Logic Reading 2.04 Indirect Reduction of Syllogisms

"I believe in order to understand."
-St. Augustine

_____ **Introduction.** In the last reading, we were able to take most of the moods from the Second, Third and Fourth Figures and reduce them to First Figure syllogisms. But there are two moods with which we cannot use Direct Reduction: these two moods are BAROCO and BOCARDO. With these moods, another method must be used: Indirect Reduction.

Remember that the reason we are reducing syllogisms to the First Figure in the first place is to see more easily that they are valid, since validity is more obvious in the First Figure. Since with BAROCO and BOCARDO we cannot do this, we must find another way to demonstrate their validity This is the purpose of Indirect Reduction.

Let us first review the four operations we use in reduction:

> S: *Simple Conversion* of the proposition signified by the preceding vowel;
> P: *Per accidens*, or *Partial*, Conversion of the proposition signified by the preceding vowel;
> M: *Mutatio*, or *Transposition of the Premises*; make the minor premise the major, and the major the minor
> C: *Reduction by Contradiction*. This is the indirect method of reduction through (rather than to) BARBARA. It is signified by a noninitial c, and is applied only to BAROCO and BOCARDO.

In Direct Reduction, we made use of the first three of these: S, P and M. Indirect Reduction, on the other hand, requires the use of C. In Direct Reduction, we transformed a Second, Third or Fourth Figure syllogism into a First Figure syllogism by changing the position of the middle term. But with syllogisms BAROCO and BOCARDO, this cannot be done.

Reduction by Contradiction is called indirect because it does not actually reduce the syllogism to a First Figure syllogism. What it does is prove that the syllogism is valid by *using* a First Figure syllogism. How is this done?

_____ **Indirect Reduction**. The ancient philosophers came up

with a way to do this that was very clever Let us first state the principle upon which this is based. It is as follows:

> ***In a valid syllogism, if the conclusion is false, then at least one of the premises must be false.***

In order to show a syllogism to be valid, we make the conclusion false. If it forces us into denying one of the premises, we know then that it must be valid. In this way, we show that the syllogism is valid by showing that it cannot be invalid. We prove its validity by showing that its invalidity is impossible.

_____ Indirect Reduction of BAROCO. Let's try to do this on a syllogism in BAROCO to see how it works:

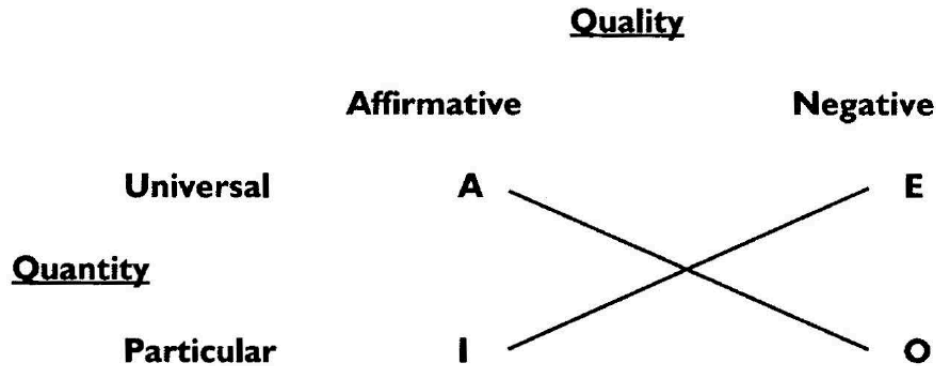|	
All rational creatures are created in the image of God	BAR
Some animals are not created in the image of God	OC
Therefore, some animals are not rational creatures	O

If this syllogism is valid, then when we deny the conclusion we should end up with a denial of one of the premises. If we say that all animals are rational creatures (thereby contradicting the conclusion), we should be able to derive the contradiction of at least one of the premises: either ***Some rational creatures are NOT created in the image of God*** (the contradiction of the major premise) or ***all animals are created in the image of God*** (the contradiction of the minor premise).

Under operation C in BAROCO above, we are told to use contradiction on the statement indicated by the vowel that precedes the ***C***. In BAROCO, that means the ***minor*** premise, which is an O statement. But, we don't replace the O statement with its own contradictory, we replace it with the contradictory of the conclusion. We do this by taking the contradiction of the conclusion and putting it in the place of our original minor premise. By doing this, we should get (if the argument is indeed valid), a contradiction of the original minor premise in the conclusion.

Let us see if this happens.

Now in order to do this we must remember another principle we learned in a previous reading Remember the Rule of Contradiction? It said that ***contradictory statements are statements that differ both***

in quality and quantity (Remember that is different from contraries, in which both statements are universals, but differ only in quality). To help us remember, we will resurrect the chart of the relationships between the statements:

Quality

As you can see from the chart, the A statement contradicts the 0 statement and the I statement contradicts the E statement. Using this principle in our Indirect Reduction of BAROCO, we must replace the 0 statement that is the minor premise with an A statement that is the contradictory of our original conclusion.

The O statement that was the minor premise in our example syllogism is as follows:

Some animals are not created in the image of God.

When we replace it with the contradiction of the conclusion, we get:

All animals are rational creatures.

This gives us the following syllogism:

All rational creatures are created in the image of God	BAR
All animals are rational creatures	BAR
Therefore, all animals are created in the image of God	A

Notice that the conclusion has changed. It went from *Some animals are rational creatures* to *All animals are created in the image of God*, because that is the only conclusion you can come to from the two premises. Notice also that it is now a BARBARA, a First Figure syllogism. But more importantly, remember, we said that, if the argument is valid, we should end up with a conclusion that contradicts the minor premise. Did this happen? Our new conclusion is:

All animals are created in the image of God

Does this contradict our original minor premise (***Some animals are not created in the image of God***)? It does, since one is an A statement and the other an O. Therefore, the original BAROCO argument is valid.

The method for indirectly reducing BAROCO, then, is basically a three-step method:

> **Step #I**: Retain the original major premise
> **Step #2**: Use the contradiction of the original conclusion as the new minor premise
> **Step #3**: Derive the new conclusion, which, if the original syllogism is valid, should be the contradiction of the original minor premise.

_____ Indirect Reduction of BOCARDO. We do essentially the same thing with BOCARDO, a Third Figure, or sub-sub syllogism, except that we replace the major premise, rather than the minor, with the contradiction of the conclusion. Let's use the following as an example:

Some animals are not rational	BOC
All animals are created by God	AA
Therefore, some things that are created by God are not rational	DO

We look at the name of this syllogism, BOCARDO, and it should tell us what to do. We see that the C in BO<u>C</u>ARDO indicates that we replace the major premise with the contradiction of the conclusion. If it is valid, we should get, as our new conclusion, the contradiction of the original major premise:

All things that are created by God are rational	BAR
All animals are created by God	BAR
Therefore, all animals are rational	RA

Does ***All animals are rational*** (the new conclusion) contradict ***Some animals are not rational*** (the original major premise)? Yes, it does. Therefore this argument is valid.

The method for indirectly reducing BOCARDO, then, also involves a three-step method:

Step #I: Retain the original minor premise
Step #2: Use the contradiction of the original conclusion as the new major premise
Step #3: Derive the new conclusion, which, if the original syllogism is valid, should be the contradiction of the original major premise

We used the same reasoning as with BAROCO, but did it through the major, instead of the minor, premise. Notice once again that we ended up with a First Figure argument. Unlike in Direct Reduction, it is not the First Figure equivalent of our original argument, we just used it, indirectly, to show that our original argument was valid.

_____ Summary. The reason we reduce syllogisms to the First Figure is to make their validity more apparent, since validity is more obvious in the First Figure. There are two moods on which Direct Reduction doesn't work: BAROCO and BOCARDO. We must therefore use Indirect Reduction. Indirect Reduction is accomplished by replacing the 0 premises in BAROCO and BOCARDO with the contradiction of the conclusion. We replace the original conclusion with the statement that logically follows from the two new premises and, if that conclusion contradicts one of the original premises (the minor in BAROCO and the major in BOCARDO), then the original syllogism is valid.