

Conditional Statements

Arguments are compound statements joined by an "if," clause and a "then" f. The property of arguments that concerns us is their validity.

In addition to arguments, we will also utter statements. The property of categorical statements that concerns us is their veracity or "truth".

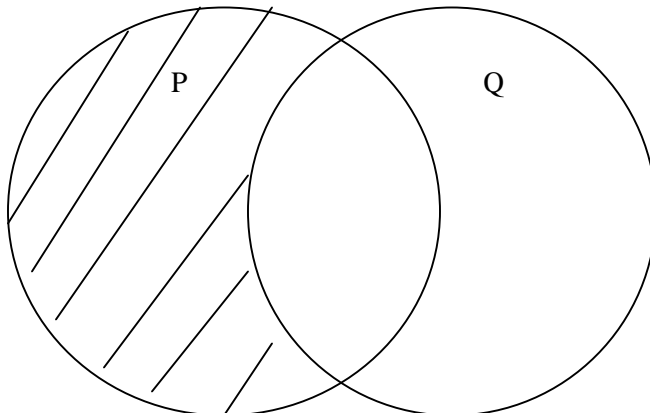
We evaluate the validity of arguments by asking whether accepting some statements in the argument as true (the premises) would compel us to accept other statements in the argument (the conclusions) as true. When this is the case, we say the argument is valid. When this is not the case, we say the argument is *invalid*.

Affirming the Antecedent: A valid argument

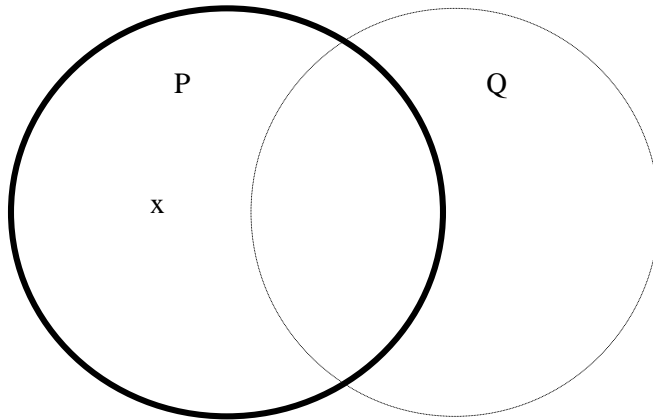
1. P, then Q	If the president commits a criminal act, then he can be impeached.	P is sufficient for Q
2. P	The president commits a criminal act.	P occurs
3. Therefore, Q	Therefore, he can be impeached.	Q occurs

let's take each step of the argument on its own. then see what happens when we put them together.

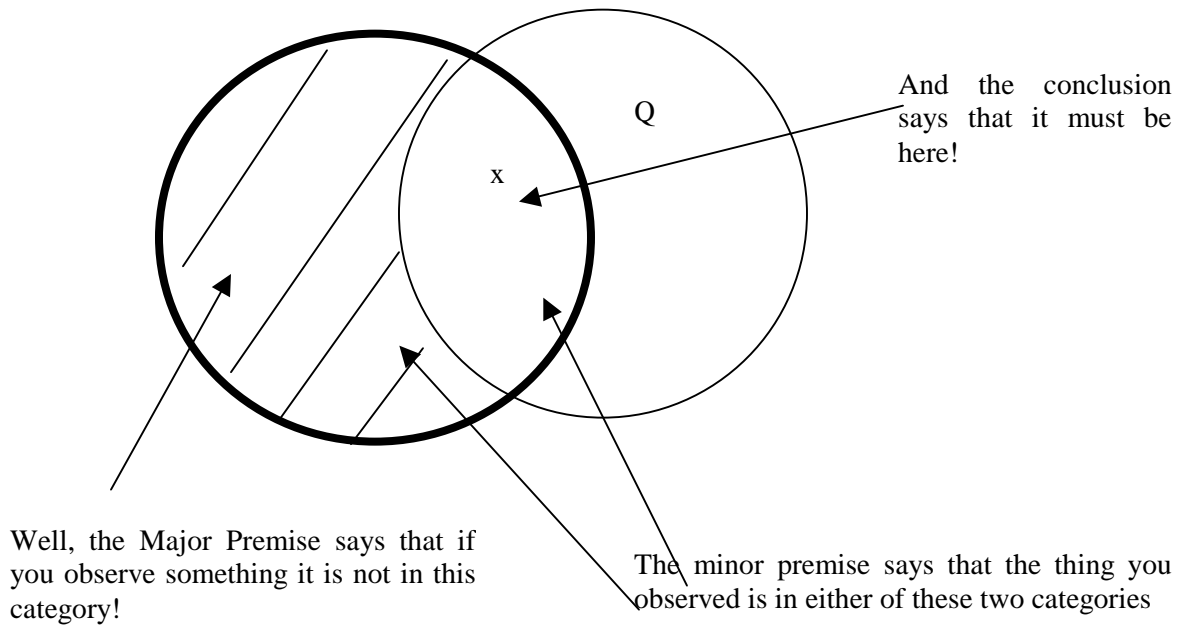
I think the meaning of conditional statements is most clear when you think in terms of what they *preclude*, or rule out. The major premise in the above argument, for example, says there are no P's that are not also Q's . That is, the shaded region in the Venn diagram below is the empty set. So, when you say something is sufficient, you're saying that you won't observe that thing without observing its consequent.



2. P says that you've observed something (lets call it x) in the left-hand circle.



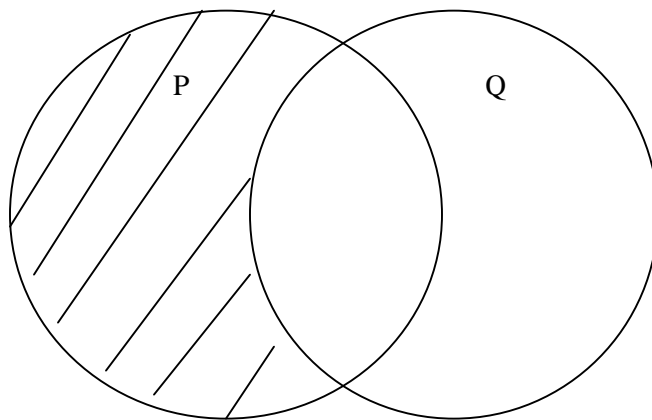
3. The conclusion says that if the premises are true, you are compelled to accept the conclusion as true. Are you?



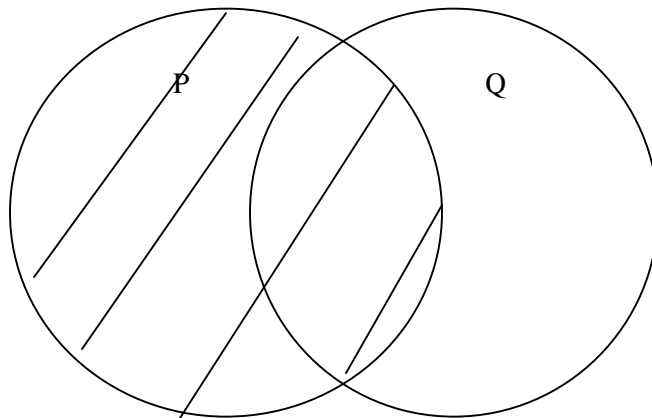
Denying the Antecedent: An invalid argument

If P, then Q	If the president commits a criminal act, then he can be impeached.	P is sufficient for Q
Not P	The president does not commit a criminal act.	P does not occur
<hr/>		
Therefore, not Q	Therefore, he can be impeached.	Q can not occur

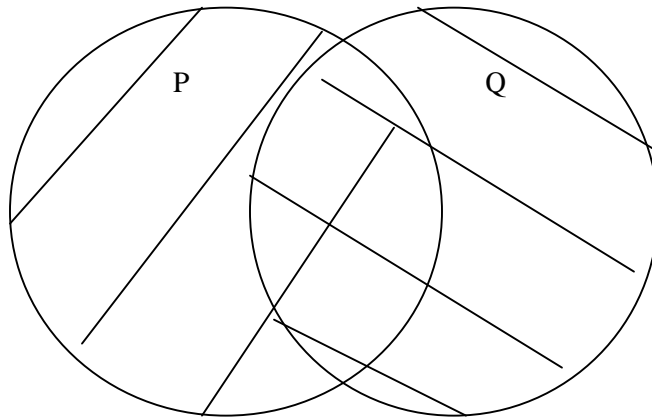
1. we have the same conditional statement as a major premise,



2. But know the minor premise says the thing you observed is not in the left hand circle



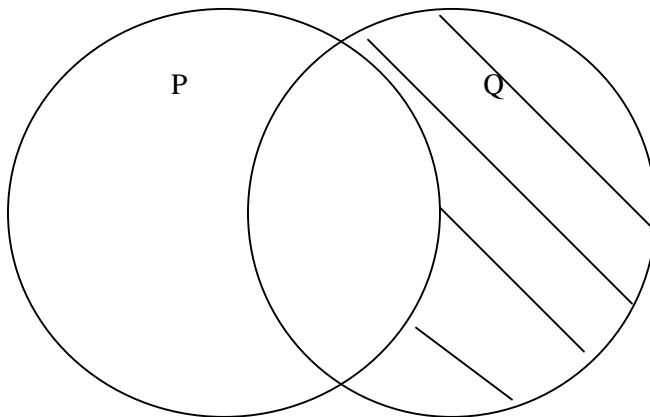
3. And the conclusion maintains that when you put this all together, you can be confident that the the thing you observed is not in the right hand circle.



the question is.... is there anything in the conclusion that is not in either of the two premises?

The answer is Yes!

Neither the major premise, nor the minor premise says anything at all about



so... where does this stuff come from?

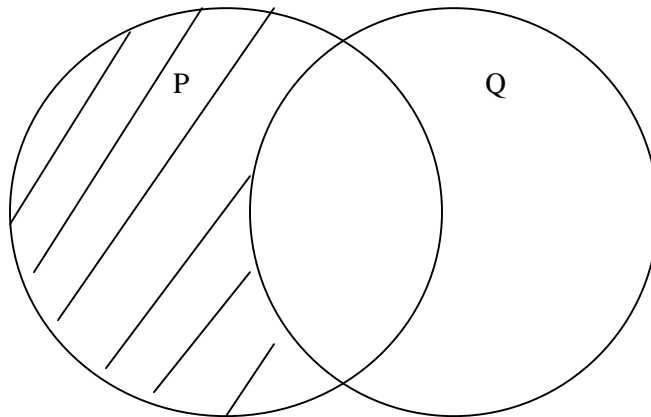
Note, it *may* be the case that 3 is true..... the thing that makes this an invalid argument is that there is nothing about 1 and 2 that compels us to accept that 3 is true.

Affirming the Consequent: An invalid argument

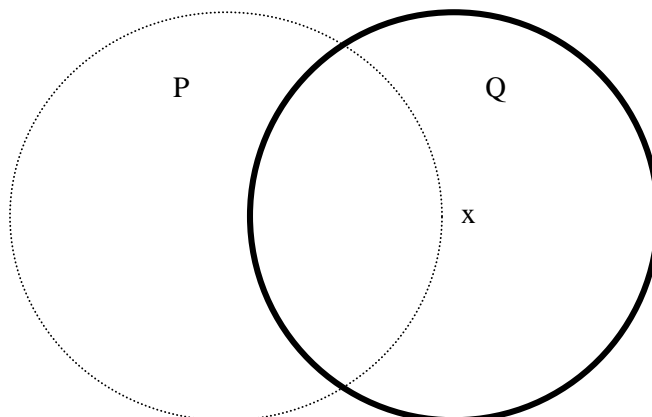
1. P, then Q	If the president commits a criminal act, then he can be impeached.	P is sufficient for Q
2. Q	The president can be impeached	Q occurs
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3. Therefore, P	Therefore, the president must have committed a criminal act.	P occurred

1. Once again, we have the same major premise:

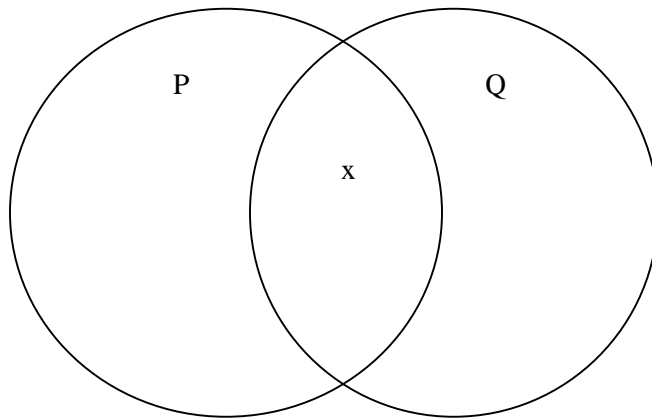
P implies Q



2. Now the minor premise is that Q occurs

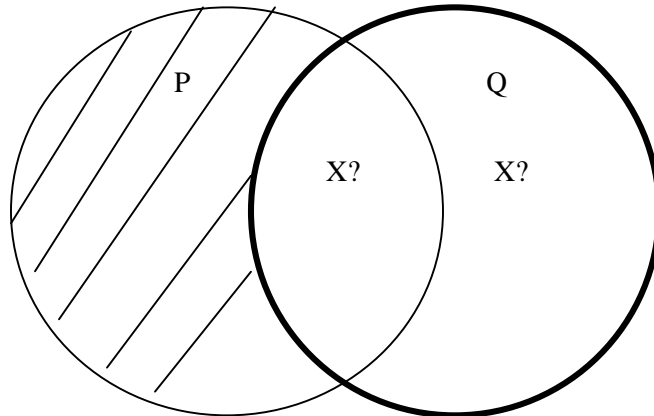


3. and the conclusion asks us to accept that it must be the case that P occurs - which (given that our major premise OR our minor premise is true) would require that that what we observed must be in the intersection of the sets p and q.



The question is.... do the major premise and the minor premise compel us to accept this?

well, the major premise says that what we observe will not be in the shaded area and the minor premise compels us to accept that what we observed is somewhere in the bold circle.

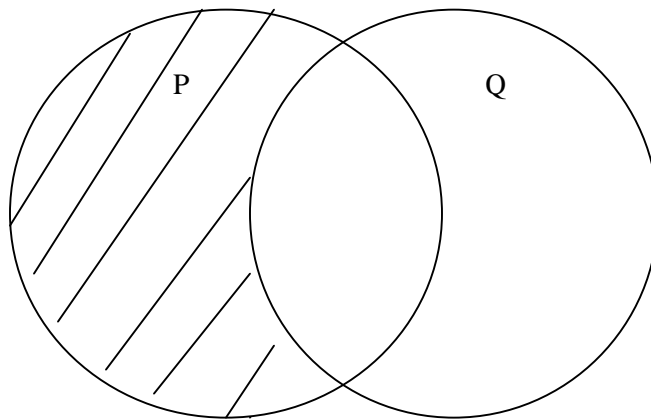


But nothing compels us to accept that its in the part of the bold circle that the conclusion says it is.

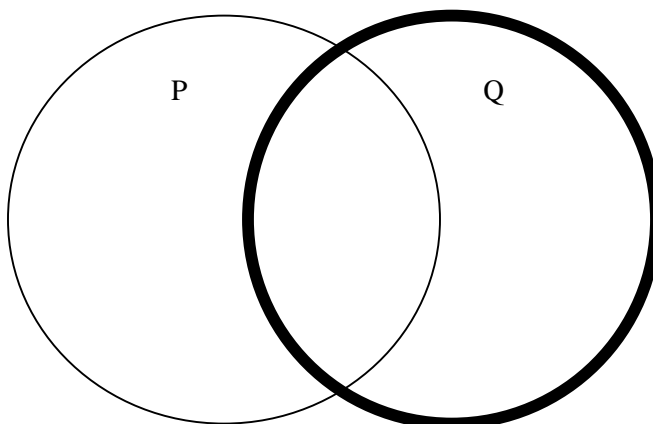
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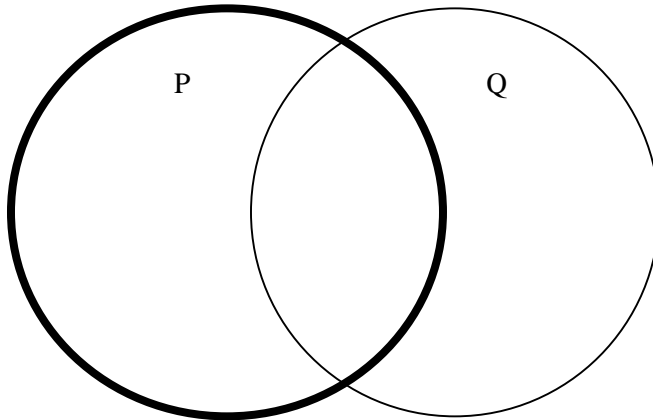
One last time we start with our friend, the major premise:



2. the minor premise says....that what we observed is not in the right hand circle.

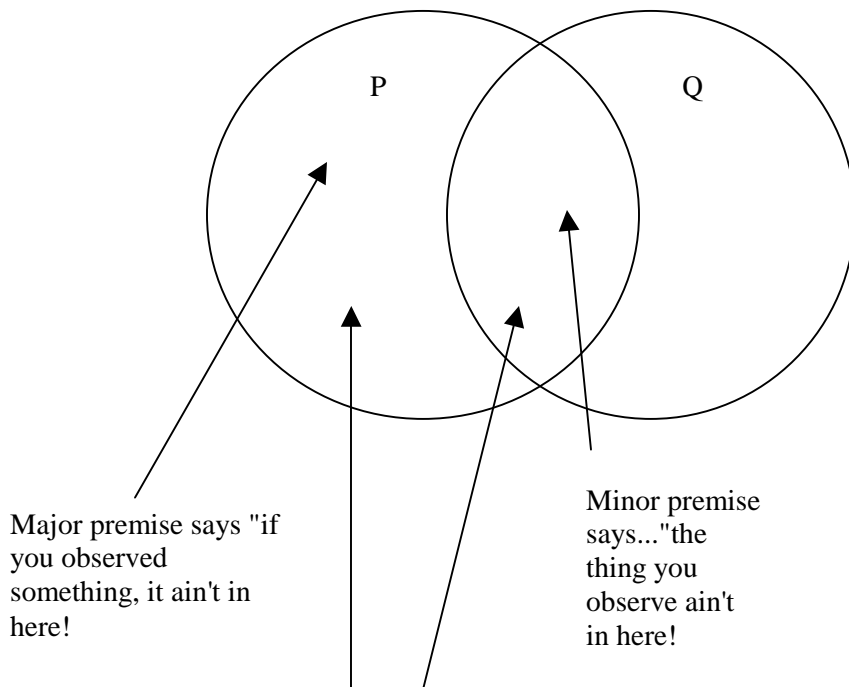


3. the Conclusion says that if we accept the major premise and the minor premise as true, we are compelled to accept that what we observed is not in the bold circle.



The question is....do the major and minor premises, together, compel us to accept this?

Answer....



And the conclusion says "the thing you observed ain't in either of these two categories"

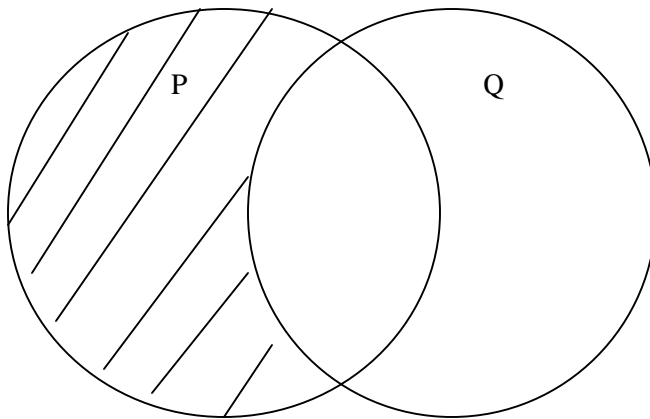
This last form of reasoning (sometimes referred to as *modus tollens*), is central to the way science works. In fact, its the only way we know anything!

Example if you are a rich country, you will be a democracy

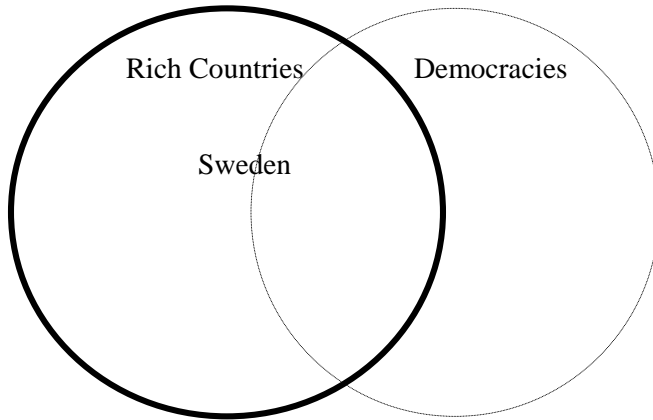
Conditional Statements – an example

Affirming the Antecedent: A valid argument

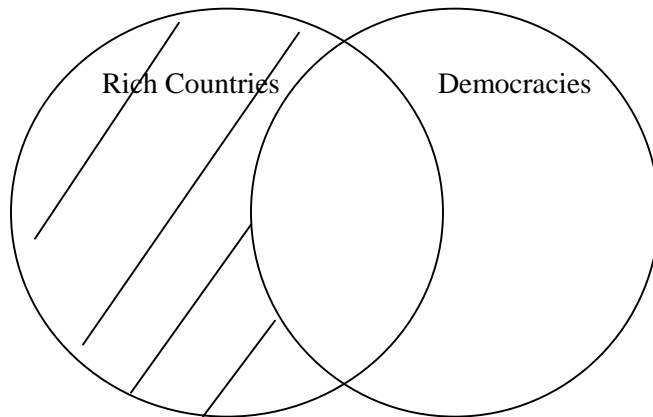
1. P, then Q	If a country is rich, it will be a democracy	P is sufficient for Q
2. P	Sweden is a rich country	P occurs
<hr/>		
3. Therefore, Q	Sweden is a democracy	Q occurs



2. P says that you've observed something (lets call it x) in the left-hand circle.



3. Says, 1. and 2. implies that you will, therefore, observe something in the intersection of the circles



Denying the Antecedent: An invalid argument

If P, then Q

If the president commits a criminal act, then he can be impeached.

P is sufficient for Q

Not P

The president does not commit a criminal act.

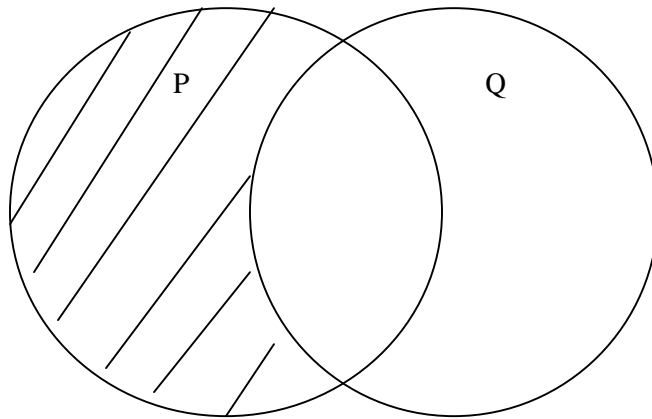
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Therefore, Q

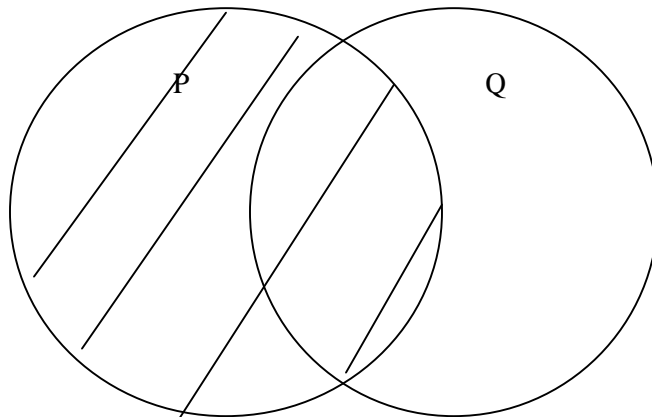
Therefore, he can be impeached.

Q can not occur

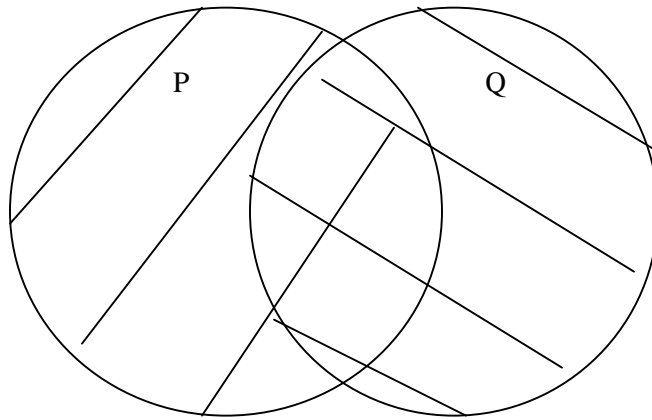
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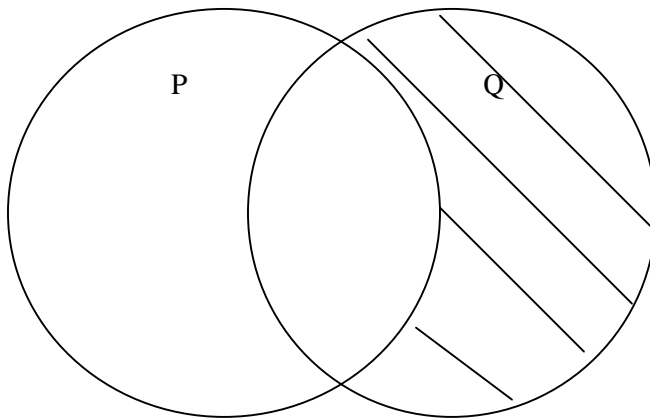
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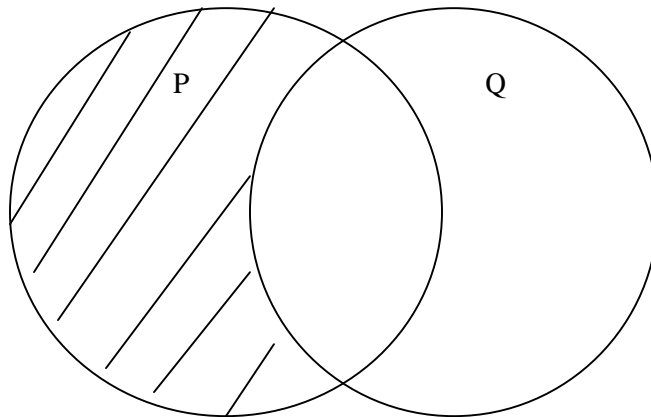
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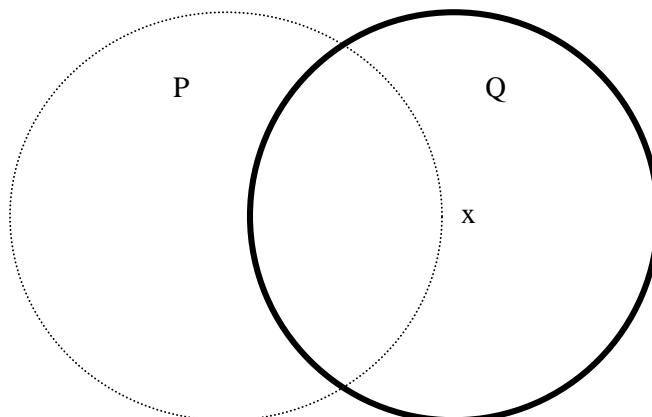
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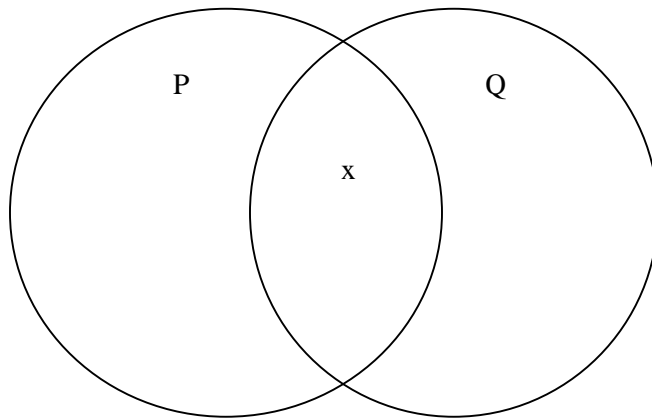
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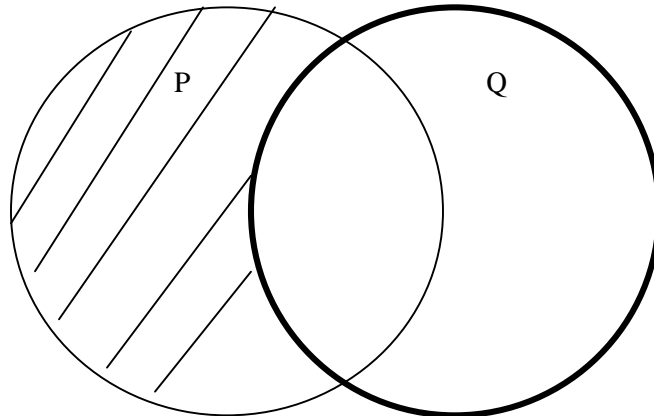


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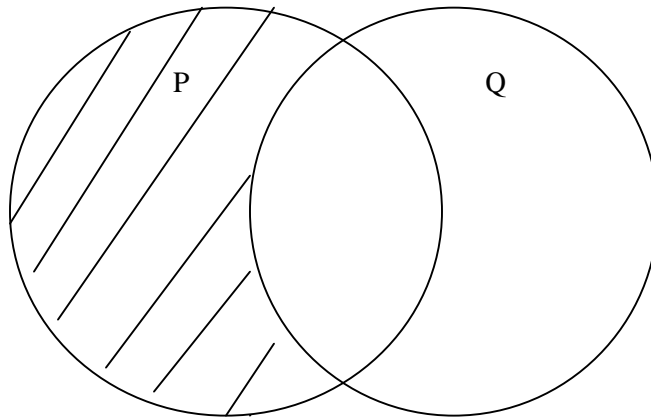


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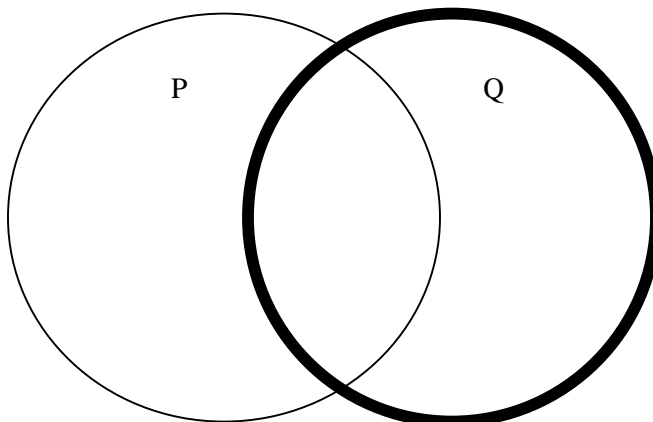
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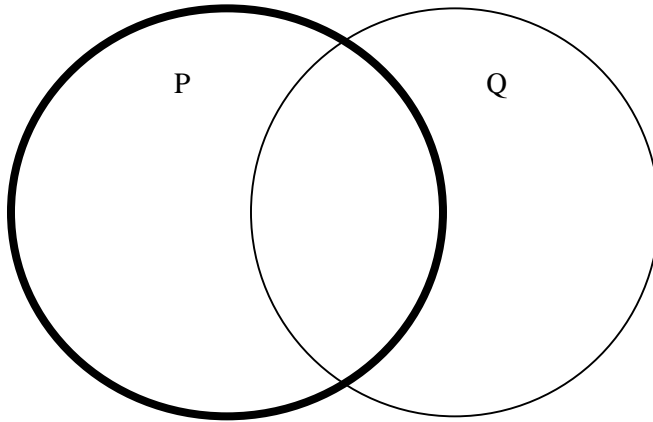
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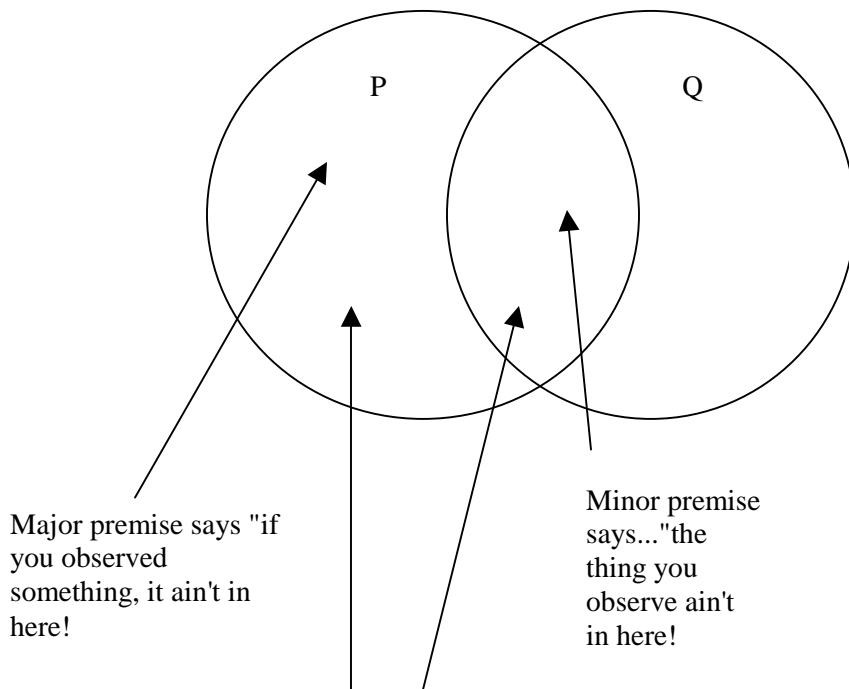


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The question is.... is do the major and minor premises, together, compel us to accept this?

Answer....



Major premise says "if you observed something, it ain't in here!"

Minor premise says..."the thing you observe ain't in here!"

And the conclusion says "the thing you observed ain't in either of these two categories"

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