Philosophical Analysis

Contrariwise,' continued Tweedledee, 'if it was so, it might be; and if it were so, it would be; but as it isn't, it ain't. That's logic.'-Lewis Carroll, Through the Looking Glass

Throughout its development as an intellectual discipline the Western philosophical tradition has been analytic in focus as well as practice. An analytic discipline is one that engages in analysis or that analyzes. To 'analyze' here means to separate into constituent components or elements, i.e., to determine the essential features or characteristics that define the phenomena or concepts in question.

Analysis is then a critical and reductive process-reductive in that it reduces phenomena or concepts to their most basic components and critical in the sense that the process is rigorous, systematic and rational. Critical also suggests the analysis tries, in some sense, to discover the truth about the phenomena or concept in question. The principal focus in philosophical analysis is on ideas and concepts.

Since good philosophical analysis depends upon the abilities to give precise definitions to concepts and to formulate, isolate and criticize logical arguments, the principle analytic tools in philosophical investigations are:

1. *Conceptual analysis*, i.e., the process that allows one to give, or to determine, a concept's precise definition.
2. *Logical analysis*, i.e., the rules and procedures that allow one to formulate and evaluate rational arguments.

The main purpose in this article is to define and discuss the most common concepts that sound conceptual analysis and logical analysis depend upon.

�1. SENTENCES AND PROPOSITIONS

A *sentence* is a linguistic structure that observes the grammatical rules in a particular language. Consider the linguistic structures:

1. *The white cat caught the mouse.*
2. *The cat white mouse the caught.*

In both instances one can understand the individual words within the structures, however, in contrast to (2) which is ungrammatical nonsense, (1) also represents a grammatical English linguistic structure, i.e., a sentence.

What distinguishes (1) and (2) then, is that because (1) is grammatical the entire structure, in addition to the individual words, makes sense - it communicates more information than the individual words themselves. Philosophers use the terms 'statement' or 'proposition' to indicate what a sentence *expresses* or *means*. Since a proposition makes an assertion (e.g., the sentence *'The white cat caught the mouse,'* asserts that there is a white cat that caught a mouse) it is either true or false. The sentence, in contrast, is *never* true or false, but rather is either grammatical or ungrammatical.

It is important to note that not all sentences express propositions, i.e., statements that are either true or false. Thus, while genuine questions (*'Is Superman real?'*) and commands (*'Let the cat in!'*) still communicate information, what these sentences *mean* is neither true nor false.[1]

What underlies the distinction between sentences and propositions is the realization that sentences in separate languages (or even separate sentences in the same language) can express the *same* proposition. Thus, without the distinction translation between languages and synonymous expressions within languages become impossible.

�2. LOGICAL ARGUMENTS

An argument consists in one or more propositions (the *premises*), that allege to demonstrate or prove another proposition (the *conclusion*). Consider the sentences:

1. *All men are mortal.*
2. *Socrates is a man.*
3. *Thus, Socrates is mortal.*

In this illustration, neither sentence (1), (2) nor (3) *alone* represents an argument. An argument emerges when the propositions that sentences (1) and (2) express are taken as premises that purport to demonstrate or prove a conclusion - the proposition that sentence (3) expresses.

The premises then represent reasons to believe that the conclusion is true. As such the premises can be either:

1. Assumptions (that the argument never proves).
2. Definitions.
3. Factual statements or observations.

In contrast to the premises, which an argument either assumes or states, the conclusion is the sole proposition that the argument claims to *prove*. An important clue that a particular sentence represents a conclusion are such words and phrases as, 'entails', 'implies', 'because', 'therefore', 'thus', 'hence', 'so', 'since', 'suggests', 'is deducible', 'is inferable', 'on this account', 'as a consequence', 'as a result', 'it follows that', and so on . . . .

Arguments come in all sizes, i.e., there is no in principle limit on an argument's length. Some complex arguments can contain one or more intermediate conclusions prior to the main or final conclusion. In most cases these intermediate conclusions become premises in the other arguments that, in the end, are meant to support the final conclusion.

5 It is sometimes difficult to isolate arguments (or even determine whether an argument exists), nevertheless there are some cases where it is obvious that no logical argument is being made. In particular, it is important to distinguish logical arguments and *causal statements*, such as:

'The airplane lost altitude because there was a storm.'

10 This statement claims that there is a causal connection between certain events or phenomena, i.e., that one event (the storm) explains the other event (the airplane's loss in altitude), since it causes that event.

What an argument attempts to demonstrate, in contrast, is that because certain statements are true then it is possible to conclude that other statements must also true.

15 This connection between the premises and conclusion in an argument is known as *logical entailment*, i.e., the premises in an argument entail the conclusion. The relationship that an argument attempts to establishment then is *logical*, rather than *causal*.

The problem is that causal statements and arguments often use the same language, and it is possible that an argument might include causal statements as premises (or perhaps

20 even as a conclusion). Nevertheless, the point is that causal statements, on their own, fail to constitute a logical arguments.[2]

Since it is obvious (or should be) that some arguments are better or worse than other arguments, there needs to be some means to evaluate logical arguments. To evaluate arguments logicians use the concepts *'valid'*, *'invalid'*, *'sound'* and *'unsound'*.

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Valid and Invalid Arguments:

The concepts 'valid' and 'invalid' concern an argument's *formal structure*, rather than the argument's substantive claims. 'Formal structure' refers to the logical relationship between the premises and conclusion.

30 An argument is *valid* when it is impossible for the premises to be true and the conclusion to be false, i.e., when the premises are true the conclusion *must* also be true. The formal structure in a valid argument then is such that the relationship between the premises and the conclusion can be said to preserve truth. This relationship can be seen in the formal argument structure:

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1. *All As are Bs.*
2. *All Bs are Cs.*
3. *Thus, all As are Cs.*

As long as (1) and (2) are true, it should be obvious that (3) must also be true and, most important, this is the case no matter what A, B and C are. Thus, this represents a valid argument structure.

An argument is *invalid* when the premises can be true and the conclusion can still be false, i.e., the premises' truth fails to entail the conclusion's truth. Consider the argument structure:

1. *All As are Bs.*
2. *Some Bs are Cs.*
3. *Thus, some As are Cs.*

In this argument the premises fail to entail the conclusion since it is possible that (3) could still be false even when both (1) and (2) are true. The problem is that while all As are Bs it remains an open question whether all Bs are As and this needs to be the case, otherwise it is possible that the Bs that are Cs and the Bs that are As are separate groups.

Again, it is essential to realize that in logical arguments the relation between the premises and conclusion is more than one in which the premises 'suggest' or 'recommend' the conclusion, there is an *essential logical* relation between the propositions, such that the premises' truth ensures or guarantees the conclusion's truth. The relationship is open to neither interpretation nor personal opinion - the argument is either valid or invalid and it is the argument's formal structure that determines this.

Sound and Unsound Arguments:

The concepts 'sound' and 'unsound' concern the argument's substantive claims, i.e., whether the propositions that comprise the argument's premises are *true* or *false*.

A logical argument is said to be a *sound* argument when both:

1. The argument is valid.
2. The premises are true.

It is essential that the argument must meet both conditions in order to be sound. Consider again the argument:

1. *All men are mortal.*
2. *Socrates is a man.*
3. *Thus, Socrates is mortal.*

While the argument is valid, i.e., on the assumption that (1) and (2) are true, (3) must also be true, in order to be sound it must be the case that (1) and (2) are true. That all men are mortal is more-or-less a truism, though it has never been proven. That Socrates is a man

is determinable through historical evidence. Thus, the argument is both valid and sound.
When an argument fails to meet either condition (1) or (2) , i.e., when either:

1. The argument is invalid.
2. The argument is valid but the premises are false.

then the argument is *unsound.*

Note that while all the premises must be true in order to have a sound argument, it suffices to have one false premise in order to render the entire argument unsound. In the argument above, e.g., were it that case that Socrates was a computer, or a hippopotamus, then the argument would be unsound, since (2) would be false.

Argument Evaluation

To evaluate a logical argument then it is essential to determine, in order, whether the argument is valid, i.e., on the assumption the premises are true must the conclusion also be true, and then whether the premises are indeed true. This determination has three possible outcomes:

1. The argument is valid and sound.
2. The argument is valid and unsound.
3. The argument is invalid.

It is essential to realize that the need to be able to evaluate arguments is more than an academic or intellectual exercise. To appreciate the need to be able to evaluate arguments one must realize the purposes that logical arguments serve? One obvious purpose is to determine and demonstrate what is true and false, and thus to increase our knowledge. There is also a sometimes more subtle purpose and that is to, through the logical demonstration that some position is true, persuade others to adopt that position. What the concepts 'valid' and 'sound' represent then are the rational (and quite impressive) means to designate what requirements an argument must meet in order to compel us to accept its conclusions. This, in the final analysis, is the entire point, a valid and sound argument compels one to accept the conclusion - one has no rational choice in the matter.

While perhaps a technical point, note that an argument is neither *true* nor *false*, the propositions that comprise the argument are true or false. Arguments are either valid and sound, valid and unsound or invalid.

�3. OTHER LOGICAL CONCEPTS

In addition to considerations about arguments and their evaluation, there are other logical concepts that are essential to sound and accurate philosophical analysis.

Logical and Physical Possibilities:

To be possible in the physical sense means that the phenomenon in question does exist or that it can be built with the available technologies. To be possible in the logical sense, in contrast, means that the phenomenon in question can be given a consistent description, i.e., the description presupposes no contradictions.

It should be obvious, that logical possibilities encompass more than physical possibilities - while under normal conditions a person cannot leap the Pacific Ocean or breath under water, there are no logical impossibilities or contradictions in the claims that a person could indeed leap the Pacific Ocean or breath under water. Thus, there are logical possibilities that are, at this point in time at least, physical impossibilities.

There are also some logical impossibilities, i.e., entities or concepts that could never exist or whose mere idea is a contradiction. It is, e.g., impossible to even imagine a triangle with five sides.

Synthetic and Analytic Statements:

The distinction between synthetic and analytic statements concerns our knowledge and its truth conditions. Synthetic statements are statements whose truth depends upon experience and observation. Consider the statement:

Some politicians are honest.

Whether this statement is true or false is an empirical matter, i.e., it is a factual matter about the universe (well, politicians, to be precise). To determine whether a synthetic statement is true then, one must appeal to experience.

Analytic statements, in contrast, are statements whose truth depends upon what the words that comprise the statements mean. Consider the statement:

All triangles have three sides.

In contrast to synthetic statements, to determine whether an analytic statement is true one determines what the constituent words mean, in this case 'triangle' means a figure that has three sides and whose internal angles equal 180 degrees.

The critical realization here is that it is impossible to determine whether analytic statements are true or false through experience. While experience might provide confirmation that a triangle has three sides, i.e., one sees that

a particular triangle has three sides, experience can never prove that all triangles have three sides.

Contradictions and Tautologies:

5   Contradictions and tautologies are important classes within analytic statements. What determines whether these statements are true (tautologies) or false (contradictions) is their logical structure.

When a sentence asserts and denies the same proposition a *contradiction* arises. Contradictions are logical impossibilities.

10   Contradictions can be explicit as in:

The water is cold and hot.

Or more subtle, as in:

My mother's first child is due next month.

Note that contradiction provides another means to determine whenan
15   argument is valid. An argument is valid when the premises' affirmation and the conclusion's denial results in a contradiction.

In contrast to contradictions, which can never be true, *tautologies* represent logical truths, i.e., statements that can never be false. Tautologies then represent logical necessities. Consider the statement:

20   *All blue marbles are blue.*

It is impossible that this proposition should ever be false.

Counterexamples:

One procedure that philosophers use to disprove or undermine arguments (i.e., show the
25   arguments to be invalid or unsound) is to construct a *counterexample*. A counterexample is a real or possible situation in which a which demonstrates that either:

1. A premise in the argument is false.
2. The premises in an argument can be true and the conclusion can still be false.

A counterexample that demonstrates (1) proves the argument to be invalid, while a counterexample that demonstrates (2) proves the argument to be unsound. As an illustration consider the statement:

1. *'All mammals live on land'*.

5 The obvious counterexamples to the proposition the statement expresses are whales and dolphins.

Necessary and Sufficient Conditions:

In order to better understand entailment philosophers and logicians distinguish between
10 *necessary* and *sufficient* conditions. To illustrate the difference between these conditions consider the proposition:
   If Elizabeth is a mother, then Elizabeth has a child.

   Let:

   p = *'Elizabeth is a mother'*
15   q = *'Elizabeth has a child'*.

   Sufficient Conditions: When a proposition such as 'If p, then q' is true, then p's truth is a sufficient condition for q's truth. To illustrate this consider the proposition above. This proposition imples that being a mother (p) is a sufficient condition for having a child (q) - that is, being a mother is enough
20   to guarantee that one has a child.
   Necessary Conditions: When a proposition such as 'If p, then q' is true, then q's truth is a necessary condition for p's truth. Consider the same illustration again. In order to be a mother (p) it is necessary to have a child (q) - that is it is impossible to be a mother without having a child.
25   Notice:

   1. While being a mother is sufficient in order to have a child it is not necessary. Why?
   2. While having a child is necessary to being a mother it is not sufficient. Why?

30   In either case the reason is the same, and that is because fathers have children also.

❖4. COMMON ARGUMENTS FORMS:

Syllogisms:
All *A*s are *B*s.
C is an *A*.
Therefore, *C* is a *B*.

5   All *A*s are *B*s.
Some *A*s are *C*s.
Therefore, some *B*'s are *C*'s.

All *A*s are *B*s.
All *B*s are *C*s.
10 Therefore, all *A*s are *C*s.

Modus Ponens:
If *p* is true, then *q* is true.
p is true
Therefore, *q* is true.

15 *Modus Tolens*:
If *p* is true, then *q* is true.
q is false.
Therefore, *p* is false.

Disjunction:
20 Either *p* is true or *q* is true.
p is false.
Thus, *q* is true.

�5. LOGICAL FALLACIES:

25 Logical fallacies are arguments that commit logical errors and as a consequence the
premises' truth fails to insure the conclusion's truth.[4]

1. *Subjectivism:* An argument that asserts that because one believes or wants a
   proposition to be true, the proposition is true.
2. *Appeal to Force:* An argument that uses a threat as a means to persuade
30   someone that a proposition is true.
3. *Appeal to Majority:* An argument that asserts that because most people
   believe a proposition to be true, the proposition is true.
4. *Appeal to Emotion:* An argument that appeals to the emotions that a
   proposition induces in order to prove that the proposition is true.

5. *Appeal to Authority:* An appeal to someone's 'expertise' as evidence that a proposition is true.
6. *Ad Hominem:* An argument that takes an attack on a person's character as evidence that the person's statements are false.
7. *Circular Argument:* The attempt to support a proposition with an argument in which that proposition is also a premise.
8. *Post Hoc:* An argument that takes the fact that one event occurs prior to another as sufficient evidence to conclude that the first event was the second event's cause.
9. *False Alternative:* An argument that excludes relevant possibilities without justification.
10. *Appeal to Ignorance:* An argument that assumes that because a given proposition is unproven, the opposite proposition must be true.
11. *Non Sequitur:* An argument that supports a proposition with premises that bear no logical relation to the proposition.
12. *Beg the Question:* An argument that assumes as a premise a controversial proposition that no additional reasons are given to accept as true

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NOTES:

1. Lilly-Marlene Russow and Martin Curd, Principles of Reasoning. New York: St. Martin's Press, 1989, page 2.
2. Lilly-Marlene Russow and Martin Curd, Principles of Reasoning. New York: St. Martin's Press, 1989, page 3.
3. Joan Callahan (editor), Ethical Issues in Professional Life. Oxford: Oxford University Press, 1988, page 14.
4. David Kelley, The Art of Reasoning. W.W. Norton: New York: 1988.