Critical Thinking
Tutorial 3: Deductive support & biases in assessing support
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Exercise 1:

Identify the pattern of each of the following arguments and say whether the pattern is **deductively valid** or **invalid**.

Example
If there are cigarette stubs in the ashtray, Sarah is annoyed. There are no cigarette stubs in the ashtray. Therefore, Sarah is not annoyed.

1. If **A** then **B.**	**A:** there are cigarette stubs in the ashtray
2. Not A.	**B:** Sarah is annoyed
Therefore	
3. Not B.	
This is an **INVALID** form of argument. (Denying the antecedent).	

(1) All blocks of cheese are more intelligent than any philosophy student. Meg the cat is a block of cheese. Therefore Meg the cat is more intelligent than any philosophy student.

1. All As are B.	**A:** blocks of cheese
2. x is A.	**B:** more intelligent than any philosophy student
Therefore	**x:** Meg
C. x is B.	
VALID - universal modus ponens	

(2) Vegetarians do not eat pork sausages. Gandhi did not eat pork sausages. So Gandhi was a vegetarian.

1. All As are B.	**A: vegetarians**
2. X is B.	**B: people who do not eat pork sausages**
Therefore	**x: Gandhi**
C. x is A.	
INVALID – universal affirming the consequent	

(3) If I've already tossed seven heads in a row, the probability that the eighth toss will yield a head is less than 50-50; that is, I'm due for a tails. I've already tossed seven heads in a row. Therefore the probability that the next toss will yield a head is less than 50-50.

1. If A then B.	**A:** I've already tossed seven heads in a row
2. A.	**B:** the probability that the eighth toss will yield a head is less than 50-50
Therefore	
C. B.	
VALID - modus ponens	

(4) If Fiona won the lottery last night, she'll be driving a red Ferrari today. Fiona is driving a red Ferrari today. Therefore Fiona won the lottery last night.

1. If A then B	**A:** Fiona won the lottery last night
2. B.	**B:** she'll be driving a red Ferrari today
Therefore	
C. A.	
INVALID - affirming the consequent	

(5) If Caterina goes bankrupt her mother will be upset. Caterina's mother is upset. Therefore, Caterina has gone bankrupt.

1. If **A** then **B.**	**A:** Caterina goes bankrupt
2. B is true.	**B:** Caterina's mother is upset
Therefore	
C. A is true.	
INVALID – affirming the consequent	

(6) If the law fined people for littering, then the city would have an obligation to provide rubbish bins. But the law does not fine people for littering, so the city has no such obligation.

1. If **A** then **B.**	**A:** The city fines people for littering
2. A is not true.	**B:** The city has an obligation to provide rubbish bins
Therefore	
C. B is not true.	
INVALID – denying the antecedent	

(7) If Oroco advertised its products effectively, the company's sales would have increased. Oroco's sales have not increased; therefore, the company did not advertise its products effectively.

1. If **A** then **B.**	**A:** Oroco advertised its products effectively
2. B is not true.	**B:** Oroco's sales have increased
Therefore	
C. A is not true.	
VALID – modus tollens	

(8) If *Doctor Who* is on the TV tonight we will stay in. But *Doctor Who* is not on the TV tonight, so we will not stay in.

1. If **A** then **B.**	**A:** *Doctor Who* is on the TV tonight
2. A is not true**.**	**B:** We will stay in
Therefore	
C. B is not true.	
INVALID – denying the antecedent	

Exercise 2 (More complex component statements)

Example

If we go out tonight, we won't have pizza for dinner. But we are not going out, so we will have pizza for dinner.

1. If A then B.	**A:** We go out tonight
2. A is **not true.**	**B:** We **won't** have pizza for dinner
Therefore	
3. B **is not true.**	It's not true that we **won't** have pizza for dinner = We *will* have pizza for dinner.
This is INVALID - denying the antecedent	

(1) If my flight is not late, I won't miss the committee meeting. Fortunately, my flight is on time. Therefore, I will make it to the meeting.

1. If **A** then **B.**	**A:** My flight is not late (My flight is on time)
2. A is true.	**B:** I won't miss the committee meeting (I will make it to the committee meeting)
Therefore	
C. B is true.	
VALID – modus ponens	

(2) If the witness is lying, she probably knows the criminals. But the witness is telling the truth, so she probably does not know the criminals.

1. If **A** then **B.**	**A:** The witness is lying
2. A is not true.	**B:** The witness probably knows the criminals
Therefore	
C. B is not true.	
INVALID – denying the antecedent	

(3) We won't need to make a picnic if it rains tomorrow because if it rains tomorrow, we will either go the art gallery or the aquarium and if we go to either of those places, we won't need to make a picnic.

1. If **A** then **B.**	**A:** It rains tomorrow
2. If **B** then **C.**	**B:** We will either go to the art gallery or the aquarium tomorrow
Therefore:	**C:** We won't need to make a picnic
C. If **A** then **C.**	
VALID – hypothetical syllogism	

Exercise 3:

Now, let's speed things up a bit. Are the following arguments valid or invalid? And why / why not?

(1) All metals conduct electricity. Copper is not a metal. Therefore, copper does not conduct electricity.

Invalid – universal denying the antecedent

(2) If he loves me then he gives me flowers. He gives me flowers. So he loves me.

Invalid - affirming consequent

(3) Beckham is famous. Beckham is a football player. Therefore, Beckham is a famous football player.

Invalid. Beckham might be a famous chef who is a football player but not a famous football player.

(4) All things that are alive need water. Televisions do not need water. Therefore, televisions are not alive.

Valid – universal modus tollens

(5) John was in Britain when Mary died in Hong Kong. So Mary could not have been killed by John.

Invalid. Perhaps John shot Mary on Monday, and flew to Britain on Tuesday, but Mary died on Friday. – this is not a complete argument, it would need an additional premise.

(6) If there is life on Pluto then Pluto contains water. But there is no life on Pluto. Therefore Pluto does not contain water.

Invalid – denying the antecedent

(7) There were only two rabbits in the room last week. No rabbit has left the room since then. Therefore there are only two rabbits in the room now.

Invalid. As you know, rabbits can reproduce! – hidden premise

(8) All whales have wings. Moby does not have wings. So Moby is not a whale.

Valid. – universal modus tollens

(9) If time travel is possible, we would now have lots of time-travel visitors from the future. But we have no such visitors. So time travel is not possible.

Valid - modus tollens

(10) All things that are smoked are good for the health. Cigarettes are smoked. Cigarettes are good for the health.

Valid – universal modus ponens

(11) The services of mobile phone companies are getting worse as there has been an increasing number of complaints against mobile phone companies by consumers.

Invalid, since the increase in complaints might only be due to an increase in the number of mobile phone users.

(12) All capitalists exploit the weak and the poor. Property developers exploit the weak and the poor. So property developers are capitalists.

Invalid. Perhaps there are non-capitalists who also exploit. Universal affirming the consequent.

(13) All things with four legs are dangerous. Poodles are not dangerous. Therefore, poodles do not have four legs.

Valid – universal modus tollens

(14) All unemployed people are poor. Bill Gates is not unemployed. Therefore, Bill Gates is not poor.

Invalid – universal denying the antecdent

The philosophical argument of the week:

There are, moreover, seemingly unanswerable arguments that, if they are correct, demonstrate that the existence of moral responsibility entails the existence of free will, and, therefore, if free will does not exist, moral responsibility does not exist either. It is, however, evident that moral responsibility does exist: if there were no such thing as moral responsibility nothing would be anyone's fault, and it is evident that there are states of affairs to which one can point and say, correctly, to certain people: That's *your* fault. (van Inwagen, 2008, *How to think about the problem of free will*)

Can you reconstruct this as a valid argument?
Is another reconstruction possible?

Here are some possible reconstructions:

(1) If we are morally responsible then we have free will.
(2) We are morally responsible.
(3) We have free will. (modus ponens, from 1 and 2)

Or a bit more complex:

1. If there is no moral responsibility, then nothing is anyone´s fault.
2. It is evident that there are things that are someone's fault.
3. So there is moral responsibility. (modus tollens)

PAP (Principle of Alternative Possibilities): An agent is morally responsible for what he has done only if he could have done otherwise.

Put slightly differently: Can you think of a case where someone would be morally responsible for an event even if it were not their fault?