

**CHAPTER 2 GOOD ARGUMENT, DEDUCTIVE VALIDITY, AND
INDUCTIVE STRENGTH**

Exercise 2.3A Deductive Validity. Does the Conclusion Follow Necessarily?

1. Deductively valid. If you assume it is true that all chem. majors must take one year of organic chem. and that Max is a chem. major, then try to deny that Max must take one year of organic chem. You can't; you'll have a contradiction.
2. Deductively valid. Given that all life requires water and there is no water on Venus, then it must follow that no life is possible there.
3. Invalid. The conclusion does not follow at all. We can imagine that coffee does stunt one's growth and that Max's growth is stunted, yet deny that Max drinks coffee. Something else may be responsible.
4. Invalid. Imagine the premises true and the conclusion false. Suppose you got a ticket for a headlight being out and yet it is still true that if you speed, you get a ticket and you did not speed.
5. Invalid. It does not follow necessarily that you will get better given that the record for improvement is "almost always."
6. Deductively valid. The premises state that only two choices are available and one is ruled out. It follows, therefore, that the remaining option will be chosen.
7. Invalid. Suppose it's true that Redford's a star and Hollywood has only stars as residents but not all need live there. It can still be denied that Redford lives there. Thus, the conclusion does not necessarily follow.
8. Deductively valid. Given the premises, it cannot be denied that Redford lives in Hollywood.
9. Invalid. The premises may be true yet Redford is not a movie star.
10. Deductively valid. Since there are at most 365 days in a year and 367 students in the class, it is inconceivable that no two students have birthdays on the same day. After each day of the year has been correlated with a student's birthday, the very next student must have a birthday on one of those days already mentioned.
11. Deductively valid. Given that you are right to be suspicious of people who think they're above the rules and that Harold is one of those people, it must follow that you are right to be suspicious of Harold.
12. Deductively valid. The premises, if granted, mean that there are no legitimate excuses for late papers.
13. Deductively valid. If a right to life does not give one a right to whatever one need to live, then the kidney patient's right to life does not give him or her a right to what he needs either.
14. Deductively valid. Given the premises, the conclusion must follow.
15. Deductively valid. It has to follow that they are not the same because they do not have the same properties and things are the same only if they have the same properties.

Exercise 2.3B Inductive Strength. Does the Conclusion Follow Probably?

1. Strong. Given that most religions include a belief in a god and that Buddhism is a religion, it is likely that Buddhism includes a belief in a god, too.
 2. Weak. If you had decided to give students what they prefer and you then learned that some prefer take-home exams, you would not conclude that you probably should give take-home exams for the simple reason that you have such vague evidence: some students!
 3. Inductively weak. She has had bad luck with her car but it is not even likely that all of us will have such luck with that make of car.
 4. Inductively strong. There's good evidence here for thinking that most have managed-care plans since most are likely to choose better benefits. No necessity to it a reasonable conclusion to make.
 5. Inductively strong. Given the high incidence, an infection is very likely particularly if one
- Answers Chapter 2: Good Argument, Deductive Validity, and Inductive Strength

- skips the antibiotic.
6. Inductively strong. Given the low incidence of infection, the conclusion that you'll not get an infection is very probable.
 7. Inductively strong. The conclusion is a reasonable one given the likely benefits of consumer spending.
 8. Inductively strong. Believing that your case will be rejected is a reasonable belief given that cases presented, as yours will be are usually rejected.
 9. Inductively strong. It does not follow necessarily but it is certainly likely, given that the number of students is nearly equal to the number of days in the year.
 10. Inductively strong. Given the premise that deterrence requires the conditions described and that those conditions are not likely to obtain, it follows with probability that punishment is not an effective deterrent.
 11. Inductively weak. Pauling's claim is not well-supported by the evidence. A reduction of barely one complete day of cold symptoms is hardly persuasive.
 12. Inductively strong. Given the premises, we have good evidence of nonhuman animals learning to use language.
 13. Inductively strong. It is very probable that humanities majors love their work because most humanities majors teach the humanities and we are told that people who teach the humanities love their work
 14. Inductively strong. If you assume the writer's premises about the better taste of those eggs from chickens that roam free, and so on, then it does seem reasonable to conclude that feed is a chief influence in egg flavor. (Or is it that happier chickens produce better-tasting eggs?)
 15. Inductively strong. Given that infections in hospitals affects nurses more severely than the same infection affects those outside hospitals, it seems to follow that pathogens strengthen in the hospital environment, a phenomenon called "cycling."

Exercise 2.4A Validity and Logical Form

1. Modus ponens. Valid.
2. Disjunctive syllogism. Valid.
3. Barbara. Valid.
4. Modus ponens. Valid.
5. Fallacy of undistributed middle. Invalid.
6. Barbara. Valid.
7. Fallacy of denying the antecedent. Invalid.
8. Modus tollens. Valid.
9. Modus ponens. Valid.
10. Modus tollens. Valid.
11. Fallacy of affirming the consequent. Invalid.
12. Disjunctive syllogism. Valid.
13. Fallacy of denying the antecedent. Invalid.
14. Fallacy of undistributed middle. Invalid.
15. Modus ponens. Valid.

Exercise 2.4B More Logical Form

1. Barbara is the theme of this argument. If you were to rewrite the statements with the term 'All' and the appropriate changes, and substitute the letter's 'A,' 'B,' 'C,' 'D,' etc. for the content terms, you would see a pattern reminiscent of Barbara.
2. This argument employs a variation on the fallacious logical form, Fallacy of Denying the Antecedent. Notice that the last premise is the denial of the antecedent of the first premise, and the conclusion is the denial of the consequent of second to last premise.

1. If **any journalists learn about the invasion**, then the newspapers will print the news.
 2. If the newspapers print the news, then the invasion will not be a secret.
 3. If the invasion is not a secret, then our troops will not have the advantage of surprise.
 4. If we do not have the advantage of surprise, then the enemy will be prepared.
 5. If the enemy is prepared, then **we are likely to suffer higher casualties**.
 6. **No journalists learned about the invasion.**
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7. Therefore, **we are not likely to suffer higher casualties**.

3. This has the form of *Modus tollens*.

1. If people get what they need to function as citizens, then they would be taught a little bit about a lot of different sciences.
 2. But universities . . . teach one science at a time.
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3. Thus, a fundamental mismatch exists between the kinds of knowledge educational institutions are equipped to impart and the kind of knowledge the citizen needs.
 4. Thus, people are not taught a little bit about a lot of different sciences.
 5. Thus, people do not get what they need to function as citizens.

The second premise implies the denial of the consequent in the first premise. The argument concludes with a statement that implies that people do not get what they need in order to function as citizens. Therefore, we have an argument that exhibits *Modus tollens*.

4. An abbreviated rewriting of the argument shows the pattern *Modus tollens*.
 1. If a golf ball were perfectly rigid and the entire ball began moving at once, the shock wave would have to travel through the ball at an infinite velocity.
 2. No shock wave can travel at an infinite velocity.

 3. No golf ball can be perfectly rigid.
5. Statements (2), (3), and (4) exhibit the pattern called Barbara.
 1. A damaged bone undergoes a series of changes before stabilizing.
 2. Mr. Fuller's bone-tissue exhibits that process of changes.
 3. The bone's process of changes takes generally five years.

 4. Therefore, Mr. Fuller's injury is at least five years old.

6. Rewriting in argument form shows the pattern of Barbara.
1. Segregation distorts the soul and damages the personality.
 2. Any law that degrades human personality is unjust.
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3. All segregation statutes are unjust. . . .
7. 1. If God does not exist, that means heaven does not exist either.
2. If heaven does not exist, then those millions who live in poverty and oppression will never go to heaven.
 3. If those millions who live in poverty and oppression never go to heaven, then the suffering of the poor and all the unhappiness we put up with is all for nothing.
- *4. It cannot be all for nothing.
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- *5. It cannot be that God does not exist.

With the supplied premise and conclusion, the argument is the form, *modus tollens*.

8. 1. If engaging in an activity is likely to limit severely our ability to honor one of our moral obligations, then we have a *prima facie* moral obligation not to engage in that activity.
2. Establishing and maintaining a friendship with one or more students is likely to limit severely a professor's ability to honor his or her moral obligations.
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3. Hence, each professor has a *prima facie* moral obligation not to engage in such friendships.

Modus ponens

9. 1. Any being which has even minimal capacities for sensory experience is the moral equal of any person.
2. If we accept this theory, then we must conclude that not only is late abortion the moral equivalent of homicide, but so is the killing of such sentient nonhuman beings as mice . . .
 3. We cannot conclude that killing mice is the moral equivalent of homicide.
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4. Therefore, we must reject the theory that any being which has even minimal capacities for sensory experience is the moral equal of any person.

The form is *modus tollens*.

10. 1. If we measure visible objects five billion light-years away receding at half the speed of light, then objects ten billion light-years away must be receding at light speed.
2. We do measure visible objects five billion light-years away receding at half the speed of light.
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3. Therefore, objects ten billion light-years away must be receding at light speed.
- *4. Objects are receding at light speed are objects we can never observe.
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5. Therefore, objects ten billion light-years away are objects we can never observe.

Modus ponens and Barbara

Exercise 2.5 Empirical or Nonempirical

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| 1. Empirical | 11. Nonempirical |
| 2. Empirical | 12. Nonempirical |
| 3. Nonempirical | 13. Nonempirical |
| 4. Empirical | 14. Empirical |
| 5. Empirical | 15. Nonempirical |
| 6. Nonempirical | 16. Nonempirical |
| 7. Nonempirical | 17. Nonempirical |
| 8. Empirical | 18. Empirical |
| 9. Nonempirical | 19. Nonempirical |
| 10. Empirical | 20. Nonempirical |

Exercise 2.6 What, if anything, is wrong with this argument?

1. (i) These statements are all true. (ii) Deductively invalid because it is the fallacy of undistributed middle. (iii) Not good because the conclusion follows neither with deductive validity nor inductive strength.
2. (i) Premise (1) is certainly false. Costs are not declining. Premise (2) might be true. (ii) Deductively valid form, *Modus ponens*. (iii) Not good because of a false premise.
3. (i) Statements (2) and (3) are not true. Hang gliding is less dangerous than driving. (ii) This is deductively invalid; fallacy of affirming the consequent. (iii) Not a good argument because it has a false premise and does not follow either necessarily or with probability.
4. (i) All statements are true. (ii) Invalid, fallacy of undistributed middle. (iii) Conclusion follows neither necessarily nor with probability; thus, not a good argument.
5. (i) Statement (1) is true. Statements (2), (3), and (4) are very controversial. Some people argue that (2) is false. Many would deny (3) on the ground that some acts of killing persons are morally justified. (ii) The argument is deductively valid. (iii) It is not a good argument because its premises are dubious.
6. (i) German is difficult to learn, so is the predominant language of the United States but the first premise is false. (ii) Deductively valid form Barbara. (iii) Not good; false premises.

7. (i) All true statements. (ii) Invalid; fallacy of undistributed middle. (iii) Not good because the conclusion does not follow, either with deductive validity or inductive strength.

8. Derek Gjertsen claims that Spinoza's argument is deductively valid but not a good argument because Axiom 4 is not true. Gjertsen gives a counterexample to the claim of Axiom 4. He says that many things are known about past catastrophes and present diseases without their causes having yet been identified. Since that premise is false, Gjertsen claims, Spinoza's argument fails.

REVIEW QUESTIONS Chapter 2

True or false?

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| 1. false | 6. false |
| 2. true | 7. true |
| 3. true | 8. false |
| 4. true | 9. true |
| 5. false | 10. false |