LOGIC,

OR THE

ART OF REASONING SIMPLIFIED.

IN THIS WORK REMARKS ARE MADE ON

Intuitive and Deductive Evidence;

DISTINCTIONS BETWEEN

REASONING BY

INDUCTION, ANALOGY, AND SYLLOGISM,

ILLUSTRATED; THE

Ancient and Modern Modes of Argumentation Contrasted,

AND THE

General Process of Reasoning, and its susceptibility of Improvement from Art stated.

IT ALSO CONTAINS THE DISTINCTIONS BETWEEN

Metaphysical, Moral, and Mathematical Demonstration, the Method of Detecting Fallacies or Deviations from Correct Reasoning, and the Rules of Interpretation, Controversy, and Method.

CLOSING WITH

DXDRCISDS

On a variety of interesting topics, to guide and develope the reasoning powers of the youthful inquirer after truth.

BY S. E. PARKER,

AUTHOR OF THE ARTICLES PROSODY, QUANTITY, AND VERSIFICATION IN DR. REES' CYCLOPEDIA.

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PART III.

ON ARGUMENTATION.

On Induction and Analogy.

CHAP. I.

SECTION I.

INDUCTION.

(Art. 123.) Induction, in a general sense, is that process, by which we examine the properties of individuals, or of species without or with reference to those properties being common to the whole species or genus; and is of two kinds; the former is discursive, the latter Argumentative.

(Art. 124.) DISCURSIVE INDUCTION is that process, by which we examine the properties of individuals or of species, without reference to those properties being common to the whole species or genus.

1. This may be, and is often done, by all persons of observation or reflection, whether accidentally, or intentionally, though not in the first case with any view to obtain the premises to consti-Thus a person in early life may remember tute an argument. that he observed that an individual, suppose a, (it may be an animal, a man, a vegetable, a mineral, &c., as the case may be,) has a property, which call x; afterwards he may perceive that the individual, b, has the same property x; and as he advances in life or in experience, or travels by land or sea, whether these observations be accidental or intentional, he notices, that other individuals, as c, d, e, and f, have each respectively, the property x. This begins to make some impression on his mind; though at first his observation seemed casual, yet the accumulated instances lead him to presume that there exists some general law, of which at first he had no conception. (It may be a case in theology, natural history,

philosophy, trade, law, or even phrenology, &c.) The numerous facts lead him now to read or converse on the subject, by which means he learns, that the individuals, a, b, c, d, e, f, all belong to one species, viz: to the species A; but that there is another individual of that species, g, which he has not observed; neither can any man or book give him information as to g: and where to find g, he knows not; nevertheless, as he has six cases established out of the seven, he has strong presumptive or probable testimony of the existence of a general law, which he can now express, by saying, "All individuals of the class A, have the property x." Though argumentation originally was not his intention, yet he is now in possession of the major premiss of an argument, which, until g can be examined, is at least presumptive; but he may from a presumptive premiss deduce at least, a presumptive conclusion of strong probability; viz.

All individuals of the species A, have the property x.

g belongs to the class A; therefore g has the property x.

2. In the course of time, he meets with g, and finds it has the property x. Now he can express the general law, from a certain premiss, and prove that the major of the former syllogism, at first presumptive, is a conclusion of certainty from premises experimentally tested and found also to be certainties; viz.

a, b, c, d, e, f, g, are all the individuals of the class A.

This he learned from books or conversation.

The property x is common to a, b, c, d, e, f, g.

This he learned experimentally.

The property x is common to all the individuals of the class A.

The fact established as a principle of science.

3. These observations at first, or as to a, b, c, &c. were merely casual, without reference to, or even the knowledge of, any general law or property, when the induction is merely discursive, or the collection of facts known and observed by experience, or even by experiment casually noticed, or intentionally instituted; but still if intentionally, not with reference to any law as yet, of course, unsuspected.

4. But as the instances are increased, through the successive steps, d, e, f, a presumption in proportion arises, that such a law, at first unsuspected, would be, could all the cases be examined, found to be general, as to some class as yet un-

defined, and not known to be the class A. Here the induction ceases to be purely discursive, or wandering, but is in search of some class, and the individuals composing it. An indistinct view of some object or principle of science arises, as yet like twilight, on the mind, excites inquiry, which is answered by the further information that the several individuals, a, b, c, de, f, g, compose a class or species, called A, and that g only remains to be examined. A probable conclusion as to the actual existence of a general law at first suspected, and coextensive with the whole class A, now takes place, and induction becomes argumentative; as yet from assumed premises, until g, the only remaining individual of the class, is examined, when the induction is completed by forming a syllogism on certain premises, which, when regular, declares a principle of science no longer a matter of doubt or controversy.

(Art. 125.) Argumentative induction is that process, by which we examine some property of particulars until we arrive at their universal, on the presumption that the property observed, is common to the universal; in order to establish the requisite premises for argumentation.

1. Thus Mr. Bakewell, the celebrated cattle breeder, (a case mentioned by Dr. Whately,) "observed, in a great number of individual beasts, a tendency to fatten readily, and in a great number of others, the absence of this constitution. In every individual of the former description, he observed a certain peculiar make, though they differed widely in size, color, Those of the latter description differed no less in various points, but agreed in being of a different make from the others. These facts were his data; from which combining them with the general principle, that nature is steady and uniform in her proceedings, he logically drew the conclusion that beasts of the specified make have universally a peculiar tendency to fatten: but then his principal merit consisted in making the observations, and in so combining them, as to abstract from each of a multitude of cases, differing widely in many respects, the circumstances in which they all agreed, and also in conjecturing skilfully how far those circumstances were likely to be found in the whole class: the making of such observations, and still more the combination, abstraction, and judgment employed, are what men commonly mean when they speak of induction."

2. Up to this point, Dr. Whately does not consider induction argumentative, nor does he admit it to be such until all the premises are discovered, and stated in argumentative form. On this point, almost trivial, we beg leave to differ from Dr. Whately. Induction, so long as it is merely discursive, as observing facts in the common way, and collecting them, but not to any specific purpose, nor to prove a property at that time not suspected to exist, is certainly not argumentative or logi-But the moment induction advances beyond this, though only on the presumption of the existence of a law, which may be predicated of the whole of any class, and is directed in such a way as to obtain all the premises of an argument, it is of the argumentative character, conducted on the persuasion that such an argument may be completed. The first observation of Mr. Bakewell, for example, in the first cases might be casual, wherein nothing either of the incipient or complete argument could exist. But when these cases began to multi-. ply and arrest his notice, it led to the presumption, 1st, that there was a distinct species of cattle easily fattened; 2dly, that such and such marks distinguished that species. Consequently with these two premises, though then presumptive, Mr. Bakewell appears to have proceeded, and that with the view to establish these two facts, that the argument might be then conclusive in his own mind; that is, he proceeded argumentatively, and with a view to establish an argument, from which point his induction was of the argumentative character, though no argument was yet completed, as much as an embryo is a being, before it is a being of the same kind at maturity. And Mr. Bakewell's induction from that point was the embryo of the following syllogism.

There is a distinct species of cattle easily fattened. Such and such marks distinguish that species. Those having those marks are easily fattened.

3. If of a young student in chemistry it were inquired, "have all neutral salts qualities different from those of either of the simples composing them?" he would, if deprived of all other means of knowing this to be a fact, proceed first by induction. After he obtained from the examination of a few, presumptive testimony, to establish complete evidence, he would probably proceed,

First, with the nitrates; and having obtained the several individuals of this species, as the nitrate of potassa, the nitrate of soda, the nitrate of ammonia, the nitrate of silver, &c., and finding by induction that each and every one had qualities

distinct from either of the simples composing them, he could then predicate, by syllogistic reasoning, this property of this species of the genus, neutral salt.

Secondly. He would then proceed to the sulphates; as to the sulphate of potassa, of soda, lime, magnesia, iron, &c., and his induction being completed, he could then predicate by

syllogism of this species of the genus neutral salt.

Thirdly. To complete his induction, and to arrive ultimately, through the several species, to their genus, a neutral salt, as originally proposed, he must now proceed consecutively with the remaining species, viz. with the chlorates, carbonates, acetates, fluates, phosphates, prussiates, oxalates, chromates, borates, &c., and the results by induction being the same, he may sum up the whole, by a syllogistic conclusion, predicating that neutral salts have qualities dis-

tinct from either of the simples composing them.

4. From this view of the subject it appears, First, that induction is the reverse of syllogism. Induction proceeds from particulars to a universal, or to a universal of any kind containing particulars composing and completing it; as from individuals to a variety; from varieties, or class, to a species; from species to a genus; from genera to a tribe; from tribes to an order. On the contrary, syllogism proceeds from universals of any kind to particulars, as from an order to a tribe, from a tribe to a genus; from a genus to a species, from a species to a variety, or from a variety, or any other universal, to an individual, provided that those particulars are contained within what is predicated of their universal.

Secondly. It appears that induction and syllogism together, make up a complete system of argumentation. We cannot always proceed by syllogism, that is, when the universal is not known, nor what may be predicated of it, but the knowledge of this may be obtained by induction, by examining its particulars. But when this is known, induction is unnecessary, we proceed by syllogism; or syllogism sums up, concisely and argumentatively expresses in three lines, a volume of the labors of induction. Induction is, therefore, the pioneer for syllogism. Syllogism relieves induction of its toil.

Thirdly. The rank of priority is doubtless due to induction; that of completion and certainty to syllogism. In early ages, before universal natures were known, men would arrive at them by the patient investigation of particulars by induction. The process would begin with presumption, or with a presumptive conclusion as to a supposed or real universal

founded on partial testimony, and probably at a lower grade still, with discursive until it advanced to argumentative induction. The latter would proceed through various degrees of probable testimony, gradually approximating to complete evidence; and throughout the whole of this some degree of uncertainty would attach to the process. But the moment it attains the point of certainty, induction has discharged its honorable office. Syllogism itself is indebted to it for the information it has afforded, and even for its own material. The universal is now known, and what may be predicated of it, and every premiss necessary to the construction of an argument, is no longer presumptive. Syllogism memorializes the whole, and in a synoptic form, in the miniature compass of three lines, and by a conclusion deduced from premises no longer presumptive, forces conviction on one not capable of tracing such connexion through the several steps of a long induction.

Fourthly. Thus it may be perceived, that throughout the whole of the period of the allowable existence of induction, it is a presumptive conclusion from probable testimony as to the universal. But syllogism need not be employed except to deduce a conclusion from premises of certainty. That is, induction is an argumentative process within the limits of probable testimony; syllogism is an argument expressive of certainty from complete evidence. On this account, partly, Dr. Whately denies that induction is an argument until it can be expressed syllogistically, or when the universal and its predicate are known; but at this point precisely it is unnecessary as an argument, would be inconvenient, and properly ceases to be one. We do not contend that induction is an argument, but a process conducted on an assumption that argumentative principles exist, and therefore is within the precincts of what is argumentative, as much as twilight is within the precincts of the morning.

Fifthly. Truths, by Dr. Whately, very properly have been divided into truths of information, and truths of instruction. It is the office of induction to afford the former, that of syllogism to communicate the latter. Induction seeks a science, syllogism expresses it. Information supplies the material of instruction, instruction cannot exist without information. Induction and information, and syllogism and instruction are therefore correlatives. In short, induction and syllogism are the two luminaries during the night and the day of science.

5. Induction is the organon of Bacon, which he recommend-

ed as the means of acquiring truths of information, though many have erroneously imagined that he proposed to substitute it in place of the dictum of Aristotle, on which syllogism is founded. This is another testimony of the possibility of even successive generations, when misled by misrepresentation, existing even for centuries under a popular error. The functions of induction and syllogism are quite distinct, and it is impossible, with propriety, to substitute the one for the other. We agree with Dr. Whately that syllogism includes, or is, all reasoning, and consequently in this sense includes induction. It does so in the view we have taken; induction is the incipient syllogism, syllogism expresses the complete induction. Induction begins with assumed premises syllogistically conducted till probable testimony amounts to evidence, and induction at maturity arrives at syllogism.

6. From the following example will be perceived what premiss is commonly suppressed in the inductive process, and likewise the comparative length, when the cases are only seven be-

tween it and the syllogistic expression.

Cloven feet belong to the ox, a horned animal, Cloven feet belong to the sheep, a horned animal, Cloven feet belong to the deer, a horned animal, Cloven feet belong to the goat, a horned animal, Cloven feet belong to the antelope, a horned animal, Cloven feet belong to the elk, a horned animal, Cloven feet belong to the ibex, a horned animal.

If this completes the inductive process we arrive at the major premiss, until this suppressed and doubtful, viz:

"A property which belongs to the ox, sheep, deer, goat, antelope, elk, ibex, &c. belongs to all horned animals."

Having obtained this major, the syllogism may be completed, thus—

A property belonging to the ox, sheep, deer, goat, antelope, elk, ibex, &c. belongs to all horned animals.

Cloven feet is a property belonging to these; therefore Cloven feet is a property belonging to all horned animals.

7. Induction, is derived from the Latin word, induco, to bring in, and therefore induction properly signifies a bringing in, one by one, all the particulars of the universal, as in this case, the ox, the sheep, the deer, &c. in order to ascertain, if what is predicated of one, may of the whole species or genus.

SECTION 2.

ON ANALOGY.

- (Art. 126.) Analogy is a presumptive inference from the resemblance of a particular or universal of one kind more known, to the particular or universal of another less known, that a property existing in the former exists in the latter.
- 1. Analogy is seldom employed except in the absence of more certain premises for reasoning. It proceeds on the presumption that in consequence of a similarity, in the mode, constitution or circumstances of an individual, or individuals, of one class, with which we are more acquainted, to those of another class, with which we are less acquainted, that some property known to belong to the former, may also belong to the individuals or class less known. It is, therefore, a process of deriving a presumptive conclusion from presumptive premises in the absence of anything more certain. Analogy, however, may by various degrees approximate towards a conclusion of strong probability. This may be illustrated in the following manner.
- 2. A has a property, which call x; but this property may depend on its constitution or circumstances which consist of the parts, a, b, c, without the addition of any other. B's constitution consists of the parts a and b, wanting c, without that defect, however, being known; C's constitution is composed of b, c, wanting a, but with the addition of e; D's constitution is a, b, c, d; and E's is precisely A's, viz: a, b, c, without that identity being known, and they stand thus:

$$\begin{cases}
A & \text{is } a, b, c, \\
\hline{B} & \text{is } a, b, c, \\
C & \text{is } b, c, e, \\
D & \text{is } a, b, c, d, \\
E & \text{is } a, b, c.
\end{cases}$$

And the argument from presumed or partially known premises, will stand thus:

All beings of A's constitution, have A's property, which is x, B, C, D, E are of A's constitution: therefore

B, C, D, E have the property of A, which is x.

The major is not denied, the minor is, it is presumed, not known, and when examined turns out to be true only as to a part of it, i. e. as to E whose case is that of A; and the above on presumed premises may be reduced to the following, where nothing is denied and the conclusion certain:

All beings of A's constitution have the property x, E has A's constitution; therefore E has the property x.

The property x, however, may be more or less found in B, C, and D, though not in the same degree, or with the same modifications as in A or E, according to something either defective or redundant in their natures not applying to the case of A.

2. But how does this apply in medicine. The physician applies a remedy to A and to E, and in both cases succeeds; and likewise to B, C and D, who apparently are persons of the same structure and organization; yet there is either something defective in the one or redundant in the other, of which the physician, not being omniscient, knew not; his best efforts, therefore, reasoning by analogy from the case of A and E, are more or less opposed, according as the difference, whatever it

be, more or less agrees with the medicine exhibited.

3. What we now call comparative anatomy, seems to have been the first process, at least amongst certain nations, by which we have arrived at our present knowledge of the structure of man. It was the process of analogy, and conclusions more or less perfect were obtained from it, which ultimately led to those of greater precision and certainty. To analogy, though we trust to it as little as possible, we owe many obligations, without being thankful for past favors. We would hope that there is always something in man averse to cutting up other men even when dead, and much more to injuring the living subject to explore the mysteries of the vital machine. Comparative anatomy, therefore, was a more agreeable process at least to delicate feelings. Here is an animal, an organized being once capable of life and motion, which by dissection we find to have these parts, thus and thus situated. Man is such a being; therefore man has these parts thus situated. Thus was their analogy producing a conclusion, partly right, and partly wrong. The middle term, animal, is improper in the sense to which it is applied. The animal dissected was probably a quadruped, a bird or a fish; but man is neither; and therefore, since the minor is not contained in the middle, no conclusion of certainty follows.

4. But

A B C and D have all tried the business x, and have succeeded. I intend to try the business x; therefore I shall succeed.

I try, and fail! why? was the fau!t in the syllogism? Certainly; for first the little important I is neither A nor B nor C nor D, and therefore no part of the middle term; for one had more capital, another more skill, and I perhaps less management; and I find that I derived my conclusion from an analogy of a very remote character, since I was not even any part of the middle term.

5. But the law says

All that commit the crime x, with the aggravations a, b, c, shall die. Z has committed the crime x, with the aggravations a and b; therefore Z, shall die.

Not so; for Z is not in the middle term. It is true that there is a similarity in the crime defined, and that Z committed; but the want of the circumstance, c, in the latter, will save his life. The want of c throws him out of the middle term, that thunders, "thou shalt die."

6. But the law also declares that the punishment for the crime Y is imprisonment for life; and Z is charged before the court for the commission of Y. But the definition of Y in the statutes is ambiguous, or such as to admit of more meanings than one; and the questions become, 1, what is Y? 2, did Z commit Y?

No similar case having been decided in this country, the only mode practicable is analogy, or reasoning from the definition of Y in another country, whose circumstances are similar to ours; or if that definition, as in our case, be defective in the statute book, the reasoning must be from the way in which it is understood in the courts of that country. Thus in the case of L, the court in that country decided that the three circumstances, a, b, c, were necessary to Y as contemplated by the law. In the case of B, the essentials were decided to be a b. So also in the case of F. Two cases, therefore, against one, contend that the two circumstances only, a, b, constitute the crime Y; Z did these, and therefore committed Y, whose definition is determined by analogy to be a, b.

7. Reasoning from analogy is not always considered as argument, but implies motive and illustration involving argument from premises whose force is often sooner felt than understood. It may be termed reasoning, not argumentation. Analogy on many occasions is improper, but many are the

cases wherein it is proper and useful. It is inference from resemblance. If that resemblance be slight or remote, or the circumstances in whatever is essential to the inference not parallel, analogy is improper; as, for example, the mind in suspense has been compared to a balance in a state of equilibrium. The analogy here is improper, for what determines the balance is mechanical; but what determines the mind is intellectual.

- 8. Analogy is frequently employed for a didactive purpose, especially as to children and minds not familiar with abstract truth. It employs visible symbols, allegories, metaphors, allusions easily understood, to teach and illustrate what is less known from some resemblance between them. It contains an implied argument whose force is readily perceived. The greatest Teacher employed this method. "Behold the fowls of the air, for they sow not, neither do they reap, nor gather into barns; yet your heavenly Father feedeth them. Are ye not much better than they? Consider the lillies of the field," &c. Here is an argument from analogy. Will a farmer take care of that part of his stock which is of little value, and will he not take care of that which is of greater? If men, if common sense act thus, will not Providence? The minds of most to whom his discourses were addressed, were in a state not otherwise equally capable of understanding and appreciating the truth and spirituality of his doctrines. He chose this method, and this evinced his intimate acquaintance with human na-"If I have told you earthly things and ye believe not, how shall ye believe if I tell you of heavenly things?" Analogy begins, therefore, with earthly things, the A, B, C of Christianity, and then ascends to the mysteries into which "angels desire to look;" "what eye hath not seen, what ear hath not heard, and what hath not entered into the heart of man to conceive"—" the heavenly things"—prepared for those that "love Him."
- 9. Analogy is also employed after argumentation, not because the latter is insufficient, but because there are some that are disposed to understand and believe the former, when they are not the latter. Hence Butler wrote his Analogy of Natural and Revealed Religion, not because the direct evidence of Revealed Religion was not more than sufficient to produce conviction in all rational minds willing to read, investigate and understand, but because many are disposed to begin first, if ever they begin at all, with the volumes of Natural Religion. And the things analogous in Nature and

experience lead us to the same conclusions more immediately

and directly declared by revelation.

10. By analogy, the naturalist or philosopher is enabled to continue his travels to the utmost bounds of reasonable inference, or of what an elegant writer terms verisimilitude, but where sense cannot follow; whilst in the animal kingdom, Cambray, Nieuwentyt, Derham, Bonnet, Buffon, and Swammerdam; in the vegetable, Tournefort and Linne; in the mineral, Theophrastus, Werner, Klaproth, Cronstedt, Morveau, Reaumur, Kirwan, Stahl, Lavoisier, Fourcroy and Davy; and in the motions of the heavenly bodies, Copernicus, Kepler, Newton, Halley and Herschell, have observed that nature acts with uniform and consistent laws, and that those laws always point to nature's God; he, in common with them, by analogy from the things that are seen, infers that in the fields of ether yet unmeasured by Herschell's telescope, this law, this uniformity, this testimony and evidence proved.

dence prevail.

11. No great mind exists without occasional excursions to regions so sublime. We are yet within the precincts of analogy, or of reasonable inference from known and visible resemblance, and are unwilling therefore to yield the whole of this to the creative fancy of the poet, but within the limits of inference almost irresistible, with Dr. Reid exclaim, "We observe a great similitude between this earth which we inhabit, and the other planets of this system. They all revolve round the sun, as the earth does, though at different distances, and in different periods. They borrow all their light from the sun, as we do. Several of them are known to revolve round their axis, like the earth, and by that means must have a like succession of day and night. Some of them have moons, that serve to give them light in the absence of the sun, as the moon does to us. From all this similitude, it is not unreasonable to think, that those planets may, like our earth, be the habitation of various orders of living creatures."

12. We need not, however, stop here. This is but one solar system, and however great to us, who are finite, to the universe, which is infinite, nay to that galaxy of which we are a part, it is but a point. We cease, therefore, to contemplate single systems, and with Herschell, view galaxies, aggregates of systems, probably each like our "via lactea," or milky way, a grand celestial chain of systems that no finite mind can grasp, but whose myriad suns have, doubtlesss, each like ours, their own systems, with planets revolving around

them. Herschell considers our galaxy but one of the many, the countless aggregates of systems that compose the universe. He directs our attention to one, to another, and to many distant beds of light; and by his telescope, they appear each a congregation of suns. We are yet within the limits of mortal vision, and by analogy infer, if this be the case so far as our own view can reach, why not throughout the universe. universe composed of aggregates, an aggregate composed of systems, a system composed of planets, a planet peopled by intelligence. No one attempts to prove it by direct argument; it is infered by analogy, from known resemblance, confirmed, so far as it can go, by observation, and compatible with the views we would form of infinity. A finite agent produces a finite work, but an infinite agent an infinite work; above, below, on this side, on that, one vast unbounded universe of being and created intelligence, of which no finite mind can form an idea, but is comprehended by Him who comprehends all, Himself comprehended by none. He has a name that no man can spell, and whilst He is the creator of suns, is, himself, the sun of suns, the fountain of every thing excellent, and therefore so comprises within himself, all excellencies, and every thing amiable, that not any word, nor all the words, in any, nor in all languages, can express. is not He, therefore, who comprises all excellencies, and every thing amiable within himself, and consequently every thing excellent or that can be loved at all, the proper object of reverence, adoration and love, to you, to me, to all? Life is too short to do any thing else than to love Him who comprises all excellencies in ONE, and without whom nothing is excellent. "To whom," therefore, "shall we go, Тнои alone hast the words," (the excellencies) "of eternal life."

INTERROGATORY EXAMINATION,

ON

CHAP. I.

- Q. 1. What is your definition of induction? Art. 123.
- Q. 2. How many kinds of induction are there? 123.
- Q. 3. What is discursive induction? 124.

- Q. 4. What is argumentative induction? 125.
- Q. 5. How does induction differ from syllogism? 125, note 4.
- Q. 6. When you are in search of some new truth, or TRUTHS OF INFORMATION, in the investigation do you employ induction or syllogism? 125, notes.
- Q. 7. To what TRUTHS OF INFORMATION, OF TRUTHS OF INSTRUCTION, is the syllogism adapted? notes.
- Q. 8. When from premises, the truth of which is known, you deduce a truth of instruction, contained in them, though not perceived, but yet infered from them, do you employ induction or syllogism? 125, notes.
 - Q. 9. What is analogy? 126.
 - Q. 10. In what cases is analogy employed? 126, note.