

Chapter 1

Logos and Critical Thinking



*"El sueño de la razón produce monstruos."
(The sleep of reason brings forth monsters.)*

Francisco Goya

In the year 1792, the father of Modern Art, the great Francisco Goya, was left completely deaf after having suffered a protracted illness in Cadiz, Spain. On his return to Madrid, he threw himself into what many today regard as some of the greatest allegorical sketches ever produced. The eighty sketches were given the titular *Los Caprichos* (*The Whims*) and what was meant to serve as the centerpiece of *Los Caprichos* was the sketch entitled *The Sleep of Reason*.¹ *The Sleep of Reason* is such a provocative work of art that it's no wonder it has generated so

1. Fred Licht, *Goya, the Origins of the Modern Temper in Art*, (New York: Universe Books), 1979. See also, D. B. Wyndham Lewis, *The World of Goya* (New York: Clarkson N. Potter, Inc.), 1968

much speculation from the art world. Most experts agree, however, that the man slumped in what seems to be a restless slumber is Goya himself, and the surrounding animals, mysterious and haunting, represent the madness, cruelty, and ignorance of human society whenever rational and balanced reflection has been supplanted by the nightmarish lust for power. For Goya, the rulers of eighteenth-century Spain had begun to retreat, once again, into the blind and foolish drive for dominance, oblivious to the desperate needs of its people. Thus, *The Sleep of Reason* is a vivid reminder to us all that while the temptations of the *chimeras*, wealth and reputation, which are so often falsely associated with the happy life, continually vex and disturb our minds, we, as individual thinking beings, have the power to brush away these terrors of the night. It may be that we must be prodded to do so, but this seems to be the necessary antecedent condition to critical thinking that Goya took to be quite natural. For in *The Sleep*, the little owl hovering anxiously by Goya's elbow can be seen to actively urge the sleeper to awaken, pick up his pencil, and take up his fight against all fantasies that threaten to delude and overwhelm us.

1-1 THINKING CRITICALLY

In so far as the mind is stronger than the body, so are the ills contracted by the mind more severe than those contracted by the body.

—Cicero

For human beings, the first step in “staying awake” involves the cultivation of our native critical thinking abilities. Critical Thinking or Logic is that branch of Philosophy which explores the principles and methods of thought. Etymologically speaking, the word “logic” comes from the Greek term *logos*, a term that is replete with meaning. *Logos*, for example, can refer to, among other things, God, cosmic justice, fire, due proportion, account, or argument.² For our purposes, however, we will focus our attention on this last signification, viz. *logos* as argument. An argument is, in fact, an account arranged in such a way that the claims advanced lead (or should lead) irresistibly to some sort of resolution that is explicitly public in character. That is to say, in theory, natural language claims ought to provide the basis for anticipated outcomes that any rational agent may deduce. These claims are referred to in logic as the *premises*, and the resolutions in their turn are referred to as *conclusions*. For our purposes we can consider logic as that domain of philosophy which will enable us to discover whether statements, if assessed according to proven rules, will result in producing legitimate or valid arguments.

This particular approach to the logical enterprise called Sentential or Propositional Logic was first developed by the Stoics primarily in the in third century BC. In this critical thinking textbook we will focus exclusively on propositions and how they relate to one another within the confines of an argument.³

2. F. E. Peters, *Greek Philosophical Terms; a Historical Lexicon*, (New York University Press, Washington Square, 1967), 111–112.

3. C. T. Jones, *The History of Western Philosophy: The Classical Mind, Second Edition* (New York: Harcourt, Brace and World Inc., 1952).

1-2 LOGOS:

"(A)ny discourse (logos) ought to be constructed like a living creature."

—Plato's *Phaedrus* (CE 264)

If you think about it, logic has the potential to help us better understand what is said, or implied, or dubiously offered as credible information. A competency in logic provides us with the pivotal tools for the evaluation of every day conversations which commit us to *feelings*, to *beliefs*, to *lifestyles*, to *faith*, to *promises*, to *actions*; and the indisputable worth of our logical powers is born out of our desperate need to unearth meaning and rational coherence in our personal lives. This is logic's primary function: to disambiguate where there is vagueness, uncertainty, or haziness that inevitably arises in any natural language. And yet, either wittingly or unwittingly, speakers can advance arguments that appear extremely complicated and somewhat obscure. As Plato points out in the *Phaedrus*, arguments are like creatures—very much alive and oftentimes behaving in contrary and unpredictable ways. If this is indeed the case, then we must be willing to confront two indisputable aspects about the human condition: (1) the protein nature of our arguments, and (2) our deep need for clarity and legitimacy in discourse. Logic is that activity, which promises to furnish us with suitable ways of wrestling with these two verities, thereby equipping us for the careful examination of arguments.

1-3 BAD THINKING

"Bad reasoning as well as good reasoning is possible; and this fact is the foundation of the practical side of logic."

—Charles Sanders Peirce

Let's examine a typical political argument advanced by a governmental bureaucrat in nineteenth-century Russia offered by the great Dostoyevsky in his remarkable short story, "A Disgraceful Affair." This so-called argument was submitted at the end of a rather sedate birthday party by a certain State Councilor, Ivan Ilyitch Pralinski. The party was hosted by his superior, a grim and staunch traditionalist, who, in all probability, believed that Russia was far better off when a person's wealth was judged according to how many "souls" (serfs) he owned. Of course the emancipation of the serfs had caused a great deal of unrest in Russia as these liberated individuals were oftentimes left bereft of home or job. It was the government's unenviable task to sort out new laws that might help administer to this newly emancipated population. Ivan Ilyitch, who witnessed on a daily basis how poorly these people were treated, suddenly decides to upbraid the gathering for holding archaic and, in his estimation, harsh views, which he believed were the sources of the unrest between individuals of the differing classes. If the freed population, he hopes to argue, were treated like our brothers and sisters, then these people, in turn, would be grateful to the government, abide by its laws, and generally behave kindly towards one another.



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The government's problem would be solved. Indeed Russia's problem would be solved! So he advances the following argument, believing it to be decisive, persuasive, and extraordinarily clever:

I am humane, consequently I am loved (by the people). They love me, then...they trust me. They put their trust in me consequently they believe in me, therefore love me...that is, no, I mean to say, if they believe, they will also believe in reform, they will understand, so to speak, the very heart of the matter. They will, so to speak, morally embrace one another and will settle everything fundamentally in a friendly spirit. What are you giggling about, Semyon Ivanovitch? Don't you follow?"⁴.

4. Fyodor Dostoevsky, *Great Short Works of Fyodor Dostoevsky. A Disgraceful Affair*, translated by Nora Gottlieb, ed. Ronald Hingley (New York: HarperCollins, 1968), 210



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Is this a credible argument, or are we apt to giggle as Semyon Ivanovitch does?

We presume Ivan Illyitch's intentions to be noble, but how could he ever hope to convince his colleagues with such a confused set of statements. Take for instance his first claim. "I am humane, consequently I am loved." Does this follow? Is it possible for someone to be humane and not loved? And is it the case that if the people loved him that they would necessarily put their trust in him? And who are these people and how many of them are we talking about, and in what parts of Russia do they reside? Moreover, Ivan Illyitch contends that because these people love, trust, and believe in him they will, therefore, also believe in reform. Which set of reforms would that be? And how does it follow that trust and belief in Ivan Illyitch necessarily generates a propositional attitude about reform? Yet, based on these astonishing claims, Ivan Illyitch concludes that the people will "morally embrace" each other? What form would that embrace take? (The mind boggles!) Moreover, could we conclude from what Ivan Illyitch argues that indeed all disputes will be settled in a "friendly spirit"? We can reflect on Ivan Illyitch's argument and recognize that it is indeed unsuccessful. The premises do not lead to his conclusion. In fact, he seems confused and utterly out of his depth in his anemic attempt to frame an argument detailing such vital issues. A lot of fine sounding words and phrases which come to nothing at last!

This was a fictional argument. But, of course, Dostoevsky meant us to take it quite seriously, precisely because his Mr. Pralinski was such a flawed and hypocritical character. But how much more seriously should we take everyday arguments that have a profound impact on our lives?

DEFINITION:

Critical thinking is the psychological ability to recognize, classify, analyze, and construct sets of propositions one of which—the conclusion—is logically supported (or not) by the others—the premises.

Again, there is a term in this definition that may be unfamiliar: “logical support.” A set of premises *logically supports* a conclusion—equivalently, a conclusion is logically supported by a set of premises—whenever the argument that is composed of that set of premises and that conclusion is deductively valid or inductively strong. Clarifying deductive validity and inductive strength is what we shall be concerned with in this book. Believe it or not, that is *all* that we shall be concerned with in this book.

1-5 WHY CRITICAL THINKING NEEDS TO BE STUDIED

The mind has many abilities and it certainly has more abilities than those used in critical thinking. Emotion, desire, sensation, and mood are psychological abilities that are not critical thinking abilities. But we will not be concerned directly with these other abilities in this book. What distinguishes critical thinking from emotion, desire, sensation, or mood is that critical thinking is a wholly cognitive ability. There are, of course, cognitive elements in emotion and desire, but there are non-cognitive elements as well. Critical thinking has no non-cognitive elements.

Critical thinking isn't the only wholly cognitive ability. Deliberation, information processing, reflection, and hypothesis formation, among others, can all be wholly cognitive abilities, but none of them is the same as critical thinking. For instance, we can deliberate about which car to buy, but do so in an uncritical manner if, for instance, our deliberation consists merely in opting for the car that is just the right shade of purple. We can reflect on the place of the news media in contemporary American society, but if our reflection extends no further than the thought that we like CBS News better than ABC News, we have not engaged in critical thinking about the matter. We can process information about the life and times of President Obama, but if we do so without any concern for the reliability of the sources of information, we have not learned about President Obama in a critical manner. Finally, we can form hypotheses, say, in biology, but if those hypotheses are governed by the idea that only those consistent with a literalist interpretation of the Bible are to be confirmed, then they have not been chosen critically. Since we can deliberate, reflect, process information, and form hypotheses uncritically, critical thinking isn't necessary for them. And since critical thinking isn't necessary for them, it isn't essential for them either. Critical thinking is its own thing; something that can be added to these other abilities—and which, when added, makes them better—but it's something distinct from them.

Most of us aren't trained to think critically. We're taught to read, write, and do arithmetic in grade school and these are necessary for thinking in a critical way. But they do not themselves constitute critical thinking. In middle school and high school, we're taught a fair number of facts and, if we do a lot of math and science, some methods of thinking. But cramming our heads full of facts is not an education in how to think logically, much less an education in critical thinking. Rather, having a lot of facts in our heads provides us with the material that is thought about either clearly or unclearly, either logically or illogically, either critically or uncritically. We're

also taught about expressing ourselves in writing. However, expressing ourselves is consistent with expressing ourselves in an illogical and disorderly manner, and the sad truth is that many of us express ourselves in an illogical and disorderly manner.

Again, in college, we learn a great number of facts, some theories, and depending upon the discipline we go into, some methods for orderly thinking. If, for example, one is a history major, one learns the method of thesis defense; if one is a sociology or psychology major, one learns the scientific method of hypothesis formation and confirmation; if one is a math major, one learns how to engage in mathematical proofs. All of these methods, and there are many others, are kinds of orderly thinking.

While we cannot engage in critical thinking without being able to think in an orderly manner, orderly thinking is not in itself all there is to critical thinking. After all, we can think in an orderly manner and do so without being the least bit critical. A person who can recite the rules and regulations of Robert's Rules of Order is thinking in an orderly way without being at all critical. So, just as critical thinking is more than deliberation and more than reflection, so too is it more than orderly thinking. To get from orderly thinking to critical thinking we must add, as the definition of critical thinking above suggests, the ability to recognize, classify, analyze, and construct arguments. *That* is what critical thinking is. Since most of us have never engaged in this kind of thinking, we need to study what it is.

1-6 BENEFITS AND DANGERS OF CRITICAL THINKING

A critical mind can be a beautiful thing. It's not the *only* beautiful thing and it's certainly not the *most* beautiful thing. It's not the former because there are different species of the genus beautiful, and it's not the latter because being critical in one's thought is not alone sufficient for great beauty. We can be logical and critical, but have a head full of falsehoods, or morally vicious claptrap, or both.

Still, someone trained to think in a logical, critical manner is instantly recognizable. Someone trained to think critically has advantages over someone not so trained. Someone who can think critically is not likely to be overwhelmed by compelling but irrelevant rhetoric or by crude displays of authority. Likewise, training in critical thinking can help us be more honest with ourselves. Many of us are prone to overestimate our talents; some of us are prone to underestimate them. If we can think carefully and critically about ourselves, we're more likely to accurately gauge the effectiveness of our contribution to a joint project or to admit to ourselves that we really can do something our irrational fears suggest we cannot. In short, critical thinking can help us clear away some of the cognitive cobwebs that inevitably appear over time.

More than that, critical thinking has direct and immediate benefits for professional life and student life. It's shocking but true that many students and professionals do not know how to think or write clearly. Knowing how to define our terms will benefit any paper, proposal, report, memo, or policy. Knowing how to categorize things in a coherent and rational manner will help us prevent mistakes and inconsistencies. Knowing the logical structure of arguments will help us formulate hypotheses and create testing measures for them, construct persuasive arguments on behalf of certain management decisions, and create good policies. Knowing what fallacious reasoning is will help us identify it in our own and others' work and will help us work with others to avoid errors when formulating rationales for policies, constructing experiments, or being engaged in other, more mundane decisions. Finally, knowing how to construct a good argument is immensely beneficial in most professional and academic settings.

It would, however, be a mistake to conclude that knowing how to think well is a cure-all for university or professional life, or for what ails one in one's personal life. It is not. As noted above, not only must one know *how* to think, one must have *something* to think about. Someone who knows only how to think without also having anything to think about is like a closet that has all the organizing units one could ever want but nothing in them. It's neat all right, but it's empty. An effective colleague or student is one who can put the two together.

There is a final problem that must be mentioned. We all know people who are clever but wicked; people who use logic to get their point across without regard to the feelings and emotions of others. Indeed, it's often thought that the world divides into logic chopping jerks and emotional nincompoops. There is no doubt that the techniques presented in this book can, if used without discretion, turn people into intimidating monsters. But the appropriate goal is not to become an argumentative bully; it is, rather, to combine critical thinking abilities with compassion, kindness, and reflection in a way that is beneficial to ourselves, our intimates, and all those with whom we come in contact. Unfortunately, no single book can do everything, and this book cannot outline how to be a good person. This book only outlines how to be a critical thinker. We leave it up to the reader not to use the skills developed here to annoy others with trivial nitpicking and arrogant displays of logical prowess.

1-7 ARGUMENTS AND NATURAL LANGUAGE

Let's look again at the definition of argument. Here it is:

An argument is composed of propositions, one of which is a conclusion, the others of which are premises.

All arguments have this structure. Take a simple argument:

All fish live primarily in water.

All trout are fish.

Therefore, all trout live primarily in water.

This is an argument consisting of two premises and a conclusion. The premises are:

All fish live primarily in water.

and

All trout are fish.

The conclusion is:

Therefore, all trout live primarily in water.

The first two propositions are *premises* because they are supposed to provide logical support for the conclusion. The last proposition is the *conclusion* because it's supposed to be logically supported by the premises. The conclusion is the thesis being argued for; the premises are the reasons offered for thinking the conclusion is true. Typically, but not always, premises appear before the conclusion. We'll spend most of the book unpacking what logical support is, how to recognize when it fails to occur in an argument, and how to construct arguments that possess it.

Typically, arguments are expressed by sets of sentences in a natural language such as English. The argument above is an example. But arguments are restricted neither to English nor even to natural language. Most cultures have argumentation as one of their communication forms and many cultures have developed specialized formal languages for particular kinds of arguments (mathematics and formal logic are obvious examples). Moreover, in many cultures, highly stylized forms of argumentation emerge. In some sects of Buddhism, for instance, ritualized verbal argumentation amongst monks is a central religious activity. In European culture there are centuries-old traditions of argumentation, both in the religious world, such as in certain monastic orders, and in the secular world of intellectual pursuits, such as in the law.

Given that arguments and argumentation are ubiquitous across cultures and within cultures, it's no surprise that they have become an academic subject. But even if we grant that professors spend their lives looking at all kinds of strange things that other people ignore, we might still wonder why arguments need to be studied. After all, we argue as readily as we walk.

The answer to this challenge is two-fold. First, many of us do not argue well. We insult others, we get defensive and upset, we bring in irrelevant details, we fail to see counter-examples to claims we're making, we infer conclusions that the premises do not support, and so forth. Second, the best way to get better at arguing and at critical thinking is to study arguments and to practice doing them. By so doing, we distill their *form* from the detail of their *content*. And uncovering the form or structure of argumentation will, at the same time, uncover the essential attributes of critical thinking. For uncovering the form of argument exposes the logical support that is claimed to exist between the premises and the conclusion.

An example will make the distinction between form and content clearer. Take the previous argument.

All fish live primarily in water.

All trout are fish.

Therefore, all trout live primarily in water.

There is some unique relation of logical support between the premises and the conclusion. If the premises are true, then the conclusion must be true.

To see that this is true, consider another argument with the same logical relation between premises and conclusion but with different content:

All hippies had long hair.

All the members of my commune were hippies.

Therefore, all the members of my commune had long hair.

In this argument, too, if the premises are true, then the conclusion must be true.

In fact, any example of this kind of argument will also be such that, if the premises are true, then the conclusion must be true. To see that this is true, suppose we just replace all the specific content of the above arguments with dashes, dots, and slashes, and look at the result:

All _____ are

All ////////// are _____

Therefore, all ////////// are

We can see that in *any* argument with this form, if the premises are true, then the conclusion has to be true. So, there is something shared by *any* argument with this form that explains why *all* arguments of this form are such that, if the premises are true, then the conclusion has to be true.

Of course, as we encounter them in our daily life, arguments are not always easy to recognize. And if natural language arguments are not always easy to recognize, neither are their forms. But Rome wasn't built in a day, and we can't be expected to develop our critical thinking skills overnight. We first learn the forms of argument and then apply what we've learned to the messy and often confusing arguments found in newspapers, books, television, and magazines.



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1-8 THE BUILDING BLOCKS OF ARGUMENTS: WORDS, SENTENCES, AND PROPOSITIONS

The elemental unit of analysis in this book is the argument. Arguments are composed of propositions. Propositions are composed of concepts and logical relations and are expressed by sentences. Sentences are composed of words in a grammatically well-formed manner and express propositions. Words are composed of letters of some language in a grammatically well-formed manner and express either concepts or logical relations.

Each one of the sentences of the previous paragraph requires explanation. So, let's slow down and get clear on the difference between propositions and sentences, between sentences and words, and between words and concepts.

Let's begin from the smallest unit and work up to the larger strings. Here's a definition of "word":

DEFINITION:

A *written* word is a grammatically well-formed string of letters in a language that has a meaning.

Take English as our language. In English, "tattle" is a word, but "ttttle" is not. Tattle is grammatically well formed, since it obeys the rules of spelling and syntax, and it has a meaning; ttttle is not grammatically well formed and has no meaning. The meanings of a huge class of words are concepts; the meanings of some other words are the concrete entities referred to by the words themselves.

Let's define "sentence" next.

DEFINITION:

A sentence is a grammatically well-formed string of words in a language that expresses a proposition.

As always, there are some terms in the definition that require expansion. Here there are two: "grammatically well-formed string of words" and "proposition." Take them in turn.

Sentences are composed of grammatically well-formed strings of words of a language. For example,

Jane went fishing down at the creek and spent all afternoon napping

is a sentence. But

John whenever chewing gum turtle appropriately stunningly it

is not a sentence. Something is *seriously* askew here. We look at this string of words and scratch our heads: what is it trying to say? English grammar requires that a sentence have a subject and a verb; but this string of words lacks a verb. We expect a verb after "John," but are disappointed; we get "whenever" instead. Even if it's a nice word, "whenever" is not a verb. English grammar also dictates that we not stack adverbs, but this string of words violates that rule by stacking "appropriately stunningly." There are other mistakes too, but the point is already made: not all strings of words are sentences, and what distinguishes those strings that are sentences from those that are not is that those that are sentences are well formed while those that are not sentences are not well formed.

Propositions are central to the concerns of this book. Propositions, not sentences, are the basic unit of logic and so of critical thinking. It's their truth or falsity, and the relationships they bear to other propositions, with which we will be concerned for the remainder of this course. Here's a definition of proposition:

DEFINITION:

A *proposition* is an abstract entity that is (a) the minimum unit of complete thought (b) true or false; and (c) the meaning of a sentence.

Given this definition, we can see that the meaning of a sentence is the proposition that it expresses. So, we could define "sentence" as follows:

DEFINITION:

A *written* sentence is a grammatically well-formed string of words in a language that has a meaning.

Both this definition and the earlier definition will suffice for what we'll be doing in this course.

It is to be admitted that the definition of "proposition" is vague in at least one respect; just as in the case of the definition of "word," here too in the definition of "proposition" we encounter the word "meaning"; in this case in the context of the "meaning of a sentence." Sentential meaning has proven difficult to specify. We shall be content with the following:

DEFINITION:

The *meaning* of a sentence of a language is that which another sentence of a distinct language that is the translation of the first sentence shares with that first sentence.

From this definition and the definition of "proposition," we can infer that the minimum unit of analysis in the kinds of logic we will investigate in this book is the proposition as expressed in a sentence of a language; that is, a group of words that is, at a minimum, composed of a subject and a predicate and has a meaning. We won't investigate the logic of subjects or of predicates in this book, although there are logics for both.

With the definition of proposition in hand, note that:

DEFINITION:

1. One proposition can be asserted in two or more sentences.
2. Two or more propositions can be asserted in one sentence.

Consider the first phenomenon. Two sentences, p and q , express the same proposition if the subject terms in p and q express the same concept and if the predicate terms in p and q express the same concept and if the logical relations in p and q are the same. Hence, if I say:

My Honda is an inexpensive form of four-wheel motorized vehicular transportation.

and

My Prelude is a cheap car.

I have expressed the same proposition in two distinct sentences. Again, if I say,

Anna is Calvin's sister.

and

Calvin's sister is Anna.

I have expressed the same proposition in two distinct sentences. Likewise, if I say,

I do not like green eggs and ham.

and

No me gustan los huevos verde con jamón.

I have expressed the same proposition in distinct sentences of different languages, English and Spanish.

Consider the second phenomenon. I can utter different propositions with a single sentence. If I say,

I am hot today.

I may be asserting any of the following propositions:

- (a) I am overheating today.
- (b) I am feeling good about myself today.
- (c) I am feeling good about what I am wearing.
- (d) I am having a good day shooting hoops.

Or any number of other propositions, depending on the current slang meanings of the word "hot."

It's a matter of learned experience when distinct sentences express the same proposition and when a single sentence expresses more than one proposition. The relation of *expression* between a word and a concept and between a sentence and a proposition is not a relation we think about very much. We are, quite properly, accustomed to running concepts and words and propositions and sentences together. We can usually do this without confusing everyone because we rely on the conversational context to disambiguate our meaning.

For the most part, we don't need to be nitpicky about the relation between sentences and propositions. However, there are legitimate philosophical reasons for being careful. We'll constrain ourselves by the following rule: Whenever there is a serious threat of ambiguity, we'll distinguish between sentence and proposition; otherwise, we'll assume that there is a one-to-one relationship between a given sentence and the proposition it expresses.

One of the necessary skills for being a good thinker is that we know the difference between sentences and propositions. With that ability, we will be able to distill overblown and ambiguous sentences into their propositional content. Good thinkers avoid pompous writing and express themselves succinctly and accurately. A skill necessary for succinct and accurate expression is distilling propositional content from its sentential expression. This fine-tuning is a logical skill: Remember *words and sentences are elements of language, while concepts and propositions are elements of logic.*

1-9 DEFINITIONS

Finally, let's consider definitions. The need for definitions in discussing complicated issues is undeniable. There are some words whose definition can't be accomplished simply by pointing and saying, "things like *that*." But that there are some words that cannot be defined this way entails that there are others that can. So we have here a case where there are different kinds of definitions.

Ostensive definitions are those that can be understood only by pointing (ostension); **explicative** definitions are those that are understood by placing the defined term in a framework of other relevant concepts. But ostensive and explicative definitions aren't the only species of definitions. There is, in addition, the stipulative definition. **Stipulative** definitions simply announce without explication that some symbol will mean something; hence the word "stipulative." One often finds stipulative definitions in mathematics and logic. There are two subspecies of stipulative definition, the precisifying stipulative definition and the pure stipulative definition. A **precisifying stipulative** definition is a stipulative definition that specifies that of all of the possible meanings of a particular symbol or set of symbols, only one will be in play. A **pure stipulative** definition is a stipulative definition that lays down that a particular symbol will mean what the author says it means.

All definitions have the same function in our cognitive life.

Definitions:

- (1) **state** the criteria for membership in the class of referents of a concept
- (2) **indicate** the relationship between a given concept and other concepts
- (3) **condense** the knowledge we have about the referents of the concept

Where definitions will differ is in the ways in which these functions are realized.

Ostensive definitions realize (1) and (3) by pointing. When we want to define "rose" we might simply point to a rose and say "everything that has flowers like that and prickles like that is a rose." Thus, in the act of pointing we have stated the criteria for membership and have condensed our knowledge about roses. Ostensive definitions typically do not directly indicate the relationship between a given concept and other concepts. But it's possible to infer those relationships indirectly. If I point to roses and say that anything that has flowers and prickles like that is a rose, I can infer that peonies, which sometimes have rose-like flowers, are not roses because they do not have prickles like that. So the concept of peony is distinct from the concept of rose, even though the ostensive definition of the concept of rose does not state that relationship.

Explicative or ordinary definitions are the really interesting definitions, from a logical point of view. They realize (1), (2), and (3) in the most recognizable ways. Let us stipulate that the word being defined is the *definiendum* and the words used to define the definiendum are the *definiens*. Then we can say that explicative definitions provide for the definiendum an explicative definiens. In order for the explicative definiens to be precise, helpful, and clear, there are six general rules for constructing definiens.

1. Definitions should include a genus and differentia. The genus is a criterion for membership in a general class; the differentia are criteria for membership in a specific class. For example, marriage is a relationship between humans in which two people agree before a legal witness to avoid intimate relationships with others during their lifetimes. Here the genus is

relationship between humans

and the differentia is

*two people agree before a legal witness to avoid intimate relationships
with others during their lifetimes.*

But providing genus and differentia also help us realize that the concept of marriage is related to the legal system and to intimate relationships, so it also helps realize the second function of a definition. And it condenses our knowledge about the concept of marriage into a single pithy proposition, so it realizes the third function of definitions too.

2. Definitions should be at the appropriate level of generality or specificity. That definitions should not be too general is a criterion for membership in a specific class; that they should not be too specific is a criterion for membership in a general class. For example, if we define marriage as a relationship between humans in which two people agree to fore swear intimate relationships with others during their lifetimes, we have not been specific enough, since any two people can do that without a legal witness. On the other hand, if we define marriage as a relationship between humans in which two people agree before a minister to fore swear intimate relationships with others during their lifetimes, we have defined marriage too narrowly, since a minister is not the only legal witness possible for a marriage. Again, following this rule helps us realize the relationship between marriage and the law, so helps us realize the second function of definitions, and following it helps us condense our knowledge about the concept of marriage, so helps us realize the third function of definitions.

3. Definitions should use essential attributes rather than accidental attributes. This rule clearly realizes the first function of a definition, for it's always preferable to have criteria for membership in a class that appeal to the essential rather than to the accidental attributes of a thing. When we classify or categorize a thing as a member of a particular class, we want to classify things by their essential properties rather than their accidental properties. An *essential property* is a property that a thing has without which it would not be the thing that it is. For instance, it's an essential property of trees that they have leaves or needles; it's an essential property of automobiles that they have a propelling device of some kind; it's an essential property of balls that they be round. It's an accidental property of trees that they have the number of leaves that they do; it's an accidental property of automobiles that they have radial tires; it's an accidental property of balls that they be of a specific color.

Determining what is and what isn't an essential property is sometimes quite difficult. Some properties are, we might say, *conditionally essential*, others, *unconditionally essential*. Take the former: if I am a police officer who is not undercover, it's essential that I carry some form of official identification. But it isn't essential to me in general that I carry some form of official identification. So, we might say that carrying some form of official identification is a conditionally essential property of mine, conditional upon my being a police officer who is

not undercover. On the other hand, it's an unconditional essential property of mine that I was born where I was born: if I were born in Chicago, then had I been born in Milwaukee, I would not be the person I am.

So, now, let's put the distinction between *essential* and *accidental* properties to work. If we define marriage as a relationship between human beings that begins with a wedding in which two people recite vows and get dressed up, we might accidentally pick out all the marriages, but we wouldn't thereby have found the essence of marriage. Rather, we would have found some attributes of marriages, but *not* the essential ones. Again, finding the essential attributes helps us realize the relationship between marriage and other concepts, such as weddings, getting dressed up, and so forth, so it helps realize the second function of definitions, and talking only about the essential attributes helps condense our knowledge of marriage, so it helps realize the third function of definitions.

4. Definitions should not be circular. This is so obvious that we need not spend much time on it. We may not use the word being defined, or synonyms of it, in the definition of the word.

5. Definitions should avoid using negative terms. It's one thing to say what something is not; it's quite another to say what a thing is. Defining marriage as a human relationship that isn't a competitive sports relationship is not all that helpful.

6. Definitions should avoid vagueness, obscurity, and metaphor. Vague criteria provide no precision. If we define marriage as the human relationship in which two people realize to the fullest extent what it is to be a person, we're not being helpful. Obscure criteria rely on abstract or technical terms that may not be well understood. If we define marriage as the human relationship that best expresses our participation in unbounded love, we're not being very helpful, since unbounded love is hopelessly abstract. Finally, metaphor doesn't tell us what a thing is, but what it's like. Defining marriage as the cherry on top of life's sundae is pretty but not very helpful.



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EXERCISES: Test Your Knowledge.

1.A. Are the following strings of letters words of English? Why or why not?

1. terrible
2. turrible
3. lola
4. lalasnocker
5. tarantula
6. antidisestablishmentarianism
7. supercalifragelisticxpealidocious

1.B. Are the following strings of words sentences of English? Why or why not?

1. Stephen slept on the Spaniard's sofa
2. Curiously, Roland's use of the WD-40 coincided with Boris Yeltsin's yawning, resulting in Mr. Yeltsin receiving an unhealthy spray of oral lubrication
3. Curiously, Roland's receiving Boris's yawning use of oral lubrication resulted in coinciding WD-40 unhealthy spray
4. Stephen's mother's sister's daughter's dog ate lollipops for dinner
5. Never in my life
6. Wouldn't it be nice if we were older?

7. Emerging from the tunnel, Hugh Grant tripped
8. Hugh Grant, emerging from the tunnel, tripped
9. Hugh Grant tripped emerging from the tunnel
10. Tipper!

1.C. How many propositions are expressed in the following sentences?

1. Tom went to the supermarket.
2. I enjoyed the drinks last night at Kimball's.
3. Tara's mathematical ability allowed her to skip third grade and go to Europe to compete in the Slovenian International Mathematical Olympiad.
4. Never in my life have I seen such a display of arrogance as when Boris read Natasha the riot act when Natasha said "hello" to Bullwinkle.
5. Either Tom or Terry are taller than Tim.
6. Since you are incapable of being dishonest, I have no alternative but to conclude that you must have been a Boy Scout when you were younger.
7. Whenever Joy goes to the office, she stops at Starbuck's for a coffee.
8. The President's reputation is forever tarnished because he accepted that tea set from the Japanese ambassador.
9. It's raining, it's pouring, the old man is snoring.
10. Judge Judy is getting hot under the collar again.

1.D. How many propositions do the following sets of sentences each express?

1a. Providence is between Boston and New York.

1b. Providence is between New York and Boston.

2a. Eric Clapton is a blues singer.

2b. Eric Clapton is a rock guitarist.

3a. The Taj Mahal is beautiful.

3b. The Taj Mahal is pulchritudinous.

3c. The Taj Mahal is bonny.

4a. Forget San Antonio as a host for the Olympics.

4b. Forget San Antonio as a host for the winter Olympics.

1.E. Provide definitions for the following terms. Be sure to follow the rules of definition as discussed in this chapter.

1. Pen

2. Justice

3. Emotion

4. Computer

5. Toaster

6. Sister

7. Democracy
8. Psychology
9. Sentence
10. Mountain

1.F. What is wrong with the following definitions? Explain.

1. “Pen” means one of these things that I bought at Walgreens.
2. Justice is whatever helps the poor.
3. An emotion is a psychological state in which one emotes.
4. “Computer” means a digital device on which to play games.
5. A toaster is someone who gives a toast.
6. A sister is the opposite of a brother.
7. Democracy is the worst form of government excepting all the other forms of government.
8. Psychology is what Professor Davis does.
9. A sentence is a string of words.
10. Mountains are the most sublime creations of God.

KH
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