Examples include the various kinds of pain, sickness, and the sensations of hunger and other appetites. But where the sensation doesn't matter to us in such a way that we need to think about *it*, our constitution leads us to consider it as a sign of something external that is constantly conjoined with it; and when we have found the item of which it is a sign we give a name to *that*; and the sensation, having no name to itself, falls into place as an accessory to the thing it signifies, and is confusingly given the same name. So the name may indeed be applied to the sensation, but most properly and commonly is applied to the thing that the sensation indicates. The sensations of smell, taste, sound and colour are of infinitely less importance •in themselves than they are •as signs or indications; like the words of a language, where our attention is focussed not on •the sound but on •the sense.

10. In sensation is the mind active or passive?

One question remains to be investigated: In smelling and in other sensations, is the mind active or passive? This may strike you as a merely verbal question, or at least as a very unimportant one; but if it leads us to attend to the operations of our minds more accurately than we usually do,

that alone makes it worth looking into. Modern philosophers, I think, hold that in sensation the mind is entirely passive. This is undoubtedly true to this extent: •we can't *have* any sensation in our minds just by willing it ·in the way you can raise your arm just by willing it·; and on the other hand •it seems hardly possible to *avoid* having the sensation when the object is presented. Yet it seems likewise to be true that a sensation is more or less thoroughly perceived and remembered depending on how much *attention* is given to it. Everyone knows that very intense pain can be diverted by a surprise, or by anything that entirely occupies the mind. When we are engaged in earnest conversation, the clock may strike nearby without being heard; at least, a moment later we don't remember having heard it. The noise and tumult of a great trading city isn't heard by those who have lived in it all their life, but it stuns visitors to the city who have lived in the peaceful retirement of the country. Can there be *any* sensation where the mind is purely passive? I shan't answer this, but I don't think we ever *remember* any sensation—even a very recent one—without being conscious of having given it some *attention* when it occurred.

No doubt when the impulse is strong and unusual it's hard to withhold attention from it—as hard as it is to keep from crying out in racking pain, or jumping when suddenly frightened. In each of these ·reactions· it might be possible through strong resolution and practice to do better, but it isn't easy to find out how far one can go with this. The ancient Aristotelians had no good reason to suppose that we have an active intellect and a passive intellect, because *attention* can quite well be accounted an act ·not of the intellect but· of the will; and yet I think they came nearer to the truth in holding that in sensation the mind is partly passive and partly active than the moderns do in affirming it to be purely passive. The vulgar have always thought of

sensation, imagination, memory and judgment as acts of the mind. The way they are referred to in all languages shows this. When the mind is very busy in them we say it is very *active*; whereas if they were merely impressions [= 'effects'] (as the ideal philosophy would have us think) we ought rather to say that the mind is very *passive*; for I suppose no-one would attribute great activity to the paper I write on just because it receives a variety of words.

How the sensation of smell relates to remembering and imagining it, and to a mind or subject that *has* the sensa-

tion, is the same as for all our sensations, and indeed for all the operations of the mind; how it relates to the will is the same as for all the powers of understanding; and how it relates to the quality or virtue of bodies that it indicates is the same as for the sensations of taste, hearing, colour, heat and cold; so that what I have said about this sense may easily be applied to our various other senses and to other operations of the mind; and this, I hope, excuses my spending so long on it.

Chapter 3: Tasting

Much of what I have said about the sense of smelling is so easily applied to those of tasting and hearing that I shall leave it to the reader to re-apply it to those senses, and save myself the trouble of a tedious repetition.

Probably everything that affects the sense of taste is to some degree soluble in saliva. It is not conceivable how anything should enter easily—as though it *wanted* to—into the pores of the tongue, palate and upper throat unless it had some chemical affinity to the fluid with which these pores are always filled. So it is an admirable device of nature's to keep the organs of taste always moist with a fluid that is such a universal solvent. This fluid deserves more study than it has so far received, both as a solvent and as a medical salve. Nature teaches dogs and other animals to use it as a salve, and its use in taste and digestion shows its effectiveness as a solvent.

The organ of taste—the tongue—guards the entrance to the alimentary canal, just as the organ of smell guards the entrance to the canal for breathing. These arrangements are obviously suitable, and obviously designed. From the fact that these organs are so placed that everything that enters the stomach must first be checked by both senses it is plain that they were intended by nature to distinguish good food from bad. The brutes haven't any other means of choosing their food, and nor would mankind if it were in the savage state. Our senses of smell and taste have probably been impaired, and made less fit to do their natural work, by the unnatural kind of life men commonly lead in society. If they *weren't* at all impaired by luxury or bad habits, they would probably seldom if ever lead us to a wrong choice of food among natural products, though the artificial compositions of refined and luxurious cookery, or of chemistry and drug-preparation, may often deceive

both senses by producing things that taste and smell good although they are bad for our health.

These ·two· senses are also very useful for distinguishing bodies that can't be told apart by our other senses, and to detecting the changes that a body undergoes and that are often detected by taste and smell sooner than by any other means. There are ever so many things in the market, the eating-house and the tavern, as well as in shops where drugs and medicines are sold, that are known to be what they are claimed to be, and are perceived to be good or bad of their kind, only by taste or smell. It's not easy to determine how much our judgment of things through our senses might be improved by accurate attention to small differences in taste and smell. ·How things taste and smell are among their so-called 'secondary qualities', but we shouldn't infer from this that they are unimportant·. In a noble effort of his great genius, Sir Isaac Newton tried to work out from •the colour (·secondary quality·) of opaque bodies •what the size (·primary quality·) is of the minute non-opaque parts of which they are made up; and who knows what new lights natural philosophy may yet receive from other secondary qualities when they are properly examined?

Some tastes and smells stimulate the nerves and raise the spirits; but such an artificial •raising of the spirits is followed—in accordance with the laws of nature—by a •lowering of them; and this can be relieved only by the passage of time or by taking more of the same stimulant. By using such things we create an appetite for them that is very like a natural appetite and has all the latter's force. This is how men acquire an appetite for snuff, tobacco, strong liquors, opium and the like.

It seems, indeed, that nature has carefully set limits to the pleasures and pains we have through smell and taste, confining them within very narrow limits so that we shan't

let any part of our happiness depend on them. For there is hardly any smell or taste so nasty that we don't find it tolerable, and eventually perhaps even agreeable, after we have become used to it; and none so agreeable that it doesn't lose its attractiveness through constant use. Nor is there any pleasure or pain of these ·two· senses that isn't introduced or followed by some degree of its contrary, which nearly balances it. So that we may here apply the beautiful allegory of the divine Socrates: although pleasure and pain are contrary in nature, and their faces look in different directions, yet Jupiter has tied them together so that whoever takes hold of one of them pulls the other along with it.

Of •smells that appear to be simple and uncompounded there's a great variety—they aren't just unlike but some of them are contrary to others. And the same can be said of •tastes—it seems that one taste is just as different from another taste as it is from a smell. So how do all smells come to be considered as one genus, and all tastes as another? What marks off each genus? Is it only **(1)** that the nose is the organ of one, and the palate of the other? or is it rather that **(2)** there is in the sensations themselves—never mind the organs—something common to all smells, and something else common to all tastes, and *this* is what distinguishes one from the other? It seems most probable that **(2)** is right, and that these sensations have a certain complexity although on the surface they appear to be utterly simple.

Considering the matter abstractly, it would seem that a number of sensations—or indeed a number of individuals of any kind—which are perfectly simple and uncompounded can't be sorted into genera and species [= 'classes and sub-classes'], because if some •individuals belong to a •species it must be the case that

each has something that only it has, to mark it off from the others,

and

they all have something in common, making them one species.

The same may be said of •species that belong to one •genus. Does this imply that there is something composite about each species? I leave that to metaphysicians to answer. The sensations of smell and of taste do undoubtedly vary in an enormous number of ways that no language can express. You could try five hundred different wines and hardly find

two with precisely the same taste, and the same thing holds for cheese and many other things. Yet of •five hundred different tastes in cheese or wine, we can hardly find •twenty that we could *describe* so as to give a clear notion of them to someone who hadn't tasted them.

In 1675 Dr. Nehemiah Grew, a most judicious and hard-working naturalist, . . . tried to show that there are at least sixteen different *simple* tastes, which he enumerated. It's easy to see how many compound ones could be made out of all the various combinations of two, three, four, or more of these simple ones. . . . And it is beyond doubt that if smells were examined with the same accuracy they would turn out to have as much variety as tastes.

Chapter 4: Hearing

1. The variety of sounds. Their place and distance is learned by custom, without reasoning

Sounds probably vary as much as tastes and odours do. For one thing, sounds differ in *pitch*. The ear is capable of perceiving four or five hundred variations of pitch in sound, and probably as many different degrees of *strength*; by combining these we get more than twenty thousand simple sounds that differ either in pitch or strength, supposing every pitch to be perfect. But note this:

To make a perfect pitch a great many waves in elastic air are required, all with the same wave-length and the same duration; they have to follow one another with perfect regularity; and each wave must be made of the

up and down movements of innumerable particles of elastic air, whose motions all have the same direction, force, and speed.

So we can easily conceive of an enormous variety in the same pitch, arising from irregularities brought into it by •the constitution, shape, situation or manner of striking the sounding body, by •the constitution of the elastic medium, •the air, or its being disturbed by other motions, or by •the constitution of the ear on which the effect is had. A flute, a violin, an oboe and a French horn may all sound a note of the same pitch and yet be easily distinguishable. Indeed, if twenty human voices sound the same note with the same strength there will still be some difference. An individual person's voice can, while continuing to be recognisably *that*

voice and no other, be varied many ways by sickness or health, youth or age, leanness or fatness, good or bad mood. We can tell whether words—the very same words—are being spoken by a foreigner or by a native—indeed by whether they are spoken by someone from this *province* rather than that.

Such an immense variety of sensations of smell, taste, and sound was surely given to us for some purpose. They are •signs by which we know external things and tell them apart, and it was appropriate that the variety of the signs should correspond to some extent with the variety of things •signified by them.

It seems to be by *custom* that we learn to use the sounds things make to tell us where they are located and what kinds of things they are. It is probably by *experience* that we learn to tell that this noise is in the street, that is in the room above me; that this is a knock at my door, that is someone walking upstairs. I remember an occasion when I was lying in bed, having been frightened by something; I heard my own heart beating, but I thought it was someone knocking at the door and I got up and opened the door. This happened more than once, until I eventually discovered that the sound was in my own chest. It is probable that if we didn't have •relevant• experience we wouldn't know whether a sound came from the right or left, from above or below, from nearby or far away, any more than we could know without experience whether it was the sound of a drum, or a bell, or a cart. Nature is not wasteful in her operations; she won't put herself to the expense of a particular instinct to give us knowledge that experience will soon produce through a general drive in human nature.

For human nature is so constituted that a little experience ties together in our imagination and also in our belief things that were in their nature unconnected. When I hear a certain sound, I conclude immediately—without thinking

about it—that a coach is passing by. There are no premises from which this conclusion is inferred by any rules of logic. It is the effect of a natural drive that we have in common with the brutes.

Although it is hearing that enables us to perceive harmony and melody and all charms of music, it seems that these •also• require a higher faculty, which we call 'a musical ear'. Two people whose hearing is perfect may, it seems, have this 'musical ear' in very different degrees; so it ought not to be classed with •the external senses but regarded as being •a faculty• of a higher order.

2. Natural language

One of the noblest purposes of sound undoubtedly is language, without which mankind would hardly be able to rise higher than the brutes. The usual view is this:

Language is purely an invention of men, who *by nature* are as speechless as the brutes. What they have done, using their superior degree of invention and reason, is to contrive *artificial* signs of their thoughts and purposes and to establish them—that is, their meanings—by common consent.

But the origin of language deserves to be looked into more carefully. Doing this •may be of importance for the improvement of language, and •it bears on my present subject, and will tend to reveal some of the basic drives in human nature. So I shall offer some thoughts on this subject.

By *language* I understand *all the signs that mankind use in order to communicate to others their thoughts and intentions, their purposes and desires*. Such signs can be divided into two kinds, artificial and natural. An artificial sign has no meaning except what is attached to it by contract or agreement among those who use it; a natural sign is one

which (independently of any contract or agreement) has a meaning that every man understands through the drives in his nature. Language can be called 'artificial' to the extent that it consists of artificial signs, and 'natural' to the extent that it consists of natural signs.

On the basis of these definitions I think it can be proved that if mankind had no natural language they could never have invented an artificial one through their reason and ingenuity. For all artificial language supposes some contract or agreement to attach a certain meaning to certain signs; so there must be contracts or agreements before the use of artificial signs; but there can't be any contract or agreement when there are no signs and no language; therefore there must be a natural language before any artificial language can be invented—Q.e.d.

If language were entirely a human invention, like writing and printing, we would find whole nations as speechless as the brutes. Indeed the brutes do have some natural signs by which they express their own thoughts, affections and desires, and understand those of others. A newly hatched chick understands the different sounds whereby its mother calls it to food or warns it of danger. A dog or a horse understands *by nature* when the human voice is kind and when it is threatening. But as far as we know brutes have no notion of contracts or covenants, or of a moral obligation to keep them. If nature had given them these notions, she would probably have given them natural signs to express them. And where •nature has withheld these notions they can't be acquired by •art—that is, through an exercise of skill—any more than a blind man can in that way acquire the notion of colours. Some brutes have a sense of honour or disgrace; they have resentment and gratitude; but as far as we know none of them can make a promise or swear to be faithful, because no such notions are built into their

constitution. If it weren't the case that mankind have these notions by nature and have natural signs to express them by, not all their sharpness and ingenuity would have enabled them to invent language.

The elements of this natural language of mankind, i.e. the signs that naturally express our thoughts, may I think be brought down to these three kinds: •modulations of the voice, •gestures, and •facial expressions. By means of these, two savages who have no artificial language in common can converse together, can communicate their thoughts well enough, can ask and refuse, affirm and deny, threaten and beg; can trade, enter into agreements, and swear to be faithful. This could be confirmed by unquestionable historical facts if there any need to do so.

So mankind have in common a natural language, though a scanty one that is fitted only for the necessities of nature. Given this language, no great ingenuity was required to improve it by adding artificial signs to do things that the natural signs don't. As the arts of life are further developed and as knowledge increases, these artificial signs inevitably multiply. The articulations of the voice seem to be the signs that work best for artificial language ; and because all mankind have always used them for that purpose, we can reasonably conclude that that's what nature intended them for. But nature probably doesn't intend that we should stop using the natural signs; it is enough that we make up for their shortcomings by adding artificial ones. A man who always rides in a chariot gradually loses the use of his legs; and someone who used only artificial signs would lose both the knowledge and use of natural ones. Dumb people retain much more of the natural language than others, because they *have to* use it; and for the same reason savages have much more of it than civilized nations do. It is mainly through natural signs that we give force and energy

to language; and the less language has of them the less expressive and persuasive it is. Thus,

- writing is less expressive when read silently than when read aloud;
- reading aloud is less expressive than speaking without a written text;
- speaking without the proper and natural modulations, force, and variations of the voice is frigid and dead compared with what you have when those things are used;
- speech is still more expressive when we add the language of the eyes and facial features; and
- speech is even better when to all the above we add the force of physical gestures.

It is in this last case, and *only* there, that speech is in its perfect and natural state, and produced with its proper energy.

When speech is natural, it will involve using not only the voice and lungs but also all the muscles of the body; like the speech of dumb people and of savages, whose language has more of nature in it than ordinary speech, and is accordingly more expressive and more easily learned. Isn't it a pity that the refinements of a civilized life, instead of making good for the defects of natural language, should root it out and replace it by dull and lifeless sequences of unmeaning sounds or the scrawling of meaningless letters? It is commonly thought that the perfection of language

consists in expressing human thoughts and feelings clearly by means of these dull signs; but if this is artificial language made perfect, it is surely natural language turned rotten.

Artificial signs *signify*, but they don't *express*; they speak to the understanding, as the letters in algebra may also do; but the passions, the affections and the will don't hear them. They stay quiet and inactive until we speak to them in the language of nature, and then they are all attention and obedience!

It would be easy to show that the fine arts of the musician, the painter, the actor and the orator are natural to the extent that they are expressive. The *knowledge* of those arts requires in us a delicate taste, precise judgment and much study and practice; but the arts themselves are merely the language of nature, which we brought into the world with us but have unlearned through disuse, and so find the greatest difficulty in getting it back.

Abolish the use of articulate sounds and writing among mankind for a century, and every man would be a painter, an actor *and* an orator. I don't mean that this is practicable; or that if it were done the advantage would outweigh the loss. But I do say that as men are led by nature and necessity to converse together, they will use every means in their power to make themselves understood; and when they can't do this by artificial signs they will do it as far as possible by natural ones; and that the best judge in all the expressive arts must be he who best understands the use of natural signs.

Chapter 5: Touch

1. Heat and cold

The senses we have been considering are alike in two fundamental ways. (1) They are all very simple and uniform: each of them presents only one kind of sensation, thereby indicating only one quality of bodies. We perceive sounds and nothing else by the ear, tastes by the palate, odours by the nose. (2) The qualities that they indicate are also all of one basic kind, being all secondary qualities. In contrast with this, what we perceive by *touch* is (1) not just one quality but many, and (2) they are of very different kinds because some are primary qualities and others secondary. The main ones are heat and cold, hardness and softness, roughness and smoothness, shape, solidity, motion, and extension. I shall consider these in order.

As to heat and cold, it will easily be accepted that they are secondary qualities, of the same basic kind as smell, taste and sound; and therefore that what I have said about smell is easily applicable to them. Namely, that each of the words 'heat' and 'cold' has two meanings: they sometimes signify certain sensations of the mind, which can't exist except when they are felt and can't exist anywhere but in a mind or sentient being; but more frequently they signify a quality of bodies which, by the laws of nature, leads to the sensations of heat and cold in us. This quality, though connected by custom so closely with the sensation that we can't easily think of them as distinct from one another, isn't in the slightest like the sensation, and can continue to exist when there is no sensation at all.

The sensations of heat and cold are perfectly known, for they aren't and couldn't be other than what we feel them

to be; but the qualities in bodies that we also call 'heat' and 'cold' are unknown. Our only conception of them is as *unknown causes or occasions of the sensations to which we give the same names*. But though common sense tells us nothing about the nature of these qualities, it plainly dictates that they do exist; and to say that there can be heat and cold only when they are felt is such a gross absurdity that it isn't worth arguing against. What could be more absurd than to say that the thermometer can't rise or fall unless some person is present, or that the coast of Guinea would be as cold as Nova Zembla if no-one lived there?

It is the business of philosophers to investigate, through proper experiments and induction, what heat and cold are in bodies. Is heat a particular kind of stuff that is spread through nature and present in a concentrated form in a hot body, or is it rather a certain vibration of the parts of the hot body? Are heat and cold contrary qualities, as the sensations of heat and cold undoubtedly are contrary, or is it rather that only heat is a quality, and cold is merely the absence of it? These questions fall within the province of philosophy [still = 'science'], for common sense says nothing on either side of either of them.

But whatever be the nature of the quality of bodies that we call 'heat', we certainly know *this* much about it: it can't in the least resemble the sensation of heat. To suppose that the sensation of heat resembles the quality of heat is as absurd as to suppose that the pain of gout resembles a square or a triangle. *Nobody* who has common sense imagines that the fire has in it the sensation of heat or something that resembles that sensation. What the plain man thinks is merely that there is in the fire *something* that

makes him and other sentient beings feel heat. But because the word 'heat' in common language signifies this unknown something in the fire more frequently and more properly than it does the sensation occasioned by it, he rightly laughs at philosophers who deny that there is any heat in the fire and thinks that they speak contrary to common sense.

2. Hardness and softness

Let us next consider hardness and softness—by which words I always understand real properties or qualities of bodies of which we have a distinct conception. When the parts of a body adhere so firmly that it can't easily be made to change its shape, we call it 'hard'; when its parts are easily moved we call it 'soft'. This is the notion that all mankind have of hardness and softness: they aren't sensations, and they aren't *like* sensations; they were real qualities before they were perceived by touch, and continue to be so when they are not perceived; for if anyone claimed that diamonds weren't hard until they were handled, who would think it worthwhile to reason with him?

There is no doubt a sensation by which we perceive a body to be hard or soft. It is easy to get this sensation of hardness by pressing one's hand against the table, and attending to the feeling that results, setting aside as far as possible all thought of the table and its qualities, or of any other external thing. But it is one thing to have the sensation, and another to attend to it and make it a distinct object of reflection. The former is very easy, whereas the latter is usually extremely difficult.

We are so accustomed to using the sensation as a sign, and passing immediately to the hardness signified, that it seems never to have been made an object of thought, either by the vulgar or by philosophers; and it has no name in any

language. No sensation is more distinct, or more frequent; yet we never *attend* to it, letting it pass through the mind instantaneously, serving only to introduce the quality of bodies which, by a law of our constitution, it suggests to us. Sometimes it is easy enough to attend to the sensation occasioned by the hardness of a body—for instance when it is so violent as to occasion considerable pain. In that case nature calls our attention to it, and we then acknowledge that it is a mere sensation that can't exist except in a sentient being. If a man violently bangs his head against a pillar, I ask him: Does the pain you feel resemble the hardness of the stone? Can you conceive of an inanimate piece of matter containing anything like what you feel?

The attention of his mind is here entirely turned toward the painful feeling. He feels nothing in the stone, but—to speak in the common language of mankind—he feels a violent pain 'in his head'. It is quite different when he leans his head gently against the pillar; for then he will tell you that he feels nothing in his head but feels hardness 'in the stone'. Doesn't he have a sensation in this case too? Undoubtedly he has; but it is a sensation that nature intended only as a sign of something in the stone; and accordingly our man instantly fixes his attention on the thing signified, and would find it extremely difficult to attend to his sensation enough to be convinced that there *is* any such thing distinct from the hardness it signifies. But however hard it may be to attend to this elusive sensation, to stop it from whipping past and pull it apart from the external quality of hardness in whose shadow it is apt immediately to hide itself, this is what a philosopher or scientist must become able to do, through effort and practice. Otherwise he won't be able to think soundly about this subject, or even to understand what I am saying here. For in subjects like this the final appeal must be to what a man feels and perceives in his own mind.

This is indeed a strange thing:

A sensation that we have every time we feel a body to be hard, and which consequently we can have as often and for as long as we wish, a sensation as distinct and definite as any other, is so *unknown* •that it has never been made an object of thought and reflection, and never honoured with a name in any language; and •that philosophers as well as the vulgar have entirely overlooked it, or muddled it with the quality of bodies that we call ‘hardness’—a quality to which it doesn’t have the faintest likeness.

Can’t we infer from this that our knowledge of the human faculties is still in its infancy? That we haven’t yet learned to *attend* to the mental operations of which we are conscious every hour of our lives? That very early in our lives we acquire habits of *inattention* that are as hard to overcome as other habits? •As regards this last point•, I think it is probable that this is the case:

The novelty of this sensation will get children to pay it some attention at first; but because the sensation is in no way interesting in itself, as soon as it becomes familiar it is overlooked, and the child’s attention is turned solely to what the sensation signifies, •namely the hardness of some external thing•. Analogously, when someone is learning a language he attends to the sounds; but when he is fluent in the language he attends only to the sense of what he wants to express.

If this is the case, we must become as little children again if we want to be philosophers. We must overcome this habit of *inattention* that has been gathering strength ever since we began to think—a habit that is useful enough in common life to make up for the difficulty it creates for the philosopher who is trying to discover the fundamental forces at work in the human mind.

The firm holding together of the parts of a body is no more *like* that sensation by which I perceive the body to be hard than the vibration of a booming body is *like* the sound I hear; and I can’t possibly perceive through my *reason* any connection between them. No man can give a reason why the vibration of a body might not have given the sensation of smelling, and the effluvia of bodies affected our hearing, if it had so pleased •God•, our maker. Similarly, no man can give a reason why hardness should not have been indicated not by the sensation that *does* indicate it (because that is how we are built) but rather by sensations of smell or taste or sound. Indeed no man can conceive *any* sensation to resemble *any* known quality of bodies. Nor can any man show by any good argument that all our sensations couldn’t have been just as they are with no body or quality of body having ever existed.

So here is a phenomenon of human nature that presents itself for explanation. Hardness in bodies is something that we conceive as distinctly, and believe as firmly, as anything in nature. Our only route to this conception and belief is through a certain sensation of touch, •and there is a problem about how that relates to hardness•. The sensation hasn’t the faintest similarity to hardness, nor can we by any rules of reasoning infer the quality from the sensation. The question is: How *do* we come by this conception and belief?

First, the conception: shall we call it an idea of sensation, or an idea of reflection? It won’t be classified as ‘of reflection’—•that is obvious•. But if we count it as ‘of sensation’, we are calling something an idea ‘of sensation’ when it has no resemblance to any sensation! Thus, the origin of this idea of hardness—one of our commonest and clearest ideas—can’t be found anywhere in our systems of the mind, not even in the ones that have tried so hard to derive all our notions from sensations and reflection.

Secondly, taking it as given that we do have the *conception* of hardness, how do we come to have our *belief* in it? Do we find some relation between the *idea* of that kind of sensation and the *idea* of hardness-in-an-external-body—a relation making it self-evident to us that such a sensation couldn't be felt unless such a quality of bodies existed? No. Can it be established by •probable or certain arguments? No, it can't. Then have we acquired this belief through •tradition, upbringing, or experience? No, it isn't achieved in any of these ways. Shall we then get rid of this belief, as having no reasonable basis? Alas! the belief isn't in our power; it triumphs over reason, and laughs at all the arguments of a philosopher. Even ·Hume·, the author of the *Treatise of Human Nature*, though he saw no reason *for* this belief and many *against* it, could hardly suppress it when he was all alone and thinking theoretically; and at other times he openly gave way to it, and admits to finding that he *had to* do so.

What shall we say of this •conception and this •belief, which are so hard to explain and hard to do anything with? The only way out I can see is to conclude that some basic force or source of energy in our make-up brings it about that a certain sensation of touch both •suggests to the mind the conception of hardness and •creates the belief in it; or, in other words, to conclude that this sensation is a natural sign of hardness. I shall now try to explain this more fully.

3. Natural signs

With •artificial signs there is often neither similarity between the sign and the thing signified, nor any necessary connection between them arising from the nature of the things; and the same holds true for •natural signs. The word 'gold' has no resemblance to the substance signified by it; nor is it

intrinsically better fitted to signify this substance than to signify any other; and yet through habit and custom this word suggests that substance and no other. Similarly, a sensation of touch suggests hardness, although it doesn't resemble hardness and, so far as we can see, doesn't have any necessary connection with it. The difference between these two signs—i.e. between how 'gold' signifies and how the sensation of hardness signifies—is just this: in the former, the suggestion is the effect of habit and custom, while in the second it is the effect not of habit but of the basic constitution of our minds.

It seems evident from what I have said about language that there are natural signs as well as artificial ones, and in particular

- that the thoughts, purposes, and dispositions of the mind have their natural signs in the features of the face, the modulation of the voice, and the motion and attitude of the body;
- that without a natural knowledge of the connection between these signs and the things they signify, language could never have been invented and established among men; and
- that the fine arts are all based on this connection, which we may call the 'natural language of mankind'.

Now it is time for me to remark that there are different *orders* ·or basic kinds· of natural signs, and to point out the ·three· different classes into which they may be sorted. This will help us to get a clearer conception of the relation between our sensations and the things they suggest, and of what it means to call sensations 'signs of external things.'

(1) First comes the class of natural signs such that **the connection of the sign with the thing signified is established by nature, but discovered only by experience.** The whole of genuine philosophy consists in discovering

such connections and bringing them under general rules. The great Francis Bacon perfectly understood this when he called it ‘an interpretation of nature’. No man ever had a clearer understanding than Bacon did of the nature and basis of scientific endeavour, and no man ever described it better. Everything that we know of mechanics, astronomy and optics—what is it but •connections established by nature and discovered by experience or observation, and •consequences deduced from them? All our knowledge of agriculture, gardening, chemistry and medicine is built on the same foundation. And if ever our study of the human mind is get far enough to deserve to be called ‘science’ (which ought never to be despaired of), it will have to be by observing facts, bringing them under general rules, and drawing sound conclusions from them. [Reid here uses ‘science’ in the special sense—current in his day—of ‘discipline that is rigorous, sharp, and highly organized under strong general principles’.] What we commonly call ‘natural causes’ might more accurately be called ‘natural signs’; and what we call ‘effects’ would be better called ‘the things signified’. The causes have no effectiveness or causality of their own, as far as we know; and all we can say with certainty is that nature has established a *constant conjunction* between them and the things we call their ‘effects’, and has given to mankind a disposition to notice those connections, to trust them to continue, and to use them for the improvement of our knowledge and increase of our power.

(2) Then there is the class of natural signs such that the connection of the sign with the thing signified is established by nature, and revealed to us through a natural force within us, without reasoning or experience on our part. Of this kind are the natural signs of human thoughts, purposes, and desires, which I have already mentioned as ‘the natural language of mankind’. An infant may be frightened by an

angry face and soothed again by smiles. A child that has a good musical ear can be put to sleep or to dance, can be made cheerful or sad, by the modulations of musical sounds. The principles of all the fine arts, and of what we call a ‘fine taste’, come down to connections of this kind. A fine taste can be •improved by reasoning and experience, but it couldn’t be •acquired in the first place if its basic drivers weren’t planted in our minds by nature. Indeed, I have already shown that much of this knowledge that we have by nature is lost when we leave natural signs unused and put artificial ones in their place.

(3) A third class of natural signs contains ones such that: even if we never before had any notion or conception of the thing signified, the signs do suggest it—conjure it up, as it were, by a natural kind of magic—and at once give us a conception of it and create in us a belief in it. I showed earlier that our sensations suggest to us a sentient being or mind to which they belong, a being which

- exists permanently although the sensations are transient and brief;
- remains the same while its sensations and other operations are varied ten thousand ways;
- relates in the same way to all the endless variety of thoughts, purposes, actions, affections, enjoyments and sufferings that we are conscious of or can remember.

This conception of a *mind* is not an idea either of sensation or of reflection, for it isn’t *like* any of our sensations or anything we are •reflectively• conscious of. The first •conception of it and of the common relation it bears to everything we are conscious of or remember, and the •belief in it, are suggested to every thinking being—we don’t know how.

We get the notion of hardness in bodies in the same way as we get our belief in it, namely through a basic

force in our nature associated with the sensation that we have when we feel a hard body. The sensation conveys the notion of hardness and the belief in it so naturally and unstoppably that until now they have been confused with one another—the sensation has been identified with the property of hardness—by the sharpest investigators of the workings of human nature, despite the fact that when you think about them carefully you'll see that they are not merely •different things but •as unlike as pain is unlike the point of a sword.

It may be observed that •the first class of natural signs I have mentioned is the basis for real philosophy, •the second is the basis of the fine arts, or of taste, and •the third is the basis of common sense—a part of human nature that has never been explained. I take it for granted that the notion of hardness and the belief in it are first acquired through the particular •kind of• sensation that has invariably suggested it as far back as we can remember; and that if we had never had a feeling of that kind we would never have had any notion of hardness. I think it is obvious that reasoning from our sensations won't enable us to infer so much as the *existence* of bodies, let alone any of their *qualities*. This has been proved by unanswerable arguments by Berkeley and Hume. It appears equally obvious that this connection between our sensations and the conception of and belief in things existing outside us can't be produced by habit, experience, upbringing or any •other• force in human nature that has been admitted by philosophers. At the same time, it is a fact that such sensations *are* invariably connected with the conception of and belief in external things. Thus, by all the rules of sound reasoning we must conclude that this connection is the effect of our constitution, and ought to be considered as a basic force in human nature until we find some more general force of which it is a special case.

4. Hardness and other primary qualities

I add that *hardness* is a quality of which we have as clear and distinct a conception as of anything whatsoever. We perfectly understand

the cohesion [= 'holding together'] of the parts of a body with more or less force,

though we don't understand its cause. We know what it *is*, as well as how it affects the •sense of• touch. So hardness is a quality of a quite different order from the secondary qualities I have discussed—qualities of which we know no more, naturally, than that they cause certain sensations in us. If hardness were a quality of that sort, it would be appropriate for philosophers to ask 'What *is* hardness?', and we would have various hypotheses about that, as we do about colour and heat. But obviously any such hypothesis would be ridiculous. If someone said that hardness in bodies is a certain vibration of their parts, or that it is certain effluvia [see page 11] emitted by bodies that affect our •sense of• touch in the manner we feel, this would shock common sense, because we all know that *if the parts of a body hold together strongly, it is hard* even if it doesn't vibrate or emit effluvia. But no-one can deny that effluvia, or the vibration of the parts of a body, *could* have affected our •sense of• touch in just the way that hardness now does, if the author of our nature, •God•, had chosen such an arrangement; and if either of these hypotheses is used to explain a secondary quality such as smell or taste or sound or colour or heat, there seems to be no obvious absurdity in this.

The distinction between primary and secondary qualities has had its ups and downs. Democritus and Epicurus and their followers maintained it. Aristotle and the Peripatetics abolished it. Descartes, Malebranche and Locke revived it and were thought to have thrown bright light onto it. But

Berkeley again discarded this distinction on the basis of arguments that must be convincing to people who hold the accepted doctrine of ideas. Yet, after all, there seems to be a real foundation for it in the workings of our nature.

What I have said about •hardness is so easily applicable not only to its opposite, •softness, but also to •roughness and •smoothness, to •shape and •motion, that I may be excused from actually applying it to them, as this would only be a repetition of what I have said about hardness. All these qualities are presented to the mind, through certain corresponding sensations of touch, as real external qualities; the conception of and the belief in them are invariably connected with the corresponding sensations, the connection being made by a basic force in human nature. Their sensations have no name in any language; they have been overlooked not only by the vulgar but also by philosophers and scientists; or if these sensations have been at all taken notice of, they have been confused with the external qualities that they suggest.

5. Extension

Notice also that hardness and softness, roughness and smoothness, figure and motion *all* presuppose *extension* and can't be conceived without it. But on the other hand *it* can't be conceived without *them*: it must be granted that if we had never felt anything hard or soft, rough or smooth, shaped or moved, we would never have had a conception of extension. Thus, just as it is certain that the notion of extension couldn't be *posterior* to the notions of any of those other qualities, because it is necessarily implied in them all, so also there is good ground to believe that the notion of extension couldn't be *prior* to the notions of the other primary qualities either.

Extension, therefore, seems to be a quality that is suggested to us by the very same sensations that suggest the other qualities I have mentioned. When I grasp a ball in my hand, I perceive it at once as •hard, •shaped and •extended. The feeling is very simple, and it doesn't in the least resemble any quality of body; yet it suggests to us three primary qualities that are perfectly distinct from one another as well as from the sensation that indicates them. When I move my hand along the table, the feeling is so simple that I can't easily sort out different natures in it; yet it immediately suggests •hardness, •smoothness, •extension and •motion—things of very different natures, and all of them as clearly understood as the feeling that suggests them.

Philosophers commonly tell us that *we get the idea of extension by feeling along the edges of a body*, leaving it at that as though there were no sort of difficulty about this. I confess to having tried *very* hard to find out how this idea can be acquired through feeling, but I haven't succeeded. And yet it is one of the clearest and most distinct notions we have; and the human understanding can—in the science of geometry—conduct more long and rigorous arguments about extension than about anything else whatsoever. The notion of extension is so familiar to us from infancy, and so constantly pushed forward by everything we see and feel, that we are apt to think it obvious how it comes into the mind; but when we look more closely we'll find it utterly inexplicable. We do have feelings of touch which every moment present extension to the mind; but the question is: *How* do they do this? Those feelings don't resemble extension any more than they resemble justice or courage! And the existence of extended things can't be inferred from those feelings by any rules of reasoning. So the feelings we have by touch can't explain how we get the notion of extension or how we come by the belief that there are extended things.

What has misled philosophers in this matter is the fact that the feelings of touch which suggest primary qualities don't have names and are never thought about. They pass through the mind instantaneously, and serve only to introduce the notion of and belief in external things, which by our constitution are connected with them. They are natural signs, and the mind immediately passes to the thing signified without giving the least thought to the sign, or even noticing that there *was* any such thing. Hence it has always been taken for granted that the ideas of extension, figure and motion are ideas of sensation, which enter into the mind by the sense of touch in the same way that sensations of sound and smell enter by the ear and nose. . . . If we want to reason clearly on this subject we should give names to the feelings of touch, and should get used to attending to them and reflecting on them, so that we may become able to separate them from—and set them side by side in our minds with—the qualities they signify or suggest. The habit of doing this can't be attained without effort and practice; and until a man has acquired the habit he won't be able to think clearly or judge soundly on this subject.

Let a man press his hand against the table: *he feels it hard*. But what does that mean? The meaning undoubtedly is that he has a certain feeling of touch from which he concludes, without any reasoning or inter-relating of ideas, that there is really existing external to him something whose parts stick together so firmly that they can't be displaced without considerable force.

There is here a •feeling and a •conclusion inferred from it or in some way suggested by it. In order to inter-relate these we must view them separately, and then consider what tie there is that connects them, and in what respects they resemble one another. The hardness of the table is the conclusion, the feeling is what leads us to that conclusion.

Attend carefully to the feeling and to the conclusion, and you'll perceive them to be as unlike as any two things in nature.

- One is a sensation of the mind, which can't exist except in a sentient being, and can't exist for a moment longer than it is felt;
- the other is in the table, and we easily conclude that it was in the table before it was felt and continues there after the feeling is over.
- One implies no kind of extension, or parts, or cohesion;
- the other implies all of these. It is true that the sensation and the quality both admit of *degrees*, but within that likeness there is another dissimilarity:
- when the feeling gets beyond a certain degree it is a sort of pain; but
- absolute rock-hardness doesn't imply the least pain.

And just as the feeling has no resemblance to hardness, so neither can our reason perceive the least tie or connection between them; nor will the logician ever be able to show a reason why we should infer hardness from this feeling, rather than softness or any other quality whatsoever. But in reality all mankind are *led by their constitution* to conclude hardness from this feeling. The •sensation of heat and the •sensation we have by pressing a hard body are equally *feelings*, and we can't by reasoning draw any conclusion from one that couldn't be drawn from the other; but our constitution makes us conclude •from the first an obscure or hidden quality of which we have only the relative conception of *something that is capable of causing us to have the sensation of heat*, and •from the second a quality of which we have a clear and distinct conception, namely the hardness of the body.

6. More on extension

To throw light on this matter from another angle, it may be worthwhile to see whether from sensation alone we can pick up any notion of extension, shape, motion and space. I take it for granted that a blind man has the same notions of extension, shape, and motion as a man who sees; that Dr. Saunderson had the same notion of a cone, a cylinder and a sphere, and of the motions and distances of the heavenly bodies, as Sir Isaac Newton.

So sight isn't needed for acquiring those notions, and I shall leave it right out of my inquiry into the first origin of them. Let us consider a blind man who has some strange illness that has caused him •to lose all the experience and habits and notions he has acquired through touch, and •to have not the least conception of the existence, shape, dimensions, or extension of his own body or of anything else. We are to suppose that he still has the complete power of reason; and it is from *reason* and *sensation* that he has to regain all his knowledge of external things. I shall look into this in six stages, in the first five of which his body is fixed immovably in one place, so that he can have feelings of touch only from other bodies that move in and touch it.

(1) He is pricked with a pin. This will no doubt give him a smart sensation, a pain, but what can he infer from it? Nothing, surely, with regard to the existence or shape of a pin. From a pain of this sort he can't infer anything that he couldn't just as well infer from gout or sciatica. Common sense may lead him to think that this pain has a cause; but is this cause body or spirit? extended or unextended? shaped or not shaped? He can't possibly form the least conjecture about any of this from any principles we are supposing him to have. Having formerly had no notion of body or of extension, he can't get one from the prick of a pin. (2) A

blunt body is applied to his body with gradually increasing force, until it bruises him. What has this given him but another sensation or sequence of sensations, from which he can't infer anything more than he could from the pin-prick? A hard cancer anywhere inside his body may, by pressing on the adjacent parts, give the same kind of sensation as the pressure of an external body, without conveying any notion but that of pain, which surely has no resemblance to extension.

(3) The body applied to him touches a larger or a smaller part of his body. Can this give him any notion of its extension or its size? To me it seems impossible for it to do so unless he already has some notion of the size and shape of his own body to serve him as a measure. When my two hands touch the ends of a body; if I know them to be a foot apart I easily infer that the body is a foot long; and if I know them to be five feet apart, that it is five feet long; but if I don't know how far apart my hands are, I can't know the length of the object they are holding; and if I don't even have a *notion* of hands or of distance between hands, I can't ever get that notion by my hands' being touched.

((4) A body is drawn across his hands or face while they remain at rest. Can this give him any notion of space or motion? No doubt it gives a new feeling; but I can't conceive how it could convey a notion of space or motion to someone who previously had no such notion. Blood moves along the arteries and veins, and when this motion is violent it is felt; but I don't think that a man who had no conception of space or motion could get it from this feeling. Such a motion may give a certain sequence of feelings, as colic may do; but no feelings or combination of feelings can ever resemble space or motion.

(5) The man makes some instinctive *effort* to move his head or his hand, but no motion follows (his head or hand

is blocked, or he is paralysed). Can this effort convey the notion of space and motion to someone who never had it before? Surely it cannot.

(6) Finally: he moves a limb by instinct, without having had any previous notion of space or motion. He has here a new sensation which accompanies the flexing of joints and the swelling of muscles. But how this sensation can bring into his mind the idea of space and motion is still altogether mysterious and unintelligible. The motions of the heart and lungs are all performed by the contraction of muscles, but they don't give any conception of space or motion. An embryo in the womb has many such motions, and probably the feelings that accompany them, without any idea of space or motion.

Summing up: it seems that our philosophers have deceived themselves and us in claiming to deduce from sensation the first origin of our notions of external existing things, of space, motion, and extension, and all the primary qualities of body—that is, the qualities of which we have the most clear and distinct conception. These qualities don't at all fit with any theory of the human faculties that anyone has put forward. They don't resemble any sensation or any operation of our minds; so they can't be ideas either of sensation or of reflection. The very conception of them can't be reconciled with the principles of any of our philosophical theories of the understanding. Still less can the belief in them.

7. The existence of a material world

When and in what order did we come by our notions of these ·primary· qualities? We don't know. When we trace the operations of our minds as far back as memory and reflection can take us, we find these qualities to be already dominating our imagination and belief, and quite familiar to the mind;

but the questions

How did they first come into contact with the mind?
 What gave them such a strong hold on our belief? and
 How much respect should we have for them?

are no doubt very important questions in the philosophy ·and science· of human nature.

Shall we join ·Berkeley·, the Bishop of Cloyne, in serving them with a *Quo warranto*—a legal challenge to their rights and powers—and have them tried at the bar of philosophy on the strength of the laws of the ideal system? In this trial they seem to have come off very pitifully. They had very able counsel, learned in the law—namely Descartes, Malebranche and Locke—who said everything they could on behalf their clients; but the Bishop of Cloyne, believing them to be aiders and abettors of heresy and schism, •prosecuted them with great vigour, •fully answered everything that had been pleaded in their defence, and •silenced their ablest advocates, who seem for the past half-century to have abandoned argument and trusted to the favour of the jury rather than to the strength of their pleadings!

Thus, the wisdom of philosophy is set up against the common sense of mankind. Philosophy claims to demonstrate *a priori* that •there can't be any such thing as a material world; that •sun, moon, stars and earth, and vegetable and animal bodies can't be anything but sensations in the mind, or copies of those sensations in the memory and imagination; that •like pain and joy they can't exist when they are not thought of. Common sense can't avoid regarding this as a kind of metaphysical lunacy. It concludes that too much learning is apt to make men mad, and that anyone who seriously entertains this belief, though in other respects he may be a very good man. . . .surely has a soft place in his understanding, and has been hurt by thinking too much.

This opposition between philosophy and common sense tends to have a bad effect on the philosopher himself. He sees human nature in an odd, unfriendly and humiliating light. He considers himself and philosophers in general as •born under a necessity of believing countless absurdities and contradictions, and as •endowed with a niggardly ration of reason that is just sufficient to make this miserable discovery—and that’s all he gets from his profound speculations. Such notions of human nature tend to slacken every nerve of the soul, to embarrass every noble purpose and feeling, and to spread a melancholy gloom over the whole face of things.

If this is wisdom, let me be deluded with the vulgar! I find something within me that recoils against it, and inspires more respectful opinions about mankind and about the universal administration of God. Common sense and reason both have one author; that almighty author in whose other works—all of them—we observe a consistency, uniformity and beauty that charm and delight the understanding; so there must be some order and consistency in the human faculties as well as in other parts of God’s output. A man who has a deeply respectful view of his own kind, and who values true wisdom and philosophy, won’t be fond of such strange and paradoxical opinions as those of Berkeley; indeed he will be very suspicious of them. If they are false, they disgrace philosophy; and if they are true, they degrade the human species and make us rightly ashamed of being as we are.

What is the point of philosophy’s deciding against common sense on this or any other topic? The belief in a material world is older, and has more authority, than any principles of philosophy. It rejects the tribunal of reason, and laughs at all the artillery of the logician. It keeps its supreme authority in spite of all the edicts of philosophy, and

reason itself must bow down and obey its commands. Even the philosophers who have disowned the authority of our notions of an external material world admit that they find themselves having to submit to the power of those notions. So I think it would be better to make a virtue of necessity! Since can’t get rid of the vulgar notion of and belief in an external world, let us reconcile our reason to it as well as we can; for Reason *can’t* throw off this yoke, however resentful and fretful it makes her; if she refuses to be the •servant of Common Sense she will have to be her •slave.

In order to reconcile reason to common sense in this matter, I venture to offer two thoughts for philosophers to consider.

(1) In all this debate about the existence of a material world, it has been taken for granted on both sides that •if there is a material world it must be *exactly like* our sensations; that •we can’t have any conception of a material thing that isn’t like some sensation in our minds; and in particular that •the sensations of touch are *like* extension, hardness, shape and motion. All Berkeley’s and Hume’s arguments against the existence of a material world presuppose this. If this presupposition is true, their arguments are conclusive and unanswerable; but if it isn’t true, there is no shadow of argument left. Well, then, have those philosophers given any solid proof of this hypothesis on which rests the whole weight of the strange system according to which there is no material world? No. They haven’t even *tried* to do it, and have merely taken it for granted because ancient and modern philosophers have accepted it. But let us do what philosophers *should* do—set aside appeals to authority. Surely we don’t need to consult Aristotle or Locke to know whether pain is like the point of a sword! I have as clear a conception of •extension, hardness and motion as I have of the point of a sword; and if I work at it and practice,

I can form as clear a notion of •the other sensations of touch as I have of pain. When I do so, and compare them together—i.e. survey in my thought •those qualities and •the sensations that signify them—it appears to me clear as daylight that the qualities are not kindred to the sensations and don't resemble them in any respect. They are as unlike one another—indeed, as certainly and plainly unlike—as are pain and the point of a sword. It may be true that those sensations first brought the material world to our knowledge; it may be true that it seldom or never appears except in company with them; but still they are as unlike as the passion of anger is unlike the facial expressions that go with it.

So that when those philosophers have passed sentence on the material world, there has been a case of mistaken identity [Reid uses the Latin legal term *error personae*]. Their proof doesn't get to matter or to any of its qualities, and strikes directly against an idol of their own imagination, a 'material world' made of ideas and sensations—a world that never did and never can exist.

(2) Our conceptions of extension, shape and motion are not ideas of sensation or of reflection, so the mere fact that they exist overturns the whole ideal system by which the material world has been tried and condemned; so that in this sentence •that Hume and Berkeley have passed on the material world• there is an error in law [Reid: *an error juris*]. Locke made a very fine and sound observation, namely that just as •no human skill can create a single particle of matter, and our only power over the material world is a power to compound, combine and disconnect the matter that comes to our hands, so •in the world of thought the materials are all made by nature and can only be variously connected and disconnected by us. It follows from this that it is impossible for reason or prejudice, true or false philosophy, to produce

one simple notion or conception that isn't the work of nature and a result of how we are built. The conception of extension, motion and the other attributes of matter *can't* be the effect of error or prejudice; it *must* be the work of nature. And the power or faculty through which we acquire those conceptions must be something other than any power of the human mind that has been explained •by philosophers up to now•, because it isn't sensation and isn't reflection.

I humbly propose this as a decisive test by which the ideal system must stand or fall, settling this argument before it drags on for too long. Either they—our conceptions of the qualities of matter—are ideas of sensation, or they are not. •If even *one* of them can be shown to be an idea of sensation, or to have some slight resemblance to any sensation, I'll lay my hand on my mouth, give up all attempts to reconcile reason with common sense in this matter, and allow the scepticism of the ideal system to triumph. But •if they are not ideas of sensation and not *like* any sensation, then the ideal system is a rope of sand and all the laboured arguments of the sceptical philosophy—against a material world and against the existence of everything but impressions and ideas—are based on a false hypothesis.

If our philosophy concerning the mind is so feeble regarding the origin of our notions of the clearest, simplest and most familiar objects of thought and the powers from which they are derived, can we expect it to do better in its account of the origin of our opinions and belief? We have seen already examples of its imperfection in this respect. Perhaps the same •human• nature that •enables us to *conceive* things that are altogether unlike any of our sensations or any operation of our minds •has likewise provided for our *belief* in them, through some part of our constitution that hasn't yet been explained.

Bishop Berkeley has proved beyond the possibility of reply that we cannot by reasoning infer the existence of •matter from our sensations; and Hume has proved no less clearly that we cannot by reasoning infer the existence of •our own or other minds from our sensations. Are we then to accept nothing but what can be proved by reasoning? If so, we must be sceptics indeed, and believe nothing at all. Hume seems to me to be only a half sceptic, because he hasn't followed his principles as far as they go. With unparalleled boldness and success he combats vulgar prejudices; then, when he has only one last one blow to strike, his courage fails him and he openly lays down his arms and surrenders himself as a captive to the most common of all vulgar prejudices, I mean *the belief in the existence of his own impressions and ideas*.

Please let me have the honour of adding something to the sceptical system—something without which I don't think it can hang together. I affirm that *the belief in the existence of impressions and ideas is not supported by reason any more than is the belief in the existence of minds and bodies*. No man ever did—no man ever *could*—give any reason for this belief. Descartes took it for granted that he •thought and •had sensations and ideas; so have all his followers done. Even •Hume• the hero of scepticism has followed suit, I beg leave to say, weakly and imprudently. I say this because I am convinced that no principle of his philosophy obliged him to make this concession •that impressions and ideas exist•. And what makes impressions and ideas so formidable that this all-conquering philosophy •of Hume's•, after triumphing over every other kind of existent, should pay homage to *them*? As well •as being weak and imprudent• the concession is dangerous; for it's just a fact about belief that if you leave any root it will spread; and you'll find it easier to pull it up altogether than to say: 'You may go this far, but no further; I

concede to you the existence of impressions and ideas, but see to it that you don't claim anything else!' So a thorough and consistent sceptic will never concede the existence of ideas and impressions; and as long as he refuses to do so you can never oblige him to concede anything else.

To such a sceptic I have nothing to say; but I ask the semi-sceptics: 'Why do you believe in the existence of your impressions and ideas?' The true reason I take to be *because they can't help it*; •but if they give that reason, they should stop being even semi-sceptics, because• that same reason will lead them to believe many other things.

All reasoning must be from first principles; and the only reason that can be given for •accepting• a first principle is that because of how we are constituted we *can't help* assenting to it. Such principles are as much parts of our constitution as is our power of thinking; reason can't make them or destroy them. And it can't do anything without them: it is like a telescope, which can help a sighted man to see further, but can't show anything to a man who has no eyes. A mathematician can't prove the truth of his axioms, and he can't prove anything else unless he takes his axioms for granted. We can't prove the existence of our minds, or even the existence of our thoughts and sensations. An historian or a witness can't prove anything unless it is taken for granted that memory and the senses can be trusted. A natural philosopher can't prove anything unless it is taken for granted that the course of nature is steady and uniform.

How and when did I first get such first principles, on which I build all my reasoning? I don't know, because I had them further back than I can remember; but I am sure they are parts of my constitution and that I can't discard them. That our thoughts and sensations must have a subject—•must be the thoughts and sensations of something•—which we call *ourselves* is not, therefore, an

•opinion acquired through reasoning, but a •natural principle. That our sensations of touch indicate something external, extended, shaped, hard or soft, is not something inferred by reason but a natural principle. The •belief in it—i.e. in an external material world—and the very •conception of it are equally parts of our constitution. If we are deceived about it, we are deceived by •God, him who made us, and there is no remedy.

I don't mean to say that in a newborn baby the sensations of touch suggest the same notions of body and its qualities that they do when we are grown up. Perhaps nature is frugal—sparing—in this, as in her other operations. The passion of love, with all its associated feelings and desires, is naturally suggested by the perception of beauty in the other sex. But this perception doesn't suggest the tender passion until one has reached a certain age. A blow given to an infant creates grief and wailing; but when he grows up it equally naturally arouses resentment and prompts him to resist. Perhaps a child in the womb, or for some short period after birth, is merely a *sentient* being and not a *thinking* one. Perhaps the faculties by which it •perceives an external world, by which it •reflects on its own thoughts and existence and relation to other things, as well as its reasoning and moral faculties, unfold themselves gradually; so that it is inspired with the various principles of common sense—as it is with the passions of love and resentment—*when it has occasion for them*.

8. The systems of philosophers concerning the senses

All the systems of philosophers concerning our senses and their objects have split on the same rock—namely, not properly distinguishing •sensations that can't exist except

when they are felt from the •things suggested by them. Aristotle, who was as given to making distinctions as anyone who ever tackled philosophical problems, confuses these two. He holds that every sensation is the *form* without the *matter* of the thing that is perceived through it. Just as the impression of a seal on wax has the •form of the seal but nothing of its •matter, so our sensations (Aristotle thought) are impressions on the mind which bear the image, likeness or •form of the external thing that is perceived, without the •matter of it. According to him:

- Colour, sound and smell, as well as extension, shape and hardness are various forms of matter; and
- Our sensations are the same forms imprinted on the mind, and perceived in its own intellect.

It is obvious from this that Aristotle didn't distinguish between primary and secondary qualities of bodies, although that distinction was made by Democritus, Epicurus and others of the ancients. Descartes, Malebranche and Locke revived the distinction between primary and secondary qualities. But they made the secondary qualities mere sensations, and the primary ones resemblances of our sensations. They maintained that colour, sound and heat are not anything in bodies, but are sensations of the mind; at the same time they acknowledged that •some particular texture or state of the body is the cause or occasion of those sensations; but they didn't give •it a name. In contrast with what these philosophers have said, the vulgar seldom apply the names 'colour', 'heat' and 'sound' to their sensations, usually applying them to those unknown causes of them (as I explained in chapter 2, section 8). We are so constituted that we are more apt to attend to •the things signified by a sensation than to •the sensation itself, and to give a name to the former rather than to the latter. Thus we see that with regard to secondary qualities, these philosophers *thought* with the vulgar and

with common sense. Their paradoxes were only a misuse of *words*. For when they maintain, as an important modern discovery, that *there is no heat in the fire* they mean only that *the fire doesn't feel heat*, which everyone knew already! They actually agree with the vulgar that there *is* in the fire something that causes sensations of heat.

With regard to primary qualities these philosophers erred more grossly. They did believe in the existence of those qualities; but they paid no attention to the sensations that suggest the qualities—sensations which, because they have no names, have been ignored as though they also had no existence. The philosophers were aware that shape, extension and hardness are perceived by means of sensations of touch, and this led them to the rash conclusion that these sensations must be images and *resemblances* of shape, extension and hardness. The accepted hypothesis of ideas naturally led them to this conclusion; indeed it can't be made consistent with any other; for, according to that hypothesis, external things must be perceived by means of images [= 'likenesses'] of them in the mind; and what can those images of external things in the mind *be* if not the sensations by which we perceive them?

But they were drawing a conclusion from an hypothesis that is *against fact*. We don't need to consult any hypothesis to know what our sensations *are* or what they *resemble*. By appropriately reflecting and paying attention we can understand them perfectly, and be as certain that they aren't like any quality of body as we can be that a toothache isn't like a triangle. How can a sensation instantly make us conceive an external thing altogether unlike it, and believe in the thing's existence? I don't claim to know; and when I say that one 'suggests' the other, I don't mean this as explaining *how* they are connected, but only to express a *fact* of which everyone can be conscious, namely that by

a law of our nature such a conception and belief constantly and immediately *follow* the sensation.

Bishop Berkeley threw new light on this subject when he showed that the qualities of an inanimate thing, such as matter is thought of as being, can't resemble any sensation; that it is impossible to conceive anything *like* the sensations of our minds except the sensations of other minds. Everyone who attends properly to his sensations must agree with this, yet it had escaped all the philosophers who came before Berkeley; it had escaped even the ingenious Locke, who had reflected so much on the operations of his own mind. That shows how hard it is to attend properly even to our own feelings. We are so accustomed to their passing through the mind unobserved, instantly making way for whatever nature intended them to signify, that it is extremely difficult to stop them and attend to them; and when we think we have become able to do this, perhaps the mind still fluctuates between the sensation and its associated quality, so that they mix together and present to the imagination something compounded of both. Thus in a globe or cylinder whose opposite sides are quite unlike in colour, if you turn it slowly the colours are perfectly distinguishable, and their unlikeness to one another is obvious; but if you turn it quickly the colours lose their differences and seem to be all the same. That is one example of the general fact that *speed* tends to mask differences.

No succession can be faster than the way in which thoughts of tangible qualities succeed the sensations with which nature has associated them. But once you have acquired the knack of making them separate and distinct objects of thought, you will then clearly perceive that the above-mentioned maxim of Berkeley's is self-evident. . . .

But look at how Berkeley uses this important discovery! He concludes that we can have no conception of an inanimate

substance such as matter is conceived to be, or of any of its qualities; and that there is the strongest reason to believe that nothing exists in nature but minds, sensations and ideas. If there exists any other kind of thing, it must be something that we don't *and can't* have any conception of. But how does this follow? This is how:

- We can have no conception of anything except what resembles some sensation or idea in our minds;

- the sensations and ideas in our minds can resemble nothing but the sensations and ideas in other minds;

therefore. . . and so on. This argument, we see, has two premises. The second of them the ingenious author has indeed made obvious to all that understand his reasoning and can attend to their own sensations; but he never attempts to prove the first premise. It is taken from the doctrine of ideas that has been so universally accepted by philosophers that it was thought not to need any proof.

I would point out, yet again, that this acute writer argues from a hypothesis *that is* against *fact* and against *the common sense of mankind*. The opinion that we can have no conception of anything unless our minds contain some impression, sensation or idea that resembles it has indeed been very generally accepted among philosophers; but it isn't self-evident, nor has it been clearly proved; so calling *it* in question would have been more reasonable than discarding the material world, thereby exposing philosophers to the ridicule of everyone who refuses to offer up common sense as a sacrifice to metaphysics.

But we ought in fairness to grant to Berkeley and Hume that their conclusions are soundly drawn from the doctrine

of ideas, which has been so universally accepted. On the other hand, judging by the *personal* character of Berkeley and of his predecessors Descartes, Locke and Malebranche, I venture to say that if they had seen all the consequences of this doctrine as clearly as Hume did, they would have been thoroughly suspicious of it and would have examined it more carefully than they appear to have done.

The theory of ideas, like the Trojan horse, appeared superficially to be both innocent and beautiful; but if those philosophers had known that in its belly it carried death and destruction to all science and common sense, they wouldn't have broken down their walls to let it in.

We have clear and distinct conceptions of extension, shape, motion and other attributes of body, attributes that are neither sensations nor *like* any sensation

—that is a *fact* of which we can be as certain as we are of the fact that we have sensations. Furthermore:

All mankind have a fixed belief in an external material world, a belief that is not acquired through reasoning or upbringing, a belief that we can't shake off even when we seem to have strong arguments against it and no shadow of argument for it

—that is another *fact*, for which we have all the evidence that the nature of the thing admits. These facts are phenomena of human nature, from which we may soundly argue against any hypothesis, however generally accepted. But to argue *not from facts against a hypothesis but from a hypothesis against facts* is contrary to the rules of true philosophy.

Chapter 6: Seeing

1. The excellence and dignity of this faculty

The advances made in the knowledge of optics in the last age and in the present—chiefly the discoveries of Sir Isaac Newton—reflect credit not only on philosophy [here = ‘science’] but also on human nature. Such discoveries ought for ever to put to shame the low attempts of our modern sceptics to downgrade the human understanding and to discourage men in their search for truth by representing the human faculties as no good for anything except to lead us into absurdities and contradictions.

Sight is certainly the noblest of the faculties called ‘the five senses’. The rays of light that serve this sense, and that we couldn’t have had the least conception of if we *didn’t* have this sense, are the most wonderful and astonishing part of the inanimate creation. We must be sure of this if we consider

- their extreme minuteness,
- their inconceivable speed,
- the regular variety of colours that they exhibit,
- the invariable laws according to which they are acted on by other bodies that reflect, diffract and refract them without changing their intrinsic properties, and
- the ease with which they pervade bodies of great density and of the closest texture (‘bodies such as clear glass’): they aren’t resisted, they don’t crowd or disturb one another, and yet they don’t push around even the lightest bodies.

The structure of the eye and of all its accessories, the admirable way in which nature has provided for it to perform all its various external and internal motions, and the way

the eyes of different animals vary according to their various natures and ways of life—all this clearly demonstrates the eye to be one of nature’s masterpieces. Someone who can seriously *wonder whether* the rays of light and the eye were made for one another—made with utter wisdom and perfect skill in optics—must either be very ignorant of what has been discovered about this or have a very strange kind of understanding.

Let us (‘through this and the next two paragraphs’) imagine beings who have every human faculty but that of sight. How incredible it would appear to them, accustomed as they would be only to the slow input of information through touch, that by the addition of an organ consisting of a ball and socket of an inch diameter they could in an instant of time, without moving about, perceive the disposition of a whole army or the order of a battle, the shape of a magnificent palace, or all the variety of a landscape? If a man tried to discover through *touch* the shape of the peak of Teneriffe or even of St. Peter’s church in Rome, it would be the work of a lifetime!

It would seem even more incredible to the beings we are imagining if they were informed of the discoveries that can be made by this little organ in things far beyond the reach of any other sense. That by means of it we can find our way in the pathless ocean; that we can go around the globe of the earth, discover its shape and dimensions and mark out every region of it. Indeed, that we can measure the planets and make discoveries as far away as the fixed stars.

Wouldn’t it seem still more astonishing to our imagined beings if they were also told that by means of this same organ we can perceive our fellow-creatures’ moods and

dispositions, passions and affections, even when they most want to conceal them? That when the tongue is taught most skillfully to lie and conceal, the hypocrisy will show in the face to a discerning eye? And that by this organ we can often perceive what is straight and what is crooked in the mind as well as in the body? If a blind man is to trust the reports of sighted people, what a lot of mysterious things he will have to believe! Surely he will need as strong a faith as is required of a good Christian. So there is good reason for the faculty of seeing to be regarded not only as •nobler than the other senses but as •being in some way *higher* than mere sensation. When reason makes something evident to us we call this 'seeing'—how an argument works, that an explanation is confused—not feeling, smelling or tasting. Indeed, we are given to speaking of God's knowledge as a matter of 'seeing', because this is the kind of knowledge that is most perfect in us.

2. Sight reveals almost nothing that the blind can't comprehend. The reason for this

Despite what I have said about the dignity and superior nature of this faculty, we should bear in mind that almost all of the knowledge acquired by sight can be communicated to—and thus understood by—a man born blind. Someone who never saw light may be learned and knowledgeable in every science, even in optics; and may make discoveries in every branch of philosophy. He may understand as much as anyone else not only about the order, distances and motions of the heavenly bodies but about the nature of light and the laws of the reflection and refraction of its rays. He may have a firm grasp of how those laws produce the phenomena of the rainbow, the prism, the camera obscura and the magic lantern, and all the powers of the microscope and telescope.

This is a fact sufficiently attested by experience. [Reid's use of 'visible' from here on calls for comment. Ordinarily to call a thing 'visible' is to say that it *can be seen*; but when Reid speaks of the 'visible appearance' of something he doesn't mean that the appearance is *seen*. He knows as well as we do that what is seen is the object 'suggested' by the appearance.] In order to see why it is so, we must distinguish the •appearance that objects make to the eye from the •things suggested by that appearance; and we must make a distinction *within* the visible appearance of objects, between the •appearance of colour and the •appearance of extension, shape and motion. Starting then with the visible appearance of the shape, motion and extension of bodies, I think that a man born blind can have a clear notion if not of those appearances themselves at least of something extremely like them. Can't a blind man be made to conceive that

- a body moving directly from the eye or directly toward it may appear to be at rest?
- the same motion may appear quicker or slower depending on whether it is nearer to the eye or further off, more direct or more oblique?
- a plane surface with a certain orientation may appear as a straight line, and vary its apparent shape as its orientation or that of the eye is varied?
- a circle seen obliquely will appear an ellipse; and a square seen obliquely will appear a rhombus or an oblong rectangle?

['Orientation' here replaces Reid's 'position'. He uses 'position' in this sense in sections 2-4, 7, 11-12. A few occurrences might mean 'orientation' but might mean 'place'.] Dr. Saunderson understood the projection of the sphere and the common rules of perspective, so he must have understood all the facts that I have listed. In case you have doubts about Dr. Saunderson's understanding of these things, I report that I once heard him talk about the

proposition that

the angles made by the circles of the sphere are equal to the angles made by their representatives in the stereographic projection.

He said that had great difficulty understanding Dr. Halley's demonstration of that proposition; but 'when I laid aside that demonstration and considered the proposition in my own way, I saw clearly that it must be true' . . .

A blind man must be more at a loss regarding •the appearance of colour because he has no perception that resembles •it. Yet he may partly make up for this lack by a kind of analogy. To those who see,

a scarlet colour signifies an unknown quality in bodies that gives to the eye an appearance that they are well acquainted with and have often observed;

whereas to a blind man

a scarlet colour signifies an unknown quality that gives to the eye an appearance that he is not acquainted with.

But he can conceive the eye to be differently affected by different colours, as the nose is by different smells, or the ear by different sounds. Thus he can conceive •scarlet to differ from •blue as •the sound of a trumpet differs from •the sound of a drum or as •the smell of an orange differs from •the smell of an apple. It is impossible to know whether a scarlet colour has the same appearance to me as to someone else, and if the appearances of it to different persons differed as much as colour does from sound, we might never be able to discover this difference. So it seems obvious that a blind man might talk about colours, clearly and relevantly, for a long time; and if you quizzed him in the dark about the nature, composition and beauty of colours, he might be able to answer without giving away the fact that he is blind.

We have seen how much a blind man can come to know about the appearances that things make to the eye. As to the ·external· things that are suggested by or inferred from those appearances, although he could never *discover* them on his own he may still *understand* them perfectly when others inform him about them. Everything of this sort that enters into our minds by the eye may enter into his by the ear. Thus, for instance, if left to the direction of his own faculties he could never have dreamed of any such thing as light; but he can be informed of everything we know about it. He can conceive as clearly as we can the minuteness and velocity of its rays, the different degrees to which they can be refracted and reflected, and all the magical powers and virtues of that wonderful element. He could never have found out for himself that there are such bodies as the sun, moon and stars; but he can be informed of all the noble discoveries of astronomers concerning the motions of these bodies and the laws of nature that regulate them. It seems, then, that there is very little knowledge acquired through the eye that couldn't be communicated by language to those who have no eyes.

Suppose it were as uncommon for men to see as it is in fact for men to be born blind. In that case, wouldn't the few who had this rare gift appear as prophets and inspired teachers to the many? Think about how we conceive inspiration:

We think of a man's inspiration not as a new faculty, but as something that communicates to him in a new way, and by extraordinary means, •what the faculties common to mankind can take in and apprehend, and •what he can communicate to others by ordinary means.

On the present supposition ·of sightedness as rare and blindness as the norm·, sight would appear to the blind

to be very similar to this; for the few who had this gift could communicate the knowledge acquired by it to those who lacked it. They couldn't convey to the blind any clear notion of *how* they acquired this knowledge: to these blind people •a ball in a socket (•which is what an eye *is*•) would seem as unsuitable for acquiring such a variety and extent of knowledge as •a dream or •a vision. *How* a sighted man detects so many things by means of the eye is as unintelligible to the blind as *how* a man can be inspired with knowledge by God is unintelligible to us. Should this lead the blind man to dismiss as fraudulent all claims to be able to see, without putting them to any test? If he were fair and open-minded, mightn't he find reasonable evidence of the reality of this gift of eyesight in others, and get great advantages from it for himself?

To get a sound notion of nature's intention in giving us eyes, we must invoke the distinction I have drawn between •the visible appearances of the objects of sight and •things suggested by them. If we pay proper attention to how our mind operates in our use of this faculty, we shall become aware that •the visible appearance of objects is something we hardly ever notice. We don't think about it or reflect on it; all it does for us is to serve as a sign to introduce to the mind •something else, something that could also be clearly conceived by people who never saw.

Thus, the visible appearance of things in my room varies almost every hour depending on whether the day is clear or cloudy, whether the sun is in the east or south or west, whether my eye is in one part of the room or in another; but I never think about these variations as anything but signs of a clear or cloudy sky or of morning, noon, or night. A book or a chair has appears differently to the eye from different distances and seen at different angles; yet we think of it as still the same; and, overlooking the •varying• appear-

ance, we immediately conceive the real shape, distance and orientation of the body, of which its visible or perspective appearance is a sign and indication.

When I see a man at a distance of ten yards and later at a hundred yards, his visible appearance in its length, breadth and all its linear proportions is ten times less in the second case than in the first, but I don't think of him as one inch shorter because of this lessening of his visible appearance. Indeed, *I pay no attention at all* to this lessening, even when I draw from it the conclusion that he is now further away. For such is the subtlety of the mind's operation in this case that we draw the •conclusion without noticing that the •premises ever entered the mind! A thousand such instances might be produced, to show that the visible appearances of objects are intended by nature only as signs or indications; and that the mind passes *instantly* to the things that are signified, without reflecting in the least on the sign or even noticing that there is any such thing. In something like the same way, if we are familiar with a language we overlook its sounds and attend only to the things signified by them. So Berkeley said something true and important when he remarked that the visible appearance of objects is a kind of *language* used by nature to inform us of objects' distance, size and shape. And that ingenious writer has made good use of this point in explaining some phenomena in optics which had previously perplexed the greatest masters in that science. The point is further improved upon by the judicious Dr. Smith in his *Optics*, for explaining the apparent shape of the sky and the apparent distances and sizes of objects seen with glasses, or by the naked eye.

Trying not to repeat what has been said by these excellent writers, I shall avail myself of the distinction between •the signs that nature uses in this 'visual language' and •the things signified by them. Let us start with the signs.

3. The visible appearances of objects

In this section I have to talk about things that are never made the object of reflection, although at almost every moment they are presented to the mind. Nature intended them only as signs, and throughout our lives that is all we use them for. The mind has acquired an ingrained habit of *inattention* to them: no sooner do they appear than—quick as lightning—the thing signified takes over and occupies all our attention. Although we are conscious of the appearances when they pass through the mind, their passage is so fast and so familiar that it is absolutely unnoticed; and they leave no footsteps of themselves in the memory or in the imagination. They have no name in *any* language. I showed in chapter 5 that all this holds with regard to the sensations of *touch*; well, it holds just as much for the *visible appearances of objects*.

So I haven't the slightest hope of being intelligible to readers who haven't through effort and practice acquired the habit of distinguishing *the appearances of objects to the eye from the judgments that we form (on the basis of those appearances) of their colour, distance, size, and shape*. The only profession in life where this distinction has to be made is that of *painting*. The painter has a need for an abstraction regarding visible objects somewhat similar to what we need here, and this is indeed the most difficult part of his art. For it is obvious that if he could fix in his imagination the visible appearance of objects, not confusing it with the things it signifies, it would be as easy for him to *paint from the life*—giving every figure its proper shading and relief, and its perspectival proportions—as to *paint from a copy*. Perspectival shading, giving relief, and colouring are merely *copying the appearance that things make to the eye*. So we may borrow some light on the subject of visible

appearance from the art of painting.

Look at any familiar object, perhaps a book, at different distances and with different orientations; can't you say on the testimony of your sight that it is the same book, whether seen from one foot away or from ten, whether with one orientation or another? That the colour is the same, the dimensions the same, and the shape the same, as far as your eye can judge? Surely you will answer Yes. Well, then, we have one individual object presented to the mind from different distances and in different positions. Does this object have the same appearance to the eye at these different distances? Quite certainly it does not. Here are *four* reasons for saying this.

(1) However certain our judgment may be that the colour is the same, it is equally certain that it *doesn't* have the same appearance at different distances. There is a certain degradation of the colour, and a certain confusion and indistinctness of the minute parts, which naturally results from the object's being moved to a greater distance. Those who are not painters or critics of painting overlook this fact, and can't easily be persuaded that the colour of one object has a different appearance at a distance of one foot and of ten, in the shade and in the light. But the masters of painting know how to degrade the colour and the confuse the minute parts so that figures that on the same canvas and at the same distance from the eye are made to represent objects that are at very different distances. They know how to make *the objects appear to be of the same colour* by making *their pictures really of different colours* depending on their distances or shades.

(2) Everyone who knows the rules of perspective knows that the appearance of the shape of the book must vary with every different orientation; but if you ask a man who has no notion of perspective 'Doesn't the shape of the book appear

to your eye to be the same in all its different orientations?’ he can with good conscience answer that it does. He has learned to make allowances for the variety of visible shapes arising from the difference of orientation, and to draw the proper conclusions from it. But he draws these conclusions so smoothly and habitually that he loses sight of the premises; so when he has concluded that the shape has remained the same he thinks that the visible appearance must also have been the same.

(3) Let us consider the apparent size or dimensions of the book. Seen from one foot away or from ten, it seems to be about seven inches long, five wide, and one thick. I can judge these dimensions pretty accurately by the eye, and I judge them to be the same at both distances. Yet it is *certain* that at the distance of one foot its visible length and breadth are about ten times as great as they are at the distance of ten feet; so its visible surface is about a hundred times as great. This great change in apparent size is overlooked entirely, and everyone is apt to imagine that it appears to the eye to be of the same size at both distances. Furthermore, when I look at the book it seems plainly to have three dimensions—length, width, and thickness—but it is *certain* that the visible appearance has no more than two and can be exactly represented on a canvas that has only length and width.

(4) Doesn’t everyone, by sight, perceive the distance of the book from his eye? Can’t he affirm with certainty that in one case it isn’t more than one foot away and that in another it is ten? Nevertheless, it appears certain that distance from the eye is not an immediate object of sight. Certain things in the visible appearance are *signs of* distance from the eye, and I’ll show later that from these signs we learn *by experience* to estimate that distance within certain limits. I emphasize ‘by experience’: it seems beyond doubt that a man who had

been born blind and was suddenly made to see could not *at first* form any judgment about the distance of the objects that he saw. The young man couched by Cheselden thought at first that everything he saw touched his eye, and learned only by experience to judge of the distance of visible objects. [Couching was a surgical procedure—displacing the opaque lens of the eye downwards into the vitreous by means of a needle.]

I have gone into all this detail in order •to show that the visible appearance of an object is *very* different from the notion of the object that experience teaches us to form by sight, and •to enable you to attend to the visible appearance of colour, shape and extension in visible things. Such an appearance is not a common object of thought, but it must be carefully attended to by those who want to enter into the philosophy and science of the visual sense, or want to understand what others say about it. To a man who had just gained eyesight the visible appearance of objects would be the same as to us, but he wouldn’t see anything of their real sizes as we do. With only his sight to go by, he couldn’t form any conjecture concerning how many inches or feet they were in length, breadth or thickness. He could perceive little or nothing of their real shape; nor could he tell that this was a cube and that a sphere, that this was a cone and that a cylinder. His eye couldn’t inform him that this object was near and that one further away. The clothing of a man or of a woman, appearing to us to be of one uniform colour but variously folded and shaded, would present to his eye no fold, no shading, but a variety of colour. In short, however perfect his eyes were they would at first give him almost no information about things in his environment. They would present the same appearances to him as they do to us, and speak the same ‘language’ as Berkeley called it; but to him it would be an unknown language, a foreign tongue; and therefore he would attend only to the signs themselves

without knowing what they signify, whereas to us it is a perfectly familiar language and therefore we take no notice of the signs but attend only to the things they signify.

4. Colour is a quality of bodies, not a sensation in the mind

Anyone who hasn't been tutored by modern philosophy understands 'colour' to be the name *not* of •a sensation in the mind that can't exist except when it is perceived but *rather* •a quality or state of bodies that continues to be the same whether or not it is seen. The scarlet rose that is in front of me now remains a scarlet rose when I shut my eyes, and was scarlet also at midnight when no eye saw it. The colour remains when the appearance ceases; it remains the same when the appearance changes. For when I view this scarlet rose through a pair of green spectacles the appearance is changed, but I don't conclude that the colour of the rose changed. To a person with jaundice it has still another appearance; but he is easily convinced that the change is in his eye and not in the colour of the object. Every difference in the brightness of light makes the rose have a different appearance, and total darkness takes away all appearance, but it doesn't make the least change in the colour of the rose. Through various optical experiments we can change the appearance of a body's shape and size as well of its colour; we can make one body appear to be ten. But no-one thinks that a multiplying glass produces ten guineas out of one, or that a microscope turns a guinea into a ten-pound piece; and similarly no-one thinks that a coloured glass changes •the real colour of the object seen through it when it changes •the appearance of that colour.

The common language of mankind shows clearly that we ought to distinguish •the colour of a body, which is

conceived to be a fixed and permanent quality of it, from •the appearance of that colour to the eye, which may be varied a thousand ways depending on the light, the medium or the eye itself. The body's permanent colour is the *cause* of all this variety of appearances, which it causes through the mediation of various kinds and intensities of light and of various transparent bodies in between. When a coloured body is presented, there appears to the eye, or to the mind, something that I have called 'the appearance of colour'. Mr. Locke calls it 'an idea', and there is nothing wrong with that. This idea can't exist except when it is perceived. It is a kind of thought, and can only be an act *of* a perceiving or thinking being. Our natural constitution leads us to think of this idea as a sign of something external, and to be impatient until we learn its meaning. A thousand experiments for this purpose are made every day by children, even before they come to the use of reason. They look at things, they handle them, they put them in various orientations at different distances and in different lights. The ideas of sight thus come to be associated with, and readily to suggest, things that are external and altogether unlike them. In particular, the idea that I have called 'the appearance of colour' suggests the conception of and belief in some unknown quality in the body, which occasions the idea; and we give the name 'colour' to this quality and not to the idea. Although the various colours are in their nature equally unknown, we easily distinguish them in our thought and talk by associating them with the ideas they cause. In the same way such unknown qualities as gravity, magnetism and electricity are distinguished by their different effects. As we grow up, the mind becomes accustomed to passing so rapidly from the ideas of sight to the external things suggested by them that we don't pay the least attention to the ideas and don't give them names in common language.

When we think or speak of any particular colour, the notion that is presented to the imagination may seem to be perfectly simple, but it is really in a way compounded. That is, it seems not to have different parts, but it is really *complex* or made up of constituent elements, because it involves an unknown cause and a known effect. The name 'colour'—like the more specific names 'blue', 'yellow' and so on—belongs only to the cause and not to the effect. But because the cause is unknown, our only way of thinking exclusively about *it* is by its relation to the known effect; so the two go together in the imagination, so tightly linked that they are mistaken for one simple object of thought. When I want to think about the colours of bodies that we call 'scarlet' and 'blue', if I conceived them only as unknown qualities I wouldn't be able to perceive any distinction between them. In order to keep them apart in my mind, therefore, I have to link each of them, in my imagination, with some effect or some relation that it has and the other doesn't; and the most obvious candidate is the appearance that it makes to the eye. So it comes about that in the imagination the appearance is so tightly linked with the quality called 'a scarlet colour' that they are apt to be mistaken for one and the same thing—different though they are in reality, one being an idea in the mind and the other a quality of body.

I conclude, then, that colour is not a sensation but a 'secondary quality' of bodies, in the sense I have explained; that it is a certain power in bodies which in full daylight exhibits to the eye an appearance that is very familiar to us although we have no name for it. Colour differs in one way from other secondary qualities: whereas with them the name of the quality is sometimes given to the sensation that indicates it and is occasioned by it, we seem never to give the name of colour to the sensation but only to the quality. This may be because the appearances of the same colour

are so various and changeable, depending on details of the light, the medium and the eye, that language couldn't afford names for them. And indeed they are of so little interest that they are never attended to, but serve only as signs to introduce the things signified by them. It shouldn't seem incredible that such frequent and familiar appearances have no names and are usually not thought about; because I have already shown that the same is true of many sensations of *touch*, which are just as frequent and familiar.

5. An inference from the foregoing

From what I have said about colour we can infer two things, to which I shall devote a section each. The first is that one of the most remarkable paradoxes of modern philosophy, which has been universally admired as a great discovery, turns out when thoroughly examined to be nothing but a misuse of words. I mean the paradox that

colour isn't a quality of bodies but only an idea in the mind.

I have shown that the vulgar employ the word 'colour' to signify *not* an idea in the mind *but rather* a permanent quality of body. I have shown that there is really a permanent quality of body to which the common use of this word exactly agrees. Could you want a stronger proof that this quality is the one the vulgar call 'colour'? If you say 'This quality that *you* call "colour" is unknown to the vulgar, who therefore can't have any name for it', I reply:

The quality is indeed known to the vulgar only by its effects, i.e. by its causing a certain idea in us; but aren't there countless qualities of bodies that are known only by their effects, and which we nevertheless find it necessary to have names for? Medicine alone could provide us with a hundred examples;

don't the words 'astringent', 'narcotic', 'epispastic' [= 'blister-producing'], 'caustic' and endless others signify qualities of bodies that are known only by their effects on animal bodies? So why shouldn't the vulgar have a name for a quality whose effects are every moment perceived by their eyes?

So we have all the reason that the nature of the thing admits, to think that the vulgar apply the name 'colour' to the quality of bodies that causes in us what the philosophers call the 'idea of colour'. That there is such a quality in bodies is agreed to by all philosophers who think there is any such thing as body. Philosophers have thought fit to

•leave nameless the quality of bodies that the vulgar call 'colour', and to •give the name 'colour' to an idea or appearance that the vulgar leave nameless

because they never think about it or reflect on it. So it seems that when philosophers say that

colour is not in bodies, but in the mind,

and the vulgar say that

colour is not in the mind, but is a quality of bodies,

there is no difference between them about •things but only about •the meaning of a word. •Even in a purely verbal disagreement, there can be a right side and a wrong, and in this case the philosophers are wrong. •The vulgar have an undoubted right to give names to things that they deal with daily, and it seems fair to accuse philosophers of misusing language when they change the meaning of a common word without giving warning •that they are doing so.

If it is a good rule—as Berkeley said it is—to 'think with philosophers and speak with the vulgar', it must be right to speak with the vulgar when we also think with them, and not to shock them by philosophical paradoxes which, when put into common language, express only the common sense of mankind.

If you ask a man who is not a philosopher 'What is colour?' or 'What makes one body appear white and another scarlet?' he can't tell. He leaves that inquiry to philosophers, and can embrace any hypothesis about it *except* the view of our modern philosophers who assert that colour is not in bodies but only in the mind.

Nothing strikes him as more shocking than that visible objects should have no colour, and that colour should be in something he thinks of as invisible! Yet this strange paradox is not only accepted by everyone but is considered as one of the finest discoveries of modern philosophy. The ingenious Addison, in the *Spectator* no. 413, says this about it:

I have been assuming that my reader is acquainted with that great modern discovery, now universally accepted by all the inquirers into natural philosophy, namely, that light and colours as grasped by the imagination are only ideas in the mind and not qualities existing in matter. This is a truth that has been proved incontestably by many modern philosophers, and is indeed one of the finest theoretical achievements of that discipline. If the English reader wants to see this line of thought explained in detail, he could consult Locke's *Essay on the Human Understanding* Book II chapter 8.

Mr. Locke and Mr. Addison are writers who have deserved so well of mankind that one must feel uncomfortable disagreeing with them, and I wouldn't want to do less than justice to a 'discovery' that they value so highly. And indeed it is only fair to admit that Locke and other modern philosophers writing about secondary qualities have the merit of distinguishing more accurately than their predecessors did between •the sensation in the mind and •the constitution or quality of bodies that gives rise to the sensation. They have shown clearly that these two things are not only distinct •from one

another· but altogether unlike; that there is no resemblance between the effluvia of an odorous body and the sensation of smell, or between the vibrations of a noise-making body and the sensation of sound; that there can be no resemblance between the feeling of heat and the constitution of the heated body that gives rise to it, or between the appearance a coloured body makes to the eye and the texture of the body that causes it.

It was a considerable achievement to distinguish these things accurately from one another; because, however different and unlike they are in their nature, they have been always so associated in the imagination as to coalesce (as it were) into one two-faced form whose dubiously double nature meant that it couldn't rightly be assigned either to body or mind; and neither body nor mind could be given due credit for this 'two-faced form' until it was properly sorted out into its different constituent parts. None of the ancient philosophers had made this distinction. The followers of Democritus and Epicurus thought the forms of heat and sound and colour to be in the mind only, but thought that our senses falsely represented them as being in bodies. The Aristotelians imagined that heat etc. are really in bodies, and that likenesses of them are conveyed to the mind by our senses.

One of these systems made the senses naturally false and deceitful; the other made the qualities of body resemble the sensations of the mind. To find a third system—an alternative to both of these—the distinction I have mentioned had to be made; and making it *did* avoid the errors of both those ancient systems, freeing us from the hard fate of having to believe either (·with the Aristotelians·) that our sensations are *like* the qualities of bodies or (·with Democritus·) that God has given us one faculty to deceive us and another to detect the deceit!

So it is a pleasure to do justice to the doctrine of Locke and other modern philosophers regarding colour and other secondary qualities, giving it the credit that is due; but I beg leave to criticize the language in which they have expressed their doctrine. When they had explained and established the distinction between •the appearance that colour makes to the eye and •the state of the coloured body which (by the laws of nature) causes that appearance, the question was whether to give the name 'colour' to •the cause or to •the effect. By giving it to the effect, as they have done, they have set philosophy apparently in opposition to common sense and exposed it to the ridicule of the vulgar. If only they had given the name 'colour' to the cause, as they ought to have done, they would then have had to join the vulgar in affirming that colour is a quality of bodies, and that there is no colour or anything *like* colour in the mind. Their language as well as their opinions would then have been perfectly agreeable to the ordinary thoughts of mankind, and true philosophy would have joined hands with common sense. Locke was no enemy to common sense, however; so we must presume that in this instance as in some others he was seduced by some generally accepted hypothesis; and in my next section I shall show that this was indeed the case.

6. None of our sensations resemble any of the qualities of bodies

Of the two inferences mentioned at the start of the preceding section, the second is that although colour is really a quality of body, it isn't represented to the mind by an idea or sensation that resembles it; on the contrary, it is suggested by an idea that doesn't resemble it even slightly. And this applies not only to colour but to all the qualities of body that I have examined.

It is worth noting that in the analysis I have so far given of the operations of the five senses and of the qualities of bodies discovered by them, there hasn't been a single instance of any sensation that resembles any quality of body, or of any quality of body whose image or resemblance is conveyed to the mind by means of the senses.

No phenomenon in nature is harder to explain than the transactions that are carried on between the mind and the external world; there is no phenomenon that philosophical minds have been more eager to dig into and to resolve. Everyone agrees that these transactions are carried on by means of the senses, and that's as much as the vulgar want to know; but philosophers want more. They must have some system, some hypothesis, that shows *how* our senses make us acquainted with external things. All the fertility of human invention seems to have produced only one hypothesis for this purpose, which therefore has been universally accepted. It is the theory that the mind, like a mirror, receives the images [= 'likenesses'] of things from outside it by means of the senses, so that the role of the senses is to convey these images into the mind.

These images of external things in the mind ·have been variously named·. We may call them 'sensible forms' or 'sensible species' with the Aristotelians; or 'ideas of sensation' with Locke; or with later philosophers (·especially Hume·) we may distinguish 'sensations', which are immediately conveyed by the senses, from 'ideas of sensation', which are faint copies of our sensations retained in the memory and imagination; but these are only differences about words. The hypothesis I have mentioned is common to all these different systems.

This hypothesis implies—and is agreed to imply—that no material thing or quality of material thing can be conceived by us or made an object of thought until its image has been

conveyed to the mind by means of the senses. I shall examine this in detail later, and at present I merely point out two things that might be expected as the natural consequences of it:

- For every quality and attribute of bodies that we know or can conceive, there is a corresponding sensation which is the image and resemblance of that quality.
- Sensations that don't resemble bodies or any of their qualities can't give us any conception of a material world or of anything belonging to such a world.

Now I have already considered extension, shape, solidity, motion, hardness, roughness, as well as colour, heat and cold, sound, taste, and smell. I have tried to show, that our nature and constitution lead us to conceive these as qualities of bodies, as all mankind have always conceived them to be. I have likewise examined very attentively the various sensations we have by means of the five senses, and I couldn't find among them a single image [still = 'likeness'] of body or of any of its qualities. So those images of body and of its qualities that are ·allegedly· in the mind—where did they come from? Let philosophers answer this question. All I can say is that *they don't come through the senses!* I am sure that with proper attention and care I can know my sensations, and can say with certainty what they do and what they don't resemble. I have examined them one by one, comparing them with matter and its qualities, and I can't find *one* that shows up as having a resembling feature.

Our sensations are not images of matter or of any of its qualities—a truth as evident as *that* ought not to surrender to a hypothesis such as the one we are now considering, however ancient it may be or however universally accepted by philosophers. And there can't be any friendly reconciliation between the two—·i.e. between the evident truth and the time-honoured hypothesis·. To see that this is so, let us

reflect on the spirit of the ancient and modern philosophy concerning sensation.

During the reign of the Aristotelian philosophy, our sensations were not minutely or accurately examined. The attention of philosophers as well as of the vulgar was turned to the things signified by the sensations, with the result that in consequence of the ancient hypothesis it was taken for granted that all the sensations we have from external things are their forms or images. And thus the ·evident· truth I have mentioned surrendered entirely to the ·ancient· hypothesis and was altogether suppressed by it.

Descartes gave a fine example of turning our attention inward and examining our sensations, and this example has been very worthily followed by modern philosophers, particularly by Malebranche, Locke, Berkeley, and Hume [this is the first occurrence of Hume's name in Reid's text]. The effect of this scrutiny has been a gradual discovery of the truth that I have been discussing, namely that the sensations of our minds don't resemble the qualities or attributes of a non-sentient inert substance such as we conceive matter to be. But this valuable and useful discovery, in its different stages, has still been unhappily combined with the 'ancient hypothesis', and this unpromising pairing of two opinions that are so unfriendly and discordant in their natures has given rise to the monsters of paradox and scepticism of which the modern philosophy is all too fairly accused.

Locke saw clearly and proved conclusively that the sensations we have by taste, smell and hearing, as well as the sensations of colour, heat and cold, don't resemble anything in bodies; and in this he agrees with Descartes and Malebranche. Joining this opinion with the ·ancient· hypothesis, it follows necessarily that three of our five senses are cut off from telling us anything about the material world, as being altogether unfit for that task.

Smell and taste and sound, as well as colour and heat, can have no more relation to bodies than anger and gratitude do; and the former have no more right to be called qualities (whether primary or secondary) of bodies than do the latter. For it was natural and obvious to argue thus from that hypothesis:

- If heat etc. are real qualities of bodies, the sensations by which we perceive them must resemble those qualities;
- These sensations do not resemble any qualities of bodies;
- Therefore heat etc. are not real qualities of bodies.

We see then that Locke, having found that the ideas of secondary qualities are don't resemble any qualities of bodies, was compelled by a hypothesis common to all philosophers—the 'ancient hypothesis'—to deny that they are real qualities of body. It is harder to explain why after this he called them 'secondary qualities' (I gather that he invented this name for them). Surely he didn't mean that they were secondary qualities *of the mind*; and I don't see what could make it even slightly right to call them secondary qualities *of bodies* after concluding that they aren't qualities of bodies at all. In this he seems to have bowed down to common sense and to have been led by her authority even when it went against his hypothesis. The same supreme mistress of our opinions that led this philosopher to call things 'secondary qualities of bodies', when according to his own principles and reasonings they weren't qualities of bodies at all, has led not merely the vulgar of all ages but also philosophers—even the disciples of Locke—to believe them to be real qualities of bodies. She has led them to conduct experiments concerning the nature of colour, sound and heat, in bodies. If there had been no such thing in bodies, this investigation would have been fruitless, but in fact it has produced very noble and useful

discoveries that constitute a very considerable part of natural philosophy. If then natural philosophy is not a dream, there is something in bodies that we call 'colour', 'heat' and 'sound'. And if this is so, the hypothesis from which the contrary is concluded must be false; for an argument that leads to a false conclusion rebounds against its premise and directs its forces backwards. If the qualities of bodies were known to us only by sensations that resemble them, then colour etc. couldn't be qualities of bodies; but colour etc. *are* real qualities of bodies; therefore the qualities of bodies are not known only by means of sensations that resemble them.

Moving on now: what Locke had proved with regard to the sensations that we have by smell, taste and hearing, Bishop Berkeley proved just as conclusively with regard to all our other sensations—namely that *none* of them can in the least resemble the qualities of a lifeless and non-sentient being such as matter is conceived to be. Mr. Hume has confirmed this by his authority and reasoning. This *new* opinion surely casts a very unfavourable light on the ancient hypothesis; yet that hypothesis has still been retained and been conjoined with the new opinion. And what a brood of monsters *this* has produced!

The firstborn of this union, and perhaps the most harmless, was *the thesis that* the secondary qualities of body were mere sensations of the mind. Next comes Malebranche's notion of 'seeing all things in the ideas of the divine mind', but I shall pass that by as it was a foreigner who never became naturalized in this island. After that there was Berkeley's thesis that extension and shape and hardness and motion are nothing but ideas of the mind; that the same is true of land and sea and houses and our own bodies, as well as those of our wives and children and friends; and that there is nothing existing in nature but minds and ideas.

The offspring that followed are still more frightful; it is surprising that anyone could be found who had the courage to act as the midwife, bringing them through gestation and ushering them into the world! •No causes or effects; •no substances, material or spiritual; •no evident truth even in mathematical demonstration; •no liberty or active power; •nothing existing in nature except impressions and ideas following each other, without time, place, or subject. Surely no age ever produced such a system of opinions, soundly deduced—with great acuteness, clarity and elegance—from a universally accepted principle. The *ancient* hypothesis that I have mentioned is the father of them all. The thesis that our sensations and feelings are unlike external things is the innocent mother of most of them.

It happens sometimes in an arithmetical calculation that two errors balance one another, so that they have little or no effect on the conclusion; but when one of them is corrected and the other left uncorrected, we are led further from the truth than by both together; and that seems to have been what happened in the Aristotelian philosophy of sensation when it was related to the modern. The Aristotelians adopted two errors; but the second served as a corrective to the first, making it mild and gentle, so that their system didn't tend to lead to scepticism. The moderns have retained the first of those two errors, but have gradually detected and corrected the second. The consequence has been that the light we have kindled has created darkness, and scepticism has advanced hand in hand with knowledge, spreading its gloom first over the material world and eventually over the whole face of nature. Such a phenomenon as this is likely to astonish even the lovers of light and knowledge while its cause is unknown; but when the cause is detected, it may give us hope that this darkness won't last for ever but will be followed by a more permanent light.

7. Visible shape and extension

Although there is no resemblance and (as far as we know) no necessary connection between the quality in a body that we call its 'colour' and the appearance that this colour makes to the eye, it is quite otherwise with regard to its shape and size. There is certainly a resemblance *and* a necessary connection between the visible shape and size of a body and its real shape and size. [See the note on 'visible' on page 49.] No-one can explain why a scarlet colour affects the eye in the way it does; no-one can be sure that it affects his eye in the same way as it affects someone else's, giving it the same appearance to him as it has to the other person; but we *can* explain why a circle placed obliquely to the eye appears in the form of an ellipse. The visible shape, size and orientation can be worked out by mathematical reasoning from the real shape, size and orientation; and it can be demonstrated that every eye that sees clearly and perfectly must in the same situation see it in the form of an ellipse and not in any other. Indeed, I venture to say that a man born blind, if he were instructed in mathematics, would be able to work out the visible shape of a body when he was told its real shape, distance and orientation. Dr. Saunderson understood the projection of the sphere, and he understood perspective. Well, for a blind man to be able to determine the visible shape of a body all he needs is to be able to project the outline of the body onto the surface of a hollow sphere whose centre is in the eye. This projection is the visible shape he wants, for it is the same shape as the one projected on the retina in vision.

A blind man can conceive lines drawn from every point on the object to the centre of the eye, making angles. He can conceive that the length of the object will appear greater or less in proportion to the angle that it makes at the eye; and that the breadth—and in general the distance of any one

point on the object from any other point—will appear greater or less in proportion to the angles that those distances make at the eye. He can easily be made to conceive that the visible appearance has no thickness, any more than a projection of a sphere does, or a drawing in perspective. We could *tell* him that until the eye is aided by experience it doesn't represent one object as nearer or more remote than another. Indeed he would probably guess this on his own account, and tend to think that the rays of light must make the same impression on the eye, whatever distance they come from.

These are all the principles that we suppose our blind mathematician to have; and he can certainly acquire them all by information and reflection. If he is told the •real shape and size of a body, and its orientation and distance in relation to the eye, he can certainly, by means of these principles, find out its •visible shape and size. Using these principles he can demonstrate that the visible shape of any body will be the same as that of its projection on the surface of a hollow sphere with the eye at its centre. And he can demonstrate that a body's visible size will be greater or less depending on whether its projection occupies more or less of the surface of this sphere.

For another way of looking at this matter, let us distinguish the *position* [Reid's word] of objects in relation to the eye from their *distance* from it. Objects that lie on the same straight line drawn from the centre of the eye have the same position, however different their distances from the eye may be; but objects that lie on different straight lines drawn from the eye's centre have different positions; and this difference of position is proportionate to the size of the angle made at the eye by the straight lines in question. Having thus defined what we mean by *the position of objects in relation to the eye*, it is obvious that just as

a body's real shape consists in the situation of its parts in relation to one another,

so also

a body's visible shape consists in the position of its several parts in relation to the eye;

from which it follows that just as

someone who has a distinct conception of the *situation* of the parts of a body in relation to one another must have a distinct conception of its real shape,

so also

•someone who conceives distinctly the *position* of a body's parts in relation to the eye must have a distinct conception of its visible shape.

Now, there is surely nothing to prevent a blind man from conceiving the position of a body's parts in relation to the eye, any more than from conceiving their situation in relation to one another; so I conclude that a blind man can attain a distinct conception of the visible shape of bodies.

Although I think the above arguments are sufficient to prove that a blind man can conceive the visible extension and shape of bodies, I am still concerned to remove prejudices against this truth. For this purpose it will be useful to compare •the notion of visible shape that a blind mathematician might give himself with •that which is presented to the eye in vision, and to note •three• differences.

(1) Visible shape is always presented to the eye in combination with colour. There is no intrinsic connection between shape and colour, but because they have so invariably kept company together we are hardly able to disconnect them even in our imagination. What makes this especially hard to do is the fact that we have never been accustomed to make visible shape an object of our thought. We use it only as a sign, and when it has served this purpose it passes away

without leaving a trace behind. The draughtsman or designer whose business it is to hunt this fugitive form and to make a copy of it finds how hard it is to do this even after many years labour and practice. How good it is for him if at last he can acquire the skill of making it hold still in his imagination while he draws it! For then it is evident that he must be able to draw as accurately from the life as from a copy [meaning, presumably, 'from the real object as from a drawing of it']. But how few of the professed masters of designing are ever able to arrive at this degree of perfection! So it is no wonder that we find it so hard to •conceive shape apart from its constant associate •colour•, when it is so difficult to •conceive it at all. But our blind man's notion of visible shape won't be associated with colour, of which he has no conception; but it may be associated with hardness or smoothness, with which he is acquainted by touch. These different associations that things have are apt to deceive us into making the things themselves seem different though in reality they are the same.

(2) [Up to here, 'shape' has replaced Reid's word 'figure' when that is clearly what it means. In some of what follows, 'figure' sounds better to our ears than 'shape', and will therefore be left untouched; but in these contexts too Reid's subject is indeed *shape*.] Secondly, the blind man forms the notion of visible shape by thought and by mathematical reasoning from principles, whereas the sighted man has it instantaneously presented to his eye by a kind of inspiration, without working at it or reasoning his way towards it. •Consider these two people, whom we can suppose to have eyesight•. One of them

(a) forms the notion of a parabola or a cycloid from the mathematical definition of those figures, without ever having seen them drawn;

while the other

(b) doesn't know the mathematical definitions of those figures but sees them drawn on paper, or feels them cut out in wood.

Each has a clear conception of the figures, (a) through mathematical reasoning and (b) through his senses. Now, the blind man forms *his* notions of visible figures in the same way as (a) formed his notion of a parabola or a cycloid without ever having seen one.

(3) Visible shape leads a sighted man directly to the conception of the real shape of which it is a sign. But the blind man's thoughts move in the opposite direction: he must first know the real shape, distance and situation of the body, and *from* that he slowly traces out the visible shape by mathematical reasoning. And his nature doesn't lead him to conceive this visible shape as a sign; it is—and he knows it is—a creature of his own reason and imagination.

8. Answers to some questions about visible shape

'What kind of thing is this visible figure? Is it a sensation, or an idea? If it is an idea, from what sensation is it copied?' These questions may seem trivial or irrelevant to someone who doesn't know that certain modern philosophers have set up a tribunal of inquisition to which everything in nature must answer! The questions the tribunal asks are few indeed, but very dreadful in their consequences. They are only these:

Is the prisoner ·in the dock· an impression or an idea?

If he is an idea, from what impression was he copied?

If it turns out that the prisoner is neither an impression nor an idea copied from some impression, he is immediately—without being allowed to offer any plea that might restrain the judgment—sentenced to pass out of existence and to be for ever afterwards an empty meaningless sound or the ghost

of a departed entity.

This dreadful tribunal has tried and condemned •cause and effect, •time and place, •matter and spirit; so how can such a poor flimsy form as •visible shape stand before it? It must even plead guilty, and confess that it is neither an impression nor an idea. For, alas! it is notorious that visible shape is extended in length and breadth; it may be long or short, broad or narrow, triangular, quadrangular or circular; so unless ideas and impressions are extended and shaped it can't be an idea or impression.

'Well, then, to what category of beings *does* visible shape belong?' I can only answer by presenting some pointers which may enable visible shaped to be ·metaphysically· placed by people who are better acquainted with the categories than I am. •It is, as I have said, the position of the different parts of a shaped body in relation to the eye. •The different positions of the parts of the body in relation to the eye, when put together, make a real shape that is truly extended in length and breadth (·two dimensions·) and that represents a shape that is extended in length, breadth and thickness (·three dimensions·). •Similarly, a projection of the sphere is a real figure that has length and breadth but represents the sphere, which has three dimensions. •A projection of the sphere, or a perspectival view of a palace, is a 'representative' in the very same sense as visible shape is, and wherever *they* have their lodgings in the categories visible shape will be found to live next door to them.

'Is there any sensation that is specifically associated with visible shape—one that suggests it in vision? By what means is visible shape presented to the mind?' This is a question of some importance if we are to get a clear notion of the faculty of seeing. To throw as much light on it as I can, I shall have to compare this sense with other senses, and to make certain suppositions which may enable us to distinguish things that

are apt to be confused with one another although they are totally different.

Three of our senses give us information about things at a distance: •smell, •hearing and •sight. In smelling and hearing we have a sensation or impression on the mind, a sensation which our constitution makes us take to be a sign of something external; but the sensation is not accompanied by any information about the position of this external thing in relation to the organ of sense. When I •hear the sound of a coach, I can't tell whether the sounding body is above or below, on my right or on my left, unless I have had ·relevant· previous experience. In short: the sensation suggests to me some external object as its cause or occasion; but doesn't suggest anything about the position of the object, whether it lies in this direction or in that. The same holds for •smelling. But the case is quite different for seeing. When I •see an object, the appearance made by its colour may be called the sensation that suggests to me some external thing as its cause; and it *also* suggests the individual direction and position of this cause in relation to the eye. I know it is precisely in such-and-such a direction and in no other. At the same time, I am not conscious of anything that can be called 'sensation' except the sensation of colour. The position of the coloured thing is not a sensation, but by the laws of my constitution it is presented to the mind along with the colour, without any additional sensation.

Suppose that the ·human· eye were so constituted that the rays coming from any one point on the object were diffused over the whole retina rather than being, as they are in fact, collected at one point on the retina. Those who understand the structure of the eye will see that in that case the eye would show the colour of a body as our eyes do but that it wouldn't show either shape or orientation. The operation of that kind of eye would be exactly like that of

hearing and smell, giving no perception of shape or extension but merely of colour. This supposition is in fact not entirely imaginary; for it nearly fits the situation of most people who have cataracts. In them the crystalline lens lets rays of light through but diffuses them over the retina, so that the person with a cataract sees things as one does through a glass of broken jelly—they perceive the colour of objects but not their shape or size.

Second supposition: suppose that smell and sound were conveyed in straight lines from the objects, and that every sensation of hearing and smell suggested the precise direction or position of its object. In that case the operations of hearing and smelling would be similar to that of seeing; we would smell and hear the shape of objects in the same sense as now we see it; and every smell and sound would be associated with some shape in the imagination, just as colour is in fact.

We have reason to believe that light-rays make some impression on the retina, but we aren't conscious of this impression and the anatomists and philosophers haven't been able to discover what it is or what its effects are—whether it produces •a vibration in the nerve, or •the motion of some subtle fluid contained in the nerve, or •something else again to which we can't give a name. Whatever it is, I shall call it the 'material impression', being careful to remember that it an impression on body, not on the mind, and that it isn't a sensation and can't be *like* any sensation. . . . Now when this material impression is made on a particular point on our retina, by the laws of our constitution it suggests two things to the mind—the colour and the position of some external object. No-one can give a reason why that same material impression couldn't have suggested sound or smell (or both) along with the object's position. Why does it in fact suggest colour and position and nothing else? We can

answer this only by saying ‘That’s how we are made’ or ‘That’s how God wanted it to operate’. And since there is no necessary connection between these two things suggested by this material impression (·colour and position·), our Creator *could* have suggested one of them without the other if he had wanted to. Let us then make a third supposition: since it plainly appears to be possible, suppose that our eyes had been constructed in such a way that they suggested to us the position of the object, without suggesting its colour or any other quality. A consequence of this supposition, obviously, is that the person who had such an eye would perceive the visible figure of bodies without having any sensation or impression made on his mind. The figure he perceives is altogether external, so it would be a gross misuse of language to call it an impression ‘on the mind’. If you say ‘It is impossible to perceive a figure unless there is some impression of it on the mind’ I beg leave not to admit the impossibility of this without some proof; and I can’t find any. Nor can I conceive what is *meant* by ‘impression of figure on the mind’. I can conceive an impression of figure on wax, or on any body that is fit to receive it; but an impression of it ‘on the mind’ is to me quite unintelligible; and although I form the clearest conception of the figure, I can’t find any impression of it on my mind, however hard I look.

If, finally, we suppose that the eye regains its power of perceiving colour, I think you’ll agree that now it perceives shape in the very same way as before, the only difference being that now colour is always joined with it.

In answer to the proposed question, therefore: there seems to be no sensation that is special to visible shape or whose job it is to suggest it. Visible shape seems to be suggested *immediately* by the material impression—of which we are not conscious—on the eye. And why can’t a material impression on the •retina suggest •visible shape, as well as

the material impression made on the •hand when we grasp a ball suggests •real shape? In the one case, one and the same material impression suggests both colour and visible shape; and in the other case, one and the same material impression suggests hardness, heat, or cold, and real shape, all at the same time.

‘Given that the •visible shape of bodies is a real and external object to the eye, as their •tangible shape is to the touch, why is it so hard to attend to •the former and so easy to attend to •the latter?’ This is the final question to be asked and answered in this section, ·and it is a good question, with a lot of bite·. It is certainly true that

- visible shape is presented to the eye more often than tangible shape is to the touch,
- visible shape is as distinct and determinate an object as tangible shape, and
- visible shape seems in its own nature to be as proper a topic for theory as tangible shape.

Yet visible shape been attended to so little that it never had a name in any language until Bishop Berkeley gave it the name that I am using, following him, to distinguish it from the shape that is the object of touch.

The difficulty of attending to the visible shape of bodies and making it an object of thought seems to be similar to the difficulty we encounter in attending to our sensations—so similar that they probably have similar causes. Nature intended the visible shape as a sign of the tangible shape and situation of bodies, and has taught us by a kind of instinct to put it always to this use. And so the mind skims across it rapidly, to attend to the things signified by it. For the mind to stop at the visible shape and attend to it would be as unnatural as it would be for a spherical body to stop on slope. There is an inner force that constantly carries it forward and can’t be overcome except by a contrary force.

There are other external things that nature intended as signs, and we find they have this in common: *the mind is inclined to overlook them and to attend only to the things they signify*. For example, certain states of the human face are natural signs of the person's present state of mind. Everyone understands the meaning of these signs, but not one person in a hundred ever attends to the signs themselves or knows anything about them. So you may find many an excellent practical face-reader who knows nothing about the proportions of a face and can't draw or describe the expression of any one emotion.

An excellent painter or sculptor can tell not only what the proportions are of a good face but what changes each passion makes in it. This, however, is one of the chief mysteries of his art, and it can't be acquired without infinite labour and attention as well as the right kind of intellect. But when he puts his art into practice and captures a passion by its proper signs, no-one needs skill or deep thought to understand the meaning of these signs.

What I have said about painting might easily be applied to all the fine arts. In each of them the difficulty consists in knowing and attending to natural signs whose meaning every man understands.

We pass easily and by a natural impulse from the sign to the thing signified, whereas it is hard and difficult work to go backwards from the thing signified to the sign. So because visible shape is intended by nature to be a sign we pass on immediately to the thing signified, and can't easily return to attend to the sign.

Nothing shows more clearly our tendency to ignore visible shape and visible extension than the fact that they have entirely escaped the notice of mathematicians, although mathematical reasoning is just as applicable to them as it is to tangible shape and extension. The shape and ex-

tension that are objects of touch have been tortured ten thousand ways for twenty centuries, and a very noble system of science—namely geometry—has been drawn out of them, whereas not a single mathematical proposition do we find concerning the shape and extension that are the immediate objects of sight.

When a geometrician draws a diagram with the most perfect accuracy, and keeps his eye fixed on it while he goes through a long process of reasoning and demonstrates the relations of the different parts of his figure, it doesn't occur to him that the visible figure presented to his eye is only *the representative of a tangible figure* which is what he is really attending to; it doesn't occur to him that these two figures have really different properties, and that what he demonstrates to be true of the one is not true of the other.

This may seem so great a paradox—even to mathematicians!—that it won't be believed until it has been demonstrated. Well, it's not hard to demonstrate, if you will have the patience to enter just a little way into the mathematical consideration of visible shape, which I shall call 'the geometry of visibles'.

9. The geometry of visibles

In this geometry, the definitions of 'point', of 'line' (whether straight or curved), of 'angle' (whether acute, or right, or obtuse), and of 'circle' are the same as in common geometry. The mathematical reader will easily enter into the whole mystery of this geometry if he attends properly to these eight evident principles.

1. Suppose an eye placed at the centre of a sphere, looking outwards. Every great circle on the sphere will have the same appearance to the eye as if it were a straight line. This is because the eye won't perceive the curvature

of the circle because the curve is always turned directly towards the eye. For the same reason, any line that is drawn in the plane of a circumference of the sphere will appear straight to the eye, whether or not it is really so.

2. Every visible straight line will appear to coincide with some great circle of the sphere; and the circumference of that great circle, even when it is extended until it returns into itself, will appear to be a continuation of the same visible straight line. . . . Here is why.

The eye perceives only the *positions* of objects in relation to itself, and not their *distances*. So any two points that have the same position in relation to the eye, no matter how different their distances from it may be, will be seen by the eye in a single visible place. Now, since a plane passing through the eye and a given visible straight line, will be the plane of some great circle of the sphere, every point on the visible straight line will have the same position as some point on the great circle; therefore, they will both have the same visible place, and coincide to the eye; and the whole circumference of the great circle continued even until it returns into itself will appear to be a continuation of the same visible straight line.

Hence it follows:

3. That every visible straight line when it is continued *in directum* as far as it can be continued, will be represented by a great circle of a sphere in whose centre the eye is placed. It follows,

4. That the visible angle made by two intersecting visible straight lines is equal to the spherical angle made by the intersection of the two great circles that are the representatives of these visible lines. For since the visible lines appear to coincide with the great circles, the visible angle made by the former must be equal to the visible angle made by the latter.

But the visible angle made by the two great circles when seen from the centre is the same size as the spherical angle that they really make, as mathematicians know; therefore the visible angle made by any two visible lines is equal to the spherical angle made by the two great circles of the sphere that are their representatives.

5. It follows obviously that every visible straight-lined triangle will coincide in all its parts with some spherical triangle. The sides of either will appear equal to the sides of the other, and the angles of either to the angles of the other; and therefore the whole of one triangle will appear equal to the whole of the other. In short: to the eye they will be one and the same, and have the same mathematical properties. Thus, the properties of visible straight-lined triangles *are not* the same as the properties of plane triangles, but *are* the same as those of spherical triangles.

6. Every lesser circle of the sphere will appear a circle to the eye (which we are still supposing to be at the centre of the sphere). And conversely every visible circle will appear to coincide with some lesser circle of the sphere.

7. Moreover, the whole surface of the sphere will represent the whole of visible space: every visible point coincides with—and has the same visible place as—some point on the surface of the sphere, so the totality of the parts of the spherical surface will represent the totality of possible visible places, i.e. the whole of visible space. And from this it follows, in the last place,

8. That every visible figure will be represented by that part of the surface of the sphere on which it could be projected, the eye being in the centre. And every such visible figure will bear the same ratio to the whole of visible space as the part of the spherical surface that represents it bears to the whole spherical surface.

The mathematical reader, I hope, will find it quite easy to take in these principles and will just as easily perceive that the following propositions about visible figure and space—which I offer only as a specimen—can be mathematically derived from them, and are as true and obvious as Euclid's propositions concerning tangible shapes.

1. Every straight line when continued long enough eventually returns into itself.
2. A straight line returning into itself is the longest possible straight line; and all other straight lines bear a finite ratio to it.
3. A straight line returning into itself, divides the whole of visible space into two equal parts, each of which will be surrounded by this straight line.
4. The whole of visible space bears a finite ratio to any part of it.
5. Any two straight lines when they are continued for long enough will meet at two points, and mutually bisect each other.
6. If two lines are parallel—i.e. everywhere equally distant from each other—they can't both be straight.
7. Given any straight line, a point can be found that is at the same distance from all the points on it.
8. A circle can be parallel to a straight line, i.e. can be equally distant from it in all its parts.
9. Straight-lined triangles whose angles match also match in the lengths of their sides.
10. Of every straight-lined triangle, the three angles taken together are greater than two right angles.
11. The angles of a straight-lined triangle may all be right angles, or all obtuse angles.
12. The difference in the areas of two unequal circles is not proportional to the difference between the squares of their diameters, and the difference in their circum-

ferences is not proportional to the difference between their diameters.

This small specimen of the geometry of visibles is intended to lead you to a clear and distinct conception of the shape and extension that is presented to the mind by vision; and to demonstrate the truth of my earlier statement •that the shapes and the extension that are the immediate objects of sight are *not* the shapes and the extension that common geometry deals with; •that when the geometrician looks at his diagram while demonstrating a proposition, he has a shape presented to his eye that is only a sign and representative of a tangible shape; •that he entirely neglects the visible shape and attends only to the tangible one; and •that these two shapes have different properties, so that what he demonstrates of the one is not true of the other.

Still, it should be noted •that a small part of a spherical surface doesn't perceptibly differ from a plane surface, so that a small part of visible extension differs very little from the extension in length and breadth that is the object of touch. And •that the human eye is so formed that an object that is seen distinctly and at one view can occupy only a small part of visible space. That is because we never see clearly anything that is at a considerable distance from the axis of the eye, so that if we want to see a large object at one view we must place our eye so far away from it that it occupies only a small part of visible space. From these two observations it follows that plane shapes seen at one view, when their planes are not oblique but direct to the eye, differ little from the visible shapes that they present to the eye. The various lines in the tangible shape have very nearly the same proportions to each other as do the corresponding lines in the visible shape; and the angles of one are very nearly (though not strictly and mathematically) equal to those of the other. So, although we have found many instances of

natural signs that don't in the least resemble the things signified, this isn't the case with regard to visible shape. It always resembles the thing signified by it in the way a plan or profile has to what it represents; and in some cases the sign and thing signified—i.e. the visible figure and the tangible figure—have the same shape and the same proportions, so far as our senses can detect.

If we could find a being who was equipped with sight but with no other external senses, and who was capable of reflecting and reasoning on what he saw, *his* notions and philosophical speculations might help us in the difficult task of distinguishing •the perceptions we have purely by sight from •the ones that come from other senses. Let us suppose such a being, and get the best understanding we can of what notion he would have of visible objects, and what conclusions he would deduce from them. We mustn't think of him as disposed by his constitution, as we are, to regard the visible appearance as a sign of something else; to him it isn't a sign because •for him• there is nothing signified by it; so we must suppose him as much disposed to *attend to* the visible shape and extension of bodies as we are disposed to attend to their tangible shape and extension.

If various shapes were presented to his sense, then as they became familiar he could of course compare them with one another and perceive their likenesses and unlikenesses. He could perceive visible objects to have length and breadth, but he couldn't have any notion of a third dimension, any more than we can have a notion of a fourth. All visible objects would appear to be terminated by lines, straight or curved; and objects terminated by the same visible lines would occupy the same place and fill the same part of visible space. He couldn't have the thought of one object's being *behind* another, or nearer or more distant than another.

To us, with our notion of three dimensions, a line can be conceived as straight, or as curved in one dimension and straight in another; or as curved in two dimensions. Suppose a line to be drawn upward and downward, its length makes one dimension which I shall call 'upward and downward'. That leaves two other dimensions, in which it may be straight or curved. It may be bent to the right or to the left; and if it doesn't bend either way, it is straight in this dimension. If so, there still remains one other dimension, in which it may be curved, for it may be bent backward or forward. When we conceive a tangible straight line, we exclude curvature in each of these two dimensions; what is *conceived to be excluded* must be *conceived*, just as what is conceived to be *included* must be conceived; so it follows that all the three dimensions enter into our conception of a straight line. Its length is one dimension; and the conception of it *also* •includes its straightness in two other dimensions, which is to say that it •excludes the line's being curved in these two dimensions.

The being we have supposed, having no conception of more than two dimensions of which the length of a line is one, can't possibly conceive it either straight or curved in more than one dimension; so that in his conception of a straight line, curvature to the right or left is excluded but curvature backward or forward can't be excluded because he doesn't and can't have any conception of such curvature. This shows us why a line that is straight to the eye can return into itself: its being straight to the eye only implies straightness in one dimension, and a line that is straight in one dimension can be curved in another dimension, and so can return into itself. To us, who conceive three dimensions, a surface is what has length and breadth, excluding thickness; and a surface can be either plane or curved in this third dimension; so that the notion of a third dimension enters into *our* conception

of a surface, for it is only by means of this third dimension, that we can distinguish surfaces into plane and curved, *neither* of which can be conceived without conceiving a third dimension.

The being whom we have supposed has no conception of a third dimension, so his visible figures have length and breadth but his thought of them neither includes nor excludes thickness, because he has no conception of thickness. It follows that visible figures, though they have length and breadth as surfaces have, are neither plane surfaces nor curved surfaces. For 'curved surface' implies curvature in a third dimension, and 'plane surface' implies lack of curvature in a third dimension; and our supposed being can't conceive either of these because he has no conception of a third dimension. Moreover, although he has a distinct conception of two lines intersecting to make *an angle*, he can't have the thought of a *plane angle* or of a *spherical angle*. Even his notion of a *point* is somewhat less determined [here = 'less complex'] than ours. *Our* notion of a point excludes length, breadth and thickness; *his* excludes length and breadth, but it can't either exclude or include thickness because he has no conception of that.

Having thus settled the notions that such a being as we have supposed might form of mathematical points, lines, angles and shapes, it is easy to see that by comparing these with one another and reasoning about them he could discover their relations and arrive at geometrical conclusions about them, built on self-evident principles. No doubt he could also have the same notion of *numbers* as we have, and construct a system of arithmetic. It doesn't matter what order he might follow in such discoveries, or how much time and trouble they might take; what matters is just to know what such a being *could* discover, using reason and ingenuity, with no sensory input except from sight.

It is harder to attend to an account of *possibilities* than to a *factual* account—even one the truth of which is not authenticated. So let me present an extract from the travels of Johannes Rudolphus Anepigraphus, a Rosicrucian philosopher who made a deep study of the occult sciences from which he learned how to transport himself to various parts of the earth and to converse with various orders of intelligences that he found there. In the course of his adventures he became acquainted with an order of beings who are exactly such as I have supposed—i.e. they have eyesight but no other external senses.

How they communicate their views to one another, and how he came to know their language and become initiated into their philosophy—as well as of many other details that might have gratified the curiosity of his readers and perhaps made him easier to believe—he hasn't thought fit to inform us, because these are things that only insiders should know. His account of their philosophy is as follows.

'Many of the Idomenians are very intelligent and much given to contemplation. They have most elaborate theories of arithmetic, geometry, metaphysics and physics. In the two latter, indeed, they have had many disputes that have been carried on with great subtlety, and they are divided into different sects; yet in arithmetic and geometry there has been as much unanimity as there is among the human species. Their principles relating to numbers and arithmetic is exactly the same as ours except for differences of notation, but their geometry differs very considerably from ours.'

As our author's account of the geometry of the Idomenians agrees in everything with the geometry of visibles of which I have given a specimen above, I shall pass over it. He goes on thus:

'Colour, extension, and shape are conceived to be the essential properties of body. A very considerable sect maintains

that colour is the essence of body. They say:

If there had been no colour there would have been no perception or sensation. Colour is all that we do or can perceive that is exclusive to body, because extension and shape are possessed by empty space as well as by body. Consider what is involved in supposing a body to be annihilated: *colour* is the only thing in it that can be annihilated, for the *place* that it occupies—and thus the shape and extension of that place—must stay in existence, and can't be imagined not to exist.

These philosophers hold that space is
 the place of all bodies,
 immovable and indestructible,
 without shape,
 exactly alike in all its parts,
 incapable of growing or shrinking,
 measurable; because each tiny part of space bears a
 finite ratio to the whole.

So that with them *the whole extent of space* is the common and natural *measure* for everything that has length and breadth: the size of every body and of every figure is stated in terms of what fraction it is of the whole universe. Similarly, the common and natural measure of *length* is an infinite straight line, which (as I noted above) returns into itself, has no limits, yet bears a finite ratio to every other line.

Their natural philosophy [here = 'philosophy and natural science'], as the wisest of them admit, has been for many ages in a very low state. The philosophers, having observed that one body can differ from another only in •colour, •shape or •size, took it for granted that all the particular qualities of bodies must arise from the various combinations of •these their essential attributes. So it was thought that the aim of natural philosophy should be to show how the various combinations of these three qualities in different bodies

produced all the phenomena of nature. It would take for ever to enumerate the various systems that were invented for this purpose, and the disputes that continued for ages, with the followers of each system using great skill to expose the weak points in other systems and to disguise the weak points in their own.

Eventually some free-thinkers with a sense of humour, tired of eternal disputation and of the labour of patching and propping weak theories, began to complain about •nature's fine-grained complexity, •the infinite changes that bodies undergo in shape, colour and size, and •the difficulty of accounting for these appearances. They made this their excuse for giving up, as empty and useless, all inquiries into the causes of things.

These wits had plenty of raw materials for mirth and ridicule in the systems of •natural• philosophers, and, finding it an easier task to pull down than to build up and support, their view began to spread mightily, and went on with great success. They were helped in this by the fact that each sect provided them with weapons and soldiers with which to destroy some other sect. Thus philosophy gave way to scepticism and irony, and systems that had been the work of ages and the admiration of the learned became jokes for the vulgar; for even the vulgar were glad to join in the triumph over a kind of learning of which they had long been suspicious because all it produced was wrangling and quarrelling. The wits having now acquired a great reputation, and flushed with success, began to think that to complete their triumph they needed to overturn *every* claim to knowledge; so they began their attacks on arithmetic, geometry, and even on the common notions of uneducated Idomenians. Conquerors have always found it hard to know where to stop!

In the meantime [this is still Anepigraphus speaking], natural philosophy began to rise from its ashes under the direction of

a person of high intelligence who is regarded as having had something in him above Idomenian nature. He remarked that the Idomenian faculties were certainly intended to be used for contemplation, and that •the works of nature were a nobler subject to exercise them on than •the follies of systems or •the errors of the learned; and, being aware of the difficulty of finding out the causes of natural things, he proposed to make accurate observations of the phenomena of nature in order to find out the *rules* according to which they happen, without inquiring into the *causes* of those rules.

'In this he made considerable progress himself, and planned out much work for his followers, who call themselves 'inductive philosophers'. The sceptics look with envy at this rising sect, which they see as eclipsing their reputation and threatening to limit their range of influence; but they can't decide what direction to attack it from. The vulgar begin to reverence it, as producing useful discoveries.

'Every Idomenian firmly believes that two or more bodies can exist in the same place ·at the same time·. For their sense—their eyesight—tells them this, and they can't doubt it any more than they can doubt whether they have any perception at all. They often see two bodies meet and coincide in the same place, and then separate again, without undergoing any perceptible change as a result of this penetration ·of each by the other·. When two bodies meet and occupy a single place, usually only one of them *appears* in that place, while the other disappears. The one that continues to appear is said to "overcome", the other to "be overcome".'

To this quality of bodies they gave a name which our author tells us has no translation in any human language. . . . He calls it the 'overcoming quality' of bodies. He assures us that:

The theorizing that went on concerning this one quality of bodies, and the hypotheses devised to

explain it, were sufficient to fill many volumes. And just as many hypotheses have been invented by the Idomenian philosophers to explain the changes of size and shape—qualities that they perceive to be in continual flux in most bodies that move. The founder of the inductive sect, believing that Idomenian faculties weren't capable of discovering the real *causes* of these phenomena, worked on finding from observation what *laws* they are connected by; and he discovered many mathematical ratios and relations concerning the motions, sizes, shapes, and the 'overcoming quality' of bodies—relations confirmed by constant experience. But the opponents of this sect prefer to content themselves with •fictional causes of these phenomena, rather than accepting the •real laws that govern them—laws that humble their pride by being admittedly not explainable in their turn.

Thus far Johannes Rudolphus Anepigraphus. . . . I shan't undertake to judge the narrative of this learned traveller by the 'external' marks of his credibility; I shall confine myself to the marks that textual scholars call 'internal'. . . . The important question is whether the account given above is a true report on their geometry and philosophy. We have all the faculties they have along with others that they lack; so we can form some judgment concerning their philosophy and geometry by putting aside all our senses but one, and reasoning purely on the basis of the perceptions we have by sight. As far as I can judge in this way, after a careful examination, their geometry must be such as Anepigraphus has described. Nor does his account of their philosophy ·and science· appear to contain any obvious marks of fakery, though here, no doubt, we should allow for liberties that travellers take ·with the truth·, as well as for involuntary mistakes that they are apt to make.

10. The parallel motion of the eyes

Having explained *visible shape* as clearly as I can, and shown how it connects with the thing signified by it, I should next consider certain phenomena of the eyes and of vision. They are ones that have commonly been attributed to •custom, to •anatomical causes, or to •mechanical causes; but I think they come down to •basic powers and forces of the human mind, which is why they belong properly to the subject of this inquiry. They will be my topic until the end of section 19.

The first of these phenomena is the parallel motion of the eyes: when one eye is turned to the right or left, upward or downward, or straight ahead, the other always goes along with it in the same direction. It is obvious to us when both eyes are open that they are always turned the same way, as if the two were acted on by a single moving force; and if one eye is shut and a hand placed over it while the other turns in various ways, we feel in the palm of the hand the closed eye turn at the same time—and it does this whether or not we want it to. This phenomenon is surprising because all the anatomists agree that the muscles that move the two eyes and the nerves that serve these muscles are entirely distinct and unconnected. If we saw a man who throughout his life never moved one arm without moving the other precisely in the same way, so that they were always parallel, we would find this very surprising and inexplicable. But it would be no harder to find the physical cause of such motion of the arms than it is to find the cause of the parallel motion of the eyes, which is perfectly similar.

The only cause that anyone has proposed for this parallel motion of the eyes is *custom*. The explanation goes like this:

We find by experience, when we begin to look at objects, that to get a clear view of something we need

to turn both eyes towards it; so we soon get the habit of doing this every time and gradually lose the power of doing otherwise.

This account of the matter seems inadequate, because habits aren't acquired at once; it takes time to acquire and to confirm them; and if this motion of the eyes came from habit we would see newborn children turn their eyes different ways, and move one without the other, as they do their hands or legs. I know that some say that they *are* apt to do this; but I have never found it true from my own observation, although I have taken trouble to make observations relating to this and have had good opportunities to do so. [Reid was the father of nine children.] I have also consulted experienced midwives, mothers and nurses, and found them to agree that they had never observed distortions of this kind in the eyes of children except when they had reason to suspect that the child was ill.

So it seems to be extremely probable that there is something in the human constitution, some natural instinct lying deeper than custom, which directs us to move both eyes always the same way.

We don't know *how* the mind acts on the body, nor by what power the muscles are contracted and relaxed; but we see that in some of our voluntary motions as well as in some of the involuntary ones this power is directed in such a way that many muscles that have no material tie or connection act in concert, each being taught to play its part with correct timing and rhythm. Think about how a company of expert actors in a theatrical performance (or excellent musicians in an orchestra or good dancers in a country dance) work together so that their separate contributions produce one uniform effect; well, they don't do this in a more regular and orderly way than a number of muscles do in many of the animal functions and in many voluntary actions. Yet

we see such actions being performed just as skillfully and regularly by children, and by people who don't know that they *have* such muscles, as by the most skillful anatomist or physiologist.

Who taught all the muscles involved in sucking, swallowing, breathing, excreting and so on to play their part in such regular order and with the timing just right? It wasn't custom, surely. It was ·God·, the powerful and wise being who made the human body and fixed the laws by which the mind operates on every part of it so that the parts can do what they were intended to do. And when we see so many such examples of a system of unconnected muscles working together so wonderfully in their separate functions, with no help from habit, it shouldn't be thought strange that the muscles of the eye should, also with no help from habit, work together to give the eyes the direction they need if they are to do what they are intended to do.

We see a similar working together in the muscles that contract the pupils of the two eyes, and in the muscles, whatever they are, by which the shape of the eyes is varied according to the distance of the objects ·being looked at·.

But it should be noted that although it appears to be by natural instinct that both eyes are always turned the same way, there is still some latitude left for custom. ·I now explain this·. What I have said about the parallel motion of the eyes isn't to be understood too strictly—nature doesn't direct us to keep the axes of the eyes always precisely and mathematically parallel to each other. Indeed, although they are always nearly parallel they are seldom exactly so. When we look at an object, the axes of the eyes meet at that object; so they make an angle, always a small one but larger or smaller depending on how close the object is. Nature has very wisely left us the power of varying the parallelism of our eyes a little, so that we can direct them both to the

same point, whether far or near. No doubt this is learned by custom, which is why we see that it is a long time before children do this perfectly.

This *natural* power of varying the parallelism of the eyes goes only as far as is needed for the purpose intended by it, but it can be increased through much practice and straining. And so we see that some people have become able to distort their eyes into unnatural directions, just as others have become able to distort their bodies into unnatural postures.

Those who have lost the sight of one eye commonly lose what they had acquired by custom, in the direction of their eyes, but retain what they had by nature. That is, although their eyes always turn and move together; when they look at an object the blind eye often deviates from it a little. A casual observer wouldn't notice this, but it can be spotted by someone who is used to making exact observations in these matters.

11. Seeing objects the right way up by images that are upside down

Another phenomenon that has puzzled philosophers is our seeing objects the right way up when it is well known that their images or pictures on the retina of the eye are inverted. The sagacious Kepler first made the grand discovery that clear but inverted pictures of visible objects are formed on the retina by the rays of light coming from the object. The same great philosopher showed through the principles of optics how these pictures are formed:

The rays coming from any one point on the object and falling on the various parts of the pupil are refracted by the cornea and crystalline lens in such a way that they meet again at one point on the retina, and there they paint the colour of the point on the object from

which they come. As the rays from different points on the object cross each other before they come to the retina, the picture they form must be upside down; the upper part of the object being painted on the lower part of the retina, the right side of the object on the left of the retina, and similarly with the other parts.

Kepler thought that we see objects the right way up by means of these inverted pictures for this reason:

As the rays from different points of the object cross each other before they fall on the retina, when they get there we conclude that the impulse we feel on the lower part of the retina comes from above, and that the impulse that we feel on the higher part comes from below.

Descartes later gave the same explanation for this phenomenon, and illustrates it by what we think about the positions of objects that we feel with our arms crossed or with two sticks that cross each other.

But I can't go along with this explanation. First, because it takes our seeing things the right way up to be something we *infer* from certain premises, whereas it seems in fact to be an immediate perception. And, secondly, because the premises from which all mankind are supposed to draw this conclusion never entered into the minds of the great majority of people, and are absolutely unknown to them. We have no feeling or perception of the pictures on the retina. . . . In order to see objects the right way up, according to the principles of Kepler or Descartes, we must already know

- that the rays of light come from the object to the eye in straight lines;
- that the rays from different points of the object cross one another before they form the picture on the retina; and lastly
- that these pictures are really upside down.

All these things are true, and are known to philosophers, but they are absolutely *unknown* to the great majority of mankind; and people who are absolutely ignorant of them can't possibly reason from them and build conclusions on them. . . . I have had occasion to note many instances of conclusions drawn. . . .from premises that pass through the mind *very quickly* and are never made the objects of reflection; but surely no-one will think it possible to draw conclusions from premises that never entered into the mind *at all!*

Bishop Berkeley having rightly rejected this explanation, gives one based on his own principles. (He is followed in this by the judicious Dr. Smith in his *Optics*.) I shall now explain and examine the explanation given by that ingenious writer. Here it is in my words:

The ideas of sight are altogether *unlike* those of touch. . . . So we can learn only *by experience* how one sense will be affected something that affects the other sense in such-and-such a way. Shape, position, and even number (i.e. number of tangible objects) are ideas of touch; and although there is no resemblance between these and the ideas of sight, we learn by experience that a tangible triangle affects the sight in manner M_t and that a tangible square affects it in manner M_s ; and from this we judge that whatever affects our sight in manner M_t is a triangle, and whatever affects it in manner M_s is a square. In the same way, finding from experience, that an object the right way up affects the eye in one way and the same object upside down affects it in another, we learn to judge from how the eye is affected whether the object is the right way up or upside down. In short, visible ideas are signs of the tangible; and what takes the mind from the sign to the thing signified is not

•any resemblance between them or •any natural force, but rather •its having found them constantly conjoined in experience, as the sounds of a language are conjoined with the things they signify. Thus, if the images on the retina had always been the right way up they would have shown the objects the right way up, just as they now do with the images upside down. . . . Similarly, if the visible appearance of two shillings had been found connected from the beginning with the tangible idea of one shilling, that appearance would as naturally and readily have signified *one* shilling as it now signifies *two*.

This opinion is undoubtedly very ingenious; and if it is sound it will solve to explain not only our present phenomenon but also the one I shall consider next [section 13], namely our seeing objects *single* with *two* eyes.

It is clear that in Berkeley's explanation it is supposed that initially—before we have any habits—we don't see things either as the right way up or as upside down, as having this shape or that, as single or double; and that *we learn from experience* to use visible signs to tell us objects' tangible position, shape, and number.

There is no denying that it's extremely difficult to distinguish the immediate and natural objects of sight from the conclusions that we have been accustomed from infancy to draw from them. Berkeley was the first to try to distinguish between them and to trace out the boundary that divides them. If in doing so he has gone a little off-track on one side or the other, this might be expected in a subject that is so intricate and altogether new. The nature of vision has received great light from this distinction; and many phenomena in optics which had previously appeared altogether inexplicable have been clearly and sharply explained by it. When someone has made an important discovery

in philosophy it is natural—almost unavoidable—that he should take it a little beyond its sphere and to use it to 'explain' phenomena that don't fall within its province. Even the great Newton, when he had discovered the universal law of gravitation and seen how many of the phenomena of nature depend on this and other laws of attraction and repulsion, couldn't help expressing his conjecture that *all* the phenomena of the material world depend on attracting and repelling forces in the particles of matter. And I suspect that the ingenious Berkeley, having found so many phenomena of vision that are instances of the constant association of the ideas of sight and of touch, carried this principle a little beyond its just limits.

In order to judge as well as we can whether this is so, consider the situation of a man •who is like Dr. Saunderson in being blind and having all the knowledge and abilities that a blind man can have, and •who is suddenly made to see perfectly. Let us suppose him to be kept from all opportunities of associating his ideas of sight with those of touch until the following experiment is performed. After the ideas of sight become a little familiar to him, and his first surprise at the objects of vision has died down, give him time to check them out and compare them in his mind with the notions that he formerly had by touch; and in particular to compare in his mind the •visible extension that his eyes present to him with the •extension in length and breadth with which he was previously acquainted by touch.

I have tried in section 7 to prove that a blind man can form a notion of the visible extension and shape of bodies from how it relates to their tangible extension and shape. It will be even easier for him, when this visible extension and shape are presented to compare them with tangible extension and shape and to perceive that one has length and breadth as well as the other; that one can be bounded

by straight or curved lines as well as the other. So he will perceive that there can be visible as well as tangible circles, triangles, and quadrilateral and multilateral figures. The visible shape is coloured and the tangible one isn't, but that doesn't prevent them from having the same shape, any more than two objects of touch are prevented from having the same shape by the fact that one is hot and the other cold.

I have demonstrated that the properties of visible shapes differ from those of the ·tangible· plane shapes that they represent; but I noted at the same time that when the object is small enough to be taken in clearly all at once, and is placed directly before the eye, the difference between the visible and tangible shape is too small to be perceived by the senses. Thus, it is true that in every visible triangle the three angles are greater than two right angles, whereas in a ·tangible· plane triangle the three angles are equal to two right angles; but when the visible triangle is small its three angles will be so nearly equal to two right angles that the senses can't pick up the difference. . . . So we find that small visible shapes—ones that can be seen clearly at one view—don't just *resemble* the plane tangible shapes that have the same name, but are *the same* so far as the senses are concerned. So that if Dr. Saunderson had been made to see, and had attentively viewed the figures of the first book of Euclid, he might—just by thinking and without touching them—have discovered that they were the very figures he had previously been so well acquainted with by touch.

When ·tangible· plane figures are seen obliquely, their visible shape differs more from the tangible shape; and the representation of solid [here = 'three-dimensional'] shapes that is made to the eye is still more imperfect, because visible extension has only two dimensions, not three. Still, just as it can't be said that an exact picture of a man has *no* resemblance to the man, or that a perspectival view of

a house has *no* resemblance to the house; so it can't be properly said that the visible shape of a man or of a house has *no* resemblance to the objects they represent.

So Berkeley has built on a serious mistake, in supposing that there is no resemblance between the extension, shape, and position that we see and that which we perceive by touch. I would further remark that Berkeley's theory regarding material things must have made him see this question about the right-way-up appearance of objects in a very different light from that in which it appears to those who don't accept that theory.

In his *Theory of Vision* Berkeley seems indeed to allow that there is an external material world; but he believed that this external world is only tangible, not visible, and that the visible world—the world accessible only by sight—is not external but in the mind. If this is accepted, then someone who says 'I see things the right way up, and not inverted,' says that there is a top and a bottom, a right and a left, *in his mind*. I'm sorry but I don't know the topography of the mind well enough to be able to give meaning to 'top', 'bottom' etc. when they are applied to it.

So I agree that *if* visible objects *weren't* external, but existed only in the mind, they couldn't have shape or orientation or extension; and it would be absurd to say that they are seen either the right way up or upside down or that there is *any* resemblance between them and the objects of touch. But when I ask 'Why are objects the right way up and not upside down?' I am taking it for granted that we are not in Berkeley's ideal world, but in the world that men who submit to the dictates of common sense believe themselves to inhabit. I am taking it for granted that the objects both of sight and of touch are external, and have a certain shape and a certain orientation in relation to one another and in relation to our bodies, whether we perceive this or not.

When I hold my walking-cane upright in my hand and look at it, I take it for granted that I see and handle the same individual object. When I say that I *feel* it as the right way up I mean that I *feel* the head directed away from the ground and the point directed towards it; and when I say that I *see* it as the right way up I mean that I *see* it with the head directed away from the ground and the point toward it. I take the ground to be a fixed object both of sight and of touch, in relation to which an object can be said to be high or low, the right way up or upside down; and to ask ‘Why do I see the object the right way up, and not upside down?’ is like asking ‘Why do I see the object with the orientation that it really has?’ or ‘Why does the eye show the real orientation of objects, rather than showing them upside down as they are seen by a common astronomical telescope or as their pictures are seen on the retina of an eye when it is dissected?’

12. More on this topic

The only way to give a satisfactory answer to this question is to point out the laws of nature that apply in vision, for they are what the phenomena of vision must be regulated by. So I answer **(1)** that by a law of nature the rays of light go from every point on the object to the pupil of the eye in straight lines. And **(2)** that by the laws of nature the rays coming from any one point on the object to the various parts of the pupil are refracted in such a way that they meet again at one point on the retina; and the rays from many different points on the object, first crossing each other and then proceeding to that many different points on the retina, form an upside-down picture of the object.

The principles of optics tell us—and experience confirms—that if there is no such picture on the retina there is no vision; and that how the object appears in respect of colour, shape,

clarity or fuzziness, and brightness or faintness, depends on what the picture on the retina is like.

So it is obvious that the pictures on the retina are, by the laws of nature, a means of vision; but we know nothing at all about *how* they accomplish their end. Philosophers think that the impression made on the retina by the rays of light is passed along to the optic nerve, and passed by the optic nerve to some part of the brain that they call the ‘sensorium’; and that the impression thus conveyed to the sensorium is immediately perceived by the mind, which is supposed to reside there. But we know nothing about where the soul is; and we don’t perceive immediately what is goes on in the brain—indeed we know less about the brain than about any other part of the human body. It is indeed very probable that the optic nerve is just as essential an instrument of vision as the retina is, and that the pictures on the retina have some effect on it. But we know nothing about what kind of effect this is.

There isn’t the least probability that either the optic nerve or the brain contains any *picture* or *likeness* of the object. The pictures on the retina are formed by the rays of light; and whether we side with those who hold that when the rays bang into the retina they cause some •vibration of the fibres of the optic nerve, or with those who hold that the impact of the rays on the retina sets in •motion some subtle fluid contained in the nerve, neither the •vibration nor the •motion can *resemble* the visible object that is presented to the mind. Nor is there any probability that the mind perceives the pictures on the retina. These pictures are no more objects of our perception than the brain is, or the optic nerve. No man ever saw the pictures in his own eye, nor indeed the pictures in the eye of someone else until the eye was taken out of the head and duly prepared •for microscopic examination•.

It is very strange that philosophers and scientists of all ages should have agreed that

the images of external objects are conveyed by the organs of sense to the brain, and are there perceived by the mind.

Nothing could be more unphilosophical, for two reasons. (1) This thesis has no foundation in fact and observation. The eye is the only sense-organ, as far as we can discover, that forms any kind of image of its object; and the images formed by the eye are not in the brain but at the back of the eye, and they are not at all perceived or felt by the mind. (2) It is no easier to conceive how the mind perceives images in the brain, I will undertake to show you how it can perceive the most distant objects; for if we give the mind eyes to perceive what is transacted at home in its dark chamber, why can't we make these eyes a little longer sighted? And if we do *that* we shall have no need for the unphilosophical fiction of images in the brain! In short, the manner and mechanism of the mind's perception is quite beyond our understanding; and *this* way of explaining it, by images in the brain, seems to be based on very gross notions of the mind and its operations—implying that the supposed likenesses in the brain, by a kind of contract, formed similar ones in the mind, of which the mind is supposed to be conscious.

I have tried to show throughout this inquiry that the effects made on the mind by means of the five senses haven't the least resemblance to the objects of sense; and therefore, as I see no shadow of evidence that there are any such likenesses in the brain, I see no scientific purpose that can be met by supposing them. Since the picture on the retina, therefore, isn't itself seen by the mind, doesn't have on

the brain or sensorium any effect that is seen by the mind, and doesn't have any effect on the mind that resembles the object, the question still stands: How does this picture on the retina cause vision?

Before answering this question, I should point out that in the operations of the mind, as well in those of bodies, we must often be satisfied with knowing that certain things are connected and invariably follow one another, without being able to discover the chain that goes between them. Such connections are what we call 'laws of nature'; and when we say that one thing produces another 'by a law of nature', all we mean is that one thing (in everyday language called the 'cause') is constantly and invariably followed by another that we call the 'effect', and that we don't know how they are connected. Thus, we see that it is a fact that bodies gravitate toward bodies, and that this gravitation is regulated by certain mathematical proportions depending upon how far apart the bodies are and the quantity of matter that each has. Being unable to discover the cause of this gravitation, and presuming that it is the immediate operation either of God, the author of nature, or of some subordinate cause that we haven't yet discovered, we call it a 'law of nature'. If any philosopher some day has the pleasure of discovering the cause of gravitation, this will have to be by discovering some more general law of nature from which the gravitation of bodies necessarily follows. In every chain of natural causes the highest link is a primary law of nature, and the highest link that we can find by sound induction is either this primary law of nature or a necessary consequence of it. Tracing out the laws of nature by induction from the phenomena of nature is all that true philosophy aims at, and all it can ever reach. [Remember that 'philosophy' also covers *science*].

There are laws of nature by which the operations of the mind are regulated; there are also laws of nature that govern the material system; and just as the latter are the ultimate conclusions that the human faculties can reach in the philosophy of bodies, so the former are the ultimate conclusions we can reach in the philosophy of minds.

Now, I put the question of *how* the picture on the retina causes vision in the way that it does. From what I have just been saying, we can see that the question amounts to this:

By what law of nature is a picture on the retina the means or occasion of my seeing an external object of the same shape and colour, with the opposite up-down orientation, and in a certain direction from the eye?

I am sure it will be agreed that I see the whole object in the same manner and by the same law by which I see any one point on it. Now I know it to be a fact that in direct vision I see every point on the object in the direction of the straight line that passes from the centre of the eye to that point on the object; and I also know from optics that the ray of light that comes to the centre of my eye passes on to the retina in the same direction. So it seems to be a *fact* that

every point on the object is seen in the direction of a straight line passing from the picture of that point on the retina through the centre of the eye.

As this is a fact that holds universally and invariably, it must be either a law of nature or the necessary consequence of some more general law of nature. And according to sound rules of philosophizing we can regard it as being itself a law of nature until we discover some more general law from which it follows (which I suspect can never be done). [Throughout this discussion Reid mostly uses 'law of nature' to mean '*basic* law of nature'.] Thus we see that •the phenomena of vision lead us by the hand to •a law of nature, or a law of our constitution; and a necessary consequence of this is that we see objects

the right way up through upside-down images. . . . My chief aim in dealing with this question was to point out this law of nature—a law which is a part of the constitution of the human mind, and therefore belongs properly to the subject of this inquiry. So I shall make some further remarks about it, after doing justice to the ingenious Dr. Porterfield who, long ago in his *Medical Essays* or more recently in his *Treatise of the Eye*, pointed out, as a primary law of our nature something which. . . .very nearly coincides with the law that I have mentioned.

In order, therefore, that we may have a more distinct notion of this law of our constitution, I shall offer three observations.

1. We can give no reason why the retina is the only part of the body on which pictures made by the rays of light cause vision; so we must set this down to being simply a law of our constitution. We can use optical glasses to form such pictures on the hand or on any other part of the body, but we don't feel them and they don't produce anything like vision. A picture on the retina is no more *felt* than is a picture on the hand; but it produces vision—and the only reason for this, as far as we know, is that the wisdom of nature intended it for this purpose. The vibrations of the air strike on the eye, the palate and the olfactory membrane with the same force as on the ear-drum; their effect on the ear-drum produces the sensation of sound, while their effects on any of the other sense-organs produce no sensations at all. This re-applies to all the senses, each of which has its own special laws according to which the effects on the organ of that sense produce sensations or perceptions in the mind that can't be produced by effects made on any other organ.

2. The laws governing perception by the different senses are very different, not only in respect of the nature of the objects perceived by them but also in respect of how they

inform us about the distance and situation of the object. In all of them the object is thought of as external and as having real existence independently of our perception; but by one sense (*·touch·*) the mind is presented with the distance, shape and situation of the object, by another (*·sight·*) the shape and situation but not the distance; and by another (*·hearing·*) neither shape, situation or distance. It is no use invoking the principles of anatomy or natural philosophy to explain these differences in the manner of perception by the different senses. Eventually we have to bring it back to the will of *·God·*, our maker, who intended that our powers of perception should have certain limits, and adapted to his wise purposes the organs of perception and the laws of nature by which they operate.

When we hear an unusual sound, the sensation indeed is in the mind, but we know that something external produced the sound. At the same time, our hearing doesn't tell us whether the sounding body is near or far, in this direction or that; so we look around to discover it. If any new phenomenon appears in the heavens, we see exactly its colour, its apparent place, size, and shape, but we don't see its distance. For all the eye can tell, it may be in the atmosphere, among the planets, or in the sphere of the fixed stars.

The testimony of the sense of touch reaches only to objects that are contiguous to the organ, but with regard to them it is more precise and detailed. When we feel a body with our hand, we know its shape, distance and position, as well as whether it is rough or smooth, hard or soft, hot or cold. The sensations of touch, seeing and hearing are all in the mind, and can't exist except when they are perceived. How do they all constantly and invariably suggest the conception of and belief in external objects that exist whether or not they are perceived? No philosopher can give any answer except

that *that is the way we are constituted*.

How do we know that the object of touch is at the finger's end and nowhere else? That the object of sight is in such-and-such a direction from the eye, and in no other direction, but can be at any distance? and that the object of hearing can be at any distance, and in any direction? Not by custom, surely, or by reasoning or comparing ideas, but by the constitution of our nature. How do we perceive visible objects in the direction of straight lines perpendicular to that part of the retina on which the rays strike, while we don't perceive the objects of hearing in lines perpendicular to the ear-drum on which the vibrations of the air strike? Because such are the laws of our nature. How do we know which parts of our bodies are affected by particular pains? Not by experience or by reasoning, but by the constitution of nature. The sensation of pain is of course in the mind, and can't be said to have any relation, from its own nature, to any part of the body; but because of the way we are built this sensation gives us a perception of some particular part of the body whose disorder causes the unpleasant sensation. If it weren't so, a man who never before felt either the gout or toothache might when he first had gout in his toe mistake it for toothache. Every sense, therefore, has its special laws and limits by the constitution of our nature; and one of the laws of sight is that we always see an object in the direction of a straight line passing from its image on the retina through the centre of the eye.

3. You may want to say: 'It would be easier and just as satisfactory to conceive a law of nature by which *we always see objects in the place where they are, and with their true orientation*, without bringing in images on the retina or the optical centre of the eye.' To this I answer that nothing can be a law of nature that is contrary to fact. The laws of nature are the most general facts we can discover in the operations

of nature. Like other facts, they are not to be found by lucky guesses but to be soundly derived from observations; like other general facts, they are to be inferred not from a few particulars but from a patient and cautious induction from a large number of particulars. That we see things always in their true place and orientation *is not fact*, so it can't be a law of nature. In a plane mirror I see myself and other things in quite different places from those they really occupy; and this is the case whenever the rays coming from the object are either reflected or refracted before striking the eye. Those who know anything of optics know that in all these cases the object is seen in the direction of a line passing from the centre of the eye to the point where the rays were last reflected or refracted, and that all the powers of the telescope and microscope depend on this.

Shall we say, then, that it is a law of nature that *the object is seen in the direction. . . .contrary to that of the rays when they meet the eye?* No. This is not true, so it isn't a law of nature. For the rays from any one point on the object come to all parts of the pupil; so they must have different directions; but we see the object only in one of these directions, namely that of the rays that come to the centre of the eye. And this holds true even when the rays that are heading for the centre are blocked and the object is seen *·only·* by rays that pass at a distance from the centre.

You may think that although we aren't made so as to see objects always in their true place, or as precisely in the direction of the rays when they strike cornea, perhaps we are made so as to *see the object in the direction that the rays have when they reach the retina after undergoing all their refractions in the eye*—i.e. the direction in which the rays pass from the crystalline lens to the retina. But this isn't true either, and consequently it isn't a law of our constitution. To see that it isn't true, we must conceive all the rays that

pass from the lens to one point on the retina as forming a small cone whose base is on the back of the lens, and whose vertex is a point on the retina. Obviously the rays that form the picture at this point have different directions, even after they pass the lens; yet the object is seen only in one of these directions. . . .

From this induction I conclude that our seeing an object in that particular direction in which we *do* see it is not a result of *•any* law of nature by which we are made to see it in the direction of the rays, whether before or after their refractions in the eye, but of *•a* law of our nature by which we see the object in the direction of the straight line that passes from the picture of the object on the retina to the centre of the eye.

The facts on which I base this induction come taken from four fascinating experiments by Scheiner and reported by Dr. Porterfield, and confirmed by his experience. I have repeated these experiments myself, and found them to agree with the report. As they are easy to perform and tend to illustrate and confirm the law of nature I have mentioned, I shall present them here as briefly and clearly as I can. [In this version, Reid's account will be made somewhat briefer still. The omissions will not be signalled by ellipses.]

Experiment 1. Place a well-lit pinhead about eighteen inches from your eye; keep your eye still, looking at the pinhead steadily. We know that the rays from anyone point on this object, whether they pass through the centre of the eye or away from the centre, come together again at one point on the retina; and that these rays have different directions, both before they strike the eye and after they pass through the crystalline lens.

Now make a small pinhole in a card and look at the pinhead through this hole, moving the card so that different parts of your eye are in play. When you do this you will be

seeing the pinhead sometimes by rays that are central and sometimes by rays that are not, with different directions and different angles to one another (both when they strike the cornea and when they strike the retina), but always by rays that come to the same point on the retina. And what is the upshot? It is that the object is seen in exactly same direction, whether seen by all these rays together or by any one subset of them.

Experiment 2. Place the pinhead about four or five inches in front of your eye. We know that in this case the rays coming from one point on the object don't meet at one point on the retina, but spread over a small circular spot of it; the central rays occupying the centre of this spot, the rays that pass above the centre occupying the upper part of the spot, and similarly with all the rest. And we know that in this case the object is seen confused, every point on it being seen not in one direction but in several. To remedy this confusion, look at the object through the pinhole, and while you move the pinhole over the various parts of the pupil the object won't keep its apparent place but will seem to move in the opposite direction!

Take note of this: when the pinhole is moved upward over the pupil of the eye, the picture of the object is moved upward on the retina while the object seems to move downward, so as to be always in the straight line passing from the picture through the centre of the eye. Bear in mind also that the rays forming the upper and the lower pictures on the retina don't cross each other as in ordinary vision; yet *still* the higher picture shows the object lower, and the lower picture shows the object higher, just as when the rays do cross each other. One consequence of this, by the way, is that the phenomenon of our seeing objects with the opposite orientation to that of their pictures on the retina does *not* depend on the crossing of the rays, as Kepler and Descartes thought.

Experiment 3. As in the second experiment, but this time make *three* pinholes in a straight line, close enough together for rays coming from the object through all them to enter the pupil at the same time. The upshot of this is very remarkable: the object is seen triple with one eye! And if you make more holes within the breadth of the pupil, you will see as many objects as there are holes. But I shall take the case of *three* holes—one right, one middle, one left—so that you see three objects standing in a line from right to left.

Notice that of the three pictures on the retina, the one on the left is formed by the rays that pass on the left of the eye's centre, the middle picture by the central rays, and the right-hand picture by the rays that pass on the right of the eye's centre. It is also important that the object appearing on the right is not the one seen through the hole on the right, but the one seen through the hole on the left; and similarly the object appearing on the left is the one seen through the hole on the right; this being easily proved by covering first one hole and then the other. Thus, whatever the direction may be of the rays that form the right-hand and left-hand pictures, still the right hand picture shows a left-hand object, and the left-hand picture shows a right-hand object.

Experiment 4. It is easy to see how to vary the second and third experiments by placing the object too far away to see clearly. For this purpose I looked at a candle ten feet away, *and put the eye of my spectacles behind the card, that the rays from the same point of the object might meet, and cross each other, before they reached the retina*. [The *asterisked* portion is in Reid's exact words.] In this case as in experiment 3, the candle was seen triple through the three pinholes; but the candle on the right was seen through the hole on the right, and the left-hand candle through the hole on the left. The principles of optics make it clear that in this experiment the rays forming the several pictures on the retina cross

each other a little before they reach the retina; so that the left-hand picture is formed by the rays that pass through the hole on the right; so that the position of the pictures is opposite to that of the holes through which they are formed, and therefore also opposite to that of their objects, as we have found it to be in the former experiments.

These experiments exhibit several unusual phenomena relating to the apparent place of visible objects and their apparent direction from the eye—phenomena that seem to go flatly against the common rules of vision. I shall mention five ways in which they do so. (i) When we look at the same time through three holes that are in a straight line and at certain distances from each other, we expect that the objects seen through them should really be and should appear to be at a distance from each other; yet by experiment 1 we can through three such holes see a single object and a single point on that object; and through each of the three it appears in the same place and direction.

(ii) When the rays of light come from the object in straight lines to the eye, without any reflection, bending or refraction, we expect the object to appear in its real and proper direction from the eye, and so it usually does. But in experiments 2, 3 and 4 we see the object in a direction that isn't its true and real direction from the eye, although the rays come from the object to the eye without any bending, reflection or refraction.

(iii) When both the object and the eye are kept perfectly still, and the medium through which the light rays pass is unchanged, we expect the object to appear to be at rest, staying in the same place. But in experiments 2 and 4, when both the eye and the object are at rest and the medium unchanged, we make the object appear to move upward or downward or in any direction we please.

(iv) When we look at the same time and with the same

eye through holes that stand in line from right to left, we expect the object seen through the left-hand hole to appear on the left, and the object seen through the right-hand hole to appear on the right. But in experiment 3 we find the exact opposite.

(v) Although there are many situations where we see a single object as double, using two eyes, we always expect it to appear single when seen through by one eye. But in experiments 2 and 4 we have cases where a single object can appear double, triple or quadruple *to one eye*, with no help from a polyhedron or multiplying glass.

All these extraordinary phenomena relating to the direction of visible objects from the eye, as well as those that are common and ordinary, take us back to the law of nature that I have mentioned, of which they are necessary consequences. There is no probability that we'll ever be able to give a reason why pictures on the retina make us see external objects while pictures on the hand or on the cheek do not, or why we see the object in the direction of a line passing from its picture through the centre of the eye rather than in any other direction. So I am inclined to look on this law as a *primary* or basic law of our constitution.

Don't misunderstand me. I am *not* saying that the picture on the retina will make us see an object—in the direction mentioned or in any other!—independently of whether the optic nerve and the other more immediate instruments of vision are in good working order. We don't have a good grasp of what the task of the optic nerve is, or of how it performs that task; but it seems to be certain that it has *some* part in the faculty of seeing, because in an amaurosis—blindness with no apparent change in the eye—which is believed to be a disorder of the optic nerve, the pictures on the retina are clear and distinct, and yet there is no vision.

We know still less of the use and function of the choroid membrane; but it seems also to be necessary for vision; for it is well known that pictures on that part of the retina where it isn't covered by the choroid. . . . produce no vision. . . . So I acknowledge that the retina is not the last and most immediate instrument of the mind in vision. There are other physical organs whose operation is necessary for seeing, even after pictures have been formed on the retina. If we ever come to know the structure and use of the choroid membrane, the optic nerve and the brain, and what effects are had on them by means of pictures on the retina, we may come to •see some more links of the chain and to •discover a more general law of vision. But when we know so little of the nature and function of these more immediate instruments of vision, it seems impossible to trace vision's laws beyond the pictures on the retina. Nor would I deny that there may be diseases of the eye, or accidents, which can lead to our seeing objects in a direction somewhat different from the one mentioned above. [Reid then describes some evidently permanent defects in his own vision, caused by inadvertently glimpsing the sun through a telescope.]

13. Seeing objects single with two eyes

Another phenomenon of vision that deserves attention is our seeing objects single with two eyes. There are two pictures of the object, one on each retina, and each picture by itself makes us see an object in a certain direction from the eye; yet both together usually make us see only one object. All the accounts or explanations of this that anatomists and philosophers have given seem to be unsatisfactory. I shall pass over the opinions of Galen, of Gassendi, of Baptista Porta, and of Rohault. The reader can see these examined and refuted by Dr. Porterfield. ·In sections 18-19· I shall

examine Dr. Porterfield's own opinion, Bishop Berkeley's, and some others. But first we must be sure of the *facts* about single and double vision, for if we don't get the phenomena right, it's ten to one that we'll be led astray regarding the causes. ·The process of *describing* the phenomena can shade into the process of *explaining* them·. The next paragraph explains why. It presents something that we ought carefully to attend to; it is accepted *in theory* by everyone who has any true judgment or sound instincts in inquiries of this kind, but it is very often overlooked *in practice*.

In explaining natural phenomena, the furthest that our faculties can take us is this: from •particular phenomena we can by induction trace out •general phenomena of which all the particular ones are necessary consequences. When we have arrived at the most general phenomena we *can* reach, there we must stop. 'Why did •that leaf gravitate toward the earth?'—we can only answer 'Because •all bodies gravitate toward the earth'. This explains a particular phenomenon through a general one. 'Why do all bodies gravitate toward •the earth?'—the only explanation we can give is 'Because all bodies gravitate toward •each other'. This explains a general phenomenon through a *more* general one. 'Why do all bodies gravitate to one another?'—we have no answer; but if we did, it could only be by bringing this universal gravitation of bodies under some other still more general phenomenon of which the gravitation of all bodies is a special case. The *most general phenomena we can reach* are what we call 'laws of nature'. So that the laws of nature are nothing but the most general facts relating to the operations of nature, which include a great many particular facts under them. If we sometimes label as a law of nature something that we later discover comes under something still more general, there is no great harm done. . . . Now let us consider the phenomena of single and double vision, in order to discover some general

principle to which they all lead and from which they all follow. If we can discover any such general principle, it must be either •a law of nature or •the necessary consequence of some law of nature; and its authority will be equal either way. The material to be presented in this section will be in nine episodes.

1. We find that when the eyes are sound and perfect, and the axes of both are directed to one point, *an object placed at that point is seen single*; and I would point out here that in this case the two pictures that show the object single are in the centres of the retinas. As an aid to keeping things clear, I shall introduce a couple of mildly technical terms. When two pictures of a small object are formed at points on the retina, if they show the object single I shall call those points 'corresponding points' on the retina. If they show the object as double, I shall say that the points on the retina at which the pictures are formed 'do not correspond'. Now, in this first phenomenon it is evident that the two centres of the retina are corresponding points.

2. When the eyes are sound and perfect, and the axes of both are directed to one object, *other objects appear single if they are at the same distance from the eyes as the object to which their axes are directed*. I direct my eyes to a candle ten feet away while another candle stands at the same distance from me and within my field of vision. While I am looking at the first candle, I can attend to how the second appears to my eyes, and I find that in this case it too always appears single. An important point here is that the pictures of the second candle don't fall on the centres of the retinas; either they fall on the right, or both to the left, and both are at the same distance from the centres. This is easy to show from the principles of optics. In this second phenomenon of single vision, therefore, it seems that the corresponding points are points of the two retinas that are similarly placed in relation

to the two centres, being both on the same side of the centre and at the same distance from it. It also appears from this phenomenon that every point on one retina *corresponds* with the similarly placed point on the other.

3. When the eyes are sound and perfect, and the axes of both are directed to one object, *other objects appear double if they much nearer to the eyes or much further from them than the object to which the two eyes are directed*. Thus, if a candle is placed ten feet away and I hold my finger at arm's length between my eyes and the candle: when I look at the candle I see my finger double, and when I look at my finger I see the candle double; and the same thing happens with all other objects at such distances that fall within the sphere of vision. Those who understand the principles of optics will realise that the pictures of the objects that are seen double don't fall on points on the retinas that are similarly placed, whereas the pictures of the objects seen single *do* fall on points that are similarly placed. From this I infer that while the points on the two retinas that are similarly placed in relation regard to the centres do correspond, those that are not similarly placed do not correspond.

4. Notice this: in cases such as I have just described we have been accustomed from infancy to see objects double that we know to be single, custom and experience of the singleness of the object never take away its appearance of doubleness.

5. I would point out, though, that if you make a regular practice of attending to visible appearances, this will have a considerable effect, making a difference to how much of the phenomenon of double vision you notice and remember. Someone may honestly say that he never saw things double all his life; but when he is put into the position described in 3 above, he will immediately see the candle double when he looks at his finger; and his finger double when he looks

at the candle. Does he now *see* differently from how he saw before? No, surely; it's just that he *attends* to what he never attended to before. The same double appearance of an object has been presented to his eye a thousand times before now; but he didn't attend to it; and so it is as little an object of his reflection and memory as if it had never happened. This general phenomenon of as-it-were-not-*seeing* what one doesn't *attend to* deserves a couple of paragraphs to itself.

When we look at an object, surrounding objects can be seen at the same time, although more obscurely and indistinctly; for the eye has a considerable field of vision, which it takes in all at once. But we *attend* only to the object we look at. The other objects that lie within the field of vision are not attended to; and therefore it's as though they weren't seen. If any of them draws our attention it naturally draws the eyes at the same time, because in the ordinary course of things the eyes always follow the attention; and when they are separated, as in a day-dream, we hardly see what is directly in front of us. So we can see why the man I have been talking about thinks that he never before saw an object double. When he looks at any object, he sees it single and doesn't notice other visible objects at that time, whether they appear single or double. If any of them draws his attention, it draws his eyes at the same time; and as soon as the eyes are turned toward the object it appears single. But in order to see things double—or at least to have any reflection or memory of doing so—he has to look at one object while attending to the faint appearance of other objects that are within his field of vision. He may never have done this, or even tried to, so he doesn't recollect that ever he saw an object double. But when he is set to work to give this attention, he immediately sees objects double in the way and with the same details as those who have given this attention through most of their lives.

There are many phenomena like this, showing that the mind can not attend to, and thereby in a way not perceive, objects that strike the senses. I mentioned several examples in chapter 2; and I have been assured by people who are highly skilled in music that when they are hearing a tune on the harpsichord, while they attend to the treble they don't hear the bass, and while they attend to the base they don't perceive the tune in the treble. . . .

6. It is observable that whenever we see an object double the two appearances have a certain position in relation to one another, and a certain apparent. . . .distance. This apparent distance is greater or less in different circumstances; but in the same circumstances it is always the same, even to different persons.

Thus in the experiment mentioned above, if twenty different people who see perfectly with both eyes place their finger and the candle at the stated distances and hold their heads upright, in looking at the finger they will see two candles, one on the right and the other on the left. The one seen on the right is seen by the right eye, the one seen on the left by the left eye; and they—the twenty people—will see them at the same apparent distance from each other. And if they look at the candle they will see two fingers, one on the right and the other on the left; and they will all see them at the same apparent distance; the finger toward the left being seen by the right eye and the other by the left eye. If the twenty people all tilt their heads 90° to one side, with the other circumstances remaining the same, one appearance of the object that is seen double will be directly above the other. In a word, however you choose to vary the circumstances, the appearances will be varied in one and the same manner to all the spectators.

7. Having made many experiments to study the apparent distance between the two appearances of an object that is

seen double, I have found this [what follows expands Reid's text a little, in ways that ·small dots· can't easily indicate]:- When a single object is seen double,

- let x be the point on the retina of the left eye where the picture of the object is made,
- let y be the point on the retina of the right eye where the picture is made, and
- let z be the point on the retina of right eye that is situated similarly to x .

Then what I have found is that *the apparent distance between the two appearances is proportional to the distance between y and z* . Thus, just as the apparent distance between •two objects seen with one eye is proportional to the arc of the retina that lies between their pictures, so also when an object is seen double with two eyes, the apparent distance between the two appearances is proportional to the arc of either retina which lies between •the picture in that retina and •the point in that retina corresponding to the point that has the picture in the other retina.

8. Just as in certain circumstances we invariably see one object appear double, so in others we equally invariably see two objects unite into one and in appearance lose their doubleness. This is evident in the appearance of the binocular telescope. And the same thing happens when one looks through two similar tubes in a parallel direction: we see only one tube; and if two similar coins are placed at the ends of the two tubes, one exactly in the axis of one eye and the other in the axis of the other eye, we see only one coin. If two coins (or other bodies) with different colour and shapes are properly placed in the two axes of the eyes and at the ends of the tubes, we see *both the bodies in one and the same place*, each as it were spread over the other, without hiding it; and the colour will be what you get from putting those two colours together.

9. From these phenomena, and from all the experiments I have been able to conduct, it seems clear that in perfect human eyes the centres of the two retinas correspond and harmonize with one another; and that every other point in one retina corresponds and harmonizes with the point that is similarly situated on the other retina, in such a way that

- pictures on the corresponding points of the two retinas show only one object even when there are really two objects, and
- pictures on points of the retinas that don't correspond show us two visible appearances even when there is really only one object.

So that pictures on corresponding points of the *two* retinas present the same appearance to the mind as if they had both been on the same point on *one* retina; and pictures on non-corresponding points of the two retinas present to the mind the same apparent distance and position of two objects as if one of those pictures were on the point corresponding to it on the other retina. I offer this. . . .not as an hypothesis but as a general fact or phenomenon of vision. All the phenomena of single or double vision that I have described lead to it and are necessary consequences of it. It holds true invariably in all perfect human eyes, as far as I can discover from countless experiments made on my own eyes and many made by others at my request. Most of the hypotheses that have been contrived to explain single and double vision presuppose this general fact without their authors' being aware of it. [Reid adds a few details to that, in relation to work by Isaac Newton and Robert Smith, author of *A System of Optics*.] So this general phenomenon appears to be based on a very full induction, which is all the evidence we can have for a fact of this kind. Before I finish with this subject I ought to ask ·and answer· some questions:

- Do animals whose eyes are on opposite sides of their heads and point in opposite directions have such

corresponding points in their retinas? (·section 14·)

- What is the position of the corresponding points in imperfect human eyes, I mean in those who squint? [sections 15-16, not included in this version]
- Is this harmony between the corresponding points in the retinas natural and original or rather the effect of custom?
- If it is original, can it be explained by any of the laws of nature already discovered, or should it itself be regarded as a law of nature and a part of the human constitution?

·The last two questions will be the topic of section 17. After that, in sections 18-19, I shall discuss the views of some other writers concerning single and double vision·.

14. The laws of vision in brute animals

In giving eyes to animals, nature intends that the animals should be able to perceive the situation of visible objects, or the direction in which they are placed. So it is probable that in ordinary cases every animal, however many eyes it has and of whatever structure, sees objects •single and •in their true and proper direction. And since there is an enormous variety among the structures, motions and number of eyes in different animals and insects, it is probable that the laws governing vision are not the same in all, but are variously adapted to the eyes that nature has given the animals in question.

Mankind naturally turn their eyes always the same way, so that the axes of the two eyes meet at one point. They naturally attend to or look at only the object that is placed at the point where the axes meet. And whether the object is more or less distant, the shape of the eye is adapted to the distance of the object so as to form a clear picture of it.

When we use our eyes in this natural way, the two pictures of the object we look at are formed at the centres of the two retinas; and the two pictures of any contiguous object are formed at points of the retinas that are similarly situated in relation to the centres. So if we are to see objects single and in their proper direction, with two eyes, all we need is to be so constituted that objects whose pictures are formed on the centres of the two retinas, or on points similarly situated in relation to these centres, shall be seen in the same visible place. And this is the constitution that nature has actually given to human eyes.

There are two, and only two, states of affairs in which we **(1)** see one object double, or **(2)** see two objects run together into one. Each involves conduct on our part that is unnatural, but that can be learned by practice: **(1)** We distort our eyes so that their axes aren't parallel; **(2)** We direct the axes of the two eyes to one point while directing our attention to some visible object that is much nearer or much more distant than that point. In these cases, **(1)** the two pictures of the same object are formed at points on the retinas that are not similarly situated, and so the object is seen double; or **(2)** the two pictures of different objects are formed at points on the retinas that are similarly situated, and so the two objects are seen run together in one place.

So it seems that the laws of vision in the human constitution are wisely adapted to the natural use of human eyes, but not to unnatural uses of them. We see objects truly when we use our eyes in the natural way, but have false appearances presented to us when we use them in an unnatural way. We may reasonably think that the case is the same with other animals. But isn't it *unreasonable* to think that animals which •naturally turn one eye toward one object and another eye toward another object must thereby have presented to them false appearances such as we have

when we •unnaturally do the same thing?

Many animals have their eyes so placed by nature that the axes of the two eyes are always in opposite directions. Do objects painted on the centres of the two retinas appear to such animals as they do to human eyes, in one and the same visible place? I think it is highly probable that they don't, and that they appear as they really are, in different places.

Judging by analogy with the human case, we will think that there is a certain correspondence between points of the two retinas in such animals, but that it is a different correspondence relation from the one we have found in human eyes. The centre of one retina will correspond with the centre of the other in such a way that the objects whose pictures are formed on these corresponding points will appear not to be in the same place (as in human eyes) but in different places. Similarly, the upper part of one retina will correspond with the lower part of the other, and the front part of one will correspond with the back part of the other.

Some animals are naturally able easily to turn their eyes in the same direction or different directions, as we turn our hands and arms. Do *these* animals have corresponding points on their retinas, and points that don't correspond, as we have? I think that probably they don't, because in them such a constitution would only serve to present them with false appearances. If we judge from analogy, that will

lead us to think •that because such animals move their eyes in a manner like the way we move our arms, they have an immediate and natural perception of the direction they are pointing their eyes in, as we have of the direction we give to our arms; and •that they perceive the situation of visible objects by their eyes in a manner like that in which we perceive the situation of tangible objects with our hands.

We can't teach brute animals to use their eyes in any way other than in that which nature has taught them, nor can we teach them to tell us the appearances that visible objects make to them, either in ordinary or in extraordinary cases. So we don't have the same means of discovering the laws of vision in them as we have for mankind, and must rest content probable conjectures. What I've said about this is chiefly intended to show that animals to which nature has given eyes that differ in their number, their position and their natural motions may well be subject to different laws of vision, adapted to the special features of their organs of vision.

15. Squinting considered hypothetically

This section is omitted.

16. Facts relating to squinting

This section is also omitted.

Chapter 6 (cont'd): Seeing

17. The effect of custom in seeing objects single

From the phenomena of single and double vision that I presented in section 13, it seems that our seeing an object single with two eyes depends on two things—on •the mutual correspondence of certain points of the retinas that I have often described, and •on the two eyes' being directed to the object so accurately that the two images of it fall on corresponding points. We need both of these if we are to see an object single with two eyes; and as far as they depend on custom, so far—and no further—can single vision depend on custom. With regard to the accurate direction of both eyes to the object, I think we have to accept that this is only learned by custom. Nature has wisely ordained the eyes to move in such a way that their axes will always be nearly parallel; but it has left it in our power to vary a little the angle between them, depending on how far away the object is that we are looking at. If we weren't able to do this, objects would appear single at one particular distance only, and would always appear double at distances much less or much greater. Nature's wisdom is conspicuous in giving us this power, and just as conspicuous in making the extent of it exactly adequate to the purpose. The parallelism of the eyes in general is therefore the work of nature, but the precise and accurate direction, which must be varied according to the distance of the object, is the effect of custom. The power that nature has left us of •varying a little the angle between the optic axes is turned into a habit of •giving them always the angle that is right for the distance of the object.

What gives rise to this habit? The answer has to be that *it comes from being found necessary for perfect and clear vision.*

A man who has lost the sight of one eye often loses the habit of directing it exactly to the object he is looking at •with the other eye• because that habit is no longer useful to him. If he regained the sight of his eye, he would regain this habit by finding it useful. No part of the human constitution is more admirable than that whereby, without any design or intention, we acquire habits that are found useful. Children must see imperfectly at first, but by using their eyes they learn to use them in the best way, and to acquire—without intending to—the habits that are necessary for that purpose. Every man becomes most expert in that kind of vision that is most useful to him in his particular profession and way of life. A painter of miniatures or an engraver sees very near objects better than a sailor does, but the sailor sees very distant objects much better than do the painter and the engraver. A person who is short-sighted gets the habit in looking at distant objects of contracting the aperture of his eyes by almost closing his eyelids. Why? Simply because this makes him see the object more clearly. In the same way, the reason why every man acquires the habit of directing both eyes accurately to the object must be because this lets him see it more perfectly and clearly. A question remains to be considered: The *correspondence* between certain points on the retinas that is also necessary for single vision—is it the effect of custom or rather an original property of human eyes?

A strong argument for its being an original property •rather than acquired through custom• can be drawn from the habit I have just been discussing—the habit of directing the eyes accurately to an object. We get this habit through finding it necessary for perfect and distinct vision. But why

is it necessary for that? Simply for this reason:

Because of this habit, the two images of the object fall on corresponding points of the retinas, and thus the eyes assist each other in vision, and the object is seen better by both eyes together than it could be by one. But when the eyes are not accurately directed, the two images of an object fall on non-corresponding points of the retinas, and thus the sight of one eye disturbs the sight of the other, and the object is seen less clearly with both eyes than it would be with one.

This makes it reasonable to conclude that this correspondence between certain points on the retinas is prior to the habits we acquire in vision, and consequently is natural and original. We have all acquired the habit of always directing our eyes in a particular manner that causes single vision. Now, if nature has ordained that we should have single vision only when our eyes are thus directed, there's an obvious reason why all mankind should agree in the habit of directing them in that way. If on the other hand single vision were the effect of custom, any other habit of directing the eyes would have done just as well; there would be no explanation of why everyone has this particular habit; and it would seem very strange that no one instance has been found of a person who had acquired the habit of seeing objects single with both eyes while they were directed in any other manner.

In his excellent *System of Optics* the judicious Dr. Smith maintains the contrary opinion, and offers some reasonings and facts in support of it. He agrees with Berkeley in attributing it entirely to custom that we see objects single with two eyes, as well as that we see objects the right way up by upside-down images. I considered Berkeley's reasonings in section 11; now let me make some remarks about what Dr. Smith has said on the subject. I approach him with the respect due to an author to whom the world owes •valuable

discoveries of his own and also •discoveries by •Newton•, the brightest mathematical genius of his age—discoveries which Smith, with great labour, generously rescued from oblivion.

He observes that the question 'Why do we see objects single with two eyes?' is of the same kind as the question 'Why do we hear sounds single with two ears?', and that the same answer must hold for both questions. He means us to infer from this observation that because the second of these phenomena is the effect of custom, the first is so as well.

My humble opinion is that the questions are not so much of the same kind that the same answer must hold for both; and that in any case our hearing single with two ears is *not* the effect of custom.

Two or more visible objects, although perfectly alike and seen at the very same time, can be distinguished by their visible places; but two perfectly similar sounds heard at the same time can't be distinguished, because from the nature of sound the sensations they cause must coalesce into one. Why do we hear sounds single with two ears? I answer: not from custom, but because two sounds that are perfectly alike and simultaneous have nothing by which they can be distinguished. But will this answer fit the other question? I think not.

The object makes an appearance to each eye, as the sound makes an impression on each ear; to that extent the two senses agree. But the visible appearances can be distinguished by place even when they are perfectly alike in every other respect; the sounds can't; and that is a difference between the two senses. Indeed, if the two appearances have the same visible place, they won't be distinguishable as *two* any more than the sounds were, and in that case we'll see the object single. But when they don't have the same visible place, they are perfectly distinguishable and we see the object double. We see the object single only when the

eyes are directed in one particular manner; while we are capable of directing them in many other ways which lead to our seeing the object double.

Dr. Smith rightly attributes to custom the well known tactual illusion in which a button pressed with two opposite sides of two contiguous fingers that are crossed is felt double. I agree with him that the cause of this appearance is that those opposite sides of the fingers have not been accustomed to feeling the same object, but two different objects, at the same time. And I would add this: just as custom produces this phenomenon, so a contrary custom destroys it; for if a man frequently accustoms himself to feel the button between his crossed fingers he will eventually feel it single—as I have found by experience.

It can be taken for a general rule that things that are produced by custom can be undone or changed by disuse or by a contrary custom. So it's a strong argument that an effect *isn't* due to custom but to the constitution of nature, when a contrary custom is long continued without changing it or weakening it. I take this to be the best rule by which we can settle our present question. I shall therefore mention and critically discuss two facts that Dr. Smith adduces to show that the corresponding points of the retina have been changed by custom; and then I shall cite some facts tending to show that there are corresponding points on the retinas of the eyes *originally*, and that custom produces no change in them. Here is the first of Dr Smith's facts:

...The Reverend Mr. Foster of Clinchwarton, having been blind for some years from amaurosis, was restored to sight by a treatment with mercury; and when he first began to see again, all objects appeared to him double; but gradually the two appearances came closer together, and eventually he came to see single and as clearly as he did before going blind.

I have three comments on this. **(1)** It doesn't prove any change of the corresponding points on the eyes unless we suppose something that has not been affirmed, namely that when Mr. Foster saw double he was directing his eyes to the object with the same accuracy, and in the same manner, as he did later when he saw single. **(2)** Even if we do suppose this, no explanation can be given of why at first the two appearances should be seen at such-and-such a particular angular distance rather than another; or why this angular distance should gradually decrease until eventually the appearances coincided. How could *custom* produce this effect? **(3)** Every detail of this case can be explained consistently with supposing that Mr. Foster had corresponding points in the retinas of his eyes from the time he began to see, and that custom made no change regarding them. All we need for our explanation is to suppose something that is common in such cases, namely that through some years of blindness he had lost the habit of directing his eyes accurately to an object, and that he gradually recovered this habit when he came to see.

The second fact mentioned by Dr. Smith is taken from Mr. Cheselden's *Anatomy*. It is this:

A gentleman who had one eye distorted by a blow on the head found every object appear double; but gradually the most familiar ones became single, and eventually all objects became so, all without any improvement in the distortion of his eye.

Notice that it isn't said that the two appearances gradually came closer to one another and eventually united into one, without any improvement in the distortion. This would indeed have been a decisive proof of a change in the corresponding points of the retinas, though not one that could be explained in terms of custom. But it isn't said that this is what happened; so it probably *isn't* what happened, because

such a remarkable detail would have been mentioned by Mr. Cheselden, as it was by the person who reported on Mr Foster's case. So we can take it for granted that one of the appearances gradually *vanished*, without approaching the other. I can see several ways in which this might happen. **(1)** The sight of the distorted eye might gradually grow weaker because of the injury, so that the appearances presented by that eye would gradually vanish. **(2)** A small and unnoticed change in the manner of directing the eyes, might occasion his not seeing the object with the distorted eye. . . . **(3)** By acquiring the habit of directing one and the same eye always to the object, the faint and oblique appearance presented by the other eye might, when it became familiar, be so little attended to that it wasn't perceived. One of these causes, or more of them acting together, could produce the effect mentioned without any change of the corresponding points of the eyes.

For these reasons, the facts mentioned by Dr. Smith, although challenging and interesting, seem not to be decisive.

The following facts ought to be put in the opposite scale. **(1)** In the famous case of the young gentleman couched [see the explanation on page 53] by Mr. Cheselden, after having had cataracts on both eyes until he was thirteen years of age, it seems that he saw objects single from the time he began to see with both eyes. Mr. Cheselden's words are:

And now being lately couched of his other eye, he says that objects at first appeared large to this eye, but not as large as they did at first to the other eye; and looking at the same object with both eyes, he thought it looked about twice as large as when seen with only the first couched eye—but not double, so far as we can discover.

(2) The three young gentlemen mentioned in section 16, who (as far as I know) had squinted since infancy, as soon as

they learned to direct both eyes to an object, saw it single. In these four cases it seems clear that the centres of the retinas corresponded *originally*, before custom could produce any such effect; for Mr. Cheselden's young gentleman had never been accustomed to see at all before he was couched, and the other three had never been accustomed to direct the axes of both eyes to the object.

(3) From the facts adduced in section 13, it appears that from the time we are capable of observing the phenomena of single and double vision, custom makes no change in them.

I have occupied myself with making such observations for more than thirty years; and in every case where I saw the object double at first, I see it double to this day, despite knowing from constant experience that it is single. In other cases where I know there are two objects there appears only one, after thousands of trials.

Let a man look at a familiar object through a polyhedron or multiplying glass every hour of his life, the number of visible appearances will be the same at last as at first; it doesn't make the least difference how often this is tried or for how long.

Effects produced by habit must vary according to the frequency of the acts by which the habit is acquired; but the phenomena of single and double vision are so invariable and uniform in all men, are so exactly regulated by mathematical rules, that I think we have good reason to conclude that they are effects not of custom but of fixed and unchanging laws of nature.

18. Dr. Porterfield's account of single and double vision

Bishop Berkeley and Dr. Smith seem to attribute too much to custom in vision; Dr. Porterfield too little. This ingenious writer thinks that by an original law of our nature, lying deeper than custom and experience, *we perceive visible objects in their true place*— not only in their true direction but also at their true distance from the eye—and that's his basis for his explanation of why we see objects single with two eyes:— Having the power to perceive the object with each eye •in its true place, we must perceive it with both eyes •in the same place, and so we must perceive it single.

He realizes that this principle, though it accounts for our •seeing objects single with two eyes, doesn't at all account for our •seeing objects double. Other writers on this subject take it to be a sufficient cause for •double vision that we have two eyes, and only find difficulty in assigning a cause for •single vision; but Dr. Porterfield's principle •reverses this and• throws all the difficulty on the other side.

To explain double vision, therefore, he advances another principle, without saying whether he takes it to be an original law of our nature or the effect of custom. This is it:

Our natural perception of the distance of objects from the eye doesn't apply to all the objects within the field of vision, but only to the object we directly look at; and objects off to the side, whatever their real distance from us may be, are seen at the same distance as the object we look at, as though they were all on the surface of a sphere with the eye at its centre.

Thus, •single vision is accounted for by our •seeing the true distance of an object that we look at; and •double vision by •a false appearance of distance in objects that we don't directly look at.

I agree with this learned and ingenious author that it is by a natural and original principle that we see visible objects in a certain direction from the eye, and I honour him as the person who first made this discovery; but I can't assent to either of those principles by which he explains single and double vision, for the following •five• reasons.

(1) Our having a natural and original perception of the distance of objects from the eye seems to be contrary to a well attested fact; for the young gentleman couched by Mr. Cheselden imagined at first that everything he saw *touched his eye*, just as what he felt touched his hand.

(2) Our perception of the distance of objects from the eye, whether it is from nature or from custom, isn't as accurate and determinate as it would have to be to produce single vision. A mistake of the twentieth or thirtieth part of the distance of a small object such as a pin ought, according to Dr. Porterfield's hypothesis, to make it appear double. Very few can judge the distance of a visible object with *that* sort of accuracy; yet we never find double vision produced by mistaking the distance of the object. Even when looking with the naked eye, we often mistake the distance of an object by a half or more; why do we see such objects single? When I move my spectacles from my eyes towards a small object two or three feet away, the object seems to come nearer and eventually appears to be at about half its real distance •from my eyes•, but I see it single at that apparent distance just as well as when I see it with the naked eye at its real distance. And when we look at an object with a binocular telescope properly fitted to the eyes, we see it single while it appears fifteen or twenty times nearer than it is. So there are few cases where the distance of an object from the eye is seen as accurately as is necessary for single vision, on Dr Porterfield's hypothesis. This seems to be a conclusive argument against his explanation of single vision.

We also find that false judgments or fallacious appearances of the distance of an object do *not* produce double vision. This seems to be a conclusive argument against Dr Porterfield's account of double vision.

(3) Our perception of objects' distances from ourselves seems to be wholly the effect of experience. I think this has been proved by Bishop Berkeley and by Dr. Smith; and when I come to set out the means of judging distance by sight, you will see that they are all provided by experience.

(4) Supposing that by a law of our nature the distance of objects from the eye *were* perceived most accurately, as well as their direction, it still wouldn't follow that we must see the object single. Let us now consider what help such a law of nature would give us in answering the question of whether the objects of the two eyes are in the very same place and consequently are not two but one.

Suppose then two straight lines, one from the centre of one eye to its object and the other from the centre of the other eye to its object. This law of nature of Dr Porterfield's gives us the direction and the length of each of these straight lines, and that is all that it gives. These are geometrical data, and we can learn from geometry what questions they can answer. Well, then, *can* they tell us whether the two straight lines terminate at one point? No indeed! In order to determine *that* we need answers to three other questions:

Are the two straight lines in one plane?

What angle do they make?

How far apart are the centres of the eyes?

When these things are known, we must apply the rules of trigonometry in order to learn whether the objects of the two eyes are in the very same place and consequently whether they are two or one.

(5) The false appearance of distance which is offered as explaining double vision can't be the effect of custom, for

constant experience contradicts it; and it doesn't have the features of a law of nature, because it doesn't serve any good purpose, or indeed any purpose at all except to deceive us. But why should we look for *arguments* about what does or doesn't appear to us? The question is,

At what distance do the objects now in my field of vision appear? Do they all appear at one distance, as if placed on the concave surface of a sphere with the eye at its centre?

Surely every man can know this with certainty; and if you will just attend to the testimony of your eyes you needn't ask a philosopher how visible objects appear to you. It is indeed true that when I look up to a star in the heavens the other stars that appear at the same time do appear in this manner. But this phenomenon doesn't favour Dr. Porterfield's hypothesis, for the stars and heavenly bodies don't appear at their true distances when we look directly at them any more when we see them off to the side; and if this phenomenon is an argument for Dr. Porterfield's second principle, it must destroy the first.

I shall explain the true cause of this phenomenon later, so I set it aside for the present. Take another case: I sit in my room and direct my eyes to the door, which appears to be about sixteen feet away; at the same time I see many other objects faintly and off to the side of my field of vision—the floor, the rug, the table that I write on, papers, ink-stand, candle etc. Do all these objects appear to be sixteen feet away? On the closest attention I find that they do not.

19. Dr. Briggs's theory and Sir Isaac Newton's conjecture on this subject

I'm afraid that you will now be tired of the subject of single and double vision—as I am! The topic has become complex and confused, as a result of two equal causes: •the multitude of theories advanced by famous authors, and •the multitude of facts observed without sufficient skill in optics or reported without attention to the most important and decisive details.

In order to bring it to some sort of conclusion, I have in section 13 given a fuller and more orderly account than anyone had previously given of the phenomena of single and double vision in those whose sight is perfect, and have brought them under one general principle which appears to be a law of vision in human eyes that are perfect and in their natural state.

In section 14 I have given reason to think that this law of vision, although excellently adapted to the way human eyes are constructed and placed, can't serve the purposes of vision in some other animals, and therefore very probably isn't common to all animals. [Reid then returns for a page or so to squinting, which was the topic of sections 15 and 16, omitted from this version.]

In section 17 I have tried to show that the correspondence and working-together of certain points of the two retinas, under which I have brought *all* the phenomena of single and double vision, is not (as Dr. Smith thought) the effect of custom, nor is it changed by custom; it is a natural and original property of human eyes; and—in section 18—that it is not due to an original and natural perception of the true distance of objects from the eye, as Dr. Porterfield thought. After this recapitulation, which is intended to ease things for you, I shall embark on some more theories on this subject.

The theory of Dr. Briggs, first published in English in

the *Philosophical Transactions* and afterwards in Latin under the title *Nova visionis theoria*—with a preface consisting of a letter from Sir Isaac Newton to the author—amounts to this:

The fibres of the optic nerves running from •corresponding points of the retinas to the *thalami* of the optic nerves ·in the brain· have the same length, the same tension, and a similar situation, so they will have the same tone; and therefore their vibrations caused by the impact of the rays of light will be like a musical unison, and will present one and the same image to the mind; but the fibres passing from •parts of the retinas that don't correspond will have different tensions and tones, will have discordant vibrations, and will therefore present different images to the mind.

I shan't discuss this theory in detail. It is enough to make the general point that it is a system of conjectures about things of which we are entirely ignorant, and that all such theories in philosophy deserve to be laughed at rather than seriously refuted.

From the first dawn of philosophy right down to this day it has been believed that the optic nerves are intended to carry the images of visible objects from the back of the eye to the mind, and that the nerves belonging to the organs of the other senses have a similar role. But how do we know this? We *conjecture* it and then, taking this conjecture for a truth, we think about how the nerves might best serve this purpose. For many ages the system of the nerves was taken to be •a hydraulic engine consisting of a bundle of pipes that carry to and fro a liquid called 'animal spirits'. Around the time of Dr. Briggs, the nervous system was thought rather to be •a stringed instrument, composed of vibrating chords each of which had its own particular tension and tone. But some, just as plausibly, conceived it to be a •wind instrument that

played its part by the vibrations of an elastic ether [= 'extremely fine gas'] in the fibres of the nerves.

These, I think, are all the engines into which the nervous system has been moulded by philosophers for conveying the images of sensible things from the sense-organ to the sensorium [= 'sensory part of the brain']. And nothing that we *know* gets in the way of anyone's freely choosing the theory that he thinks is best for the purpose, for none of them can claim to be better supported by facts and experiments than are the others. Indeed, they all seem to be such clumsy devices for carrying images that a man would be tempted to invent a new one! Well, in the dark a blind man can guess as well one who sees, so I venture to offer another conjecture about the nervous system—one that will serve the purpose as well as those I have mentioned, and has the virtue of simplicity. It is offered in a spirit of instructive fun. I shall state it for the special case of the nerves relating to vision.

Why can't the optic nerves be made up of empty tubes opening their mouths wide enough to receive the rays of light that form the image on the retinas, and gently conveying them—safely and in their proper order—to the very seat of the soul where they flash in her face?

It is easy for an ingenious philosopher to fit the calibre of these empty tubes to the diameter particles of light so that nothing larger will get in. And if there is a risk that the rays will lose their way, an expedient can be found to prevent this: simply give the tubes of the nervous system a peristaltic motion like that of the alimentary canal.

This hypothesis has a special advantage over the other three I have mentioned. All philosophers believe that the . . . likenesses of things are conveyed by the nerves to the soul, but none of their hypotheses show *how* this could be done. For how can the likenesses of sound, taste, smell, colour, shape and all sensible qualities be made out of the

vibrations of musical chords, or the undulations of animal spirits or of ether? We ought not to suppose means that are inadequate to the end. Isn't it just as philosophical, and more intelligible, to conceive that the soul receives her likenesses by a kind of nervous *swallowing*, as the stomach receives its food? I might add that to account for muscular motion we need only to continue this peristaltic motion of the nervous tubes from the sensorium to the ends of the nerves that serve the muscles.

Thus nature will be in harmony with herself: sensation will be the conveying of idea-food to the mind, and muscular motion will be the expulsion of the waste products. For who can deny that the likenesses of things conveyed by sensation can after appropriate digestion be excreted by muscular motion? . . . I hope that in time this hypothesis may be developed into a system as philosophical as that of animal spirits or the vibration of the nervous fibres!

To be serious now: in the operations of nature I regard the theories of a philosopher that are unsupported by facts with as little respect as I do the dreams of a sleeping man or the ravings of a madman. We laugh at the Indian philosopher who explained the support of the earth by inventing the hypothesis of a huge elephant, and to support the elephant a huge tortoise. If we are honest about it, we'll admit that we don't know any more about how the nerves operate than he did about how the earth is supported; and that our hypothesis about animal spirits, or about the tension and vibrations of the nerves, are as likely to be true as is his hypothesis about the support of the earth. His elephant was a hypothesis, and our hypotheses are elephants! Every theory in philosophy that is built on pure conjecture is an elephant; and every theory that is supported partly by fact and partly by conjecture is like the statue of Nebuchadnezzar with feet partly of iron and partly of clay.

The great Newton set philosophers an example that always *ought to be* but rarely *has been* followed, by distinguishing his •conjectures from his •conclusions and putting the former by themselves in the modest form of questions. This is fair and legal; but any other kind of philosophical traffic in conjectures ought to be regarded as contraband and illicit. Indeed *his* conjectures often have more foundation in fact and more plausibility than the dogmatic theories of most other philosophers; so we shouldn't overlook the conjecture he has offered concerning the cause of our seeing objects single with two eyes, in the 15th query in his *Optics*:

When an object is seen with both eyes, isn't what happens the following? The likenesses of the object are united at the place where the optic nerves meet before they come into the brain,

- the fibres on the right side of both nerves uniting there, and then going on into the brain in the nerve on the right side of the head, and
- the fibres on the left side of both nerves uniting in the same place, and then going on into the brain in the nerve on the left side of the head; and these two nerves meet in the brain in such a way that their fibres make just one likeness or picture,
- half of which on the right side of the sensorium comes from the right side of both eyes through the right side of both optic nerves to the place where the nerves meet and from there on the right side of the head into the brain, and
- the other half on the left side of the sensorium comes in the same way from the left side of both eyes.

For the optic nerves of animals that look in the same direction with both eyes—such as men, dogs, sheep, oxen etc.—meet before they come into the brain; but

the optic nerves of animals that don't look in the same direction with both eyes—such as fishes and the chameleon—do not meet, if I am rightly informed.

Let me divide this question into two, which are of very different kinds, one being purely anatomical, the other relating to the carrying of likenesses or pictures of visible objects to the sensorium.

The first question is this:

Do the fibres coming from corresponding points of the two retinas unite at the place where the optic nerves meet, and continue united from there to the brain; so that the right optic nerve after the meeting of the two nerves is composed of the fibres coming from the right sides of the two retinas, and the left of the fibres coming from the left sides of the two retinas?

This is undoubtedly a challenging and reasonable question; because if we could find anatomical grounds for answering it in the affirmative, it would lead us a step forward in discovering the cause of the correspondence and working-together that there is between certain points of the two retinas. For although we don't *know* what the particular function of the optic nerves is, it is *probable* that vision requires some impression that is had on them and passed along their fibres; and whatever such impressions *are*, we can say that if two fibres are united into one, an impression made on one of them is likely to have the same effect as would the same impression made on both. Anatomists think that when two parts of the body work together this is sufficiently explained by their being served by branches of the same nerve; so we should look on it as an important discovery in anatomy if it were found that a single nerve sent branches to the corresponding points of the retinas.

But has any such discovery been made? No, not in a single case. as far as I can learn. And in several cases the contrary seems to have been discovered. Dr. Porterfield has passed on detailed reports. . . .of two cases where the optic nerves, after touching one another as usual, appeared to be reflected back to the same side from which they came, without any mixing of their fibres. Each of these persons had lost an eye some time before his death, and the optic nerve belonging to that eye had shrunk so that it could be distinguished from the other at the place where they met. Another case that Dr Porterfield reports from the same source is still more remarkable; for in it the optic nerves didn't touch at all; and yet those who had known the person best when he was alive declared (when asked about this) that he never complained of any defect in his sight, or of seeing objects double. . . . Other writers also affirm that they have encountered cases where the optic nerves didn't touch.

These observations were made before Sir Isaac Newton put his question; I don't know whether he was ignorant of them, or whether he suspected some inaccuracy in them and wanted the matter to be looked into more carefully. But from a report by the most accurate Winslow it doesn't seem that later observations have been more favourable to Newton's conjecture. [Reid then quotes a passage implying that sometimes there is a partial cross-over of fibres and sometimes not.]

When I consider this conjecture of Sir Isaac Newton's •on its own merits, it seems more ingenious and more plausible than anything else that has been offered on the subject; and I admire Newton's caution and modesty in proposing it only as something to be looked into. But when I consider it •in the light of the observations of anatomists that contradict it, I am naturally led to the thought all we'll get from trusting to the *conjectures* of men of the greatest genius in the operations

of nature is a chance to go wrong in an ingenious manner! The second part of Newton's question is:

Are the two likenesses of objects from the two eyes united into one likeness or picture at the place where the optic nerves meet, half of this picture being carried from there to the sensorium by the right optic nerve, and the other half by the left? And are these two halves put together again at the sensorium in such a way as to make one likeness or picture?

Here it seems natural to put my previous question: What reason do we have to believe that pictures of objects are carried *at all* to the sensorium, whether by the optic nerves or by any other nerves? Isn't it possible that this great philosopher, like many lesser ones, was first led into this opinion by education, and then retained it because he never thought of calling it into question? I admit that this was my own situation for much of my life. But then something happened that started me thinking seriously about what *reason* I had to believe it, and I couldn't find any. It seems to be a mere hypothesis, as much as the Indian philosopher's elephant. I am not conscious of any pictures of external objects in my sensorium, any more than in my stomach; the things that I perceive by my senses appear to be external to me and not in any part of my brain; and my sensations - properly so-called—in no way resemble external objects. The conclusion from everything I have said about our seeing objects single with two eyes is this: •By an original property of human eyes, objects painted at the centres of the two retinas or at points similarly situated in relation to the centres, appear in the same visible place; •the most plausible attempts to explain this property of the eyes have been unsuccessful; and therefore •it must be either a primary law of our constitution or a consequence of some more general law that isn't yet discovered.

I have now finished what I intended to say about •the visible appearance of things to the eye and about •the laws of our constitution by which those appearances are presented to us. But I noted at the start of this chapter that the visible appearances of objects serve only as signs of their distance, size, shape, and other tangible qualities. The •visible appearance is presented to the mind by •nature, according to laws of our constitution that I have explained. But the •thing signified by that appearance is presented to the mind by •custom.

When someone speaks to us in a familiar language we hear certain sounds, and that is the only effect that his discourse has on us *by nature*; but by *custom* we understand the meaning of these sounds, and so we fix our attention not on the sounds but on the things signified by them. Similarly, by nature we see only the visible appearance of objects, but we learn by custom to interpret these appearances and to understand their meaning. And when we have learned this visual language and it has become familiar to us, we attend only to the things signified and find it very difficult to attend to the signs by which they are presented. The mind passes from one to the other so rapidly, and so familiarly, that no trace of the sign is left in our memory, and we seem to perceive the signified thing immediately and without the intervention of any sign.

When I look at the apple-tree that stands before my window, I perceive, at the first glance its distance and size, the roughness of its trunk, the lay-out of its branches, the shapes of its leaves and fruit. I seem to perceive all these things immediately. The visible *appearance* that presented them all to the mind has entirely escaped me; even when it stands before me I can't attend to it without great difficulty and laborious abstraction. Yet it is certain that this visible appearance is *all* that is presented to my eye by nature,

and that I learned by custom to infer all the rest from it. If this were the first time I had ever seen anything, I wouldn't perceive either the distance or tangible shape of the tree, and it would have required the practice of seeing for many months to change that original perception that nature gave me by my eyes into what I now have by custom.

The objects that we see naturally and originally, as I pointed out earlier, have length and breadth but no thickness and no distance from the eye. Custom, by a kind of sleight of hand, gradually withdraws these original and proper objects of *sight* and substitutes in their place objects of *touch*, which have length, breadth, thickness and a determinate distance from the eye. My next topic is: *how* this change is brought about, and what forces in the human mind are involved in it.

20. Perception in general

•Sensation and •the perception of external objects by the senses have commonly been considered as one and the same thing, though really they are very different in their natures. The purposes of common life give us no need to distinguish them, and the accepted opinions of philosophers tend rather to run them together; but •they *are* distinct from one another, and •if we don't attend carefully to their distinctness we can't possibly get a sound conception of how our senses operate. The simplest operations of the mind aren't capable of being logically *defined*; all we can do is to *describe* them, so as to lead those of you who are conscious of them in yourselves to attend to them and reflect on them; and it is often very difficult to describe them so as to produce this result.

The same form of words is used to denote •sensation and •perception, which makes us apt to look on them as things of the same nature. Thus:

I feel a pain.

I see a tree.

The first denotes a sensation, the second a perception. The grammatical analysis of the two expressions is the same, for both consist of an active verb and an object. But if we attend to the things signified by these expressions we shall find that in the first the distinction between the act and the object is not real but grammatical; in the second the distinction is not just grammatical but real.

The form of the expression 'I feel pain' might seem to imply that the feeling is something distinct from the pain felt, but in reality they are not distinct. Just as 'thinking a thought' is an expression that can't signify anything more than 'thinking' does, so 'feeling a pain' signifies no more than 'being pained'. What I have just said about pain is true of every other mere sensation. It is difficult to give examples because very few of our sensations have names; and when a sensation does have a name it will also be the name of something *else* that is associated with the sensation. But when we attend to the sensation by itself, and separate it from other things that are linked with it in the imagination, it appears •to be something that can't exist except in a sentient mind, and •not to be distinct from the act of the mind by which it is felt.

Perception, as I here understand it, always has an •object distinct from the •act by which it is perceived—an object that can exist whether or not it is perceived. I perceive a tree that grows just outside my window: there is here an •object that is perceived, and an •act of the mind by which it is perceived; and these two are not only distinguishable but are extremely unlike in their natures. The object is made up of a trunk, branches and leaves; but the act of the mind by which it is perceived has no trunk, branches

or leaves! I am conscious of this act of •my• mind and I can reflect on it; but it is too simple to admit of an analysis •or definition•, and I can't find proper words to describe it. I find nothing that resembles it so much as the •memory of the tree or the •imagining of it; yet both of these differ essentially from •perception, and they also differ from one another. It is useless for a philosopher •such as Hume• to assure me that •imagining the tree, •remembering it, and •perceiving it are all one, and differ only in degree of liveliness. I know better, for I am as well acquainted with all three of those as I am with the rooms in my own house. I also know this: •perceiving an object implies both •conceiving of its form and •believing in its present existence. I know, moreover, that this belief isn't the effect of arguments and reasoning; it is the immediate effect of my constitution.

I am aware that this belief that I have in perception stands exposed to the big guns of scepticism. But they don't have much effect on it. The sceptic asks me:

Why do you believe in the existence of the external object that you perceive?

Reply: This belief, sir, is not made by me; it came from the mint of nature; it bears her image and official stamp, and, if it isn't right that's not my fault; I took it on trust, without suspicion.

Sceptic: Reason is the only judge of truth, and you ought to rid yourself of every opinion and every belief that isn't based on reason.

Reply: Why, sir, should I trust the faculty of •reason more than that of •perception? They came out of the same workshop and were made by the same craftsman; and if he puts one piece of false ware into my hands, what's to stop him from putting another? Perhaps the sceptic will agree to distrust reason rather than give any credence to perception. He may argue like this:

Since you concede that the object that you perceive and the act of your mind by which you perceive it are quite different things, either can exist without the other: just as the object can exist without being perceived, so *the perception can exist without an object*. There is nothing so shameful in a philosopher as to be deceived and deluded; and therefore you ought to resolve firmly to withhold assent, and to get rid of all this belief in external objects, which may be all delusion.

For my part, I will never attempt to get rid of it. The sober part of mankind won't be much concerned to know my reasons, but if they can be of use to any sceptic, here they are. **(1)** It isn't in my power to get rid of my belief in external objects, so why should I waste time *trying* to do so? It would be enjoyable to fly to the moon, and to make a visit to Jupiter and Saturn; but when I know that nature has bound me down by the law of gravitation to this planet that I inhabit, I rest content and quietly allow myself to be carried along in its orbit. Well, my belief is carried along by perception as irresistibly as my body is carried along by the earth. And the greatest sceptic will find that this holds for him too. He may struggle hard to disbelieve the information of his senses, like a man struggling to swim against a current; but ah! it is useless. It is useless for him to strain every nerve, and to wrestle with nature and with every object that impinges on his senses. For after all this effort, when his strength is exhausted in the forlorn attempt, he will be carried down the current with the common herd of believers.

(2) I think that it wouldn't be prudent to throw off this belief, even if I could. If nature intended to deceive me and lead me astray by false appearances, and I by my great cunning and profound logic discovered this, prudence would dictate to me that I should put up with this indignity as

quietly as I could and not call nature an impostor to her face, for fear that she would get even with me in some other way. What do I gain by resenting this injury? 'You ought at least not to believe what she says.' This indeed seems reasonable if she intends to lead me astray. But what is the consequence? I resolve not to believe my senses. I break my nose against a post that comes in my way; I step into a canal; and after twenty such wise and rational actions I am arrested and dumped into a mad-house. Now, I admit that I would rather be one of the credulous fools whom nature leads astray than one of the wise and rational philosophers who resolve to withhold assent at all this expense. If a man pretends to be a sceptic with regard to what his senses tell him, yet prudently keeps out of harm's way as other men do, he must excuse my suspicion that either he is a hypocrite or he is deceiving himself. For if the scales of his belief were so evenly poised as to lean no more to one side than to its opposite, his actions couldn't possibly be directed by any rules of ordinary prudence.

(3) Although those two reasons are perhaps two more than enough, I shall offer a third. For a considerable part of my life I completely trusted what nature told me through my senses, before I had learned enough logic to be able to *start* a doubt about this. And now when I think back on my past, I don't find that I have been led astray by this belief. I find that without it I would have perished by a thousand accidents. I find that without it I would have been no wiser now than when I was born. I wouldn't even have been able to acquire the logic that suggests these sceptical doubts with regard to my senses. So I regard this instructive belief as one of nature's best gifts. I thank God, the author of my being, who gave it to me before the eyes of my reason were opened and still gives it to me as a guide in matters where reason leaves me in the dark. And now I follow the direction of my

senses not merely from instinct but also from confidence and trust in a reliable and kindly guide—trust based on my experience of his paternal care and goodness.

In all this I deal with the author of my being in just the way I have thought it reasonable to deal with my parents and teachers. I instinctively believed whatever they told me, long before I had the idea of a lie or thought of the possibility of their deceiving me. Afterwards, I found on reflection that they had acted like fair and honest people who wished me well. I found that if I hadn't believed what they told me before I could give any reason for doing so, I would even today have been little better than an imbecile. And although my natural credulity has sometimes led to my being imposed on by deceivers, it has been of infinite advantage to me on the whole; and so I consider my credulity as another good gift of nature. And the trust that I used to give •instinctively I continue to give •thoughtfully to those of whose integrity and truthfulness I have had experience.

People don't generally realise how greatly •the testimony of nature given by our senses resembles •testimony of men given by language. Our trust in both is at first an effect purely of instinct. When we grow up and begin to reason about them, our trust in human testimony is restrained and weakened by our experience of being deceived. But our trust in the testimony of our senses is established and confirmed by the uniformity and constancy of the laws of nature.

Our perceptions are of two kinds: some are •natural and original, others are •acquired and the result of experience. When I perceive that

this is the taste of cider and that of brandy,
 this is the smell of an apple and that of an orange,
 this is the noise of thunder and that the ringing of bells,
 this is the sound of a coach passing and that the voice of
 a friend,

these perceptions and others like them are not original; they are acquired. But the perception that I have by touch of the hardness and softness of bodies, of their extension, shape and motion, isn't acquired; it is original. With all our senses there are many more acquired perceptions than original ones—and especially in the case of *sight*. By this sense we perceive •originally

only the visible shape and colour of bodies, and their visible place;

but we •learn to perceive by the eye

almost everything that we can perceive by touch.

The •original perceptions of this sense serve only as signs to introduce the •acquired ones. The signs by which objects are presented to us in perception are the language in which nature speaks to man; it is in many ways like the language in which men speak to one another, and especially in this: both •languages• are partly •natural and original and •partly acquired by custom. Our original or natural perceptions are analogous to the •natural language of man to man, which I discussed in chapter 4, and our acquired perceptions are analogous to •artificial language which, in our mother tongue, is acquired in much the same way as our acquired perceptions, as I shall explain •in section 24•.

It is not only healthy adults who acquire by habit many perceptions that they didn't have originally—the same is true for children, idiots, and lower animals. [In Reid's day, 'idiot' meant 'person who is seriously mentally defective'.] Almost every employment in life has perceptions of this kind that are special to it. The shepherd knows every sheep in his flock the way we know our acquaintances, and can pick them out of another flock one by one. The butcher knows by sight the weight and quality of his cattle and sheep before they are killed. The farmer perceives by his eye roughly how much hay there is in a haystack, or how much corn in a heap. The

sailor sees from a great distance what a ship's build and carrying capacity are, and how far away it is. Every man accustomed to writing tells his acquaintances apart by their hand-writing, as he does by their faces. And the painter distinguishes in paintings the styles of all the great masters. In short, acquired perception varies greatly from person to person, because of the variety in the objects to which the perceptions are directed and the different ways people go about perceiving them.

•Perception ought to be distinguished not only from •sensation but also from the knowledge of the objects of sense that is acquired by •reasoning. There is no reasoning *in* perception, as I have already observed. The belief that is implied *in* perception is an effect ·not of reasoning but· of instinct. But there are many facts concerning sensible objects that we can *infer from* what we perceive, and such •conclusions of reason ought to be distinguished from •what is merely perceived. When I look at the moon, I perceive it to be sometimes circular, sometimes crescent-shaped and sometimes in between. This is simple perception, and is the same in the philosopher as in the clown; but from these various appearances of the moon's illuminated part I infer that it is really spherical in shape. This conclusion isn't obtained by simple perception but by reasoning. •Simple perception relates to •the conclusions of reason drawn from our perceptions in the same way as •the axioms in mathematics relate to •the propositions ·inferred from them·. I can't demonstrate that

two quantities that are equal to the same quantity are equal to each other;

neither can I demonstrate that

the tree that I perceive exists.

But by the constitution of my nature my belief is irresistibly carried along by my grasp of the axiom; and by the consti-

tution of my nature my belief is just as irresistibly carried along by my perception of the tree. All reasoning is from principles. The first principles of mathematical reasoning are mathematical axioms and definitions, and the first principles of all our reasoning about existing things are our perceptions. The first principles of *every* kind of reasoning are given us by nature, and have as much authority as does the faculty of reason—which is also a gift of nature. The conclusions of reason are all built on first principles, and can't have any foundation but that. So it is quite proper that such principles refused to be tried by reason, and laugh at the artillery of the logician when it is aimed at them.

When a long train of reasoning is needed to demonstrate a mathematical proposition, it is easily distinguished from an axiom, and they seem to be things of a very different nature. But some propositions lie so near to axioms that it is hard to decide whether they should be •held as •axioms or rather •demonstrated as •propositions. The same thing holds with regard to perception and the conclusions drawn from it. Some of these conclusions follow our perceptions so easily, and are so immediately connected with them, that it is hard to ascertain the boundary dividing them from one another.

Perception, whether original or acquired, doesn't involve any use of reason; and it is something that adults have in common with children, idiots, and lower animals. The •more obvious conclusions inferred by reason from our perceptions constitute what we call 'common understanding', which is what men steer by in the common affairs of life, and what distinguishes them from idiots. The •more remote conclusions that are inferred by reason from our perceptions constitute what we commonly call 'science' concerning the various parts of nature— whether in agriculture, medicine, mechanics or any part of natural philosophy. When I see

a garden in good order, containing a great variety of plants of the best kinds and in the most flourishing condition, I immediately infer from these signs that the gardener has worked hard and skillfully. When a farmer gets up in the morning and sees that the neighbouring brook overflows his field, he infers that a great deal of rain has fallen in the night. Seeing his fence broken and his corn trodden down, he infers that some of his own or his neighbour's cattle have broken loose. Seeing that his stable door is broken open and some of the horses gone, he infers that a thief has taken them. He traces the prints of his horses' feet in the soft ground, and from them he discovers which road the thief has taken. These are instances of *common understanding*, which is so close to perception that it's hard to draw the line between them. Similarly, *the science of nature* is so close to common understanding that we can't see where the latter ends and the former begins. I perceive that:

Bodies lighter than water float in water while those that are heavier sink.

From this item of common understanding I infer something that is closer to the science of nature, namely that

If a body immersed in water stays wherever it is put, whether at the top or bottom, it weighs exactly the same as water. If it stays put only when part of it is above the water, it is lighter than water; and the bigger the proportion of it that is above water the lighter the body is. If it had no gravity at all, it would have no effect on the water and would stand wholly above it.

Thus every man has by common understanding a rule by which he judges of the specific gravity of bodies immersed in water; and a step or two more leads him into the science of hydrostatics.

The whole of what we know about nature, i.e. about existing things, can be compared to a tree: perception is the

root of this tree of knowledge, common understanding is its trunk, and the sciences are its branches.

21. Nature's way of bringing about sense-perception

Although there is no reasoning in perception, nature ordains that certain means and instruments shall intervene between the object and our perception of it; and these means and instruments limit and regulate our perceptions. **(1)** If the object isn't in contact with the organ of sense, some medium—i.e. some intervening things or stuff—must pass from the object to the organ. Thus,

in vision the rays of light,

in hearing the vibrations of elastic air,

in smelling the effluvia of the body that is smelled,

must pass from the object to the organ; otherwise we have no perception. **(2)** There must be some action or effect [Reid's word is 'impression'] on the organ of sense, either by the immediate application of the object or by the medium that goes between the object and the organ. **(3)** The nerves that go from the brain to the organ must receive some effect by means of the effect that was made on the organ; and probably by means of the nerves some effect must be made on the brain. **(4)** The effect made on the organ, nerves and brain is followed by a sensation. **(5)** Lastly, this sensation is followed by the perception of the object.

Thus our perception of objects is the result of a sequence of operations, some of which affect only the body, others affect the mind. We don't know much about the nature of some of these operations; we don't know *anything* about how they are connected to one another or how they contribute to the perception that results from them all together; but by the laws of our constitution this is how we perceive objects—and

our only way of doing so.

There may be other beings who can perceive external objects without rays of light or vibrations of air or effluvia of bodies, without effects on bodily organs, even without sensations. But *we* are so built by ·God·, the author of nature, that we could be surrounded by external objects and yet perceive none of them. Our capacity for perceiving an object lies dormant until it is roused and stimulated by a certain corresponding sensation. And this sensation isn't always available, for it enters into the mind only as a result of a certain corresponding effect that the object has on the sense-organ.

Let us track down, as far as we can, this correspondence of effects, sensations and perceptions, starting with what comes first, namely the effect on the bodily organ. But, alas! we don't know what these effects are, let alone how they cause sensations in the mind.

We know that one body can act on another by •pressure, by •impact, by •attraction, by •repulsion and probably in many other ways that we don't know and don't have names for. But in which of these ways

objects that we perceive act on the sense-organs,
these organs act on the nerves, and
the nerves act on the brain,

we don't know. Can anyone tell me how in vision the rays of light act on the retinas, how the retinas acts on the optic nerve and how the optic nerve acts on the brain? No-one can. When I feel the pain of the gout in my toe, I know that there is some unusual effect made on that part of my body. But what kind of effect? Are the small vessels swollen by some intrusive. . . fluid? Are the fibres abnormally stretched? Are they torn apart by force, or eaten away by some acid? I can't answer any of these questions. All that I •feel is *pain*, which is an effect on the mind, not on the body; and all

that I •perceive through this sensation is that *something wrong in my toe leads to this pain*. But because I don't know the natural state of my toe when it is not in pain, I also don't know what change or disorder in its parts leads to this painful sensation. Similarly with every other ·kind of· sensation, there is doubtless some effect on the sense-organ but we don't know what it is. It is too subtle to be discovered by our senses, and we can make a thousand conjectures about it without coming near to the truth. If we understood the structure of our sense-organs in such detail that we could learn what effects external objects have on them, this knowledge wouldn't add anything to our perception of the object; for those who know least about what happens in perception perceive as clearly as the greatest experts. ·For perception to occur·, it is necessary •that the effect be made on our organs, but not •that it be known. Nature carries on this part of the process of perception without our being aware of it or helping it along.

But we can't be unaware of the next step in this process, the sensation of the mind that always immediately follows the effect made on the body. It is essential to a sensation to be *felt*, and it can't *be* anything more than we *feel it to be*. We can know our sensations perfectly, if we will just get the habit of attending to them. But how are the sensations of the mind produced by impressions on the body? Of this we are absolutely ignorant, having no way of knowing how the body acts on the mind, or the mind on the body. When we consider the nature and attributes of body and of mind they seem to be so different, and so unlike, that we can't find any handle by which either can lay hold of the other. There is a deep and dark gulf between them that our understanding can't pass, and *how* they correspond and interrelate is absolutely unknown.

Experience teaches us that certain effects on the body are constantly followed by certain sensations of the mind, and that in the other direction certain states of the mind are constantly followed by certain motions in the body; but we don't see the chain that connects these events. For all we know, their connection may be purely a matter of a *choice* by ·God· our maker. Perhaps the same sensations could have been connected with other effects or with other bodily organs. Perhaps we might have been made in such a way as to taste with our fingers, smell with our ears, and hear through the nose. Perhaps we could have been made in such a way that we could have all the sensations and perceptions that we do in fact have, without any effect at all being made on our bodily organs.

Be all that as it may, if nature had given us nothing more than effects on the body and corresponding sensations in our minds, that would have made us sentient beings but not percipient ones—beings that *sense* but not ones that *perceive*·. In that case we would never have been able to form a ·conception of any external object, far less a ·belief in its existence. Our sensations don't at all resemble external objects, and we can't discover through our reason any necessary connection between the existence of the sensation and the existence of the object.

Perhaps we could have been made with a constitution such that we had our present ·actual· perceptions connected with different sensations. Perhaps we could have had the perception of external objects without any effects on the sense-organs and without any sensations. Or, lastly, the perceptions we have could have been *immediately* connected with the effects on our organs, without any sensations coming into the process. This last seems really to be the case in one instance, namely in our perception of the visible shape of bodies, as I noted in section 8.

So nature's way of bringing about sense-perception can be thought of as a kind of drama, in which some things are performed off-stage, and others are represented to the mind in a succession of different scenes. The ·effect that the object has on the organ (either by immediate contact or through some intervening medium) and the ·effect on the nerves and the brain happen off-stage, and the mind sees nothing of either of them. But by the laws of the drama every such effect is followed by *sensation*, which is the first scene that is shown to the mind; and this scene is quickly followed by another, which is the *perception* of the object.

In this drama, nature is the actor and we are spectators. We know nothing of the stage-machinery by means of which every different effect on the organ, nerves and brain exhibits its corresponding sensation; or of the machinery by means of which each sensation exhibits its corresponding perception. We are inspired with the sensation, and with the corresponding perception, by means unknown. And because the mind

- passes immediately from the sensation to the conception of and belief in the object that we have in perception

in the same way that it

- passes from signs to the things signified by them,

I have called our sensations 'signs of external objects', finding no terms that express better the function that nature has assigned to sensations in perception and the relation they have to their corresponding objects.

There is no need for a sign to resemble what it signifies, and indeed no sensation can resemble any external object. But two things *are* needed for us to know things by means of signs.

(1) A real connection must be established, either by the course of nature or by the will and decision of men, between

the sign and the thing signified. When they are connected by the course of nature it is a natural sign; when by human decision it is an artificial sign. Thus smoke is a natural sign of fire, certain facial expressions are natural signs of anger; but our spoken or written words are artificial signs of our thoughts and purposes.

(2) For us to know things by signs, the sign's appearing to the mind must be followed by the conception of and belief in the thing signified. If this doesn't happen the sign isn't understood or interpreted, in which case it isn't *to us* a sign, however suitable it may be *in itself* to serve as a sign.

Now, the mind passes from the appearance of a natural sign to the conception of and belief in the thing signified in three ways—by •original principles of our constitution, by •custom, and by •reasoning.

Our •original perceptions are had in the first of these ways, our •acquired perceptions in the second, and •everything that reason discovers concerning the course of nature in the third. In the first of these ways, nature through the sensations of touch informs us of the hardness and softness of bodies, of their extension, shape and motion, and of the space in which they move and are situated, as I explained in chapter 5 above. And in the second of these ways nature informs us by means of our eyes of almost all the same things that originally we could perceive only by touch.

In order to provide a better grasp of how we •learn to perceive so many things •by the eye which •originally could be perceived only •by touch, I should first point out

the signs by which those things are exhibited to the eye, and the connection between those signs and the things signified by them;

and secondly consider

how the experience of this connection produces the habit by which the mind passes, with no reasoning or reflection, from the sign to the conception of and belief in the thing signified.

This all concerns 'acquired perceptions', the second of the trio listed just under item (2) above. It will be my topic until the end of section 23.

Of all the acquired perceptions that we have by sight, the most remarkable is the perception of the distance of objects from the eyes. So I shall consider in some detail the signs by which this perception is exhibited, and only make some general remarks—with much less detail—concerning the signs that are used in other acquired perceptions.

22. The signs by which we learn to perceive distance from the eye

I remarked earlier that the original perceptions of sight are signs that serve to introduce the acquired ones; but this doesn't mean that no *other* signs are employed for that purpose. For clear vision, many motions of the eyes have to be varied according to how far away the object is; and such motions, being connected by habit with the corresponding distances of the object, become *signs* of those distances. The motions in question were at first made freely and deliberately; but as nature's intention was to produce perfect and clear vision by means of them, we soon learn by experience to regulate them according to that intention only, without even thinking about it.

A ship requires a different *trim* [= 'a different setting of the sails'] for every variation in the direction and strength of the wind; and—if I may be allowed to borrow that word—the eyes require a different *trim* for every degree of light and for every variation (within certain limits) in the distance of the object.

The eyes are trimmed for a particular object by contracting certain muscles and relaxing others, as the ship is trimmed for a particular wind by pulling some ropes and slackening others. The sailor learns the trim of his ship, as we learn the trim of our eyes, by experience. Although a ship is the noblest machine that human skill can boast, it is far inferior to the eye in this respect: it requires skill and ingenuity to navigate a •ship; and a sailor must *know* which ropes to pull and which to slacken to make her right for a particular wind; whereas one needs no skill or ingenuity to see by the •eye, because such superior wisdom has gone into its structure and workings. Even the part of vision that is acquired by experience is attained by idiots: we don't need to *know* which muscles to contract and which to relax to make the eye right for a particular distance of the object. But although we aren't conscious of the motions we make in order to make the eyes right for the distance of the object, we *are* conscious of the effort involved in producing those motions; and they are probably accompanied by some sensation that we don't attend to any more than we do to other sensations. And thus

- an effort consciously exerted, or
- a sensation resulting from that effort,

comes to be associated with

- the distance of the object that gave rise to it;

and this association enables the effort or the sensation to become a *sign* of that distance. I shall give examples of this when I come to discuss the means or signs by which we learn to see how far objects are from the eye. I accept Dr. Porterfield's list of these, despite our difference of opinion: he thinks that distance from the eye is perceived •originally, while I think it is perceived only •by experience.

In general, when a nearby object affects the eye in one way and the same object when further off affects it in a different way, these different states of the eye become *signs* of the

corresponding distances. So I can show how we perceive distance by means of the eye by showing in what ways objects affect the eye differently depending on how far away they are. ·I shall discuss five of them in this section·.

1. It is well known that to see objects clearly at various distances, the shape of the eye must undergo some change. And nature has given us the power to adapt our eye to nearby objects by contracting certain muscles, and to distant objects by contracting other muscles.

Anatomists don't entirely agree about how this is done and what muscles are employed in it. The ingenious Dr. Jurin, in his excellent essay on clear and blurred vision, seems to have given the most likely account of this matter, and I refer you to him.

Anyway, . . . it is certain that young people generally have the power to adapt their eyes to all distances of the object from six or seven inches to fifteen or sixteen feet, so as to have perfect and clear vision at any distance within these limits. It follows from this that what we consciously do to adapt the eye to any particular object-distance within these limits will be connected and associated with that distance and will become a *sign* of it. When the object is moved away beyond the furthest limit of clear vision, it will be seen unclearly, but more or less so depending on whether its distance is greater or less; so that the degrees of clarity of the object can become the *signs* of distances considerably beyond the furthest limit of distinct vision. If this were our *only* way of perceiving the distance of visible objects, the most distant objects would appear to be no more than twenty or thirty feet from the eye, and the tops of houses and trees would seem to touch the clouds; for in that case the signs of all greater distances would be the same, so they would have the same signification and would thus give the same perception of distance.

Here is a more important point. When as children we learn to perceive distance by the eye, the closest objects that we learn to perceive clearly are about six or seven inches away, and for that reason no object that is seen clearly ever appears to be closer than six or seven inches from the eye. We have devices for making a small object appear clearly when it is in reality not more than half an inch from the eye—either by using a single microscope, or by looking through a small pinhole in a card. When an object is made to appear clearly by either of these means, it *seems* to be at least six or seven inches away— i.e. within the limits of ·unaided· clear vision—however close it is in reality.

This observation gets extra importance from the fact that it provides the only •reason we can give why an object is *magnified* either by a single microscope or by being seen through a pinhole, and the only •means by which we can determine *by how much* the microscope or pinhole will magnify the object. Thus, if the object is really half an inch away from the eye and appears to be seven inches away, its diameter will seem to be enlarged in the same proportion as its distance, i.e. fourteen times.

2. For us to direct both eyes to an object, the optic axes must slope towards one another—more or less steeply, depending on how near or distant the object is. We aren't conscious of this slope, but we *are* conscious of the effort involved in creating it. This enables us to perceive things that are very close to us more accurately than we could do just by the shaping—the 'trim'—of the eye. And so we find that people who have lost the sight of one eye are apt to make mistakes about how far away objects are—even objects within an arm's length—these being mistakes that are easily avoided by those who see with both eyes. Such mistakes are often discovered in snuffing a candle, threading a needle, or filling a tea-cup. When a picture is seen fairly close up

with both eyes, the representation doesn't seem as natural as when it is seen with only one. The intention of painting is to deceive the eye, making things appear to be at different distances when really they are on the same piece of canvas; and it is harder to deceive two eyes in this way than to deceive just one, because we perceive the distance of visible objects more accurately and precisely with two eyes than with one. If the shading and relief are carried out as well as they can be, the picture can have

almost the same appearance to one eye as the objects themselves would have,

but it can't have

the same appearance to one eye as to two.

This isn't the fault of the artist—it's an unavoidable imperfection in painting as such. What makes the picture look •better, close up, with one than with two is the very same fact that makes a single eye •worse than two eyes at judging distances and avoiding deception about them.

The biggest obstacle—and I think the only one that can't be overcome—to that agreeable deception of the eye that the painter aims at is our perception of *how far* visible objects are from the eye—a perception that we have partly through •the shape of the eye but mainly through •the angle between the optic axes. If this perception ·of distance· could be removed, I see no reason why a picture couldn't be made so perfect that it would *really deceive* the eye and be mistaken for the original object. In order to judge the merit of a picture, therefore, we ought as far as we can to exclude •those two means of perceiving the distance from us of its different parts.

In order to remove this perception of distance, art-lovers use a good method: they look at the picture with one eye, through a tube that excludes the view of all the other objects. This entirely excludes our main way of perceiving

the distance of the object, namely the angle between the optic axes. I humbly suggest an improvement of this method of viewing pictures, namely making the tube through which one looks at the picture very narrow. If the aperture is as small as a pinhole, so much the better, as long as there is enough light to see the picture clearly. The reason for my proposal is that when we look at an object through a small aperture it is seen clearly, whether or not the shape of the eye is adapted to its distance; and then our only remaining way to estimate the distance is the light and colouring in the picture, and those are up to the painter. So if he does his part properly, the picture will affect the eye in the same way that the object represented would do; which is the perfection of his art.

Although the second way of perceiving the distance of visible objects is more exact than the first, there are limits beyond which it is of no use. When the optic axes directed to an object are so nearly parallel that in directing them to an even more distant object we aren't conscious of any new effort and don't have any different sensation, that is where our perception of distance stops; all more distant objects affect the eye in the same manner, so we perceive them to be at the same distance. That is why the sun, moon, planets and fixed stars, when seen not near the horizon, appear to be all at the same distance as though they were on the inner surface of a great sphere. The surface of this heavenly sphere is at the distance beyond which all objects affect the eye in the same way. I shall explain later why this celestial ceiling appears more distant toward the horizon.

3. When objects are far away, their *apparent* colours become fainter and more washed-out, and are tinged more with the blue of the intervening atmosphere; also, their small parts become less clear and their outline less precisely marked out. It is mainly through these facts that painters

can represent objects *as being* at very different distances, on the same canvas. Simply making an object *smaller* wouldn't have the effect of making it appear to be far off if there weren't also this degradation of its colour, and the unclarity of its outline and its small parts. If a painter made one human figure a tenth of the size of other human figures in the same picture, with the colours as bright and the outline and minute parts as precisely marked, it wouldn't appear like a man at a great distance but rather like a pygmy or Lilliputian. When an object has a variety of colours, its distance is more clearly indicated by the gradual fusion of the colours into one another than when it is of one uniform colour. In the steeple that stands before me at a small distance, the joinings of the stones are clearly perceptible; the grey colour of the stone is clearly marked off from the white cement; when I see at a greater distance, the joinings of the stones are less clear and the colours of the stone and of the cement begin to fuse into one another; at a still distance greater the joinings disappear altogether and the variety of colour vanishes. [Reid then makes the same point in terms of the appearances of colours and outlines as one backs away from an apple tree. He concludes:] This change of appearance, corresponding to the different distances, marks the distance more exactly than if the whole object had been of one colour.

Dr. Smith reports in his *System of Optics* a fascinating observation made by Bishop Berkeley in his travels through Italy and Sicily. He observed that in those countries, cities and palaces seen at a great distance appeared to him miles nearer than they really were; and suggested this explanation: the purity of the Italian and Sicilian air gave to very distant objects the degree of brightness and clarity that was to be seen only in nearby objects in the polluted air of his own country. Italian painters commonly give a more lively colour

to the sky than the Flemish ones do, and this has been attributed to the purity of the Italian air. Oughtn't they for the same reason to represent very distant objects with brighter colours and more clear detail of the small parts?

Just as in uncommonly pure air we are apt to think visible objects to be nearer and smaller than they really are, so in uncommonly foggy air we are apt to think them more distant and larger than they are. Walking by the seaside in a thick fog I see an object that seems to me to be a man on horseback about half a mile away. My companion, who has better eyes or is more accustomed to seeing such things in fog, assures me that it is a sea-gull. . . . On a second look I immediately agree with him: it now appears to me to be a sea-gull about seventy yards away. My mistake and my correction of it are both so sudden that we don't know whether to call them 'judgment' or simple 'perception'.

It isn't worthwhile to argue about labels; but it is evident that my first belief and my second corrected one were produced by •signs rather than by •arguments, and that in each of them my mind reached its conclusion by •habit and not by •reasoning. The process of my mind seems to have been as follows. Not knowing (or not bearing in mind) the effect of a foggy air on the visible appearance of objects, •I perceive the object as having the washed-outness of colour and fuzziness of outline that objects •customarily• have at a distance of half a mile; taking that visible appearance as a sign, I •immediately proceed to the belief that the object is half a mile distant. Then that distance together with the visible size •signify to me that the real size must be equal to that of a man on horseback, and the figure—given the unclarity of its outline— agrees with that of a man on horseback. Thus the deception is brought about. But when I am assured that it is a sea-gull, the real size of a seagull together with the visible size presented to the eye immediately suggest the

distance, which in this case can't be above seventy yards; the unclarity of the figure likewise suggests the fogginess of the air as its cause; and now the whole chain of signs and things signified seems stronger and better connected than it was before: the half mile shrinks to seventy yards, the man on horseback dwindles to a sea-gull, I get a new perception, and I wonder how I got the previous one or what has become of it; for it has now so entirely gone that I can't get it back.

I should add that in order to produce such deceptions from the clearness or fogginess of the air, it must be uncommonly clear or uncommonly foggy; for we learn from experience to make allowance for the variety of air-conditions that we have been accustomed to observe and that we are aware of. So Bishop Berkeley made a mistake in his explanation of why the moon appears larger near the horizon. The cause of this, he said, is that near the horizon the moon's light is faint because it has passed through more of the atmosphere •than when it is higher in the sky•; but this is wrong, because we are so used to seeing the moon with different degrees of faintness and brightness that we learn to make allowance for this, and aren't led by the faintness of her appearance to imagine her size as increased. Besides, it is certain that when the moon near the horizon is seen through a tube that cuts off the view of the intervening ground and of all terrestrial objects, it loses all that unusual appearance of size.

4. We frequently perceive the distance of objects by means of intervening or contiguous objects whose distance or size is already known. When I perceive certain fields. . . .to lie between me and an object, it's obvious that they can become signs of its distance. Even if we don't know exactly how big the fields are, their similarity to others that we know suggests their sizes. We are so used to measuring with our eye the ground that we move across, and to comparing •the

judgments of distances formed by sight with •what we know in other ways, that we gradually learn in this way to form a more accurate judgment of the distance of terrestrial objects than we could do by the means described earlier. An object placed on the top of a high building appears much smaller than when it is placed on the ground at the same distance. When it stands on the ground

- the intervening ground serves as a sign of •its distance, and
- the distance together with •the visible size serves as a sign of •its real size.

But when the object is placed high up this sign of its distance is taken away; •the remaining signs lead us to place it at •a lesser distance; and •this lesser distance together with •the visible size becomes •a sign of a lesser real size. Methods 1 and 2 would never on their own make a visible object appear to be more than about two hundred feet away, because beyond that distance the shape of the eyes and the angle between their axes don't alter in any way that one could feel. Method 3 is only a vague and approximate sign when applied to distances greater than two or three hundred feet, unless we know the real colour and shape of the object. And method 5, which I shall come to shortly, can be applied only to objects that are familiar, or whose real size is known. So it follows that when unknown objects on or near the surface of the earth are perceived to be some miles away, it is always by this method 4 that we are led to that conclusion.

Dr. Smith has made the sound point that the known distance of the most distant terrestrial objects that we see makes •the part of the sky that is toward the horizon appear more distant than •the part that is toward the zenith. So the apparent shape of the sky is not that of •a hemisphere [= 'half-sphere'] but rather of •a segment of a sphere that is less than half of it. So, also, the diameter of the sun or moon, or the distance between two fixed stars, appears much greater

when seen contiguous to a hill or to any distant terrestrial object than it appears when no terrestrial object is seen at the same time.

These observations have been sufficiently explained and confirmed by Dr. Smith. Let me add that when the visible horizon is terminated by very distant objects the sky seems to be enlarged in all dimensions. When I view it from a confined street or lane it has some proportion to the buildings that surround me; but when I view it from a large plain, surrounded by hills that rise one above another to a distance of twenty miles from the eye, I seem to see a new heaven whose magnificence declares the greatness of •God•, its author, and puts every human building to shame; for now the lofty spires and gorgeous palaces shrink to nothing before it, and are no more comparable with the celestial dome than *their* makers are comparable with *its* maker!

5. Our only remaining way of perceiving the distance of visible objects is by the lessening of their visible or apparent size. By experience I know what a man (for example) looks like at a distance of ten feet; I perceive the gradual and proportional lessening of this visible figure at the distance of twenty, forty, a hundred feet, and at greater distances until it vanishes altogether. Thus, a certain visible size of a known object becomes the sign of a certain determinate distance, and brings with it the conception of and belief in that distance.

In this process of the mind, the sign is not •a sensation but rather •an original perception. We perceive the visible shape and visible size of the object by the original powers of vision; but the visible shape is used only as a sign of the real shape, and the visible size is used only as a sign either of the distance or of the real size of the object; and so these original perceptions—like other mere signs - pass through the mind without our attending to them or reflecting on them.

This last way of perceiving the distance of known objects serves to explain some very remarkable phenomena in optics—ones that would otherwise appear very mysterious. When we view an object of known size through a telescope, there is no way of determining their distance except this method 5. From this it follows that known objects seen through a telescope must seem •to be brought nearer in proportion to the magnifying power of the glass, or to be moved to a greater distance in proportion to the minifying power of the glass.

Suppose that a man who has never before seen objects through a telescope is told that the telescope that he is about to use magnifies the diameter of the object ten times. When he looks through this telescope at a man six feet high, what will he expect to see? Surely he will naturally expect to see a giant sixty feet high. But he sees no such thing! The man appears no more than six feet high, and consequently no bigger than he really is; but he appears ten times nearer than he is. The telescope indeed magnifies tenfold the image of this man on the retina, and must therefore magnify his visible figure in the same proportion; and as we have been accustomed to seeing him with this visible size when—and *only* when—he was ten times nearer than he is at present, this visible size suggests the conception of and belief in that distance of the object with which it has been always connected. . . . That's why a telescope seems not to magnify known objects but to bring them nearer to the eye.

When we look through a pinhole or a single microscope at an object that is half an inch from the eye, the picture of the object on the retina is not enlarged but only clarified; and the visible figure isn't enlarged either; yet the object appears to the eye twelve or fourteen times more distant, and twelve or fourteen larger in diameter, than it really is. A telescope such as the one I have mentioned amplifies the image on the retina,

and the visible figure of the object, ten times in diameter, and yet makes it seem no bigger but only ten times nearer. Writers on optics have known about these appearances for a long time, and have struggled to explain them through •optical principles; but they had no chance of succeeding. The appearances must be explained in terms of •habits of perception that are acquired by •custom, though they are apt to be mistaken for •original perceptions. Berkeley first provided the world with the proper key for opening up these mysterious appearances, but he made considerable mistakes in his use of it. Dr. Smith, in his elaborate and judicious treatise *System of Optics*, has applied it to the apparent distance of objects seen through glasses, and to the apparent shape of the sky, with such wonderful success that there is now no room for doubt about the causes of these phenomena.

23. The signs used in other acquired perceptions

The most important thing to be learned in vision is *the distance of objects from the eye*. Many others things are easily learned on the basis of that.

- The distance of the object joined with •its visible size is a sign of •its real size; and
- the distances of the object's various parts joined with •its visible shape is a sign of •its real shape.

Thus, when I look at a globe that stands before me, all I perceive by the original powers of sight is something that is circular and variously coloured. The visible figure has no distance from the eye, isn't convex, and has only two dimensions; even its size is incapable of being measured in inches, feet, or other linear measures. But when I have learned to perceive the *distance from the eye of each part* of this object, this perception gives it convexity and a spherical shape, adding a third dimension to the two that it had before.

The *distance of the whole object* similarly makes me perceive its real size. . . .

I showed in section 7 that the visible shape of a body can be inferred by mathematical reasoning from its real shape, distance and orientation in relation to the eye; similarly we can, by mathematical reasoning infer from the visible shape, together with the distances from the eye of the various parts of it, infer the real shape and orientation. But this second inference is usually made not by mathematical or any other kind of *reasoning*, but by custom.

We have no name for the sensation that the original appearance the colour of an object makes to the eye, because in everyday life we use it merely as a sign, and don't *attend* to it. But this appearance signifies different things in different circumstances. If a piece of cloth with one uniform colour is placed partly in sunlight and partly in the shade, the appearance of colour in these different parts is very different; yet we perceive the colour to be the same because we interpret the variety of appearance as •a sign of light and shade and not as •a sign of real difference in colour. But if our eye could be deceived into not perceiving the difference of light on the two parts of the cloth, then we would interpret the variety in the appearance to signify different colours in the parts of the cloth.

If the cloth is placed as before, but with the shaded part brighter in colour than the sunlit part, so that the two parts give the same appearance to the eye, we'll interpret the •sameness of appearance as a sign of a •difference in colour, because we'll allow for the effect of light and shade.

When the •real colour of an object is known, its •apparent colour indicates

the degree of light or shade, or
the colour of the nearby bodies whose rays it reflects, or
how far or near the object is (as I noted in section 22),

depending on the circumstances; and these can •in their turn• suggest other things to the mind. Thus, an unusual appearance in the colour of familiar objects may lead to the diagnosis of a disease in the spectator. The appearance of things in my room may indicate sunshine or cloudy weather, the earth covered with snow or blackened with rain. . . .

I have already remarked that •the original and acquired perceptions that we have by our senses are •the language of nature to man, which is similar in many respects to human languages. My examples of acquired perceptions suggest this point of resemblance: just as ambiguities are often found in human languages, the language of nature in our acquired perceptions has them too. We have seen this especially in the case of vision, where the same appearance to the eye can in different circumstances indicate different things. So when the circumstances on which the interpretation of the signs depends are unknown, the signs must be ambiguous; and when the circumstances are mistaken, the meaning of the signs must also be mistaken.

This is the case with all the phenomena that we call 'fallacies of the senses', and especially with those we call 'fallacies of vision'. The appearance of things to the eye always conforms to the fixed laws of nature, so strictly speaking there are no fallacies in the senses. Nature always speaks the same language, and uses the same signs •with the same meanings• in the same circumstances; but we sometimes mistake the meaning of a sign, either through ignorance of the laws of nature or through ignorance of the circumstances in which the sign has occurred. To someone who doesn't know the principles of optics, almost every experiment made with a prism, a magic lantern, a telescope or a microscope seems to produce some fallacy in vision! Even the appearance of a common mirror would seem most remarkably fallacious to someone who knew nothing

at all about how mirrors work. For how can a man be more deceived than he is in seeing in front of him something that is really behind him? In seeing himself several yards away from himself? Yet children who haven't yet learned to speak learn not to be deceived by these appearances. These, as well as all other surprising appearances produced by optical glasses, are a part of the visual language; and to those who understand the laws of nature concerning light and colours they are in no way fallacious, but have a true and clear meaning.

24. How perception is analogous to the trust we have in human testimony

There are countless objects of human knowledge, but the channels through which the knowledge is conveyed to the mind are few. Among the important channels are these two:

the perception of external things by our senses, and
the information we get through human testimony.

The analogy between these two is so remarkable, as is the analogy between the forces of the mind used by one and those used by the other, that I shall without further apology consider them together.

In the testimony of nature given by the senses, as well as in human testimony given by language, things are signified to us by signs; and in each of them the mind passes, either by original forces or by custom, from the sign to the conception of and belief in the things signified.

I have divided our perceptions into •original and •acquired; and have divided language into •natural and •artificial. There is a great analogy between •acquired perception and •artificial language, but an even greater analogy between •original perception and •natural language.

In original perception the signs are *sensations*, of which nature has given us a great variety, suited to the variety of the things signified by them. Nature has established a real connection between the signs and the things signified; and nature has also taught us how to interpret the signs, so that independently of experience the sign suggests the thing signified and creates the belief in it.

In natural language the signs are features of the face, gestures of the body and modulations of the voice; and the variety of *these* is suited to the variety of the things signified by them. Nature has established a real connection between these signs and the thoughts and mental dispositions that they signify; and nature has taught us how to interpret these signs, so that independently of experience the sign suggests the thing signified and creates the belief in it. A man on a social occasion can, without doing good or evil, behave himself

gracefully, civilly, politely,
or, on the contrary,

meanly, rudely and impertinently,
without uttering a word! We see the disposition of his mind by their natural signs in his face and his behaviour, in the same way that we perceive the shape and other qualities of bodies by the sensations that nature has connected with them.

The signs in the natural language of the human face and behaviour, as well as the signs in our original perceptions, have the same signification [= 'meaning'] in all climates and in all nations, and the ability to interpret them is innate, not acquired.

In acquired perception the signs are either •sensations or •things that we perceive by means of sensations. The connection between the sign and the thing signified is established by nature, and we discover this connection by

experience—but helped in this by our original perceptions or by previously acquired ones. After we have discovered this connection, the sign always suggests the thing signified, and creates the belief in it—just as with original perception.

In artificial language, the signs are articulate sounds that are connected by human decision with the things signified by them. In learning our mother tongue we discover this connection by experience— but we're helped in this by natural language or by previously learned artificial language. And after we have this connection, the sign always suggests the thing signified, and creates the belief in it—just as with natural language,

We don't have many original perceptions compared with the acquired ones, but without the former we couldn't possibly attain the latter. Similarly, natural language is scanty compared with artificial language; but without the former we couldn't possibly attain the latter.

Our original perceptions, as well as the natural language of human features and gestures, must be explained in terms of the *particular* forces at work in the human constitution. Thus it is by one of these that certain features express anger, and by another that certain features express benevolence. Similarly, it is because of one *particular* force of our constitution that a certain sensation signifies hardness in the body that I handle, and it is by another that a certain sensation signifies motion in that body.

But •our acquired perceptions and •the information we get through artificial language must be explained in terms of *general* forces in the human constitution. When a painter perceives that this picture is the work of Raphael and that the work of Titian, a jeweller that this is a true diamond and that a counterfeit, a sailor that this is a ship of five hundred tons and that a ship of four hundred—these different acquired perceptions are produced by the same general forces in

the human mind, which operate differently at different times in one person, depending on how he applies them, and operate differently in different person, depending on their various upbringings and ways of life. Similarly, when certain articulate sounds convey to my mind the knowledge of the battle of Pharsalia and to others the knowledge of the battle of Poltowa, or when a Frenchman and an Englishman receive the same information through different articulate sounds, the signs used in these different cases produce, by means of the same general forces in the human constitution, the knowledge of and belief in the things signified. Now, if we compare •the general forces in our constitution that enable us to receive information from our fellow creatures by language with •the general forces that enable us to acquire the perception of things by our senses, we shall find them to be very similar in their nature and manner of operation.

When we begin to learn our mother tongue, we perceive (through the help of natural language) that those who speak to us use certain sounds to express certain things; we imitate the same sounds when we want to express the same things, and we find that we are understood.

But here a difficulty occurs that we should attend to because the solution of it leads to some original forces in the human mind that are of great importance and of very extensive influence. We know by experience that men *have* used such-and-such words to express such-and-such things. But all experience is of the past, and it can't in itself give any notion of or belief in what is future. So how do we come to believe—and to rely confidently on the belief—that men who *could* do otherwise *will* continue to use the same words when they think the same things? Where do we get it from, this knowledge and belief (or, better, this *foresight*) of the future voluntary actions of our fellow-creatures? Have they promised that they will never deceive us by ambiguity or

falsehood? No, they have not. And even if they had, that wouldn't remove the difficulty, for such a promise would have to be expressed by words or by other signs, and we couldn't rely on it unless we were assured that they were giving the usual meanings to the signs expressing promise. No sensible person ever thought of taking a man's own word for his honesty: when we rely on someone's word or promise, we are obviously already taking his truthfulness for granted. Anyway, this reliance on the declarations and testimony of men is found in children long before they know what a promise is.

So there is in the human mind an early expectation, not derived from •experience or from •reason or from any •contract or promise, that when our fellow-creatures use language they will use the same signs when they have the same thoughts.

This is in reality a kind of foreknowledge of human actions; and it seems to me to be an original force in the human constitution, without which we couldn't have language and so couldn't receive instruction.

The wise and beneficent author of nature, who intended •that we should be social creatures and •that we should receive the largest and most important part of our knowledge through information from others, has for these purposes implanted in our natures two forces that fit in with one other.

1. The first is a propensity to speak the truth, and to use the signs of language so as to convey our real thoughts. This operates powerfully, even in the greatest liars; for even they speak truth a hundred times for every lie they tell. Truth is always uppermost, and is the natural output of the mind. It requires no skill or training, no inducement or temptation; to be truthful all we need do is to yield to a natural impulse. Lying on the other hand is doing violence to our nature; and

even the worst men never do it without some temptation. •Speaking truth is like •eating our natural food, which our appetite would lead us to do even if it didn't lead to any •desired• end •such as preserving health•; but •lying is like •taking medicine, which tastes disgusting and which no-one takes except for some end that he can't otherwise achieve.

You may want to object: 'Men can be influenced by moral or political considerations to speak the truth, so their doing so is no proof of an *original* force such as you have mentioned.' I answer first •that moral or political considerations can't come into play until we arrive at years of understanding and reflection; yet we know from experience that children invariably keep to the truth before they are capable of being influenced by such considerations. And secondly •that when we are influenced by moral or political considerations, we must be *aware* of that influence and capable of perceiving it on reflection. Now, when I reflect on my actions most attentively I am not aware that in speaking the truth I am influenced on ordinary occasions by any moral or political motive. I find that truth is always at the door of my lips, and goes out spontaneously if I don't hold it back. For truth to come out, it isn't necessary for me to have any good or bad intention; all that is needed is for me to be simple, straightforward, not *up to* anything. It may well be that some •temptations to falsehood would be too strong for the natural force of •truthfulness unless forces of •honour or virtue were bought to its aid; but when there is no such temptation we speak the truth *by instinct*; and this instinct is the force I have been explaining.

By this instinct, a real connection is formed between our words and our thoughts—one that makes the former fit to be signs of the latter, which they couldn't otherwise be. This connection is broken every time someone lies or trades on ambiguity; but cases of this are comparatively rare, so the

authority of human testimony is only weakened by them, not destroyed.

2. A second original force implanted in us by God, the supreme being, is a disposition to trust in the truthfulness of others and to believe what they tell us. Let the first of the two forces be called 'the force for truthfulness'; then this second one—the counterpart of the first—can be called 'the force for trust'. It is unlimited in children until they meet with instances of deceit and falsehood, and it stays pretty strong throughout life.

If nature had left the mind of the *speaker* evenly balanced between truth and falsehood, children would lie as often as they spoke the truth, until their reason had developed far enough to suggest that lying is imprudent, or their conscience had developed far enough to suggest that lying is immoral. [Reid wrote 'as often as they *speak* the truth', making lying much commoner than truth-telling. This was presumably a slip.] And if nature had left the mind of the *hearer* evenly balanced between believing and disbelieving what is said, we wouldn't take anyone's word until we had positive evidence that he was speaking the truth. In those circumstances his testimony would have no more authority than his dreams—which may be true or false, but no-one is inclined to believe them *just because they were dreamed!* It is obvious that in the matter of testimony nature tips the balance of human judgment to the side of belief; that is the side our judgment takes when there is nothing put into the opposite scale. If this were not so, no proposition that is uttered in discourse would be believed until it was examined and tested by reason, and most men would be unable to find reasons for believing a thousandth part of what is told to them. Such distrust and disbelief would deprive us of the greatest benefits of society and make our condition worse than that of savages.

On this supposition of equilibrium between belief and disbelief, children would be absolutely untrusting and therefore absolutely unteachable; those adults who had little knowledge of human life and of the manners and characters of men would be in the next degree untrusting; and the most trusting people would be those with the greatest experience and deepest thought, because they would often be able to find good *reasons* for believing the testimony—reasons that the weak and the ignorant couldn't discover.

In short: if trust were the effect of reasoning and experience, it would grow up and gather strength in the same proportion as reason and experience do. But if it is a gift of nature, it will be strongest in childhood and limited and restrained by experience. You don't have to know much about human life to realise that the second of these is really the case, and not the first.

Nature intends that we should be carried in the arms of others before we can walk on our legs; similarly, nature intends that our belief should be guided by the authority and reason of others before it can be guided by our own reason. The weakness of the infant and the natural affection of the mother plainly indicate the former of these; and the natural trustfulness of youth and the authority of age equally plainly indicate the latter. The infant, by proper nursing and care, acquires strength to walk without support. Reason likewise has her infancy when she must be carried in arms; at that time she leans entirely on authority, by natural instinct, as if she were conscious of her own weakness; and without this support she becomes dizzy. When brought to maturity by proper development she begins to feel her own strength and to lean less on the reason of others; she learns to suspect testimony in some cases and to disbelieve it in others, and she sets limits to that authority to which she was at first entirely subject. But still, throughout her life she finds that

•she has to borrow light from testimony when she has no light of her own ·to shine on the matter in question·, and that •she has to lean somewhat on the reason of others when she is conscious of her own weakness.

Just as reason, even in her maturity, often gets help *from* testimony, so she also sometimes gives help *back to* testimony and strengthens its authority. For just as we find good reason to reject testimony in some cases, so in others we find good reason to rely on it with perfect confidence in our most important concerns.

The witnesses are trustworthy people. There are many of them. They have nothing personally at stake in this matter. They can't have come together to agree on their testimony. It's not credible that the agreement of their testimony came about by chance.

These facts may give an irresistible strength to testimony, compared with which its native and intrinsic authority is very inconsiderable.

Having now considered the general forces in the human mind that enable us to receive information from our fellow-creatures by means of language, let us next consider the general forces that enable us to receive information about nature through our own acquired perceptions. It is undeniable—and nobody *does* deny—that when we have found two things to be constantly conjoined in the course of nature, the appearance of one of them is immediately followed by the conception of and belief in the other. The former becomes a natural sign of the latter; and the knowledge of their constant conjunction in the past, whether acquired by experience or in some other way, is sufficient to make us rely confidently on the continuance of that conjunction.

This process of the human mind is so familiar that we never think of inquiring into the forces that underlie it. We are apt to conceive it as a self-evident truth that *what is*

to come must be similar to what is past. Thus if a certain degree of cold freezes water today and has been known to do so throughout the past, we have no doubt that the same degree of cold will freeze water tomorrow or a year hence. I freely grant that this is a truth that all men believe as soon as they understand it, but my question is: What *makes* it evident to us? Not the relating of ideas, surely; for when I set the idea of •cold alongside that of •water hardened into a transparent solid body, I can perceive no connection between them; no-one can show one to be a necessary effect of the other, or give a shadow of reason why nature has conjoined them. But don't we learn their conjunction from experience? True; experience informs us that they *have been* conjoined in the past; but no-one has ever had any experience of what is future, and that's our question—*How do we come to believe that the future will be like the past?* Has the author of nature promised this? Or were we told about his planning at the time when he established the present laws of nature and settled how long they were to continue for? No, surely. Indeed, if we believe that there *is* a wise and good author of nature, we can see a good reason why he should give a long lease of life to the same laws of nature and the same connections of things. The reason is that if he did otherwise we couldn't learn anything from what is past, and all our experience would be useless to us. But though this consideration can when we come to the use of reason confirm our belief in the continuance of the present course of nature, it can't have given rise to this belief ·in the first place·, for children and idiots have this belief as soon as they know that *fire will burn them.* So it must be an effect of instinct, not of reason.

The wise author of our nature intended that a great and necessary part of our knowledge should be derived from experience before we are capable of reasoning, and

he has provided means that are perfectly adequate to this intention. **(1)** God governs nature by fixed laws, so that we find innumerable connections of things that continue from age to age. Without this stability in the course of nature there could be no experience, or there would be experience but it would be a false guide and lead us into error and trouble. If there were no force for truthfulness in the human mind, men's words wouldn't be signs of their thoughts; and if there were no regularity in the course of nature, no one thing could be a natural sign of something else. **(2)** God has implanted in human minds an original force which leads us to believe in and expect the continuance of the course of nature and of the connections that we have observed in the past. It is through this general force in our nature that when two things have been found connected in the past the appearance of one produces a belief in the other.

I think that the ingenious author of the *Treatise of Human Nature*, David Hume, was the first to point out that our belief in the continuance of the laws of nature can't be founded either on knowledge or probability; but, far from conceiving it to be an original force in the mind, he tries to explain it in terms of his favourite hypothesis, namely that belief is nothing but a certain degree of liveliness in the idea of the thing that is believed. I made one remark on this curious hypothesis in chapter 2, and now I shall make another.

- The belief we have in perception is a belief in the *present* existence of the object.
- The belief we have in memory is a belief in the object's *past* existence.
- The belief I am now discussing is a belief in the object's *future* existence, and
- In imagination there is no belief at all.

What I want Hume to tell me is this: How does it come about that one degree of liveliness ties the existence of the object to the present moment, another carries it back to a past time, a third goes the opposite way and carries it into the future, and a fourth carries it out of existence altogether? Suppose I see the sun rising out of the sea; I remember having seen it rise yesterday; I believe it will rise tomorrow near the same place; I can likewise imagine it rising in that place, without any belief at all. Now, according to Hume's sceptical hypothesis, this perception, this memory, this foreknowledge and this imagination are all *the same idea*, varied only by different degrees of liveliness: the perception of the sun rising is the liveliest idea, the memory of its rising yesterday is the same idea a little fainter, the belief in its rising tomorrow is the same idea fainter still; and the imagination of its rising is *still* the same idea but faintest of all. One would have thought that this idea might gradually pass through all possible degrees of liveliness without stirring out of its position in time; but if we do think this we deceive ourselves (according to Hume), for as soon as the idea begins to grow faint it moves backward into the past. Well, if we grant this, we would at least expect that . . . the more its liveliness fades the further back in time it will go, until it recedes out of sight. But here we are deceived again (according to Hume), for at a certain point in this declining liveliness the idea, as if it had met an elastic obstacle in its backward motion, suddenly rebounds from the past to the future without touching on the present en route. And now that the idea has come into the regions of futurity, we might expect that the future gives it room enough to spend all its remaining vigour; but yet again we are deceived (according to Hume), because the idea makes another vigorous jump up into the airy region of imagination. . . . This article of the sceptical creed is so full of mystery. . . . that it appears to require as

much *faith* as does the Athanasian Creed!

However, I agree with Hume that our belief in the continuance of nature's law is not derived from reason. It is an *instinctive* foreknowledge of the operations of nature, very like the foreknowledge of human actions that makes us rely on the testimony of our fellow creatures; and just as we need the latter if we are to be able to receive information from men by language, so we need the former if we are to be able to receive information about nature by means of experience.

All our knowledge of nature beyond our original perceptions is acquired by experience, and consists in the interpretation of natural signs. The constancy of nature's laws connects the sign with the thing signified, and, by the natural force I have just explained we rely on the continuance of the connections that experience has revealed; and thus the appearance of the sign is followed by the belief in the thing signified.

This aspect of the workings of our constitution is the basis not only for acquired perception but for all inductive reasoning and all our reasoning from analogy; so, for want of another name, let me call it the 'inductive force'. It is what leads us to assent immediately to the axiom on which all our knowledge of nature is built, namely that *effects of the same kind must have the same cause*. For 'effects' and 'causes' in the operations of nature mean nothing but 'signs' and 'things signified by them'. We don't perceive in any natural cause any real causality or effectiveness, but only a connection established in the course of nature between it and what is called its 'effect'. Our constitution makes us expect, independently of all reasoning, that there is a fixed and steady course of nature; and we have an eager desire to discover it. We pay attention to every conjunction of things that presents itself, and expect that conjunction to continue. And when such a conjunction has been often

observed, we think of the things as naturally connected, and the appearance of one carries along with it the belief in the other, without any reasoning or reflection on our part.

If you think that the inductive force can be explained in terms of what philosophers usually call the 'association of ideas', you should bear in mind that this force associates a natural sign are not only with an *idea* but with a *belief in the thing signified*. This can't properly be called an 'association of ideas' unless ideas and belief are one and the same thing. A child has found the prick of a pin conjoined with pain, so now he believes and knows that these things are naturally connected; he knows that the one will always follow the other. If you want to call this only an 'association of ideas' I don't want to argue about words, but I think you are speaking very improperly. For if we express it in plain English, it is a foreknowledge that things you have found conjoined in the past will be conjoined in the future. And this foreknowledge is an effect not of reasoning but of an original force in human nature, which I have called the 'inductive force'.

This force, like the force for trust, is unlimited in infancy and is gradually restrained and regulated as we grow up. It leads us often into mistakes, but on the whole it is infinitely helpful to us. By the inductive force

- (1) a child who has once been burnt keeps away from the fire, and
- (2) a child who has once been inoculated runs away from the surgeon who did it.

It is better that he should do (2) than that he should not do (1). But the mistakes we are led into by these two natural forces are of different kinds. Men sometimes lead us into mistakes when we perfectly understand their language, by speaking lies. But nature never misleads us in *this* way; her language is always true, and it is only by misinterpreting it that we fall into error. There must be many •accidental

conjunctions of things, as well as •natural connections; and •the former are apt to be mistaken for •the latter. Thus in example (2) the child connected the pain of inoculation with the surgeon, whereas it was really connected only with the needle's going in. Philosophers and men of science also make such mistakes; indeed all false reasoning in philosophy comes from them. •False reasoning is drawn from experience and analogy just as •sound reasoning is; if it weren't, it wouldn't be plausible; but the difference between them is that between •an unskilful and rash interpretation of natural signs and •a sound and legitimate interpretation of them. If a child or an educated man were told to interpret a book of science, written in his mother tongue, how many blunders and mistakes would he be apt to fall into? Yet he knows as much of this language as he needs for his manner of life.

The language of nature is what we all study, and the students of it belong to different classes. •Brutes, idiots and children engage in this study, and owe to it all their acquired perceptions. •Ordinary not very educated men make more progress with it, and learn through a little thought many things that children don't know. •Philosophers [here = 'scientists'] fill up the top class in this school, and are scholars of the language of nature. All these different classes have one teacher, Experience, enlightened by the inductive force. Take away the light of this inductive force and Experience is as blind as a mole; she may indeed feel what is present and what immediately touches her, but she sees nothing that is spatially or temporally separated from her.

The rules of inductive reasoning, i.e. of a sound interpretation of nature, as well as the fallacies by which we are apt to misinterpret her language, have been brilliantly set out by the great genius of Francis Bacon; so that his *New Organon* can fairly be called 'a grammar of the language of nature'. It adds greatly to the merit of this work, and excuses

its defects, that at the time Bacon wrote it the world had not seen any tolerable model of inductive reasoning from which the rules of such reasoning might be copied. The arts of poetry and eloquence had grown up to perfection when Aristotle described them; but the art of interpreting nature was still an embryo when Bacon described the features and proportions it would have as an adult. Aristotle drew his rules ·for poetry etc.· from models of those arts that are still the best that have appeared; but the best models of inductive reasoning that have appeared, which I take to be the third book of Newton's *Principia* and his *Optics*, were drawn from Bacon's rules! The purpose of all those rules is to teach us to distinguish seeming or apparent connections of things in the course of nature from ones that are real.

Those who are unskilful in inductive reasoning are more likely to fall into error in their •reasonings from the phenomena of nature than in their •acquired perceptions. This is because we often •reason from *a few* instances, and thus risk mistaking accidental conjunctions of events for natural connections; whereas the •habit of passing without reasoning from the sign to the thing signified, which is what acquired perception is, has to be learned through *many* instances or experiments; and the number of experiments serves not only to confirm our belief in natural connections but also to disconnect the events that have been accidentally conjoined.

From the time that children begin to use their hands, nature directs them to handle everything over and over, to look at it while they handle it, and to put it in various postures and at various distances from the eye. We are apt to excuse this as something that children do because they have to be doing *something* and haven't the mental resources to entertain themselves in a more grown-up way. But if we think more justly we'll find that they are engaged in a most serious and important study, and if they had all

the reason of a philosopher they couldn't be better employed. For it is this childish conduct that enables them to make proper use of their eyes. Through it they every day acquire habits of perception that are of greater importance than anything we could teach them. The original perceptions that nature gave them are few, and insufficient for the purposes of life; so she made them capable of acquiring many more perceptions by habit. And to complete her work she has made children tireless in conducting the exercises by which those perceptions are acquired.

This is the education that nature gives to her children. And while I am on this topic I might as well add that another part of nature's education is that in the natural course of things children often can't gratify their curiosity and satisfy their appetites without exerting all their muscular force and employing all their ingenuity. What they want can be obtained only at the expense of labour and patience and many disappointments. By the exercise of body and mind necessary for satisfying their desires, they acquire agility, strength and dexterity in their motions, as well as health and vigour in their constitutions; they learn patience and perseverance; they learn to take pain in a good spirit and to bear up under disappointment. Nature's education is most perfect in savages, who have no other tutor; and we see that in

the acuteness of all their senses,
the agility of their motions,
the hardiness of their constitutions, and
the strength of their minds to bear hunger, thirst, pain
and disappointment,

savages commonly far exceed civilized people. This seems to be what has led a very able writer to prefer the savage life to that of society. But nature's education, unaided, could never produce a Rousseau! Nature intends that human education

should be added to her régime in order to form the man. And she has equipped us for human education by the natural forces for imitation and for trust, which reveal themselves almost in infancy, as well as by others that develop later.

When the education we receive from men doesn't give scope to nature's education, it is wrongly directed; it tends to hurt our faculties of perception, and to weaken both the body and mind. Nature has her way of rearing men, as she has her way of curing their diseases. •The art of medicine is to follow nature, imitating her and helping her to cure the diseases; and •the art of education is to follow nature, helping and imitating her in her way of rearing men. In ancient times the inhabitants of the Balearic Islands followed nature in teaching their children to be good archers: they hung their dinner up high by a thread, and left the youngsters to bring it down by their skill in archery!

The education of nature, with the addition only of such human care as is needed to preserve life, makes a perfect savage. Human education added to that of nature can make a good citizen, a skillful artisan, or a well bred man. But to produce a Rousseau, a Bacon or a Newton there must be tutoring ·not only from nature and from men, but also· from reason and reflection. Despite the innumerable errors committed in human education, hardly any education is so bad that it's worse than having none. And I think that even Rousseau, if he had to choose whether to educate a son among the French, the Italians, the Chinese or the Eskimos, wouldn't choose the Eskimos.

When reason is properly employed it will confirm the documents of nature, which are always true and wholesome; and it will distinguish the good from the bad among the documents of human education, rejecting the bad with modesty [here = 'without making a big fuss'] and holding onto the good with reverence.

Most men continue throughout their lives to be just what
•nature and •human education made them. Their behaviour,
their opinions, their virtues and their vices are all acquired

by habit, imitation and instruction, and reason has little or
no share in forming them.

Chapter 7: Conclusion

Reflections on the opinions of philosophers on this subject

There are two ways in which men can form their notions and opinions about the mind, and about its powers and operations. The •first is the only way that leads to truth, but it is narrow and rough, and few have entered on it. The •second is broad and smooth, and has been much travelled—not only by the vulgar but even by philosophers. It is sufficient for everyday life and is suitable for the purposes of the poet and orator, but in philosophical investigations of the mind it leads to error and delusion.

We may call the •first of these ways *the way of reflection*. When the mind is at work we are conscious of its workings; it is in our power to attend to them and reflect on them until they become familiar objects of thought. This is our only way of forming sound and accurate notions of those mental operations. But this attention and reflection is so hard for us, surrounded as we are by external objects that constantly claim our attention, that it has been very little practised, even by philosophers. Many times in the course of this *Inquiry* I have had reason to remark on how little attention has been given to the most familiar operations of the senses.

The •second, and the most common, way in which men form their opinions about the mind and its operations may be called *the way of analogy*. There is nothing in the course of nature that is so special that we can't find some resemblance, or at least some analogy, between it and other things with which we are acquainted. The mind naturally delights in hunting after such analogies, and it attends to them

with pleasure. From them poetry and wit derive a great part of their charms, and eloquence gets a good deal of its persuasive force from them. Besides the *pleasure* we receive from analogies, they are of very considerable *use*, both in •helping us to *think* about things that we can't easily get hold of without that handle, and in •leading us to probable conjectures about the nature and qualities of things that we haven't the means to investigate more directly. When I consider that the planet Jupiter is like the earth in this:

it rotates around its own axis, revolves around the sun, and is lit up by several secondary planets as the earth is lit up the moon,

I am inclined to conjecture from analogy that, as these features of the earth fit it to be the habitation of various orders of animals, they also make the planet Jupiter fit to contain animals; and having no more direct and conclusive argument to settle the matter, I accept the conclusion of this analogical reasoning, with a degree of assent proportioned to its strength. When I observe that the potato plant very much resembles the solanum in its flower and fruit, and am informed that the solanum is poisonous, I am inclined from analogy to have some suspicion of the potato; but in this case I have access to more direct and certain evidence, and therefore ought not to trust to analogy, which would lead me into an error.

•Arguments from analogy are always easily available, and crop up spontaneously in a fruitful imagination; but •arguments that are more direct and more conclusive often require painful attention and concentration; which is why mankind in general have been strongly inclined to trust to •the former. Look carefully at the systems of the ancient

philosophers, either concerning the material world or concerning the mind, and you'll find them to be built solely on the foundation of analogy. Francis Bacon first described the strict and severe method of *induction*; since his time it has been applied with great success in some parts of natural philosophy and very little in anything else. There is in fact no subject in which mankind are so strongly inclined to trust to the analogical way of thinking and reasoning as they are in what concerns the mind and its workings; because forming clear and distinct notions of those workings in the direct and proper way, and reasoning about them, requires a habit of *attentive reflection* of which few people are capable, and of which *no-one* is capable without much trouble and hard work.

Every man is apt to form his notions of things that are unfamiliar or hard to grasp from their analogy with things that are more familiar. Thus, if a sailor. . . were to start theorizing about the powers of the mind, he would no doubt. . . find in the mind sails, masts, rudder, and compass!

Sensible objects of one kind or another occupy and engross the rest of mankind as much as ship-related things occupy the sailor. For much of our lives we can think of nothing but the objects of sense; and it is hard, even after we come to years of reflection, to attend to things of a different kind in such a way as to form clear and distinct notions of them. So the condition of mankind provides good reason to expect •that their language and their common notions relating to the mind and its operations will be analogical, and derived from the objects of sense; and •that these analogies will be apt to deceive philosophers as well as on the vulgar, leading them to *materialize* the mind and its faculties. And experience abundantly confirms the truth of this expectation.

The names given to the soul in almost all languages sufficiently testify to how generally men of all nations at all

times have conceived the soul or generator of thoughts in man to be some subtle *matter*, like breath or wind. We have words that are proper [= 'literally and strictly correct'], and not analogical, to express the various ways in which we perceive external objects by the senses—words such as 'feeling', 'sight' and 'taste'—but we are often obliged to use these words analogically, to express other powers of the mind that are of a very different nature, ·for instance when we talk about '*seeing* that there is something wrong with his argument'. And for the powers that involve some degree of reflection we generally have only analogical names. The objects of thought are said to be

- in* the mind, ·though the mind is not spatial·,
- weighed, ·though mental items have no weight·,
- apprehended—·from Latin *apprehendere* = 'seize'·,
- comprehended—·from *comprehendere* = 'seize'·,
- conceived—·from *concipere* = 'contain' or 'grasp'·
- imagined—·from *imago* = 'picture' or 'image'·,
- retained—·from *retinere* = 'hold back'·,
- ruminated—·from *ruminare* = 'chew the cud'·.

The notions that the ancient philosophers had regarding the nature of the soul don't appear to have been much more refined than those of the vulgar, or to have been formed in any other way. I shall distinguish philosophical positions regarding the soul into the 'old and the 'new'. •The old is now almost extinct: it lasted until the time of Descartes, who gave it a fatal blow from which it has been slowly dying ever since. Descartes is the father of •the new philosophy of the soul, but it has been gradually improving since his time, on principles laid down by him. The old philosophy seems to have been purely analogical; the new is derived more from reflection, but still with a very considerable mixture of the old analogical notions.

Because the objects of sense consist of *matter* and *form*, the ancient philosophers thought that everything must belong to one of these categories or to be made up of both. Thus, some thought that the soul is a particular kind of subtle [= 'very finely divided'] *matter*, separable from our gross [= 'lumpy'] bodies; others thought that it is only a particular *form* of the body, and inseparable from it. For it seems that some of the ancients, like some of the moderns, thought that a certain structure or organization ·or form· of the body is all that is necessary to make it capable of sensing and thinking. These philosophers thought that the different powers of the mind belong to different parts of the body—e.g. the heart, the brain, the liver, the stomach, the blood.

Those who thought that the soul is a subtle matter separable from the body argued about which of the 'four elements' it belongs to, whether to earth, water, air, or fire. Each of these except earth had its particular advocates. But some thought that it involves all the elements: something in its make-up must be similar to everything we perceive (they argued), and we perceive earth by the earthly part of the soul, water by its watery part, and fire by its fiery part. Some philosophers wanted to know not just what kind of matter the soul is made of but also what its *shape* is; and they decided that it is spherical, so as to be more fit for motion. Among the ancient philosophers the most spiritual and sublime notion concerning the nature of the soul was that of the Platonists, I think. They held that the soul is made of the same •heavenly and •incorruptible matter that the fixed stars were made of, and therefore has a natural tendency to ·fly upwards to· rejoin its proper element. I can't work out which of these classes of philosophers Aristotle belonged to. He defines the soul to be the first *entelekheia* ·of a natural body that has potential life. Forgive me for not translating the Greek word—I don't know what it means!

[In Aristotle's use: the essential nature or informing principle of a living thing; the soul'—*New Shorter Oxford English Dictionary*.]

The ancient philosophers' notions of the *operations* of the mind, particularly with regard to perceptions and ideas, seem also to have been formed by the same kind of analogy.

Of the philosophers whose writings we have, Plato was the first to introduce the word 'idea' into philosophy, but his doctrine of ideas was somewhat peculiar. He agreed with the other ancient philosophers that all things consist of matter and form; and that

the *matter* of which all things are made exists from eternity, without form;

but he also believed that

there are eternal *forms* of all possible things, and these exist without matter;

and to these eternal and immaterial forms he gave the name 'ideas', maintaining that they are the only objects of true knowledge. It doesn't matter much to us whether he borrowed these notions from Parmenides or whether they came from his own creative imagination. The later Platonists seem to have improved on them: they conceived those ideas or eternal forms of things to exist not of themselves but in the mind of God, and to be the models and patterns according to which all things were made. . . .

Malebranche's views are close to these Platonic notions. He seems to have been more aware than anyone else of the difficulties that come with the common hypothesis concerning ideas, namely that *ideas of all objects of thought are in the human mind*. To avoid those difficulties, Malebranche contends that •the ideas that are the immediate objects of human thought are •the ideas of things in the mind of God; because God is intimately present to every human mind, he can reveal *his* ideas to *it* as far as he pleases.

Apart from the Platonists and Malebranche, every philosopher that I know of has thought that there are ideas or images of every object of thought in the human •mind, or at least in some part of the •brain where the mind is supposed to have its residence.

Aristotle had no great liking for the word 'idea', and seldom or never uses it except when refuting Plato's notions about ideas. He thought that matter can exist without form, but that forms can't exist without matter—i.e. that for a form to exist there must be something that *has* it. But at the same time he taught •that there can be no sensing, imagining or thinking without forms, phantasms or species in the mind; and •that things that can be sensed are perceived by 'sensible species', while things that can be thought are perceived by 'intelligible species'. His followers went into more detail. They held that those sensible and intelligible species are •emitted by the objects, and •make their impressions on the passive intellect; and that the active intellect perceives those impressions. This seems to have been the common opinion while the Aristotelian philosophy retained its authority.

The Epicurean doctrine, as explained by Lucretius, though widely different from the Aristotelian one in many things, is almost the same in this. He affirms that slender films or ghosts, *tenuia rerum simulacra* [= 'fine, delicate copies of things'] go on being emitted from all things and flying about; and that these, being extremely subtle, easily penetrate our gross bodies, strike on the mind, and thus cause thought and imagination.

After the Aristotelian system had reigned for more than a thousand years in the colleges of Europe, almost without a rival, it *sank* when it ran up against the system of Descartes. The clarity of his writings and notions, contrasted with the obscurity of Aristotle and his commentators, created a strong prejudice in favour of his new philosophy. The characteristic

of Plato's genius was •sublimity, that of Aristotle's •subtlety; but Descartes far excelled both in •clarity, and he bequeathed this spirit to his successors. The theory about the mind and its workings that is now generally accepted gets from Descartes not only its •spirit but its •basic principles; and even after all the improvements made by Malebranche, Locke, Berkeley and Hume, it can still be called 'the Cartesian system'. So I shall make some remarks about its spirit and tendency in general, and about its doctrine of ideas in particular. There will be five of these; they will bring us to the end of this book.

1. The method that Descartes pursued naturally led him to attend more to the operations of the mind by accurate reflection, and to trust less to analogical reasoning on this subject, than any philosopher had done before him. Intending to build a system on a new foundation, he began with a resolve to admit nothing that wasn't absolutely certain and evident. He supposed that his senses, his memory, his reason and every other faculty to which we trust in common life might be deceptive; and he resolved to disbelieve everything, until he was compelled by irresistible everything to assent •to something.

What appeared to him first of all to be certain and evident was •*That he thought, that he doubted, that he deliberated*. In short, he held that the workings of his own mind, of which he was conscious, must be real and not illusory; and that even if all his other faculties were to deceive him, his consciousness could not. So he looked on •this as the first of all truths. This was the first firm ground on which he set his foot after being tossed around in the ocean of scepticism; and he resolved to build all knowledge on it without looking for any more first principles.

This would involve him in starting with what he knew by consciousness and rigorously deducing from that every other

truth, and particularly the existence of the objects of sense; so he was naturally led to attend to the ·mental· operations of which he was conscious, without ·analogically· borrowing his notions of them from external things.

It wasn't analogical thinking but attentive reflection that led Descartes to this conclusion:

Thought, volition, memory and the other attributes of the mind are altogether *unlike* extension, shape, and all the attributes of body; so we have no reason to regard •thinking substances as having any resemblance to •extended substances; and as the attributes of the thinking substance are things of which we are conscious, we can have a more certain and immediate knowledge of them by reflection than we can have of external objects by our senses.

As far as I know, Descartes was the first to make these observations; and they are more important and more illuminating than everything that had previously been said on this subject. They ought to make us suspicious of—and nervous about accepting—*any* notion concerning the mind and its operations that is drawn by analogy from sensible objects, and to make us rely only on accurate reflection as the source of all real knowledge on this subject.

2. I observe that just as the Aristotelian system tends to *materialize the mind* and its operations, so the Cartesian system tends to *spiritualize body* and its qualities. The two systems share a single error which leads •through analogy to the first of these extremes and •through reflection to the second of them. The error I mean is the view that we can't know anything about body or its qualities except by having sensations that *resemble* those qualities. The two systems agreed in this, but according to their different methods of reasoning they drew very different conclusions from it. The Aristotelian drew his notions of sensation from the qualities

of body, whereas the Cartesian drew his notions of the qualities of body from his sensations.

The Aristotelian, taking it for granted that bodies and their qualities really do exist and are such as we commonly take them to be, inferred from them the nature of his sensations, and reasoned in this manner:

Our sensations are the impressions that sensible objects make on the mind, and can be compared to the impression of a seal on wax; the impression is the likeness or form of the seal without the matter of it; similarly, every sensation is the likeness or form of some sensible quality of the object.

This is the reasoning of Aristotle, and it has an obvious tendency to *materialize the mind* and its sensations.

The Cartesian, on the other hand, thinks that the existence of the body or of any of its qualities is not to be taken as a first principle, and that we oughtn't to admit anything about it except what can by valid reasoning be deduced from our sensations. And he knows that by reflection we can form clear and distinct notions of our sensations without borrowing our notions of them by analogy from the objects of the senses. So the Cartesians, beginning by attending to their sensations, first discovered that the sensations corresponding to secondary qualities can't resemble any quality of body. From this Descartes and Locke inferred that sound, taste, smell, colour, heat and cold, which the vulgar took to be qualities of body, were not qualities of body but mere sensations of the mind. Afterwards the ingenious Berkeley paid closer attention to the nature of sensation in general, and discovered and demonstrated that no sensation whatever could possibly resemble any quality of an unthinking being such as body is supposed to be; from which he inferred, quite validly, that there is the same reason to hold that extension, shape, and all the primary qualities

are mere sensations as there is to hold that the secondary qualities are mere sensations. Thus, by valid reasoning from the Cartesian principles matter was stripped of all its qualities; the new system. . . converted all the qualities of matter into sensations, thus spiritualizing body, as the old system had materialized spirit.

The way to avoid both these extremes is to admit •the existence of what we see and feel as a first principle, as well as •the existence of things of which we are conscious; and (with the Aristotelians) to take our notions of the qualities of body from the testimony of our senses, and (with the Cartesians) take our notions of our sensations from the testimony of consciousness.

3. Modern scepticism is the natural offspring of the new system; and although the system didn't give birth to this monster until the year 1739 when Hume's *Treatise of Human Nature* was published, it can be said to have carried it in its womb from the beginning.

The old system accepted all the principles of common sense as first principles, without requiring any proof of them; and therefore, though its reasoning was commonly vague, analogical and dark, it was built on a broad foundation and had no tendency to scepticism. I don't find any Aristotelian thinking he ought to prove the existence of a material world; but every writer on the Cartesian system tried to do this, until Berkeley clearly demonstrated the futility of their arguments, from which he concluded that there is no such thing as a material world and that the belief in it ought to be rejected as a vulgar error.

The Cartesian system accepts only one of the principles of common sense as a starting-point, and claims to deduce all the rest from it by strict argumentation. The accepted starting-point is the thesis that *our thoughts, our sensations and everything of which we are conscious has a real exis-*

tence; and everything else must be made evident by the light of reason. Reason must erect the whole structure of knowledge on the foundation of this single principle of consciousness.

There is a disposition in human nature to bring things down to as few principles as possible; and having very few principles certainly adds to the beauty of a system *if* the principles can take the weight that is placed on them. The mathematicians are entitled to glory in having raised so noble and magnificent a system of science on the foundation of a few axioms and definitions. But this •love of simplicity, of basing everything on a few principles, has produced many a false system, and there never was any system in which •it appears so remarkably as that of Descartes. His whole system concerning matter and spirit is built on one axiom, expressed in one word, *Cogito* [= 'I think']. On the foundation of conscious thought, with ideas for his materials, he builds his system of the human understanding and tries to account for all its phenomena; and having (he thought) proved from his consciousness the existence •of matter and •of a certain quantity of motion originally conferred on it, he builds his system of the material world and tries to account for all *its* phenomena.

These principles concerning the material system have been found to be inadequate. It has become clear that besides •matter and motion we must also admit •gravitation, •cohesion and •corpuscular attraction, •magnetism, and other •centripetal and •centrifugal forces by which the particles of matter attract and repel each other. Newton discovered this, demonstrating that these forces don't come down to matter and motion; and he was led by analogy and the love of simplicity to conjecture—not dogmatically, but with his characteristic modesty and caution—that all the phenomena of the material world depend on •attracting and

•repelling forces in the particles of matter. But I venture to say that this conjecture fell short of the mark. For even in the inorganic kingdom the powers by which salts, crystals, spars and many other bodies come together into regular forms can never be accounted for by forces of attraction and repulsion in the particles of matter. And in the plant and animal kingdoms there are strong indications of powers of a different nature from all the powers of inorganic bodies. So we see that although in the structure of the material world there is certainly all the beautiful simplicity consistent with the purposes for which it was made, it isn't as simple as the •great Descartes said it is; indeed, it isn't as simple as the •greater Newton modestly conjectured it to be. Both were misled by analogy, and the love of simplicity. Descartes had had a great deal to do with extension, shape, and motion; Newton had enlarged his views to take in attracting and repelling forces; and both formed their notions of the unknown parts of nature from those with which they were acquainted— . . . thus engaging in analogical thinking.

But to come to Descartes's system concerning the human understanding: as I have already noted, it was built on consciousness as its sole foundation and with ideas as its materials; and all Descartes's followers have built on the same foundation and with the same materials. They acknowledge that nature has given us various •simple ideas. These are analogous to the •matter of Descartes's physical system. They also acknowledge a •natural power by which ideas are compounded, disjoined, associated, compared. This is analogous to the •original quantity of motion in Descartes's physical system. From these starting-points they try to explain the phenomena of the human understanding, just as in the physical system the phenomena of nature were to be explained by matter and motion. It must indeed be acknowledged, that there is great simplicity in this system

as well as in the other. They are alike to an extent that might be expected in children of the same father; one of them has been found to be the child of Descartes rather than of nature, so there is reason to think that Descartes fathered the other one as well.

It is obvious that the natural outcome of this system is scepticism with regard to everything except the existence of our ideas and of the necessary relations amongst them that appear when we compare them: because from

- ideas are the only objects of thought, and
- ideas have no existence except when we are conscious of them,

it necessarily follows that

- no object of our thought can have a continued and permanent existence.

We have been accustomed to regarding body and mind, cause and effect, time and space, as existing independently of our thought; but they are all turned out of existence by this short dilemma:

- Either these things are ideas of sensation or reflection, or they are not;
- if they *are*, they can't exist except when we are conscious of them;
- if they *are not*, they are words without any meaning.

Neither Descartes nor Locke perceived this consequence of their system concerning ideas. Bishop Berkeley was the first who discovered it. And what followed on this discovery? Why, •with regard to the material world and with regard to space and time he accepts the conclusion that these things are mere ideas, and have no existence except in our minds; but •with regard to the existence of spirits or minds he does not accept that conclusion—and if he had done so he would have been an absolute sceptic. But how does he evade this conclusion with regard to the existence of spirits?

The expedient that the good bishop uses on this occasion is very remarkable, and shows his great dislike for scepticism. He maintains •that we have no ideas of spirits, and •that we can think and speak and reason about them and their attributes without having any ideas of them. If this is so, my lord bishop, what is to prevent us from thinking and reasoning about bodies and their qualities without having ideas of them? The bishop either didn't think of this question or didn't think fit to give any answer to it. However, I would point out that in order to avoid scepticism Berkeley openly jumps away from the Cartesian system, without giving any reason why he does so in this instance and in no other. This indeed is the only case of a deviation from Cartesian principles that I have met with in Descartes's successors; and it seems to have been only a sudden lurch caused by a terror of scepticism, for in everything else Berkeley's system is founded on Cartesian principles.

Thus we see, that Descartes and Locke take the road that leads to scepticism, without knowing the end of it; but they stop short for lack of light to take them further. Berkeley, frightened at the appearance of the dreadful abyss of scepticism, abruptly turns aside and avoids it. But Hume is more daring and intrepid: without turning aside to the right hand or to the left, like Virgil's Alecto, he shoots directly into the gulf. [Reid then quotes three Latin lines by Virgil.]

4. The new system gives an extremely lame and imperfect account of the part of the furniture of the human understanding that is the gift of nature rather than being acquired by our own reasoning faculty.

The natural furniture of the human understanding is of two kinds:

- the •notions or simple apprehensions that we have of things, and
- the •judgments or beliefs that we have concerning them.

The new system puts all our notions into two classes: •ideas of sensation, which are taken to be copies of our sensations that are retained in the memory or imagination; •ideas of reflection, which are taken to be copies of the workings of our minds of which we are conscious, similarly retained in the memory or imagination. We are told that these two classes include all the materials about which human beings do or can think. As to our judgment of things, or the beliefs that we have concerning them, the new system allows no part of them to be the gift of nature, but regards them all as acquired by reason through comparing our ideas and perceiving their 'agreements' or 'disagreements'. I regard this account as extremely imperfect, both in what it says about our notions and in its treatment of our judgments or beliefs. I shall briefly point out some of its main defects.

The division of our notions into ideas of sensation and ideas of reflection is contrary to all rules of logic, because the second member of the division includes the first. We can't form clear and sound notions of our sensations in any way except by reflection.

Sensation is an operation of the mind of which we are conscious; and we get the notion of sensation by reflecting on what we are conscious of.

Similarly,

doubting and believing are operations of the mind of which we are conscious, and we get the notion of *them* by reflecting on what we are conscious of.

So the ideas of sensation *are* ideas of reflection, as much as the ideas of doubting or believing, or any other ideas whatsoever.

Apart from its logical inaccuracy, this division of our notions or ideas is extremely incomplete. For, since sensation is as much an operation of the mind as any of the other things of which we form our notions by reflection, when

we are told 'All our notions are either ideas of sensation or ideas of reflection', what this means in plain English is: 'Human beings don't and can't think of anything except the operations of their own minds.' Nothing can be more contrary to truth, or more contrary to the experience of mankind. I know that Locke, while he maintained this doctrine, believed that our notions of body and of its qualities, and of motion and of space, are ideas of sensation. But why did he believe this? It was because he believed those notions to be nothing but images [= 'likenesses'] of our sensations. Well, then, if in fact the notions of body and its qualities, of motion and of space are *not* likenesses of our sensations, won't it follow that those notions are not ideas of sensation? It certainly will.

No doctrine in the new system leads more directly to scepticism than this. And Hume knew very well how to use it for that purpose; for if you maintain that there is any such existing thing as body or mind, time or place, cause or effect, he immediately catches you between the horns of this dilemma: your notions of these things are either ideas of sensation or ideas of reflection; if of sensation, from what sensation are they copied? if of reflection, from what operations of the mind are they copied?

It is indeed to be wished that those who have *written* much about sensation and the other operations of the mind had also carefully *thought and reflected much* on those operations! But isn't it very strange that they won't allow it to be possible for mankind to think of anything else?

This system's account of our judgment and beliefs about things is as far from the truth as its account of our notions or simple apprehensions. It represents our senses as having no role except to provide the mind with notions or simple apprehensions of things; and it says that our judgment and belief about those things are acquired by relating our

notions to one another and perceiving their agreements or disagreements.

I have shown, on the contrary, that every operation of the senses *includes* judgment or belief as well as simple apprehension. Thus, when I feel the pain of gout in my toe, I have not only a •notion of pain but a •belief in its existence and a •belief in something wrong in my toe that is causing it. And this belief isn't produced by inter-relating ideas and perceiving their agreements and disagreements; it is included in the very nature of the sensation. When I perceive a tree in front of me, my faculty of seeing gives me not only a •notion or simple apprehension of the tree, but a •belief in its existence, its shape, its distance and its size; and this judgment or belief is not acquired by comparing ideas—it is included in the very nature of the perception. I have already called attention to several original forces for belief in the course of this *Inquiry*; and when other faculties of the mind are examined we shall find others that haven't come up in the examination of the five senses. Such original and natural judgments are therefore a part of the provision nature has made for the human understanding. Just as much as our notions or simple apprehensions, they are put into our minds by God. They serve to direct us in the everyday affairs of life, where our reasoning faculty would leave us in the dark. They are a part of our constitution, and all the discoveries of our reason are based on them. They make up what is called 'the common sense of mankind'; and what is plainly contrary to any of them is what we call 'absurd'. Their strength is 'good sense', which is often found in people who are not highly intelligent. A remarkable deviation from them, arising from a disorder in the person's constitution, is what we call 'lunacy', as when a man believes that he is made of glass. When a man allows himself to be reasoned out of the principles of common sense by metaphysical arguments, we may call this

‘metaphysical lunacy’, which differs from the other sort of lunacy in being intermittent rather than continuous: it is apt to seize the patient in solitary and speculative moments; but when he comes into the company of others common sense recovers its authority. A clear listing and explanation of the principles of common sense is one of the chief things that logic should provide. I have considered only the ones that came up in the examination of the five senses.

5. Although the new system professes to set out on the route of reflection, not that of analogy, it has retained some of the old analogical notions concerning the workings of the mind, particularly this one:

Things that don’t now exist in the mind itself can only be perceived, remembered or imagined by means of ideas or likenesses of them in the mind, which are the immediate objects of perception, memory and imagination.

This doctrine seems evidently to be borrowed from the old ·Aristotelian· system, which taught that external things make impressions on the mind like the impressions of a seal on wax; that it is by means of those impressions that we perceive, remember or imagine them; and that those impressions must resemble the things from which they are taken. When we form our notions of the operations of the mind by analogy, this way of conceiving them seems to be very natural, and offers itself to our thoughts. Everything that is ·tactually· felt must make some impression on the body, and so we are apt to think that everything that is understood must make some impression on the mind.

This analogical sort of reasoning seems to be the source of the opinion—so universally accepted among philosophers—that there are ideas or images of things in the mind. I have pointed out that Berkeley at one point deserts this principle of the new system by affirming that we have no ideas of

spirits, and that we can think of them immediately, without ideas. But I don’t know whether anyone has followed him in this. The modern philosophers also somewhat disagree amongst themselves regarding the ideas or images by which (they say) we perceive, remember or imagine sensible things. They all agree about the *existence* of such images, but they differ about *where* they are: some say they are in a particular part of the •brain where the soul is thought to reside, while others place them in the •mind itself. Descartes held the first of these opinions, and Newton seems to have favoured it also. . . . But Locke seems to place the ideas of sensible things in the mind, and it is obvious that Berkeley and Hume were of the same opinion. Hume makes a very curious application of this doctrine, by trying to prove from it that the mind is either an extended and divisible substance or not a substance at all, because the ideas of extension can’t be in a subject that is indivisible and unextended.

In this as in most things, Hume’s reasoning is admittedly clear and strong. For whether ‘the idea of extension’ is

only another name for extension itself,

as Berkeley and Hume assert, or

an image and resemblance of extension,

as Locke thought—either way, any man of common sense will agree that the idea of extension cannot be *in* an unextended and indivisible subject. But while I agree with Hume in his reasoning, I would make a different application of it. He takes it for granted that there are ideas of extension in the mind, from which he infers that if the mind is a substance at all it must be an extended and divisible one. I on the other hand take it for granted on the testimony of •common sense that my mind is a substance, i.e. a permanent subject of thought; and my •reason convinces me that it is an unextended and indivisible substance; and from this I infer that there can’t be anything in it that resembles extension. If this reasoning

had occurred to Berkeley, it would probably have led him to accept that we can think and reason not only about *spirits* but also about *bodies* without having ideas of them in the mind.

I had intended to examine more fully and in more detail this doctrine that *there are ideas or images of things in the mind*; and also another doctrine that is based on it, namely that *judgment or belief is nothing but a perception of the agreement or disagreement of our ideas*. But all through this work I have shown that the operations of the mind that I have examined do not favour either of these doctrines, and in many things contradict them; so I have thought it right to drop this part of my plan. If there is any need for it, it can be done better after inquiring into some other powers of the human understanding.

Although I have examined only the five senses, and the forces in the human mind that •are active in them or •have come to our notice in the course of this examination, I shan't push on further with this inquiry until I have thought some more. The powers of

memory,
 imagination,
 taste,
 reasoning,
 moral perception,
 the will,
 the passions,

the affections, and
 all the active powers of the soul
 present a vast and boundless field of philosophical inquiry, which I am far from thinking myself able to survey with accuracy. Many able authors, ancient and modern, have made excursions into this vast territory and have communicated useful observations; but there is reason to believe that those who have claimed to give us a map of the whole territory have satisfied themselves with a very inaccurate and incomplete survey of it. If Galileo had attempted a complete system of natural philosophy, he would probably have done little service to mankind; but by confining himself to what he could understand, he laid the foundation for a system of knowledge that is coming into existence gradually, and that does honour to the human understanding. Newton, building on this foundation and in the same way confining his inquiries to the law of gravitation and the properties of light, performed wonders. If he had attempted a great deal more he would have done a great deal less, and perhaps nothing at all. I have wanted to follow these great examples—though with shorter strides, alas! and with less force—so I have attempted an inquiry into just one little corner of the human mind. It seems to be the corner that is most exposed to vulgar observation and is most easily comprehended; but if I have described it accurately, you must admit that the accounts previously given of it were very lame and wide of the truth.