Categorical proposition in logic pdf

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CHAPTER 5. CATEGORICAL PROPOSITIONS

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Theory of Deduction and Categorical Propositions

5.1 The Theory of Deduction
5.2 Classes and Categorical Propositions
5.3 The Four Kinds of Categorical Propositions
5.4 Quality, Quantity, and Distribution

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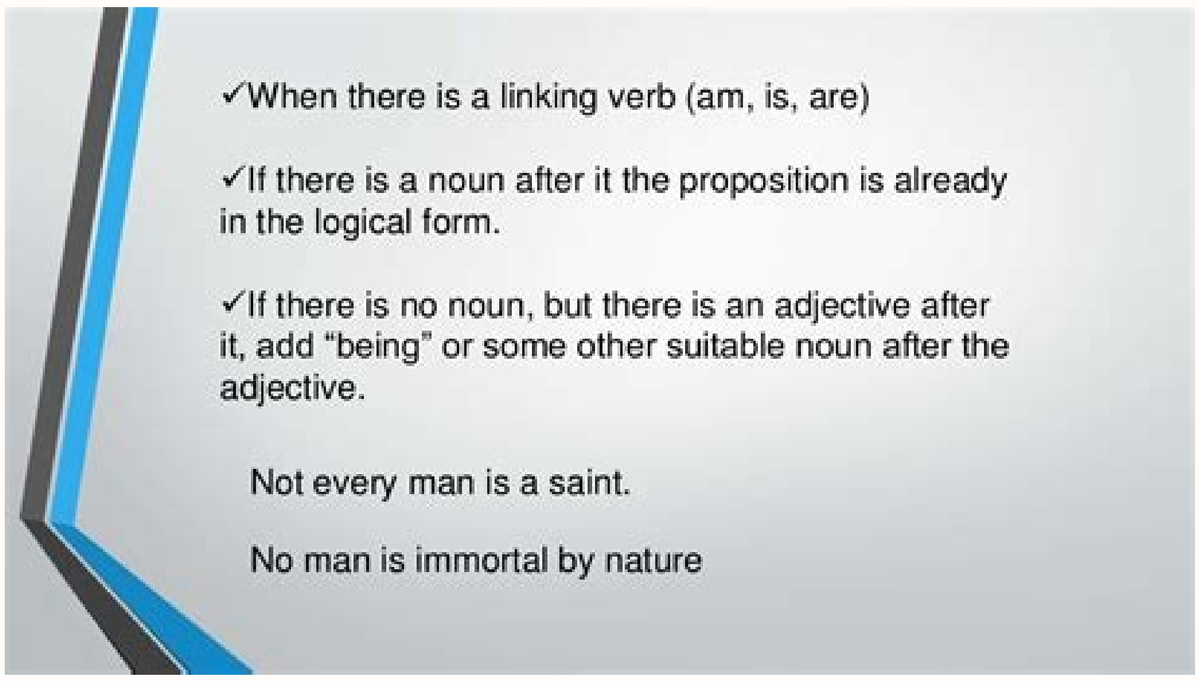
DEDUCTIVE ARGUMENT

- It is one whose premises are



Categorical Propositions

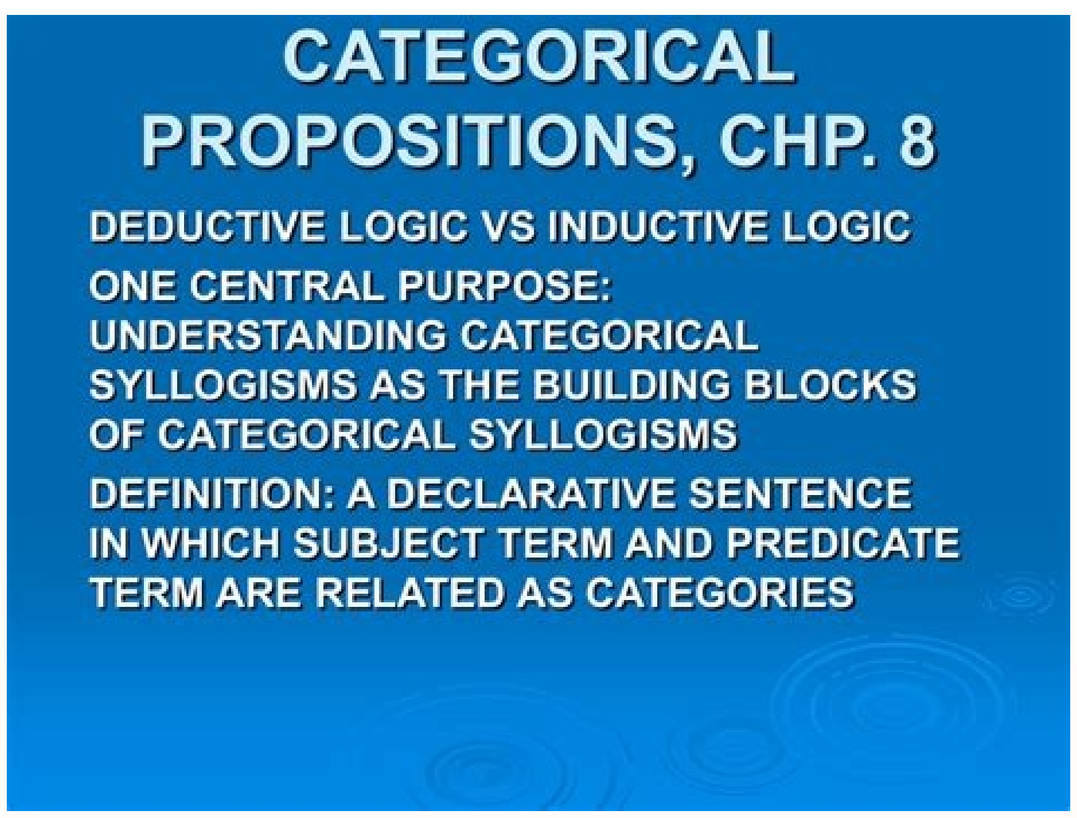
Now that we've taken notice of many of the difficulties that can be caused by sloppy use of ordinary language in argumentation, we're ready to begin the more precise study of deductive reasoning. Here we'll achieve the greater precision by eliminating ambiguous words and phrases from ordinary language and carefully defining those that remain. The basic strategy is to create a narrowly restricted formal system—an artificial, rigidly structured logical language within which the validity of deductive arguments can be discerned with ease. Only after we've become familiar with this limited range of cases will we consider to what extent our ordinary-language argumentation can be made to conform to its structure.

Our initial effort to pursue this strategy is the ancient but worthy method of categorical logic. This approach was originally developed by Aristotle, codified in greater detail by medieval logicians, and then interpreted mathematically by George Boole and John Venn in the nineteenth century. Respected by many generations of philosophers as the the chief embodiment of deductive reasoning, this logical system continues to be useful in a broad range of ordinary circumstances.

Terms and Propositions

We'll start very simply, then work our way toward a higher level. The basic unit of meaning or content in our new deductive system is the categorical term. Usually expressed grammatically as a noun or noun phrase, each categorical term designates a class of things. Notice that these are (deliberately) very broad notions: a categorical term may designate any class—whether it's a natural species or merely an arbitrary collection—of things of any variety, real or imaginary. Thus, "`cows`," "`unicorns`," "`square circles`," "`philosophical concepts`," "`things weighing more than fifty kilograms`," and "`times when the earth is nearer than 75 million miles from the sun`," are all categorical terms.

Notice also that each categorical term cleaves the world into exactly two mutually exclusive and jointly exhaustive parts: those things to which the term applies and those things to which it does not apply. For every class designated by a categorical term, there is another class, its complement, that includes everything excluded from the original class, and this complementary class can of course be designated by its own categorical term. Thus, "`cows`" and "`non-cows`" are complementary classes, as are "`things weighing more than fifty kilograms`" and "`things weighing fifty kilograms or less.`" Everything in the world (in fact, everything we can talk or think about) belongs either to the class designated by a categorical term or to its complement; nothing is omitted.



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A Deductive System of Aristotelian Syllogism

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Abstract

Aristotelian syllogism is traditional logic which is considered as un-formalized normally. The paper formalized Aristotelian syllogism as the forms of propositions with all the rules for getting the valid forms (figures).Based on the results, an automatic system are developed using VC++ and MFC(Microsoft Foundation Class).For any Aristotelian syllogism which are divided into 4 types named as 4 figures and numbered totally 256, the valid conclusions can be output when users input the premises of a Aristotelian syllogism.The core codes and the methods of transforming Aristotelian syllogism logic into programming logic are presented.

1. Introduction

An Aristotelian syllogism consists of the three categorscal propositions of major, minor (the two premises) and one conclusion. A categorical proposition is one of the following four types as in Table 1.

Type of judgment	Type of judgment classified by quantifier	Natural language Expression in English	Interpretation by first-order logic
A	universal	Every (For all) S is P	$(\forall s)P(s)$
E	universal	Every (For all) S is not P	$(\forall s)\neg P(s)$
I	particular	Some S is P	$(\exists s)P(s)$
O	particular	Some S is not P	$(\exists s)\neg P(s)$

Table 1: The interpretation of Aristotle's syllogism by natural language (English) [1]

Every categorical proposition consists of the four variables as follows:

Quantifier term Copula term

Definition 1. Aristotelian syllogism. The three categorical propositions constitute one Aristotelian syllogism if the 6 terms of the three ones respectively are {m,p},{m,s},{s,p}.

As the positions of the four terms in the two premises of syllogism m,p,m,s can be different , so the it can be formalized as the four figures according to the different positions of the two middle terms (obviously, middle term m is the repeated term in the two premises) .

Definition 2. Figure of Aristotelian syllogism. A permutation of the different positions of term m is a figure.

So, An Aristotelian syllogism can be one of the four figures as in table 2(Q denotes quantifier).

Obviously,By BNF, we have:

Term ::= < s > |< p >|< m >
Quantifier ::= < universal >| < particular >
Copula::= <affirmation> |< negation>
Categorical proposition ::= < major >|<minor>|<conclusion>
Premise ::= < major >|<minor>
Aristotelian syllogism::= < major ><minor><conclusion>
Figure::= first figure | second figure | third figure | fourth figure

Definition 3 Valid Aristotelian syllogism. If the following proposition is true:

major∧minor →conclusion

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Categorical proposition in logic ppt. Define categorical proposition in logic. Components of categorical proposition in logic. What is categorical proposition and what is the use of it in logic. Types of categorical proposition in logic. Categorical proposition in logic examples. Categorical proposition in logic pdf.

In this essay, you will find everything related to categorical logic: examples, definition of a categorical proposition, and more. We will write a custom essay specifically for you for only $16.05 $11/page 308 certified writers online What Is Categorical Logic? Categorical logic is a type of deductive logic that is based on four propositions. These propositions are statements, which categorize members of different classes on the basis of their connection to each other. The first categorical proposition has a form of "all S is P," where S is the subject category, and P is a predicate category ("Categorical propositions," 2017). This type of statement has a universal quantity and a positive quality because it assures that all members of one category are included in another class. Categorical Logic Examples For example, the phrase "all women are people" is a categorical statement of the first type. The second categorical proposition is also a universal statement, but it has a negative quality – "no S is P" ("Categorical propositions," 2017). A phrase "no mice are people" can be given as an example of this proposition, because no mice can be attributed to the category of people. The other two propositions show a connection between a particular quantity of objects to a category. First of all, an affirmative statement, "some S is P," denotes that some of the objects from one category can be attributed to another group ("Categorical propositions," 2017). For instance, "some people are women" means that while some people can be women, not all people are female. Finally, the fourth categorical proposition is a negative statement "some S is not P" ("Categorical propositions," 2017). This proposition can be seen in the phrase "some people are not women," which shows that people can be women, but not all of them are. Why Is It Important to Understand Categorical Logic? It is important to understand categorical logic because it allows one to make certain logical statements. According to Copi, Cohen, and McMahon (2016), these arguments have a solid foundation and are usually considered valid. The application of this logic can help to form an opinion and become a basis for every problem solution process. This logic can assist in resolving personal arguments or establishing moral grounds in controversial professional issues. For example, making such claims as "some patients have different beliefs" and "all patients are equal" provides a firm basis for developing a tolerant environment in providing equal treatment for every person. References Categorical propositions. (2017). Web. Get your 100% original paper on any topic done in as little as 3 hours Copi, I. M., Cohen, C., & McMahon, K. (2016). Introduction to logic (14th ed.). New York, NY: Routledge. Categorical Logic: Categorical Propositions Let's start with a question: What is a proposition/ What does a proposition do? Answer: it proposes that something is the case. That's the same as: it says something about something. And that is often called "predicating" (also "attributing"). There is a limit to the number of ways that you can say something about something. i.e., there is a limit to the number of ways you can predicate. To start with, you can say something about one single individual or individual thing, like "Pluto is not a planet." Or you can say something about a group of things. When you say something about a group of things, you are always either talking about the entire group (in which case you either use "all" or "no," or something roughly equivalent), or you are talking about less than the entire group (in which case you use "some" or something roughly equivalent). So, for instance, you might say Water is wet (which is equivalent in meaning to All water is wet) or No popes have daughters or you might say: Some teapots break easily or Some Members of the House send inappropriate emails. You can use any number of different verbs to make a predication (like "send," "break," "have," or "is"). But if you wanted to simplify things and make all your predications be of the same form –verb-wise, I mean–the best candidate is the verb "to be." All the predications above can be restated using "to be." But not all predications using "to be" could be restated as readily using "have" or "send." No Popes are people who have daughters. Some teapots are things that break easily. Some Members are people who send inappropriate emails. When you do that, when you use "to be" as the main verb of your predication, what you are doing is explicitly setting up a claim about a relation between two groups of things, or what we'll call two categories. Your predication is proposing that one category is either completely inside, or completely outside, or partially inside, or partially outside of another category. In Logic, this is known as the study of Categorical Propositions, i.e., statements which assert something about membership between two categories of things. There are four standard form categorical propositions, and they are going to be our focus in this chapter. Here are the forms they take: All S is P No S is P Some S is P Some S is not P There are four elements to each of them: 1. A quantifier: the word that clues you in to whether we are saying something about an entire class or only part of the class. 2. A Subject term –indicated by the letter "S." A term is an expression (a word or a phrase) that describes a group or category. The subject is the category about which something is being said. 3. A Predicate term –indicated by the letter "P." The predicate is what is being said of the subject. 4. A form of the verb "to be," which connects the subject term to the predicate term. This is known in Logic talk as "the copula." Those are all pretty easy to spot. You might have noticed that two of these four propositional forms are negative: the one that begins with "No" and the one that has "is not" in it. The other two are positive, or affirmative, as we say in Logic. This is called the Quality of the proposition: whether it affirms or denies the inclusion of a class in another class. Two of them begin with "some" while the other two begin with words that indicate an entire class or group: "all" and "no" respectively. This is called the Quantity of the proposition: whether it is about all or only some members of a class. Talk about all is called "universal," and talk about some is called "particular." In Latin, "I affirm" is "Affirmo." "I deny" is "Nego." The working out of the basic knowledge about categorical propositions was done in Latin, by medieval scholars. They chose to use letters from these two Latin words to provide names –as shorthand–for the four forms of predication that we call "categorical propositions." "A" is the name of the universal statement that affirms inclusion of one class in another: All S is P. "E" is the name of the universal statement that denies inclusion of one class in another: No S is P. "I" is the name of the particular statement that affirms the inclusion of one class in another: Some S is P. "O" is the name of the particular statement that denies the inclusion of one class in another: Some S is not P. "A" and "I" are affirmative statements, and these letters are the first two vowels in the Latin word "Affirmo." "E" and "O" are negative statements, and these letters are the first two (only) vowels in the Latin word "Nego." That's why "A" stands for the universal affirmative, "E" for the universal negative, "I" for the particular affirmative, and "O" for the particular negative. Before you go to the exercise set, there is an oddity about standard form categorical propositions: when a statement is about a single individual (person, place, country, planet, etc.), that individual has to be represented in the proposition as a category. This is not how we think of individuals in everyday life. So this means that it won't be enough to use the person or planet's name, and say "Pluto is not a planet." That looks somewhat like an O statement, since O is the one with "is not" in it. Instead you have to refer to the category that Pluto makes up. Now there is only one thing in that category, namely Pluto itself. So you are going to write this as a standard E statement: "No things identical to Pluto are planets," or "No thing that is Pluto is a planet." This way you preserve the four parts of the standard form proposition. Distribution There is another feature of categorical propositions, besides their quantity and their quality, that is important to understand if one is to master them. It is called "distribution." If you will entertain the connotation of "distribute" as "giving something out to all," you may find this concept less difficult to grasp than otherwise. We say that a proposition distributes a term when the term is located in a place that means that something is being said about all members of the class named by it. By "place," what I mean is this: whether it occurs as subject or as predicate. In "All S is P," whatever term might go into the place occupied by "S" is going to be distributed. Whether we say All jerks are inconsiderate people or All cats are animals or All smokers are people at higher risk for lung disease than others, it is obvious in each case that something is being said about every member of the class that follows the word "all." So we can say that in A propositions (that is, in universal affirmative propositions), the subject term is always distributed, i.e., something is being said about each and every member of the class named by the subject term. Once this is clear, it should be obvious that it is also true for E propositions: universal negative statements also say something about each and every member of their subject term: No popes have daughters No Christians are Buddhists No vegetarians are scuba divers. In all three of these examples, it is clear that the predication being made is made of each and every member, respectively, of the class of popes, Christians, and vegetarians. There is never going to be an exception to this point: all universal statements make a predication about all members of their subject class. But it is important to note that No popes have daughters also says something about all daughters, whereas All cats are animals does not say anything about each and every animal. How is this the case? No popes have daughters says that every single daughter has for her father a person who is not a pope. But All cats are animals does not tell us anything about all animals; it only says something about the animals that are cats. So in a universal negative (E) statement, we find that the predicate term is always distributed as well as the subject term, but that in universal affirmative (A) statements, the predicate term is not distributed. It's too early in our study of Logic, and of Categorical Propositions, for you to see the relevance of this just yet, but it is helpful to get the concept in front of you early on, so you'll have time to digest it, so to speak, for later on, when you'll need to bring it back up. (Note the metaphor.) Just in case you are wondering, the reason it is relevant is that when you build an argument using two or more categorical statements, the validity or invalidity is going to depend on whether or not connections between the categories are established. If a term is never distributed in an argument, then no overlaps or explicit connections have been made, and no conclusion will be able to follow as a result. Let's finish this discussion of distribution with two more points: particular affirmative statements, which we call "I" statements, distribute neither term. No surprise there: "Some birds are robins" clearly does not say anything about all birds, and no statement of the form "Some S is P" ever could. It also does not say anything about all robins. But like the universal negative statements, the particular negative (O) statements do say something about each and every member of their predicate terms' classes. To say that they say something about these terms' classes is to say that these statements contain information about them: it takes a little thought to see how they say it. Consider the O statements Some animals are not cats and Some cats are not dogs. Both are true, and you can see that the first means that there is at least one animal that falls outside the class of cats –outside the entire class of cats. Search through the entire class of cats, this statement says, and you are guaranteed to realize that there is at least one animal that is not a member of it. The same is true if you search through the whole class of dogs. That is a reference to every member of the predicate class, the class of cats in the first example, the class of dogs in the second. This brings us to the need to comment on how we interpret "some" in Logic. We take it to mean "at least one." So the statement that Some dogs are animals is one we call true. It might sound funny to you at first to say that this is true, since you want to say "No you idiot, all of them are!" And you are quite right, of course, if a little rude. But your being right that all of them are animals is completely consistent with my claiming only the weaker point– that at least one of them is. So take note: this will take a little getting used to on your part: accepting that in Logic, "some" only means "there is at least one," and that therefore sentences like "Some wives are married" are not false, even though they tell less than the whole story; rather, they are true in what we call a trivial sense. If what you say is not the whole story, that does not mean that it must be false. In fact, that is something most of us know intuitively, and explains why, from time to time, we are tempted to not tell the whole story: under the right circumstances, at least we can say we were not lying! Time to summarize the results of this discussion of distribution: Universal statements distribute their subject terms, and Negative statements distribute their predicates. That's what it boils down to. As long as you can tell universals and negatives apart, you can make the relevant call on the question of distribution. Like much in Logic, there is a formal element to this knowledge: you can get it right without even understanding it, as long as you memorize the formalizable aspects accurately. But it is preferable to also understand what it is that you memorize. Insight has its own rewards. Here is a link to a Powerpoint that reviews this material: 7 Categorical Propositions

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