

---

# A Philosophical Toolkit

---

A Logic Primer

---

## The Currency of Philosophy

---

- ❖ Philosophy trades in *arguments*.
- ❖ An argument is a set of propositions some one of which is intended to be warranted or entailed by the others.
  - ❖ The one supported is the *conclusion*.
  - ❖ Those offered in support are the *premises*.
    - ❖ One can look for ordinary conclusion markers: '*Therefore, p*'; '*Consequently, p*'; '*It follows that p*'; '*So, p*'; '*Ergo, p*'.

---

## Propositions I

---

- ❖ The units of arguments are *propositions*.
- ❖ A proposition is an assertion (typically) expressed by a declarative sentence.
- ❖ A proposition may provisionally be thought of as the meaning of a declarative sentence.
- ❖ It is also, for these reasons, a mind- and language-independent entity which has its truth conditions essentially.
- ❖ Generally speaking, declarative sentences express propositions; they are truth-evaluable; they typically report beliefs.
- ❖ More generally, where *s* is a declarative sentence, it is always possible to ask, sensibly: Is it true that *s*?
  - ❖ So, some examples of sentences which are not declarative:
    - ❖ Commands
    - ❖ Invitations
    - ❖ Questions

---

## Propositions II

---

- ❖ We will assume bi-valence: proposition (or a declarative sentence pressing it) is either true or false.
  - ❖ So, every proposition has a truth value.
  - ❖ Further, no proposition is ever both true and false.
- ❖ Tricky for:
  - ❖ Vacuous reference: The first female president of Notre Dame was born in Quebec.
  - ❖ Complex sentences: Thankfully, he no longer beats his dog.

## An Extra-logical Feature of Propositions

- ❖ Propositions are made true by truth-makers, like facts.
- ❖ A proposition is true when what it claims about the world is so; it is false otherwise.
- ❖ Beliefs are true when they have as their contents true propositions.
- ❖ So, truth-makers make beliefs true.
  - ❖ Thus, the world makes true beliefs true; true beliefs do not make the world the way the world is.
- ❖ N.b.: these are extra-logical features of propositions and can (and must, in fact) be set aside in the study of logic.
- ❖ 'Correct rules of logic are indeed useful. It staggers the imagination to picture a world in which they have no authority. But their utility derives from their correctness, not the other way around.' —Feinberg (RR, 1)

## Relations between Propositions

- ❖ Logic focuses on *the relations* between propositions.
- ❖ The relations of immediate concern to us are:
  - ❖ Consistency
  - ❖ Entailment
  - ❖ Warrant

## Consistency

- ❖ A set of propositions is consistent if and only if (*iff*) there exists some possible situation in which they can be true together.
- ❖ Otherwise they form an inconsistent set, or are inconsistent.
  - ❖ Two propositions are *contradictory iff* one is true, the other is false; or, equivalently, if one is false, the other is true.
    - ❖ So, e.g.: (i) The ball is red; and (ii) It is not the case that the ball is red.
  - ❖ Two propositions are *contraries iff* they can be false together but cannot be true together.
    - ❖ So, e.g.: (i) The ball is altogether red; and (ii) The ball is altogether blue.

## Entailment and Warrant

- ❖ Consider again our definition of argument: an argument is a set of propositions some one of which is intended to be warranted or entailed by the others.
- ❖ Two kinds of arguments: deductive and inductive
  - ❖ a *deductive* argument is an argument where one proposition is represented as being *entailed* by some other propositions.
  - ❖ an *inductive* argument is an argument where one proposition is represented as being *warranted* by some other propositions.

## Entailment and Validity

- ❖ A set of premises entails its conclusion *iff* their being true requires the truth of the conclusion.
- ❖ A *valid* argument is an argument such that its premises entail its conclusion.
  - ❖ An argument is valid if it has the following feature: *if* its premises are true, then its conclusion cannot fail to be true.
  - ❖ N.b. This does not say that an argument is valid only if it has true premises.
    - ❖ In fact, it says nothing at all about whether the premisses are or are not true.
      - ❖ Validity is a matter of form or structure, rather than of content.

## Some Valid Arguments

- ❖ If it is raining, then the field is wet; it is raining; so, the field is wet.
- ❖ All sopranos are Italian; all Italians are vegans; so, all sopranos are vegans.
- ❖ If the Republicans win the next election, then the problem of global warming will be ignored; unfortunately, they will win; so, the problem of global warming will be ignored.
- ❖ If at least some Buddhists are Republicans, then at least some Republicans wear saffron robes; some Buddhists are definitely Republicans; so, at least some Republicans wear saffron robes.
- ❖ If Lassie is a fish, then some fish bark like dogs; Lassie is a fish; so, some fish bark like dogs.

## Some Invalid Arguments

- ❖ If you are a status-conscious bourgeois dog, then you own a Jaguar. You do own a Jaguar. So, I guess you are a status-conscious bourgeois dog.
- ❖ Some birds are animals with webbed feet. Some animals with webbed feet can swim beneath the surface of the sea. So, at least some birds can swim beneath the surface of the sea.
- ❖ If it's raining, then the sidewalks are wet. They're very wet; so, it must be raining.

## Moving from Natural Language to Canonical Form

- ❖ Researchers have shown that relaxing activities promote health. Many people find smoking both enjoyable and relaxing. Same again with wine, at least in moderation. So, in its own humble way, smoking, contrary to what some have claimed, actually promotes health.
  - ❖ Conclusion?
  - ❖ Premises?
  - ❖ Valid or Invalid?

## Some Canonical Forms of Deductive Arguments

- ❖ *Modus Ponens*: if p, then q; p; therefore q.
- ❖ *Modus Tollens*: if p, then q; not-q; therefore not p.
- ❖ N.b. these both derive from the same contention, viz. that p is *sufficient* for q.
  - ❖ N.b. that this cuts two ways: whenever p is *sufficient* for q, then q is *necessary* for p.
    - ❖ e.g. If there is fire, then oxygen is present. Or, equivalently, there is fire only if oxygen is present.
    - ❖ Thus, one can conclude on the basis of the same conditional *if p then q* (if there is fire, then oxygen is present):
      - ❖ Since there is fire, oxygen is present. (This is the basis of MP)
      - ❖ Since there is no oxygen present, there is no fire. (This is the basis of MT)

## Argument Chains

- (1) If the Democrats win the next election, then the economy will do well.
- (2) If the economy does well, then the environment will suffer.
- (3) If the environment suffers, then the poor will suffer inordinately.
- (4) If the poor suffer inordinately, there will be a revolution.
- (5) So, if the Democrats win the next election, there will be a revolution.

## A Valid Argument We Will Meet Again

- (1) If God exists, there is no evil.
- (2) There is evil.
- (3) So, God does not exist.

## The Gold Standard

- ❖ A *sound* argument is a valid argument with all true premises.
  - ❖ We can test for validity without knowing the truth values of the premises of an argument.
  - ❖ To judge an argument for soundness, we must first determine validity and then assess for truth.

# Three Common Fallacies

- ❖ *Petitio Principii* (Begging the Question): implicitly tandem arguments where the conclusion of the first is called to support a conclusion of the second, when the conclusion of the second was a premiss in the first.
  - ❖ (i) The Bible is the word of God; obviously, whatever God says is true; so, whatever the Bible says is true. —You ask: How do I know that the Bible is the word of God? (ii) Well, I'll tell you: we've just seen that whatever the Bible says is true; and the Bible itself tells us that Bible is the word of God; so, it follows that it is true that the Bible *is* the word of God.
- ❖ Circular Reasoning: an argument whose conclusion is also one of its own premisses.
  - ❖ In business, it sometimes pays to maximize profits by skirting the laws when possible. Of course, sometimes one is caught and sometimes not—and when one is caught, one is required to pay huge fines. Still, as long as one is careful and not too flagrant, the probabilities that one will be caught are acceptably low. So, you see, in business under capitalism, it sometimes really does pay to maximize profits by skirting the law now and again.
- ❖ *Ad hominem*
  - ❖ Professor Smedley claims that if the Republicans win the next election, the poor will suffer inordinately. You know what though? He's an idiot. You know what else he said? He said that capitalism is doomed to suffocate under its own weight within the next fifty years. I'll tell you something else. He's a hypocrite, too: he drives a Jaguar. A big, fat bourgeois Jaguar. There's *no* reason to believe that the poor will suffer at all if the Republicans win. Maybe they'll all get rich and be able to afford Jaguars, just like Professor Smedley. Idiot. Hypocrite.