I. TRANSLATING ORDINARY LANGUAGE INTO CATEGORICAL PROPOSITIONS

Categorical propositions can be found in everyday life. Here is one example:

> Some football coaches are persons of character who always put their players' health first. Gregg Easterbrook, "Concussion Hazards Must Be Addressed"

We have already seen how logic can help us make sense of the claims all around us—but first we need to be able to paraphrase statements in ordinary language. As we are all aware, ordinary language statements can be subject to differing interpretations. If you recall from Chapter 3, sometimes missing information requires us to reconstruct arguments based on our understanding of the context. If we can translate an ordinary language statement into a standard-form categorical proposition, then we can reduce the possibility of ambiguity. A correct translation does this by clearly formulating the subject and predicate terms, the quantity (universal or particular), and the quality (affirmative or negative).

Any translation starts with an analysis of the meaning of the ordinary language. Once we are satisfied that we understand the statement, we then construct the appropriate categorical proposition. This requires deciding on the correct quantifier (*all, no, some*), the subject term, the copula (*are, are not*), and the predicate term. Since ordinary language contains an unlimited number of possible statements, we will concentrate on a few of the types that you are most likely to encounter.

Missing Plural Nouns

Consider the following statement:

> Some alcoholics are convicts.

This is a standard-form categorical proposition and contains the terms "alcoholics" and "convicts." Each of these terms is a plural noun, and each denotes a class of objects. (A *noun* is a word or group of words that refers to a person, place, or thing.) If we switch the position of the two terms, the result is again a perfectly acceptable standard-form categorical proposition:

> Some convicts are alcoholics.

Now consider a second statement:

> Some political parties are disorganized.

Most people would have little difficulty understanding this example. On the surface, it appears to be a standard-form categorical proposition. But this is deceiving. Let's see what happens if we switch the position of the two terms:

> Some disorganized are political parties.

We no longer have an acceptable statement. The problem is that the word "disorganized" is an *adjective*, not a noun. Adjectives are used to modify nouns, and they

cannot normally stand alone. Although the original statement is acceptable as far as ordinary language is concerned, in order to translate it into a standard-form categorical proposition, we have to add a plural noun, so that the resulting term will denote a class. For example:

Some political parties are disorganized groups.

The term "disorganized groups" denotes a class of objects. If we now switch the terms, we get this result:

Some disorganized groups are political parties.

When you translate ordinary language statements into standard-form categorical propositions, always make sure that the subject and predicate terms contain plural nouns.

Nonstandard Verbs

As we have seen in this chapter, standard-form categorical propositions use two forms of the verb "to be"—"are" and "are not." The copula is needed to connect the subject and predicate terms; it is a linking verb. However, many ordinary language statements use other forms of the verb "to be." For a regular verb, the past tense is typically formed by adding an "-ed" ending (e.g., "talk," "talked"). But the verb "to be" is an irregular verb, which means that different tenses do not follow general rules. In fact, "to be" is considered by many language experts to be the most irregular verb in the English language. Here are a few of the forms that it takes: *is, are, was, being, been, be, will (be), would (be),* and *were*. This means that many everyday examples of ordinary language statements contain verbs that must be translated into either "are" or "are not."

Here are some examples:

Ordinary Language Statement:
All the protesters at the convention were arrested.

Standard-Form Translation:
All the protesters at the convention are people who were arrested.

Ordinary Language Statement:
Some students would prefer to cheat rather than learn the material.

Standard-Form Translation:
Some students are people who would prefer to cheat rather than learn the material.

Ordinary Language Statement:
Trespassers will be prosecuted.

Standard-Form Translation:
All trespassers are people who will face prosecution.

As these examples illustrate, you must be careful to translate the verb into either "are" or "are not," and you must make sure that translation contains terms that denote classes

Many ordinary language statements do not use any form of the verb "to be." In these cases you have to look closely to grasp the meaning of the statement. Here are some examples:

Ordinary Language Statement:
Some assembly required.

Standard-Form Translation:
Some parts of this item are parts that need assembling.

Ordinary Language Statement:
No pain, no gain.

Standard-Form Translation:
No exercise routines without physical pain are exercise routines offering physical gain.

Even short sentences in ordinary language can be misunderstood. The tradeoff of creating translations that are lengthy and repetitive is that they offer clarity, as we shall see again in the next chapter.

Singular Propositions

The examples so far have contained plural nouns denoting classes, but it is possible that a class has only one object. These cases occur in ordinary language when the proposition is **singular** in nature; that is, something is asserted about a specific person, place, or thing. A singular proposition can normally be translated into a universal proposition. Here is one example:

Singular proposition A proposition that asserts something about a specific person, place, or thing.

Ordinary Language Statement:
Al Gore is a Nobel Prize winner.

Standard-Form Translation:
All persons identical to Al Gore are persons who have won a Nobel Prize.

The phrase "persons identical to Al Gore" may seem odd, but there is a reason for it. Since the subject is a single individual (Al Gore), the subject term of the translation must designate a class of objects which happens to have exactly one member. There is only one person identical to Al Gore, and that is Al Gore himself. So, the phrase "persons identical to Al Gore" refers to a class of objects that has exactly one member.

The phrase "persons identical to" is called a *parameter*. A parameter must accurately represent the intended meaning of an ordinary language statement, while at the same time transforming it into a standard-form categorical proposition. Here are some parameters that you can use to translate singular propositions:

persons identical to	places identical to
things identical to	events identical to
times identical to	cases identical to

Always remember that a singular proposition refers to a *specific* person (place, thing, etc). Given this, the phrase "identical to" is to be taken literally. There is only one Eiffel

Tower, and it is in Paris. If you go to Las Vegas, you will see a structure that looks *very much like* the Eiffel Tower (at one-third the size), but there is only one tower *identical* to the Eiffel Tower.

Here are some more singular propositions in ordinary language and their translations:

Ordinary Language Statement:
Shane is good at DDR (*DanceDanceRevolution*).

Standard-Form Translation:
All persons identical to Shane are persons good at DDR (*DanceDanceRevolution*).

Ordinary Language Statement:
Hugo did not go to Hawaii last spring break.

Standard-Form Translation:
No persons identical to Hugo are persons who went to Hawaii last spring break.

Ordinary Language Statement:
My car is in Joe's garage for repairs.

Standard-Form Translation:
All things identical to my car are things in Joe's garage for repairs.

Ordinary Language Statement:
Leo was ill last night.

Standard-Form Translation:
All times identical to last night are times that Leo was ill.

Parameters are used when translating singular propositions. They are not needed when the ordinary language statement has plural nouns.

Adverbs and Pronouns

Some ordinary language statements contain adverbs that describe places or times. For example, in the statement "Wherever there is smoke there is fire," the word "wherever" is a *spatial* adverb. Spatial adverbs describe where something happens. Here are some spatial adverbs: *wherever, everywhere, anywhere, somewhere, nowhere, upstairs,* and *underground.*

In the statement "Whenever you are audited by the IRS, you had better get legal help," the word "whenever" is a *temporal* adverb. Temporal adverbs describe when something happens. Here are some temporal adverbs: *whenever, never, always, anytime, yesterday,* and *tomorrow.*

Translating ordinary language statements into standard-form categorical propositions using these kinds of adverbs is relatively straightforward:

Ordinary Language Statement:
Wherever there is smoke, there is fire.

Standard-Form Translation:
All places that have smoke are places that have fire.

Ordinary Language Statement:
Whenever you are audited by the IRS, you should get legal help.

Standard-Form Translation:
All times you are audited by the IRS are times that you should get legal help.

Pronouns are often used to replace nouns that are unspecified. Some ordinary language statements contain pronouns that describe unspecified persons. For example, in the statement "Whoever took my laptop is in big trouble," the pronoun "whoever" refers to an unspecified person (or persons). Here are some pronouns referring to persons: *whoever, anyone, anybody, everyone, no one,* and *someone.* In the statement "What goes around comes around," the pronoun "what" refers to an unspecified thing (or things). Here are some pronouns referring to things: *what, whatever, anything, something,* and *everything.*

Here are translations of the last two examples:

Ordinary Language Statement:
Whoever took my laptop is in big trouble.

Standard-Form Translation:
All persons who took my laptop are persons in big trouble.

Ordinary Language Statement:
What goes around comes around.

Standard-Form Translation:
All things that go around are things that come around.

"It Is False That . . ."

Suppose you hear the following statement: "Every professional athlete uses steroids." This can be translated as the **A**-proposition "All professional athletes are people who use steroids." Now if you happen to believe that the proposition is false, you can say, "It is false that every professional athlete uses steroids." What your statement does is to *negate* (or deny) the original statement. Since your statement is the contradictory of an **A**-proposition, it gets translated as an **O**-proposition: "Some professional athletes are not people who use steroids."

Since **E**- and **I**-propositions are contradictory, creating a negation works much the same way. For example, the statement "It is not the case that some rapes are forgivable" gets translated as an **E**-proposition: "No rapes are forgivable acts." The phrase "It is not the case" negates the translated **I**-proposition "Some rapes are forgivable acts."

Here are some useful negation phrases:

It is false that . . .
It is not the case that . . .
It is not true that . . .

Remember that all three of these phrases negate the statement following it. If what follows the negation phrase is an **A**-proposition, then the translation results in an **O**-proposition, and vice versa. On the other hand, if what follows the negation phrase is an **E**-proposition, then the translation results in an **I**-proposition, and vice versa.

Implied Quantifiers

As we saw in Chapter 3, some statements in ordinary language imply something without actually saying it. Important terms are either left out on purpose or simply overlooked. In these cases we have to supply the missing terms. If the missing term is a quantifier word (*all, no, some*), then our translation into a standard-form categorical proposition must rely on a close reading of the intended meaning. Here is one example:

Sharks are predators.

The statement connects a species of animals (*sharks*) with a specific characteristic (*being a predator*). As such, it refers to the entire subject class and can be translated as follows:

All sharks are predators.

Now let's look at another example that uses the same subject (sharks):

There are sharks in the local aquarium.

It is unlikely that the person making the assertion is claiming that the entire class of sharks is in the local aquarium. Therefore, our translation will have to use the quantifier "some":

Some sharks are animals in the local aquarium.

We had to add the word "animals" because the phrase "in the local aquarium" would not by itself designate a class of objects.

How would you translate the next statement?

A professor is a human being.

Although the statement contains the phrase "a professor," it appears likely that the assertion is about every professor. It can therefore be translated as follows:

All professors are human beings.

What about this example?

A professor is not a machine.

This statement also refers to every professor, but it contains the word "not." It is tempting to translate the statement as follows:

All professors are not machines. *Incorrect*

The correct form of a universal affirmative categorical proposition is *All S are P*, so we cannot add the word "not" using this form. The universal negative form solves our problem:

No professors are machines. *Correct*

Here is one more example to consider:

A professor won the Nobel Prize.

This statement also contains the phrase "a professor" but it is unlikely that it is meant to refer to every professor. It can be translated as follows:

Some professors are winners of the Nobel Prize.

Earlier we had to make the subject term a plural noun in order for it to designate a class. Of course, if a specific professor had been named (e.g., Professor Blake), then we would have used the information regarding singular propositions to get the correct translation.

Now try a more complex example:

We will not be able to finish all the costumes by 5:00.

A quick reading might suggest that the quantifier word "all" means that this should be translated as a universal affirmative proposition. However, the word "not" indicates negation. Combining these two words gives us the phrase "not all." It is unlikely that the speaker is claiming that no costumes will be finished by 5:00. (If this had been intended, then we would expect the statement to be "We will not be able to finish *any* costume by 5:00.") Therefore, the correct quantifier is "some," and the translated statement must include the word "not":

Some costumes are not costumes that will be finished by 5:00.

This example illustrates why ordinary language statements often require a careful reading in order to understand the meaning and to arrive at a correct translation.

Nonstandard Quantifiers

Ordinary language statements might contain quantifiers that are nonstandard, because they are not one of the following: *all*, *no*, or *some*. Here is an example:

Not every investment banker is a crook.

In this statement the nonstandard quantifier "not every" probably means at least one investment banker is not a crook. Given this interpretation, the translation would be the following:

Some investment bankers are not crooks.

Notice that we once again had to change the subject and predicate terms into plural nouns.

Here are some nonstandard quantifiers: *any*, *many*, *most*, *a few*, *one*, *several*, and *not every*. Let's take one from the list and look at another example:

Not every novel about romance is interesting.

In this statement the nonstandard quantifier "not every" means that there are some novels about romance that are not interesting. Given this interpretation, the translation would be the following:

Some novels about romance are not interesting novels.

Here is another statement in ordinary language that uses a nonstandard quantifier:

A few movies at the mall are worth watching.

Here the quantifier "a few" is likely to mean that at least one movie at the mall is worth watching. The translation would be the following:

Some movies at the mall are movies worth watching.

Since the phrase "worth watching" does not by itself designate a class, we had to add the term "movies" to it.

Conditional Statements

We have already encountered conditional statements when we looked at existential import. The A-proposition "All scientists are people trained in mathematics" can be translated as "*If* a person is a scientist, *then* that person is trained in mathematics." The E-proposition "No slackers are reliable workers" can be translated as "*If* a person is a slacker, *then* that person is not a reliable worker." These translations are a result of the Boolean interpretation of universal categorical propositions.

As you might know from Chapter 3, the part of the conditional statement that follows the word "if" is called the *antecedent*, and the part that follows the word "then" is called the *consequent*. Here are some simple examples:

Ordinary Language Statement:
If a person has $10 in her checking account, then she is not rich.

Standard-Form Translation:
No persons having $10 in their checking account are rich persons.

Ordinary Language Statement:
If a salesperson calls on the phone, then I just hang up.

Standard-Form Translation:
All calls from salespersons are calls where I hang up.

Sometimes ordinary language statements do not have the word "if" at the beginning. When this occurs, we simply reposition the appropriate part so the antecedent comes first:

Ordinary Language Statement:
Pizza is a healthy meal if it has vegetable toppings.

Standard-Form Translation:
All pizzas with vegetable toppings are healthy meals.

Ordinary Language Statement:
A dog is not dangerous if it has been well-trained.

Standard-Form Translation:
No well-trained dogs are dangerous animals.

The conditional statement "If your cup of coffee is not perfect, then you are not drinking a cup of Bigbucks coffee" poses a new kind of problem for translation. To

assist us, we need to introduce *transposition*. This rule is a two-step procedure. First, we switch the positions of the antecedent and the consequent, and second, we negate both of them. Let's work through it step by step and make any additional changes in wording as we go to capture the meaning of the statement:

First Step:
If you are not drinking a cup of Bigbucks coffee, then your cup of coffee is not perfect.

Second Step:
If you are drinking a cup of Bigbucks coffee, then your cup of coffee is perfect.

Final Translation:
All cups of Bigbucks coffee are perfect cups of coffee.

Now let's look at an example that is a little more challenging. The conditional statement "If murderers do not get punished, then they do not stop their behavior" requires a bit of rewriting to capture the meaning in standard-form categorical proposition. As before, we will take it step by step and apply the rule of transposition:

First Step:
If murderers do not stop their behavior, then murderers do not get punished.

Second Step:
If murderers stop their behavior, then murderers get punished.

Final Translation:
All murderers who have stopped their behavior are murderers who have been punished.

In order to translate the statement "A citizen cannot be president unless the citizen is at least 35 years old," we need to understand how the word "unless" gets translated. In most statements, the word "unless" means "if not." Substituting this into the original statement gives us this result: "A citizen cannot be president if the citizen is not at least 35 years old." Next, we can place the antecedent at the beginning of the statement: "If the citizen is not at least 35 years old, then a citizen cannot be president." We are now in a position to apply the two-step rule of transposition:

If a citizen can be president, then the citizen is at least 35 years old.

The last step completes the translation into a standard-form categorical proposition:

All citizens that can be president are citizens at least 35 years old.

Exclusive Propositions

Suppose you hear this announcement over a loudspeaker:

Only persons with tickets can enter the arena.

The announcement means that admission into the arena is limited to those holding tickets. Therefore, anyone who does not have a ticket is *excluded* from entering the arena, and we call this an *exclusive proposition*. Another way of saying this is "If a person

does not have a ticket, then that person cannot enter the arena." Applying transposition to this statement, we get:

If a person can enter the arena, then that person has a ticket.

This statement can now be translated into a standard-form categorical proposition:

All persons who can enter the arena are persons that have tickets.

Here are some other words that indicate an exclusive proposition: *none but*, *solely*, *alone*, and *none except*. Let's take the first one from the list and analyze a statement that contains the words "none but":

None but students can see the movie for free.

According to the statement, anyone who is not a student is excluded from seeing the movie for free. This can be rewritten as "If a person is not a student, then that person cannot see the movie for free." Applying transposition to this statement we get:

If a person can see the movie for free, then that person is a student.

This statement can now be translated into a standard-form categorical proposition:

All persons who can see the movie for free are students.

Some ordinary language statements do not have the exclusive term at the beginning. For example, "Lottery winners get lucky only once in their lives." In these cases, we have to rewrite the terms in order to designate the correct classes:

All lottery winners are persons who get lucky once in their lives.

"The Only"

Although the words "only" and "the only" seem very much alike, they sometimes require different kinds of translations. For example, the statement "The only true friends are people who want nothing from you" can be directly translated as "All true friends are people who want nothing from you." However, if the words "the only" occurs in a different part of a statement, then you rewrite the statement by placing it and the phrase following it at the beginning. Here is an example:

Android phones are the only phones imported by her company.

The first step is to put "the only" phrase at the beginning: "The only phones imported by her company are Android phones." The final step is the translation into a standard-form categorical proposition:

All phones imported by her company are Android phones.

Propositions Requiring Two Translations

The examples so far could be translated as single statements. However, some statements need to be translated into *compound* statements, containing the word "and." For example, propositions that take the form "All except S are P" and "All but S are P" are called *exceptive propositions*. Here is one exceptive proposition: "All except those under

21 are allowed to gamble in Las Vegas." The meaning of the statement is quite clear: If you are under 21 you cannot gamble, and if you are 21 or older you can. In other words, the statement relates the predicate to both the class designated by subject term *and* to its complement. Hence the complete translation will result in a compound statement:

No under-21 persons are persons allowed to gamble in Las Vegas, and all non-under-21 persons are persons allowed to gamble in Las Vegas.

Here is another example:

Everyone but gamblers sleep well at night.

Translation:

No gamblers are people who sleep well at night, and all non-gamblers are people who sleep well at night.

Knowing the context in which ordinary language statements occur can help in making correct translations. When we have a conversation, we can ask questions to clear up any ambiguity. This option is obviously not available when we are reading something and the author is not present. When in doubt, it is better to do more than less. In other words, if there are two reasonable interpretations of the meaning of a statement, then you had best work out the details of both. For example, suppose you read the following: "The heavy snowfall affected the turnout. Few registered voters went to the polls today." Clearly, some registered voters went to the polls and some didn't. This can be translated as a compound statement:

Some registered voters are persons who went to the polls today, and some registered voters are not persons who went to the polls today.

Earlier, the nonstandard quantifier "a few" was translated as a single I-proposition. ("A few movies at the mall are worth watching" was translated as "Some movies at the mall are movies worth watching.") However, sometimes "a few" should be translated as a compound statement. Again, the context is your best guide to which translation is appropriate.

Sometimes we should translate an exclusive proposition containing "only" as a compound statement. For example, the statement "Only Carly designed the wedding gown" makes two assertions. First, Carly designed the wedding gown, and second, no one else did. Also, since the statement asserts something about a specific person (an individual), our translation has to take that into account:

All persons identical to Carly are persons who designed the wedding gown, and all persons who designed the wedding gown are persons identical to Carly.

We get the same results for the statement "The only person who designed the wedding gown is Carly." In this case, the statement is equivalent to "Only Carly designed the wedding gown," and therefore, it gets the same translation.

Here is one more example:

Barack Obama alone is the forty-fourth president of the United States.

This example contains two references. The first is to an individual (Barack Obama), and the second is to an elected office. We can translate the statement as follows:

> All persons identical to Barack Obama are persons identical to the forty-fourth president of the United States, and all persons identical to the forty-fourth president of the United States are persons identical to Barack Obama.

Translations into standard-form categorical propositions often require close and careful reading, but the effort pays off by reducing the chance of misunderstanding. It makes us aware of the many possible ambiguities in ordinary language, and it makes our spoken and written communication more precise.

CHECK YOUR UNDERSTANDING 5I

Translate the following ordinary language statements into standard-form categorical propositions.

1. An apple is in the refrigerator.

Answer: Some apples are items in the refrigerator.
Although the statement is referring to a particular apple, the use of "some" is appropriate in this translation because it has been stipulated that it means "at least one."

2. Any medical doctor is well-educated.
3. No insects sing.
4. A flower is a plant.
5. All happy people dance.
6. Some bears hibernate.
7. Some cars don't pollute.
8. A mango is not a vegetable.
9. It is not the case that every novel is a satire.
10. Every office worker is under pressure to perform.
11. A tsunami is dangerous.
12. Some people don't jaywalk.
13. Not every final exam in calculus is a challenging test.
14. Every opera is easy to understand.
15. Not every dog is friendly.
16. Any company that introduces green technology will succeed.
17. Young children are not protected from the dangers of war.
18. Ocean levels rise whenever glaciers melt.

51. Not all soap operas are boring.
52. Magicians are the only people capable of keeping a secret.
★ 53. Whatever improvement is made to the gas engine decreases our need for oil.
54. Beauty is not skin deep.
55. A practical joke is not funny if it harms someone.
56. All sharks hunt.
★ 57. Some people don't bowl.
58. Not every computer is expensive.
59. Most smokers wish they could quit.
60. All good things must come to an end.
★ 61. Beliefs worth having must withstand doubt.
62. If something is worth having, then it's worth struggling for.
63. Fair-weather friends are not trustworthy.
64. Not all that glitters is gold.
★ 65. Every ending is a new beginning.
66. Whoever saves even one life saves the entire world.
67. The enemy of my enemy is my friend.
68. Everything old is new again.
★ 69. It is false that people over 30 years of age are not to be trusted.
70. Two snowflakes are never the same.
71. Whoever controls the media, controls the mind.
Jim Morrison, quoted in *Telling It Like It Is* by Paul Bowden
72. Every unhappy family is unhappy in its own way. Leo Tolstoy, *Anna Karenina*
★ 73. Whoever is winning at the moment will always seem to be invincible.
George Orwell, *The Orwell Reader*
74. If you tell the truth, you don't have to remember anything.
Mark Twain, *Notebook*
75. Whoever undertakes to set himself up as a judge in Truth and Knowledge is shipwrecked by the laughter of the gods.
Albert Einstein, quoted in *The Princeton Companion to Mathematics*