

Diagramming Arguments

Supplement
to

Critical Thinking

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Advanced Reasoning Forum

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A. Diagrams

This appendix is a supplement to the section Complex Arguments for Analysis in *Critical Thinking*, presenting a way to visualize the structure of complex arguments.

Consider:

Spot chases rabbits. 1

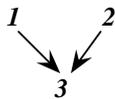
Spot chases squirrels. 2

Therefore, Spot chases all small animals. 3

To picture this argument, we number the premises and conclusion. Then we ask which claim is meant to support which other. Here *support* just means that it's a reason to believe the other claim.

If a claim A is meant to support another claim B then we draw an arrow from A to B, putting A above B.

The conclusion will have to be at the bottom, since all the premises are supposed to support it. And both do. The picture we'll draw is:



Neither 1 supports 2, nor does 2 support 1. So there is no arrow from one to the other. But both support 3, so we have arrows there. That's simple.

Now consider:

Dogs are mammals. 1

Cats are mammals. 2

Some dogs hate cats. 3

Therefore, some dogs hate mammals. 4

We number the claims. It's easy to see which is the conclusion (it's labeled with the word "therefore"). Which claims are meant to support which others? We need 2 and 3 to get the conclusion 4. But what's 1 doing? Nothing. The argument doesn't get any better by adding it, since it doesn't support any of the other claims. So our picture is:

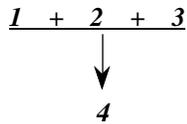


We also need a way to represent premises that are *dependent*, that is, they are meant together to support another claim, in the sense that if one is false, the other(s) do not give support.

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In a diagram we indicate that premises are dependent by putting '+' between them and drawing a line under them.

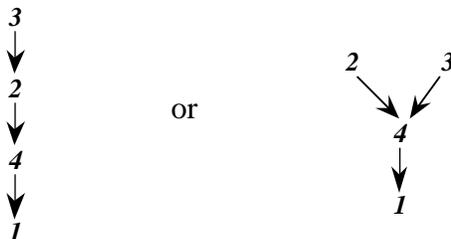
Dogs are loyal. 1
Dogs are friendly. 2
Anything that is friendly and loyal makes a great pet. 3
Hence, dogs are great pets. 4



Recall now the argument discussed on pp. 247–248 of *Critical Thinking*:

Whatever you do, don't take the critical thinking course from Dr. E. 1
He's a really tough grader 2, much more demanding than the other professors that teach that course. 3
You could end up getting a bad grade. 4

We rewrote 1 as "You shouldn't take the critical thinking course from Dr. E."
And we rewrote 3 as "He's much more demanding than the other professors that teach that course." It wasn't clear which claim was supposed to support which other.
We had two choices:

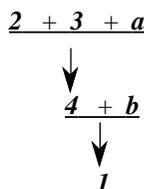


We chose to repair this argument with:

If you take critical thinking from someone who's more demanding than other professors who teach that course and who is a really tough grader, then you could end up getting a bad grade. *a*

That makes the second diagram a better choice, though we still need to get from 4 to 1. We can use:

You shouldn't take any course where you might get a bad grade. *b*

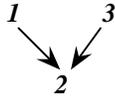


We can see that the argument is only as good as the unsupported premise *b*.

Let's see how adding a series of unstated premises can affect the picture.
Consider:

My buddies John, Marilyn, and Joe all took Dr. E's critical thinking class and did well. *1* So I'm going to sign up for it, too. *2* I need a good grade. *3*

First, we need to rewrite *2* as a claim "I should sign up for Dr. E's critical thinking class." I take this to be the conclusion (try the other possibilities, asking where you could put "therefore" or "because"). Initially we might take the diagram:



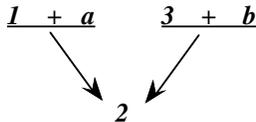
But we need some glue for this to be even moderately strong. To begin with, why do *1* and *3* yield *2*? A (fairly weak) assumption might be:

Usually if John, Marilyn, and Joe all do well in a class, I'll do well. *a*

But even that plus *3* won't give us *2*. We need some further assumption like:

I should sign up for classes in which I know I'll get a good grade. *b*

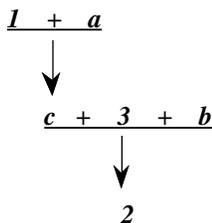
Then the argument becomes:



Still, there's something missing. We need:

I'll do well in Dr. E's course. *c*

And that changes the picture entirely:



We have a strong argument, in which we see a dependence between *3* and what we get from *1*. Whether this is a good argument depends on whether the premises are plausible.

Exercises for Section A

For each of the following, if it is an argument, diagram it, repairing as necessary.

1. Dr. E is a teacher. All teachers are men. So Dr. E is a man.

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2. No one under sixteen has a driver's license. So Zoe must be at least sixteen.
3. Sheep are the dumbest animals. If the one in front walks off a cliff, all the rest will follow him. And if they get rolled over on their backs, they can't right themselves.
4. I'm on my way to school. I left five minutes late. Traffic is heavy. Therefore, I'll be late for class. So I might as well stop and get breakfast.
5. Pigs are very intelligent animals. They make great pets. They learn to do tricks as well as any dog can. They can be housetrained, too. And they are affectionate, since they like to cuddle. Pigs are known as one of the smartest animals there are. And if you get bored with them or they become unruly, you can eat them.
6. Smoking is disgusting. It makes your breath smell horrid. If you've ever kissed someone after they smoked a cigarette you feel as though you're going to vomit. Besides, it will kill you.
7. You're good at numbers. You sort of like business. You should major in accounting—accountants make really good money.
8. Inherited property such as real estate, stocks, bonds, etc. is given a fresh start basis when inherited. That is, for purposes of future capital gains tax computations, it is treated as though it were purchased at its market value at the time of inheritance. Thus, when you sell property which was acquired by inheritance, tax is due only on the appreciation in value since the time it was inherited. No tax is ever paid on the increase in value that took place when the property belonged to the previous owner.

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B. Counterarguments

Recall the conversation between Dick and Zoe we looked at in Chapter 6:

We ought to get another dog. 1

(objection) We already have Spot. 2

The other dog will keep Spot company. 3

(objection) Spot already has us for company. 4

We are gone a lot. 5

He is always escaping from the yard. 6

He's lonely. 7

We don't give him enough time. 8

He should be out running around more. 9

(objection) It will be a lot of work to have a new dog. 10

(objection) We will have to feed the new dog. 11

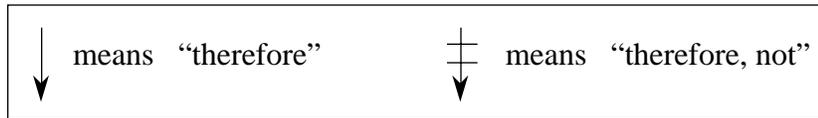
(objection) It will take a lot of time to train the new dog. 12

Dick will train him. 13

We can feed him at the same time as Spot. 14

Dog food is cheap. 15

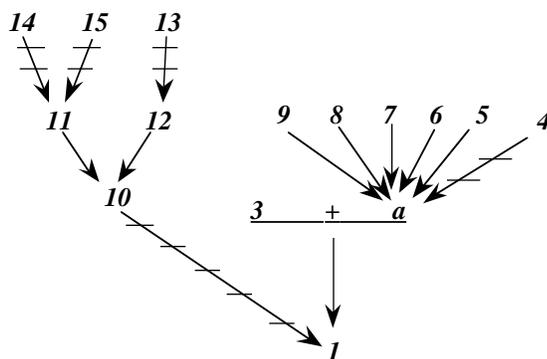
We can diagram this if we have a way to represent that a claim is an objection, not support, for another claim.



To diagram the argument, then, note that it seems that Dick intends but never says:

Spot needs company. *a*

That with 3 will be what gets the conclusion.



Claim 4 is an objection to *a*. That is, it’s an attempt to show that a crucial premise of Dick is false. It must be answered. And Dick answers it by amassing enough other evidence for *a*. Claim 10 is a direct challenge to the conclusion. If it is true, the conclusion is in doubt. So it must be answered. Dick doesn’t try to show that it is false directly. Rather he shows that the two claims Zoe uses to support 10 are false. So there is no reason to believe 10.

When we finish diagramming we can see at a glance whether the argument has left some objection to a premise or objection to the conclusion unanswered. Either the objection is knocked off with a counterclaim above the support for it (as with 13–15 against 10) or other claims are amassed as evidence (as with 5–9 against 4). Of course you’ll still need to evaluate whether the various claims are plausible.

Exercises for Section B

Diagram and evaluate the following arguments:

1. You should not take illegal drugs. They can kill you. If you overdose, you can die. If you share a needle, you could get AIDS and then die. If you don’t die, you could end up a vegetable or otherwise permanently incapacitated. By using drugs you run the risk of getting arrested and possibly going to jail. Or at least having a hefty fine against you. Although some think the “high” from drugs is worth all the risks, the truth is that they are addicted and are only trying to justify supporting their habit.

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2. Zoe: I think sex is the answer to almost everyone's problems.
Dick: How can you say that?
Zoe: It takes away your tensions, right?
Dick: Not if you're involved with someone you don't like.
Zoe: Well, anyway, it makes you feel better.
Dick: Not if it's against your morals. Anyway, heroin makes you feel good, too.
Zoe: But it's healthy, natural, just like eating and drinking.
Dick: Sure, and you can catch terrible diseases. Sex should be confined to marriage.
Zoe: Is that a proposal?
3. Dick: Nixon was a crook.
Zoe: No he wasn't. Remember that famous "Checkers" speech where he said so?
Dick: That was just political evasion. Anyway, you can't just take someone's word that he's not a criminal, especially if he's a politician. He directed the break-in at the Democratic Party Headquarters.
Zoe: They never showed that he did that.
Dick: That's because his accomplices like Haldemann were covering up. That's why they got pardoned. And he used the FBI against his enemies. He was a criminal. It was stupid for Clinton to make a speech honoring him when he died.
Zoe: Maybe Clinton was doing it so that when he dies someone will make a speech for him, too.

Answers to Exercises

Section A

The answers here are not definitive. When an argument is incomplete and doesn't have enough indicator words, there are likely to be different ways to repair it.

1. $\frac{1 + 2}{3}$

2. No one under sixteen has a driver's license. *1* So Zoe must be over 16. *2*
Zoe has a driver's license. *a*

$$\frac{1 + a}{2}$$

3. If an animal is such that *2* and *3*, then it is the dumbest animal in the world. *a*

$$\frac{2 + 3 + a}{1}$$

4. I'm on my way to school. *1* I left five minutes late. *2* Traffic is heavy. *3*
I'll be late for class. *4* I might as well stop and get breakfast. *5* Whenever I'm
on my way to school and I'm five minutes late and traffic is heavy, I will be late
for my classes. *a* If I'm late for classes, I might as well be very late or miss the
class. *b*

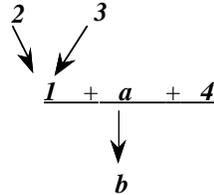
$$\frac{1 + 2 + 3 + a}{4 + b}$$

5. Pigs are very intelligent animals. *1* They make great pets. *2* They learn to do
tricks as well as any dog can. *3* They can be housetrained. *4* And they are
affectionate *5*. They like to cuddle. *6* Pigs are known as one of the smartest
animals there are. *7* If you get bored with them or they become unruly, you can
eat them. *8* Anything that is intelligent, can be housetrained, and is affectionate
is a great pet. *a*

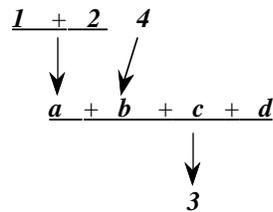
$$\frac{1 + 4 + 5 + a}{2}$$

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6. Smoking is disgusting. 1 It makes your breath smell horrid. 2 If you've ever kissed someone after they smoked a cigarette you feel as though you're going to vomit. 3 Besides, it will kill you. 4 You should not do anything that is disgusting and can kill you. *a* You should not smoke. *b*



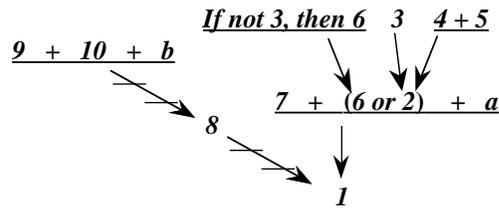
7. You're good at numbers. 1 You sort of like business. 2 You should major in accounting 3—accountants make really good money. 4 If you're good at numbers and sort of like business, you'll be good at accounting. *a* If you're an accountant you'll make good money. *b* You should major in something that you'll enjoy, be good at, and make good money at. *c* Accounting is the *only* thing that you'll enjoy, be good at, and make good money at. *d*



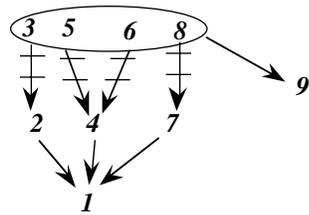
8. Not an argument.

Section B

1. You should not take illegal drugs. 1
 They can kill you. 2
 If you overdose, you can die. 3
 If you share a needle, you could get AIDS. 4
 If you get AIDS, then you die. 5
 If you don't die (not 3), you may end up a vegetable or otherwise permanently incapacitated. 6
 By using drugs you run the risk of getting arrested and possibly going to jail or having a hefty fine against you. 7
 Some think the "high" from drugs is worth all the risks. 8
 They are addicted. 9
 They are only trying to justify supporting their habit. 10
 You shouldn't do anything that has a high risk of killing you or permanently incapacitating you or putting you in jail or having a fine against you. *a*
 People who are addicted to drugs and are trying to justify their habit shouldn't be believed. *b*



2. Sex is the answer to almost everyone's problems. 1
 It takes away your tensions. 2
 It doesn't if you're involved with someone you don't like. 3
 Sex makes you feel better. 4
 It doesn't if it's against your morals. 5 Heroin makes you feel good. 6
 It's healthy, natural, just like eating and drinking. 7
 You can catch terrible diseases. 8 Sex should be confined to marriage. 9



This is an example in which the counterargument is intended to do more than throw doubt on the conclusion: It's meant to establish another claim.

(Though it's missing premises for that.)

Just looking at the diagram, we can see that Zoe has not established her conclusion: Every one of her premises has been brought into doubt by a plausible claim.

3. Nixon was a crook/criminal. 1
 He said he wasn't in the famous "Checkers" speech. 2
 That was just political evasion. 3
 You can't just take someone's word that he's not a criminal, especially if he's a politician. 4
 He directed the break-in at the Democratic Party Headquarters. 5
 They never showed that he did that. 6
 His accomplices like Haldemann were covering up. 7
 That's why they got pardoned. 8
 Nixon used the FBI against his enemies. 9
 It was stupid for Clinton to make a speech honoring Nixon when Nixon died. 10
 Clinton was doing it so that when he dies someone will make a speech for him. 11
 It is stupid to make a speech honoring someone who was a criminal. a
 (Don't add "Clinton is a criminal." There's no reason to believe that Zoe thinks that's plausible.)

12 *Diagramming*

