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Weber Freiligrath Frey
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Deductive Logic

St. George William Joseph Stock

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DEDUCTIVE LOGIC

BY

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PREFACE.

One critic, who was kind enough to look at this book in manuscript, recommended me to abandon the design of Publishing it, on the ground that my logic was too like all other logics; another suggested to me to cut out a considerable amount of new matter. The latter advice I have followed; the former has encouraged me to hope that I shall not be considered guilty of wanton innovation. The few novelties which I have ventured to retain will, I trust, be regarded as legitimate extensions of received lines of teaching.

My object has been to produce a work which should be as thoroughly representative of the present state of the logic of the Oxford Schools as any of the text-books of the past. The qualities which I have aimed at before all others have been clearness and consistency. For the task which I have taken upon myself I may claim one qualification—that of experience; since more than seventeen years have now elapsed since I took my first pupil in logic for the Honour School of Moderations, and during that time I have been pretty continuously engaged in studying and teaching the subject.

In acknowledging my obligations to previous writers I must begin with Archbishop Whately, whose writings first gave me an interest in the subject. The works of Mill and Hamilton have of course been freely drawn upon. I have not followed either of those two great writers exclusively, but have endeavoured to assimilate what seemed best in both. To Professor Fowler I am under a special debt. I had not the privilege of personal teaching from him in logic,—as I had in some other subjects; but his book fell into my hands at an early period in my mental training, and was so thoroughly studied as to have become a permanent part of the furniture of my mind. Much the same may be said of my relation to the late Professor Jevons's *Elementary Lessons in Logic*. Two other books, which I feel bound to mention with special emphasis, are Hansel's edition of Aldrich and McCosh's *Laws of Discursive Thought*. If there be added to the foregoing Watts's *Logic*, Thomson's *Outlines of the Laws of Thought*, Bain's *Deductive Logic*, Jevons's *Studies in Deductive*

Logic and Principles of Science, Bradley's Principles of Logic, Abbott's Elements of Logic, Walker's edition of Murray, Ray's Text-book of Deductive Logic, and Weatherley's Rudiments of Logic, I think the list will be exhausted of modern works from which I am conscious of having borrowed. But, not to forget the sun, while thanking the manufacturers of lamps and candles, I should add that I have studied the works of Aristotle according to the measure of my time and ability.

This work has had the great advantage of having been revised, while still in manuscript, by Mr. Alfred Robinson, Fellow of New College, to whom I cannot sufficiently express my obligation. I have availed myself to the full of the series of criticisms which he was kind enough to send me. As some additions have been made since then, he cannot be held in anyway responsible for the faults which less kindly critics may detect.

For the examples at the end I am mainly indebted to others, and to a large extent to my ingenious friend, the Rev. W. J. Priest of Merton College.

My thanks are due also to my friend and former pupil, Mr. Gilbert Grindle, Scholar of Corpus, who has been at the pains to compose an index, and to revise the proofs as they passed through the press.

And last, but not least, I must set on record my gratitude to Commander R. A. Stock, R.N., one of Her Majesty's Knights of Windsor, without whose brotherly aid this work might never have been written, and would certainly not have assumed exactly its present shape.

OXFORD,

October 22, 1888.

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INTRODUCTION.

§ 1. LOGIC is divided into two branches, namely –

(1) Inductive,

(2) Deductive.

§ 2. The problem of inductive logic is to determine the actual truth or falsity of propositions: the problem of deductive logic is to determine their relative truth or falsity, that is to say, given such and such propositions as true, what others will follow from them.

§ 3. Hence in the natural order of treatment inductive logic precedes deductive, since it is induction which supplies us with the general truths, from which we reason down in our deductive inferences.

§ 4. It is not, however, with logic as a whole that we are here concerned, but only with deductive logic, which may be defined as The Science of the Formal Laws of Thought.

§ 5. In order fully to understand this definition we must know exactly what is meant by 'thought,' by a 'law of thought,' by the term 'formal,' and by 'science.'

§ 6. Thought, as here used, is confined to the faculty of comparison. All thought involves comparison, that is to say, a recognition of likeness or unlikeness.

§ 7. The laws of thought are the conditions of correct thinking. The term 'law,' however, is so ambiguous that it will be well to determine more precisely in what sense it is here used.

§ 8. We talk of the 'laws of the land' and of the 'laws of nature,' and it is evident that we mean very different things by these expressions. By a law in the political sense is meant a command imposed by a superior upon an inferior and sanctioned by a penalty for disobedience. But by the 'laws of nature' are meant merely certain uniformities among natural phenomena; for instance, the 'law of gravi-

tation' means that every particle of matter does invariably attract every other particle of matter in the universe.

§ 9. The word 'law' is transferred by a metaphor from one of these senses to the other. The effect of such a command as that described above is to produce a certain amount of uniformity in the conduct of men, and so, where we observe uniformity in nature, we assume that it is the result of such a command, whereas the only thing really known to us is the fact of uniformity itself.

§ 10. Now in which of these two senses are we using the term 'laws of thought'? The laws of the land, it is plain, are often violated, whereas the laws of nature never can be so [Footnote: There is a sense in which people frequently speak of the laws of nature being violated, as when one says that intemperance or celibacy is a violation of the laws of nature, but here by 'nature' is meant an ideal perfection in the conditions of existence.]. Can the laws of thought be violated in like manner with the laws of the land? Or are they inviolable like the laws of nature?

§ 11. In appearance they can be, and manifestly often are violated—for how else could error be possible? But in reality they can not. No man ever accepts a contradiction when it presents itself to the mind as such: but when reasoning is at all complicated what does really involve a contradiction is not seen to do so; and this sort of error is further assisted by the infinite perplexities of language.

§ 12. The laws of thought then in their ultimate expression are certain uniformities which invariably hold among mental phenomena, and so far they resemble the laws of nature: but in their complex applications they may be violated owing to error, as the laws of the land may be violated by crime.

§ 13. We have now to determine the meaning of the expression 'formal laws of thought.'

§ 14. The distinction between form and matter is one which pervades all nature. We are familiar with it in the case of concrete things. A cup, for instance, with precisely the same form, may be composed of very different matter—gold, silver, pewter, horn or what not?

§ 15. Similarly in every act of thought we may distinguish two things—

- (1) the object thought about,
- (2) the way in which the mind thinks of it.

The first is called the Matter; the second the Form of Thought.

§ 16. Now Formal, which is another name for Deductive Logic, is concerned only with the way in which the mind thinks, and has nothing to do with the particular objects thought about.

§ 17. Since the form may be the same, whilst the matter is different, we may say that formal logic is concerned with the essential and necessary elements of thought as opposed to such as are accidental and contingent. By 'contingent' is meant what holds true in some cases, but not in others. For instance, in the particular case of equilateral triangles it is true to say, not only that 'all equilateral triangles are equiangular,' but also that 'all equiangular triangles are equilateral.' But the evidence for these two propositions is independent. The one is not a formal consequence of the other. If it were, we should be able to apply the same inference to all matter, and assert generally that if all A is B, all B is A, which it is notorious that we cannot do.

§ 18. It remains now for the full elucidation of our definition to determine what is meant by 'science.'

§ 19. The question has often been discussed whether logic is a science or an art. The answer to it must depend upon the meaning we assign to these terms.

§ 20. Broadly speaking, there is the same difference between Science and Art as there is between knowing and doing.

Science is systematized knowledge;

Art is systematized action.

Science is acquired by study;

Art is acquired by practice.

§ 21. Now logic is manifestly a branch of knowledge, and does not necessarily confer any practical skill. It is only the right use of its

rules in thinking which can make men think better. It is therefore, in the broad sense of the terms, wholly a science and not at all an art.

§ 22. But this word 'art,' like most others, is ambiguous, and is often used, not for skill displayed in practice, but for the knowledge necessary thereto. This meaning is better conveyed by the term 'practical science.'

§ 23. Science is either speculative or practical. In the first case we study merely that we may know; in the latter that we may do.

Anatomy is a speculative science;
Surgery is a practical science.

In the first case we study the human frame in order that we may understand its structure; in the second that we may assist its needs. Whether logic is a speculative or a practical science depends entirely upon the way in which it is treated. If we study the laws of thought merely that we may know what they are, we are making it a speculative science; if we study the same laws with a view to deducing rules for the guidance of thought, we are making it a practical science.

§ 24. Hence logic may be declared to be both the science and the art of thinking. It is the art of thinking in the same sense in which grammar is the art of speaking. Grammar is not in itself the right use of words, but a knowledge of it enables men to use words correctly. In the same way a knowledge of logic enables men to think correctly, or at least to avoid incorrect thoughts. As an art logic may be called the navigation of the sea of thought.

§ 25. The laws of thought are all reducible to the three following axioms, which are known as The Three Fundamental Laws of Thought.

(1) The Law of Identity—

Whatever is, is;

or, in a more precise form,

Every A is A.

(2) The Law of Contradiction—

Nothing can both be and not be;
Nothing can be A and not A.

(3) The Law of Excluded Middle –

Everything must either be or not be;
Everything is either A or not A.

§ 26. Each of these principles is independent and self-evident.

§ 27. If it were possible for the law of identity to be violated, no violation of the law of contradiction would necessarily ensue: for a thing might then be something else, without being itself at the same time, which latter is what the law of contradiction militates against. Neither would the law of excluded middle be infringed. For, on the supposition, a thing would be something else, whereas all that the law of excluded middle demands is that it should either be itself or not. A would in this case adopt the alternative of being not A.

§ 28. Again, the violation of the law of contradiction does not involve any violation of the law of identity: for a thing might in that case be still itself, so that the law of identity would be observed, even though, owing to the law of contradiction not holding, it were not itself at the same time. Neither would the law of excluded middle be infringed. For a thing would, on the supposition, be both itself and not itself, which is the very reverse of being neither.

§ 29. Lastly, the law of excluded middle might be violated without a violation of the law of contradiction: for we should then have a thing which was neither A nor not A, but not a thing which was both at the same time. Neither would the law of identity be infringed. For we should in this case have a thing which neither was nor was not, so that the conditions of the law of identity could not exist to be broken. That law postulates that whatever is, is: here we have a thing which never was to begin with.

§ 30. These principles are of so simple a character that the discussion of them is apt to be regarded as puerile. Especially is this the case with regard to the law of identity. This principle in fact is one of those things which are more honoured in the breach than in the observance. Suppose for a moment that this law did not hold – then

what would become of all our reasoning? Where would be the use of establishing conclusions about things, if they were liable to evade us by a Protean change of identity?

§ 31. The remaining two laws supplement each other in the following way. The law of contradiction enables us to affirm of two exhaustive and mutually exclusive alternatives, that it is impossible for both to be true; the law of excluded middle entitles us to add, that it is equally impossible for both to be false. Or, to put the same thing in a different form, the law of contradiction lays down that one of two such alternatives must be false; the law of excluded middle adds that one must be true.

§32. There are three processes of thought

(1) Conception.

(2) Judgement.

(3) Inference or Reasoning.

§ 33. Conception, which is otherwise known as Simple Apprehension, is the act of forming in the mind the idea of anything, e.g. when we form in the mind the idea of a cup, we are performing the process of conception.

§ 34. Judgement, in the sense in which it is here used [Footnote: Sometimes the term 'judgement' is extended to the comparison of nameless sense-impressions, which underlies the formation of concepts. But this amounts to identifying judgement with thought in general.] may be resolved into putting two ideas together in the mind, and pronouncing as to their agreement or disagreement, e.g. we have in our minds the idea of a cup and the idea of a thing made of porcelain, and we combine them in the judgement—"This cup is made of porcelain."

§ 35. Inference, or Reasoning, is the passage of the mind from one or more judgements to another, e.g. from the two judgements 'Whatever is made of porcelain is brittle,' and 'This cup is made of porcelain,' we elicit a third judgement, 'This cup is brittle.'

§ 36. Corresponding to these three processes there are three products of thought, viz.

(1) The Concept.

(2) The Judgement.

(3) The Inference.

§ 37. Since our language has a tendency to confuse the distinction between processes and products, [Footnote: E.g. We have to speak quite indiscriminately of Sensation, Imagination, Reflexion, Sight, Thought, Division, Definition, and so on, whether we mean in any case a process or a product.] it is the more necessary to keep them distinct in thought. Strictly we ought to speak of conceiving, judging and inferring on the one hand, and, on the other, of the concept, the judgement and the inference.

The direct object of logic is the study of the products rather than of the processes of thought. But, at the same time, in studying the products we are studying the processes in the only way in which it is possible to do so. For the human mind cannot be both actor and spectator at once; we must wait until a thought is formed in our minds before we can examine it. Thought must be already dead in order to be dissected: there is no vivisection of consciousness. Thus we can never know more of the processes of thought than what is revealed to us in their products.

§ 38. When the three products of thought are expressed in language, they are called respectively

(1) The Term.

(2) The Proposition.

(3) The Inference.

§ 39. Such is the ambiguity of language that we have already used the term 'inference' in three different senses—first, for the act or process of inferring; secondly, for the result of that act as it exists in the mind; and, thirdly, for the same thing as expressed in language. Later on we shall have to notice a further ambiguity in its use.

§ 40. It has been declared that thought in general is the faculty of comparison, and we have now seen that there are three products of thought. It follows that each of these products of thought must be the result of a comparison of some kind or other.

The concept is the result of comparing attributes.

The judgement is the result of comparing concepts.

The inference is the result of comparing judgements.

§ 41. In what follows we shall, for convenience, adopt the phraseology which regards the products of thought as clothed in language in preference to that which regards the same products as they exist in the mind of the individual. For although the object of logic is to examine thought pure and simple, it is obviously impossible to discuss it except as clothed in language. Accordingly the three statements above made may be expressed as follows—

The term is the result of comparing attributes.

The proposition is the result of comparing terms.

The inference is the result of comparing propositions.

§ 42. There is an advantage attending the change of language in the fact that the word 'concept' is not an adequate expression for the first of the three products of thought, whereas the word 'term' is. By a concept is meant a general notion, or the idea of a class, which corresponds only to a common term. Now not only are common terms the results of comparison, but singular terms, or the names of individuals, are so too.

§ 43. The earliest result of thought is the recognition of an individual object as such, that is to say as distinguished and marked off from the mass of its surroundings. No doubt the first impression produced upon the nascent intelligence of an infant is that of a confused whole. It requires much exercise of thought to distinguish this whole into its parts. The completeness of the recognition of an individual object is announced by attaching a name to it. Hence even an individual name, or singular term, implies thought or comparison. Before the *child* can attach a meaning to the word '*mother*,' which to it is a singular term, it must have distinguished between the set of impressions produced in it by one object from those which are produced in it by others. Thus, when Vergil says

Incipe, parve puer, risu cognoscere matrem,

he is exhorting the beatific infant to the exercise of the faculty of comparison.