

Introduction to Logic

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Deduction vs. Induction

- In deductive arguments, the following is not uncommon...

- [https://www.uky.edu/~look/
AnselmAquinasPascal.pdf](https://www.uky.edu/~look/AnselmAquinasPascal.pdf)

Anselm's Ontological Argument for the Existence of God

Anselm's argument is an *a priori* argument; that is, it is an argument that is independent of experience and based solely on concepts and logical relations, like a mathematical proof. The form of the argument is that of a *reductio ad absurdum* argument. Such an argument works like this:

Suppose P.
If P, then Q.
But Q is absurd (i.e. implies a contradiction).
Therefore, P is false (or not the case).

Anselm begins with a stipulative definition of "God" as "a being than which no greater being can be conceived."

The argument of *Proslogium* (Ch. II):

- (1) God exists in the understanding but not in reality. (Supposition)
- (2) Existence in reality is greater than existence in the understanding alone. (Premise)
- (3) God's existence in reality is conceivable. (Premise)
- (4) If God did exist in reality, then he would be greater than he is (from (1) and (2)).
- (5) It is conceivable that there be a being greater than God is (from (3) and (4)).
- (6) It is conceivable that there be a being greater than the being than which nothing greater can be conceived ((5), by the definition of "God").

But surely

- (7) It is false that it is conceivable that there be a being greater than the being than which none greater can be conceived.

Since (6) and (7) contradict each other, we may conclude that

- (8) It is false that God exists in the understanding but not in reality.

Thus, if God exists in the understanding, he also exists in reality. Since even the fool (or rational atheist) will allow that God exists in the understanding, God exists in reality. From the definition of God as "that than which nothing greater can be conceived," it follows by logical necessity that God exists.



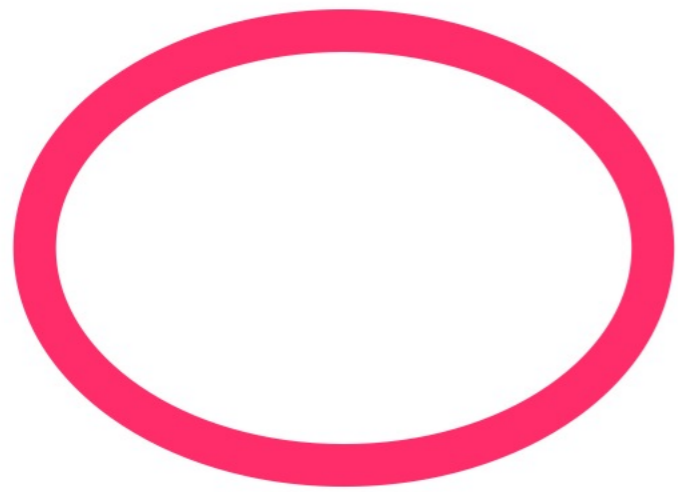




Induction

- We now proceed to the study of induction.
- Here we will be concerned with the following issues:
 - 1) Cases in which events have occurred in the past, and we want to know whether something will occur in the present or future.
 - 2) Cases in which one thing occurs after another
 - 3) Understanding how scientific reasoning works.

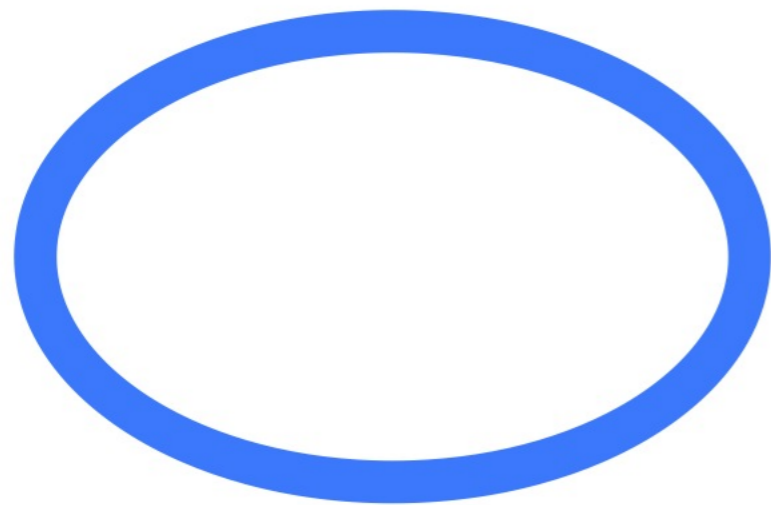
- On the following slide, pink represents deduction, and blue represents induction.



Evidence



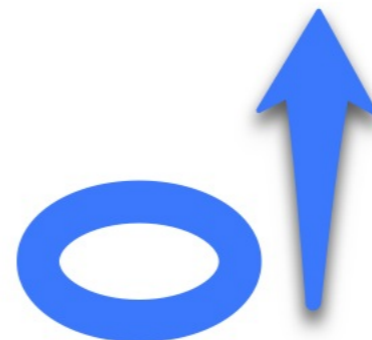
Conclusion



Evidence



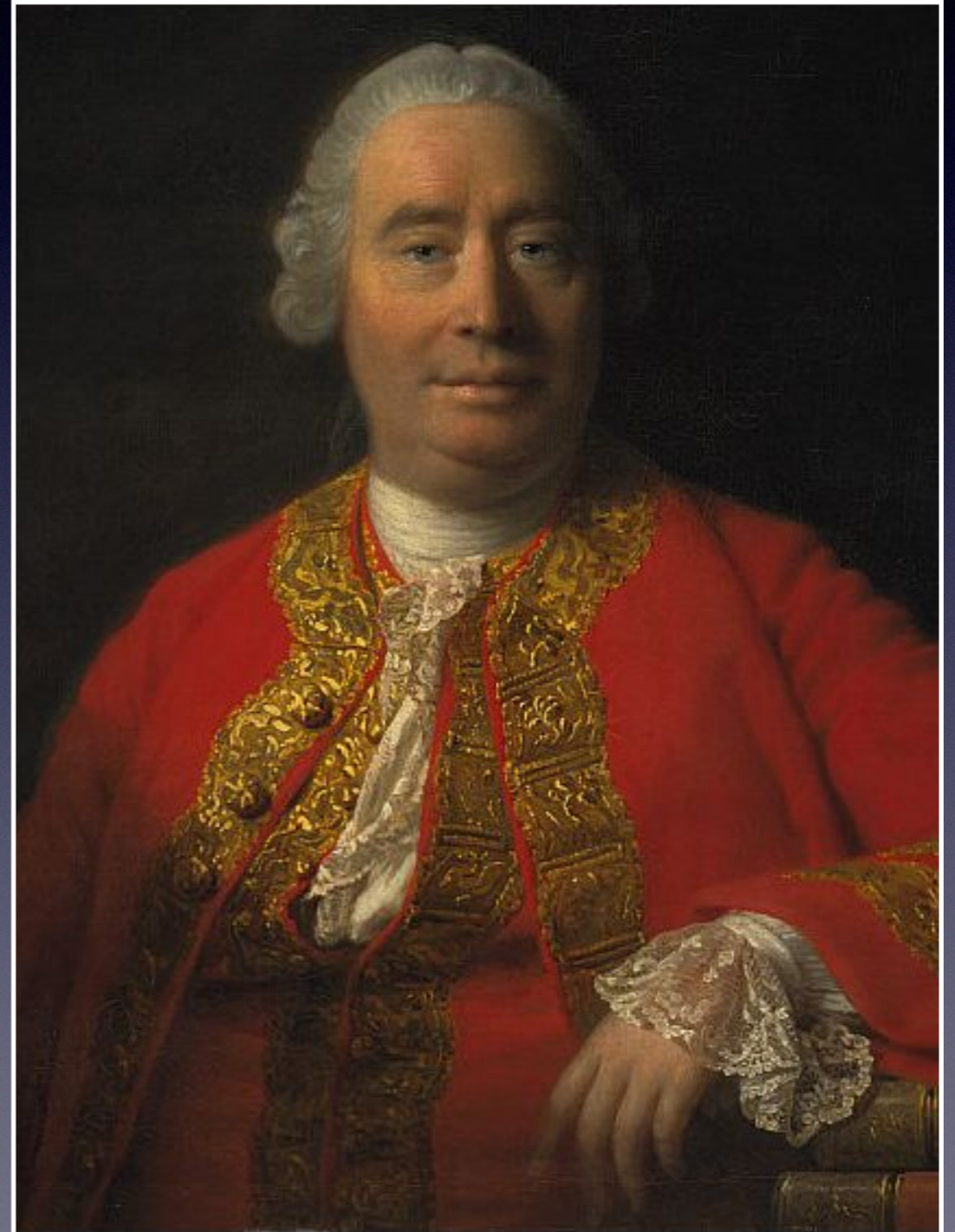
Conclusion



The key idea is that in inductive arguments, we can always add or subtract evidence to make the conclusion more or less probable.

David Hume

- 1711-1776



The contrary of every matter of fact is still possible; because it can never imply a contradiction, and is conceived by the mind with the same facility and distinctness, as if ever so conformable to reality.

- That the sun will not rise tomorrow is no less intelligible a proposition, and implies no more contradiction than the affirmation, that it will rise. We should in vain, therefore, attempt to demonstrate its falsehood. Were it demonstratively false, it would imply a contradiction, and could never be distinctly conceived by the mind.



- "All reasonings concerning matter of fact seem to be founded on the relation of cause and effect. By means of that relation alone we can go beyond the evidence of our memory and senses."

Notice Hume's examples here... (p. 323)

I shall venture to affirm, as a general proposition, which admits of no exception, that the knowledge of this relation is not, in any instance, attained by reasonings a priori; but arises entirely from experience, when we find that any particular objects are constantly conjoined with each other.

Let an object be presented to a man of ever so strong natural reason and abilities; if that object be entirely new to him, he will not be able, by the most accurate examination of its sensible qualities, to discover any of its causes or effects. Adam, though his rational faculties be supposed, at the very first, entirely perfect, could not have inferred from the fluidity and transparency of water that it would suffocate him, or from the light and warmth of fire that it would consume him.

Moral and Legal Analogies

- Thus far, we have examined Deductive inference, as well as various fallacies that arise.
- We now move on to Inductive inference.
- The first kind we will look at is Analogical reasoning.

Analogical Reasoning

Entity A has attributes a, b, c, and z. [Primary analogue]

Entity B has attributes a, b, c. [Secondary analogue]

Therefore, entity B probably has attribute z also.

Analogical Reasoning

Principles for analyzing analogies:

1. Relevance of the similarities shared by the primary and secondary analogues.
2. Number of similarities.
3. Nature and degree of disanalogy.
4. Number of primary analogues.
5. Diversity among the primary analogues.
6. Specificity of the conclusion.

“You should say what you mean,” said the March Hare.

“I do,” Alice hastily replied; “at least -- at least I mean what I say -- that’s the same thing, you know.”

“Not the same thing a bit!” said the Hatter.

“Why, you may just well say that ‘I see what I eat’ is the same thing as ‘I eat what I see’!”

“You might just as well say,” added the March Hare, “that ‘I like what I get’ is the same thing as ‘I get what I like’!”

(Lewis Carroll, Alice’s Adventures in Wonderland, Ch. 7)

We may observe a very great similitude between this earth which we inhabit, and the other planets, Saturn, Jupiter, Mars, Venus, and Mercury. They all revolve round the sun, as the earth does, although at different distances and in different periods. They borrow all their light from the sun, as the earth does. Several of them are known to revolve around their axis like the earth, and by that means, must have a like succession of day and night. Some of them have moons, that serve to give them light in the absence of the sun, as our moon does to us. They are all, in their motions, subject to the same law of gravitation, as the earth is.

From all this similitude, it is not unreasonable to think that those planets may, like our earth, be the habitation of various orders of living creatures. There is some probability in this conclusion from analogy. (Thomas Reid, Essays on the Intellectual Powers of Man, Essay 1, 1785)

Life on this earth is not only without rational significance, but also apparently unintentional. The cosmic laws seem to have been set going for some purpose quite unrelated to human existence. Man is thus a sort of accidental by-product, as the sparks are an accidental by-product of the horseshoe a blacksmith fashions on his anvil. The sparks are far more brilliant than the horseshoe, but all the same they remain essentially meaningless. (Bertrand Russell, Religion and Science, 1949)

Harold needs to have his rugs cleaned, and his friend Veronica reports that Ajax Carpet Service will do an equally good job on his rugs. How do the following facts bear on Veronica's argument?
(Strengthen, Weaken, Irrelevant)

A. Veronica hired Ajax several times, and Ajax always did an excellent job.

B. Veronica's rugs are wool, whereas Harold's are nylon.

C. Veronica's carpets never had any stains on them before they were cleaned, but Harold's have several large stains.

Harold needs to have his rugs cleaned, and his friend Veronica reports that Ajax Carpet Service will do an equally good job on his rugs. How do the following facts bear on Harold's argument?

(Strengthen, Weaken, Irrelevant)

D. Veronica always had her rugs cleaned in mid-October, whereas Harold wants his done just a week before Easter.

E. Harold knows of six additional people who have had their carpets cleaned by Ajax, and all six were very pleased.

F. All six own rugs made of different material.

Harold needs to have his rugs cleaned, and his friend Veronica reports that Ajax Carpet Service will do an equally good job on his rugs. How do the following facts bear on Harold's argument?
(Strengthen, Weaken, Irrelevant)

G. All six were born in Massachusetts.

H. Ajax has recently undergone a change in management.

I. The EPA recently banned the cleaning solution Ajax has used for many years.

J. Harold changes his conclusion to state that Ajax will get his carpets approximately as clean as it has gotten Veronica's.

Paul is searching for a puppy that will grow up to be friendly with his children. His friend Barbara has an Airedale that is good with her children.

From this, Paul concludes that an Airedale puppy would make a good choice. How do the following facts bear on Paul's argument?

- A. Barbara's dog is female, but Paul plans to get a male.
- B. Tim, Ed, and Irene have male Airedales that are friendly with their children.
- C. Tim's, Ed's, and Irene's dogs all came from the same litter.

Paul is searching for a puppy that will grow up to be friendly with his children. His friend Barbara has an Airedale that is good with her children.

From this, Paul concludes that an Airedale puppy would make a good choice. How do the following facts bear on Paul's argument?

D. Fran, Penny, and Bob have Airedales that snap at their children.

E. Fran's, Penny's, and Bob's Airedales all came from different litters.

F. The puppy that Paul plans to get was born in June just as Barbara's was.

G. The puppy that Paul plans to get is of the same subspecies as Barbara's dog.

Paul is searching for a puppy that will grow up to be friendly with his children. His friend Barbara has an Airedale that is good with her children. From this, Paul concludes that an Airedale puppy would make a good choice. How do the following facts bear on Paul's argument?

H. The puppy that Paul plans to get had a littermate that was vicious and had to be destroyed. Barbara's dog had no such littermates.

I. Paul plans to give his dog special training, but Barbara's dog received no such training.

J. Paul changes his conclusion to state that if he gets an Airedale puppy, it will grow up at least to tolerate children.

Analogical Reasoning and Legal Arguments

Legal reasoning in the United States is primarily based on arguments by analogy.

This is because our legal system works on the basis of precedent. A precedent is a case in which a ruling has been made and in which there are some relevant similarities to the case at hand.

The judge's job is to decide whether the similarities are analogous enough to warrant giving the same decision in the current case. Often a judge has to decide which of multiple precedents is most analogous to the case at hand.

Constructing an argument on the basis of analogy with legal precedent.

The current case: Blake attempted to earn some pocket change by breaking into a cigarette vending machine and stealing the cash. The police apprehended Blake in the act, and the DA charged him with burglary.

Notes: Blake had one prior conviction for breaking into a cigarette machine. This particular machine contained \$450 but most machines only hold \$350.

Constructing an argument on the basis of analogy with legal precedent.

Definition of 'burglary': the trespassory breaking and entering of a structure of another with the intent to commit a felony therein.

Definition of felony theft: A theft of \$400 or more.

1. Is a cigarette machine the kind of structure intended by the statute for burglary?
2. Did Blake intend to commit a felony?

Constructing an argument on the basis of analogy with legal precedent.

Precedents:

People vs. Harris: Harris broke into a warehouse with the intent of stealing its contents. The warehouse contained microwave ovens valued at \$10,000, and Harris was found guilty of burglary.

People vs. Sawyer: Sawyer broke into a newspaper vending machine with the intent to steal the cash in the cash box. The maximum capacity of the cash box was \$20 and Sawyer was found not guilty of burglary.

How the DA might argue to the judge:

In breaking into the cigarette machine, Blake is guilty of burglary for the following reasons. In People vs. Harris, the defendant was found guilty of burglary for breaking into a warehouse. A cigarette vending machine is like a warehouse in that it contains goods sold for resale.

Furthermore, like a warehouse, people's livelihoods depend on the goods stored therein. Also, the vending machine contained over \$400, and Blake intended to steal this money. Stealing over \$400 is a felony. Therefore, Blake intended to commit a felony when he broke into the machine. Also, by placing his hand into the machine, he "entered" it. A cigarette machine differs from a newspaper machine in that it can hold goods valued much more than a stack of newspapers. Thus, all requirements are met for conviction.

How the defense might argue to the judge:

In breaking into the cigarette machine, Blake is not guilty of burglary, for the following reasons. The original crime of burglary extended only to dwelling houses because people live in dwelling houses and it is important that their lives be protected. Modern law has extended the kind of structure requisite for burglary to include warehouses because people work and live in them. A cigarette machine is unlike a warehouse in that a person is not capable of working and living in it. Also, for the crime of burglary to be committed, the burglar must enter the structure. A cigarette differs from a warehouse in that a person is not capable of entering it with his whole body.

How the defense might argue to the judge:

On the contrary, a cigarette vending machine is very similar to a newspaper vending machine in that it contains relatively small quantities of products for resale. In People vs. Sawyer, the defendant was found not guilty of burglary in breaking into a newspaper vending machine. Finally, Blake was familiar with cigarette machines (he broke into one before), and he therefore knew that their cash boxes are usually limited to holding less than \$400. Therefore, when he broke into this particular machine, Blake intended to steal less than \$400, and therefore he did not intend to commit a felony.

Constructing an argument on the basis of analogy with legal precedent.

The current case: A group of gays and lesbians apply for a permit to march on Gay Freedom Day. Similar parades in other cities have been calm and orderly, but the police chief denies a parade permit to this group.

Notes: The First Amendment to the U.S. Constitution states that Congress shall make no law abridging the freedom of speech or the right to peaceable assembly. This “law” applies to states (and cities) as a result of the adoption of the Fourteenth Amendment.

Constructing an argument on the basis of analogy with legal precedent.

Precedents:

Lester vs. City: Police seized an art collection displayed in a public park, because it depicted heterosexuals in nude poses.

The court ruled that the display was protected the First Amendment.

Byron vs. City: Police denied a parade permit to a Nazi group that wanted to march on Hitler's birthday. The court ruled that the denial violated the group's rights under the First

Amendment.

Stone vs. City: Police closed down a theater showing an erotic gay film, because they claimed that the film promoted the spread of AIDS. The court ruled that the action of the police was allowed under the First Amendment.

Constructing an argument on the basis of analogy with legal precedent.

How could we construct an argument on the bases of these precedents to supports the group of gays and lesbians?

How could we construct an argument on the bases of these precedents to support the decision of the police chief?

Analogical Reasoning and Moral Arguments

People often reason about moral claims with analogical arguments.

These arguments typically do not appeal to precedent.

Instead, they rely on the strength of a hypothetical analogy to the moral claim being made.

Analogical Reasoning and Moral Arguments

Judith Jarvis Thompson on the morality of abortion

Here's the position she is arguing against:

“Grant that the fetus is a person from the moment of conception. How does the argument go from here? Every person has a right to life. So the fetus has a right to life. No doubt the mother has a right to decide what shall happen in and to her body; everyone would grant that. But surely a person's right to life is stronger and more stringent than the mother's right to decide what happens in and to her body, and so outweighs it. So the fetus may not be killed; an abortion may not be performed.”

Thompson's moral claim: Even if the fetus is a person, a woman has no moral obligation to give her body for nine months to keeping that person alive. Or, none of us have an obligation to keep another person alive when that comes at some extended sacrifice to our own body.

What's the moral analogy?

“It sounds plausible. But now let me ask you to imagine this. You wake up in the morning and find yourself back to back in bed with an unconscious violinist. A famous unconscious violinist. He has been found to have a fatal kidney ailment, and the Society of Music Lovers has canvassed all the available medical records and found that you alone have the right blood type to help. They have therefore kidnapped you, and last night the violinist's circulatory system was plugged into yours, so that your kidneys can be used to extract poisons from his blood as well as your own. The director of the hospital now tells you, "Look, we're sorry the Society of Music Lovers did this to you--we would never have permitted it if we had known. But still, they did it, and the violinist is now plugged into you. To unplug you would be to kill him. But never mind, it's only for nine months. By then he will have recovered from his ailment, and can safely be unplugged from you."”

continued....

What's the moral analogy? continued

“Is it morally incumbent on you to accede to this situation? No doubt it would be very nice of you if you did, a great kindness. But do you have to accede to it? What if it were not nine months, but nine years? Or longer still? What if the director of the hospital says. "Tough luck. I agree. but now you've got to stay in bed, with the violinist plugged into you, for the rest of your life. Because remember this. All persons have a right to life, and violinists are persons. Granted you have a right to decide what happens in and to your body, but a person's right to life outweighs your right to decide what happens in and to your body. So you cannot ever be unplugged from him." I imagine you would regard this as outrageous, which suggests that something really is wrong with that plausible-sounding argument I mentioned a moment ago.”

Another moral analogy

The moral claim: It is morally permissible to have an abortion when the mother's life is at stake.

What's the moral analogy?

“Suppose you find yourself trapped in a tiny house with a growing child. I mean a very tiny house, and a rapidly growing child--you are already up against the wall of the house and in a few minutes you'll be crushed to death. The child on the other hand won't be crushed to death; if nothing is done to stop him from growing he'll be hurt, but in the end he'll simply burst open the house and walk out a free man. Now I could well understand it if a bystander were to say. "There's nothing we can do for you. We cannot choose between your life and his, we cannot be the ones to decide who is to live, we cannot intervene." But it cannot be concluded that you too can do nothing, that you cannot attack it to save your life. However innocent the child may be, you do not have to wait passively while it crushes you to death. Perhaps a pregnant woman is vaguely felt to have the status of house, to which we don't allow the right of self-defense. But if the woman houses the child, it should be remembered that she is a person who houses it.”

Another moral analogy

The moral claim: A woman still has a right to an abortion in cases where the pregnancy resulted from a voluntary act (i.e., she wasn't raped).

What's the moral analogy?

“If the room is stuffy, and I therefore open a window to air it, and a burglar climbs in, it would be absurd to say, "Ah, now he can stay, she's given him a right to the use of her house--for she is partially responsible for his presence there, having voluntarily done what enabled him to get in, in full knowledge that there are such things as burglars, and that burglars burgle." It would be still more absurd to say this if I had had bars installed outside my windows, precisely to prevent burglars from getting in, and a burglar got in only because of a defect in the bars. It remains equally absurd if we imagine it is not a burglar who climbs in, but an innocent person who blunders or falls in.”

continued...

What's the moral analogy? continued...

“Again, suppose it were like this: people-seeds drift about in the air like pollen, and if you open your windows, one may drift in and take root in your carpets or upholstery. You don't want children, so you fix up your windows with fine mesh screens, the very best you can buy. As can happen, however, and on very, very rare occasions does happen, one of the screens is defective, and a seed drifts in and takes root. Does the person-plant who now develops have a right to the use of your house? Surely not--despite the fact that you voluntarily opened your windows, you knowingly kept carpets and upholstered furniture, and you knew that screens were sometimes defective. Someone may argue that you are responsible for its rooting, that it does have a right to your house, because after all you could have lived out your life with bare floors and furniture, or with sealed windows and doors. But this won't do--for by the same token anyone can avoid a pregnancy due to rape by having a hysterectomy, or anyway by never leaving home without a (reliable!) army.”

Another moral argument

The moral claim: When faced with a situation where we must choose to kill one person to save the lives of more than one person, it is morally permissible to kill the one person. More than that, it's our moral obligation to kill the one person.

What's the moral analogy?

The trolley problem: “A trolley is running out of control down a track. In its path are 5 people who have been tied to the track by a mad philosopher. Fortunately, you can flip a switch which will lead the trolley down a different track to safety. Unfortunately, there is a single person tied to that track. Should you flip the switch?”

If you say yes, then you endorse the moral claim.

If you say no, then you reject the moral claim.

What's the moral analogy? continued...

Variations on the trolley problem:

“As before, a trolley is hurtling down a track towards five people. You are on a bridge under which it will pass, and you can stop it by dropping a heavy weight in front of it. As it happens, there is a very fat man next to you - your only way to stop the trolley is to push him over the bridge and onto the track, killing him to save five. Should you proceed?”

What's the moral analogy? continued...

More variations on the trolley problem:

“As before, a trolley is hurtling down a track towards five people. You can divert its path by colliding another trolley into it, but if you do, both will be derailed and go down a hill, across a road, and into a man's yard. The owner, sleeping in his hammock, will be killed. Should you proceed?”

What's the moral analogy?

continued...

"What happens if, on the tracks of one trolley, five men guilty of murder are tied, and on the other, one man is innocent. Should you choose to save the one man, simply because he has committed no crime?"

"What happens if, on one of the trolley tracks, the President of the United States has been tied by terrorists, and on the other trolley tracks, five average citizens are also tied up. As in the original trolley problem, who should you save?"

"What if the trolley is headed towards five average people you've never met but on the other tracks is your mother? Do you flip the switch and save five or save your mother?"

What's the moral analogy? continued...

“As before, a trolley is hurtling down a track towards five helpless people. This time, however, you are on board the trolley yourself. There is a large explosive device on the trolley with you. Detonating it would utterly obliterate the trolley, saving the five people, but killing you. Or you could escape from the trolley, killing the five people, but saving your own life. Should you detonate the device?”

What's the moral analogy? continued...

“A brilliant transplant surgeon has five patients, each in need of a different organ, each of whom will die without that organ. Unfortunately, there are no organs available to perform any of these five transplant operations. A healthy young traveler, just passing through the city the doctor works in, comes in for a routine checkup. In the course of doing the checkup, the doctor discovers that his organs are compatible with all five of his dying patients. Suppose further that if the young man were to disappear, no one would suspect the doctor.”