5.4-5.5 Constructing Arguments, part 2

1. More Than Three Terms: Very often, you will come across arguments that do not have ONLY THREE terms (a **major term**, **minor term**, and a **middle term**). There is an easy fix for this IF the extra terms are just negations of the three terms we need (for example, if the middle term was "dog", its negation would be "non-dog"). Here is an example of an argument with too many terms, BUT the extra terms are all just negations of other terms in the argument:

1. All **dogs** are **non-winged creatures**.
2. Some **insects** are **winged creatures**.
3. Therefore, some **non-dogs** are not **non-insects**.

Notice that there are actually SIX terms in this argument—not THREE—but that the extra three terms are all just negations of the other three. Namely, the argument above includes the following three pairs of terms:

(a) **insects** and **non-insects**
(b) **dogs** and **non-dogs**
(c) **winged creatures** and **non-winged creatures**

Standard form categorical syllogisms must have ONLY THREE terms, so we'll need to get rid of the extra terms. Luckily, using **conversion**, **obversion**, and **contraposition**, we can translate these propositions so that there are only three terms total. Let's do that with the argument above. First, let's convert the argument into its FORM using letters:

1. All **D** are **non-W**.
2. Some **I** are **W**.
3. Some **non-D** are not **non-I**.

It would be great if we could get rid of all the "non" bits. To do that, we'd have to change the middle term of premise 1 and BOTH terms of the conclusion. Is there any way to do this? Yes! We can **obvert premise 1** and **contrapose the conclusion**:

1. No **D** are **W**.   (obverted)
2. Some **I** are **W**.
3. Some **I** are not **D**.   (contraposed)

This is now a categorical syllogism in standard form. Premise 1 is an "E" proposition, premise 2 is an "I" proposition, and the conclusion is an "O" proposition. Also, the middle term is on the right side in both premises, so this is an "EIO-2" syllogism. Consulting our charts for mood and figure, we see that the argument is valid. Yay!

<u>Example #2:</u> Let's do one more. This time, I will give you the argument in paragraph form. *Note: This is problem #1 from exercise 5.4 on pg. 291 of your textbook*:

Some intelligible statements are true statements, because all unintelligible statements are meaningless statements and some false statements are meaningful statements.

First, what is the conclusion? The conclusion is at the very beginning. We know this because everything else after that is provided as EVIDENCE (note the keyword "because"). So the conclusion is:

<u>Conclusion:</u> Some **intelligible statements** are **true statements**.

I've noted the subject/minor term of the conclusion in **red**, and the predicate/major term of the conclusion in **blue**. Now, in any argument in standard form, the first premise is always the one that contains the **major term** (along with the middle term), and the second premise is always the one that contains the **minor term** (along with the middle term).

Let's look for premise 1 first. To do that, we look for some statement with the major term (i.e., "**true statements**") in it. I do not see "true statements" but I DO see "FALSE statements." But, false statements are just "NON-true statements." We found premise 1! It's the statement which says, "Some false statements are meaningful statements." But, we can re-write that statement as follows:

Premise 1: Some **non-true statements** are **meaningful statements**.

Meanwhile, the second premise should have something like the minor term (i.e., "**intelligible statements**" in it. I do not see "intelligible statements" in the premises, but I DO see "UNintelligible statements"—which means the same thing as "NON-intelligible statements." So, here is premise 2:

Premise 2: All **non-intelligible statements** are **meaningless statements**.

But, now the middle term of the second premise does not match the middle term of the first premise (Premise 1 says "**meaningful**" and premise 2 says "**meaningless**"). So, we need to change "meaningless statements" to say "NON-meaningful" statements. Here is the entire argument so far:

1. Some **non-true statements** are **meaningful statements**.
2. All **non-intelligible statements** are **non-meaningful statements**.
3. Some **intelligible statements** are **true statements**.

For simplicity, let's replace the terms with letters, like this:

1. Some **non-T** are **M**.
2. All **non-I** are **non-M**.
3. Some **I** are **T**.

What a mess! This argument has SIX terms in it, since ALL THREE terms appear in both negated and normal form. We need to get rid of all the "non" bits so that there are only three terms altogether. How do we do this? Well, first let's **contrapose premise 2**. This seems like a good idea, since whenever you contrapose something of the form "All A are B", BOTH terms get negated, to give this result: "All non-B are non-A." So, the contraposition of premise 2 is this:

2. All **M** are **I**. (premise 2 contraposed)

That's great! We've already gotten rid of two "nons". There's only one left, in premise 1. The argument so far looks like this:

1. Some **non-T** are **M**.
2. All **M** are **I**.
3. Some **I** are **T**.

How do we get rid of the "**non**" in front of the "**T**"?

Note: There are great cheat-sheets on pages 224-225 of your textbook, and also on page 290, and also in the removable cheat-sheet pamphlet in the back of your book.

Looking at our cheat sheet, we see that whenever we have a proposition of the form "Some S are P" the only way to negate one of the terms is by **obversion**—but obversion only negates the SECOND term. We want to negate the FIRST! Is there any way to swap the two terms? Sure enough, there is! If we **convert** the proposition, it swaps the order of the terms, like this:

1. Some **M** are **non-T**. (premise 1 converted)

NOW we can use **obversion** to negate the second term, to get this:

1. Some **M** are not **T**. (premise 1 converted, and then obverted)

Here is the final result. This is the argument we get:

1. Some **M** are not **T**.
2. All **M** are **I**.
3. Some **I** are **T**.

This is an OAI-3 syllogism. Looking at the cheat sheet on page 262 (or in the pamphlet from the back of the book), we see that mood OAI and figure 3 is NOT a valid syllogism form. This argument is INVALID! (So, if Exercise 5.4, #1, were assigned for the homework, the answer would be "**invalid**")

Note: Do homework for section 5.4 at this time.

<u>2. Improper Language:</u> Very often, you will come across arguments made up of statements that are not in the right form. When this happens, it will be useful to convert the statements into the correct form—just as we did in lesson 10, section 4.7. Let's do a couple of examples.

Note: The following example is from your textbook, exercise 5.5, #1:

<u>Example #1:</u> Consider this argument: "Physicists are the only scientists who theorize about the nature of time, and Stephen Hawking certainly does that. Therefore, Stephen Hawking must be a physicist."

First, let's put this in numbered argument form:

1. Physicists are the only scientists who theorize about the nature of time.
2. Stephen Hawking certainly does that.
3. Therefore, Stephen Hawking must be a physicist.

First, let's put the conclusion into the correct form so that we can determine what the **major term** and the **minor term** are:

3. All **people identical to Stephen Hawking** are **physicists**.

Now that we have our **major term** and the **minor term**, we see that the first two premises need a lot of work if we are to get a single **middle term** that is found in both premises. Let's change premise 1 first. Looking back to section 4.7 to see the method for changing "the only" statements, we see that premise 1 should look like this:

1. All **scientists who theorize about the nature of time** are **physicists**.

Now that we know what our **middle term** is, we know that the term "**scientists who theorize about the nature of time**" should appear somewhere in premise 2. Looking at premise 2, we can ask, "What is THAT referring to when it says that Stephen Hawking 'does THAT'"? Well, apparently 'THAT' refers to the fact that Stephen Hawking is a scientist who theorizes about the nature of time. So, premise 2 should say:

2. All **people identical to Stephen Hawking** are **scientists who theorize about the nature of time**.

Here is the corrected argument in its entirety:

1. All **scientists who theorize about the nature of time** are **physicists**.
2. All **people identical to Stephen Hawking** are **scientists who theorize about the nature of time**.
3. All **people identical to Stephen Hawking** are **physicists**.

Let's replace the terms with letters to make things more clear:

1. All **T** are **P**.
2. All **SH** are **T**.
3. All **SH** are **P**.

This is an AAA-1 syllogism, which we know to be a valid argument form. So this argument is **valid**! Let's do one more.

Note: The following example is from your textbook, exercise 5.5, #4:

Example #2: Consider this argument: "Whoever wrote the Declaration of Independence had a big impact on civilization, and Thomas Jefferson certainly had that. Therefore, Thomas Jefferson wrote the Declaration of Independence."

First, let's put this in numbered argument form:

1. Whoever wrote the Declaration of Independence had a big impact on civilization.
2. Thomas Jefferson certainly had that.
3. Therefore, Thomas Jefferson wrote the Declaration of Independence.

Now, let's change the conclusion to read as follows:

3. All **people identical to Thomas Jefferson** are **people who wrote the Declaration of Independence**.

Now, let's change premise 1 to read as follows:

1. All **people who wrote the Declaration of Independence** are **people who had a big impact on civilization**.

Now that we know what our middle term should be, let's change premise 2. When it says that "Thomas Jefferson certainly had that", we know that "had THAT" refers to the fact that he **had a big impact on civilization**. So, premise 2 should say:

2. All **people identical to Thomas Jefferson** are **people who had a big impact on civilization**.

Here is the corrected argument in its entirety:

1. All **people who wrote the Declaration of Independence** are **people who had a big impact on civilization**.
2. All **people identical to Thomas Jefferson** are **people who had a big impact on civilization**.
3. All **people identical to Thomas Jefferson** are **people who wrote the Declaration of Independence**.

Now we can replace the terms with letters for simplicity:

1. All **DI** are **P**.
2. All **TJ** are **P**.
3. All **TJ** are **DI**.

This is an AAA-2 syllogism, which is NOT on the list of valid syllogism forms. So, we know that this argument is **invalid**.

Note: Do homework for section 5.5 at this time.