

In confirmation of this last remark, many additional arguments might be drawn from the peculiar circumstances in which Bacon wrote. At the period when he entered on his literary career, various branches of physical science were already beginning to exhibit the most favourable presages of future improvement; strongly inviting his original and powerful mind to co-operate in the reformation of philosophy. The turn of his genius fortunately led him to employ himself chiefly in general suggestions for the advancement of learning; and, leaving to others the task of inductive investigation, to aim rather at stating such rules as might direct and systematize their exertions. In his own experimental researches he was not very fortunate; nor is much reliance to be placed on the facts recorded in his *Histories*. Perhaps the comprehensiveness of his views diminished his curiosity with respect to the particular objects of science; or, perhaps, he found the multiplicity of his engagements in active life, more consistent with speculations, in which the chief materials of his reasonings were to be drawn from his own reflections, than with inquiries which demanded an accurate observation of external phenomena, or a minute attention to experimental processes. In this respect, he has been compared to the Legislator of the Jews, who conducted his followers within sight of their destined inheritance; and enjoyed,

gic at Glasgow, is worthy of imitation in those universities which admit of similar deviations from old practices. For an account of his plan, see Biographical Memoirs of Smith, Robertson, and Reid, p. 12.; where I have inserted a slight but masterly sketch of his academical labours, communicated to me by his pupil and friend, the late Mr Millar.

in distant prospect, that promised land which he himself was not permitted to enter*.

The effect of this prophetic imagination in clothing his ideas, to a greater degree than a severe logician may approve, with the glowing colours of a poetical diction, was unavoidable. The wonder is, that his style is so seldom chargeable with vagueness and obscurity; and that he has been able to bequeath to posterity so many cardinal and eternal truths, to which the progressive light of science is every day adding a new accession of lustre. Of these truths, however, (invaluable in themselves as heads or texts, pregnant with thought) many,—to borrow the expression of a Greek poet,—*sound only to the intelligent*; while others present those confident but indefinite anticipations of intellectual regions yet undiscovered, which, though admirably calculated to keep alive and to nourish the ardour of the man of science, are more fitted to awaken the enthusiasm, than to direct the studies of youth. Some of them, at the same time (and *these*, I apprehend, cannot be too early impressed on the memory) are singularly adapted to enlarge and to elevate the conceptions; exhibiting those magnificent views of knowledge which, by identifying its progress with the enlargement of human power and of human happiness, ennoble the humblest exertions of literary industry, and annihilate, before the triumphs of genius, the most dazzling objects of vulgar ambition.—A judicious se-

* See Cowley's Ode, prefixed to Sprat's History of the Royal Society.

"In rebus quibuscunque difficilioribus, non expectandum est ut quis simul et seriat et metat; sed præparatione opus est, ut per gradus maturescant." BACON.

lection of such passages, and of some general and striking aphorisms from the *Novum Organon*, would form a useful manual for animating the academical tasks of the student ; and for gradually conducting him from the level of the subordinate sciences, to the *vantage-ground* of a higher philosophy.

Unwilling as I am to touch on a topic so hopeless as that of Academical Reform, I cannot dismiss this subject, without remarking, as a *fact* which at some future period will figure in literary history, that two hundred years after the date of Bacon's philosophical works, the antiquated routine of study, originally prescribed in times of scholastic barbarism and of popish superstition, should, in so many Universities, be still suffered to stand in the way of improvements, recommended at once by the present state of the sciences, and by the order which nature follows in developing the intellectual faculties. On this subject, however, I forbear to enlarge.—Obstacles of which I am not aware may perhaps render any considerable innovations impracticable ; and, in the mean time, it would be vain to speculate on ideal projects, while the prospect of realizing them is so distant and uncertain.

NOTES AND ILLUSTRATIONS.

NOTES AND ILLUSTRATIONS.

Note (A.) p. 39.

OF the fault in Euclid's arrangement which I have here remarked, some of the ancient editors were plainly aware, as they removed the two *theorems* in question from the class of axioms, and placed them, with at least an equal impropriety, in that of postulates. "In "quibusdam codicibus (says Dr Gregory) Axiomata 10 et 11 inter "postulata numerantur." (Euclidis quæ supersunt omnia. Ex Recens. Dav. Gregorii. Oxon. 1703. p. 3.)

The 8th Axiom too in Euclid's enumeration is evidently out of its proper place. Καὶ τὰ ἐφαρμόζοντα ἐπ' ἀλλήλα ἴσα ἀλλήλοις ἐστί :—thus translated by Dr Simson; "Magnitudes which coincide with one another, that "is which exactly fill the same space, are equal to one another." This, in truth, is not an axiom, but a definition. It is the definition of geometrical equality;—the fundamental principle upon which the comparison of all geometrical magnitudes will be found ultimately to depend.

For *some* of these slight logical defects in the arrangement of Euclid's definitions and axioms, an ingenious, and, I think, a solid apology has been offered by M. Prevost, in his *Essais de Philosophie*. According

to this author (if I rightly understand his meaning) Euclid was himself fully aware of the objections to which this part of his work is liable; but found it impossible to obviate them, without incurring the still greater inconvenience of either departing from those modes of proof which he had resolved to employ exclusively in the composition of his *Elements**; or of revolting the student, at his first outset, by prolix and circuitous demonstrations of manifest and indisputable truths.—I shall distinguish by Italics, in the following quotation, the clauses to which I wish more particularly to direct the attention of my readers.

“ C'est donc l'imperfection (peut-être inévitable) de nos conceptions, qui a engagé à faire entrer les axiomes pour quelque chose dans les principes des sciences de raisonnement pur. Et ils y font un double office. Les uns remplacent des définitions. Les autres remplacent des propositions susceptibles d'être démontrées. J'en donnerai des exemples tirés des *Elémens* d'Euclide.

“ Les axiomes remplacent quelquefois des définitions très faciles à faire, comme celle du mot *tout*. (El. Ax. 9.) *D'autres suppléent à certaines définitions difficiles et qu'on évite, comme celles de la ligne droite et de l'angle.*

“ Quelques axiomes remplacent des théorèmes. J'ignore si (dans les principes d'Euclide) l'axiome 11. peut-être démontré (comme l'ont cru Proclus et tant d'autres anciens et modernes). *S'il peut l'être, cet axiome supplée à une démonstration probablement laborieuse.*

“ Puisque les axiomes ne font autre office que suppléer à des définitions et à des théorèmes, on demandera peut-être qu'on s'en passe. Observons 1. *Qu'ils évitent souvent des longueurs inutiles.* 2. *Qu'ils tranchent les disputes à l'époque même où la science est imparfaite.* 3. *Que s'il est un état, auquel la science puisse s'en passer (ce que je n'affirme point) il est du moins sage, et même indispensable, de les employer, tant que quelque insuffisance, dans ce degré de perfection où l'on tend, interdit un ordre absolument irréprochable.* Ajoutons 4. Que dans chaque

* By introducing, for example, the idea of *Motion*, which he has studied to avoid, as much as possible, in delivering the *Elements* of Plane Geometry.

" science il y a ordinairement un principe qu'on pourroit appeller
 " dominant, et qui par cette raison seule (et indépendamment de cel-
 " les que je viens d'alléguer) a paru devoir être sorti, pour ainsi dire,
 " du champ des définitions pour être mis en vue sous forme d'axiome.
 " Tel me paroît être en géométrie le principe de congruence contenu
 " dans le 8 Axiome d'Euclide." (Essais de Philosophie, Tom. II. pp.
 30, 31, 32.)

These remarks go far, in my opinion, towards a justification of Euclid for the latitude with which he has used the word axiom in his Elements. As in treating, however, of the fundamental laws of human belief, the utmost possible precision of language is indispensably necessary, I must beg leave once more to remind my readers, that, in denying *Axioms* to be the first principles of reasoning in mathematics, I restrict the meaning of that word to such as are analogous to the first seven in Euclid's list. Locke, in what he has written on the subject, has plainly understood the word in the same limited sense.

Note (B.) p. 70.

The prevalence in India of an opinion bearing *some* resemblance to the Berkeleian Theory may be urged as an objection to the reasoning in the text; but the fact is, that this resemblance is much slighter than has been generally apprehended. (See Philosophical Essays, pp. 81, 82, et seq.) On this point the following passage from Sir William Jones is decisive; and the more so, that he himself has fallen in to the common mistake of identifying the Hindu Belief with the conclusions of Berkeley and Hume.

" The fundamental tenet of the *Védānti* school consisted, *not in denying the existence of matter, that is, of solidity, impenetrability, and extended figure (to deny which would be lunacy), but in correcting the popular notion of it, and in contending, that it has no essence independent of mental perception, that existence and perceptibility are convertible terms, that external appearances and sensations are illusory, and would vanish into nothing, if the divine energy, which alone sus-*

"tains them, were suspended but for a moment" ; an opinion, which "Epicharmus and Plato seem to have adopted, and which has been maintained in the present century with great elegance, but with little public applause ; partly because it has been misunderstood, and partly because it has been misapplied by the false reasoning of some unpopular writers, who are said to have disbelieved in the moral attributes of God, whose omnipresence, wisdom, and goodness, are the basis of the Indian philosophy. I have not sufficient evidence on the subject to profess a belief in the doctrine of the *Védānta*, which human reason alone could, perhaps, neither fully demonstrate, nor fully disprove ; but it is manifest, that nothing can be farther removed from impiety than a system wholly built on the purest devotion." (Works of Sir William Jones, Vol. I. pp. 165, 166.)

From these observations (in some of which I must be permitted to say, there is a good deal of indistinctness, and even of contradiction), it may on the whole be inferred, 1. That in the tenets of the Vedanti school, however different from the first apprehensions of the unreflecting mind, there was nothing *inconsistent* with the fundamental laws of human belief, any more than in the doctrine of Copernicus concerning the earth's motion. 2. That these tenets were rather articles of a theological creed, than of a philosophical system ; or at least, that the two were so blended together, as sufficiently to account for the hold which, independently of any refined reasoning, they had taken of the popular belief.

In this last conclusion I am strongly confirmed, by a letter which I had the pleasure of receiving, a few years ago, from my friend Sir

* Sir William Jones here evidently confounds the system which represents the material universe as not only at first *created*, but as every moment *upheld* by the agency of Divine Power, with that of Berkeley and Hume, which, denying the distinction between primary and secondary qualities, asserts, that extension, figure, and impenetrability are not less inconceivable without a *percipient* mind, than our sensations of heat and cold, sounds and odours. According to both systems, it may undoubtedly be said, that the material universe has no existence independent of *mind* ; but it ought not to be overlooked, that in the *one*, this word refers to the Creator, and in the *other*, to the created percipient.

James Mackintosh, then Recorder of Bombay. His good nature will, I trust, pardon the liberty I take in mentioning his name upon the present occasion, as I wish to add to the following very curious extract, the authority of so enlightened and philosophical an observer.—Amidst the variety of his other important engagements, it is to be hoped that the results of his literary researches and speculations, while in the East, will not be lost to the world.

“ I had yesterday a conversation with a young Bramin of no great learning, the son of the Pundit (or assessor for Hindu law) of my Court. He told me, that besides the myriads of gods whom their creed admits, there was one whom they know by the name of BRIM, or the great one, without form or limits, whom no created intellect could make any approach towards conceiving; that, in reality, there were no trees, no houses, no land, no sea, but all without was Maia, or illusion, the act of BRIM; that whatever we saw or felt was only a dream, or, as he expressed it in his imperfect English, thinking in one's sleep, and that the reunion of the soul to BRIM, from whom it originally sprung, was the awakening from the long sleep of finite existence. All this you have heard and read before as Hindu speculation. What struck me was, that speculations so refined and abstruse should, in a long course of ages, have fallen through so great a space as that which separates the genius of their original inventor from the mind of this weak and unlettered man. The names of these inventors have perished; but their ingenious and beautiful theories, blended with the most monstrous superstitions, have descended to men very little exalted above the most ignorant populace, and are adopted by them as a sort of articles of faith, without a suspicion of their philosophical origin, and without the possibility of comprehending any part of the premises from which they were deduced. I intend to investigate a little the history of these opinions, for I am not altogether without apprehension, that we may all the while be mistaking the hyperbolical effusions of mystical piety, for the technical language of a philosophical system. Nothing is more usual, than for fervent devotion to dwell so long and so warmly on the mean-

"ness and worthlessness of created things, and on the all-sufficiency of the Supreme Being, that it slides insensibly from comparative to absolute language, and, in the eagerness of its zeal to magnify the Deity, seems to *annihilate* everything else. To distinguish between the very different import of the same words in the mouth of a mystic and of a sceptic, requires more philosophical discrimination than most of our Sanscrit investigators have hitherto shewn."

Note (C.) p. 82.

THE private correspondence here alluded to, was between Mr Hume and the late Sir Gilbert Elliott; a gentleman who seems to have united, with his other well-known talents and accomplishments, a taste for abstract disquisitions, which rarely occurs in men of the world; accompanied with that soundness and temperance of judgment which, in such researches, are so indispensably necessary to guard the mind against the illusions engendered by its own subtilty. In one of his letters (of which the original draft in his own handwriting was communicated to me by the Earl of Minto,) he expresses himself thus *:

"I admit, that there is no writing or talking of any subject which is of importance enough to become the object of reasoning, without having recourse to some degree of subtilty and refinement. The only question is, where to stop, how far we can go, and why no farther? To this question I should be extremely happy to receive a satisfactory answer. I can't tell if I shall rightly express what I have just now in my mind; but I often imagine to myself, that I perceive within me a certain instinctive feeling, which shoves away at once all over subtle refinements, and tells me, with authority, that these air-built notions are inconsistent with life and experience, and by consequence cannot be true or solid. From this

"I am led to think, that the speculative principles of our nature ought to go hand in hand with the practical ones; and, for my own part, when the former are so far pushed, as to leave the latter quite out of sight, I am always apt to suspect that we have transgressed our limits. If it should be asked, how far will these practical principles go? I can only answer, that the former difficulty will recur, unless it be found, that there is *something* in the intellectual part of our nature, resembling the moral sentiment in the moral part of our nature, which determines this, as it were, instinctively. Very possibly, I have wrote nonsense: However, this notion first occurred to me at London, in conversation with a man of some depth of thinking; and talking of it since to your friend Henry Home *, I found that he seemed to entertain some notions nearly of the same kind, and to have pushed them much farther."

The *practical principles* referred to in this extract, seem to me to correspond very nearly with what I have called *fundamental laws of belief*, or *first elements of human reason*; and the *SOMETHING in the intellectual part of our nature, resembling the moral sentiment in the moral part of our nature*, is plainly descriptive of what Reid and others have since called *common sense*;—coinciding, too, in substance with the philosophy of Lord Kames, who refers our belief of the existence of the Deity, and of various other primary truths, to particular *senses*, forming a constituent part of our intellectual frame. I do not take upon me to defend the forms of expression which Mr Hume's very ingenious correspondent has employed to convey his ideas; and which, it is probable, he did not think it necessary for him, in addressing a confidential friend, to weigh with critical exactness; but his doctrine must be allowed to approximate remarkably to those parts of the works of Reid, where he appeals from the paradoxical conclusions of metaphysicians, to the principles on which men are compelled, by the constitution of their nature, to judge and to act in the ordinary concerns of life;—as well as to various appeals of

* Afterwards Lord Kames.

the same kind, which occur in Lord Kames's writings. My principal object, however, in introducing it here, was to shew, that this doctrine was the natural result of the state of science at the period when Reid appeared; and consequently, that no argument against his originality in adopting it can reasonably be founded on a coincidence between his views concerning it and those of any preceding author.

Of Mr Hume's respect for the literary attainments of this correspondent, so strong a proof occurs in a letter, (dated Ninewells, March 10, 1751) that I am tempted to subjoin to the foregoing quotation the passage to which I allude.

"You would perceive, by the sample I have given you, that I make Cleanthes the hero of the dialogue. Whatever you can think of to strengthen that side of the argument, will be most acceptable to me. Any propensity you imagine I have to the other side crept in upon me against my will; and 'tis not long ago that I burned an old manuscript-book, wrote before I was twenty, which contained, page after page, the gradual progress of my thoughts on that head. It began with an anxious search after arguments to confirm the common opinion: Doubts stole in,—dissipated,—returned,—were again dissipated,—returned again: And it was a perpetual struggle of a restless imagination against inclination, perhaps against reason.

"I have often thought, that the best way of composing a dialogue would be, for two persons that are of different opinions about any question of importance, to write alternately the different parts of the discourse, and reply to each other. By this means that vulgar error would be avoided, of putting nothing but nonsense into the mouth of the adversary; and, at the same time, a variety of character and genius being upheld, would make the whole look more natural and unaffected. Had it been my good fortune to live near you, I should have taken upon me the character of Philo in the dialogue, which you'll own I could have supported naturally enough: and you would not have been averse to that of Cleanthes."

In a postscript to this letter, Mr Hume recurs to the same idea. "If

"you'll be persuaded to assist me in supporting Cleanthes, I fancy
 "you need not take the matter any higher than Part 3. He allows,
 "indeed, in Part 2d, that all our inference is founded on the simi-
 "tude of the works of nature to the usual effects of mind: otherwise
 "they must appear a mere chaos. The only difficulty is, why the
 "other dissimilitudes do not weaken the argument: And, indeed, it
 "would seem from experience and feeling, that they do not weaken
 "it so much as we might reasonably expect. A theory to solve this
 "would be very acceptable *."

Note (D.) p. 89.

It would perhaps be difficult to mention another phrase in our language, which admits of so great a variety of interpretations as *common sense*; and to which, of consequence, it could have been equally dangerous to annex a new technical meaning in stating a controversial argument. Dr Beattie has enumerated some of these in the beginning of his Essay, but he has by no means exhausted the subject; nor is his enumeration altogether unexceptionable in point of logical distinctness. On this point, however, I must allow my readers to judge for themselves. (See Essay on the Nature and Immutability of Truth, p. 37 et seq. 2d Edit.)

The Latin phrase *sensus communis* has also been used with much latitude. In various passages of Cicero it may be perfectly translated by the English phrase *common sense*; and, in the same acceptation, it is often employed in modern latinity. Of this (not to mention other authorities) many examples occur in the *Lectiones Mathematicæ* of Dr Barrow; a work not more distinguished by originality and depth of thought, than by a logical precision of expression. In one of these,

* From the above quotations it appears, that Mr Hume's posthumous work, entitled Dialogues concerning Natural Religion, was projected, and, in part at least, executed, twenty-five years before his death.

he appeals to *common sense* (*sensus communis*), in proof of the circumference of the circle being less than the perimeter of the circumscribed square. (Lect. 1.)

On other occasions, the *sensus communis* of classical writers plainly means something widely different;—as in those noted lines of Juvenal, so ingeniously illustrated by Lord Shaftesbury, in his *Essay on the Freedom of Wit and Humour*.

“Hæc satis ad juvenem, quem nobis fama superbum

“Tradit, et inflatum, plenumque Nerone propinquo.

“Rarus enim ferme *sensus communis* in illâ

“Fortunâ.” ———

“Some commentators (says Shaftesbury) interpret this very differently from what is generally apprehended. They make this *common sense* of the poet, by a Greek derivation, to signify sense of public weal, and of the common interest; love of the community or society, natural affection, humanity, obligingness, or that sort of civility which rises from a just sense of the common rights of mankind, and the natural equality there is among those of the same species.

“And indeed if we consider the thing nicely, it must seem somewhat hard in the poet to have deny’d wit or ability to a court such as that of Rome, even under a Tiberius or a Nero. But for humanity or sense of public good, and the common interest of mankind, ’twas no such deep satire to question whether this was properly the spirit of a court. ’Twas difficult to apprehend what Community subsisted among courtiers; or what Public among an absolute Prince and his slave-subjects. And for real *society*, there could be none between such as had no other *sense* than that of private good.

“Our poet, therefore, seems not so immoderate in his censure; if we consider it is the *heart*, rather than the *head* he takes to task: when reflecting on a court-education, he thinks it unapt to raise any affection towards a country; and looks upon young Princes and Lords as the *young masters* of the world; who, being indulged in all their passions, and trained up in all manner of licentiousness, have

"that thorough contempt and disregard of Mankind, which Mankind
 "in a manner deserves, where arbitrary power is permitted, and a
 "tyranny adored."

While I entirely agree with the general scope of these observations, I am inclined to think, that the *sensus communis* of Juvenal might be still more precisely rendered by *sympathy*; understanding this word (in the appropriate acceptation annexed to it by Mr Smith) as synonymous with that fellow-feeling which disposes a man, in the discharge of his social duties, to place himself in the situation of others, and to regulate his conduct accordingly. Upon this supposition, the reflection in question coincides nearly with one of Mr Smith's own maxims, that "the great *never* look upon their inferiors as their fellow-creatures*;"—a maxim which, although sufficiently founded in fact to justify the sarcasm of the satirical poet, must (it is to be hoped for the honour of human nature) be understood with considerable limitations, when stated as a correct enunciation of philosophical truth.

It yet remains for me to take some notice of the *sensus communis* of the schoolmen; an expression which is perfectly synonymous with the word *conception*, as defined in the first volume of this work. It denotes the power whereby the mind is enabled to *represent* to itself any absent object of perception, or any sensation which it has formerly experienced. Its *seat* was supposed to be that part of the brain (hence called the *sensorium*, or the *sensorium commune*) where the nerves from all the organs of perception terminate. Of the peculiar function allotted to it in the scale of our intellectual faculties, the following account is given by Hobbes. "Some say the senses receive the species of
 "things, and deliver them to the Common Sense; and the Common
 "Sense delivers them over to the Fancy; and the Fancy to the Memo-
 "ry and the Memory to the Judgment;—like handing of things from
 "one to another, with many words making nothing understood." (Of Man, Part I. Chap. 2.)

Sir John Davis, in his poem on the Immortality of the Soul (pub-

* Theory of Moral Sentiments, Vol. I. p. 136. 6th Edit.

lished in the reign of Queen Elisabeth) gives the name of *common sense* to the power of *imagination* (See Sections XIX. and XX.); and the very same phraseology occurs, at a later period, in the Philosophy of Des Cartes: (see, in particular, his Second Meditation, where he uses *Sensus Communis* as synonymous with *Potentia Imaginatrix*.) Both of these writers, as appears evidently from the context, understand by *Imagination* what I have called *Conception*. To the power now denoted by the word *Imagination*, Sir John Davis gives the name of *Fantasy*.—Gassendi seems disposed to consider this use of the phrase *Sensus Communis* as an innovation of Des Cartes, (see his Objections to Des Cartes' Second Meditation, § 6.) but it had been previously adopted by various philosophical writers; and, in the English schools, was at that time familiar to every ear.

The singular variety of acceptations of which this phrase is susceptible; and the figure which, on different occasions, it has made in the history of philosophy, will, I trust, furnish a sufficient apology for the length as well as for the miscellaneous nature of the foregoing remarks*.

Note (E.) p. 102.

The Arithmetical Prodigy, alluded to in the text, is an American boy (still, I believe, in London), of whose astonishing powers in per-

* It has been observed to me very lately by a learned and ingenious friend, that in one of the phrases which I have proposed to substitute for the *common sense* of Buffier and Reid, I have been anticipated, two hundred years ago, by Sir Walter Raleigh. "Where natural reason hath built any thing so strong against itself, as the same reason can hardly assail it, much less batter it down; the same, in every question of nature, and infinite power, may be approved for a *fundamental law of human knowledge*." (Preface to Raleigh's History of the World.) The coincidence in point of expression, is not a little curious; but is much less wonderful than the coincidence of the *thought* with the soundest logical conclusions of the eighteenth century.—The very eloquent and philosophical passage which immediately follows the above sentence, is not less worthy of attention.

forming, by a mental process, hitherto unexplained, the most difficult numerical operations, some accounts have lately appeared in various literary Journals. When the sheet containing the reference to this Note was thrown off, I entertained the hope of having an opportunity, before reaching the end of the volume, to ascertain, by personal observation, some particulars with respect to him, which I thought might throw light on my conclusions concerning the faculty of Attention, in the former volume of this work. In this expectation, however, I have been disappointed; and have, therefore, only to apologize for having inadvertently excited a curiosity which I am at present unable to gratify.

Note (F.) p. 166.

Εν ταυτοῖς ἡ ἰσότης ἐνόητος. "In mathematical quantities, equality is identity." (Arist. Met. x. c. 3.)

This passage has furnished to Dr Gillies (when treating of the theory of syllogisms), the subject of the following comment, in which, if I do not greatly deceive myself, he has proceeded upon a total misapprehension of the scope of the original. "In mathematical quantities, " (Aristotle says, that) equality is sameness," because ὁ λογος ὁ τῆς πρώτης κείας ἕως ἐστι. "The definition of any particular object denoted by the "one is precisely the same with the definition of any particular object denoted by the other." (Gillies's Aristotle, Vol. I. p. 87.)

In order to enable my readers to form a judgment of the correctness of this paraphrase, I must quote Aristotle's words, according to his own arrangement, which, in this instance, happens to be directly contrary to that adopted by his interpreter. Ἐτι δὲ ἀνὸς λογος ὁ τῆς πρώτης κείας ἕως ἡ, ὅσον αἱ ἰσάι γραμμαὶ εὐθείαι αἱ αὐταὶ, καὶ τὰ ἰσα καὶ τὰ ἰσογώνια τετραγώνια, καὶ τοὶ πλείω. ἀλλ' ἐν ταυτοῖς ἡ ἰσότης ἐνόητος. The first clause of this passage is, from its conciseness, obscure; but Aristotle's meaning, on the whole, seems to be this;—"That all those magnitudes which bear the "same *ratio* to the same magnitude, though in fact they may form a "multitude, yet, in a scientific view, they may be regarded as *one*;" "the mathematical notion of equality being ultimately resolvable in-

"to that of *unity* or identity *." It was probably to obviate any difficulty that might have been suggested by diversities of *figure*, that Aristotle has confined his examples to equal straight lines, and to such quadrangles as are not only equal but similar.

Let us now consider the paraphrase of Dr Gillies. "In mathematical quantities, equality is sameness, because the *definition* of any particular object denoted by the one, is precisely the same with the *definition* of any particular object denoted by the other." Are we to understand by this, that "to all things which are equal the same definition is applicable;" or conversely, that "all things to which the same definition is applicable, are equal?" On the former supposition, it would follow, that the same definition is applicable to a circle, and to a triangle having its base equal to the circumference, and its altitude to the radius. On the latter, that all circles are of the same magnitude; all squares, and all equilateral triangles.—There is, indeed, one sense wherein those geometrical figures which are called by the same name, (all circles, for example,) may be identified in the mind of the logician; inasmuch as any theorem which is proved of one, must equally hold true of all the rest; and the reason of this is assigned, with tolerable correctness, in the last clause of the sentence quoted from Dr Gillies. But how this reason bears on the question with respect to the convertibility of the terms *equality* and *sameness*, I am at a loss to conjecture.

Note (G.) p. 206.

In an Essay on Quantity (by Dr Reid), published in the Transactions of the Royal Society of London, for the year 1748, mathematics is very correctly defined to be "the doctrine of measure."—"The object of this science (the author observes) is commonly said to be *quantity*; in which case, quantity ought to be defined, *what may be measured*. Those who have defined quantity

* Τα πρὸς τὸ αὐτὸ τὸν αὐτὸν ἔχοντα λόγους, ἴσα ἀλλήλους εἶναι. Euc. Elem. Lib. V. Prop. ix.

"to be whatever is capable of more or less, have given too wide a notion of it, which has led some persons to apply mathematical reasoning to subjects that do not admit of it*." The appropriate objects of this science are therefore such things alone as admit not only of being increased and diminished, but of being multiplied and divided. In other words, the common quality which characterizes all of them is their *mensurability*.

In the same Essay, Dr Reid has illustrated, with much ingenuity, a distinction (hinted at by Aristotle †) of quantity into proper and improper. "I call that (says he) proper quantity, which is measured by its own kind; or which, of its own nature, is capable of being doubled or trebled, without taking in any quantity of a different kind as a measure of it. Thus a line is measured by known lines, as inches, feet, or miles; and the length of a foot being known, there can be no question about the length of two feet, or of any part or multiple of a foot. This known length, by being multiplied or divided, is sufficient to give us a distinct idea of any length whatsoever.

"Improper quantity is that which cannot be measured by its own kind, but to which we assign a measure in some proper quantity that is related to it. Thus velocity of motion, when we consider it by itself, cannot be measured. We may perceive one body to move faster, another slower, but we can perceive no proportion or ratio between their velocities, without taking in some quantity of another kind to measure them by. Having therefore observed, that by a greater velocity, a greater space is passed over in the same time, by a less velocity a less space, and by an equal velocity an equal space; we hence learn to measure velocity by the space passed over in a given time, and to reckon it to be in exact proportion to that; and

* In this remark, Dr Reid, as appears from the title of his paper, had an eye to the abuse of mathematical language by Dr Hutcheson, who had recently carried it so far as to exhibit algebraical formulas for ascertaining the moral merit or demerit of particular actions. (See his Inquiry into the Original of our Ideas of Beauty and Virtue.)

† *Κατὰ τὴν φύσιν τὰ ποσὰ πάντα μετρεῖται ἑαυτῷ, τὰ δὲ ἄλλα πάντα κατὰ συμβεβηκός· εἰς ταῦτα γὰρ ἀποβλέπομεν, καὶ τὰ ἄλλα ποσὰ λεγόμενα.* (Arist. Categ. cap. vi. 17.)

“ having once assigned this measure to it, we can then, and not till
 “ then, conceive one velocity exactly double, or triple, or in any pro-
 “ portion to another. We can then introduce it into mathematical
 “ reasoning, without danger of error or confusion; and may use it as
 “ a measure of other improper quantities.

“ All the proper quantities we know may I think be reduced to
 “ these four: extension, duration, number, and proportion.

“ Velocity, the quantity of motion, density, elasticity, the *vis insita*
 “ and *impressa*, the various kinds of centripetal forces, and the diffe-
 “ rent orders of fluxions, are all improper quantities; which therefore
 “ ought not to be admitted into mathematical reasoning, without hav-
 “ ing a measure of them assigned.

“ The measure of an improper quantity ought always to be includ-
 “ ed in the definition of it; for it is the giving it a measure that
 “ makes it a proper subject of mathematical reasoning. If all mathe-
 “ maticians had considered this, as carefully as Sir Isaac Newton has
 “ done, some trouble had been saved both to themselves and their
 “ readers. That great man, whose clear and comprehensive under-
 “ standing appears even in his definitions, having frequent occasion
 “ to treat of such improper quantities, never fails to define them, so
 “ as to give a measure of them, either in proper quantities, or such as
 “ had a known measure. See the definitions prefixed to his *Prin-*
 “ *cipia*.”

With these important remarks I entirely agree, excepting only the enumeration here given of the different kinds of proper quantity, which is liable to obvious and insurmountable objections. It appears to me that, according to Reid's own definition, extension is the only proper quantity within the circle of our knowledge. Duration is manifestly not measured by duration, in the same manner as a line is measured by a line; but by some regulated motion, as that of the hand of a clock, or of the shadow on a sun-dial. In this respect it is precisely on the same footing with velocities and forces, all of them being measured, in the last result, by extension. As to number and proportion, it might be easily shewn, that neither of them fall under the definition of quantity, in any sense of that word. In proof of this assertion (which may, at first sight, seem somewhat paradoxical)

I have only to refer to the mathematical lectures of Dr Barrow, and to some very judicious observations introduced by Dr Clarke in his controversy with Leibnitz. It is remarkable, that, at the period when this essay was written, Dr Reid should have been unacquainted with the speculations of these illustrious men on the same subject; but this detracts little from the merits of his memoir, which rest chiefly on the strictures it contains on the controversy between the Newtonians and Leibnitzians concerning the measure of forces.

Note (H.) p. 207.

The following view of the relation between the theorems of pure geometry and their practical applications strikes me as singularly happy and luminous; more especially the ingenious illustration borrowed from the science of geometry itself.

“ Les vérités que la géométrie démontre sur l'étendue, sont des vérités purement hypothétiques. Ces vérités cependant n'en sont pas moins utiles, eu égard aux conséquences pratiques qui en résultent. Il est aisé de le faire sentir par une comparaison tirée de la géométrie même. On connoit dans cette science des lignes courbes qui doivent s'approcher continuellement d'une ligne droite, sans la rencontrer jamais, et qui néanmoins, étant tracées sur le papier, se confondent sensiblement avec cette ligne droite au bout d'un assez petit espace. Il en est de même des propositions de géométrie; elles sont la limite intellectuelle des vérités physiques, le terme dont celles-ci peuvent approcher aussi près qu'on le desire, sans jamais y arriver exactement. Mais si les théorèmes mathématiques n'ont pas rigoureusement lieu dans la nature, ils servent du moins à résoudre, avec une précision suffisante pour la pratique, les différentes questions qu'on peut se proposer sur l'étendue. Dans l'univers il n'y a point de cercle parfait; mais plus un cercle approchera de l'être, plus il approchera des propriétés rigoureuses du cercle parfait que la géométrie démontre; et il peut en approcher à un degré suffisant pour notre usage. Il en est de même des autres

"figures dont la géométrie détaille les propriétés. Pour démontrer
 "en toute rigueur, les vérités relatives à la figure des corps, on est
 "obligé de supposer dans cette figure une perfection arbitraire qui n'y
 "sauroit être. En effet, si le cercle, par exemple, n'est pas supposé
 "rigoureux, il faudra autant de théorèmes différens sur le cercle qu'on
 "imaginera de figures différentes plus ou moins approchantes du cer-
 "cle parfait; et ces figures elles-mêmes pourront encore être absolu-
 "ment hypothétiques, et n'avoir point de modele existant dans la na-
 "ture. Les lignes qu'on considere dans la géométrie usuelle, ne sont
 "ni parfaitement droites, ni parfaitement courbes; les surfaces ne
 "sont ni parfaitement planes, ni parfaitement curvilignes; mais il est
 "nécessaire de les supposer telles, pour arriver à des vérités fixes et
 "déterminées, dont on puisse faire ensuite l'application plus ou moins
 "exacte aux lignes et aux surfaces physiques."—D'Alembert, *Elémens*
de Philosophie, Article *Géométrie*.

Note (I.) p. 225.

From some expressions in this quotation, it would seem that the writer considered it as now established by mathematical demonstration, not only that a provision is made for maintaining the order and the stability of the solar system; but that, after certain periods, all the changes arising from the mutual actions of the planets, begin again to be repeated over in an invariable and eternal *round*;—or rather, that all this is the result of the *necessary* properties of matter and of motion. The truth is, that this assumption is quite unfounded, in point of fact; and that the astronomical discovery in question affords not the slightest analogical presumption in favour of a *moral cycle*;—even on the supposition, that the actions of the human race, and the motions of the globe which they inhabit, were both equally subjected to the laws of mechanism.

I shall avail myself of this opportunity to remark further, that notwithstanding the lustre thrown by the result of La Grange's investigations on the metaphysical reasoning of Leibnitz against the *ma-*

mus emendatrix of Newton,—this reasoning, when we consider the vagueness of the abstract principles on which it rests, can be regarded in no other light than as a fortunate conjecture on a subject where he had neither experience nor analogy for a guide. The following argument is not ill-stated by Voltaire; and, in my opinion, is more plausible than any thing alleged *a priori*, on the other side of the question, by Leibnitz. “Il est trop clair par l’expérience que Dieu a fait des machines pour être détruites. Nous sommes l’ouvrage de sa sagesse; et nous périssons. Pourquoi n’en seroit-il pas de même du monde? Leibnitz veut que ce monde soit parfait; mais si Dieu ne l’a formé que pour durer un certain tems, sa perfection consiste alors à ne durer que jusqu’à l’instant fixé pour sa dissolution.” Voltaire’s Account of Newton’s Philosophy.

For some excellent observations on these opposite conjectures of Leibnitz and of Newton, see Edinburgh Review, Vol. XIV. pp. 80, 81.

The quotation which gave occasion to the foregoing strictures induces me to add, before concluding this Note, that when we speak of La Grange’s *Demonstration* of the Stability of the Solar System, it is by no means to be understood that he has proved, by mathematical reasoning, that this system never *will*, nor ever *can* come to an end. The amount of his truly sublime discovery is, that the system does *not*, as Newton imagined, contain within itself, like the workmanship of mortal hands, the elements of its own decay; and that, therefore, its final dissolution is to be looked for, not from the operation of physical causes subjected to the calculations of astronomers, but from the will of that Almighty Being, by whose *fiat* it was at first called into existence. That this stability is a *necessary* consequence of the general laws by which we find the system to be governed, may, indeed, be assumed as a demonstrated proposition; but it must always be remembered, that *this necessity is only hypothetical or conditional*, being itself dependent on the continuance of laws, which may at pleasure be altered or suspended.

The whole of the argument in the text, on the permanence or stability of the order of nature, is manifestly to be understood with si-

milar restrictions. It relates, not to necessary but to probable truths ; not to conclusions syllogistically deduced from abstract principles, but to *future contingencies*, which we are determined to *expect* by a fundamental Law of Belief, adapted to the present scene of our speculations and actions.

Note (K.) p. 231.

" The power of designating an individual object by an appropriate articulation, is a necessary step in the formation of language, but very far removed indeed from its consummation. Without the use of general signs, the speech of man would differ little from that of brutes : and the transition to the general term from the name of the individual is a difficulty which remains still to be surmounted. Condillac, indeed, proposes to shew, how this transition may be made in the natural course of things. ' Un enfant appelle du nom *d'arbre* le premier arbre que nous lui montrons. Un second arbre qu'il voit ensuite lui rappelle la même idée ; il lui donne le même nom ; de même à un troisième, à un quatrième, et voilà le mot *d'arbre*, donné d'abord à un individu, qui devient pour lui un nom de classe ou de genre, une idée abstraite qui comprend tous les arbres en general.' In like manner, Mr Adam Smith, in his *Dissertation on the Origin of Languages*, and Mr Dugald Stewart, in his *Elements of the Philosophy of the Human Mind*, endeavour to explain this process, by representing those words which were originally used as the proper names of individuals, to be successively transferred to other individuals, until at length each of them became insensibly the common name of a multitude. This, however, is more ingenious than solid. The name given to an individual, being intended exclusively to designate that individual, it is a direct subversion of its very nature and design, to apply it to any other individual, known to be different from the former. The child, it is true, may give the name of *father* to an individual like to the person it has been taught to call by that name : but this is

“ from mistake, not from design ; from a confusion of the two as the same person, and not from a perception of resemblance between them whilst known to be different. In truth, they whose thoughts are occupied solely about individual objects, must be the more careful to distinguish them from each other; and accordingly, the child will most peremptorily retract the appellation of *father*, so soon as the distinctness is observed *. The object with those whose terms or signs refer only to individuals, must naturally be to take care, that every such term or sign shall be applied to its appropriate individual, and to none else. Resemblance can produce no other effect, than to enforce a greater caution in the application of the particular names, and therefore has no natural tendency to lead the mind to the use of general terms.” (Discourses and Dissertations on the Scriptural Doctrines of Atonement and Sacrifice. By William Magee, D. D. Senior Fellow of Trinity College, and Professor of Mathematics in the University of Dublin. Vol. II. pp. 63, 64. 3d Edit.)

The observations in pp. 231, 232, &c. of this Volume, (to which I must request the attention of my readers before they proceed to the following remarks) appear to me to weaken considerably the force of this reasoning, as far as it applies to the *substance* of the theory in question. With respect to Mr Smith's illustration, drawn from the *accident* of a child's calling a stranger by the name of *father*, I readily acknowledge that it was unluckily chosen; and I perfectly assent to the strictures bestowed on it by Dr Magee. In consequence of the habitual intercourse which this domestic relation naturally keeps up between the parties, the *mistake* of the child (as Dr Magee very properly calls it) must, of course, be immediately corrected; and therefore, the example is of no use whatever in confirming the conclusion it is brought to support. It is to be regretted that, upon this occa-

* These remarks have a particular reference to the following sentence in Mr Smith's Dissertation: “ A child that is just learning to speak calls every person who comes to the house its *papa* or its *mama*; and thus bestows upon the whole species those names which it had been taught to apply to two individuals.”

sion, Mr Smith should not only have appealed to a period of infancy, when the notions of similarity and of identity, cannot fail to be sometimes one and the same; but should have assumed, as a general fact, an accidental occurrence, which, if it ever has happened, may be justly regarded as an exception to the usual history of the species. While yet on the breast, a child is able to distinguish, with the utmost quickness and accuracy, between the face of an acquaintance and that of a stranger; and, when it is so far advanced, as to begin to utter articulate sounds, any tendency to transfer or to generalize the words *mother* or *nurse* seems scarcely conceivable. We are apt to suppose that the first attempts towards speech are coëval with the study of language; whereas the fact manifestly is, that these attempts are only the consequences of the progress previously and silently made in the interpretation of words. Long before this time, many of the logical difficulties which appear so puzzling to the speculative grammarian, have been completely surmounted*.

But although this particular example has been ill chosen, it does not therefore follow that the author's theory is altogether unfounded. Whoever has paid any attention to the phenomena of the infant mind, must be satisfied of its strong bias, in the first developement of the intellectual powers, to apply to similar objects a common name, without ever thinking of confounding them together.—Nor does this hold merely with respect to similar *objects*: it holds also (and at a surprisingly early period of life) with respect to similar *relations*. A

* The general fact with respect to children, assumed by Mr Smith in the foregoing note, is stated still more strongly by Aristotle. Both of these philosophers have, I suspect, trusted more, in this instance, to theory than to observation. Καὶ τὰ παῖδια το μὲν πρῶτον προσαγορεύει πάντας τὴν αἰδράς, πατέρας· ἔν μῆτερας, τὰς γυναῖκας· ὕστερον δὲ διαρίζῃσι τούτων ἑκάστην. “Ac pueri quoque primum omnes viros appellant patres, “et omnes mulieres, matres: postea vero discernunt horum utrumque.” (Arist. Nat. Ausc. Lib. I. Cap. i.)

This passage (which I do not recollect to have seen quoted by any former writer) does honour to Aristotle's acuteness. The *fact*, indeed, asserted in it, is more than questionable; but, admitting the fact to be true, it must be owned that Aristotle has viewed it in a juster light than Mr Smith;—not as an instance of any disposition to generalize proper names, but merely of imperfect and undistinguishing perception.

child who has been accustomed to the constant attentions and caresses of its mother, when it sees another child in the arms of its nurse, will naturally and infallibly call the nurse the child's mother. In this instance, as in numberless others, its error arises from generalizing too hastily;—the distinction between the meanings of the two relative words Mother and Nurse being too complex to be comprehended, till the power of observation begins to be exercised with some degree of attention and accuracy. This disposition, however, to transfer names from one thing to another, the diversity of which is obvious even to sense, certainly affords no inconsiderable an argument in favour of the opinion disputed by Dr Magee.

It is indeed, wonderful, how readily children transfer or generalize the name of the *maternal relation* (*that* which of all others must necessarily impress their minds most strongly) not only in the case of their own species, but of the lower animals; applying, with little or no aid from instruction, the word *mother* to the hen, the sheep, or the cow, whom they see employed in nurturing and cherishing their young.

To myself, I own, it appears, that the theory of Condillac and Smith on this point, is confirmed by every thing I have been able to observe of children. Even generic terms will be found, on examination, if I be not much deceived, to be originally understood by them merely as *proper names*; insomuch that the notions annexed by an infant to the words denoting the different articles of its nursery-furniture, or the little toys collected for its amusement, are, in its conceptions, as individually and exclusively appropriated, as the names of its father, mother, or nurse. If this observation be well-founded, the same gradual conversion of proper names into appellatives, which Mr Smith supposes to have taken place in the formation of a language, is exemplified in the history of every infant while learning to interpret its mother-tongue. The case is nearly the same with the peasant, who has never seen but one town, one lake, or one river. All of these appellatives are to his ear precisely equivalent to so many proper names.

“Quo te, Mæri, pedes? An, quo via ducit, in Urbem?”

That resemblance is one of our most powerful associating principles will not be disputed; and that, even in the maturity of our reason, we have a natural disposition to generalize the meaning of signs, in consequence of apprehended similarities, both of *things* and of *relations*, is equally certain. Why then should it be apprehended, that there is any peculiar mystery connected with this step in the commencement of the progress, when it seems to admit of an explanation so satisfactory, from a law of the human mind, exemplified daily in facts falling within the circle of our own experience?

Note (L.) p. 256.

"Aristotle's rules are illustrated, or rather, in my opinion, *purposely darkened*, by putting letters of the alphabet for the several terms." (Reid's Analysis of Aristotle's Logic.)

On this remark the following criticism has been made by Dr Gillies.

"In the first Analytics, Aristotle shews, what is that arrangement of terms in each proposition, and that arrangement of propositions in each syllogism, which constitutes a necessary connection between the premises and the conclusion. When this connection takes place, the syllogism is perfect in point of form; and when the form is perfect, the conclusion necessarily follows from the premises, whatever be the signification of the terms of which they are composed. These terms, therefore, he commonly expresses by the letters of the alphabet, for the purpose of shewing that our assent to the conclusion results, not from comparing the things signified, but merely from considering the relation which the signs (whether words or letters) bear to each other. Those, therefore, totally misconceive the meaning of Aristotle's logic, who think that by employing letters instead of words, he has *darkened* the subject; since the more abstract and general his signs are, they must be the better

“adapted to shew, that the inference results from considering them alone, without at all regarding the things which they signify*.”

With the doctrine stated in the beginning of this extract I entirely agree. It coincides indeed remarkably with a passage in the former volume of this work, where I have shewn, at some length, that our assent to the conclusion of a legitimate syllogism results, not from comparing the things signified, but merely from considering the relations of the signs; and consequently, that letters of the alphabet might be substituted instead of verbal terms, without impairing the force of the argument. The observation appears to myself of considerable importance, when connected with the fundamental question *there* discussed, concerning the use of language as an instrument of thought; but, I own, I am at a loss to conceive how it should have been supposed to bear on the present subject. The only point at issue between Dr Gillies and Dr Reid is, whether the use of letters instead of words be, or be not, a useful expedient for facilitating the study of logic; and upon this, I apprehend, there can scarcely exist a diversity of opinion. No instance, I will venture to affirm, ever occurred of any hesitation in the mind of the merest novice about the conclusiveness of a legitimate syllogism, when illustrated by an example; but how difficult to explain to a person altogether unaccustomed to scholastic abstractions, the import and cogency of those symbolical demonstrations by which Aristotle has attempted to fortify the syllogistic theory!

The partiality of Dr Gillies for this technical device has probably arisen, in part, from his supposing it to bear a much closer analogy than it does, in fact, to the algebraical art. Another very learned writer has proceeded on the same idea, when he observes, that “it should recommend the study of logic to mathematicians, that, in order to make his *demonstrations* universal, Aristotle uses letters as universal characters, standing for all kinds of terms or propositions†.” It would

* Analysis of Aristotle's Speculative Works, &c. by Dr Gillies, Vol. I. p. 89, 2d. Edit.

From a note at the foot of the page it appears, that the remarks just quoted from Reid gave occasion to the above strictures.

† Ancient Metaphysics, Vol. III. p. 51 of the Preface.

be an idle waste of words to shew, how very slight this analogy is, and how totally inapplicable to the question before us;—amounting to little more than this, that, in both cases, the alphabet happens to be employed as a substitute for common language. An analogy, much more in point, may be traced in the practice of designating by letters the different parties in a hypothetical law-suit;—a practice attended with no inconvenience, where these symbols only supply the place of proper names; but which would at once convert the simplest case into an ænigma, if they were to be employed (as they are by Aristotle) to denote, not merely individual existences, but the relations of general ideas.

While Dr Gillies has thus exerted his ingenuity in defending the use made by Aristotle of letters instead of words, it is to be regretted, that he has said nothing about the motives which induced that philosopher, in disproving the illegitimate modes, to content himself with general references to such words as *bonum*, *habitus*, *prudentia*, upon which the student is left to his own judgment, in ringing the various changes necessary for the illustration of the theory. A more effectual contrivance could not easily have been thought of, for perplexing a subject, level, in itself, to the meanest capacity. In this respect, it answers the intended purpose still better than his alphabetical *formulæ*.

Note (M.) p. 293.

As instances of what are called by logicians *fallaciæ in dictione*, a modern writer mentions the mistakes which may arise from confounding "*liber* Bacchus, et *liber* a servitute; *liber* codex, et *liber* cortex; *crevi* à cerno, et *crevi* à cresco; *infractus* participium ab "*infringo*, et *infractus* compositum ab *in* et *fractus*, sensu plane "*contrario*." He mentions also the danger of confounding the literal with the figurative sense of a word, as *vulpes* when applied to a quadruped, and to a man noted for cunning.—"Sic si quis arguat "*(he adds for the sake of illustration) stellam latrare, quia stella quædam Canis dicitur, facile respondebitur captioso argumento, distinguendo varios sensus ejusdem vocis, indeque ostendendo syllogismi*

"quatuor terminos (si sensum spectes) ubi tres saltem sono comparent."

To exemplify the *fallacia accentus*, the same writer warns us against confounding *hortus* and *ortus*; *hara* and *ara*; *malum* adjectivum, and *malum* pro pomo; *cervus* and *servus*; *concilium* and *consilium*, &c. &c. The remedy against such fallacies, he gravely tells us, is 'to distinguish the words thus identified, so as to shew that the syllogism consists of more than three terms. "Solvuntur distinguendo ea quæ confunduntur, indeque monstrando pluralitatem terminorum." He acknowledges, however, that fallacies of this sort are not likely to impose on a skilful logician. "Sed crassiores sunt hæ fallaciæ quam ut perito imponant."

I have purposely quoted these remarks, not from a mere schoolman, but from an author justly distinguished both by science and learning, Dr Wallis of Oxford. They are taken, too, from a treatise written with the express view of adapting the logic commonly taught in our universities to the ordinary business of life; having a formal dedication prefixed to it, to the Royal Society of London, then recently instituted. The subject is the same with that of the third Book of Locke's Essay, relating to the *abuse of words*; and the interval between the two publications was only two years. Yet how immense the space by which they are separated in the history of the Human Mind!

The concluding paragraph, however, of this very puerile chapter on sophisms, bears marks of a mind fitted for higher undertakings. I cannot deny myself the pleasure of transcribing it, and of pointing it out to those who may hereafter speculate upon the theory of wit, as not unworthy of their attention.

"Interim hic monendum duco; quod hæ *fallaciæ*, utcunque justam argumenti vim non habeant, apprime tamen commodæ sunt ad id omne quod *ingeniosum* vulgo dicimus: Ut sunt joci, facetiæ, dicteria, scommata, sarcasmi, retorsiones lepidæ, (*wit, raillery, repartee*). Quippe hoc omne fundari solet in hujusmodi fallaciarum aliquâ. Nonnunquam allusio fit ad verborum sonos; nunc ad ambiguum vocum significationem; nunc ad dubiam syntaxin; nunc proverbialiter dici solita accommodantur sensu proprio, aut vice versa: nunc

“aliud aperte dicitur, aliud clam insinuat; saltem oblique insinuat, quod non erat directo dicendum; nunc verba contrario sensu captantur, et retorquentur; nunc verisimile insinuat ut verum, saltem ut suspectum; nunc de uno dicitur, quod mutato nomine, de alio intellectum vellent; nunc ironice laudando vituperant; nunc objecta spicula, respondendo declinantur, aut etiam (obliquata) alio diriguntur, forte sic ut auctorem feriant; et fere semper ex ambiguo luditur. Quæ quidem fallaciarum formulæ, si frigidæ sint crassæque, ridentur; si subtiliores arrident; si acutæ, titillant; si aculeatæ, pungunt.”

Note (N.) p. 315.

In the first volume of these Elements, I have endeavoured to trace the origin of that bias of the imagination, which has led men, in all ages of the world, to consider physical causes and effects as a series of successive events necessarily connected together, like the links of a metallic chain. (See Chap. i. Sect. 2.) So very strong is this bias, that, even in the present times, some of the most sagacious and cautious of Bacon's followers occasionally shew a disposition to relapse into the figurative language of the multitude. “The chain of natural causes (says Dr Reid) has, not unfitly, been compared to a chain hanging down from heaven: A link that is discovered supports the links below it, but it must itself be supported; and that which supports it must be supported, until we come to the first link, which is supported by the throne of the Almighty.” (Essays on the Intellectual Powers, p. 115. 4to Ed.) It is difficult to reconcile the approbation here bestowed on the above similitude, with the excellent and profound remarks on the relation of cause and effect, which occur in other parts of Dr Reid's works. (See Essays on the Active Powers, p. 44. and pp. 286, 287, 288. 4to Ed.)

Mr Maclaurin, in the concluding chapter of his Account of Newton's Discoveries, has still more explicitly lent the sanction of his name to this idea of a chain of second causes. “As we cannot but conceive the universe as depending on the first cause and chief mover, whom it would be absurd, not to say impious, to exclude

"from acting in it; so we have some hints of the manner in which
 "he operates in nature, from the laws which we find established in it.
 "Though he is the source of all efficacy, yet we find that place is left
 "for *second causes*, to act in subordination to him; and mechanism
 "has its share in carrying on the great scheme of nature. The esta-
 "blishing the equality of action and reaction, even in those powers
 "which seem to surpass mechanism, and to be more immediately de-
 "rived from him, seems to be an indication that those powers, while
 "they derive their efficacy from him, are, however, in a certain de-
 "gree, circumscribed and regulated in their operations by mechanical
 "principles; and that they are not to be considered as *mere immediate*
 "*volitions of his*, (as they are often represented), but rather as instru-
 "ments made by him, to perform the purposes for which he intended
 "them. If, for example, the most noble phenomena in nature be
 "produced by a rare elastic *ætherial medium*, as Sir Isaac Newton
 "conjectured, the whole efficacy of this medium must be resolved in-
 "to his power and will who is the supreme cause. This, however,
 "does not hinder, but that the same medium may be subject to the
 "like laws as other elastic fluids, in its actions and vibrations; and
 "that, if its nature were better known to us, we might make curious
 "and useful discoveries concerning its effects, from these laws. It is
 "easy to see, that this conjecture no way derogates from the govern-
 "ment and influences of the Deity; while it leaves us at liberty to
 "pursue our inquiries concerning the nature and operations of such a
 "medium: *Whereas they who hastily resolve these powers into immediate*
 "*volitions of the Supreme Cause, without admitting any intermediate in-*
 "*struments, put an end to our inquiries at once; and deprive us of*
 "*what is probably the most sublime part of philosophy, by representing it*
 "*as imaginary and fictitious.*"

On the merits of this passage, considered in relation to the evi-
 dences of natural religion, I do not mean to offer any remarks here.
 Some acute strictures upon it in this point of view (but expressed with
 a most unbecoming and offensive petulance) may be found in the
 third volume of Baxter's Inquiry into the Human Soul.—It is with
 the *logical* proposition alone, stated in the concluding sentence, that
 we are concerned at present; and *this* (although Baxter has passed it
 over without any animadversion) appears to me highly exceptionable;

proceeding on a very inaccurate, or rather totally erroneous conception of the object and aim of physical science. From the sequel of the section to which this note refers, (particularly from pages 319, 320, 321, 322,) I trust it will appear, that supposing all the phenomena of the universe to be produced by *the immediate volitions of the Supreme Cause*, the business of natural philosophers would be precisely the same as upon the hypothesis adopted by Maclaurin; the investigation of the *necessary connections* linking together physical causes and effects (if any such necessary connections *do* exist) being confessedly placed beyond the reach of our faculties; and, of consequence, our most successful researches terminating in the discovery of some general law, or in the farther generalization and simplification of laws already known. In this intellectual process there is no more reason to apprehend that any limit is fixed to our inquiries, than that the future progress of geometry should be stopped by the discovery of some one truth comprising the whole science in a single theorem.

Nor do I apprehend that the theory which excludes from the universe *mechanism* (strictly so called) tends, in the smallest degree, to detract from its beauty and grandeur; notwithstanding the popular and much admired argument of Mr Boyle in support of this idea. "As it more recommends (he observes) the skill of an engineer to contrive an elaborate engine, so as that there need nothing to reach his ends in it, but the contrivance of parts void of understanding; than if it were necessary that, ever and anon, a discreet servant should be employed to concur notably to the operations of this or that part, or to hinder the engine from being out of order: so it more sets off the wisdom of God, in the fabric of the universe, that he can make so vast a machine perform all those many things which he designed it should, by the mere contrivance of brute-matter, managed by certain laws of motion, and upheld by his ordinary and general concurrence; than if he employed, from time to time, an intelligent overseer to regulate and controul the motion of the parts *."—"What may be the opinion of others (says Lord Kames, after quoting the foregoing

* Inquiry into the vulgar notion of Nature.

"passage) I cannot say; but to me this argument is perfectly conclusive. Considering this universe as a great machine, the workmanship of an intelligent cause, I cannot avoid thinking it the more complete, the less mending or interposition it requires. The perfection of every piece of workmanship, human and divine, consists in its answering the designed purpose, without bestowing further labour upon it*."—To myself, I must confess, Mr Boyle's argument appears altogether unworthy of its author. The avowed use of a *machine* is to save labour; and therefore, the less frequently the interposition of the artist is necessary, the more completely does the machine accomplish the purpose for which it was made. These ideas surely do not apply to the works of the Almighty. The multiplicity of his operations neither distract his attention, nor exhaust his power; nor can we, without an obvious inconsistency in the very terms of the proposition, suppose him reduced to the necessity of economizing, by means of mechanism, the resources of Omnipotence†.

My object in these observations (I think it proper once more to remind my readers) is not to prejudice the metaphysical question between Maclaurin and Baxter; but merely to establish the two following propositions. 1. That this question is altogether foreign to the principles which form the basis of the inductive logic; these principles neither affirming nor denying the existence of necessary connections between physical causes and effects, but only asserting, that such connections, if they do exist, are not objects of human knowledge. 2. That no presumption in favour of their existence is afforded by Mr Boyle's similitude; the reasoning founded on the supposed analogy between the universe and a machine, being manifestly inap-

* Of the Laws of Motion. Published in the First Volume of the Physical and Literary Essays, read before the Edinburgh Philosophical Society. (1754.)

† A comparison still more absurd than that of Mr Boyle occurs in the 6th Chapter of Aristotle's book *de Mundo*; where he represents it as unbecoming the *dignity* of the Supreme Being *αὐτοῦς ἑαυτῶν*,—"to put his own hand to every thing;" a supposition, according to him, "much more unsuitable to the divine majesty, than to conceive a great monarch like Xerxes taking upon himself the actual execution of all his own decrees."

plicable where the *power* as well as the *skill* of the Contriver is admitted to be infinite.—If the remarks offered on these points be well-founded, they may serve, at the same time, to shew, that the attempt made in the text to illustrate some abstract topics connected with the received Rules of Philosophising was not altogether superfluous.

The metaphysical doctrine maintained by Baxter in opposition to Maclaurin, seems to coincide nearly with Malebranche's Theory of *Occasional Causes*, as well as with the theology of the old Orphic verses quoted in the 7th chapter of Aristotle's Treatise *de Mundo*.—A very striking resemblance is observable between these verses, and the Hymn to Narrayna or the Spirit of God, translated by Sir William Jones from the writings of ancient Hindu Poets*.

Note (O.) p. 332.

Although Dr Reid was plainly led into this train of thinking by Mr Hume, the same doctrine, with respect to the relation of *cause* and *effect*, (considered as the object of physical science), is to be found in many English writers of a far earlier date. Of this assertion I have produced various proofs in my first Volume, from Hobbes, Barrow, Berkeley, and others, to whose speculations on this head Dr Reid does not seem to have paid any attention. To these quotations I beg leave to add the following, from a book, of which the *third* edition was published in 1737.

"Here it is worth observing, that all the real true knowledge we have of nature is entirely *experimental*; insomuch, that how strange soever the assertion seems, we may lay this down as the first fundamental unerring rule in physics, *that it is not within the compass of human understanding, to assign a purely speculative reason for any one phenomenon in nature*; as why grass is green, or snow is white; why

* The same opinion is explicitly avowed by Dr Clarke, a zealous partizan of the Experimental Philosophy, and one of the ablest logicians that the Newtonian School has hitherto produced. "The course of nature, truly and properly speaking, is nothing but the will of God, producing certain effects in a continued, regular, constant, and uniform manner." (Clarke's Works, Vol. II. p. 698. Fol. edit.)

" fire burns, or cold congeals. By a *speculative reason*, I mean assigning an immediate *efficient cause a priori*, together with the manner of its operation, for any effect whatsoever purely natural. We find, indeed, by observation and experience, that such and such effects *are* produced; but when we attempt to think of the reason *why*, and the manner *how* the causes work those effects, then we are at a stand, and all our reasoning is precarious, or at best but probable conjecture.

" If any man is surprised at this, let him instance, in some speculative reason he can give for any natural phenomenon; and how plausible soever it appears to him at first, he will, upon weighing it thoroughly, find it at last resolved into nothing more than mere observation and experiment, and will perceive that these expressions generally used to describe the *cause* or manner of the productions of nature, do really signify nothing more than the *effects*." "The Procedure, Extents, and Limits of Human Understanding." Ascribed to Dr Peter Brown, Bishop of Cork. (London, 1737. 3d Ed.)

For the following very curious extracts, (together with many others of a similar import, both from English and from foreign writers), I am indebted to a learned correspondent, William Dickson, LL.D., a gentleman well known by his able and meritorious exertions for the abolition of the slave-trade.

" Confidence of *science* is one great reason we miss it: for on this account, presuming we have it everywhere, we seek it not where it is; and therefore fall short of the object of our inquiry. Now, to give further check to *dogmatical* pretensions, and to discover the vanity of assuming ignorance, we'll make a short inquiry, whether there be any such thing as *science* in the sense of its assertors. In their notion, then, *it is the knowledge of things in their true, immediate, necessary causes*: Upon this I'll advance the following observations.

" 1. All knowledge of causes is deductive; for we know none by simple intuition, but through the mediation of their effects. So that we cannot conclude any thing to be the cause of another, but from its continual accompanying it; for the causality itself is

"insensible. But now to argue from a concomitancy to a causality is
 "not infallibly conclusive; yea, in this way lies notorious delusion.
 "&c. &c. &c.

"2. We hold no *demonstration* in the notion of the dogmatist, but
 "where the contrary is impossible:" &c. &c. (*Scepsis Scientifica: or*
Confess't Ignorance the Way to Science; in an Essay of the Vanity
of Dogmatizing and Confident Opinion; with a Reply to the Ex-
*ceptions of the learned Thomas Albius**. By Joseph Glanvill, M. A.
 London, 1665. Dedicated to the Royal Society.)

"*Causalities* are first found out by *concomitancy*, as I intimated.
 "And our experience of the dependence of one, and independence of
 "the other, shews which is the effect, and which the cause. Defini-
 "tions cannot discover causalities, for they are formed after the
 "causality is known. So that, in our author's instance, a man cannot
 "know heat to be the atoms of fire, till the concomitancy be known,
 "and the efficiency first presumed. The question is, then, How *heat*
 "is known to be the effect of *fire*? Our author answers by its defi-
 "nition. But how came it to be so defined? The answer must be,
 "by the concomitancy and dependence, for there's nothing else as-
 "signable." (SCIRI[†] tuum nihil est: or the Author's Defence of the
 Vanity of Dogmatizing against the Exceptions of the learned *Thomas*
Albius, in his late SCIRI.) London, 1665.

"Inter causam propriè dictam et effectum oportet esse necessarium
 "nexum; adeo ut positâ actione causæ sequatur necessario effectus.
 "Cum Deus vult aliquid efficere id necessario eveniat oportet, &c.
 "Quia autem ejusmodi nexûs non cernitur inter causas creatas et ef-
 "fectus, nonnulli causas secundas, seu creatas, suâ vi agere negarunt.
 "Negant corpora a corporibus moveri, quod inter motum corporis,
 "et motum eorum in quæ incidit nullus deprehendatur nexus, adeo
 "ut moto corpore A, necesse sit moveri corpus B, cui colliditur.
 "Iidem quoque negant corpora a spiritibus moveri, quia inter volun-
 "tatem spirituum et motum corporum nullam connexionem animad-

* Or *White*, a Romish priest, author of a treatise entitled, *Sciri sive Sceptices et*
Scepticorum a jure Disputationis Exclusio. (See Biog. Diction.)

“vertunt, &c. Fatendum a nobis hujusmodi connexum nullum cerni,
 “nec sequi ex eo quod, corpore moto, id, in quod incidit, movetur;
 “aut ex eo quod, mente volente, corpus agitur, corpora et mentem
 “esse veras motus causas. Fieri posset, ut occasiones tantum essent,
 “quibus positis, alia causa ageret. Verum uti, ex ejusmodi possibili-
 “tate, non collegeris rem ita se habere; ita ne eò quod non adseque-
 “ris aliquid, consequens est ut nihil sit; nisi aliunde probaveris tibi
 “esse earum rerum, de quibus agitur, adæquatam ideam, aut rem re-
 “pugnare, &c.—Possunt inesse corporibus motis, et spiritibus, facul-
 “tates ignotæ, de quibus judicium nullum, aut negando aut affirman-
 “do, ferre possumus. Itaque ex æquo peccant, qui affirmant inesse
 “iis certò facultates efficiendorum quorundam, quæ ab iis fiant ig-
 “norant; et qui negant quidquam inesse corporibus et spiritibus, nisi
 “quod in iis perspicue porunt.” Joannis Clerici Opera Philosophica.
 Amstel. 1698. Ontol. T. I. p. 376.

After this cloud of authorities, (many of which are from books in very general circulation), it is surprising that the following sentence should have escaped the pen of Dr Beattie. “The sea *has* ebbd and flowed twice every day, in time past; therefore the sea *will continue* to ebb and flow twice every day in time to come,—is by no means a logical deduction of a conclusion from premises.—THIS REMARK WAS FIRST MADE BY MR HUME.” Essay on Truth, 2d Ed. p. 126.

It is evident, that this remark is only a particular application of the doctrine contained in the above quotations; as well as in the numerous extracts to the same purpose, collected in Note (C.) at the end of the first Volume of this Work. In one of these (from Hobbes,) the very same observation is made; and a sort of theory is proposed to explain *how* the mind is thus led to infer the *future* from the *past*;—a theory which, however unsatisfactory for its avowed purpose, is yet sufficient to shew, that the author was fully aware, that our expectation of the continuance of the laws of Nature was a fact not to be accounted for from the received principles of the scholastic philosophy.

Note (P.) p. 254.

From the Preface of Pappus Alexandrinus to the Seventh Book of his Mathematical Collection. (See Halley's Version and Restitution of Appollonius Pergæus de Sectione Rationis et Spatii, p. xxviii.)

“ Resolutio est methodus, quâ à quæsito quasi jam con-
 “ cesso per ea quæ deinde consequuntur, ad conclusionem aliquam, cu-
 “ jus ope Compositio fiat, perducamur. In resolutione enim, quod
 “ quæritur ut jam factum supponentes, ex quo antecedente hoc con-
 “ sequatur expendimus; iterumque quodnam fuerit hujus antecedens;
 “ atque ita deinceps, usque dum in hunc modum regredientes, in ali-
 “ quid jam cognitum locoque principii habitum incidamus. Atque
 “ hic processus Analysis vocatur, quasi dicas, inversa solutio. E contra-
 “ rio autem in Compositione, cognitum illud, in Resolutione ultimo lo-
 “ co acquisitum ut jam factum præmittentes; et quæ ibi consequentia
 “ erant, hic ut antecedentia naturali ordine disponentes, atque inter se
 “ conferentes, tandem ad Constructionem quæsiti pervenimus. Hoc
 “ autem vocamus Synthesin. Duplex autem est Analyseos genus, vel
 “ enim est veri indagatrix, diciturque Theoretica; vel propositi inves-
 “ tigatrix, ac Problematica vocatur. In Theoretico autem genere,
 “ quod quæritur, revera itase habere supponentes, ac deinde per ea
 “ quæ consequuntur, quasi vera sint (ut sunt ex hypothesi) argumen-
 “ tantes; ad evidentem aliquam conclusionem procedimus. Jam si
 “ conclusio illa vera sit, vera quoque est propositio de qua quæritur;
 “ ac demonstratio reciproce respondet analysi. Si vero in falsam con-
 “ clusionem incidamus, falsum quoque erit de quo quæritur.* In Pro-
 “ blematico vero genere, quod proponitur ut jam cognitum sistentes,
 “ per ea quæ exinde consequuntur tanquam verâ, perducimur ad con-

* From the account given in the text of *Theoretical Analysis*, it would seem to follow, that its advantages, as a method of investigation, increase in proportion to the variety of demonstrations of which a theorem admits; and that, in the case of a theorem admitting of one demonstration alone, the two methods would be exactly on a level. The justness of this conclusion will, I believe, be found to correspond with the experience of every person conversant with the processes of the Greek geometry.

“clusionem aliquam : quod si conclusio illa possibilis sit ac *τοπιον*, quod Mathematici *Datum* appellant ; possibile quoque erit quod proponitur : et hinc quoque demonstratio reciproce respondebit *Analysi*. Si vero incidamus in conclusionem impossibilem, erit etiam problema impossibile. *Diorismus* autem sive determinatio est qua discernitur quibus conditionibus quotque modis problema effici possit. Atque hæc de Resolutione et Compositione dicta sunt.”

Note (Q.) p. 387.

The following passage from Buffon, although strongly marked with the author's characteristical spirit of system, is yet, I presume, sufficiently correct in the outline, to justify me for giving it a place in this note, as an illustration of what I have said in the text on the insensible gradations which fix the limits between resemblance and analogy.

“Take the skeleton of a man ; incline the bones of the pelvis ; shorten those of the thighs, legs, and arms ; join the *phalanges* of the fingers and toes ; lengthen the jaws by shortening the frontal bones ; and lastly, extend the spine of the back. This skeleton would no longer represent that of a man ; it would be the skeleton of a horse. For, by lengthening the back-bone and the jaws, the number of the vertebrae, ribs, and teeth would be increased ; and it is only by the numbers of these bones, and by the prolongation, contraction, and junction of others, that the skeleton of a horse differs from that of a man. The ribs, which are essential to the figure of animals, are found equally in man, in quadrupeds, in birds, in fishes, and even in the turtle. The foot of the horse, so apparently different from the hand of a man, is composed of similar bones, and, at the extremity of each finger, we have the same small bone resembling the shoe of a horse which bounds the foot of that animal. Raise the skeletons of quadrupeds, from the ape kind to the mouse, upon their hind-legs, and compare them with the skeleton of a man ; the mind will be instantly struck with the uniformity of structure observed in the formation of the whole group. This uniformity is so

"constant, and the gradations from one species to another are so imperceptible, that, to discover the marks of their discrimination requires the most minute attention. Even the bones of the tail will make but a slight impression on the observer. The tail is only a prolongation of the os coccygis or rump-bone, which is short in man. The ouran outang and true apes have no tail, and in the baboon and several other quadrupeds its length is very inconsiderable. Thus, in the creation of animals, the Supreme Being seems to have employed only one great idea, and, at the same time, to have diversified it in every possible manner, that men might have an opportunity of admiring equally the magnificence of the execution and the simplicity of the design." (Smellie's Translation.)

As a proof that the general conclusion in which the foregoing extract terminates, requires some important qualifications and restrictions, it is sufficient to subjoin a few remarks from a later writer, who, with the comprehensive views of Buffon, has combined a far greater degree of caution and correctness in his scientific details.

"It has been supposed by certain naturalists, that all beings may be placed in a series or scale, beginning with the most perfect, and terminating in the most simple, or in the one which possesses qualities the least numerous and most common, so that the mind, in passing along the scale from one being to another, shall be nowhere conscious of any chasm or interval, but proceed by gradations almost insensible. In reality, while we confine our attention within certain limits, and especially while we consider the organs separately, and trace them through animals of the same class only, we find them proceed, in their degradation, in the most uniform and regular manner, and often perceive a part, or vestige of a part, in animals where it is of no use, and where it seems to have been left by Nature, only that she might not transgress her general law of continuity.

"But, on the one hand, all the organs do not follow the same order in their degradation. *This* organ is at its highest state of perfection in one species of animals; *that* organ is most perfect in a different species, so that, if the species are to be arranged after each particular organ, there must be as many scales or series formed, as

“there are regulating organs assumed; and in order to construct a general scale of perfection, applicable to all beings, there must be calculation made of the effect resulting from each particular combination of organs,—a calculation which, it is needless to add, is hardly practicable.

“On the other hand, these slight shades of difference, these insensible gradations continue to be observed, only while we confine ourselves to the same combinations of leading organs; only while we direct our attention to the same great central springs. Within these boundaries all animals appear to be formed on one common plan, which serves as the ground-work to all the lesser internal modifications: but the instant we pass to animals where the leading combinations are different, the whole of the resemblance ceases at once, and we cannot but be conscious of the abruptness of the transition.

“Whatever separate arrangements may be suitable for the two great classes of animals, with and without vertebræ, it will be impossible to place at the end of the one series, and at the commencement of the other, two animals sufficiently resembling, to form a proper bond of connection.” Introduction to *Cuvier's Leçons d'Anatomie Comparée*.

Note (R.) p. 403.

Of fortunate conjectures or hypotheses concerning the laws of nature, many additional examples might be produced from the scientific history of the 18th century. Franklin's sagacious and confident anticipation of the identity of lightning and of electricity is one of the most remarkable. The various analogies previously remarked between their respective phenomena, had become, at this period, so striking to philosophers, that the decisive experiment necessary to complete the theory, was carried into execution, in the course of the same month, on both sides of the Atlantic. In the circumstantial details recorded of that made in America, there is something pecu-

liarily interesting. I transcribe them in the words of Dr Priestley, who assures us that he received them from the best authority.

"After Franklin had published his method of verifying his hypothesis concerning the sameness of electricity with the matter of lightning, he was waiting for the erection of a spire in Philadelphia to carry his views into execution; not imagining that a pointed rod, of a moderate height, could answer the purpose; when it occurred to him that, by means of a common kite, he could have a readier and better access to the regions of thunder, than by any spire whatever. Preparing, therefore, a large silk handkerchief, and two cross sticks of a proper length, on which to extend it, he took the opportunity of the first approaching thunder-storm to take a walk into a field, in which there was a shed convenient for his purpose. But dreading the ridicule which too commonly attends unsuccessful attempts in science, he communicated his intended experiment to nobody but his son, who assisted him in raising the kite.

"The kite being raised, a considerable time elapsed before there was any appearance of its being electrified. One very promising cloud had passed over it without any effect; when, at length, just as he was beginning to despair of his contrivance, he observed some loose threads of the hempen string to stand erect, and to avoid one another, just as if they had been suspended on a common conductor. Struck with this promising appearance, he immediately presented his knuckle to the key, and (let the reader judge of the exquisite pleasure he must have felt at that moment) the discovery was complete. He perceived a very evident electric spark. Others succeeded, even before the string was wet, so as to put the matter past all dispute; and when the rain had wet the string, he collected electric fire very copiously. This happened in June 1752, a month after the electricians in France had verified the same theory, but before he heard of any thing they had done."

Priestley's History of Electricity, pp. 180. 181. 4to Ed.

Note (S.) p. 410.

“ Natural knowledge may not unaptly be compared to a vegetable, whether plant or tree, which springs from a seed sowed in a soil proper, and adapted by a skilful gardener, for that plant. For as the seed, by small fibrills or roots it shoots out, receives from the soil or earth a nourishment proper and adapted for ascending into the body or stalk, to make it grow in bulk and strength to shoot upwards, and from thence to shoot forth branches, and from them leaves, thereby to draw and receive out of the air a more refined, spirituous, and enlivening juice, which, descending back into the body or stock, increases its stature, bulk, circumference, and strength, by new incirclings, and thereby enables it to send forth more fibrills and greater roots, which afford greater and more plentiful supplies to the stock or trunk, and enables that to exert and shoot forth more branchings, and greater numbers of leaves; which, repeating all the effects and operations by continued and constant circulations, at length bring the plant to its full stature and perfection :

“ So natural knowledge doth receive its first informations from the supplies afforded by select and proper phenomena of nature conveyed by the senses; these improve the understanding, and enable it to raise some branchings out into conclusions, corollaries, and maxims; these afford a nutritive and strengthening power to the understanding, and enable it to put forth new roots of inquisition, trials, observations, and experiments, and thereby to draw new supplies of information: which further strengthening the understanding, enable it to exert and produce new deductions and new axioms: These circulate and descend downwards, increasing and strengthening the judgment, and thereby enable it to make more striking out of roots of inquiries and experiments, which cause the like effects as before, but more powerfully, and so by consent and continued circulations from phenomena to make deductions, and from deductions to inquire phenomena, it brings the understanding to a

"complete and perfect comprehension of the matter at first proposed
"to be considered." (Hooke's Posthumous Works, p. 553.)

Note (T.) p. 412.

"Aliquando observationes et experimenta immediate nobis exhibent principia, quæ quærimus; sed aliquando etiam *hypotheses* in auxilium vocamus, non tamen penitus arbitrarias, sed conformes iis quæ observantur, et quæ suppletes immediatarum observationum defectum, viam investigationi sternunt, tanquam divinantibus; ut si ea, quæ ex ipsis deducuntur, inveniamus re ipsa, eadem retineamus, et progrediamur ad nova consectaria; secus vero, ipsas rejiciamus. Et quidem plerumque hanc esse arbitror methodum omnium aptissimam in physica, quæ sæpissime est velut quædam enucleatio epistolæ arcanis notis conscriptæ, ubi per attentionem, et per errores etiam plurimos paulatim et caute progrediendo, ad veram ejus theoriam devenitur: cujus rei specimen admodum luculentum exhibui in mea dissertatione de lumine, agens de rectilinea luminis propagatione; ac in Stayanæ Philosophiæ Tomo I., agens de generalibus proprietatibus corporum, et de vi inertie in primis; Tomo vero II. agens de totius Astronomiæ constitutione." Boscovich de Solis ac Lunæ Defectibus.

In Sprat's History of the Royal Society, a similar idea occurs, illustrated by an image equally fanciful and apposite. "It is not to be questioned, but many inventions of great moment have been brought forth by authors, who began upon suppositions, which afterwards they found to be untrue. And it frequently happens to philosophers, as it did to Columbus; who first believed the *clouds* that hovered about the Continent to be the firm *land*: But this mistake was happy; for, by sailing towards them, he was led to what he sought; so by prosecuting of mistaken causes, with a resolution of not giving over the pursuit, they have been guided to the truth itself."

[The work from which this passage is taken (it may be here remarked, by the way,) affords complete evidence of the share which,

in the judgment of the founders of the Royal Society, Bacon had in giving a beginning to experimental pursuits in England. See, in particular, Section xvi.]

Note (U.) p. 413.

With respect to the application of the method of *exclusions* to physics, an important logical remark is made by Newton, in one of his letters to Mr Oldenburgh. Obvious and trivial as it may appear to some, it has been overlooked by various writers of great name; and therefore I think proper to state it in Newton's own words.

"In the meanwhile, give me leave, Sir, to insinuate, that I cannot think it effectual for determining truth, to examine the several ways by which phenomena may be explained, *unless where there can be a perfect enumeration of all those ways*. You know the proper method for inquiring after the properties of things, is to deduce them from experiments. And I told you, that the theory which I propounded (concerning light and colours) was evinced to me, not by inferring, *it is thus, because it is not otherwise*; that is, not by deducing it only from a confutation of contrary suppositions, but by deriving it from experiments concluding positively and directly. The way, therefore, to examine it, is, by considering whether the experiments which I propound, do prove those parts of the theory to which they are applied; or by prosecuting other experiments which the theory may suggest for its examination," &c. &c. Horseley's Edition of Newton's Works, Vol. IV. p. 320.

Note (X.) p. 419.

"If we consider the infantine state of our knowledge concerning vision, light, and colours, about a century ago, very great advancements will appear to have been made in this branch of science; and yet a philosopher of the present age has more *desiderata*, can start more difficulties and propose more new subjects of inquiry

" than even Alhazen or Lord Bacon. The reason is, that whenever a
 " new property of any substance is discovered, it appears to have con-
 " nections with other properties, and other things, of which we could
 " have no idea at all before, and which are by this means but imper-
 " fectly announced to us. Indeed, every *doubt* implies some degree
 " of *knowledge*; and while nature is a field of such amazing, perhaps
 " boundless extent, it may be expected that the more knowledge we
 " gain, the more doubts and difficulties we shall have; but still, since
 " every advance in knowledge is a real and valuable acquisition to
 " mankind, in consequence of its enabling us to apply the powers of
 " nature to render our situation in life more happy, we have reason to
 " rejoice at every new difficulty that is started, because it informs us
 " that more knowledge, and more advantage are yet unattained, and
 " should serve to quicken our diligence in the pursuit of them.
 " Every *desideratum* is an imperfect *discovery*." Priestley's History of
 Discoveries relating to Vision, Light, and Colours, p. 773. (Lond.
 1772.)

Note (Y.) p. 434.

For the analogies between Galvanism and Electricity, see *Traité
 Élémentaire de Physique, par M. L'Abbé Haiiy*, §. 717.—The passage
 concludes with the following remark, which may be regarded as an ad-
 ditional proof, that even when analogical conjectures appear to départ
 the most widely from the evidence of experience, it is from experience
 that they derive their whole authority over the belief. " Partout le
 " fluide électrique semble se multiplier par la diversité des pheno-
 " menes; et il nous avait tellement accoutumés à ses métamorphoses,
 " que la nouveauté même de la forme sous laquelle il s'offrait dans le
 " Galvanisme naissant, semblait être une raison de plus pour le recon-
 " naître."

Note (Z.) p. 447.

In that branch of politics which relates to the theory of Government, one source of error (not unfrequently overlooked by the advocates for experience) arises from the vagueness of the language in which political facts are necessarily stated by the most faithful and correct historians. No better instance of this can be produced than the terms, Monarchy, Aristocracy, and Democracy, commonly employed to distinguish different forms of Government from each other. These words, in their strict philosophical acceptation, obviously denote not *actual* but *ideal* constitutions, existing only in the imagination of the political theorist; while, in more popular discourse, they are used to discriminate, according to their prevailing bias or spirit, the various mixed establishments exemplified in the history of human affairs. Polybius, accordingly, with his usual discernment, expresses his doubts, under which of the three simple forms the constitution of Rome, at the period when he had an opportunity of studying it, ought to be classed. "When we contemplate (he observes) the power of the Consuls, it seems to be a monarchy; when we attend to the power of the Senate, it seems to be an aristocracy; when we attend to the power of the People, we are ready to pronounce it a democracy *."

* This observation of Polybius has been very unjustly criticised by Grotius. "Sed neque Polybii hic utor auctoritate, qui ad mixtum genus reipublicæ refert Romanam rem publicam, quæ illo tempore, si non *actiones ipsas*, sed *jus agendi* respicimus, mere fuit popularis: Nam et senatus auctoritas, quam ad optimatum regimen refert, et consulum quos quasi reges fuisse vult, subdita erat populo. Idem de aliorum politica scriptentium sententiis dictum volo, qui magis externam speciem et quotidianam administrationem, quam jus ipsum summi imperii spectare congruens ducunt suo instituto." (De Jure Belli ac Pacis, Lib. I. Cap. 3.) The truth is, that Polybius is not here speaking of the *theory* of the Roman constitution, (about which there could be no diversity of opinion), but of what common observers are so apt to overlook,—the *actual state of that constitution*, modified as it was by time, and chance, and experience.—Among the numerous commentators on Grotius, I recollect one only (Henry de Cocceii) who has viewed this question in its proper light. "Auctor inter eos, qui circa formas im-

It is easy to see how much this scantiness and want of precision in our political vocabulary, must contribute to mislead the judgments of those reasoners who do not analyze very accurately the notions annexed to their words; and, at the same time, what a purchase they afford to the sophistry of such writers as are disposed, in declamations addressed to the multitude, to take an undue advantage of the ambiguities of language.

Another source of error which goes far to invalidate the authority of various political maxims supposed to be founded on *experience*, is the infinite multiplicity of the seemingly trifling and evanescent causes connected with local manners and habits, which, in their joint result, modify, and in some cases counteract so powerfully, the effects of written laws and of established forms. Of these causes no verbal description can convey an adequate idea; nor is it always possible even for the most attentive and sagacious observer, when the facts are before his eyes, to appreciate all their force:—So difficult is it to seize the nicer shades which distinguish the meanings of correspondent terms in different languages; and to enter, at years of maturity, into those delicate and complex associations, which, in the mind of a well-educated native, are identified with the indigenous feelings of national sympathy and taste.

Of the truth of this remark a striking illustration presents itself in the mutual ignorance of the French and English nations (separated from each other by a very narrow channel, and, for centuries past, enjoying so many opportunities of the most familiar intercourse) with respect to the real import of the words and phrases marking the analogous gradations of rank in the two countries. The words *gentilhomme* and *gentleman* are both derived from the same etymological root; yet how imperfect a translation does the one afford of the other! and how impossible to convey by a definition all that is implied in either! Among French writers of no inconsiderable name, we meet with reason-

"perii falluntur etiam Polybium refert, qui rempublicam Romanam suis temporibus
 "mixtam fuisse ait. At bene notandum, Polybium non loqui de mixtura *status* sed
 "administrationis: forma enim reipublicæ erat mere popularis, sed administratio di-
 "visa fuit inter consules, senatum, et populum."

ings which plainly shew, that they considered the relative rank of the members of our two Houses of Parliament, as something similar to what is expressed in their own language by the words *noble* and *roturier*;—while others, puzzled with the inexplicable phenomena occasionally arising from the boundless field of ambition opened in this fortunate island to every species of industry and of enterprize, have been led to conclude, that birth has, among us, no other value than what it derives from the privileges secured by the constitution to our hereditary legislators. Few perhaps but the natives of Great Britain are fully aware, how very remote from the truth are both these suppositions.

I transcribe the following passage from an article in the French *Encyclopedie*, written by an author of some distinction both for talents and learning; and which, it is not impossible, may be quoted at some future period in the history of the world, as an authentic document with respect to the state of English society in the 18th century. The writer had certainly much better access to information than was enjoyed by those to whom we are indebted for our experimental knowledge of the ancient systems of policy.

“ En Angleterre, la loi des successions attribue aux aînés dans les familles nobles les biens immeubles, à l'exclusion des cadets qui n'y ont aucune part. Ces cadets sans bien cherchent à réparer leurs pertes dans l'exercice du négoce, et c'est pour eux un moyen presque sur de s'enrichir. Devenus riches, ils quittent la profession, ou même sans la quitter, leurs enfans rentrent dans tous les droits de la noblesse de leur famille; leurs aînés prennent le titre de *milord* si leur naissance et la possession d'une terre païre le leur permettent.—Il faut néanmoins remarquer, que quelque fière que soit la noblesse Angloise, lorsque les nobles entrent en apprentissage, qui selon les réglemens doit être de sept ans entiers, jamais ils ne se couvrent devant leurs maîtres, leur parlant et travaillant tête nue, quoique souvent le maître soit roturier et de race marchande, et que les apprentifs soient de la première noblesse.” *Encyclop. Method. Commerce, Tom. 3. Article Noblesse.*

Note (AA.) p. 455.

"Metaphysicæ pars secunda est finalium causarum inquisitio, quam
 "non ut prætermissam, sed ut male collocatam notamus. Solent enim
 "inquiri inter physica non inter metaphysica. Quanquam si ordinis
 "hoc solum vitium esset, non mihi fuerit tanti. Ordo enim ad illus-
 "trationem pertinet, neque est ex substantia scientiarum. At hæc or-
 "dinis inversio defectum insignem peperit, et maximam philosophiæ
 "induxit calamitatem. Tractatio enim causarum finalium in physicis,
 "inquisitionem causarum physicarum expulit et dejecit, effecitque ut
 "homines in istiusmodi speciosis et umbratilibus causis acquiescerent,
 "nec inquisitionem causarum realium, et vere physicarum, strenue ur-
 "gerent, ingenti scientiarum detrimento. Etenim reperio hoc factum
 "esse non solum a Platone, qui in hoc littore semper anchoram figit,
 "verum etiam ab Aristotele, Galeno, et aliis, qui sæpissime etiam ad
 "illa vada impingunt. Etenim qui causas adduxerit hujusmodi,
 "*palpebras cum pilis pro sepi et vallo esse, ad munimentum oculorum:*
 "*aut corium in animalibus firmitudinem esse ad propellendos calores et fri-*
 "*gora: Aut ossa pro columnis et trabibus a natura induci, quibus fabrica*
 "*corporis innitatur: Aut folia arborum emitti, quo fructus minus pati-*
 "*antur à sole et vento: Aut nubes in sublimi fieri, ut terram imbribus*
 "*irrigent: Aut terram densari et solidari, ut statio et mansio sit animali-*
 "*um: et alia similia: Is in metaphysicis non male ista allegarit; in*
 "physicis autem nequaquam. Imo, quod cœpimus dicere, hujusmodi
 "sermonum discursus (instar remorarum, uti fingunt, navibus adhæ-
 "rentium) scientiarum quasi velificationem et progressum retarda-
 "runt, ne cursum suum tenerent, et ulterius progredierentur: et jam-
 "pridem effecerunt, ut physicarum causarum inquisitio neglecta de-
 "ficeret, ac silentio præteriretur. Quapropter philosophia naturalis
 "Democriti, et aliorum, qui Deum et mentem à fabrica rerum amove-
 "runt; et structuram universi infinitis naturæ prælusionibus et ten-
 "tamentis (quas uno nomine *fatum* aut *fortunam* vocabant) attribue-
 "runt; et rerum particularium causas, materiæ necessitati, sine in-
 "termixtione causarum finalium, assignarunt; nobis videtur, qua-
 "tenus ad causas physicas, multo solidior fuisse, et altius in Naturam

“penetrasse, quam illa Aristotelis, et Platonis: Hanc unicam ob
 “causam, quod illi in causis finalibus nunquam operam triverunt; hi
 “autem eas perpetuo inculcarunt. Atque magis in hac parte accusan-
 “dus Aristoteles quam Plato: quandoquidem fontem causarum fina-
 “lium, Deum scilicet, omiserit, et naturam pro Deo substituerit,
 “causasque ipsas finales, potius ut logicæ amator quam theologiæ,
 “amplexus sit. Neque hæc eo dicimus, quod causæ illæ finales
 “veræ non sint, et inquisitione admodum dignæ in speculationibus
 “metaphysicæ, sed quia dum in physicarum causarum possessiones
 “excurrunt et irruunt, misere eam provinciam depopulantur et vas-
 “tant.” De Augm. Scient. Lib. III. Cap. 4.

Note (BB.) p. 467.

Among the earliest opponents of Des Cartes' doctrine concerning *Final Causes*, was Gassendi; a circumstance which I remark with peculiar pleasure, as he has been so unjustly represented by Cudworth and others, as a partisan, not only of the physical, but of the atheistical opinions of the Epicurean school. For this charge I do not see that they had the slightest pretence to urge, but that, in common with Bacon, he justly considered the physical theories of Epicurus and Democritus as more analogous to the experimental inquiries of the moderns, than the logical subtleties of Aristotle and of the schoolmen. The following passage is transcribed in Gassendi's own words, from his *Objections to the Meditations of Des Cartes*.

“Quod autem à *physica consideratione rejicis usum causarum fina-*
 “*lium*, aliâ fortassis occasione potuisses recte facere: at de Deo cùm
 “agitur verendum profectò, ne præcipuum argumentum rejicias, quo
 “divina sapientia, providentia, potentia, atque adeò existentia, lumine
 “naturæ stabiliri potest. Quippe ut mundum universum, ut cælum
 “et alias ejus et præcipuas partes præteream, undenam, aut quomodo
 “meliùs argumentare valeas, quàm ex usu partium in plantis, in ani-
 “malibus, in hominibus, in te ipso (aut corpore tuo) qui similitudi-
 “nem Dei geris? Videmus profectò magnos quosque viros ex spe-
 “culatione anatomica corporis humani non assurgere modò ad Dei

"notitiam, sed hymnum quoque ipsi canere, quòd omnes partes ita conformaverit, collocaveritque ad usus, ut sit omnino propter solertiam atque providentiam incomparabilem commendandus." Objectiones Quintæ in Meditationem IV. *De Vero et Falso*.

I do not know if it has been hitherto remarked, that Gassendi is one of the first modern writers, by whom the following maxim, so often repeated by later physiologists, was distinctly stated; "*Licet ex conformatione partium corporis humani, conjecturas desumere ad functiones mere naturales.*" It was from a precipitate application of this maxim, that he was led to conclude, that man was originally destined to feed on vegetables alone; a proposition which gave occasion to several memoirs by Dr Wallis and Dr Tyson, in the Philosophical Transactions of the Royal Society of London.

Note (CC.) p. 483.

The theories of Hume, of Paley, and of Godwin, how differently soever they may have figured in the imaginations of their authors, are all equally liable to the fundamental objections stated in the text. The same objections are applicable to the generous and captivating, but not always unexceptionable morality inculcated in the writings of Dr Hutcheson.—The system, indeed, of this last philosopher, may be justly regarded as the parent stock on which the speculations of the others have been successively grafted.

Mr Hume entered on his *Inquiries concerning Morals*, at a period when Dr Hutcheson's literary name was unrivalled in Scotland. The abstract principles on which his doctrines are founded, differ widely from those of his predecessor, and are unfolded with far greater ingenuity, precision, and elegance. In various instances, however, he treads very closely in Dr Hutcheson's footsteps; and, in the final result of his reasonings, he coincides with him exactly. According to both writers, a regard to general expediency affords the only universal canon for the regulation of our conduct.

It is a curious circumstance in the History of Ethics, that the same practical rule of life, to which Dr Hutcheson was so naturally

and directly led by his cardinal virtue of disinterested benevolence, has been inferred by Dr Paley from a theory which resolves moral obligation entirely into prudential calculations of individual advantage. For the very circuitous, and (in my opinion) very illogical argument, whereby he has attempted to connect his conclusion with his premises, I must refer to his work*.

The *political justice* of Mr Godwin is but a new name for the principle of general expediency or utility. "The term *justice* (he observes) may be assumed as a general appellation for all moral duty. —That this appellation (he continues) is sufficiently expressive of the subject, will appear, if we consider for a moment, mercy, gratitude, temperance, or any of those duties which, in looser speaking, are contradistinguished from justice. Why should I pardon this criminal, renumerate this favour, abstain from this indulgence? If it partake of the nature of morality, it must be either right or wrong, just or unjust. It must tend to the benefit of the individual, either without entrenching upon, or with actual advantage to the mass of individuals. Either way, it benefits the whole, because individuals are parts of the whole. Therefore to do it is just, and to forbear it is unjust. If justice have any meaning, it is just that I should contribute every thing in my power to the benefit of the whole." (*Polit. Justice*, Vol. I. pp. 80, 81.)

It is manifest, that, in the foregoing extract, the duty of *justice* is supposed to coincide exactly as a rule of conduct with the affection of *benevolence*; whereas, according to the common use of words, justice means that particular branch of virtue which leads us to respect the *rights* of others; a branch of virtue remarkably distinguished from all others by this, that the observance of it may be extorted by force; the violation of it exposing the offender to resentment, to in-

* Principles of Moral and Political Philosophy, Book ii. Chap. 1, 2, 3, 4, 5, 6.

The theory of Dr Paley has been very ably examined by Mr Gisborne, in a treatise entitled, *The Principles of Moral Philosophy investigated, and briefly applied to the Constitution of Civil Society.* (London 1790.) The objections to it there stated appear to me quite unanswerable; and they possess the additional merit of being urged with all the deference so justly due to Dr Paley's character and talents.

dignation, and to punishment. In Mr Godwin's language, the word *justice* must either be understood to be synonymous with general *benevolence*, or—assuming the existence of such an affection—to express the *moral fitness* of yielding, upon all occasions, to its suggestions. “It is *just* (says Mr Godwin) that I should contribute every thing in my power to the benefit of the whole.—My benefactor ought to be esteemed, not because he bestowed a benefit upon me, but because he bestowed it upon a human being. His desert will be in exact proportion to the degree in which the human being was worthy of the distinction conferred. Thus, every view of the subject brings us back to the consideration of my neighbour's moral worth, and his importance to the general weal, as the only standard to determine the treatment to which he is entitled. Gratitude, therefore, a principle which has so often been the theme of the moralist and the poet, is no part either of *justice* or *virtue*.” (Ibid. p. 84.) The words *just* and *justice* can, in these sentences, mean nothing distinct from morally *fit* or *reasonable*; so that the import of the doctrine amounts merely to the following proposition, That it is reasonable or right, that the private benevolent affections should, upon all occasions, yield to the more comprehensive;—which is precisely the system of Hutcheson disguised under a different and much more exceptionable phraseology.

This abuse of words is not without its effect in concealing from careless readers the fallaciousness of some of the author's subsequent arguments; for although the idea he professes to convey by the term *justice*, be essentially different from that commonly annexed to it, yet he scruples not to avail himself, for his own purpose, of the received maxims which apply to it in its ordinary acceptation. In discussing, for example, the validity of promises, he reasons thus. “I have promised to do something just and right.—This certainly I ought to perform. Why? Not because I promised, but because *justice* prescribes it. I have promised to bestow a sum of money upon some good and respectable purpose. In the interval between the promise and my fulfilling it, a greater and nobler purpose offers itself, which calls with an imperious voice for my co-operation. Which ought I to prefer? That which best deserves my pre-

ference. A promise can make no alteration in the case. I ought "to be guided by the intrinsic merit of the objects, and not by any "external and foreign consideration. No engagements of mine can "change their intrinsic claims.—If every shilling of our property, "every hour of our time, and every faculty of our mind, have already "received their destination from the principles of *immutable justice*, "promises have no department left upon which for them to decide. "*Justice*, it appears therefore, ought to be done, whether we have "promised it or not." (*Ibid.* p. 151.)

It is quite evident, that, in this passage, the paramount supremacy indisputably belonging to *justice* in its usual and legitimate sense, is ascribed to it when employed as synonymous with *benevolence*; and of consequence, that the tendency of the new system, instead of extending the province of *justice*, properly so called, is to set its authority entirely aside, wherever it interferes with views of utility. In this respect, it exhibits a complete contrast to all the maxims hitherto recognized among moralists. The rules of justice are happily compared by Mr Smith, to the strict and indispensable rules of grammar; those of benevolence to the more loose and general descriptions of what constitutes the sublime and beautiful in writing that we meet with in the works of critics. According to Mr Godwin, the reverse of this comparison is agreeable to truth; while, at the same time, by a dexterous change in the meaning of terms, he assumes the appearance of combating for the very cause which he labours to betray.

Of the latitude with which the word *justice* had been previously used by many ethical writers, a copious and choice collection of instances may be found in the learned and philosophical notes subjoined by Dr Parr to his Spital Sermon. (London 1801.) "By none of "the ancient philosophers, however, (as he has well observed,) is justice set in *opposition* to any other social duty; nor did they employ "the colossal weight of the *term* in crushing the other moral excellencies, which were equally considered as pillars in the temple of "virtue." pp. 28, 29, 30, 31.*

* Having mentioned the name of this eminent person, I eagerly embrace the opportunity of acknowledging the instruction I have received, not only from his various

Note (DD.) p. 483.

As the main purpose of this section is to combat the logical doctrine which would exclude the investigation of Final Causes from natural philosophy, I have not thought it necessary to take notice of the sceptical objections to the theological inferences commonly deduced from it. The consideration of these properly belongs to some inquiries which I destine for the subject of a separate Essay. On *one* of them alone I shall offer at present a few brief remarks, on account of the peculiar stress laid upon it in Mr Hume's Posthumous Dialogues.

"When two *species* of objects (says Philo) have always been observed to be conjoined together, I can *infer*, by custom, the existence of one wherever I *see* the existence of the other: and this I call an argument from experience. But how this argument can have place, where the objects, as in the present case, are single, individual, without parallel, or specific resemblance, may be difficult to explain. And will any man tell me, with a serious countenance, that an orderly universe must arise from some thought and art, like the human, because we have experienced of it? To ascertain this reasoning, it were requisite that we had experience of the origin of worlds; and it is not sufficient surely, that we have seen ships and cities arise from human art and contrivance.—Can you pretend to shew any similarity between the fabric of a house, and the generation of the universe? Have you ever seen Nature in any such situation as resembles the first arrangement of the elements? Have worlds ever been formed under your eye; and have you had leisure

publications, but from the private literary communications with which he has repeatedly favoured me. From one of these (containing animadversions on some passages in my Essay on the Sublime,) I entertain hopes of being permitted to make a few extracts in a future edition of that performance. By his candid and liberal strictures, I have felt myself highly honoured; and should be proud to record, in his own words, the corrections he has suggested of certain critical and philological judgments which, it is highly probable, I may have too lightly hazarded.

"to observe the whole progress of the phenomenon, from the first appearance of order to its final consummation? If you have, then cite your experience, and deliver your theory."

This celebrated argument appears to me to be little more than an amplification of that which Xenophon puts into the mouth of Aristodemus, in his conversation with Socrates, concerning the existence of the Deity. "I behold (says he) none of those governors of the world, whom you speak of; whereas here, I see artists actually employed in the execution of their respective works."—The reply of Socrates, too, is in substance the same with what has been since retorted on Philo, by some of Mr Hume's opponents. "Neither, yet, Aristodemus, seest thou thy soul, which, however, most assuredly governs thy body:—Although it may well seem, by thy manner of talking, that it is *chance* and not *reason* which governs thee."

Whatever additional plausibility Philo may have lent to the argument of Aristodemus, is derived from the authority of that much abused maxim of the inductive logic, that "all our knowledge is entirely derived from experience." It is curious, that Socrates should have touched with such precision on one of the most important exceptions with which this maxim must be received. Our knowledge of our own existence as sentient and intelligent beings, is (as I formerly endeavoured to shew) not an inference from experience, but a fundamental law of human belief. All that experience can teach me of my internal frame, amounts to a knowledge of the various mental operations whereof I am conscious; but what light does experience throw on the origin of my notions of personality and identity? Is it from having observed a constant conjunction between sensations and sentient beings; thoughts and thinking beings; volitions and active beings; that I infer the existence of that individual and permanent *mind*, to which all the phenomena of my consciousness belong? Our conviction that *other men* are, like ourselves, possessed of thought and reason; together with all the judgments we pronounce on their intellectual and moral characters, cannot (as is still more evident) be resolved into an experimental perception of the conjunction of different objects or events. They are inferences of design from its sensible effects, exactly analogous to those which, in

the instance of the universe, Philo would reject as illusions of the fancy*.

But leaving for future consideration these abstract topics, let us, for a moment, attend to the scope and amount of Philo's reasoning.—To those who examine it with attention it must appear obvious, that, if it proves any thing, it leads to this general conclusion, That it would be perfectly impossible for the Deity, if he *did* exist, to exhibit to Man any satisfactory evidence of *design* by the order and perfection of his works. That every thing we see *is consistent* with the supposition of its being produced by an intelligent author, Philo himself has explicitly acknowledged in these remarkable words: "Supposing there were a God, who did not discover himself immediately to our senses; would it be possible for him to give stronger proofs of his existence, than what appear on the whole face of nature? What, indeed, could such a Divine Being do, but copy the present economy of things;—render many of his artifices so plain, that no stupidity could mistake them;—afford glimpses of still greater artifices, which demonstrate his prodigious superiority above our narrow apprehensions;—and conceal altogether a great many from such imperfect creatures?"—The sceptical reasonings of Philo, therefore, do not, like those of the ancient Epicureans, hinge, in the least, on alleged disorders and imperfections in the universe, but en-

* This last consideration is ably stated by Dr Reid. (See *Essays on the Intellectual Powers*, pp. 631, 632. 4to Ed.) The result of his argument is, that "according to Philo's reasoning, we can have no evidence of mind or design in any of our fellow-men."—At a considerably earlier period, Buffier had fallen into the same train of thinking. Among the judgments which he refers to *common sense*, he assigns the first place to the two following. "1. *Il y a d'autres êtres, et d'autres hommes que moi au monde.* 2. *Il y a dans eux quelque chose qui s'appelle vérité, sagesse, prudence,*" &c. &c. (*Cours de Sciences*, p. 566. Paris, 1732.) I have already objected to the application of the phrase *common sense*, to such judgments as these; but this defect in point of expression does not detract from the sagacity of the author in perceiving, that in the conclusions we form concerning the minds and characters of our fellow-creatures, (as well as in the inferences drawn concerning the invisible things of God from the things which are made), there is a perception of the understanding implied, for which neither reasoning nor experience is sufficient to account.

ity, in a case to which experience furnishes analogous, of rendering intelligence and designies by their sensible effects.—In thus shifting occupied by his predecessors, Philo seems to the only post from which it was of much im-saries to dislodge him. The logical subtilties, t experience and belief, (even supposing them d), are but little calculated to shake the autho- which we are every moment forced to judge and cies of life. For this change in the tactics of mo-e evidently, in a great measure, if not wholly, in-e thrown on the order of nature, by the physical vo last centuries.

sion extorted from Philo by the discoveries of mo- ill more important. I need not point out its coin-e remarks in the first part of this section, on the un- ence often paid to final causes by those inquirers who theory ;—a coincidence which had totally escaped my hen these remarks were written. I quote it here, chief- g-and encouraging confirmation of the memorable pre- which Newton concludes his *Optical Queries* ; that “ if *philosophy*, in all its parts, by pursuing the inductive me- at length be perfected, the bounds of *Moral Philosophy* rged also.”

se, an intention, a design, (says Philo) strikes everywhere reless, the most stupid thinker ; and no man can be so absurd systems, as at all times to reject it. *That Nature in vain*, is a maxim established in all the schools, mere- contemplation of the works of Nature, without any reli- se ; and from a firm conviction of its truth, an anat- od observed a new organ or canal, would never be satis- ad also discovered its use and intention. One great f the *COPERNICAN* system is the maxim, *That Nature mplest methods, and chooses the most proper means to any* ronomers often, without thinking of it, lay this strong piety and religion. The same thing is observable in

“ other parts of philosophy : And thus all the
“ insensibly to acknowledge a first intelligent
“ thority is often so much the greater, as they
“ that intention.”

* P. 103.

Since this sheet was cast off, I have been informed by an authority, that the conversation here alluded to, was supposed to have taken place between Lord Chief Justice and the late Sir Basil Keith, really passed between another very distinguished officer, the late gallant Sir Archibald Campbell. I have not, however, while, in consequence of a mistake which does not detract from the substance of the anecdote, to cancel the leaf;—more especially as there is at least a possibility that the same advice may have been given on more than one occasion.

THE END.

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