

IV.—TESTIMONY AND AUTHORITY.

BY A. F. RAVENSHEAR.

I.—THE CLAIMS OF TESTIMONY.

IN the best scientific work, even as in the worst, much must be taken upon trust; on the authority of the competent observer, skilled instrument maker, or original investigator. The Chemist, in establishing the existence of a new compound, or defining its properties, relies to a great extent upon the determinations of others as to the atomic weights, formulæ, densities, specific heats, boiling-points, refractive indices and other coefficients of the auxiliary substances or reagents he employs. In much of his apparatus—weights, balances, polarimeters—he relies upon the work of the instrument maker. The Physicist in like manner employs all such results as are in general repute—tabulated densities, temperature-coefficients, elasticities, weights, resistances. The Astronomer makes use of the observations of his predecessors, as well as of his contemporaries in distant observatories. The acceptance of observations and descriptions in this manner is still more marked in geology, zoology, botany. The disposition of rocks in various countries and the occurrence of minerals; the kinds and distribution of plants and animals; all are to any given systematiser largely matters of report.

It might indeed seem that, in physical science, time and opportunity alone are needed to enable a man of sufficient energy and capacity to do the work of a hundred observers. But in psychology it is far otherwise; for, whatever his capacity, one man knows only one mind. Reliance upon others in physical science may be merely unavoidable; but to Psychology it is essential.

Inductive Logic, in so far as it claims to be a theory of Scientific Method, ought then to include a theory of Testimony and Authority. But in the current treatment this seems to a great degree to be lost sight of. We are presented with a theory of scientific method conceived as followed out by an investigator working alone, and almost from the

beginning. It is not, indeed, explicitly laid down that every man must be his own Observer, Speculator, Experimenter, Calculator, and Critic. The complex interchange of opinion, observations, experimental results, criticisms—the division of labour—that constitutes the life of science, is simply dropped out of sight.

Testimony finds its chief use in the establishment of individual facts. A line of reasoning may be reinvestigated; an experiment may be repeated. But for knowledge of specific facts or events in the past, or occurring outside one's personal range, each is perforce largely dependent on testimony. Such knowledge must in great part be derived from persons present at the particular time and place of the occurrence. In the current descriptions of the method by which individual facts may be logically proved, the use of testimony is, however, scarcely referred to. In Mill's *Logic*, for instance, the method is thus described:¹ "When the phenomenon is within the range of present observation, by observation we assure ourselves of its existence; when it is beyond that range and is therefore said to be absent, we infer its existence from marks or evidences. . . . The simple existence . . . is inferred from some inductive law . . . we prove the existence of a thing by proving that it is connected by succession or coexistence with some known thing." It would be a somewhat forced interpretation of this passage to suggest that it covers the case of testimony as to a matter of fact. It might, perhaps, be said that the testimony itself is some known thing connected by succession or coexistence with the fact it reports; and that the inductive laws to which reference is made are laws relating to the conditions of trustworthiness of testimony. But to argue thus would seemingly be to adopt as a guiding principle the oft-quoted aphorism that 'language is given us to conceal our thoughts'; for even if enclosed in the passage cited, the idea can scarcely be said to be disclosed.

In an indirect manner Testimony is doubtless alluded to in Mill's discussion of the "grounds of disbelief";² and in the dictum "whatever contradicts a well-grounded induction is to be disbelieved". But this alone is not sufficient. We ought to determine not only what testimony must be rejected, but under what conditions it may be accepted. Between these two is a broad neutral zone within which we can do nothing but suspend judgment.

It seems likely too that some logicians have regarded

¹ Chap. xxiv., § 1.

² *System of Logic*, chap. xxv.

testimony as sufficiently dealt with in the discussion of Observation. In Venn's *Empirical Logic*,¹ for example, a passing allusion is made to testimony under the head of Observation. This is to look upon the acceptance of testimony as observation or experiment by deputy; but it clearly results in an incomplete treatment, in so far as it supposes us already furnished with some means of distinguishing the deputies that are trustworthy from those that are not.

Still, since the acceptance or rejection of testimony is a process of selection of the material of knowledge, it would seem that even though credence in testimony does not fall wholly under Observation, yet it ranges alongside it. But while Observation and Experiment are directed towards phenomena, the selection now in question is from among statements or assertions.

There is no ground for denying 'credence'—if we may use this term to denote critical acceptance of testimony or authority—a position co-ordinate with Observation in the supposition that it must necessarily be less certain than first-hand observation, or as it might be put less 'logical'. That testimony may, in certain cases, give even greater certainty than personal observation must be familiar to every one who recognises the great inequalities existing between different individuals in their respective powers. A person may well derive, perhaps in some unfamiliar department of knowledge, a degree of certainty from the affirmation of the qualified expert far surpassing anything he could reasonably derive from his own imperfect or untrained observation.

But Testimony is involved in Inductive Logic in a far more intimate manner than this. It might almost be said that Testimony is necessary not only to the establishment of the *universality* of the principle of the Uniformity of Nature, but even to the perception of *any* uniformity in the bulk of Nature's activities. Along with clearly exhibited uniformity in certain respects, Nature presents infinite variety. Some uniformities only are patent, most are disguised. We see that heavy bodies fall when free, but a balloon rises. The same piece of wood, however often we try it, will always float; but that a friend on one occasion, say, took wine is no guarantee that he will accept the same thing on another occasion. In such instances it is easy to specify the uniformities underlying the apparent irregularities; and in doing so we clearly see that in these as in other cases the

¹ *Empirical Logic*, p. 111.

perception of uniformity is the result of a selection and emphasis of certain features, commonly not noticed in our early acquaintance with the matter, which are brought to light by a comparison of those experiences with others. This emphasising of certain features and neglect of others—the process of analysis or abstraction—is not only a laying of stress on something in an isolated experience, but is also a selection and emphasising of other experiences. The balloon—an apparent irregularity to the rule that heavy bodies fall when free—is seen to exhibit uniformity when experience of hydrogen is brought into view; and the different behaviour of our friend under similar external circumstances shows uniformity when experience of varying bodily condition is brought into line with it. But these other experiences that must be employed to force the given experience to yield up its uniformity may not be within the reach of any one individual. The uniformities shown in the return of certain of the comets are visible only to those who know how to rely upon records many hundred years old. The uniformities brought to light by statistics are nothing to him who cannot depend on an army of co-workers. If the individual indeed were to confine himself strictly to his own experience, Nature, far from seeming universally uniform, would seem infinitely capricious. The universal uniformity of Nature can be seen only by an analytical use of the experience of others as well as our own. Mere addition of obvious uniformities derived from other persons' experience might perhaps give a restricted field of uniform action; but only by an intussusception of each other's experience does the universal extent of that field become known.

But in laying stress on some features we ignore others. What of those we neglect? the errors of observation, the individual variations when we are dealing with averages or elimination of chance, the 'irrelevant' circumstances which make up the difference between the abstract conception and the concrete experience. Is nature uniform only as far as the limits of errors of observation? This question scarcely needs an answer; but it furnishes an illustration of the preceding remarks on the use of the experience of others in the proof of Nature's uniformity. These neglected things are never intended to be neglected for ever. The ideally complete theory would take account of them all. Wherever at present this cannot be done the reason is that the appropriate experiences by which their apparent irregularity and caprice could be converted into law either have

not occurred or have not been noticed in the requisite relation.

The facts capable of introducing order and uniformity into the irregularities and caprices of our own individual experience are then so often not facts of that experience, or are, if there, so often overlooked, that the emphasis and selection constituting the perception of uniformity must to a large extent be performed by deputy; a substitute for direct experience in the interpretation of other experience must be found in the use of Testimony.

To this claim a seemingly strong objection, which has oftentimes been pitted against the empirical basis of Induction, might be urged thus: How can criteria of testimony be included among the principles of induction when they have themselves to be established by induction? Only under misconception, perhaps generated by false analogy to the alternate deduction of premiss and conclusion each from the other, could this be thought to be illegitimate. The apparent difficulty disappears as soon as we distinguish the successive stages in the growth of the power of reasoning inductively. First we find the inductive processes implicitly occurring in mental operations long before they become explicit. On a higher plane there are the explicit and fully developed processes. Lastly, the organised logical theory in which the principles are enunciated, their interdependence exhibited, their legitimate extent and necessary limitations defined; by which they are reduced to mutual consistency and precise accordance with experience. The perfecting of the principles is the proper business of Logic, not the origination of the processes. Exact principles of induction result from the working of the primitive processes, as, in the grinding of lenses, a truly spherical form results from the mutual attrition of surfaces initially imperfect. If the relation between inductive processes and logical principles were like that between conclusion and premiss the objection would be fatal. But it is not so: rather does Logic take the imperfect processes, grind them, so to speak, one against the other, and hand them back as nearly as may be in the form of perfected principles.

II.—CRITERIA OF TRUSTWORTHINESS.

Excessive credulity and excessive incredulity have each been fixed upon as the marks of ignorance and simplicity. Within the narrow circle of personal experience the uninformed person exhibits obstinate prejudice; outside that circle childlike dependence upon others. A theory of testi-

mony aims at showing how to steer an even course between these two extremes. In a well-informed mind the modes of belief here seen in sharp contrast both enter in modified forms. Each is to be seen in almost every estimate of the truth or falsity of the statement of another.

Every one believes himself to have some sort of justification, however obscurely apprehended, in accepting or rejecting a statement resting on testimony or authority. The precise nature of this justification, when valid, is the object of our present inquiry. In so far as an investigation is first-hand, the conditions to which the evidence must conform in order to constitute proof are those formulated in Logic. In so far as we depend upon acquaintance with the subject, grounds of disbelief are also discussed in Logic. But the questions now proposed relate to inquiries that for any reason are not first-hand; to those inquiries in which either from necessity or convenience reliance is placed upon the work of others. To what conditions then must testimony or authority conform in order to be reliable? What safeguards can be devised in order to lessen risk of error in judgments as to matters not within our own cognisance? These are the questions that must be answered by a logic of testimony and authority; and an attempt to give a sketch of the answer is made in the following pages:—

The Legal and the Mathematical treatment of the Subject.—The nearest approach to a consistent body of principles regulative of the admission and indicative of the trustworthiness of testimony might be expected to be found in the Law of Evidence. The work on that subject by the late Mr. Justice Stephen¹ shows, however, that it is scarcely to be found in the existing law in this country. Many of the rules as they stand at present are designed merely to facilitate the business of the courts—to regulate procedure and forms. Some are to limit the extent of inquiry, and some to safeguard the interests of strangers. Very few, strange to remark, aim directly and solely at securing reliability in the witnesses, or at setting up tests of trustworthiness—these are matters left to cross-examiners and juries. The rules, indeed, have mainly been framed to deal with the exigencies of judicial inquiry; and accordingly are more often narrower in scope and more often based on considerations of convenience than a purely scientific treatment of the subject from the point of view of Logic would permit.

¹ *Digest of the Law of Evidence.*

There are, nevertheless, some few examples of rules that might be looked upon as having been devised to attain reliability. Thus there are rules as to the necessity in a few isolated cases for corroboration—as in promise of marriage, charges made by accomplices, or in allegations of treason. There are the rules as to the 'competence' of interested witnesses, or those labouring under any infirmity. There is also the rule as to 'directness' of evidence—excluding hearsay except in certain very special circumstances. Lastly, there are the rules as to the sanction under which a witness shall speak.

These as will hereafter be seen are far from constituting an adequate list of safeguards. But it will be found that all except the last—which has reference to penalties and, therefore, does not here concern us—readily fall into line with and find a place among the criteria of trustworthiness indicated in the paragraphs that follow.

But if the Legal treatment of Testimony is inadequate, the Mathematical treatment seems positively useless. Problems relating to the conflict and concurrence of testimony have commonly been regarded as belonging to the mathematical theory of Probability. The probability of the truth or falsity of the assertions of the several witnesses being supposed known, that of any matter which some of them affirm and others deny is by its aid deducible. The mathematical solution of such a problem is doubtless logically based upon the data—but only when coupled with numerous restrictions expressed or implied. But these are such as to make the theoretical witness so highly abstract a personage as to find no counterpart in nature, unless it be—as Dr. Venn humorously puts it—a bag containing black and white balls.

To apply the method to real witnesses, resuming Dr. Venn's argument in the *Logic of Chance*,¹ would require statistics of mendacity based upon a full classification of witnesses; and some means for identifying the class to which each witness should be assigned. It would also be necessary to assume—ignoring fact—that each person has a definite degree of reliability independently of the subject of testimony; or else to base the statistics upon a classification of matter as well as of witnesses. There would still remain even then the difficulty of determining on each occasion whether the witnesses were or were not independent or ever could be so absolutely; and lastly, the surpassing difficulty of deciding in how many ways each witness might go wrong.

¹ Chap. xvi.

The mathematical theory makes the evaluation of concurrent testimony depend upon the previous evaluation of individual assertions. It will, however, be submitted in the following pages that, to make the most effective use of corroboration, the reverse procedure should be adopted. We ought to start from the fact of corroboration, when we have it, and employ it as a means for distinguishing how far the conditions of trustworthiness have been satisfied by the individual witnesses. The inference is to be drawn from the nature of the corroboration. This method of dealing with concurrence of testimony, and with conflict, will, it is hoped, be found to be entirely free from the objections that may so forcibly be urged against the mathematical treatment.

Conditions of Trustworthiness.—It should be here noted that although for the sake of brevity the terms "witness" and "testimony" are employed, they are intended to apply to the conveyance of information of all kinds and in any form. The works of authors past and present, the deliverances of authority, writings and assertions of specialists and other investigators, the reports and descriptions of travellers, and recorded information from all quarters is to be kept in view. It does not seem easy to suggest a pair of terms that will fairly indicate all this; and the required extension of meaning must therefore be pressed into the somewhat specialised pair of terms here proposed. It may further be noted that testimony and capacity of particularly high value are commonly said to possess "authority"; and in what follows this latter term and its derivatives will be employed in accordance with this usage.

The first step, before tracing the bearings of corroboration, must evidently be to pass in review the conditions of trustworthiness of 'witnesses' considered singly. These conditions are not far to seek; the only point requiring remark being that the mode of derivation adopted must be capable of guaranteeing the completeness of the list.

In our examination of 'credence,' or the critical acceptance of testimony, we must take account both of the giver and receiver. Error must assuredly arise unless each of the two parties, the assertor and the hearer or reader, perform correctly the part of the operation that falls to him. Not only must the assertor speak truly, but the hearer must rightly understand. A presupposition to a consideration of the conditions that must be satisfied to justify us in relying on the statements of others is, then, that *the assertor's meaning must be correctly ascertained.*

Any discussion concerning possible safeguards against misinterpretation of the statements of others would take us into a region of logic bordering on that of definition. Let it suffice here to say that interpretation must be self-consistent; must neglect nothing in the data; must give full effect to the context—immediate, systematic and historical—and must not be limited to mere grammatical or logical analysis, but must take due account of the style and intention of the writer or speaker.

Let us turn first to the part taken by the assertor. It is clear that to impart information implies first the getting of it. The reliability of testimony depends not only upon the conveyance of the information being correctly performed, but also upon its having been correctly obtained; not only upon the veracity of the witness, but also upon his cognizance of the matter in hand. Two conditions or groups of conditions therefore might naturally be expected to unfold themselves; one set arising out of the process of conveying information, and the other from the processes of obtaining it.

Beyond these we should expect to find another if there be any influence likely to adversely affect equally both the acquisition and the conveyance of information. It is universally recognised that however careful and conscientious a person may be, yet the effect of interest may be to lead him unwittingly into error throughout the acquisition, the retention and the conveyance of information. To be free from such unseen influence in completeness is the unattainable ideal; but practical freedom from bias with regard to some particular matter is not so far out of reach. This relative *freedom from bias* is then one of the conditions that an assertor must conform to in order to be trustworthy.

In the process of conveying information there are evidently involved intention and capacity. A person will speak truly provided he wants to and can. Nevertheless a witness may be perfectly sincere, and yet fail to recall accurately the matter asserted; or even if he can do this he may still not succeed in expressing exactly what he has in mind. This factor then gives rise to two conditions—one that *the assertor must be sincere*, and the other that *he must be accurate in memory and expression*.

The great difficulty is, of course, to find out whether there is bias or insincerity in any given case. To a certain extent, as we shall see, corroboration deals with it; but if we are without corroboration there is nothing but to consider the circumstances under which the statements are made in

relation to the character of the assertor. This does not amount to saying that every one will be carried away if there be any inducement to deceit, but merely recognises that as some undoubtedly will, the evidential value of all uncorroborated assertion is thereby depressed.

As regards accuracy of memory and expression, the time that elapses after an occurrence before it is recorded or reported is one of the chief circumstances. Care would seem to be another. But it should be noticed that *carefulness* belongs rather to sincerity than to accuracy. Care is doubtless necessary to the attainment of accuracy, but that after all is only the way in which sincerity combines with ability in the production of accuracy. These two conditions will not be discussed at this point. The brief remarks already made are only intended to indicate the meaning of the phrases *condition of sincerity* and *condition of accuracy of memory and expression*.

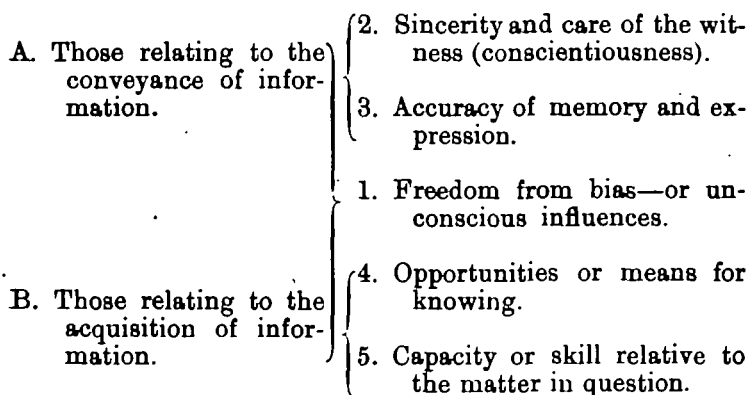
The conditions arising out of the processes of obtaining information are also two. The ascertainment of facts, events and other matters of observation or experiment demands both means or opportunity for ascertaining them, and competence in observation, or judgment. The conditions that must be satisfied are then that the assertor must have had *sufficient opportunity or means for becoming acquainted with the matter asserted*; and that he must be a person of *skill or capacity adequate to the acquisition of the knowledge professed*.

The question is here again : How are we to know whether some certain matter is or is not within the cognizance of one whose testimony we are examining? This may sometimes be difficult to answer; but need not always be so. If we are unable in any given case to answer it satisfactorily, the testimony is of little value; but if we can, we are on the way towards its evaluation. In some cases the answer may be easy. We should naturally hesitate to accept as fact an account of an occurrence by some one we knew had not been present; or in accepting as fact the statements of some one volunteering to inform us as to what was passing in another person's mind, or to give us information as to any other matter that we believed to be beyond human faculty. Such considerations are summarised in the phrase *opportunity or means for knowing*, which is the name by which this condition will be mentioned in the pages that follow.

Special keenness or genius are of course not demanded unless the matter testified to renders them essential. But in many matters it is absolutely necessary to rely on the

expert in the arts of observation and experiment. We must be satisfied in such cases not merely that there has been no confusion between true observation and inference, but of much more besides. In scientific experiment we depend not only on the observer's power of seeing, but on his skill in doing. We must be satisfied not only that nothing present was missed, but also that the contriving and operative skill of the observer were such as to ensure that everything that could possibly be present was present. Natural endowment of sense counts for much—keenness of eyesight, touch, hearing. But practice and experience are factors equally important, especially in those inquiries depending on manipulative skill or on the use of complex instruments or methods. Facts of this character must be understood in the following pages by the terms *skill* or *capacity*.

The conditions, as we have seen, then, on which the credibility of a single witness depends, supposing his meaning first to have been correctly apprehended, comprise (1) his freedom from bias, (2) his sincerity and care, (3) his accuracy of memory and expression, (4) his opportunities or means for knowing, (5) his capacity or skill relative to the matter in question. The relationship of the criteria to each other may be exhibited diagrammatically thus:—



It may be admitted that testimony is of the highest authority if it is deliberately given by a sincere person having had opportunities for cognizance of the matter and adequate powers of observation or judgment, who is careful and capable of accurate memory and expression, and is free from the influence of bias. But in place of the apparently simple question, "Is or is not this testimony reliable?" there now seems to be a multitude of questions,

seemingly no easier to answer than the original one. That there may, nevertheless, be some advantage in thus splitting up the main question in the hope of some one or more of the subordinates ones being answerable is obvious. For unfavourable answers to the questions as to sincerity or opportunity condemn the testimony without more ado. A further advantage, however, becomes immediately apparent when we begin to take into account the subject of Corroboration. We may often with the aid of corroboration of one kind or another draw conclusions as to the component questions far more certainly than we could as to the whole question ; and by an aggregate of testimony and other corroboration may in effect ensure that all the conditions have been satisfied that a single witness would conform to if perfect.

Corroboration.—The conditions of trustworthiness having thus been briefly enumerated, we are in a position to look more closely at the subject of Corroboration. This may take the form of concurrence—or conflict—of testimony, and confirmation by other evidence, which may either be internal or external. The various kinds of corroboration will be reviewed in the order named, beginning with concurrence of testimony.

As we have already seen, it is necessary in estimating the value of testimony to consider whether there is any want of sincerity or anything likely to breed unconscious bias in the mind of the assertor. To satisfy the conditions of logical proof on these points in the case of a single witness might be extremely difficult or quite impossible ; but if the circumstances and interests of the individual witness, where there are several, are sufficiently varied, the difficulty disappears. If indeed there is known conflict of interest between the witnesses with regard to the matter asserted, and they nevertheless agree, we may safely infer that insincerity has not been operative with the bulk of the assertors. Since we are given a conflict of interest but a concurrence in statement, most of the assertors we are assured must have spoken against interest ; whence bias or insincerity cannot have been operative in their several cases. *Bias and insincerity may therefore be eliminated by a concurrence of persons of sufficiently varied interests.*

In a less degree concurrence of testimony throws light on the extent to which others of the conditions of reliability are conformed to. We have seen that the value of testimony is largely dependent upon the sufficiency of skill or experience on the part of the assertor, on his powers of observation

and his opportunities for ascertaining the fact. The more varied the powers, experience and knowledge brought to bear on any question the more likely is the judgment to be well-founded. *Any assertion concurred in by persons of different training, habits, and point of view is likely to be accordant with a wider aggregate body of knowledge and experience than if made by one of them alone*; and is accordingly so much the more reliable than if it had no other support.

It is essential, however, in this case that the variety should be in knowledge or experience relevant to the assertion. This is an important part of the independence of the witnesses postulated in the mathematical treatment of testimony, and is perhaps more difficult of attainment than is a sufficient conflict of interest to eliminate bias and insincerity. Unfavourable cases are those in which it is not possible to obtain the requisite variety. An example may be easily imagined. Suppose we had the evidence of a number of men as to the colour of some object; and afterwards found out that they all worked in some industry productive of colour-blindness. The effect on their testimony would be much the same as though they had agreed to deceive, and we should naturally refuse to rely on their assertions even though we saw no appearance of collusion.

The remaining condition of trustworthiness whose relation to corroboration we have yet to mention is that of accuracy of memory and expression, and this does not seem to be touched by concurrence of testimony. On this, however, as well as on another of the conditions, light may be thrown by 'internal evidence' which has been adverted to as constituting another form of corroboration.

Rigid and thoroughgoing consistency in all parts—cogency of reasoning and absence of confusion—raise a presumption of accuracy and care. Even an occasional lapse as regards these characters is of no great consequence as invalidating the remainder; for wherever consistency and cogency *do* appear they are assuredly not the result of chance.

In the same way also that inaccuracy may be disclosed by inconsistencies of statement, a presumption of imperfect observation may be raised by a record that fails to distinguish exactly between results due to observation and those due to inference. Where these are not carefully discriminated in description and discussion there can be no certainty that they have not been confused in fact; and accordingly the work in which they appear cannot be regarded as fulfilling the condition that has reference to observation.

The third and last form of corroboration is that gained by

testing or verifying the statements by extraneous evidence—experiment or other means. Whenever this is resorted to we are approaching a new field. Just to the extent to which appeal is made to extraneous evidence we engage not so much in a deduction of reliability as in an inductive inquiry. It is true that a test may be applied merely here and there, perhaps as to accuracy, perhaps as to meaning, but such tests if sufficiently multiplied would in reality constitute an example of the full process of Induction. The hypothesis being that the evidence is true, it is established or overthrown by its agreement or otherwise with the tests applied.

Cross-examination as practised in the Law Courts—the most powerful weapon conceivable for exposing falsification—may indeed be regarded as a special case of this. It is impossible that any person should be aware, in framing an untrue story, of every discoverable fact that might have a bearing on it. Hence however fully he may harmonise his tale with all he knows, it is extremely unlikely that an exhaustive cross-examination would not bring to light some conflict with matters not known to the witness, although known to others. The 'verification' of the story in such cases fails.

Conflict of Testimony or Authority.—Up to this point complete concurrence of testimony only has been dealt with. But it is commonly recognised that 'substantial agreement coupled with circumstantial variety' is of more value than precise accord between a number of witnesses; since the latter imports a suspicion of collusion. Even when the variety in detail is considerable we may find that as to those parts in which there is no conflict the testimony is reliable. This is not, however, an example of true conflict, since we here conclude only as to portions in which there is accord. Cases of true conflict are those in which one of two inconsistent assertions is preferred on account of the superior trustworthiness of its source. To illustrate apparent conflict of the former kind, we may suppose that we have a number of opposing statements easily separable into allegation as to matters of fact and inferences therefrom. If then we find that the divergence is wholly or mainly as to the inferential portions, we have, other circumstances being favourable, good ground for concluding that the matters of fact are correctly stated.

In order to deal with true conflict of testimony as distinguished from apparent conflict—that is those cases in which the divergence is in detail or in matters irrelevant to what we wish to ascertain—we have to determine on

what conditions the superiority of one source of testimony to another depends.

Sincerity and absence of bias *may* belong to any testimony, but to "authority" or authoritative testimony they must. The possession of these characters does not alone guarantee its trustworthiness; but their absence—or a doubt as to their presence—does assure us of its *untrustworthiness*. The remaining characters—(1) accuracy of memory and expression, (2) opportunities for knowing, and (3) capacity—are therefore those on which the relative value or the grade of trustworthiness of testimony depends. For these may vary in degree without absolutely invalidating the testimony.

Where, then, there is direct conflict, which of the two opposing statements is to be preferred must be decided by determining which of the assertors or groups of assertors has been the more accurate in memory and expression, or has had the better opportunities or capacity for ascertaining the matter asserted. This account of the procedure to be adopted in cases of conflicting authority still, however, needs further amplification; for there are three characters to consider, and the weight of these per chance in any given case may not be all on one side.

It may happen for instance that great capacity is found coupled with small opportunity; or ample opportunities with relatively smaller capacity. Granted the bare minimum of each of these characters—without which the testimony would fall into the great class of the unreliable—can we fix the order of precedence in respect of their authority, of the several combinations that may occur? An attempt to do so soon discloses that their order must vary with the nature of the subject-matter.

Testimony may broadly be divided into (1) expressions of judgment or opinion, and (2) assertions of fact; and the latter into (a) matters of common observation or patent facts, and (b) latent facts, the subject of experiment or research. It is clear that capacity plays a chief part in the trustworthiness of judgment and research, while in the case of patent facts the reliability is chiefly grounded on the assessor's means or opportunities for knowing. Further, nothing beyond the bare minimum of accuracy in memory and exposition adds anything to the reliability in either case. In expressions of judgment or opinion, and in the description of facts disclosed by research, it would seem, therefore, that we ought to give preference to the authority of capacity, while in regard to patent facts we must conclude that authority is to be measured chiefly by opportunity.

There is a close relation between the subject of conflict of authority and the further question : What attitude must we assume towards authorities or groups of assertors that seem to contradict our own personal conclusions or experiences ? This embodies in another form the main question that, as it has before been stated, a theory of testimony sets out to answer, *viz.* : How shall an even course be steered between excessive reliance on self, and excessive dependence on others ? The preceding discussions seem to furnish us immediately with the answer. We must in thought each go down into the crowd—and deal with the case as one of conflict of testimony only—our own testimony against that of the others. The question is resolved into one of comparison of authority ; and the answer depends on relative opportunities and capacities for ascertaining the matter in hand, considered with reference to the nature of the subject in the manner above sketched out.

Authority ; the Expert or Specialist.—By the aid of the conclusions arrived at above we may attempt also to define the limits within which the argument from authority is legitimate.

Criteria of testimony, as we have seen, rise into primary importance in those cases in which reliance is placed on the statements of others either from *necessity* or for *convenience*. How much we shall concede to convenience in any given case is clearly not a question for Logic ; and the logical interest accordingly centres about the claims of necessity. We wish then to distinguish precisely between those cases in which we must of *necessity* rely upon others, and those in which we may examine the reasoning, criticise the evidence, and trace out for ourselves the dependence of the conclusion upon observation and experiment.

This we shall find is easily accomplished by the aid of the obvious distinction between simple facts of observation or experiment, and critical judgments formed on complex considerations. The facts of observation cannot from their nature be repeated and examined at will. We must wait an opportunity for observing the event ; and that opportunity may never be ours. In matters of experiment also we are dependent on laboratories, observatories, and on the skill and co-operation needed for making use of them. Therefore must we in matters of simple observation and in matters of experiments often of necessity rely upon testimony. This necessity is in general merely practical as regards the results of experiment, but is absolute as regards specific events in the past or outside our own range of observation.

In results arrived at by reasoning on the facts of observation and experiment we are, however, not under the necessity of relying wholly upon others. The reasoning admits of being dissected and critically examined. It is not, like an experiment or observation, an event limited to some particular place and time; but is capable of repetition merely at the expense of intellectual exertion. Yet, even after the analysis has been carried to its farthest limit, there will still remain the facts of observation or experiment on which it is based. And as to these we may still be under the compulsion of relying upon the assertions of others.

Our conclusion is then that *necessity* for reliance on others exists nowhere except as to certain matters of observation or experiment; and as to these only in so far as they themselves are unanalysable or simple facts. The critical conclusions of competent investigators may on certain occasions be adopted on practical grounds without a sifting of the evidence; but to repeat a former remark this can receive no justification from the point of view of abstract logic. An assertion being given us, if it can be analysed it should be. If it cannot we must either suspend judgment or see how far the assertor satisfies the conditions of trustworthiness. If we are unable to do this, we finally have no choice but to avoid coming to a conclusion until we can.

Among the various kinds of authorities the *Specialist* and *Expert* deserve more particular mention. The terms are perhaps not very sharply distinguished; but 'specialist' adverts rather to the attainment of high proficiency by a limitation in the range of inquiry; while the term 'expert' imports the possession of a high degree of skill or capacity. They seem to differ also in this, that while the specialist must possess *all* the qualities of authority the expert need not. The latter may be an expert in some one or more of the particular kinds of skill or capacity that go to the making of authority. Thus we may have experts in observation, or in experiment, or in some particular variety of one of these. The two terms, however, are often used synonymously.

The natural home of the Expert seems to be the Law Courts, where — especially in Patent litigation — his habit is to distribute his favour impartially between plaintiffs and defendants. This habit of his gives point to the question: What is the proper way to use him? How can he best be made to give reliable assistance in any inquiry?

We have already seen that the argument from authority is logically defensible only when no other sufficient evidence

is available; only when either absolutely or practically it is a necessity. A slight development of this shows us the Expert in his proper place—he should be employed only in so far as his assistance is unavoidable. He should, to make the strictest use of his powers, be referred to only to prove or to point out unanalysable facts of observation or experiment not without his aid perceptible to or attainable by the inexperienced. If this rule be departed from in any given case and the *expert* asked his opinion on a matter *as a whole* it should be clearly kept in view that such departure is justifiable only as a concession to convenience.

Concatenation of Testimony.—It is an obvious conclusion from the preceding discussion that a mere random assertion—uttered we know not by whom or under what circumstances—is in general of little value as testimony. Statements have weight as testimony only in so far as we already have information about the assertor independently of the subject under consideration. Testimony then, in general, consists in assertions whose trustworthiness can be judged through the medium of independent information about the assertor.

The case in which this independent information is obtained wholly or in part through the medium of other testimony deserves, on account of its wide occurrence and the importance of its uses, to be especially singled out. Our sources of testimony need not be known to us first-hand; indeed, perforce they are not usually so. By the various ways of obtaining a knowledge of distant facts, *including reliance on testimony*, we may obtain information about persons or writers at a distance or in the past sufficient to enable us to judge as to the trustworthiness of any statement that can be properly attributed to them.

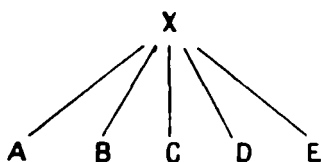
It is of some interest that testimony reached and vouched for in this manner can be shown to be free from the obvious objections to statements that have been handed on from person to person, each relying on his predecessor. The latter certainly bears a superficial resemblance to the use of testimony for establishing the credentials of other witnesses, and is liable to be confused with it. Indeed, in enforcing the importance of the distinction between the “self-infirmative chain” and the “self-corroborative chain,” Bentham¹ and those who follow him seem to make no mention of any other possible way in which the testimony of a number of persons might be concatenated.

¹ *Rationale of Judicial Evidence*, vol. iii., p. 224, and chap. x., bk. vi.; *Mill's System of Logic*, chap. xxiii., § 6.

A "self-infirmative chain" is one in which a statement passes from mouth to mouth among persons whose credibility in mathematical language is less than unity. The probability of the truth of the final assertion is then measured by the product of a number of fractions corresponding to the number of links in the chain. It, therefore, continually diminishes as the length of the chain increases. The process may be symbolised thus—where the assertion X passes from E to A through D, C, B:—

X—E—D—C—B—A.

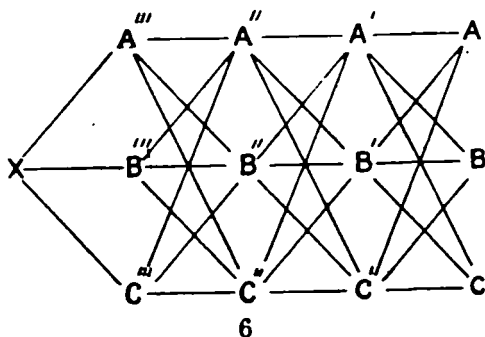
In the "self-corroborative chain" a number of persons independently make the same assertion X; a process which may thus be symbolised:—



The credibility of the assertion in this case is greater than that of an assertion of any of the witnesses taken separately; but the process possesses the disadvantage of carrying us but one remove from the fact; it takes but one step.

But if we make use of testimony as to the credentials of our witnesses, which is the method that our examination of the conditions of trustworthiness has led us to—if we inquire how far our witnesses satisfy the conditions of reliability—we find that we can retain the advantages of the "self-infirmative chain" without sacrificing those of the "self-corroborative chain"; we can combine the length of the former with the strength of the latter.

The process may be represented in a diagram thus:—



Here we have statements of A, B, C, to show that A', B', C', respectively satisfy the conditions of trustworthiness with regard to their assertions about A'', B'', C''; and those of A'', B'', C'', as to the reliability of A''', B''', C'''. If, now, the last three agree in an assertion X we have confirmation of the same kind as in the "self-corroborative chain," joined with a number of steps or removes such as we find in the "self-infirmative chain". We have constructed in fact what might be more aptly termed a "bridge" than a "chain". This process is not a mere conjunction of the two former; for the assertion X, it should be noticed, does not pass through all the groups of assertors. We are supposed to get that directly from A''', B''', C'''. It is the reliability—the opportunities, capacity, sincerity—of the various assertors that is vouched for in successive stages. These are of course quite arbitrarily represented in the diagram. The number of persons in the different stages might vary largely; the contributions of the different witnesses, indicated by the number of cross-lines drawn from the letters in the diagram, might be very unequal; nor need the stages themselves be so distinctly marked as in the figure.

It is, however, quite unnecessary for the present purpose to attempt to represent on a diagram the ramifications of testimony in the full complexity of their actual occurrence. We may yet keep their variety in mind, and may also add in thought the further complication produced by the introduction at every stage of corroboration by extraneous evidence.

After the utmost has been done in the direction of getting knowledge first-hand, whether scientific or practical, the evidence in great part finally assumes this form. We cannot entirely sever any portion of knowledge from its context. When the historian makes use of the admissions of Clarendon in favour of the Parliamentarians, he first adduces contemporary testimony and other evidence to show the part played by his author in the public affairs of the time. This comes to the historian largely through manuscripts or books; perhaps fortified by the independently established history of some library of repute, or place of public record; perhaps guaranteed by generations of trustworthy editors and commentators spanning the interval from that time to this; possibly even the part taken by famous publishers may enter into the total sum. In the acceptance of Livingstone's accounts of the countries through which he passed, are not the relevant grounds in part the esteem in which he was held by his contemporaries, coupled with their

credentials; in part the credentials of the Societies and other media of record and publication through which his work has in successive stages come to the individual reader? If I submit myself to the knife of the Surgeon, how have I assured myself that he will do the right thing, unless by relying upon a complex tissue of testimony as to the professional ability of a large number of individuals? The same thing is seen in the employment of mathematical results by non-mathematical persons; and, as an attempt was made to show at the beginning of this paper, cannot by any process be avoided in even the best scientific work.

The actual occurrence of these "bridges" of testimony, explicitly set out in the structure of each one's knowledge, is doubtless rare. The singling of them out must in general be a process of logical analysis. But a man can so little divest himself of his social nature that they exist implicitly in almost every part of his knowledge. They are characteristic not merely of loosely and carelessly held floating opinion; they chiefly rise into prominence in the more carefully and exactly ascertained portions of his knowledge; those, indeed, more than in any others, in which he is apt to take pride for having thoroughly worked out and sifted them for himself.