CHAPTER VI.

Of Compound Forms of Immediate Inference.

Section 503. Having now treated of the three simple forms of immediate inference, we go on to speak of the compound forms, and first of

Conversion by Negation.

Section 504. When A and O have been permuted, they become respectively E and I, and, in this form, admit of simple conversion. We have here two steps of inference: but the process may be performed at a single stroke, and is then known as Conversion by Negation. Thus from 'All A is B' we may infer 'No not-B is A,' and again from 'Some A is not B' we may infer 'Some not-B is A.' The nature of these inferences will be seen better in concrete examples.

Section 505.

  (A) All poets are imaginative.
      .'. No unimaginative persons are poets (E).

  (O) Some parsons are not clerical.
      .'. Some unclerical persons are parsons (I).

Section 506. The above inferences, when analysed, will be found to resolve themselves into two steps, namely,

  (1) Permutation.

  (2) Simple Conversion.

  (A) All A is B.
      .'. No A is not-B (by permutation).
      .'. No not-B is A (by simple conversion).

  (O) Some A is not B.
      .'. Some A is not-B (by permutation).
      .'. Some not-B is A (by simple conversion).

Section 507. The term conversion by negation has been arbitrarily limited to the exact inferential procedure of permutation followed by simple

conversion. Hence it necessarily applies only to A and 0 propositions, since these when permuted become E and 1, which admit of simple conversion; whereas E and 1 themselves are permuted into A and 0, which do not. There seems to be no good reason, however, why the term 'conversion by negation' should be thus restricted in its meaning; instead of being extended to the combination of permutation with conversion, no matter in what order the two processes may be performed. If this is not done, inferences quite as legitimate as those which pass under the title of conversion by negation are left without a name.

Section 508. From E and 1 inferences may be elicited as follows--

(E) No A is B.
  .'. All B is not-A (A).

(I) Some A is B.
  .'. Some B is not not-A (O).

(E) No good actions are unbecoming.
  .'. All unbecoming actions are not-good (A).

(I) Some poetical persons are logicians.
  .'. Some logicians are not unpoetical (O).

Or, taking a privative term for our subject,

Some unpractical persons are statesmen.
.'. Some statesmen are not practical.

Section 509. When the inferences just given are analysed, it will be found that the process of simple conversion precedes that of permutation.

Section 510. In the case of the E proposition a compound inference can be drawn even in the original order of the processes,

No A is B.
.'. Some not-B is A.

No one who employs bribery is honest.
.'. Some dishonest men employ bribery.

The inference here, it must be remembered, does not refer to matter of fact, but means that one of the possible forms of dishonesty among men is that of employing bribery.

Section 511. If we analyse the preceding, we find that the second step is conversion by limitation.

  No A is B.
  .'. All A is not-B (by permutation).
  .'. Some not-B is A (by conversion per accidens).

Section 512. From A again an inference can be drawn in the reverse order of conversion per accidens followed by permutation--

  All A is B.
  .'. Some B is not not-A.

  All ingenuous persons are agreeable.
  .'. Some agreeable persons are not disingenuous.

Section 513. The intermediate link between the above two propositions is the converse per accidens of the first--'Some B is A.' This inference, however, coincides with that from 1 (Section 508), as the similar inference from E (Section 510) coincides with that from 0 (Section 506).

Section 514. All these inferences agree in the essential feature of combining permutation with conversion, and should therefore be classed under a common name.

Section 515. Adopting then this slight extension of the term, we define conversion by negation as--A form of conversion in which the converse differs in quality from the convertend, and has the contradictory of one of the original terms.

Section 516. A still more complex form of immediate inference is known as

Conversion by Contraposition.

This mode of inference assumes the following form--

  All A is B.
  .'. All not-B is not-A.

  All human beings are fallible.
  .'. All infallible beings are not-human.

Section 517. This will be found to resolve itself on analysis into three

steps of inference in the following order--

  (1) Permutation.

  (2) Simple Conversion.

  (3) Permutation.

Section 518. Let us verify this statement by performing the three steps.

  All A is B.
  .'. No A is not-B (by permutation).
  .'. No not-B is A (by simple conversion).
  .'. All not-B is not-A (by permutation).

  All Englishmen are Aryans.
  .'. No Englishmen are non-Aryans.
  .'. No non-Aryans are Englishmen.
  .'. All non-Aryans are non-Englishmen.

Section 519. Conversion by contraposition may be complicated in appearance
by the occurrence of a negative term in the subject or predicate or
both, e.g.

  All not-A is B.
  .'. All not-B is A.

Again,

  All A is not-B.
  .'. All B is not-A.

Lastly,

  All not-A is not-B.
  .'. All B is A.

Section 520. The following practical rule will be found of use for the right
performing of the process--

  Transpose the subject and predicate, and substitute for each its
  contradictory term.

Section 521. As concrete illustrations of the above forms of inference we
may take the following--

All the men on this board that are not white are red.
.'. All the men On this board that are not red are white.

Again,

All compulsory labour is inefficient.
.'. All efficient labour is free (=non-compulsory).

Lastly,

All inexpedient acts are unjust.
.'. All just acts are expedient.

Section 522. Conversion by contraposition may be said to
rest on the following principle--

If one class be wholly contained in another, whatever is external to
the containing class is external also to the class contained.

[Illustration]

Section 523. The same principle may be expressed intensively as follows:--

If an attribute belongs to the whole of a subject, whatever fails to
exhibit that attribute does not come under the subject.

Section 524. This statement contemplates conversion by contraposition only
in reference to the A proposition, to which the process has hitherto
been confined. Logicians seem to have overlooked the fact that
conversion by contraposition is as applicable to the O as to the A
proposition, though, when expressed in symbols, it presents a more
clumsy appearance.

Some A is not B.
.'. Some not-B is not not-A.

Some wholesome things are not pleasant.
.'. Some unpleasant things are not unwholesome.

Section 525. The above admits of analysis in exactly the same way as the
same process when applied to the A proposition.

Some A is not B.
.'. Some A is not-B (by permutation).
.'. Some not-B is A (by simple conversion).
.'. Some not-B is not not-A (by permutation).

The result, as in the case of the A proposition, is the converse by negation of the original proposition permuted.

Section 526. Contraposition may also be applied to the E proposition by the use of conversion per accidens in the place of simple conversion. But, owing to the limitation of quantity thus effected, the result arrived at is the same as in the case of the O proposition. Thus from 'No wholesome things are pleasant' we could draw the same inference as before. Here is the process in symbols, when expanded.

  No A is B.
  .'. All A is not-B (by permutation).
  .'. Some not-B is A (by conversion per accidens).
  .'. Some not-B is not not-A (by permutation).

Section 527. In its unanalysed form conversion by contraposition may be defined generally as--A form of conversion in which both subject and predicate are replaced by their contradictories.

Section 528. Conversion by contraposition differs in several respects from conversion by negation.

  (1) In conversion by negation the converse differs in quality from the convertend: whereas in conversion by contraposition the quality of the two is the same.

  (2) In conversion by negation we employ the contradictory either of the subject or predicate, but in conversion by contraposition we employ the contradictory of both.

  (3) Conversion by negation involves only two steps of immediate inference: conversion by contraposition three.

Section 529. Conversion by contraposition cannot be applied to the ordinary E proposition except by limitation (Section 526).

From 'No A is B' we cannot infer 'No not-B is not-A.' For, if we could, the contradictory of the latter, namely, 'Some not-B is not-A' would be false. But it is manifest that this is not necessarily false. For when one term is excluded from another, there must be numerous individuals which fall under neither of them, unless it should so happen that one of the terms is the direct contradictory of the other, which is clearly not conveyed by the form of the expression 'No A is B. 'No A is not-A' stands alone among E propositions in

admitting of full conversion by contraposition, and the form of that
is the same after it as before.

Section 530. Nor can conversion by contraposition be applied at all to I.

[Illustration]

From 'Some A is B' we cannot infer that 'Some not-B is not-A.' For
though the proposition holds true as a matter of fact, when A and B
are in part mutually exclusive, yet this is not conveyed by the form
of the expression. It may so happen that B is wholly contained under
A, while A itself contains everything. In this case it will be true
that 'No not-B is not-A,' which contradicts the attempted
inference. Thus from the proposition 'Some things are substances' it
cannot be inferred that 'Some not-substances are not-things,' for in
this case the contradictory is true that 'No not-substances are
not-things'; and unless an inference is valid in every case, it is not
formally valid at all.

Section 531. It should be noticed that in the case of the [nu] proposition
immediate inferences are possible by mere contraposition without
conversion.

  All A is all B.
  .'. All not-A is not-B.

For example, if all the equilateral triangles are all the equiangular,
we know at once that all non-equilateral triangles are also
non-equiangular.

Section 532. The principle upon which this last kind of inference rests is
that when two terms are co-extensive, whatever is excluded from the
one is excluded also from the other.