

Subject matter of Logic and its Components

It was clearly stated that Logic is concerned with the correctness of argumentation. This means that the distinctive subject matter of logic is arguments. Indeed in its creative usage and for all practical and intellectual purposes and usages, logic is concerned with arguments. And it is remarkable that argument is central to our existence as human beings. At home, in the market places, in our offices and at school, indeed in everyday life, argument is one of the main ways we exchange ideas with one another. Suffice it to say that all people, including you, make arguments on a regular basis. When you make a claim and then support the claim with reasons, you are making an argument. Academics, business people, politicians, scientists, and other professionals all make arguments to determine what to do or think, or to solve a problem by enlisting others to do or believe something they otherwise would not. Not surprisingly, then, argument dominates everything we do as humans, hence essential for our training in life engagements especially as learners.

Arguments

In everyday life, we often use the word "argument" to mean a verbal dispute or disagreement. This is not the way this word is usually used in logic. When people disagree each person ordinarily attempts to convince the other that his or her viewpoint is the right one. Unless he or she merely resorts to name calling or threats, he or she typically presents an argument for his or her position. In this context, that is, in logic, **"arguments" are those statements a person makes in the attempt to convince someone of something, or present reasons for accepting a given position.** An argument is thus not the same thing as a quarrel.

The goal of an argument is not to attack your opponent, or to impress your audience. The goal of an argument is to offer good reasons in support of your position, reasons that all parties to your dispute can accept. Nor is an argument just the denial of what the other person says. Even if what your opponent says is wrong and you know it to be wrong, to resolve your dispute you have to produce arguments. And you haven't yet produced an argument against your opponent until you offer some reasons that show him to be wrong. Therefore, to argue means to put forward or proffer reasons for or against something (idea, opinion, view).

An argument is, thus, said to have taken place whenever one constructs a chain of reasoning(s) in support of a viewpoint or position. In consequence, an argument or argumentation involves the provision of reasons in support of a viewpoint. What is clear from this standpoint is that an argument, in a formal or technical sense, is not understood in the pedestrian sense, according to which the term connotes in its meaning disagreement, controversy, or even verbal quarrelling.

An argument is accordingly defined as any set of statements (propositions) some of



which (the premiss(es) purport to provide reasons for accepting one of them (the conclusion). That is, in an argument we usually have a set of statements (propositions) constructed in such a manner that one follows from or implied is by the other(s). When we use the word "argument" here, therefore, its use has nothing to do with quarreling, fighting, or disagreement. An argument is simply a set of statements, one of which is designated as a conclusion and the remaining statements, called premises, are offered as evidence or justification that supports or implies the conclusion. It is also instructive to distinguish an argument from a debate. A debate is really a series of arguments usually, but certainly not always, about a single topic or a set of related topics. A debate may be a formal debate such as the presidential debate or the debate held between two scholastic debating teams. A debate may be an informal debate during, for instance, a dinner party or a public hearing where rules of debate are not enforced. The point is that a debate always involves argumentation but an argument itself is not and does not involve a debate.

Premiss (es) and Conclusion

The statements (propositions in logic parlance) that are used to proffer reasons which support or provide evidence on the basis of which, we are enabled to assert a position or another proposition are called premiss(es). The word premiss itself comes from the Latin praemisus (plural praemissa) meaning —placed in front||. This etymological definition supports our use of the spelling "premiss" and "premiss(es)" rather than "premise" and "premises||. "Premises" is a lawyers' term of art meaning "real estate", which captures a French legal term meaning —aforesaid|| that only came to be used (usually in the plural) to refer, rather legalistically, to property (and its appurtenances), in such phrases as "to occupy the premises" and "to vacate the premises." The confusion over the spelling arises from the fact that the premises of an argument are traditionally laid down before the conclusion, so they are also "aforesaid," in the same sense as the description of property on a legal document. Although both spellings are ordinarily used, "premise" and "premises" are more correct and indeed preferred in logic. In this etymological sense and indeed its more correct usage, premises are statements usually put forth as part of an argument, they constitute the reasons on the basis of which we establish or arrive at new set(s) of information. In the sense of this characterization, in arguments such as: 1. (a) All lawyers are liars

- (b) All liars are unreliable
- (c) Therefore, all lawyers are unreliable statements



(a) and (b) are premiss(es); they provide the information on the basis of which statement (c) is arrived at.

Statement (c) of 1 is called the conclusion or main claim; it is arrived at or its truth is established by statements (a) and (b) of 1.

The conclusion (of an argument) is, therefore, the proposition that is affirmed or asserted based on the information or reason(s) provided by the premiss(es). In effect, in making arguments, propositions are patterned into premiss(es) and conclusion such that the premiss(es) provide evidence, reasons or support for the conclusion that is main claim; the conclusion is affirmed or asserted based on the evidence or reasons provided by the premiss. The import here is that the propositions identified as the premiss(es) of an argument are the reasons for accepting the conclusion of the argument. Arguments may be as short as a single sentence or as long as a book. Every argument, however, must (by definition) have a conclusion. The conclusion is the claim that is argued for. Both premiss(es) and conclusion must be statements, that is, claims that are either true or false (whether or not we know which). Questions, in particular, cannot be premiss(es) or conclusions.

In the sense of "argument" and "arguing" (offering an argument) we are using here we would not say "John was arguing whether God exists"—or at least if we did say this we would not be identifying the conclusion of his argument. "Who caused the world?" is not going to be a premise or conclusion of any argument, because it is not a statement. Nor is a question of the form "Who is to say that ...?" Premises are claims that support the conclusion. Questions may be used to suggest claims, of course. Indeed this is so often done for effect in debate that such questions are known as "rhetorical questions." Thus a debater might say "Would you want to be governed by the military? Well, then you should support a strong defense." But insofar as there is an argument here, the premise is not the question —would you want to be governed by the military?|| but the answer that the debater is presuming you would offer (silently) in reply to the question, namely that you would not want to be governed by the military.

In an argument, the conclusion, which is the main claim is normally supported by its two or more premiss(es). In this sense, the premiss(es) are reasons or statements of support for the main claim. It is this support provided by the premiss(es) that make the conclusion something more than mere assertions. In this regard, the premiss(es) or reasons are statements in an argument that pass two tests:

1. the answers to the hypothetical challenge to a claim: —Why do you say that?|| —What reason can you give me to believe that?||, and
2. a link to the claim, an indication of the reason (usually using the word because or its equivalent).

If the premiss fail to address the hypothetical challenge or the 'because' tests, there



is something wrong with the logic of the argument. The import here is that the reasons or premiss(es) of arguments themselves need to be supported in a number of ways. Here are some ways that the premiss of an argument itself can be supported:

(1)**Assumptions:** Eventually, all support for premiss(es) can be traced back to a set of beliefs which the person making the argument considers to be self-evident, and therefore not in need of further support or analysis. These may be called assumptions, presumptions, suppositions, or, in certain situations, postulates and axioms. Such assumptions serve as the premiss(es) for supporting arguments and, in general, any premiss can be called an assumption.

(2) **Evidence:** A premise can be made more acceptable when it is supported by various kinds of evidence: statistical studies, historical information, physical evidence, observations, or experiments, eyewitness accounts, and so on. Statistics include raw numbers (3 million candidates registered for JAMB), averages ('women bowling teams drink on average two pitchers less than men's'), statistical probabilities ('travelling by train reduces chances of accident by 70%'), and statistical trends ('kidnappings have risen 60% over the past three years'). Generally, statistics have the advantage of seeming objective, authoritative, and factual, but critical audiences will want to know about the sources and methods for determining your statistical evidence. The relative strength of evidence is determined by how reliable a person believes it to be. Almost no evidence is beyond dispute – we might challenge the methodology of a study, the accuracy of the information, the manner in which physical evidence was collected, and the eyesight or motivation of an eyewitness. And remember that the evidence only supports the premiss(es) – evidence cannot be an argument itself.

(3)**Testimony from an Eyewitness.** Eyewitness or first-hand testimonies are reports from people who directly experience some phenomenon. If, for example, one is arguing about toxic waste dumps, a quotation from someone living next to a dump would fall into this category. First-hand testimony can help give the audience a sense of being there. Experts may also rely on direct experience, but their testimony is also backed by more formal knowledge, methods, and training. Supplementing the neighbor's account with testimony from an environmental scientist, who specializes in toxic waste sites, is an appeal to expertise or authority.

(4) **Authority:** Sometimes, we are not in a position to judge supporting evidence for ourselves: there may simply be too much of it, or it may be too technical in nature, or it may not be directly available to us. In those cases we often rely on the judgments of others, authorities whom we believe to be more likely to come to an accurate evaluation of the evidence than we are ourselves. Though we tend to think of such expertise inscientific, medical, or other scholarly fields, authority in arguments can also come from religious teachings, folk wisdom, and popular sayings – anything or anyone that we accept as somehow able to reach a more accurate evaluation. The



relative strength of an authority in an argument depends on how willing a person is to accept the judgment of that source, but even in the strongest of cases, use of an authority merely supports a premiss, and does not make an argument by itself. In fact, when using expert testimony in arguments, you should always make sure the authority you are appealing to is in fact qualified to speak on the topic being discussed.

(5) **Explanations and Anecdotes:** Sometimes, we are more willing to accept a premiss if we are given background information or specific examples. Such explanations and accounts are not given the importance of evidence or authority in an argument. Anecdotal evidence, for example, is by definition less statistically reliable than other sorts of evidence, and explanations do not carry the weight of authority. But both anecdotal evidence and explanations may affect our understanding of a premiss, and therefore influence our judgement. The relative strength of an explanation or an anecdote is usually a function of its clarity and applicability to the premiss it is supporting.

(6) **Specific** instances include examples, case studies, and narratives. Each can be an effective mode of building support for a reason or claim. Specific instances offer a way to see an idea illustrated in a particular case. To be effective, specific instances need to be representative of the broader trend or idea they are supporting. With an example as evidence, someone arguing against seat belt use might say "Last year my cousin crashed her car off a bridge and would have drowned if she were wearing her seatbelt" as evidence (the answer to "Why do you believe that?" question.) An opponent might challenge whether this example was a representative one: surely there are many more car crashes that do not end in water, so this one instance is not a fair gauge of the relative safety of not wearing.

The various sorts of support for a premiss supporting arguments, assumptions, evidence, authority, and explanations and anecdotes etc. – interact in what we might call a hierarchy of support or evidence, in which one sort is given priority over another. In a murder trial, for example, the prosecution is usually based on the assumption that the court's hierarchy of evidence will have at the top physical evidence (fingerprints, blood samples), especially as explained by technical authorities (forensic pathologists, ballistics experts), followed by eyewitness accounts, then by other sorts of authorities (psychologists, sociologists), and finally by explanations and anecdotes (character witnesses, personal histories). If the prosecution is right, their strong physical evidence and eyewitness accounts will outweigh the defendant's character witnesses, because of their relative placement in the court's hierarchy of evidence. However, because that hierarchy is determined by the judge on a case-by-case basis, one can never be totally sure how any one piece of support will be accepted.

Propositions, premiss(es) and conclusion are however, the basic components of an argument. Both premiss and conclusion are themselves propositions, which are,



however, distinguished by virtue of their role(s) in an argument; premiss(es) are those propositions which are used to provide reasons in and for an argument, while the conclusion is the proposition asserted, warranted or established by the reasons provided in the premiss(es). Premiss(es) and conclusion are accordingly integral parts of an argument. In the following arguments:

2. (a) All Centre-leftists are radicals

(b) All radicals are democrats

(c) Therefore, all Centre-leftists are democrats.

3. (a) If Nigeria is an oil-producing country, then Nigeria is wealthy

(b) Nigeria is an oil-producing country

(c) Therefore Nigeria is wealthy

(a) and (b) of 2 and 3 respectively are the premiss(es) and (c) in each instance is the conclusion, that is, (c) is the inference drawn from the earlier propositions in both arguments.

In both examples, also, propositions (a) and (b) respectively, which are identified as the premiss(es) are the reasons for accepting the conclusions. However, the point is important that arguments are not always patterned as per examples 1, 2 and 3. In some cases, the conclusion of an argument may occur as the first proposition. The conclusion may also occur in the middle of an argument. There are also arguments, which are such that they consist of several premiss(es) from which a single conclusion is drawn. The point that comes to a relief here(s) or the conclusion of the argument. The determination as to which propositions are the premiss(es) or the conclusion is a function of identifying which set of propositions that provide support or reasons, and which of them are asserted or follows from the reasons or evidence provided.

Inferences

The reasoning process which is employed in evaluating arguments such that one moves from the information provided by or in the premiss(es) to assert certain claim or information in the conclusion is called inference. In this sense, inference rightly is what enables us to make propositions about the unknown using the known as their foundation; it is inference that allows us to transit from the premise, (which constitute the evidence for the establishment of) to, the conclusion. We may infer from the dressing and conduct of lady that she is a sex worker; we may infer from a person's demeanour, dressing and attitude that he/she is a Muslim; we may infer from the nature of the debris that it is a building razed by fire; we may infer from a man's calloused hands the nature of his occupation; we may infer from a pastor's denomination and speech that he is tolerant of gay marriage; we may infer from the sound of an engine the condition of its connecting rods.



Inferences may be carefully or carelessly made. They may be made on the basis of a broad background of previous experience with the subject matter or with no experience at all. For example, the inferences a good mechanic can make about the internal condition of a motor by listening to it are often startlingly accurate, while the inferences made by an amateur (if he tries to make any) may be entirely wrong. But the common characteristic of inferences is that they are statements about matters which are not directly known, statements made on the basis of what has been observed." (Hayakawa, S.I., 1972) Consider the following example: Suppose that Aisha visited Hakeem and upon entering the room, Hakeem shut the door and within some splits of minutes, Aisha began to scream. When people came to the direction of the scream, Hakeem believably refused to open the door, and upon forcing the doors open Aisha's dresses and pant had been torn and she is seen crying.

The inference ordinarily is that Hakeem was attempting to, or perhaps has indeed, raped Aisha. In the above example, although the fact that Hakeem was attempting to rape Aisha is not given; the inference is drawn consequent upon the reasoning based on the observed state of affairs, that is, the given in experience. Inference is thus the endpoint of reasoning; it is the process that enables us to arrive at (infer) a conclusion on the basis of the premiss(es) which constitute both the starting point of the process and the evidence for the establishment of the former proposition.

However, there is no doubt that inference as a process of reasoning is an important category in evaluating arguments, but the logician's interest is not in the process of inference. The logician is interested in the propositions that are the initial and endpoints of that process, and the relationships between them. Inference is thus not a component or part of an argument; it is only a process to which corresponds an argument. If you examine our examples above, you understand that "making an inference" is a psychological process, yet an inference is the reasoning process by which a logical relation is understood. The logical relation is considered valid (good) or not valid (not good) even if we do not understand the inference right away. In other words, it is convenient to consider the logical relation as not being dependent for its validity on the psychological process of an inference. In this manner, logic is not considered as "the science of reasoning." It is prescriptive, as already adumbrated. So, this logical relation between the premiss(es) and conclusion of an argument holds regardless of whether we pay attention or not. The point that the logical relation between the premises and conclusion of an argument does not depend for its validity on the psychological process of an inference is brought into prominent relief if we consider the following example of an argument: If professionals and intellectuals are continuously edged out in the electoral process, then the apparatus of government will keep on to be in the hands of charlatans. If the apparatus of government is kept on in the hands of charlatans then good governance will persist only as a pipe- dream. If good governance persists only as a pipe-dream, then this country will remain perpetually vulnerable both economically and in infrastructure.



Therefore, if professionals and intellectuals are continuously edged out in the electoral process, then this country will remain perpetually vulnerable both economically and in infrastructure. This logical relation that exists between the premiss(es) and the conclusion of an argument is called an entailment. An entailment is a logical relation between or among propositions such that the truth of one proposition is determined by the truth of another proposition or other propositions, and this determination is a function solely of the meaning and syntax of the propositions concerned. Another way to remember the difference between an inference and an entailment is to note that people infer something, and propositions entail something.

Inference Identifiers The language in which an argument is presented often contains words or phrase to help identify its parts, especially its premises and conclusion. These words and phrases are identifiers of the function played in the argument. Unfortunately, identifiers are only as precise as the persons using them, and both the individual making an argument and the one evaluating it are liable to make mistakes by inexact or sloppy use of identifiers. Since the purpose of an argument is to communicate an idea clearly, the careful use and interpretation of identifiers is an important skill for critical thinking.

The following are some of the most common premise and conclusion identifiers:

Premiss identifiers { since, for, because, in that, seeing that, given that, may be inferred from, the reason is that, as indicated by, in as much as, as owing to, by reason of, follows from, may be derived from, supposing that, may be deduced from, in view of the fact that, as shown by, supposing that, for the reason that

Conclusion identifiers: therefore, thus, so, as a result, consequently, we can conclude that, it follows that, hence, accordingly, In consequence, wherefore, whence, which means that, as a result, we may infer that, proves that, it must be that, the upshot is that, implies that, which allows us infer, conclude that, In conclusion, which implies that, which points to, which shows that, entails that, for that reason

Though our list is not exhaustive, it is notable that while these words and phrases may help in spotting an argument, yet it is instructive that not all conclusions are preceded by these conclusion indicators, and not all statements preceded by these words and phrases are conclusions. Again, not all premiss(es) are introduced by premiss indicators, and these same words and phrases sometimes serve functions other than introducing premiss(es). "Because" frequently appears in explanations, and there is a use of "for" as a preposition, a use more common than its use as a premiss indicator. Similarly, "since" commonly functions as a preposition concerning duration of time rather than as a premiss indicator.

Notice also that "for" not only indicates that a premiss is coming, but that what has just been stated (before the word "for") is the conclusion (whether intermediate or final). Some of these words can also appear within the context of an argument, but



without indicating an inference. "So," for example, have several meanings, only one of which is a synonym for "therefore." Sloppy usage may also produce confusing identifiers. A common answer to the question, "What would you think if the sky suddenly clouded up and turned very dark," is "I would assume it was going to rain." Yet "it is going to rain" here is a conclusion, not an assumption or premiss. "If" and "then" are often used to identify premiss(es) and conclusions, respectively. However, "if" and "then" are also used to introduce the two halves of a conditional premise. In either usage, —then|| is sometimes omitted; or it has other meanings, as well. An identifier may not immediately precede or follow the word or phrase whose function it is indicating. For example, in the sentence "Thus, whenever the sun rises, the rooster crows," there are two claims: a premiss, "the sun rises," and a conclusion identified by "thus" (but not immediately following it), "the rooster crows."

In cases where there are no identifiers, the most frequent order is conclusion first, followed by one or more premisses. If more (say two) premises are given, they are often conjoined with "and" or "but." For example, "I like Handel. I like most classical composers, and Handel was a classical composer." Because arguments are attempts to provide evidence or support for a certain claim, they often contain these —indicators" which no doubt aid in the task of identifying the conclusion of the argument, which often comes last in the series of statements making up the argument, as we have illustrated in our examples above, but which we have noted earlier can also come first, or even in the middle, such as in these examples: Amarachi is the most qualified person for the job. This is because she has the best academic credentials and proven track record of competence of all the candidates, and she will not place the interests of trade unions above those of the establishment. Callisto orbits Jupiter. Hence, it is not a planet, because something must orbit a star in order to be a planet. In the examples above, the italicized statements are the conclusions. The other statements are offered as reasons or justifications for these claims.

