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Augustus De Morgan

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FORMAL LOGIC:

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Necessary and Probable.

BY

AUGUSTUS DE MORGAN

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Fellow of the Cambridge Philosophical Society, Secretary of the Royal
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P R E F A C E.

THE system given in this work extends beyond that commonly received, in several directions. A brief statement of what is now submitted for adoption into the theory of inference will be the matter of this preface.

In the form of the proposition, the copula is made as abstract as the terms: or is considered as obeying only those conditions which are necessary to inference.

Every name is treated in connection with its *contrary* or *contradictory* name; the distinction between these words not being made, and others supplied in consequence. Eight really separable forms of predication are thus obtained, between any two names: the eight of the common system amounting only to six, when, as throughout my work, the two forms of a convertible proposition are considered as identical.

The complex proposition is introduced, consisting in the coexistence of two simple ones. The theory of the syllogism of complex propositions is made to precede that of the simple or ordinary syllogism; which last is deduced from it. I have only used the word *complex*, because *simple* was already appropriated (see page 85).

By the introduction of contraries, the number of valid fyllogistic forms is increased to thirty-two, connected together by many rules of relation, but all shewn to contain, each with reference to its own disposition of names and contraries, only one form of inference.

The distinction of figure is avoided from the beginning by introducing into every proposition an order of reference to its terms.

A simple notation, which includes the common one, gives the means of representing every fyllogism by three letters, each accented above or below. By inspection of one of these symbols it is seen immediately, 1. What fyllogism is represented, 2. Whether it be valid or invalid, 3. How it is at once to be written down, 4. What axiom the inference contains, or what is the act of the mind when it makes that inference (chapter XIV).

A subordinate notation is used (page 60) in abbreviation of the proposition at length.

Compound names are considered, both when the composition is conjunctive, and when it is disjunctive. Distinct notation and rules of transformation are given, and the compound fyllogisms are treated as reducible to ordinary ones, by invention of compound names.

The theory of the numerical fyllogism is investigated, in which, upon the hypothesis of numerical quantity in both terms of every proposition, a numerical inference is made.

But, when the numerical relations of the several terms are fully known, all that is unusual in the quantity of the predicate is shown to be either superfluous, or else, as I have called it, spurious.

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The old doctrine of modals is made to give place to the numerical theory of probability. Many will object to this theory as extralogical. But I cannot see on what definition, founded on real distinction, the exclusion of it can be maintained. When I am told that logic considers the validity of the inference, independently of the truth or falsehood of the matter, or supplies the conditions under which the hypothetical truth of the matter of the premises gives hypothetical truth to the matter of the conclusion, I see a real definition, which propounds for consideration the forms and laws of inferential thought. But when it is further added that the only hypothetical truth shall be absolute truth, certain knowledge, I begin to see arbitrary distinction, wanting the reality of that which preceded. Without pretending that logic can take cognizance of the probability of any given matter, I cannot understand why the study of the effect which partial belief of the premises produces with respect to the conclusion, should be separated from that of the consequences of supposing the former to be absolutely true. Not however to dispute upon names, I mean that I should maintain, against those who would exclude the theory of probability from logic, that, call it by what name they like, it should accompany logic as a study.

I have, of course, been obliged to express, in my own manner, my own convictions on points of mental philosophy. But any one will see that, in all which I have proposed for adoption, it matters nothing whether my views of the phenomena of thought, or others, be made the basis of the explanation. So far therefore, as I am

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considered as proposing forms of fyllogism, &c. to the logician, and not giving instruction to the student of the science, the reader has nothing to do with my choice of the terms in which mental operations are spoken of.

In the appendix will be found some remarks on the personal controversy between Sir W. Hamilton of Edinburgh and myself, of which I suppose the celebrity of my opponent, and the appearance of part of it in a journal so widely circulated as the *Athenæum*, has caused many students of logic to hear or read something.

At the end of the contents of some chapters in the following table, are a few additions and corrections, to which I request the reader's attention.

A. DE MORGAN.

University College, London,

October 14, 1847.

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Additions and corrections. Page 56, line 7, insert except only one which consists of four simple propositions. Page 62, line 23; Say X and Y are not complements (instead of contraries) that is, do not together either fill, or more than fill, the universe. Page 72, lines 4 and 3, from the bottom; The oppositions are incorrect. It ought to be cannot do without and cannot fail with: must precede, and must follow. The reader may easily identify the eight forms of predication as having X for subject, Y for predicate, with the copulæ, cannot be without, can be without, cannot be with, can be with, cannot fail without, can fail without, cannot fail with, can fail with.

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Additions and corrections.—Page 79, in the first diagram, for D_1D_1D , read $D_1D_1D_1$; page 88, line 23, instead of has the other two for its opponents, read has its opponents in the set; page 90, line 4, from the bottom, for premises read premise: the first spelling has been common enough, but it seems strange that the cognate words promise, surmise, demise, &c. should not have dictated the second. Page 96;

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The inverted forms of the strengthened syllogisms are omitted: of these, four are their own inversions, namely, $A_1A_1I_1$, $A_1A_1I_1$, $E_1E_1I_1$, and $E_1E_1I_1$: of the remainder, $A_1E_1O_1$ and $E_1A_1O_1$ are inversions; and also $A_1E_1O_1$ and $E_1A_1O_1$. Page 100, line 12, from the bottom; for $—\circ 11$ read $—\circ 11$), the first time it occurs. Page 101: Read the symbols of the strengthened syllogisms so as to begin from the middle in both premises: thus, Xyz is $y(X \dashv y)z \equiv Xz$. Page 101. I might have said a word or two on the case in which a complex particular is combined with a universal; to form the results will be an easy exercise for the reader. Page 102, line 7, from the bottom, for $I_1A_1I_1$ read $I_1A_1I_1$.

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Additions and corrections. Page 121, line 8, from the bottom. For $[x,y][p,q]u$ read $[X,Y][p,q]u$.

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Additions and corrections. Page 143, line 12: Supply the propositions X)M,P and Y)N,Q, as deducible from the numbers of instances in the several names. Page 148, line 10, from the bottom: for propositions read prepositions. Page 152, line 4: for m read m. Page 153, line 22: for will presently show us, read have shown us in page 145. Page 154, line 2, from the bottom, for ys read zs. Page 155, line 6 from the bottom, for mXY read mXY. Page 162, line 2, after the table: for last chapter read chapter V. Page 166, line 17, for m'xy read m'xy. Page 167, line 24: for 6z read 9z.

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Additions and corrections. Page 199, line 4, from the bottom: for $(1-\lambda)$ read $(1-\lambda)^m$. Page 201, line 14, from the bottom: for γ read γ^2 .

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Additions and corrections. Page 230, lines 16 and 15, from the bottom; *transpose the words former and latter.* Page 234 line 2 from bottom, for after read before. Page 237, note; I find that etymologists are decidedly of opinion that *ῥῆσις*, speech, and *ῥέω*, flow, have different roots, and that the former is *speech* in its primitive meaning. The reader must make the alteration, which however does not affect my suggestion.

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Additions and corrections. Page 250, lines 3 and 5; for *millenium* read *millennium*, and for *Newtonion* read *Newtonian*.

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