

Two types of immediate inference: Conversion and Obversion.

Conversion (আবর্তন) : One standard-form categorical proposition is said to be the *converse* of another when we derive it by simply interchanging the subject and predicate terms of that other proposition. The proposition from which it is derived is called the *convertend*.

Thus, “No idealists are politicians” is the converse of “No politicians are idealists,” which is its convertend.

E propositions: Conversion is perfectly valid for all **E** propositions and for all **I** propositions.

O propositions: The conversion of an **O** proposition is not valid. The **O** proposition, “Some animals are not dogs,” is plainly true; its converse is the proposition, “Some dogs are not animals,” which is plainly false. An **O** proposition and its converse are not logically equivalent.

A proposition: From “All dogs are animals” we certainly may not infer that “All animals are dogs.”

Conversion by limitation: From “All dogs are animals,” we infer that “Some animals are dogs.”

It proceeds by interchanging subject and predicate terms and changing the quantity of the proposition from universal to particular.

In all conversions, the converse of a given proposition contains exactly the same subject and predicate terms as the convertend, their order being reversed, and always has the same quality (of affirmation or denial).

আবর্তনের চারটি নিয়ম: 4 rules of Conversion

১) হেতুবাক্যের উদ্দেশ্য সিদ্ধান্তের বিধেয় হবে।

1) The subject in the premise is the predicate of the conclusion.

২) হেতুবাক্যের বিধেয় সিদ্ধান্তের উদ্দেশ্য হবে।

The predicate of the premise is the subject of the conclusion.

৩) হেতুবাক্য ও সিদ্ধান্তের গুণ একই থাকবে।

The quality of both the premise and the conclusion is the same.

৪) হেতুবাক্যে যে পদ অবাধ্য, সিদ্ধান্তে সেই পদটি বাধ্য হতে পারে না।

A term which is undistributed in the premise cannot be distributed in the conclusion.

Valid Conversions

Convertend	Converse
A: All <i>S</i> is <i>P</i> .	I: Some <i>P</i> is <i>S</i> . (by limitation)
E: No <i>S</i> is <i>P</i> .	E: No <i>P</i> is <i>S</i> .
I: Some <i>S</i> is <i>P</i> .	I: Some <i>P</i> is <i>S</i> .
O: Some <i>S</i> is not <i>P</i> .	(conversion not valid)

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Complement: Every class has, associated with it, a **complementary class**, or **complement**, which is the collection of all things that do not belong to the original class. The complement of the class of all people is the class of all things that are *not* people.

The class-defining characteristic of that complementary class is the (negative) attribute of not being a person. The complement of the class of all people contains no people, but it contains everything else: shoes and ships and sealing wax and cabbages—but no kings, because kings are people.

The complement of the class designated by the term *S* is then designated by the term *non-S*; we may speak of the term *non-S* as being the complement of the term *S*.

A class is the (class) complement of its own complement. Likewise, a term is the (term) complement of its own complement.

Obversion (বিবর্তন)

A valid form of immediate inference for every standard-form categorical proposition.

To obvert a proposition, we change its quality (from affirmative to negative, or from negative to affirmative) and replace the predicate term with its complement.

(Obvertend) "All dogs are mammals" → "No dogs are nonmammals" (Obverse)

The proposition serving as premise for the obversion is called the *obvertend*; the conclusion of the inference is called the *obverse*.

- The **E** proposition, "No umpires are partisans," has as its obverse the logically equivalent **A** proposition, "All umpires are nonpartisans."

- The **I** proposition, "Some metals are conductors," has as its obverse the **O** proposition, "Some metals are not nonconductors."

- The **O** proposition, "Some nations were not belligerents," has as its obverse the **I** proposition, "Some nations were nonbelligerents."

To obtain the obverse of any proposition, we leave the quantity (universal or particular) and the subject term unchanged; we change the quality of the proposition and replace the predicate term with its complement.

Four rules of Obversion বিবর্তনের চারটি নিয়ম:

১) হেতুবাক্যের উদ্দেশ্য সিদ্ধান্তের উদ্দেশ্য হয়

Subject of premise is the subject of the conclusion.

২) হেতুবাক্যের বিধেয়ের বিরুদ্ধ পদ সিদ্ধান্তের বিধেয় হয়

The complement of the predicate term of the premise is the predicate of the conclusion

৩) হেতুবাক্য ও সিদ্ধান্তের গুণ ভিন্ন হয়

The quality of the premise and the conclusion are different.

৪) হেতুবাক্য ও সিদ্ধান্তের পরিমাণ একই থাকে

The quantity of the premise and the conclusion is the same.

Valid Obversions

Obvertend	Obverse
A: All S is P .	E: No S is non- P .
E: No S is P .	A: All S is non- P .
I: Some S is P .	O: Some S is not non- P .
O: Some S is not P .	I: Some S is non- P .

Contraposition (সমবিবর্তন)

A valid form of immediate inference for some, but not for all types of propositions.

To form the contrapositive of a given proposition:

- 1) its subject term is replaced by the complement of its predicate term, and
- 2) its predicate term is replaced by the complement of its subject term.

Neither the quality nor the quantity of the original proposition is changed.

Example:

“All humans are mammals” \rightarrow “All nonmammals are nonhumans.”

Contraposition, wherever valid, can be obtained by first **obverting** the proposition, next applying **conversion**, and then applying **obversion** again.

A proposition: “All S is P ”:

First obvert it to obtain “No S is non- P ,” which converts validly to “No non- P is S ,” whose obverse is “All non- P is non- S .”

The contrapositive of any **A** proposition is the obverse of the converse of the obverse of that proposition.

O proposition: “Some S is not P ” obverts to “Some S is non- P ,” which converts to “Some non- P is S ,” which obverts to “Some non- P is not non- S .”

I proposition: For **I**, contraposition is not a valid form of inference.

The true **I** proposition, “Some citizens are nonlegislators,” has as its contrapositive the false proposition, “Some legislators are noncitizens.”

The obverse of the original **I** proposition, “Some S is P ,” is the **O** proposition, “Some S is not non- P ,” but (as we saw earlier) the converse of an **O** proposition does not follow validly from it.

E proposition: The contrapositive does not follow validly.

The true proposition, “No wrestlers are weaklings,” has as its contrapositive, the obviously false proposition, “No nonweaklings are nonwrestlers.”

If we begin with the **E** proposition, “No S is P ,” and obvert it, we obtain the **A** proposition, “All S is non- P ”—which in general cannot be validly converted *except by limitation*. If we do then convert it by limitation to obtain “Some non- P is S ,” we can

obvert this to obtain “Some non- P is not non- S .” This is *contrapositive by limitation*: **E**
 \rightarrow **O**

Contraposition is thus seen to be valid only when applied to **A** and **O** propositions.

It is not valid at all for **I** propositions, and it is valid for **E** propositions only by limitation.

Contraposition

Premise	Contrapositive
A: All S is P .	A: All non- P is non- S .
E: No S is P .	O: Some non- P is not non- S . (by limitation).
I: Some S is P .	(contraposition not valid)
O: Some S is not P .	O: Some non- P is not non- S .

If the proposition, “All surgeons are physicians,” is true, what can we know about the truth or falsehood of the proposition, “No nonsurgeons are nonphysicians”?

Answer: From “All surgeons are physicians,” \rightarrow contraposition \rightarrow “All nonphysicians are nonsurgeons.” \rightarrow conversion by limitation \rightarrow “Some nonsurgeons are nonphysicians.”

But this is the contradictory of the proposition in question (“No nonsurgeons are nonphysicians”), which is thus known to be false.

State the contrapositives of the following propositions and indicate which of them are equivalent to the given propositions.

1. All journalists are pessimists.
2. Some soldiers are not officers.
3. All scholars are nondegenerates.
4. All things weighing less than fifty pounds are objects not more than four feet high.

5. Some noncitizens are not nonresidents.