Sketch for an Historical Picture of the Advances of the Human Mind

Nicolas de Condorcet

1795

[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 brief passage that seems to present more difficulty than it is worth. Longer omissions are reported between brackets in normal-sized type.—The author's frequent first-person plural ('We shall show. . . ') is replaced through out by the singular. In the work's final paragraph he refers to himself only as 'the philosopher'.—The many quiet switches from a past tense to the present tense (e.g. in the long paragraph on page 3) all occur in the French.—The A-B-C section-headings in two of the chapters are added. So are cross-headings in small capitals; each of these marks the place where a substantial new theme is launched, but there is no special indication of where it ends.—The title indicates that this was to be a preliminary sketch for a fuller picture, referred to as 'the work itself' on pages 7, 105 and 109, which explains the author's frequent mentions of what he *will* show.—His full name was Marie-Jean-Antoine-Nicolas Caritat, Marquis de Condorcet.

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Contents

Glossary

advance: Translates *progrès* in the many places—including the work's title—where *progrès* is used as a plural noun. Its singular occurrences are translated by 'progress'.

alter: To be understood in the same sense as the French *altérer*, which it everywhere translates. The French means 'change for the worse'; we have no English word with that meaning; hence this note, which also applies to 'alteration'.

anathema: A formal act of consigning someone to damnation.

arbitrary: In early modern uses, this means 'chosen', resulting from someone's decision, or the like, with no implication (as there is in today's usage) that there weren't good reasons for the choice. On pages 16 and 69 the emphasis is on contrasting what happens because of what •some powerful person decides and what happens because of what •the law says.

art: Any practical activity that is governed by rules and (same thing?) requires skill. Portraiture, sculpting, farming, carpentry, weaving,. . .

caste: This translates *caste*. As used on pages 18–22 the word refers to cults, cliques, self-proclaimed 'professions', or the like. The meaning is vague but defnitely derisive.

Christ: Condorcet uses this in its original meaning, as a general term meaning the same as 'messiah'. He gives both terms initial capitals but does not mean them as proper names. The hyphenated phrase on page 58 should be thought of as 'Jesus, the Christ'.

'civilised': In quotation marks (on pages 12–13 and 53) this word translates *politicés*, which means 'gentler, less rough' or the like.

deism: A deist is someone who believes there is a god (opposite of 'atheist'), but whose theology is *thin* compared with Christianity—e.g. the deist doesn't think of God as intervening in the world.

elysium: The home of the blessed after death in Greek mythology. In the last sentence of this work it occurs translating *élysée*, which was also the name of a royal palace in Paris.

era: Translates *époque*. 'A period of history characterised by a particular state of affairs, series of events, etc.' (OED). That isn't quite what 'epoch' means today, but it was and is the meaning of *époque*.

faculty: *faculté* This means 'basic ability', 'fundamental capacity'—an ability that a man is born with, or possesses in such a way that we can't investigate how or through what mechanism he has it.

irritability: High responsiveness to stimuli.

magistrate: Here, as elsewhere in early modern writings, a 'magistrate' is anyone with an official role in government. The magistracy is the set of all such officials, thought of as a single body.

***mœurs*:** The *mœurs* of a people include their morality, their basic customs, their attitudes and expectations about how people will behave, their ideas about what is decent. . . and so on. This word—rhyming roughly with 'worse'—is left untranslated because it has no English equivalent. Good *English* dictionaries include it, for the same reason they have for including *Schadenfreude*.

nation: This always translates the French *nation*, though

in Condorcet's day a *nation* could be quite small, really no more than a tribe.

observation: In a good many places this translates *observation* in its sense of 'controlled, purposeful, disciplined collection of facts'. That explains why 'observations' are sometimes treated as additional to 'facts' in contexts where clearly *observed* facts are the topic. See for example page 93.

opinion: The six occurrences of this word on page 69 and one each on pages 16, 17, 55 and 79 translate the French *opinion* in a sense that doesn't correspond to any one English word. It's not **an** *opinion* or **the** *opinion* of. . . , but just *opinion*. The definition of it in the Petit Robert dictionary equates it with 'set of mental attitudes dominant in a society'.

***Philosophe*:** As used on page 49 this is a standard French label (and sometimes an English one) for the public intellectuals of the Enlightenment in the 18th century; not necessarily philosophers.

picture: Translates *tableau*, which can also mean 'view' or 'chart' (see page 108).

popular: In early modern times this means 'of the people' or 'accessible to the people'; not (usually) 'liked by the people'.

positive: A positive law (or right) is one that has been made by men; it always stands in contrast with 'natural law (or right)', which is supposed to be inherent in nature and not an upshot of anything humans have done.

prejudice: In Condorcet's time, a *préjugé* could be any preconceived opinion; he mainly uses the word unfavourably, but not as narrowly as we do today in using 'prejudice' to refer to something pre-judged concerning race, sex, etc.

pyrrhonism: The doctrine of Pyyrho, the founder of ancient Greek scepticism, who held that nothing can be known.

speculative: This means 'having to do with non-moral propositions'. Chemistry is a 'speculative' discipline; ethics is a 'practical' one (and so is carpentry; on page 6 and elsewhere speculative/practical is aligned with science/art).

subtleties: *subtilités* When used in the plural in this work, it means 'hair-splitting', 'logic-chopping', or the like. Definitely dyslogistic.

theurgy: A system of white magic, originally practised by the Egyptian Neoplatonists, performed by the invocation and employment of beneficent spirits (Shorter OED).

tribe: This translates both *peuplade* and *tribu*. Condorcet uses *peuplade* when writing about the first three eras and the tenth; and uses *tribu* when writing about the second, third (page 15) and sixth (pages 42 and 47) eras. On page 11 the first 'tribe' is *peuplade* and the other five are *tribu*. If there's a shade of difference in their intended meanings, the present translator can't find it.

vulgar: Applied to people who have no social rank, are not much educated, and (the suggestion often is) not very intelligent.

Ninth era
From the time of Descartes to the formation of the French Republic

We have seen human reason being formed slowly by the natural advances of civilisation; superstition taking it over so as to corrupt it and despotism degrading it and slowing minds down by loading them with fear and suffering.

Only one nation escaped this double influence. In that happy land where liberty had just lit the torch of genius, the human mind—freed from the baby-harness of its infancy—advanced towards the truth with a firm step. But conquest soon introduced tyranny, followed by its inseparable companion, superstition, and the whole race of man is plunged back into darkness which is apparently going to last for ever. However, daylight returned very gradually; eyes long condemned to darkness blinked open and shut, getting used to the light until they could look straight at it, and high intelligence ventured to re-appear on the globe from which fanaticism and barbarity had for so long banished it.

We have seen reason lightening its chains by getting rid of some of them, and preparing and hastening its moment of liberty by steadily acquiring new forces.

We have now to go through the era in which it finally *breaks* them; in which. . . .it gets rid of them, one by one; in which, free at last to go its way, it can't be held up except by obstacles such as are inevitable with each new advance—•results of the very conformation of our intelligence or •obstacles that nature has placed in the way of our discovering the truth. ·That is, no obstacles resulting from human actions or attitudes.·

Religious intolerance had forced seven of the Belgian provinces to throw off Spain's yoke and form themselves into a federal republic. The same cause had revived a spirit of liberty in England, which—tired of long and bloody commotions—finally settled for a constitution that was for a long time admired by philosophy but is now reduced to having no support except national superstition and political hypocrisy.

Lastly, the Swedish nation: it was priestly persecution that gave them the fortitude to seize back some of their rights.

Yet France, Spain, Hungary and Bohemia, amidst the commotions caused by theological quarrels, had seen the annihilation of their feeble liberties, or at least of what looked like liberties.

In the countries said to be free it would be useless to look for the freedom that harms none of the natural rights of man, that doesn't merely affirm that man has those rights but also lets him exercise them. The 'liberty' found in those countries is based on a positive [see Glossary] right that is unequally shared; what privileges it grants to a given man depends on what town he lives in, what class he was born into, how rich he is, or how he makes his living. The best answer we can give to anyone who still maintains that these bizarre distinctions are useful and necessary will be to present a picture showing them—·and thus showing how different they are·—in different nations.

But in these countries civic and personal liberty are guaranteed by the laws. If in them man isn't all that he ought to be, still the dignity of his nature is not totally degraded; some of his rights are at least recognised; he can't any longer be called a slave—only someone who doesn't yet know how to be truly free.

In nations where during this period liberty suffered more or less real losses, the political rights enjoyed by the mass of the people were so restricted that that the loss of them seems to have been more than made up for by the annihilation of the almost arbitrary [see Glossary] aristocracy under which they had groaned. They have lost the title 'citizen', which inequality had made almost illusory; but status of *man* has been more respected, and royal despotism has saved them from feudal oppression, rescuing them from that state of humiliation. . . .

The laws were bound to improve

- •in half-free constitutions, because the interests of those who have the real power there are not always at variance with the general interests of the people; and
- •in despotic states, because the public's prosperity is sometimes mixed up with the despot's, or because the despot—in trying to destroy the remaining authority of the nobles or the clergy—introduces a spirit of equality into the laws.

In the latter case, the motive was to establish an equality of slavery, but the results were often salutary.

I shall expound in detail the causes that have produced in Europe a type of despotism that has not appeared at any earlier time or in any other place. It involved an almost arbitrary authority that was restrained by opinion [see Glossary], governed by enlightenment, and tempered by its own interests; and it has often contributed to the advances of wealth, industry, education and sometimes even to the advances of civil liberty.

Men's *mœurs* were softened by the decay of the prejudices that had kept them fierce, by the influence of commerce and industry (natural enemies of disorder and violence which scare away wealth), by the horror induced by still-fresh mental pictures of the barbarities of the preceding era, by a more general diffusion of the philosophical ideas of equality and humanity, and lastly by the slow but sure effect of the general progress of enlightenment.

Religious intolerance survived, but as a prudent human invention—as a homage to the people's prejudices or as a safeguard against emotional outbreaks from them. It had its ferocity. Burning at the stake, seldom resorted to, was replaced by oppression that was often more arbitrary though less barbaric; and in these recent times persecution appeared only here or there, as an upshot of mere *habit* or of complacency. The behaviour of governments everywhere had reluctantly followed, on all topics, the footsteps of opinion and even of philosophy.

In the political and moral sciences •the level of insight reached by the philosophers is always far above •the intermediate level reached by the general run of thinking men whose shared views constitute what is called 'opinion', while those who direct the affairs of a nation. . . ., whatever its form of government, are at •a lower level still. They follow opinion, but without catching up let alone getting ahead; they are always below it—many years below it, many truths below it.

So now the picture of the philosophical advances and of the spread of knowledge—whose most general and perceptible effects I have expounded—leads us into an era in which the influence of these advances on opinion and of opinion on nations or on their leaders, suddenly stopped being gradual and imperceptible and produced a revolution in the entire populace of certain nations, a secure pledge of the revolution that is bound to embrace the whole human species.

After ages of error, after wandering lost among vague and incomplete theories, writers on law at last came to know the true rights of man, deriving them from this simple truth: *Man is a sentient being, capable of reasoning and of acquiring moral ideas*.

They saw that the sole purpose of men's coming together in political societies was to maintain these rights and that the art of *society* ought to be the art of preserving them with no inequalities and no exceptions. They saw that the means of securing the rights of each individual should be governed by general rules laid down in his community, so that the power of choosing these means and determining these rules could belong only to the majority of the members of that community. Why? Because in this choice no individual can follow his own reason without imposing it on others, so the only principle that can be followed by all without harming equality is the will of the majority.

Each man can commit himself in advance to comply with the will of the majority and this—·if everyone does it·—turns the will of the majority into unanimity; but he can't commit anyone else, and he can't even commit himself to the majority except on the condition that it won't violate his individual rights after having recognised them.

Such are the rights of the majority over the society or its members and the limits of these rights. Such is the origin of the unanimity that makes all the majority's decisions obligatory for everyone, an obligation that ceases to hold when the unanimity ceases to exist because of a change of individuals. No doubt there are issues on which the majority might more often than not decide wrongly, ·i.e.· against the common interest; but what these topics are that oughtn't to be directly settled by majority decisions is something that only the majority can decide. And it alone can •determine who the individuals are whose judgment it will prefer to its own and •set the rules for how those individuals are to go about this business. And it can't dodge its responsibility for pronouncing whether those individuals' decisions have harmed the rights that are common to all.

These simple principles were seen to abolish the idea of there being between a people and its magistrates [see Glossary] a *contract* that could be annulled only by mutual consent or by a violation of the conditions by one of the parties; and to abolish the opinion—less servile but equally absurd—that once a constitution has been established the people are chained to it, as if the right of changing it were not the primary guarantee of every other right! and as if human institutions, necessarily defective and capable of improvement as men learn more, were condemned to last for ever! So it was seen that one had to give up that sneaky and false political theory which—forgetting that the very nature of men gives them equal rights—would in some places **(i)** apportion rights to countries on the basis of the size of territory, the climate, the national character, the wealth of the populace, or the state of commerce and industry, and in other places **(ii)** grant these rights unequally ·within countries· across the different classes of society, according to birth, fortune, or profession. The result of **(ii)** was to create contrary interests and opposing powers, which then created a need for a ·corrective· equilibrium—which •wouldn't be needed if it weren't for these inequalities and in any case •isn't adequate to correct their dangerous influences.

So they no longer ventured to divide mankind into two species,

- •one destined to govern, the other to obey,
- •one destined to lie, the other to be deceived,

and they had to recognise that all men have an equal right to be enlightened—to know all the truths—regarding all their interests, and that no power established *by* the people *for* the people can be entitled to hide anything *from* the people.

These principles, for which the generous ·Algernon· Sydney paid with his life and to which Locke gave the authority of his name, were later developed with greater force, precision and extent by Rousseau, who earned the glory of placing

them among the truths which it is no longer permissible to forget or dispute.

Man has needs, and faculties to provide for them; and the output of these faculties (differently modified and distributed) is a mass of goods that can provide for the community's needs. ·Three questions arise·. **(i)** What are the laws governing how these goods are formed or distributed, conserved or consumed, increased or diminished? **(ii)** What are the laws of the equilibrium between needs and resources that continually tends to be established? [In the original, the following sentence is built *into* **(ii)**.] The equilibrium has the result that

- •it is easier to meet those needs, and thus possible to do more for general happiness, when wealth grows—until it reaches its upper limit, and
- •as wealth diminishes there are greater difficulties and thus more suffering—until depopulation and abstinence restore the balance.

In this astonishing variety of works and outputs, needs and resources; in this frightening complication of interests that connects a single individual's survival and well-being to his society's general system, making him dependent on all the stray events of nature and of politics and extending (in a way) to the whole globe his openness to experiencing privations or enjoyments; in this seeming chaos **(iii)** how can one see by a general law of the moral world that •each individual's efforts on his own behalf serve the good of the whole and that •despite the clash of opposing interests the common interest requires that each individual should understand his own interest and be free to pursue it without hindrance?

Thus man ought to be able to employ his faculties, dispose of his goods and provide for his needs in complete freedom. The general interest of his society, so far from restraining him in this respect, forbids any attempt to restrain him. In this department of public order, the care of securing to every man the rights he derives from nature is •the only sound policy, •the only duty of society as a whole, and •the only law that the general will is entitled to exercise over individuals.

·Duties of the public power·

But once this principle is acknowledged, the public power still has some duties to fulfill. It has to make laws laying down, for things that are exchanged, the measures that are to be used for their weight, volume, width and length.

It has to create a common measure of values that can represent any value; this can make it easier to compare and calculate values, and when it comes to *have* a value of its own it can be used as the medium of exchange for everything that *can* be exchanged. Without this, commerce would be confined to direct barter, and would inevitably be very sluggish.

Each year's output has a portion that is *dispensable* in that it isn't ear-marked to pay for the work that produced it or work that will have an equal or better output in time to come. The owner of this dispensable portion doesn't owe it immediately to his own labour; he owns it independently of any use he can make of his faculties to meet his needs. So it is the portion of the ·people's· annual income that the sovereign authority can, without infringing on anyone's rights, avail itself of to meet the expenses of •the State's security, •its internal tranquility, •securing the rights of individuals, •the work of the authorities set up to create or administer law, and finally •the maintenance of public prosperity.

There are works, establishments and institutions that are beneficial to society as a whole and that society ought to establish, direct, or superintend. I'm talking about institutions etc. to handle matters that can't be dealt with *immediately*

by personal inclinations or the coming together of individual interests—matters such as •making advances in agriculture, industry and commerce, and •preventing or mitigating the evils that nature inevitably brings, or ones that unforeseen events add to those.

Up to ·the start of· this ninth era, and even for a long time after, these various matters had been left to chance, to the greed of governments, to the skill of charlatans, or to the prejudices and self-interest of the powerful classes; but a disciple of Descartes, the illustrious and unfortunate Jan de Witt, saw that political economy, like every other science, should be governed by the principles of philosophy and by precise calculation. [Jan de Witt—a brilliant, liberal, republican prime minister of Holland—was lynched in 1672 by a royalist mob.]

But political economy made little progress until the peace of Utrecht promised to Europe a durable tranquility. At that time many minds started to attend to this previously neglected subject; and this new science was raised by James Stewart, Adam Smith and above all (at least as regards precision and purity of principles) the French economists to a level that couldn't have been expected so soon after such a long indifference. [The word 'economist' (*économiste*) occurs only twice in this work, each time in the phrase *économistes français*.]

The main cause of these advances in politics and political economy was the advances in general philosophy, i.e. in metaphysics, taking this word in its broadest sense.

Descartes had restored metaphysics to the domain of reason; he had seen that it should come *entirely* from the evident and primary truths that should be revealed to us by investigating the operations of our mind. But it didn't take long for his eager imagination to lead him off the path that he had mapped, and philosophy seemed for a while to be using its newly regained independence only to wander around among new errors!

Eventually Locke grasped the thread needed to show the way back. He showed that a precise and accurate analysis of ideas, reducing them stepwise to ideas more immediate in their origin or simpler in their structure, was the only way to avoid being lost in a chaos of incomplete, incoherent and vague notions that have come to us haphazardly and been received by us without reflection.

He showed by this analysis that all ·our ideas· result from the operations of our intellect on the sensations we have received, or—more precisely—result from sensations that our memory presents us with simultaneously but in such a way that that our attention is fixed and our perception limited to some part of each of these composite sensations.

He showed that by attaching one word to each idea, properly analysed and defined, we become able to recall constantly the same idea, i.e. the upshot of the same simple ideas kept within the same limits, which lets us use it in a train of reasoning without risk of going astray.

Whereas if our words don't each represent one fixed and definite idea, they can at different times call up different ideas to the mind, which is the main source of our errors.

In short, Locke was the first who ventured to fix the limits of human intelligence, or rather to determine the nature of the truths it can know and the objects it can grasp.

This method was soon adopted by all the philosophers; and it was by applying it to •morals, •politics and •public economy that they became able in these sciences

- •to follow a path almost as secure as that of the natural sciences,
- •to admit only conclusions that could be proved, separating these from anything that might still be doubtful and uncertain, and
- •to settle for not knowing anything that is and always will be unknowable.

Thus, the analysis of our feelings showed us that the development of our capacity for feeling pleasure and pain is •the source of our moral ideas, •the basis of the general truths which—being derived from those ideas—fix the unchanging necessary laws of right and wrong; and showed us the proper motives of obeying those laws, motives that are drawn from the very nature of our sensibility, i.e. from our *moral constitution*, so to speak.

The same method became a kind of all-purpose instrument: they used it to improve the methods of the physical sciences, to clarify principles and to evaluate proofs of them; and they extended it to testing factual claims ·in history·, and to laws of taste.

So this metaphysic, being brought to bear on every topic humans can think about, revealed for each branch of knowledge,

•the process of the human mind in it,
•the nature of the truths that form it into a system,
•and what kind of certainty can be achieved in it.

It's the third of these that has, in a way, placed an everlasting barrier between the human race and the old mistakes of its infancy. It guarantees the collapse of prejudices that we now have (including ones that we aren't even aware of), and it ought to prevent us from dragged back into our earlier ignorance by new prejudices—ones that might replace the old ones but now can have only a brief feeble influence.

In Germany, however, a man of wide and deep intelligence laid the foundations of a new doctrine. His bold and ardent imagination couldn't settle for a modest philosophy that left unanswered those great questions of the spirituality or survival of the human soul, the freedom of man and of God, and the existence of vice and misery in a universe governed by an omnipotent thinking being whose justice and goodness should—one might think—lead him to rule them out. Leibniz cut the knot that a learned analysis wouldn't have been able to untie. He supposed the universe to be composed of simple indestructible beings, equal by their very nature. The qualities that distinguish any one of these from all the others are determined by how it *relates* to all the others within the system of the universe. The human soul and

the next phrase: *le dernier atome qui termine un bloc de pierre*

lumpishly translated: the last atom that ends a block of stone

but probably means: the smallest particle (an atom) that you end up with if you divide a block of stone into smaller and smaller pieces until you can go no further

are each one of these *monads* ·as Leibniz called them·. They differ only through their different places in the order of the universe.

Of all the possible combinations of these beings, an infinite intelligence chose *one*, and couldn't have chosen any other because this is the most perfect of all. If we are afflicted by the spectacle of misery and vice in the existing universe, the fact is that any other combination would have produced even greater evils.

I shall expound this system which, adopted or at least supported by Leibniz's countrymen, slowed down the advances of philosophy in that part of the world. In England there arose a whole school of philosophers who enthusiastically accepted and eloquently defended the doctrine of optimism, ·i.e. the thesis that this is the best possible world·; but they hadn't Leibniz's skill or depth. Whereas he based the doctrine primarily on the thesis that an omnipotent thinking being *couldn't*, by the very necessity of its (or his) nature, have chosen any but the best of the possible universes, the English optimists tried to show the perfection of our world by looking into the facts about *it*. This led

to their losing the advantages that this system has when considered generally and in the abstract, and often to their wandering around among details that were either revolting or ridiculous.

In Scotland, however, other philosophers—not finding that the analysis of the development of the faculties we *do* have led to any principle that would or provide a sufficiently solid and pure basis for the morality of our actions—credited the human soul with a new faculty, distinct from those of sensation and reason but combining with them. Their only evidence for the existence of this new faculty was their insistence that they couldn't do without it! I'll present the history of these opinions, and will show how they have, while slowing the onward march of philosophy, done good in speeding up the spread of philosophical ideas.

Up to here I have exhibited the advances of philosophy only among men who have cultivated it, deepened it, improved it; it remains to show •what its effects on general opinion have been, and •how reason, while coming to know the certain means of discovering and recognising the truth, also learned to protect itself from the errors that it had so often been led into by a respect for authority, and by imagination. At the same time it destroyed in the mass of individuals the prejudices that had for so long afflicted and corrupted the human species.

So eventually it was permissible to declare openly our right—at long last recognised—to subject every opinion to the test of our reason, i.e. to use in our search for truth the only means we have been given for recognising it. Every man learned, with a kind of pride, that nature hadn't condemned him to basing his beliefs solely on what others told him; and the superstition of antiquity—putting reason below the ecstasies of a supernatural faith—disappeared from society as it did from philosophy.

·PREACHING THE NEW PHILOSOPHY·

There soon formed in Europe a class of men who were less concerned with discovering and deepening the truth than with disseminating it. Pursuing prejudices in all the safe-houses where clergy, schools, governments and former corporations had collected and protected them, they made it their glory •to eradicate popular errors rather than •to push back the boundaries of human knowledge—an indirect way of helping knowledge to advance, and not the least dangerous or the least useful way of doing so.

In England Collins and Bolingbroke, and in France Bayle, Fontenelle, Voltaire, Montesquieu and the schools formed by these celebrated men, will fight for the truth,

- •using all the weapons that learning, philosophy, intelligence and writing talent can provide;
- •adopting every tone and using every ·literary· form, from joking to heart-tugging, from a vast and learned treatise to a novel or mere pamphlet;
- •covering the truth with a veil to accommodate weak eyes, leaving them with the pleasure of guessing at it;
- •gently caressing prejudices so as the better to aim punches at them;
- •almost never threatening prejudices, or attacking more than one at a time, or even attacking one in its entirety;
- •sometimes soothing the enemies of reason by pretending to want only half-toleration in religion and only half-freedom in politics;
- •keeping mild relations with despotism when fighting religious absurdities, and with religious sects when battling tyranny;
- •attacking these two scourges at their heart even when seeming to object only to disgusting or ridiculous abuses, striking at the roots of these deadly trees

while apparently meaning only to prune some untidy branches;

- sometimes teaching the friends of liberty that superstition, which covers despotism with impenetrable armour, should be first victim to be sacrificed, the first chain to be broken; and
- sometimes on the contrary denouncing superstition to despots as the true enemy of their power, and scaring them with recitals of its hypocritical conspiracies and bloody furies;
- never tiring of proclaiming the independence of reason and freedom of writing as mankind's right, as its salvation;
- rising up with tireless energy against all the crimes of fanaticism and of tyranny;
- pursuing in religion, in administration, in *mœurs*, and in laws everything that smacked of oppression, of harshness, of barbarity;
- calling on kings, soldiers, magistrates and local officials, in the name of nature, to respect men's blood;
- reproaching them with energetic severity for all the miseries incurred in battles and in punishments because of their policies or indifference; and lastly
- having as their war-cry *reason, toleration, humanity.*

Such was this new philosophy, loathed by all the many classes of men that exist only through prejudices, live only through errors, and have power only because of men's credulity. It was nearly everywhere accepted but persecuted, having kings, priests, nobles and magistrates as disciples and as enemies. Its leaders had almost always the skill to escape vengeance while exposing themselves to hatred, to hide themselves from persecution while revealing themselves sufficiently not to lose their glory.

Quite often a government rewarded them with one hand while paying their attackers with the other, condemned them yet boasted over the fact that they had been born in its territory, punished them for their opinions but would have been embarrassed to be suspected of not having those opinions itself!

These opinions would soon be accepted by all enlightened men, openly by some, by others hypocritically concealed in a manner that was more or less transparent depending on how personally timid they were or on how much they were influenced by the opposing interests of their profession or of their vanity. But already ·intellectual· vanity was strong enough for these men to settle—for themselves and often for others—for a merely prudent caution rather than the deep dissimulation of earlier times.

I'll follow the advances of this philosophy in the various parts of Europe into which it spread rapidly—the inquisitions of governments and priests notwithstanding—with help from the fact that the French language had become almost universal. I'll show the subtle skill with which tyranny and superstition deployed against it all the arguments a man could offer for distrusting his own reason, arguments to show it as narrow and weak; thus using pyrrhonism [see Glossary] itself in support of credulity!

This simple system •which regarded unrestricted freedom as delivering the surest encouragements to commerce and industry, •which freed the people from the destructive scourge, the humiliating yoke, of taxes apportioned with such inequality, levied with such extravagance and often with such barbarity, by replacing them with a system of contribution that was fair, equal, and hardly noticeable; **this** theory •which tied the real power and wealth of States to the happiness of individuals and respect for their rights, •which united by the bond of common well-being the different classes into which societies naturally divide themselves;

this soothing idea of a brotherhood of the whole human race, whose gentle harmony is never to be disturbed by any national interest; **these** principles, so attractive from their generous spirit as well as from their simplicity and scope, were propagated with enthusiasm by the French economists.

·The spread of the new philosophy·

Their success was slower and less general than that of the philosophers; the prejudices they had to combat were more refined, the errors more subtle, ·than those that confronted the philosophers·. They had to •explain before they could •undeceive, and to •educate good sense before they could •judge anything by its standards.

But if they couldn't convert many people to the whole of their doctrine, if they scared off most by the general nature of their maxims and the inflexibility of their principles, if they harmed their cause by adopting an obscure and dogmatic style, by seeming to neglect political freedom so as to focus on the freedom of commerce, and by insisting too absolutely and magisterially on certain parts of their system that they hadn't sufficiently grounded, at least they succeeded in making odious and contemptible the cowardly, crafty and corrupt policy that places a nation's prosperity in •the impoverishment of its neighbours, in •the short-sighted views of a protectionist regime, and in •the petty calculations of a tyrannical exchequer.

But the new truths with which genius had enriched philosophy, politics and public economy, adopted more or less by enlightened men, extended still further their salutary influence.

•The art of printing had been applied to so many subjects, •it had so greatly increased the number of books, •the makers of books knew how to adapt them so well to every level of knowledge, of studiousness and even of fortune, •had so skillfully made them suitable for every taste and every cast of mind, and •presented instruction that was so easy and often so delightful, and •books had opened so many doors to truth that couldn't ever all be closed again, that there was no longer any class or profession that truth could be kept out of. Accordingly, although there were still many men condemned to a voluntary or forced ignorance, the *line* between mankind's thick-headed portion and its enlightened portion was almost entirely erased, leaving only a *gradual slope* from the height of genius to the depth of stupidity.

Thus, these things—

- •a general knowledge of the natural rights of man;
- •the opinion that these rights aren't given and can't be taken away;
- •a strongly expressed demand for
  - •freedom of thinking and writing,
  - •freedom of industry and commerce,
  - •relief of the people's distress,
  - •repeal of penal laws against religious dissidents,
  - •abolition of torture and cruel punishments;
- •the desire for
  - •a milder system of criminal legislation,
  - •jurisprudence giving complete security to innocence,
  - •a civil code that is simpler and more in harmony with reason and nature;
- •lack of bias in favour of any religion, with *all* of them being classified as superstitions or political tricks;
- •hatred of hypocrisy and fanaticism;
- •contempt for prejudices; and lastly,
- •a zeal for the propagation of truth;

—passed, a little at a time, from the writings of philosophers into every class of society whose instruction was not confined

to the catechism and the alphabet, and became the common creed, the badge of everyone who wasn't a machiavellian or an imbecile. In some countries these views formed a public opinion that was general enough for the mass of the people to seem ready to be directed by it and to obey it.

A natural consequence of these principles was the feeling for humanity, i.e. the feeling of •tender and active compassion for all the afflictions of the human race, and of •horror for whatever miseries public institutions, acts of government and private actions add to the miseries inevitably inflicted by nature. This feeling ·for humanity· breathed in every written work and in every conversation, and its benign effects were already visible in the laws and administration even of countries subject to despotism.

Philosophers of various nations, embracing in their meditations the interests of mankind as a whole without distinction of country, race or religion, formed a strongly united battalion against all errors, all kinds of tyranny; and they did this despite the difference of their speculative [see Glossary] opinions. Driven by a feeling of universal philanthropy, they fought against injustice when it existed in a foreign country and couldn't harm them, and fought against it also when it was perpetrated by their own country against another. In Europe they rose up against the crimes with which greed had stained the shores of America, Africa and Asia. The philosophers of England and of France were glad to take the name and fulfill the duties of *friends* of those same Blacks whose stupid oppressors disdained to count them even as *men*. The French writers paid the tribute of their praise to the toleration granted in Russia and Sweden, while Beccaria in Italy refuted the barbarous maxims of French jurisprudence.

The French also tried to cure England of its commercial prejudices, and its superstitious respect for the vices of its constitution and its law; while the virtuous Howard ·in England· denounced to the French the casual barbarity that sacrificed so many human victims in their solitary-confinement cells and workhouses.

The violent acts of governments and their seductions lost their fatal power of suppressing the voice of truth; so did the intolerance of priests, and even the prejudices of the nation; and now nothing could rescue the enemies of reason or the oppressors of liberty from the judgment that would soon be that of the whole of Europe.

Finally Europe saw the rise of a new doctrine that was destined give the final blow to the shaky tower of prejudices; I'm referring to the doctrine of the **indefinite perfectibility of the human species**, of which Turgot, Price and Priestley were the first and most illustrious apostles. It belongs in the tenth era, and I'll expound it at length in that context, ·starting on page 100·.

·Desperate moves by false philosophy·

But I should expound now the origin and the advances of a false philosophy which would have deprived reason of its triumph if it weren't for the doctrine of the perfectibility of man.

The false philosophy in question came from some men's pride and others' self-interest. Its secret aim was to perpetuate ignorance and to prolong the reign of error, and its numerous followers •sometimes tried to corrupt reason by shiny paradoxes or to seduce it by the lazy comfort of absolute pyrrhonism; •sometimes insulted mankind by announcing that advances in knowledge would do it no good, and might be dangerous to its happiness and to its liberty; and •sometimes, finally, led men astray through the false enthusiasm of an imaginary 'greatness' or 'wisdom' that lets virtue off from being enlightened and lets good sense off from relying on real knowledge. •In some places they

spoke of philosophy and the deep sciences as theories above the level of ordinary limited folk who are surrounded by needs and subject to difficult daily tasks; •in others they brushed them off as a pile of uncertain and exaggerated conjectures that couldn't stand up to the skill and experience of affairs that a man of State has. They could be heard incessantly •lamenting the decay of knowledge in the midst of its most brilliant advances, •groaning over the degradation of the human species when in fact man were recalling their rights and using their reason; •announcing that an era was approaching in which mankind would swing back into barbarism, ignorance and slavery, at the very time when all the evidence showed that this was no longer to be feared ! They seemed to be either •humiliated by mankind's improvement because they couldn't share in the glory of having contributed to it, or •afraid of its advances which portended the collapse of their importance or their power. But some charlatans—cleverer than those who clumsily strained to prop up the edifice of old superstitions whose foundations had been wrecked by philosophy—tried

- •(some of them) to use the ruins as materials for building a new religious creed that would demand from reason only a half-submission, re-establishing its rights and allowing it freedom of belief except for a demand that it believe something incomprehensible;
- •(others) to revive by means of secret associations the forgotten mysteries of ancient theurgy [see Glossary]; leaving the populace to its old errors and chaining their disciples to new superstitions, they even hoped that some of their followers could restore the ancient tyranny of the king-priests of India and Egypt.

But philosophy, standing on the unbreakable base that science had prepared for it, set up a barrier that they were powerless to break through.

By comparing the disposition of ·individuals'· minds, which I have already sketched, with the prevailing systems of government, one could easily predict that a big revolution was inevitable, and that it would have to happen in one of two ways: **(i)** the populace itself would establish the principles of reason and of nature that philosophy had made so dear to them; or **(ii)** governments would hurry to get ahead of the populace and act in accordance with the way public opinion was moving. Of these revolutions **(i)** would be faster and more radical but more stormy; **(ii)** would be slower and less complete but more tranquil. In **(i)** the price of liberty and happiness would be transient evils ·which are inevitable in a sudden popular revolution·; in **(ii)** the price of avoiding these evils would be a delay in the full enjoyment of liberty and happiness—perhaps a long delay, but inevitably those benefits would eventually appear.

The corruption and ignorance of governments have led to **(i)**, and the sudden triumph of reason and liberty has avenged the human race.

·The American and French revolutions·

Simple good sense had taught the inhabitants of the British colonies that Englishmen born on the far side of the Atlantic had received from nature exactly the same rights as other Englishmen born under the meridian of Greenwich, and that a difference of 70° of longitude couldn't have changed that. They understood better than the Europeans (perhaps) what rights were common to all the individuals of the human race; and they took these to include the right of not paying any tax to which they hadn't consented. But the British government acted as though it thought that God had created America, like Asia, for the pleasure of the inhabitants of London; and wanted to keep a long-distance grip on a subject nation, which in due course it would use to help it to oppress

European England. It commanded the obedient representatives of the English people to violate the rights of America by subjecting it to compulsory taxation. America announced that this injustice had broken its ties ·to England·, and declared its independence.

One then saw *for the first time* a great people throwing off all its chains and peaceably framing the constitution and laws that it believed would do most for its happiness. Its geographical position and its political history obliged to become a federal republic, so thirteen republican constitutions grew up within it, each based on a solemn recognition of the natural rights of man and having the preservation of those rights as its primary objective. I will draw the picture of these constitutions. I'll show in what ways they were indebted to advances in the political sciences, and what old errors remained, resulting from the prejudices of education. Two examples of the latter: we'll see why the simplicity of these constitutions is altered [see Glossary] by the system of a balance of powers; and why *identity of interests* is adopted as their principle rather than *equality of rights*. I shall show not only

- how greatly this principle of identity of interests, when made the rule of political rights, violates such rights for those who are denied the unrestricted exercise of them, but also
- that this identity ceases to exist at the very instant when it becomes a real inequality.

I shall press this matter because it's the only dangerous error remaining, the only error that enlightened men are still making. I'll show how the American republics implemented the idea (at that time almost new in theory) of the need to establish and regulate by law a regular and peaceful procedure for reforming the constitutions themselves, and to separate the power to do this from the power to make laws.

But in the war that broke out between two enlightened peoples—with one defending humanity's *natural* rights while the other countered with the doctrine that rights are subject to edicts, political interests, and written conventions—this great cause was tried at the tribunal of opinion [see Glossary] with the whole of Europe looking on; the rights of men were vigorously maintained, and developed without reservations or restrictions, in writings that circulated freely from the banks of the Neva ·in north-western Russia· to those of the Guadalquivir ·in south-western Spain·. These discussions penetrated into the most enslaved regions, into the most remote villages, whose inhabitants were astonished to learn that they had *rights*; they learned to know what they were, and came to know that other people had the courage to try to win them back or defend them.

So the American revolution was bound soon to spread to Europe; and if there existed a European country

- where attachment to the Americans' cause led to their writings and principles being more widely disseminated than anywhere else;
- at once the most enlightened and one of the least free;
- where philosophers had the most real knowledge and the government had the most crass and insolent ignorance;
- where the laws were so far *below* the general level of thinking that neither pride nor prejudice would defend the old institutions;

weren't the people of that country destined by the very nature of things to give the first impulse to this revolution that the friends of humanity were waiting for with so much hope and impatience? So it was bound to start with France.

Its government's clumsiness hastened this revolution; philosophy guided its principles; the force of the people destroyed the obstacles that might have slowed it down.

It was more complete than the American revolution, and consequently was less peaceful. The Americans, satisfied with the code of civil and criminal law that they had received from England, not having to reform a corrupt system of taxation, and not having to destroy

- •feudal tyrannies,
- •hereditary distinctions,
- •privileged, rich or powerful corporations, or
- •any system of religious intolerance,

had only to establish new powers to replace the ones that had previously been exercised over them by the British nation. Nothing in these innovations made any difference to the mass of the people; nothing changed the relations that had formed among individuals. In France the conditions were opposite to those, so that the revolution had to take in the whole economy of the society, to change every social relation, to work down to the smallest links of the political chain; right down to individuals who, living peacefully on their fortunes or by their industry, weren't connected with public affairs by their opinions, their occupations, or any concern for fortune, ambition, or glory.

Because the Americans appeared to be fighting only against the tyrannical prejudices of the mother country, they had as ·open· allies the powers that were rivals of England; while other nations, jealous of England's wealth and pride, aided the triumph of justice by secret treaties; so all Europe seemed to be united against the oppressors. Whereas the French ·revolutionaries· attacked, all at once,

- •the despotism of kings,
- •the political inequality of half-free constitutions,
- •the pride of the aristocracy,
- •the domination, intolerance and wealth of the priests, and
- •the feudal abuses that still covered most of Europe;

so inevitably the powers of Europe united on the side of tyranny. France had in its favour only the voice of some wise men, and the timid prayers of the oppressed peoples; and calumny has since worked hard to deprive it of even those small helps.

I shall show why the principles on which the constitution and laws of France have been brought together are more pure, more precise and more profound than the ones that directed the Americans; why they have escaped much more completely from the influence of all sorts of prejudices; how in them the equality of rights is never replaced by that 'identity of interests' which is nothing but its feeble and hypocritical substitute; how in them *limits on* powers have been put in the place of that long-admired but empty *balance of* powers; how in a large nation that is necessarily dispersed and divided into a large number of separate and partial assemblies, they dare *for the first time* to let the populace keep its right of sovereignty, the right to obey only laws whose manner of formation by trusted representatives is legitimised by the immediate approval of the populace; laws which, if they harm its rights or interests, the populace can always reform by a regular act of its sovereign will.

·Advances in the sciences·

From •the time when Descartes's genius impressed on minds that general impulse that is the primary driver of a revolution in the lives of the human species to •the happy era of entire and pure social liberty where man has been able to regain his natural independence only after enduring many centuries of misfortune and slavery, the picture of the advances of the mathematical and physical sciences presents us with an immense horizon; we'll have to sort out and order its various parts, if we are to have a good view of their inter-relations and a good grasp of the whole.

The application of algebra to geometry became the fruitful source of discoveries in both those sciences; but, more than that, in showing by this great example how •the methods for computing magnitudes in general can be extended to all topics involving spatial measurement, Descartes was giving advance notice that •they would be employed with equal success on all topics where precise valuation was possible. This great discovery, by showing for the first time the ultimate aim of the sciences—namely, to bring strict calculation to bear on all truths—gave hope *that* this would be achieved and a glimpse of *how*.

This discovery was soon followed by the discovery of a new method of calculating which lets one find the rate of increase or decrease of a variable quantity, or to find the quantity itself when this rate is given; whether the increase is supposed to have a positive magnitude or the rate is to be determined for an instant only—i.e. when the increase is nil. This method applies to all the combinations of variable magnitudes and to all the hypotheses concerning their variations; so it enables us to determine, with regard to everything whose changes are precisely measurable, either the relations between the elements when only those between the objects are known, or the relations between the objects when only those between the elements are known. [That sentence, from 'either' to the end, is copied from a previous translation. It isn't quite faithful to the original, but the original has clearly suffered a mishap, and this rescue effort isn't bad.]

The discovery of these methods is due to Newton and Leibniz, the way to it having been prepared by the work of geometers of the previous generation. The methods in question have been advancing uninterruptedly for more than a century. These advances have been the work of several men of genius, to whom they have brought glory. To the eyes of a philosopher who can observe them even if he can't follow them, they present a striking monument to the powers of the human mind.

In expounding •the formation and principles of the language of algebra, which is the only truly accurate and truly analytic language that we have so far, •the nature of the technical procedures of this science, and •the comparison of these procedures with the natural operations of the human understanding, I shall show that even if this method is in itself only one particular instrument in the science of quantity, it includes the principles of a universal instrument that can be applied to all combinations of ideas.

Rational mechanics soon becomes a vast and deep science. The true laws of the collision of bodies, which Descartes was wrong about, are finally known.

Huyghens discovers the laws of circular motion; and at the same time he gives a method for determining, for *any* point on *any* curve, the circle it belongs to. By uniting these two theories, Newton found the theory of curvilinear motions; he applied that to the laws that Kepler found the planets to obey in their elliptical orbits.

A planet launched into space at a given instant with a given velocity and direction will follow an ellipse around the sun by virtue of a force directed towards that star, the force ·at any moment· being inversely proportional to the square of the distance ·between the sun and that planet at that moment·. The same force retains the satellites in their orbits around the primary planets: it pervades the whole system of heavenly bodies and acts reciprocally between all their component parts.

The regularity of the planetary ellipses is disturbed by this force, and calculation precisely explains the very tiniest details of these perturbations. This force acts also on the comets, whose orbits are determined and whose returns are predicted by the same theory. The movements observed in

the axes of rotation of the earth and the moon also attest to the existence of this universal force. Lastly, it is the cause of the weight of terrestrial bodies. It appears to be constant in them because we don't get to observe them at sufficiently different distances from the centre of action, ·i.e. from the earth toward which they are being pulled·.

So at last man has come to know one of the physical laws of the universe. It is the only one so far, and in this uniqueness it matches the glory of him who discovered it.

A hundred years of ·scientific· work have confirmed this law, which all the celestial phenomena seem to conform to with a (so to speak) miraculous accuracy. Every time an apparent deviation occurs, this passing uncertainty has soon become the subject of a new ·scientific· triumph.

Wanting to know the secret thread that guided a man of genius, we have in most cases been forced to search for it in his writings; but in Newton's case we have precious anecdotes enabling us to follow him step by step, anecdotes that have been discovered and preserved because admiration for him has made him especially interesting. They serve to show us how a great discovery can arise from a fortunate combination of chance events and the efforts of genius; and how easily less fortunate combinations could have delayed the discoveries or left them to be discovered by others.

But the discovery of this general law of nature may not have been Newton's only contribution to the advances of the human mind; he ·also· taught men to allow in physics only theories that are precise and open to calculation, theories that give an account not only of a phenomenon's existence but of its quantity and extent. Yet he was accused of reviving the 'occult qualities' of the ancients because the general cause he offered for celestial phenomena was a simple *fact*, which observation had incontestably proved to be real. This accusation shows how greatly the methods of the sciences still needed to be enlightened by philosophy.

Many problems in statics and dynamics had been successively proposed and resolved when d'Alembert discovered a general principle that can determine, all on its own, the motions of any number of •points acted on by any forces and related to each other by certain conditions. He soon extended this same principle to •finite bodies of a determinate shape; to •elastic or flexible bodies which can change shape but only according to certain laws and preserving certain relations among their parts; and lastly to •fluids themselves—ones that keep the same density and ones that can expand. A new calculation was needed to resolve these last questions, but d'Alembert's genius was up to that; and mechanics is now nothing but a science of pure calculation.

These discoveries belong to the mathematical sciences; but the natures of the law of universal gravitation and of the principles of mechanics—consequences of it—apply to the eternal order of the universe and belong to the province of philosophy. We learn that all bodies are subject to necessary laws that tend unaided to produce or maintain equilibrium, cause or preserve the regularity of bodies' motions.

Astronomy's advances are assured by the combined working of several causes:

- •knowledge of the laws that govern the celestial phenomena,
- •the discoveries in mathematical analysis that lead to the most precise methods of calculating the appearances of those phenomena,
- •the hitherto undreamed-of perfection to which optical instruments have been brought, and also instruments whose precise calibration determines the exactness of the observations,
- •the precision of machines for measuring time,
- •the more general liking for the sciences, which—

> combined with the interest of governments—leads to an increase in the number of astronomers and observatories.

For man the heavens are enriched with new stars, and he knows how to determine and predict with accuracy their positions and their movements.

·ADVANCES IN PHYSICS·

Physics, gradually escaping from Descartes's vague explanations, just as it previously cleared itself from the absurdities of the scholastics, is now nothing more than the art of interrogating nature by experiments for the purpose of afterwards deducing more general facts by computation.

The weight of air is known and measured; the transmission of light is found not to be instantaneous; its velocity is determined; the effects of that velocity on the apparent positions of the celestial bodies have been calculated; sunlight is broken down into distinct rays which are of different colours and bend differently when they go through a prism. The rainbow is explained, and the methods of causing its colours to come or go are subjected to calculation. Electricity—formerly known only as the ability of certain substances to attract light bodies towards them after they are rubbed—now becomes ·known to be· one of the general phenomena of the universe. The cause of thunder is no longer a secret, and ·Benjamin· Franklin teaches men how to change its course and direct it as they will. New instruments are used to measure variations in the weight of the atmosphere, in the humidity of the air and in the temperature of bodies. A new science called 'meteorology' teaches men to understand and sometimes to predict atmospheric phenomena; we don't yet know the laws governing these, but some day this science will reveal them to us.

In depicting these discoveries I'll show how the methods that physicists have used in their researches are purified and perfected; and how the art of conducting experiments and making instruments has become ever more precise, so that not only is physics enriched every day with new truths but also the truths already known have been more exactly ascertained; and not only have vastly many new facts been observed and analysed but also all of them have been submitted to stricter measures in their details.

·ADVANCES IN CHEMISTRY·

All that physics had to combat were the prejudices of scholasticism and the attraction—so seductive to lazy minds—of general hypotheses. The advances of chemistry were held back by other obstacles. It had been thought that this science ought to provide the secret of making gold, and that of making man immortal.

The effect of great interests is to make man superstitious. Those prospects arouse the passion for glory and flatter the two strongest passions of vulgar minds—·to make gold and to live for ever·—and it wasn't thought that either could be accomplished by *ordinary* means. So all the extravagances that delirious credulity had ever invented seemed to come together in the minds of chemists!

But these fantasies gradually retreated in face of Descartes's mechanical philosophy; although that itself was rejected, it cleared the way for a truly experimental chemistry. The observation of the events that accompany the composition and decomposition of bodies, research into the laws of these operations, and the analysis of substances into more and more simple elements, became ever more precise and strict.

But to these advances of chemistry we must add the improvements of the sort that involve the whole system of a science and, by extending its methods rather than increasing

the number of it truths, foretell and prepare the way for a very satisfactory revolution. **Example**: The discovery of new means of capturing and experimenting on the elastic fluids which had previously escaped unnoticed; a discovery which, by permitting us to operate on an entire class of new beings and on previously known ones when in a state that had enabled them to escape our researches, and by adding one more element to almost every combination, has switched the whole system of chemistry for a new one, so to speak. **Another example**: The formation of a language in which the names of substances sometimes express the resemblances or differences amongst those that have an element in common and sometimes express the class to which they belong. To these causes of progress we may add the use of a scientific notation in which these substances are represented by analytically combined characters which can express the most common operations and the general laws of chemical affinity. Also, ·chemistry has been enriched by· the use of all the means and all the instruments that physicists have used to compute with rigorous precision the results of experiments; and lastly by applying mathematics to the phenomena of crystallization, ·i.e.· to the laws according to which the elements of certain bodies come together in regular and constant shapes.

Men who for so long had had no way of explaining the formation of the earth except by superstitious or philosophical daydreams, before they started trying to understand it properly, have at last felt the need to study with scrupulous attention both its surface and the internal parts that their needs have led them to dig down to—the substances found there, their random or regular distribution, and the disposition of the masses they have formed. They have learned to recognise in the earth the traces of the slow and long-continued action of the sea, of rivers and of volcanic fires; and to distinguish •those parts of the surface and outer crust of the globe where sea, rivers and magma have produced the inequalities, the layout of substances, and frequently the substances themselves, from •the other portion of the surface, mostly made of different substances and bearing the marks of more ancient revolutions whose causes we don't yet know.

Minerals, vegetables and animals are divided into species whose individual members are barely noticeably different from one another. . . . Many of these species resemble each other in some number of respects which serve as bases for successive divisions into larger and larger groups. Naturalists have learned to classify individuals methodically on the basis of determinate features that are easy to grasp—the only way they can be recognised among this numberless multitude of individuals. These methods are a kind of real language in which each object is denoted by some of its most constant qualities; and someone who knows these can find the name an object has in the conventional language. When such a language is well made it indicates the truly essential qualities in each class of natural objects—qualities that jointly guarantee a more or less complete resemblance in the rest of their properties. [The language in question is 'real' in the sense that it maps onto a system of qualities that real things have; it is 'conventional' simply in that its choice of actual words is conventional.]

We have sometimes seen this happen: men who have studied some objects exclusively, and achieved knowledge of them only with great difficulty, have in their self-importance seen their methods as more important than they are, and have taken for •a science itself something that is merely •a kind of dictionary and grammar of its real language. We have also seen the opposite mistake: philosophers who have wrongly under-rated these same methods, taking them to be futile and laborious compilations—mere arbitrary name-lists.

[The bold-type headings in this paragraph are added.] Here is what natural history looks like to us today. **Animal-vegetable-mineral**: The chemical analysis of the substances in the three great kingdoms of nature, the description of their external form, the exposition of their physical qualities and of their usual properties. **Organisms**: The facts about the development of organised bodies (animals or plants), and of their nutrition and reproduction; the details of their organisation, the anatomy of their various parts and the functions of each. **Animal behaviour**: The facts about animals' ways of life—their industry to procure food, defence and habitation, to seize their prey or escape their enemies; the societies of family or species that are formed among them. **The organic hierarchy**: The great mass of truths we are led to by thinking our way along the immense chain of beings—the way successive links take us •from brute matter to •the lowest level of organisation, from •organised matter to •matter with the first signs of feeling and spontaneous motion, and from •this level to •man. **Man and the rest**: The relation of man to all these other beings ·on the chain·, whether relative to his needs or to the ways in which he resembles them and the ways in which he is unlike them.

The physical man is himself the topic of a separate science, *anatomy*, which in the word's general meaning includes physiology. This science, which had been held back by a superstitious respect for the dead, profited from the general weakening of prejudices; and it enlisted, against those prejudices, the support of powerful men who had a concern for their own health! It has advanced so far that it seems in a way •to have dried up, •to be waiting for more perfect instruments and new methods, and •to be nearly reduced, today, to seeking—in comparisons between

- •the parts of animals and the parts of man,
- •the organs that different species have in common, and
- •the ways in which those organs exercise similar functions

—truths that the direct observation of the human body appears to refuse. Almost everything that the eye of the observer, aided by the microscope, has been able to discover, is already revealed. Anatomy appears to need experiments, so useful to the progress of other sciences; but the nature of its object deprives it of this means that is now so evidently necessary for its further improvement.

The circulation of the blood was already known; but

- •the lay-out of the vessels that carry the chyle to mix with the blood and make good its losses,
- •the existence of a gastric fluid that readies the ingested food for the decomposition that is needed to separate out the portion of it that can be assimilated by the living fluids and the organised matter,
- •the changes undergone by the various parts and organs in the interval between conception and birth, and then post-natally during the different ages of life,
- •the distinction between the parts possessing sensibility and those that have only irritability [see Glossary], a property discovered by Haller and possessed by nearly all organisms

—there's what physiology has been able to discover during this brilliant era, relying on indubitable observations. These important truths should secure forgiveness for the mechanical, chemical and organic explanations that have succeeded each other and burdened this science with hypotheses that are harmful to its progress and downright dangerous when medical practice is based on them.

To the picture of the sciences we should add that of the arts [see Glossary], which, being founded on them, have advanced with a surer tread and broken the shackles of *routine* which had previously held them back.

I shall show how advances in mechanics, astronomy, optics and the art of measuring time have influenced the art of constructing, moving and directing vessels at sea. I shall show how an increase in the number of observers, greater skill on the part of navigators, and more rigorous accuracy in the astronomical determinations of positions and in topographical methods, have at last let us know at first hand this globe of which almost nothing was known at the end of the last century; and how greatly the mechanical arts (properly so called) have owed their improvements to improvements in the art of making instruments, machines, looms, and how much *these* improvements have owed to advances in rational mechanics and physics. These arts are also indebted to the science of using already known machines more cheaply and efficiently, and to the invention of new machines.

We'll see architecture draw from the science of equilibrium the way to give the most commodious and least expensive form to roofs without fear of altering their solidity; and from the theory of fluids the means •to calculate more securely what is needed to hold a given body of water in place, •to direct the course of water, and •to use it in canals with greater skill and success.

We'll see the chemical arts enriched with new processes; the previous methods simplified and cleared of the deposit left by routine—useless or toxic substances, pointless or imperfect practices; while they also found ways to prevent some of the dangers, often terrible ones, to which the workmen were exposed. That's how they could produce more riches and enjoyment without having to pay such a price in ·their· painful sacrifice or ·our· guilt.

In the meantime chemistry, botany and natural history spread a productive light on the economic arts, on the growing of plants and trees to meet our various needs; on the art of feeding, propagating and preserving domestic animals, bringing their races to perfection and improving their products; on the art of preparing and preserving the productions of the earth or of animals.

From the moment when anatomy and chemistry give them clearer and surer guides, surgery and pharmacy become almost new arts.

Medicine—which in its practice should be considered as an art—is at least delivered from its false theories, its pedantic jargon, its murderous routines, and its servile submission to the authority of men and the doctrines of colleges; it learns to trust nothing but experience. Medicine has increased the means at its disposal, and learned how to make a better job of combining and using them; and though some of its advances are in a way negative, consisting in the abolition of dangerous practices and harmful prejudices, the new methods of studying chemical medicine and of combining observations are a promise of more positive and extended advances.

I'll try above all to follow the path of genius in the sciences, which sometimes moves from an abstract and profound theory to learned and delicate applications, then simplifies its means and adapts them to ·people's· needs, and finally spreads its advantages through the most everyday practices; and sometimes ·goes in the opposite direction·, starting from the needs of everyday practices and going into high-level theorising in search of resources that the ordinary state of our knowledge would have refused to give us.

I'll show that declamations against theories as being useless have never, even with regard to the simplest arts, shown anything but the ignorance of the declaimers. I shall show that the uselessness (or worse) of so many applications of theories is due not to their profundity but on the contrary to their imperfection—·i.e. not to their belonging to the class

of *theories* but to their being poor specimens of that class·.

These observations will lead us to the following general truth. In all the arts the truths of theory have to be modified in practice; some inexactness is inevitable in the nature of things, and we should try to make it negligible in practice without without indulging the illusory hope of avoiding it altogether; many facts about needs, means, time and expense, which a theory can't take account of, do have to be taken account of in dealing with real immediate practical problems; and, lastly, in bringing in these facts with the skill that truly constitutes the genius of the practical man, one can get beyond the narrow limits that prejudices against theory threaten to impose on the arts, while preventing the errors that an improper use of theory could lead to.

Sciences that are separate from each other can't be extended without coming closer, without forming points of contact.

An account of the advances each science will suffice to show •what the usefulness of the direct application of mathematics has been in several of them; •how much calculation has done, in almost all of them, to make experiments and observations more precise; •what the sciences owe to mechanics for providing them with more perfect and more accurate instruments; •how greatly the discovery of microscopes and of meteorological instruments has contributed to the perfection of natural history; •what this science owes to chemistry, which was needed to lead it to a deeper knowledge of the objects it considers, by displaying their most intimate nature and most essential properties—by showing their composition and elements; •what natural history does ·in return· for chemistry by providing so many products to analyse and gather, so many operations to perform, so many naturally formed combinations whose true elements must be separated out and whose secrets may sometimes be discovered or even imitated; and lastly •what helps physics and chemistry are apt to give one another, and how greatly anatomy has already profited from these sciences and from natural history.

But ·even after expounding all that· I still would have presented only a small portion of the advantages that have been received or can be expected from the application of mathematics. Several geometers have given us general methods of working out from observations the empirical laws of phenomena. These methods extend to all the sciences, because they are equally good in enabling us to know

- •the law of the successive values of the same quantity for a series of instants or positions, and
- •the law governing how different properties, or different values of a similar quality, are distributed among a given number of objects.

Several applications have already proved that the science of combinations can be successfully used to set out observations in such a way as to see more easily their relations, their results, and them as a whole.

·Mathematics of probability·

Applications of the calculus of probabilities foretell how much they can contribute to advance the sciences; •here enabling us to determine the likelihood of extraordinary factual claims, teaching us to judge whether they should be rejected or instead are worth looking into; •there enabling us to calculate the likelihood of the constant recurrence of those facts that often present themselves in the practice of the arts, and don't fall into any order that is already regarded as a general law. Examples of that in medicine: the salutary effect of certain remedies, the success of certain preservatives. These applications also show us how probable it is that a set of phenomena results from the intention of a thinking being, or

depends on other previous or contemporary phenomena; and how probable that it should be attributed to the necessary and unknown cause known as *chance*, a word whose real meaning can't be properly grasped except through the study of the mathematics of probability.

[Background to this next paragraph: the formal properties of voting systems are still an active and practically important topic of logico/mathematical study; our writer was one of its founders, and 'Condorcet condition' is still a working technical term in it.]

The mathematics of probability has also taught us to recognise the various levels of certainty that we can hope to achieve, the likelihood that an opinion should have if we're to adopt it and base our reasonings on it without harming the rights of reason and the rules of our conduct, ·i.e.· without offending against justice or lacking in prudence. Probability theory also shows what the advantages and disadvantages are of various forms of election, various ways of basing a decision on the number of votes supporting it; the different levels of probability that may result from such proceedings; the level of probability that public interest should demand for a given question;. . .

[The rest of this paragraph is obscure. The preparer of this version received help with it from Jean-François Laslier, who reports that it is too condensed to stand on its own for a reader who doesn't know the earlier work of Condorcet's on which it relies. What follows is Dr Laslier's statement of what Condorcet is getting at in the rest of the paragraph.]

. . . and the means for dealing with two different kinds of case: (1) There are two alternative opinions P and not-P; a choice has to be made, and the stakes are such that we will follow the opinion we think is most likely true. (2) There are two asymmetrical alternatives. Two species of this are the following: **(a)** We raise the question 'do we have enough to believe that P is true?' Note that we may reject P while not accepting not-P. **(b)** The stakes are such that the consequences of mistakes about P and not-P are very different; for example, a death penalty needs a high degree of confidence about guilt. Then the questions solved with the help of the calculus of probability are questions of institutional design, for instance how many voters in total, and how many votes on one side, do we need to take a particular type of decision?

These applications include the examination of the probabilities of factual claims for those who aren't in a position to rely on their own observations in the given case—the probabilities that result either from the testimony of witnesses or from the connection of those claims with others ·whose truth has been· immediately observed.

Then there are inquiries into the duration of human life, the influence on longevity of differences in sex, temperatures, climates, professions, governments and life-styles; into the death-rate from various diseases; into changes in population numbers; into how much various causes contribute to these changes; into the distribution of the populace in each country according to the age, sex and occupation—how useful these researches can be to the physical knowledge of man, to medicine and to public economy!

How much the calculus of probabilities has been used by the part of the public economy that concerns the establishment of annuities, ton tines [look it up], private savings banks, benefit schemes and insurance policies of every kind!

Isn't that calculus also needed for the part of the public economy that deals with the theories of measures, coinage, banking, financial operations—as well as taxation as established by law, of actual taxation (often not the same thing), and of the effects of both on all parts of the social system?

How many important questions there are in the science of public economy that couldn't have been properly answered

without help from knowledge acquired in natural history, agriculture, botany and the mechanical and chemical arts!

In short, such has been the general progress of the sciences that it's virtually true that not one of them could be completely grasped—in its principles and its details—by someone who didn't get help from all the others.

In presenting this picture both of •the new facts that each science has been enriched with and •of what each science owes to the application of theories or methods that seem to belong more particularly to another branch of knowledge, I'll try to learn what the nature and limits are of the truths that observation, experience, or meditation can lead us to in each science; I'll also investigate what in each science constitutes the *gift for discovery*—the first faculty of the human mind—which we call 'genius'; by what operations the mind can arrive at the discoveries it pursues, and sometimes be led to others it wasn't looking for and perhaps couldn't even have envisaged in advance. I shall show how the methods that lead us to discovery can become exhausted, so that the science ·in question· grinds to a halt until new methods arrive •to provide the researcher with a new instrument or •to make it easier for him to use older methods that have become too time-consuming or laborious to use.

·Benefits from scientific advances·

If I confined myself to exhibiting the advantages that have been drawn from the sciences in their immediate use or in application to the arts, whether for the welfare of individuals or the prosperity of nations, I would have shown only a small part of their benefits. The most important benefit may have been to destroy prejudices. The human understanding had been forced into strange postures by absurd beliefs that each generation had drilled into it from its infancy by the terrors of superstition and the dread of tyranny; and the destruction of prejudices enabled it to *stand up straight*, so to speak.

Errors in politics and in morals all arise from philosophical mistakes, which are connected with scientific errors. Every single religious system, every supernatural extravagance, is based on ignorance of the laws of nature. The inventors and defenders of these absurdities couldn't foresee the gradual improvement of the human mind. Convinced that the men of their time knew everything they could ever know and would always believe what they believed then, they confidently relied for their fantasies on the current opinions of their country and their time.

The advances in physics are all the more fatal to these errors because •they often destroy them without seeming to attack them, and •they subject those who obstinately defend the errors to the taunting label 'ignorant'.

At the same time the practice of reasoning soundly on the topics of these sciences, and what their methods provide in the way of precise ideas and ways for recognising or proving truths, must naturally lead us to contrast the frame of mind •that forces us to stick to opinions based on these real sources of credibility with the one •that attaches us to our habitual prejudices or forces us to yield to authority. This contrast is all we need to become suspicious of the latter opinions, to give us a sense that *they aren't really believed*, even when belief in them is proudly proclaimed and declared with the purest sincerity. When this secret is discovered their abolition follows quickly and inevitably.

> In short, this progress of the physical sciences, which aren't disturbed by passions or self-interest, and don't allow that someone who can't *understand* a given topic is nevertheless entitled by his birth, profession, or government position to *make judgments* about it,

couldn't have been observed if enlightened men hadn't kept working to bring the other sciences closer to the physical

sciences. The latter's progress at every step offers these men the model they ought to follow, a standard by which they could

- judge their own efforts,
- recognise the wrong routes they could have taken,
- preserve themselves from pyrrhonism as well as from credulity, and from a blind mistrust or a too complete submission to the authority even of men with knowledge and renown.

Metaphysical analysis doubtless ·would have· led to the same results, but it would have provided only abstract principles. In the physical sciences the same abstract principles, put into action, are clarified by examples and strengthened by success.

Until this ·ninth· era the sciences had been the birthright of only a few; now they had become common property, and the moment was approaching in which their elements, their principles and their simplest methods would become really popular. That is when their usefulness—to the arts and to the general health of men's minds—would be truly universal.

I'll trace the advances of European nations in infant and adult education. Up to now the advances •haven't amounted to much, if we attend merely to the philosophical **system** of this education, which has nearly everywhere been given over to scholastic prejudices; but they •have been very rapid if we consider the extent and nature of the **content**, which now includes hardly any knowledge that isn't real, and takes in the elements of almost all the sciences; while men of all ages find in dictionaries, abstracts and journals the knowledge they need, although it isn't always of the purest kind. I'll look into what the usefulness is, in the sciences, of adding oral instruction to the instruction that comes straight from books and study; and into whether any benefit has come from the fact that the assembling of anthologies has become a real *trade*, a way of earning a living, which has multiplied the number of inferior works but has also multiplied uneducated people's means of acquiring common knowledge. I'll expound the influence that learned scientific societies have exercised on the advances of the human mind, a barrier that will be useful, for a long time yet, to hold off fraud and false scholarship. And, lastly, I'll present the history of the encouragements given by governments to the advances of the human mind, and of the obstacles they have put up to them, often in the same country at the same time. I shall show what prejudices or machiavellian principles have directed governments in this opposition to the journey of minds towards truth; and what views of political interests, even of public good, have been at work when they have seemed rather to want to speed and protect the journey.

·ADVANCES IN THE FINE ARTS·

The picture of the fine arts offers results that are no less brilliant. Music has become (in a way) a new **art**, while the science of combinations and the application of mathematics to the vibrations of sounding bodies and waves in the air have clarified its **theory**. The graphic arts, which had already passed from Italy to Flanders, Spain and France, were raised in France to the same level they had had in Italy in the preceding era, and were acclaimed even more strongly than they had been in Italy itself. The art of our painters is that of Raphael and the Carracci family. All the means of that art have been preserved in the schools; far from being lost, they have spread. But it's a long time since any genius comparable with them has appeared—too long for this period of sterility to be attributed to chance. It's not because the methods of graphic art are exhausted, though it really has become harder to achieve great success in it. Nor is it because nature has denied us organs as perfect as

those it gave the Italians of the 16th century. It is solely to changes in politics and *mœurs* that we should attribute not the decay of the art but the mediocrity of its productions.

Literary productions (cultivated in Italy with less success, but without having degenerated there) have made advances in the French language, advances which have entitled it to the honour of becoming, in a way, the universal language of Europe.

The art of tragedy in the hands of Corneille, Racine and Voltaire has been raised step by step to a previously unknown level of perfection. Comedy is indebted to Molière for having more quickly reached a level not previously achieved by any nation.

The English language was perfected from the start of this ·ninth· era, as was the German language more recently. ·In both languages· the art of poetry as well as that of prose writing have been brought—though less completely than in France—under the **universal rules** of reason and nature that ought to direct them. These rules are equally true for all languages and all peoples, though up to now few men have been able to know them and rise to the sound and sure *taste* that is nothing but a sense of those rules. That sense presided over the compositions of Sophocles and Virgil, as well as those of Pope and Voltaire; it taught the Greeks and Romans, as well as the French, to be struck with the same beauties and shocked by the same faults.

I shall show what it is in each nation that has helped or hindered the advances of these arts; by what causes the various kinds of poetry or prose-works have reached such different levels in the different countries; and how these **universal rules** can, while remaining true to their own fundamental principles, be modified by the *mœurs* and opinions of their intended audience, and even by the uses to which their different genres are to be put. Thus, for example, a tragedy declaimed in daily performances before small audiences in a small theatre couldn't follow the same practical rules as a tragedy sung on an immense stage in solemn festivals to which the whole populace was invited. I'll try to show that the rules of taste are like the other laws of the moral and physical universe in •in their generality and constancy and in •the kind of modifications they are open to when they have to be applied in the practice of some common art.

I'll show •how printing, publishing and disseminating works—even ones intended to be publicly read or recited—enables them to reach incomparably many more readers than they'll have hearers; •how, because nearly all the important decisions by large assemblies were taken after the members had been briefed *in writing*, the rules for the art of persuasion among the moderns were bound to be different from those for the ancients, matching the differences in the effect aimed at and the means employed; and lastly •how those rules differ ·between ancients and moderns· even for matters—such as history and philosophy—where the ancients also relied on reading, because the invention of printing made it easy for the moderns to learn about more developments and get more details.

The advances in philosophy and the sciences have helped and extended the advances of literary pursuits, and these have served to make the study of the sciences easier and philosophy more popular [see Glossary]. There has been mutual help between the sciences and philosophy on one hand and literary pursuits on the other, despite the efforts of ignorance and folly to disunite them and make them enemies. Scholarship, with its obedience to human authority and respect for anything ancient, seemed sure to support the cause of harmful prejudices; but in fact scholarship has helped to destroy them, because the sciences and philosophy

have lent it the torch of a sounder criticism. It already knew about weighing and comparing authorities, but now at last it has submitted them to the tribunal of reason. It had rejected miracles, absurd tales, factual claims contrary to probability; but now in attacking the testimony on which these relied it has learned to reject that testimony, however much of it there is, unless it outweighs the physical or psychological improbability of the extraordinary factual claim in question.

Thus, all men's intellectual occupations—however different in topic, method, or mental qualities required—have collaborated in the advances of human reason. In fact the entire system of human ·intellectual· achievement is like a single well-built piece of work: its parts, though carefully distinguished from one another, must nevertheless be closely connected so to form one whole and work towards one goal.

Surveying the human species, I'll show that

- •the discovery of true methods in all the sciences,
- •the scope of the theories they include,
- •their applicability to all natural objects and all human needs,
- •the lines of communication established among them,
- •the great number of people who cultivate them, and
- •the spread of printing presses,

are sufficient to assure us that no science will ever sink below the level to which it has been carried. I'll show that the principles of philosophy, the maxims of liberty, and the knowledge of the true rights and real interest of man are spread through too many nations, in each of which they direct the opinions of too many enlightened men, for them ever to fall back into oblivion.

The two most widely used languages—·French and English·—are those of the two peoples who have the most complete liberty, and have best known the principles of liberty; so that no confederacy of tyrants, nor any possible political conspiracy, can prevent the rights of reason and of liberty from being openly defended in both languages. So what is there to fear now?

But if everything assures us that the human race won't relapse into its former barbarous state; if everything ought to guarantee us against that feeble and corrupt system that condemns mankind to eternal oscillations between truth and error, liberty and servitude; still we see •enlightenment spreading over only a small part of our globe, and •the number of those who are really enlightened *vanishing* when set alongside the mass of men who are given over to ignorance and prejudice. We see vast territories groaning under slavery, containing only •nations degraded by the vices of a civilisation that can't progress because it is so corrupt and •nations still vegetating in the infancy of their first eras. We see that the exertions of these last ages have done much for the progress of the human mind but little for the perfection of the human species; much for man's glory, something for his liberty, but hardly anything yet for his happiness. At a few points our eyes are struck with a dazzling light, but thick darkness still covers an immense horizon. The philosopher's soul can peacefully take satisfaction in a few things, but more often it is afflicted by the spectacle of stupidity, slavery, wildness and barbarism. The only way a friend of humanity can have unmixed pleasure is by abandoning himself to hopes of a lovely future.

Such are the topics that belong in an historical picture of the advances of the human mind. In presenting them I shall aim to emphasise the influence of these advances on the opinions and the welfare of the general mass of the various nations in the different eras of their political existence; to show on one side

- •what truths they have known,
- •what errors they have been cured of,

- what virtuous habits they have acquired,
- what new improvements have brought their faculties nearer to satisfying their needs;

and on the other side

- what prejudices have enslaved them,
- what religious or political superstitions have been introduced,
- what vices they have been dragged down to by ignorance or despotism,
- what miseries they have suffered through violence or their own degradation.

Until now political history, like the histories of philosophy and the sciences, has been merely the history of a few men; the real substance of the human species, the mass of families that live almost entirely on their labour, has been forgotten; and even in the class of those who follow public professions—acting not for themselves but for society, their occupation being to instruct, govern, defend and comfort other men—only the chiefs have attracted the attention of historians.

·THE HISTORY OF MASSES OF MEN·

For the history of individuals, all one needs is to collect facts; but the history of a mass of men has to rely on observations [see Glossary]; and in order to select these and grasp their essential traits the historian needs to have considerable knowledge already, and to make a proper use of them he needs philosophy.

Another point: these observations relate to common things that are perfectly visible; anyone who wants to can find out about them for himself. So nearly all that have been collected have come from travellers, because things that are very trivial in the place where they exist have aroused the curiosity of foreigners. Unfortunately these travellers are nearly always inaccurate observers; they see objects too quickly, *through* their own country's prejudices and often *by* the eyes of the locals. They consult people they *happen* to meet, and the answers they get are nearly always dictated by the answerer's self-interest, party spirit, national pride, or mood.

So it's not only because of historians' servility (historians of monarchies have rightly been criticised as servile) that we don't have ·literary· monuments from which to trace this most important part of the history of men.

The gap can be filled only very imperfectly by knowledge of **(i)** laws, **(ii)** practical principles of government, **(iii)** public economy, **(iv)** religions and **(v)** general prejudices. In fact the differences between

- **(i)** the written law and the actually applied law,
- **(ii)** the principles of those who govern and the way their governing is shaped by the frame of mind of the governed,
- **(iii)** the institution in the minds of the men who formed it and the actual institution that results,
- **(iv)** the religion of the books and the religion of the people, and
- **(v)** the apparent universality of a prejudice and the facts about who actually has it

can be so great that there comes to be absolutely no match between the effects and these public and known 'causes'.

This part of the history of the human species—the most obscure, the most neglected, and the least supported by records—is what should be emphasised most in the picture I am drawing; whether the topic is a new discovery, an important theory, a new system of laws, or a political revolution, the task will be to discover what its effects must have been on the most numerous portion of each society; for *that* is the true topic of philosophy, since all the intermediate effects

of these same causes can only be regarded as means of eventually acting on this portion ·of humanity· that truly constitutes the mass of the human race.

It is when we reach this last link of the chain that the observation of past events, as well as the knowledge acquired by meditation, become truly useful. It is when we arrive at this stage that men can appreciate their real claim to glory, or get durable pleasure from the advances of their reason; only then can anyone judge regarding the true improvement of the human species.

This idea of relating everything to this last point—·i.e. to the welfare of the mass of people·—is dictated by justice and by reason. One might be tempted to regard it as chimerical, but it isn't; and it will be enough here to show this by two striking examples.

First, the man who cultivates the soil has an abundance of food to meet his needs; he owes this to the continued exertions of industry aided by scientific knowledge; so ultimately he owes it to the victory of the Greeks over the Persians in the battle of Salamis, without which the darkness of oriental despotism threatened to cover the whole of the earth. Second, the sailor who is saved from shipwreck by the accurate observation of *longitude* owes his life to a theory that descends, through a chain of truths, from discoveries made in the school of Plato and buried for twenty centuries in total disuse.

Tenth era
Future advances of the human mind

If man can predict with almost perfect certainty phenomena whose laws he knows; and if, even when he doesn't know those laws, experience of the past enables him to foresee future events with high probability; why would it be thought fanciful to try to draw a plausible picture of what lies in store for mankind, on the strength of its past history? The sole basis for trust in the natural sciences is the thesis that the general laws governing the phenomena of the universe are necessary and constant, whether or not we know them; why shouldn't this principle hold just as well for the development of man's intellectual and moral faculties as it does for the other operations of nature? Given that the wisest men are guided in their conduct solely by opinions based on past experience of similar situations, why shouldn't the philosopher be allowed that same basis to support his conjectures, as long as he doesn't claim for them more certainty than is warranted by the number, consistency and precision of the relevant observations?

Our hopes for the future state of mankind come down to three points: **[A]** the destruction of the inequality among nations, **[B]** advances in equality within individual nations, and **[C]** the real improvement of mankind. Aren't all nations bound some day to approach the state of civilisation reached by the peoples who are most enlightened, most free, most clear of prejudices, e.g. the French and the Anglo-Americans? The chasm separating these peoples from the slavery of countries subjected to kings, the barbarity of African tribes and the ignorance of savages—mustn't it gradually vanish?

[A] Are there territories on the globe whose inhabitants are condemned by nature never to enjoy liberty, never to

exercise their reason?

[B] The difference in knowledge, means and wealth that has so far been visible in all civilised nations, between the different classes making up each nation—what is the status of this inequality that the earliest advances of society have increased (one might almost say 'have *produced*')? Is it integral to civilisation as such, or is it one of the imperfections of the social art? Is it on course to lessen continually, being replaced by the chief goal of the social art, namely the actual equality that lessens even the effects of the *natural* differences in people's faculties and leaves standing only such inequality as is useful to everyone because it favours civilisation, education and industry, without creating dependence, humiliation or poverty? In short, are men approaching a state in which everyone will know what he needs to know for leading his everyday life on the basis of his own reason, and for keeping that reason uncontaminated by prejudices; for knowing his rights and exercising them according to his opinions and his conscience; a state in which everyone will be able by the development of his faculties to earn a secure livelihood; a state in which folly and misery will be only ·occasional· accidents and not the permanent state of a considerable portion of society?

[C] Finally, is the human race going to become better, either

- •through new discoveries in the sciences and the arts, resulting in improvements in individual well-being and general prosperity; or
- •by making further advances in the principles of conduct and in moral practice; or
- •by real improvement of our moral, intellectual and physical faculties?

That last one might result from any of three improvements: in the instruments that increase the power of those faculties, in the instruments that direct the faculties' use, or in the natural organisation of the faculties themselves.

In answering these three questions we'll find the strongest reasons—from past experience, from observation of the advances that the sciences and civilisation have made up to now, and from analysing the journey of the human mind and the development of its faculties—to believe that nature has set no limits to what we can look forward to.

[A] Inequality among nations

If we take a quick look at the present state of the globe, we'll see right away that in Europe the principles of the French constitution are already those of every enlightened man. We'll see them too widely disseminated there, and too openly professed, for tyrants and priests to block them from gradually penetrating the hovels of their slaves; and there they'll soon awaken the remnants of ·the slaves'· good sense, and arouse in the soul of the oppressed the silent indignation that a life of humiliation and terror can't extinguish.

Looking then at the different nations we'll see what particular obstacles each of them poses to this revolution and what particular factors favour it. We'll pick out •those where it is on course to come about gently through the (perhaps already overdue!) wisdom of their governments, and •those that will be dragged into swift and terrible events because the revolution has been made violent by their governments' resistance to it.

Can it be doubted that either the good sense or the senseless rivalries of the European nations, co-operating with the slow but unstoppable effects of the advances of their colonies, will soon produce the independence of the new world? and that then the European population ·of those former colonies·, rapidly spreading across that enormous

territory, will either civilise the savage nations still occupying immense tracts of it or peacefully cause them to disappear?

Survey the history of our enterprises and establishments in Africa or in Asia and you'll see

- our trade monopolies,
- our treachery,
- our blood-soaked contempt for men of a different colour or creed, and
- the insolence of our usurpations,
- the wild proselytising of our priests, or their intrigues

destroying the feeling of respect and good-will that had initially been won by the superiority of our knowledge and the benefits of trade with us.

But no doubt the moment is coming when we'll stop presenting ourselves to these people only as corruptors or tyrants and will become for them sources of benefit or warm-hearted liberators.

The sugar-growing industry that is now being established in Africa will put an end to the shameful robbery by which that enormous continent has been corrupted and depopulated through two centuries.

Already in Great Britain some friends of humanity have set the example; and if the force of public thinking has restrained that country's machiavellian government from opposing it, what may we not expect from this same source when the reform of a servile and venal constitution leads to a government worthy of a humane and good-hearted people? Won't France be eager to imitate enterprises dictated equally by Europe's philanthropy and its *true* self-interest? Spice-trading has already been introduced into the French islands, Guiana, and some English settlements; and we'll soon see the collapse of the spice monopoly that the Dutch have maintained by so much treachery, oppression and crime. The nations of Europe will eventually learn that trading monopolies are merely a tax imposed on a nation's people to give their government a new instrument of tyranny.

Then the Europeans, settling for free trade and too enlightened about their own rights to treat the rights of others lightly, will respect the independence that until now they have so insolently violated. Their settlements, instead of being filled by

> government hirelings who rush to exploit their position or their privilege in committing robbery and treachery to amass wealth with which to buy honours and titles back in Europe,

will be staffed with

> hard-working men who will go to those pleasant climates in search of the comfortable way of life that they couldn't find in their native country.

They will be kept there ·in the colonies· by liberty; ambition will stop calling them back to Europe; and those counting-houses of robbers will become colonies of citizens who will disseminate through Africa and Asia the principles and the example of Europe's liberty, enlightenment and reason. Also

> the monks who bring to these peoples nothing but shameful superstitions, and who antagonise them by threatening them with a new tyranny

will be replaced by

> men who busy themselves spreading among these nations truths that serve their happiness, and enlightening them about their interests as well as their rights.

Zeal for the truth is one of the passions; and when it stops seeing itself surrounded by gross prejudices to combat and shameful errors to dissipate it will naturally extend its efforts to distant parts of the earth.

These immense lands will offer to it—·i.e. to the zeal for the truth·—in some places **(i)** numerous peoples that seem

to need, in order to be civilised, only •for us to give them the means for this and •for the Europeans to treat them as brothers so as to have them as friends and disciples; in others **(ii)** nations ground down by religious despots or stupid conquerors, having spent centuries calling for liberators; in others again either **(iii)** nearly savage tribes whose harsh climate has •blocked them from having the gentle pleasures of a polished civilisation and •deterred those who would have liked to help them in this from making the attempt, or **(iv)** conquering tribes that know no law but force and no profession but piracy. The advances of **(iii)** and **(iv)** will be slower and more tempestuous; it may even happen that, reduced in numbers as they see themselves repelled by civilised nations, they will in the long run gradually disappear, or blend in with their neighbours.

I'll show how these events will be the inevitable consequence not only of Europe's advances but of the freedom that the French and North American republics *can* and in their own interests *should* give to trade with Africa and Asia—·i.e.· how they must necessarily result from the European nations' new-found wisdom or from their obstinate adherence to mercantile prejudices.

I'll show that the only event that could block this revolution would be a new invasion of Asia by the Tartars [here = roughly 'Turks and Mongols'], and that this won't again be possible. Meanwhile everything is working towards the early collapse of the great religions of the East. These have been abandoned to the people nearly everywhere, share the low moral level of their ministers, and in many regions are already regarded by those in power as mere political institutions; they no longer threaten to keep human reason in hopeless slavery and endless infancy.

The progress of these peoples will be faster and steadier than ours has been, because •they will get from us what we had to discover for ourselves, and because •for them to know the simple truths and reliable methods that we arrived at only through many errors all they'll need is to grasp their proofs and their developments in what we say and write. If the advances of the Greeks were lost on other nations, the blame for that lies with lack of communication between peoples and with the tyrannical domination of the Romans. But when mutual needs bring all men closer together, so that the most powerful nations will count among their political principles equality among societies as well as among individuals, respect for the independence of weak states as well as compassion for ignorance and wretchedness; when maxims that tighten the mainspring of the human faculties are replaced by ones that favour releasing it into action and energy; will it still be reasonable to fear that some parts of the globe are inaccessible to enlightenment, or that the pride of despotism will be able to go on for long putting up insurmountable barriers to the truth?

So the time will come when the sun shines only on men who are free and acknowledge no master except their reason; when tyrants and slaves, priests and their stupid or hypocritical instruments, will exist only in history books and on the stage; when we'll give no thought to them except for •pitying their ·past· victims and dupes, and •keeping watch for any new sprouting of the seeds of superstition and tyranny, so that if they dare to re-appear we can recognise them and stamp them down by the weight of reason.

[B] Inequality within individual nations

In surveying the history of societies I'll have had occasion to remark that there is often a big gap between the rights that the law grants to the citizens and the rights they really enjoy, between the equality that political institutions establish and

the equality there is among individuals; and that this gap was a leading cause of the destruction of liberty in the ancient republics, the storms they went through, and the weakness that delivered them into the hands of foreign tyrants.

These discrepancies have three principal causes: **(a)** inequality of wealth, **(b)** inequality of status between •someone whose means of subsistence are secure for himself and will be inherited by his family and •someone whose resources depend on the length of his life or rather of the part of his life in which he can work, and lastly **(c)** inequality of education.

So it will have to be shown that these three kinds of real inequality must continually lessen—but without vanishing, for they have natural and necessary causes that it would be absurd and dangerous to try to destroy. Even *trying to* abolish their effects entirely would let loose more harmful sources of inequality, attacking the rights of man more directly and fatally.

·(a) INEQUALITY OF WEALTH·

It is easy to prove that fortunes naturally tend to be equal, and that their extreme disproportion couldn't exist or couldn't last long if

- •civil laws didn't introduce artificial means of perpetuating them and combining them;
- •complete freedom of commerce and industry abolished the advantages that every restrictive law, every fiscal privilege, gives to those who are already rich;
- •there weren't taxes on contracts, restrictions on the freedom to make them, tiresome formalities regarding them, uncertainty and expenses in having them enforced—all suppressing the poor man's activity and swallowing up his pitiful capital;
- •public administration didn't open to some men abundant sources of wealth that are closed to all the other citizens;
- •marriages weren't presided over by elderly people's spirit of greed and other prejudices;
- •the simplicity of our *mœurs* and the wisdom of our institutions stopped wealth from operating as the means of gratifying vanity or ambition, but didn't favour an ill-judged austerity that would •forbid the use of wealth to pay for delicate pleasures and thus •lead to the hoarding of wealth.

·(b) INEQUALITY OF STATUS·

Let us compare the present populations of the enlightened nations of Europe with the extent of their territories. As we look at their agriculture and industry, let us observe how •labour and •the means of subsistence are distributed; we'll see that it would be impossible to maintain these means at the same level (and thus to maintain the same size of population) if many individuals stopped having to depend, for almost the whole upkeep of themselves and their families, on •their own work and •the equipment they have bought to make the work possible or to make it more productive. Now, these two resources depend on the family-head's remaining alive and indeed in good health. What he has is a sort of annuity, or something even more chancy than that; which creates a very real difference between this class of men and the class whose resources are not subject to the same risks because their needs are met by income from land or by interest on capital that depends hardly at all on their work.

So there's an inevitable cause of inequality, dependence, and even of misery, which ceaselessly threatens the most numerous and most active class of our societies.

I'll show that this ·inequality· can be vastly reduced by setting chance against chance:

- securing for someone who grows old a support arising from his savings but augmented by the savings of others who made the same sacrifice ·of savings to a common fund· but died before they needed it;
- procuring, in a similar way, compensation for widows and fatherless children, with the costs and benefits not being affected by the man's age at death; and
- preparing for young folk who reach the age of working for themselves and starting their own family the benefit of the capital—·e.g. to buy equipment·—that they need to get started on work. . . .

The idea of these procedures comes from the application of mathematics to the probabilities of life and investment of money. The procedures have already been employed with success, though never with the scope or the variety of forms that would make them truly beneficial not merely to some individuals but to the whole mass of society, delivering them from that periodical ruin that afflicts so many families and is the ever-recurring source of corruption and misery.

I shall show that these schemes, which can be one of government's benefactions, can also come from private associations that it will be safe to institute once the principles by which the schemes should be organised become more popular, and the errors that have led to the downfall of many such associations no longer have to be feared.

I'll expound other means of securing this equality: •preventing credit from being a privilege so exclusively attached to large fortunes, yet providing an equally solid basis for it; •making the advances in industry and the activity of commerce less dependent on the existence of great capitalists. These means also will be due to the application of mathematics.

·(c) Inequality of education·

The educational equality that we can hope to attain, and that ought to be sufficient, is that which excludes all *dependence*, whether forced or voluntary. I'll show that in the present state of human knowledge this can easily be achieved even for those who can devote only a few years of childhood to study and will have only odd hours of leisure during their adult lives. I'll show that by a good choice of subjects to be taught and methods of teaching them the entire mass of a populace can be instructed in everything that each man needs to know for

- managing his household, administering his affairs, freely developing his work and his faculties, knowing what his rights are, and exercising and protecting them;
- knowing what his duties are and being able to perform them well, judging his own actions and those of others by his own lights, and being capable of all the dignified or delicate sentiments that honour human nature;
- not depending *blindly* on those to whom he is obliged to entrust the care of his interests or the exercise of his rights;
- being in a position to choose them and then supervise them, so as no longer to duped by the popular [see Glossary] errors that torment a man's life with superstitious fears and flimsy hopes;
- defending himself against prejudices purely by the forces of his reason; and finally
- escaping from the magic-tricks of charlatanism that would set traps for his fortune, his health, his freedom of opinion and of conscience, on the pretence of enriching, healing and saving him.

[In that last item, note how the three traps line up with the three pretences.]

When that happens, the inhabitants of one country will no longer be distinguished from one another by the elegance or earthiness of their way of speaking, can be equally governed by their own understandings, will have knowledge of more than merely the mechanical processes of an art or the routine of a profession, and will no longer depend, in the most trifling affairs or for the slightest information, on clever men whose skill puts them in charge (there inevitably *will* be such men). And then a real equality must result, because the difference of knowledge and talents can no longer place a barrier between men whose sentiments, ideas and language allow them to understand one another; some of whom may *want to be educated* by others but won't *need to be led* by them; some may want to delegate to others, more enlightened, the responsibility for governing them, but they can't be forced to hand over this responsibility with blind confidence.

That is when this superiority—·the inevitable intellectual superiority of some men over others·—will become an advantage even for those who don't have it, because it will exist for them and not against them. Natural difference of faculties among men whose understandings haven't been cultivated produces—even among savages—charlatans and dupes, clever men and ones who are easily deceived; the same difference will doubtless exist among a people where education is truly general, then it will be a difference

> between •enlightened men and •men with sound minds who sense learning's value but aren't dazzled by it;
> between •talent or genius and •the good sense that knows how to appreciate and enjoy these;

and even if this difference were greater—looking only at the power and scope of the faculties—it wouldn't force itself on people's notice if they attended only to its effects on interpersonal relations in matters concerning their independence and their happiness.

These various causes of equality don't act separately; they unite, meld together, support one another, and their combined influence is stronger, surer and more constant. If education is more equal, that gives rise to more equality in work, and from that comes more equality in wealth; equality in wealth must contribute to equality of education; and equality among peoples both helps and is helped by equality within a single people.

In short, properly directed education corrects the natural inequality of the faculties rather than increasing it, just as good laws remedy the natural inequality of the means of subsistence; and just as, in societies whose institutions bring about this equality, liberty—though regulated by law—will be more extensive, more complete, than in the ·unregulated· independence of savage life. *Then* the social art will have achieved its goal, namely securing and extending for everyone the enjoyment of the common rights they are called to by nature.

[C] The perfecting of the human species

I have been showing that we can have almost sure hope of certain advances. The real advantages that must result from them can't be limited by anything except whatever limits there are to the perfecting of the human species. Why? Because in proportion as different kinds of equality equip the species with greater means for meeting our needs, with more universal education, and with more complete liberty, the more *real* this equality will be, and the closer it will come to taking in everything truly important to men's happiness.

So the only way we can know how much we can hope for—what limits there are to the benefits we can come to enjoy—is by examining the course of this perfecting ·of the human species· and the laws governing it.

No-one has ever thought that the ·human· mind could grasp •all the facts of nature, •*complete* precision in the measuring and analysing those facts, •all the ways in which objects are inter-related, and •all the possible combinations of ideas. The mere relations of *sizes*—the combinations of this one idea of quantity or extent—form a system that is too immense for man's mind ever to grasp it all; however much of it he comes to penetrate, more than that will always remain unknown to him. But it has been found credible that ·we'll eventually come to a dead-end·: that man, being able ever to know only a part of the topics that the nature of his intelligence permits him to understand, must eventually reach a limit, where the number and complexity of the facts he already knows have absorbed all his powers so that further progress will become absolutely impossible for him.

But ·that is not clearly right· because

- •as the range of known facts grows, men become correspondingly better at classifying them and reducing them to more general facts;
- •at the same time the instruments and methods for observing and measuring them exactly become more precise;
- •as more and more relations are discovered among more and more objects, men manage to reduce them to more general relations and express them in simpler language, presenting them in a way that enables more of them to be grasped without any increase in intellectual power or intellectual effort;
- •as the mind comes to understand more complex constructs of ideas, simpler formulae will soon reduce their complexity;

and the upshot of all this is that truths the discovery of which required the greatest efforts—truths that at first couldn't even be *understood* except by deep thinkers—soon come to be expounded and proved by methods that are within the reach of average intelligences. And if the methods that led to new combinations come to be exhausted, if the use of them to deal with still unanswered questions demands from scientists more time or more intellectual power than they have, simpler and more general methods ·come to their aid and· open up a new field to high intelligence. The energy and real scope of the human intellect will stay the same; but •the instruments it can use will be multiplied and improved, and •the language that fixes and determines ideas will be able to acquire more precision and generality. Unlike the situation in mechanics, where you can't increase the force without reducing the velocity, these methods that will direct high intelligence in the discovery of new truths will increase equally the force and the speed of its operations.

In short, because these changes are themselves the inevitable upshot of progress in the knowledge of detailed truths, and because the cause that creates a need for new resources produces at the same time the means of supplying them, it follows that the sheer content of the truths forming the system of the sciences of observation, experiment and calculation could increase endlessly, even if man's faculties retained the same strength, activity and extent.

Applying these general reflections to the different sciences, I shall present for each science examples of this progressive improvement—examples that will leave no doubt that more improvements lie ahead. I shall make a special point of noting, with regard to sciences that prejudice regards as nearest to the end of their tether, the ·possible· advances that are the most probable and the nearest in time. I shall expound all the ways in which a more general and more philosophical application of the mathematical sciences to all branches of human knowledge are bound to increase the

scope, precision, and unity of the system of that knowledge. I shall point out

- •how our hopes would be greater if in each country education were more universal, giving to more people the elementary knowledge that might inspire them with a taste for a particular kind of study and the ability to make advances in it;
- •how greatly these hopes would be further strengthened if more general affluence enabled more people to devote themselves to such study—because at present, even in the most enlightened countries, of those to whom nature has given the required talents barely one in fifty gets the education needed to develop them; and thus
- •that correspondingly more people would be on course to make discoveries that would push back the frontiers of science.

I'll show •how much this educational equality, combined with the coming equality among different nations, would speed those sciences whose advances depend on observations repeated more times over larger stretches of territory; •all the benefit that this would bring to mineralogy, botany, zoology and meteorology; in short, •what a vast difference there is between the feeble means now available to these sciences (though they have led to useful and important truths) and the means that man would then have at his disposal.

I shall reveal how much, even in the sciences where discoveries are the reward of individual meditation, the advantage of being pursued by more people could also contribute to their advances by improvements in the details—things of sorts that can arise from simple thinking and don't require the strength of intellect needed for discoveries.

If we pass now to the arts [see Glossary] whose theories depend on these same sciences, we'll see •that their theoretical advances can march with those of the sciences, not having any other limits; •that the procedures of the arts are capable of the same improvements and simplifications as the methods of the sciences; •that instruments, machines and looms will go on adding to man's power and skill, increasing the excellence and precision of the things he makes while reducing the amount of the time and labour needed to produce them. When all that happens, that will be the end of the obstacles that still stand in the way of those advances, obstacles such as accidents that men will learn to foresee and prevent, and the unsanitariness of certain operations, work-habits and climates.

Provisions of higher value or greater utility will be extractable from smaller and smaller portions of ground; more goods will be obtainable at less expense; the same manufactured article will require less destruction of raw materials or will be stronger and more durable. Men will be able to choose for each kind of soil the use of it that will do most to satisfy people's needs; and to choose, among different productions that meet the same need, the ones that will provide for the most people at the lowest cost. Thus, advances in the arts of producing and preparing materials and making things from them will bring with them cost-free improvements in the means of conservation and of frugality.

Thus, not only will the same ground feed more individuals, but each individual's work will be more productive—because less *grinding*—and so will satisfy more needs.

·Global over-population·

In these advances in industry and well-being, leading to a better relation between what men need and what they can do, each successive generation will have (either from its own advances or from the products of previous generations)

more usable goods than its predecessors; this will lead to an ever-rising level of health and thus to an ever-growing population. So a certain line of questioning arises:

- Wouldn't a point be reached at which these necessary laws ·of improvement and increase· came into conflict?
- Wouldn't the ever-increasing population eventually outrun the means of production, so that there would be if not a continual loss of population and loss of well-being then at least a sort of oscillation between good and bad?
- And wouldn't that, in societies that reached this point, be a perennial source of intermittent misery?

Wouldn't this mark the limit beyond which no further improvement ·in the human condition· would be possible? the point that the perfectibility of man would reach after ever so many centuries but wouldn't ever be able to get past?

Everyone can see that this point lies very far in the future; but aren't we bound to reach it some day? Well, if event E couldn't occur except at a time when the human species had acquired a level of knowledge and understanding that we today can scarcely form an idea of, we today can't possibly know that E will occur—or that it won't. Who would be so bold as to guess *now* what developments there will some day be in the art of converting the elements ·of life· to our use?

And even if this limit were reached, that wouldn't lead to anything alarming for mankind's happiness or its indefinite perfectibility, if the following things are true. Before that time comes

- reason will have advanced in step with the advances of the sciences and the arts;
- the prejudices of superstition will have stopped infecting morality with a harshness that corrupts and degrades instead of purifying and exalting it;
- men will then know that if they have obligations regarding people who are not yet born, those obligations
  - will have to do not with bringing those beings into existence but with their being happy ·if they come into existence·; and
  - will concern the general welfare of the human species or the society in which the obliged person lives or the family he belongs to, and not the puerile idea of cluttering the earth with beings who are useless and wretched.

So there might be a limit to how many people the earth can support and thus to how large the global population can be, without there being those early deaths ·from starvation· that would be so contrary to nature and to the social prosperity of some of the beings who have received life.

·Improvements in metaphysics, morals and politics·

The discovery (or rather the accurate analysis) of the basic principles of metaphysics, morals and politics is still recent, and it was preceded by knowledge of very many truths of detail; so it is easy to think that those three disciplines have now reached their destination; the prejudice has arisen that nothing remains to be done in them because there are no longer any gross errors to destroy or basic truths to establish.

But it is easy to see how far we are from fully understanding the intellectual and moral faculties of man; how greatly knowledge of his duties, which requires knowledge of how his actions will affect the welfare of his fellow creatures and of the society he belongs to, can be increased by a steadier, deeper and more accurate observation of that action-to-upshot relation; how many questions still have to be answered, how many social ties have to be examined, before we can have precise knowledge of the individual rights of man and of the rights that the social state confers on the

whole community with regard to each member. Have we yet even set with any precision the limits of these rights, whether •between different societies, or •of single societies over their members in times of trouble and division, or •of individuals and of free associations at the time of their first formation or of their having to be dissolved?

If we pass now to the theory that will have to direct the *application* of these principles, serving as the basis of the social art, don't we see the need for a level of precision that these first truths—absolutely general as they are—aren't capable of? Have we reached the point where we can base our laws on either justice or proved and acknowledged utility, rather than on vague, uncertain and arbitrary views of claimed political advantages? Have we settled on precise rules to guide a confident choice, among the almost infinite variety of possible systems that would respect the general principles of equality and natural rights, the ones that best secure the preservation of these rights, give the widest scope for their exercise and enjoyment, and best promote the leisure and welfare of individuals and the strength, peace and prosperity of nations?

The application of the calculus of combinations and probabilities to these same sciences ·of metaphysics, morals and politics· promises advances that will get added importance from the fact that this ·calculus· is the only means of •giving their results an almost mathematical precision and of •judging how certain or probable they are. The facts that support these results may well lead—at a glance, without calculation—to some general truths, telling us whether the effects produced by such-and-such a cause are good or bad; but if these facts can't be counted or weighed, if these effects can't be subjected to exact measurement, we shan't be able to know *how much* good or bad the cause in question produces; and if the good and bad are nearly equal, the difference between them being small, we won't even be able to say confidently which way the balance swings. Without the application of this calculus it would often be impossible to make a secure choice between two routes to a single goal when there was no obvious difference between their respective advantages. Without this ·mathematical· help these sciences would remain forever crude and limited because of their lack of instruments fine enough to lay hold of the fleeting truth, of machines sound enough to get down into the depths of the mine where some of the wealth of these sciences lies hidden.

Yet this application, despite the happy efforts of certain geometers, is still in a rudimentary state, so to speak; and to future generations it must open a source of knowledge that is—like the calculating science itself, and like the combinations of relations and facts that it can be applied to—truly inexhaustible.

Another kind of progress that these ·three· sciences can make is equally important—the perfecting of their language, which is so vague still and so obscure. It's through this improvement that the sciences can become truly popular [see Glossary] even in their basic elements. Someone who is ·highly trained and· highly intelligent can triumph over the inexactitude of scientific language, as he can over other obstacles; he recognises the truth despite of the ·linguistic· mask that conceals or disguises it. But what about the man who can spend only a few leisure moments on his education—how can *he* acquire and retain even the simplest truths if they are disguised by inaccurate language? The fewer ideas he is able to collect and combine, the greater his need for them to be sound and precise. He doesn't have stored in his mind any system of truths to defend him against error; and his understanding, not being strengthened or refined by long exercise, cannot catch the feeble rays of

light that escape through the obscurities and ambiguities of an imperfect and perverted language.

·Moral science and moral practice·

When men become enlightened about the nature and development of their moral sentiments, the principles of morality, the natural motives that prompt them to act morally, and their interests as individuals or as members of society, they will inevitably make advances in •moral practice that are as real as those they make in •the science of morality. Isn't a mistake about our interests the most frequent cause of actions contrary to the general welfare? Isn't the violence of our passions often the effect of •habits that we have acquired only through false calculations or of •ignorance of the means by which to resist the passions at their outset so as to tame them, steer them, direct their action?

Isn't the practice of

- •reflecting on one's own conduct,
- •listening to the deliverances of reason and conscience upon it, and
- •having gentle feelings that don't distinguish one's own happiness from that of others

—isn't all this an inevitable result of **(a)** the well-directed study of morality and of **(b)** greater equality in the conditions of the social compact? Won't **(b)** the free man's sense of his own dignity and **(a)** an educational system based on a deepened knowledge of our moral constitution have the result that almost everyone has those principles of strict and pure justice, those habitual impulses of active and enlightened benevolence, of a delicate and generous sensibility, whose seed nature has planted in our hearts and which will flower there if they get the gentle influence of **(a)** enlightenment and **(b)** liberty? Just as the mathematical and physical sciences serve to improve the arts that are employed for our simplest needs, isn't it equally part of nature's necessary order that advances in the moral and political sciences should serve to improve the motives that direct our feelings and our actions?

What is achieved by the improvement of laws and public institutions that comes from the advances of these sciences except to bring •the common interest of each individual closer to—to make it *identical* with—•the common interest of all? Isn't the goal of the social art to destroy the seeming opposition between these? And won't the country whose constitution and laws accord best with the demands of reason and nature also be the one where the practice of virtue will be easiest and the temptations to stray will be rarest and weakest? What vicious habit, what practice contrary to good faith, what *crime*, even, can't be ultimately traced back to its origin or first cause in the legislation, institutions and prejudices of the country in which the habit, practice, or crime is seen to be committed?

In short, aren't men disposed to humanity, beneficence and justice by the prosperity resulting from •the advances the useful arts make with the support of a sound theory, or •the advances sound legislation makes on the basis of the truths of the political sciences?

Don't all these observations (which I'll develop at length in the work itself) show that man's moral goodness, the necessary consequence of his constitution, is like all his other faculties capable of indefinite improvement? and that nature binds together truth, happiness and virtue by a chain that can't be broken?

·Imbalance between the sexes·

Among the advances of the human mind that matter most to general happiness we must include the total annihilation of the prejudices that have established an inequality of rights between the sexes, an inequality that is deadly even to the

sex that it favours. It would be useless to try to justify it by differences of physical organisation, of intellect, or of moral sensibility. This inequality began as a pure abuse of strength, and subsequent attempts to excuse it by bad arguments have all been wasted breath.

I shall show how much the abolition of the practices authorised by this prejudice, and of the laws that it has dictated, can do to increase the happiness of families and spread the virtues of domestic life (which are the basis of all the other virtues); and to favour advances in education, above all making it truly *general*—because it would be extended more equally to both sexes and because it can't become general even for men without the support of the mothers of families. Wouldn't this long-overdue tribute to equity and good sense dry up a brimming well of injustices, cruelties and crimes by abolishing the dangerous opposition between •man's most vigorous and hard-to-control natural propensity and •his duties or the interests of society? Wouldn't it *at last* produce something that until now has been merely a pipe-dream? I mean: mild and pure national *mœurs*, not formed by

- •proud asceticism,
- •hypocritical appearances ·of sexual propriety·, or
- •·sexual· moderation imposed by the fear of shame or religious terrors,

but by habits freely contracted, inspired by nature and acknowledged by reason?

·The end of war·

When people are more enlightened, and have reclaimed the right to dispose of their own blood and their own goods, they'll gradually come to regard war as the deadliest scourge, the worst of all crimes. The first wars to disappear will be the ones that usurpers of national sovereignty drag their subjects into in defence of supposed hereditary rights.

Nations will know that they can't become conquerors without losing their freedom; that permanent confederations are the only way to maintaining their independence; that they should aim for security, not power. Commercial prejudices will gradually die away; false ideas about mercantile interest will lose their terrible power of drenching the earth in blood, ruining nations on the pretence of enriching them. •As the nations come closer to one another in their views on the principles of politics and morality, and •as each of them, for its own advantage, invites foreigners to have a more equal share in the benefits that nature or industry have given it, all the causes that produce, intensify and perpetuate national hatreds will gradually disappear; they'll no longer provide either fuel or pretext for the fury of war.

The advances of this brotherhood of nations will be accelerated by institutions that are better conceived than the projects of perpetual peace with which certain philosophers have filled their spare time and soothed their souls; and wars between nations will count (like assassinations) as extraordinary atrocities, humiliating and loathsome in the eyes of nature and fixing an indelible stain on the country or the age whose history records them.

·Improvements in fine arts and sciences·

Regarding the fine arts in Greece, Italy and France I said [page 29] that one should distinguish in their productions what really belongs to the progress of the art from what is due only to the talent of the artist. Now I shall ·turn from the past to the future and· consider what advances ·in the fine arts· may still be expected, whether because of

- •advances in philosophy and the sciences,
- •more observations [see Glossary], or deeper ones, concerning the goal, the effects and the means of the fine arts themselves, or

- the abolition of the prejudices that have narrowed their sphere and still hold them back by the yoke of authority from which the sciences and philosophy have broken free.

I'll look into something that has been believed, namely [to the end of this paragraph]: The means of the fine arts are bound to dry up, because •the most sublime beauties, or the most touching ones, have been taken, •the happiest subjects have been treated, •the simplest and most striking ideas have been used, •the most prominent and general characters have been portrayed, •the liveliest passions and their truest or most natural expressions, the most striking truths, and the most brilliant images have been put to work by the artists; so that the ·fine· arts, whatever growth we attribute to their means, are condemned to an eternal and monotonous imitation of their first models.

I shall show that this opinion is nothing but a prejudice born of the habit of artists and literary folk of *judging the men* rather than *enjoying their works*. The thoughtful pleasure that comes from comparing the products of different ages and countries, and from being amazed by the efforts or the success of genius, may be lost; but the pleasure to be derived from the productions themselves because of their own real perfection needn't be less lively, even in cases where the artist doesn't deserve as much credit for rising to that level of perfection. As there come to be more works that are really worth preserving, and as they become more perfect, each generation will direct its attention and admiration to those that deserve to be singled out, and the rest will gradually be forgotten; and the pleasures to be derived from the simpler and more striking beauties that were first seized on will still be had by our posterity even though those beauties are found only in more modern works.

The advances of the sciences guarantee advances in the art of education, which then speed up those of the sciences; and this reciprocal influence, whose action is ceaselessly renewed, must count as one of the most active and powerful causes of the perfecting of the human race. A young man graduating from one of our universities today knows more in mathematics than Newton learned by profound study or discovered by the force of his genius; he can handle the instrument of calculation with an ease that was unknown back then. The same observation applies, though not quite equally, to all the sciences. The more a given science grows, the better it becomes at compressing more proofs of truths within less space, making them easier to understand. Thus, not only will this be the case for each generation:

> despite the new advances in the sciences, men of equally high intelligence will at the same stage of their individual lives come to be right on top of the present state of ·the· science ·they are working on·,

but so also will this:

> the amount that can be learned in a given stretch of time by the same strength of intellect and the same level of attention will inevitably increase; and the elementary part of each science—the part that *everyone* can master—will grow, coming ever closer to containing all the knowledge that everyone needs if he is to steer himself through everyday life and freely exercise his reason.

In the political sciences there's a category of truths which—particularly in free countries, i.e. some generations hence in *all* countries)—can't be useful until they are generally known and accepted. So the influence of these sciences on the freedom and prosperity of nations must be somewhat measured by how many of those truths are lodged in everyone's mind through elementary education; so the growing advances in elementary education, tied to the inevitable

advances in these sciences, provides us with a guarantee of an improvement in the lot of the human race that can be regarded as indefinite because it could only be limited by limits on those two kinds of advance.

·TECHNICAL METHODS AND UNIVERSAL LANGUAGE·

I have to address two other general means that are bound to influence improvements in both •the art of education and •the sciences. One is a broader and better use of what may be called *technical methods*; the other is the setting up of a •universal language.

By 'technical methods' I mean the art of bringing many objects into a systematic layout that lets one see at a glance their inter-relations, quickly grasp the complexes that they form, and more easily form new complexes from them.

I shall expound the principles of this art and bring out how useful it can be. Today it is still in its infancy, but when it is perfected it can offer us

- •the advantage of presenting within the narrow compass of a *chart* material that it would often be hard to make so quickly or so well understood in a big book; and
- •something even more valuable—a way to present isolated facts in the layout that is best for deriving general results from them.

It's easy to learn how to use these charts; and I'll show •how, with the help of a few of them, men who have been stuck at the level of elementary education, and thus haven't been able to absorb—to *make their own*—knowledge of details that are useful in everyday life, will come to be able to lay their hand on those details as needed; and •how these ·technical· methods can make elementary education easier in all the branches of it that are concerned with either a regular system of truths or a series of observations and facts.

A language is *universal* if it expresses by signs either **(i)** real **objects** or **(ii)** well-defined collections of simple and general **ideas** which are found to be the same, or can be formed equally in the understanding of all men; or **(iii)** the general relations among these ideas—the **operations** of the human mind, or the operations that specifically belong to each science or to the procedures of the arts. Thus, anyone who knew these signs, the ways to combine them and the rules for forming them would understand what is written in this language and could easily translate it into the vernacular of his own country.

Clearly this language could be used to expound either the theory of a science or the rules of an art; to report a new experiment or observation, the invention of a procedure, the discovery of a truth or of a method; and, as in algebra, when new signs have to be introduced they will be explainable in terms of the already existing ones.

Such a language doesn't have the drawback of a scientific idiom different from the vernacular. I have remarked [page 65] that the use of such an idiom necessarily divides societies into two unequal classes—one composed of men who understand the language and thus have the key to the sciences, the other of those who have been unable to learn it and so are almost completely unable to acquire knowledge. The universal language that I am describing, on the other hand, would be learned (as the language of algebra is) along with learning the science itself; the sign would be known at the same time as the **object**, **idea** or **operation** that it stands for. Anyone who had learned the elements of a science and wanted to go further in it would find in books not only truths he could understand with the aid of the signs whose meanings he already knew but the explanation of further signs that were needed for him to go on to other truths.

I'll show •that the formation of such a language, if confined to the expressing of simple and precise propositions like those that form the system of a science or the practice of an art, is far from being a mere fantasy; •that even today it could easily be set up for many topics; and •that the chief obstacle to its being extending to others would be something that it's a bit embarrassing to admit, namely the paucity of our stock of precise ideas, accurately defined notions, understood exactly in the same sense by every mind.

I'll show how this language, with daily improvements and enlargements of its scope, would bring to every topic that comes within the reach of human intelligence a rigour and precision that would make it easy to know the truth and almost impossible to go wrong. Then each science would go forward as securely as mathematics does, and the propositions constituting its system would have all the certainty of geometry—i.e. all that is permitted by the propositions' subject-matter and method.

·Improving man's physique and natural faculties·

All these causes of the improvement of the human species, all these means that ensure it, must from their very nature exert an always active influence and continually broaden their scope. I have presented the evidence for this; and when it is developed at length in the work itself it will be even stronger; so we can already conclude that man is indefinitely improvable; and we have reached this point while assuming him to go on having only the same natural faculties that he has now, as being internally organised in the same way. Think how sure we could be ·about man's future improvement·, how much we could hope for on his behalf, if we could believe that these natural faculties themselves—this organisation—could also be improved. This is the last matter that I have to examine.

The organic perfectibility or deterioration of the species of plants and animals can be regarded as one of the general laws of nature. This law extends to the human race; and surely no-one will doubt that

- •advances in conservative [*conservatrice*] medicine,
- •healthier food and housing,
- •a life-style that develops physical powers by exercise without ruining them by excess, and lastly
- •eliminating degradation's two most active causes, extreme poverty and extreme wealth,

are bound to prolong man's average life-span and secure for him better health and a sturdier constitution. We can sense that advances in preventive [*préservatrice*] medicine, which will become more efficacious because of advances in reason and the social order, are bound eventually to put an end to hereditary and contagious illnesses and to general ill-health arising from climate, food and working conditions. It wouldn't be hard to show that this hope should apply to almost every other illness whose remote causes we come to discover. Would it be absurd now to suppose that *this* improvement is capable of indefinite progress; to suppose that the time must come when death will be due only to extraordinary accidents or to the decay (slower and slower ·down through the generations·) of the person's vital forces, and that eventually the amount of time between a person's birth and this decay will have no assignable value? Certainly man won't become immortal; but can't the interval between a man's birth and ·his death—i.e.· the usual time at which naturally, without illness or accident, he encounters the difficulty of staying in existence—become ever longer?

Since I am now speaking of a progress that can be precisely represented by numbers or on a graph, this is the place where I should explain the two meanings that the word 'indefinite' can have.

This average life-span that we are supposing to keep lengthening as men push on into the future could be growing in either of two ways:

(i) following a law such that the life-span continually *approaches* some indeterminate length without being able to *reach* it—·like the series $n - \frac{1}{2}, n - \frac{1}{3}, n - \frac{1}{4} \ldots$;·

(ii) following a law such that as the centuries unroll the life-span becomes longer than any determinate quantity that might have been assigned as its limit—·like the series 1, 2, 3, 4,. . . .·

In case **(ii)** its increases are really *indefinite* in the strictest sense of the word, since there is no length x such that the life-span must be shorter than x. In case **(i)** the increases are also indefinite in the sense of being *indefinite to us*, because we can't say what the length n is that the life-span can go on approaching but can never reach. The fact is that even if we know that the increases can never stop, we don't know whether they are indefinite in sense **(i)** or in sense **(ii)**. And this is the end-point of our present knowledge of the perfectibility of the human species—the sense in which we can call human perfectibility *indefinite*.

Thus, in the example we are considering, we have to believe that average human life-span will go on increasing for ever unless physical upheavals prevent that from happening; but we don't know what the length is that it can't ever exceed; we don't even know whether the laws of nature have set any such limit.

But ·that doesn't end the *questions* about human perfectibility·. Mightn't it be that individual improvements in the strength, dexterity and acuteness of our **senses** can be transmitted from one generation to the next? Observation of the various breeds of domestic animals should incline us to think so, and we can confirm this by direct observation of the human species.

Lastly, can we hope for the same thing for our **intellectual** and **moral** faculties? Mightn't it be that our parents, who transmit to us the benefits or defects of their bodily constitution, and from whom we receive our distinctive facial features as well as our tendency to certain physical upsets, also transmit to us that part of the physical organisation that determines intelligence, brain-power, energy of soul, or moral sensibility? Isn't it likely that education, by improving these qualities, also influences, modifies and improves this physical organisation?. . . .

These questions that bring to an end my examination of this last era. And this picture of the human species—•freed from all its shackles, •no longer dominated by chance or by the enemies of its advances, and •striding with a firm and sure step along the path of truth, virtue and happiness—how consoling it is for the philosopher who laments the errors, the crimes and the injustices which still pollute the earth and of which he is often a victim! Contemplating this picture is the reward for all his efforts on behalf of reason's advances and of the defence of liberty. He ventures to regard these efforts as links in the eternal chain of human destiny; and *that* is the true repayment for virtue, namely the pleasure of having done lasting good that fate can't destroy through any fatal operation that brings back prejudice and slavery. This contemplation is for him a refuge into which the memory of his persecutors cannot pursue him. In there he unites himself in thought with man re-established in his rights and in the dignity of his nature; he forgets those who are tormented and corrupted by greed, fear or envy; he truly lives there with people like him, in an elysium [see Glossary] which his reason has created for him and which his love for humanity enhances with the purest joys.

THE END