Reference Manual
Chapter Three:
Ampliative Reasoning and Informal Logic

This reference provides some of the basic points made in Chapter Three. But it doesn't include everything of importance! Please spend the time working through all the tutorials! Often details for working homework problems -- the only good preparation for exams! -- is available in the tutorials. Even if you can do this weeks homework without doing them all, there may be material in later units that will be very hard without a clear understanding of all that going on in the tutorials.

Contents: Section 1: "Ampliative" Reasoning and Inductive Argument Types; Section 2: Informal Argument Diagramming; Section 3: Informal Fallacies of Relevance; Section 4: Informal Fallacies of Presumption; Section 5: Informal Fallacies of Ambiguity

1. "Ampliative" Reasoning and Inductive Argument Types

Informal reasoning typically leads to a conclusion by means of some educated guess-work. Maybe we should call this something like detective work. It takes evidence and amplifies it. (Think CSI, if you watch TV.) Let's review what we know from chapters one and two.
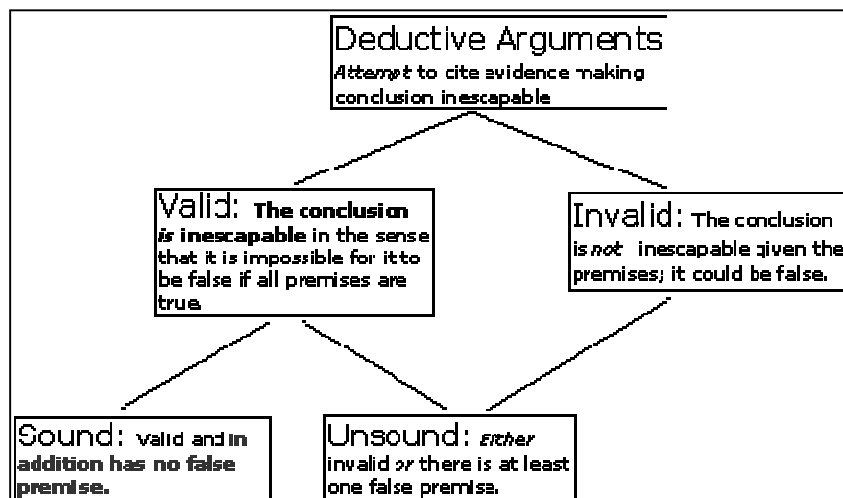
> *Formal reasoning (of deductive logic) manipulates* the statements of evidence and performs something of a calculation on them in virtue of their form or sentential structure.
>
> (Think about the simple "process of elimination" argument for Chris's B grade: "Either A or B but not A, so B".)

> *Informal reasoning (of inductive logic) interprets* the evidence to form a conclusion. This thinking *amplifies the evidence* -- often by generalizing, predicting, or uncovering the best account of this evidence.
>
> (Think about figuring out that Chris is in love. This may be a "best guess" but it may be a reasonable one.)

Think about all the arguments we symbolize in SL as good examples of deductive arguments. Keep in mind, say, the arguments about Bush (e.g., If he's US president, then he is a US Citizen. He is US president, so...). Then:

Deductive Arguments
Attempt to cite evidence making conclusion inescapable

Valid: The conclusion *is inescapable* in the sense that it is impossible for it to be false if all premises are true

Invalid: The conclusion is *not* inescapable given the premises; it could be false.

Sound: valid and in addition has no false premise.

Unsound: *Either* invalid *or* there is at least one false premise.

1. ***Deductive arguments** attempt* to provide grounds for making their conclusion

inescapable.
2. If they succeed in this attempt, the argument is *valid*.
3. But, just as essential to a good deductive argument, the premises must be true. If the argument is both valid and has all true premises, then it is *sound*.

Another little diagram to keep in mind, then, is this.

For a deductive argument:

> Sound = Valid + No false premises.

Let's compare this to our inductive concepts:

Inductive arguments are just as common. The example about our conclusion that Chris has fallen in love is an example. It's an attempt to give the best account of the evidence...it could be wrong, maybe Chris is faking it, but we're trying to give the likely cause of his behavior here, not the only possible one. That's the big difference between inductive and deductive. And we can picture it this way:
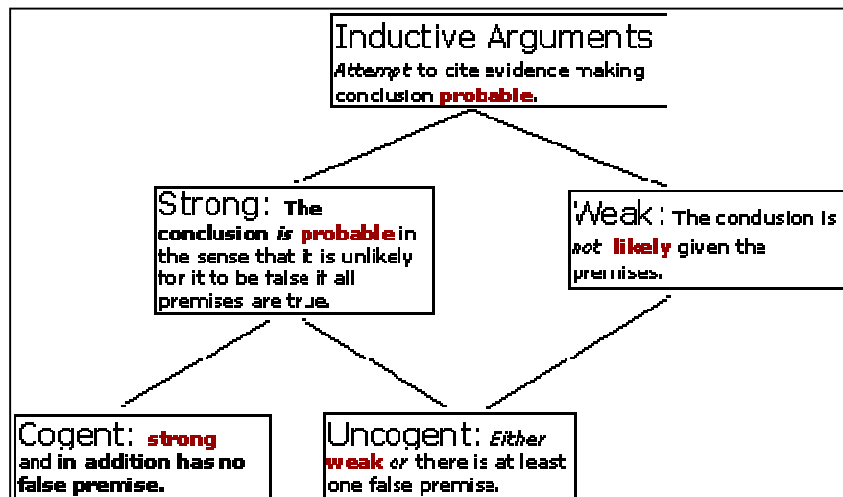
1. *Inductive arguments attempt* to provide grounds for making the conclusion likely or probable.
2. If an inductive argument succeed in this attempt, the argument is *strong*.
3. But, just as essential to a good inductive argument, the premises must be true. If the argument is both strong and has all true premises, then it is *cogent*.

So, for an inductive argument:

> Cogent = Strong + No false premises.

Inductive Argument Types

There are various sorts of informal, inductive arguments. Here are six kinds.

1. **Causal Reasoning:** The example of Chris-in-love is inference to a cause. The best -- but not the only -- interpretation of the data about Chris is that he is in love. Still, attributing causation can be very difficult. Here we make a guess about an emotional state given behavior.
   Often times there are correlations between types of events but no causal link. I'm told that there is a positive "correlation" between increased salaries for religious workers and increased consumption of alcohol. But this doesn't mean there's a causal relation. This

does not mean priests of various sorts are responsible for the increase in drinking! Instead, both increases are the result of a common cause: increase in overall wealth in the economy.

2. **Argument from Authority:** Very often are best reasons for believing something is expert testimony. Smoking causes cancer. I believe this but have never done the study. The experts tell us this is so: *they* do the causal reasoning and *we* reason they are right based on their expertise. Still, once was the time when the tobacco industry paid "experts" to testify that there was no causal link but just a correlation. One needs to be careful to make sure that
   - spokespersons cited as authorities truly do know the field of knowledge in question and are in a position to wisely judge, and
   - there are not other equally good authorities taking an opposed position.

   Like all inductive arguments, those from authority offer no *guarantee* that their conclusion is true. But, if the authority cited is a good one, and there is no other evidence to the contrary, then the conclusion is likely true.

3. **Generalization:** One of the most common sorts of inductive argument is from particular cases to a more universal statement about all members of a group. For example, one may notice that each and everyone you've contacted in PHL 102 thinks that symbolization of 4.5 is difficult. Then one might want to conclude that 4.5 is difficult for everyone.

   But be *careful*. It may be that your contacts only come from the postings. It could be that there are people finding 4.5 easy and not bothering to post. When one generalizes from a "sample", one needs to be careful that the sample is a good representation of the whole group. (So, we ask for a "**representative sample**" when generalizing.)

4. **Statistical Generalization:** Sometimes the generalization is not universal. Instead of saying "everyone finds 4.5 difficult", one might conclude that *most* people do. A more sophisticated sampling, e.g., in election polling, will sample from a big group and conclude that x% of voters will vote for y. Again, one needs to be very careful that that the generalization be based on a sample that is representative of the whole group being portrayed!

5. **Statistical Inference:** This sort of reasoning moves from evidence about a group, often a very large group, to a conclusion about an individual or another group. Often the groups are explicitly described in statistical terms: "90% of my group got an A" or "most US citizens distrust tyranny". Two important types of statistical inference are treated separately below: Arguments from Analogy and Predictions. In all cases of statistical inference, generalizations about groups are applied to make conclusions about particular individuals or particular groups of individuals. Such reasoning is the reverse of generalization.

   Often, we start have statistical information about a group and make an inference about particular members or subclasses. Perhaps it's a given that 37% of students at O.U. are transfer students from other universities. Then, I can expect that some of my students will be transfer students. But because my class is small and may not be an average grouping I would not jump to the conclusion that 37% of the class are transfers. In any case, the study of statistical inference of this sort -- from percentages in a whole to particular sample class -- is as tricky as statistical generalization.

6. **Prediction:** From information about what has happened in times past, we make an inference to the future. So, predictions are a type of statistical inference.

7. **Argument by Analogy:** Attempts to show a conclusion that some thing X has a quality q given that similar things Y, Z, etc. all have this same quality q. (Perhaps I notice that you don't really like doing truth tables, "boring" you call them, so, I conclude that like other people who have had that reaction, you will prefer doing formal derivations because they present a little strategic challenge.) So, an argument from analogy is be a special case of a statistical inference to a particular. For an argument from analogy to be a good one, certain considerations must hold.
   a. *Number of instances.* (How many analogues X, Y are there? The more the better for the quality of the inference.)
   b. *Instance variety.* (If we are to generalize from a number of analogues, the better

reasoning includes variety of instances supporting the conclusion. The variety indicates that our individual X is less likely to be completely different from Y, Z, etc.)

   c. *Number of similarities.* (The more the better.)

   d. *Relevance.* (Of greatest importance: the similarities cited between X and Y,Z etc. should be relevant to q.)

   e. *Number of dissimilarities.* (These, if relevant, can undermine the argument.)

   f. *Modesty of conclusion.* (The conclusion about q should not be too specific. We cannot expect X to be exactly like Y, Z, etc. just because it bears some similarities.)

All argument by these informal, inductive means is holistic. One attempts to render the best all-things-considered judgment. One might call this the best account or best interpretation of the data. Sometimes this is called "abductive" thinking = inference to the best explanation. But I think that "best interpretation" is more general. So, when rendering a conclusion, it may be best to have an 8th, overall category:

8. **Best Overall Interpretation of the Evidence:** But this is to say very little. To give an theory of interpretation would involve something like a theory of how to do science and detective work together. That is not an easy task.

    So, 8 in not the preferred characterization of reasoning: We will try first to analyze a bit with 1 - 7.Sometimes we can only say that "on balance" the best conclusion is C. It is usually best, though, to be able to describe and analyze this weighing of the evidence in terms of 1 through 7. And only use 8 when we are confident that nothing we know is left out.

2. Informal Argument Diagramming

In order to analyze and evaluate an informal argument, we need tree diagrams as a tool to spatially represent complex interconnections. Let's look just a bit more at that tool.
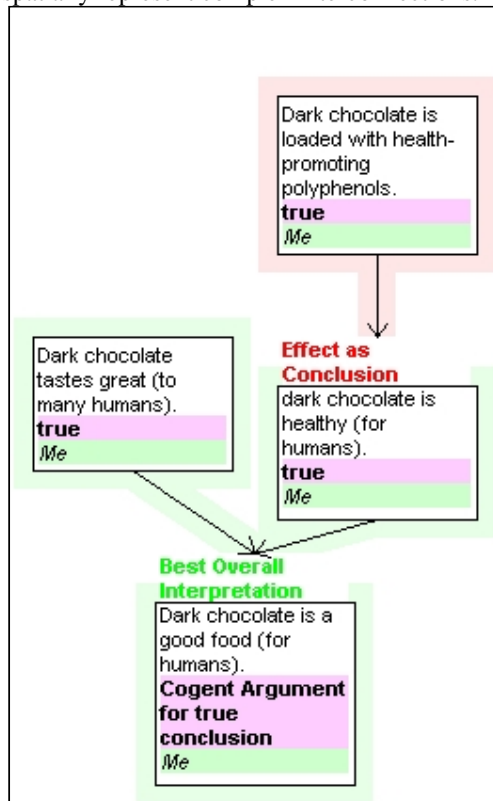
First, here's that old argument attributed to me...and maybe I give it too much weight? Maybe we should be more skeptical about this claim that this is good, cogent reasoning?

Missing Premises

I just claimed that my argument was cogent. That would mean the it's a strong one with true premises. But is it really? I'm not so sure. Let's start considering potential problems...just like you should for any real-life reasoning.

To begin, I don't know if there are other factors for quality food besides the ones of taste and health. Maybe some would say that chocolate is not such a great food for humans because it is a bit expensive for most of the world. Others would say that we *exploit* the third world growers when we force them to harvest the cocoa bean.

But, at least for today, I'm going to deny all of this. In fact, I've just been assuming (and you have too?) that health and taste are the only important factors for assessing the quality of a food. This is a kind of missing premise. It may not be true, but for this reason it's good to try and make our hidden assumptions explicit. Then we can examine them!

Try this...we add the missing premise with the [button icon] button (just type in what you think is missing and you'll get the missing premise in gray:
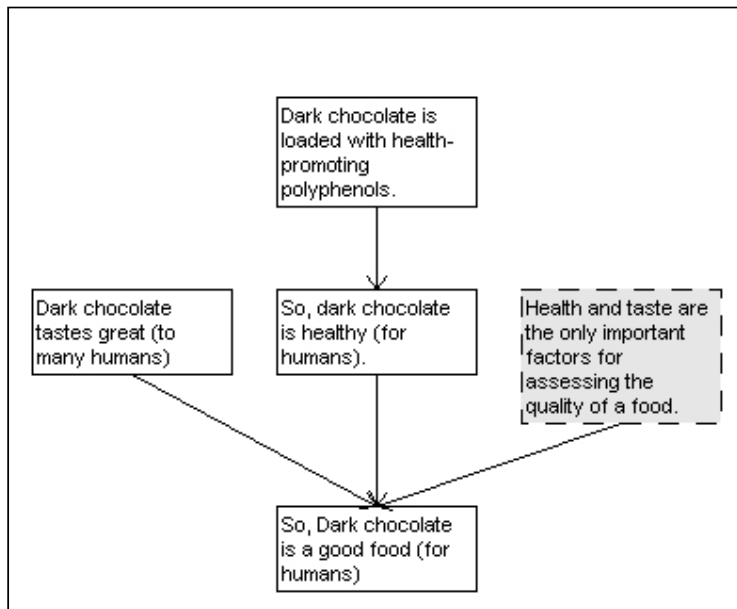
But, I'm still not ready to evaluate this argument. We need to think some more. (So, I've taken away my claim that it is cogent.)

In fact, I suspect you'd come up with problems with this argument and conclusion if you had to....Let's see:

Argument and Rebuttal
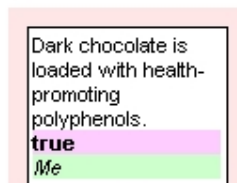
We have had our fun with the chocolate argument. But you may well want to object before it is taken too seriously.

Let's go back to the earlier strong claim about the cogency of this argument. Look, you may say, some California journalist and some OU philosophy prof argue about the importance of eating chocolate. But they are not the experts on health. I am! (Let's suppose you're a nurse or otherwise have expertise in this matter.)

You may want to suggest a counterargument...

Objection: It may be that chocolate contains some health promoting antioxidants, but as well its high fat content can contribute to migraines, acne and obesity.

Point-Counter Point, Argument-Rebuttal

Suppose that you and I are arguing a bit about my old chocolate argument. Here's "my" argument and "your" contrasting one.
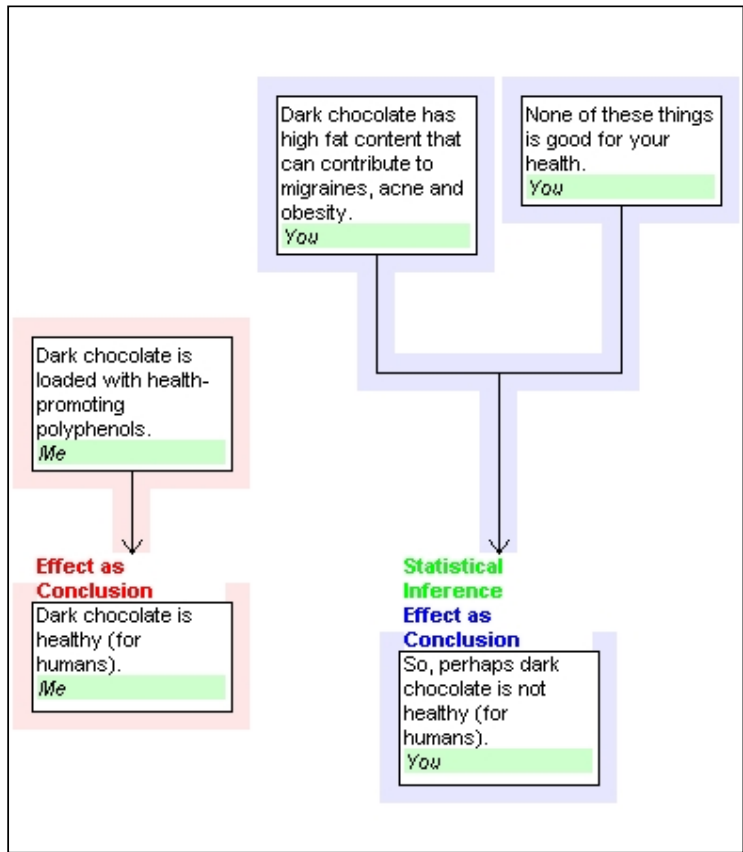

Notice that your conclusion (blue) is more or less the opposite of mine.

Your argument, a **rebuttal** to mine, has a conclusion that is a **counterpoint** to my point.

(Also notice that I choose two different argument schemes to represent your argument. I don't think the decision matters much. I'd count either as correct.)
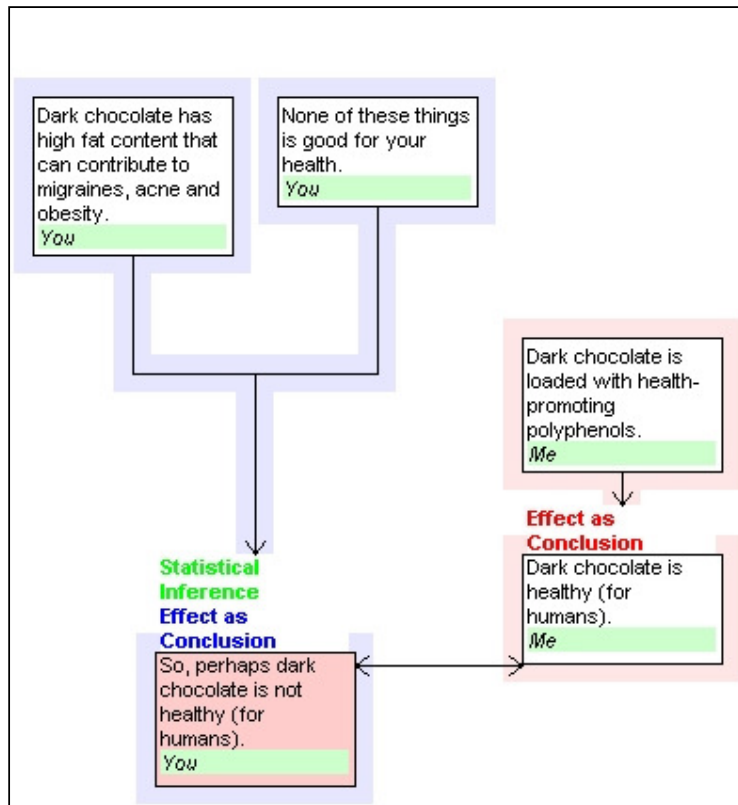
Araucaria allows you to

mark counterpoints in rebuttal arguments. Here are the directions. **First, drag an arrow from your counterpoint to the original point** (as though your rebuttal gave a reason for my point rather than its opposite). You'll get this:

Conclusion
So, perhaps dark chocolate is not healthy (for humans).
You
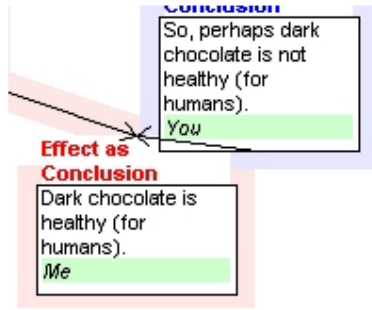
Funny, the program doesn't make this look so good. But you clean that up when you make your point the counterpoint to my conclusion.

Effect as Conclusion
Dark chocolate is healthy (for humans).
Me

Second, click on your counterpoint and then on the rebuttal button: ⬌ and you will get this:

Dark chocolate has high fat content that can contribute to migraines, acne and obesity.
You

None of these things is good for your health.
You

Notice that my argument just got switched to the right and yours to the left. (I didn't program A3...don't blame me!)

Dark chocolate is loaded with health-promoting polyphenols.
Me

Effect as Conclusion
Dark chocolate is healthy (for humans).
Me

Statistical Inference
Effect as Conclusion
So, perhaps dark chocolate is not healthy (for humans).
You

Best Overall Interpretation of the Evidence?

We need to be able to analyze and evaluate the various sorts of inductive arguments. Our Araucaria Tool is just a way to illustrate this analysis and evaluation. But it can be useful. Here's a way to see the bottom line.
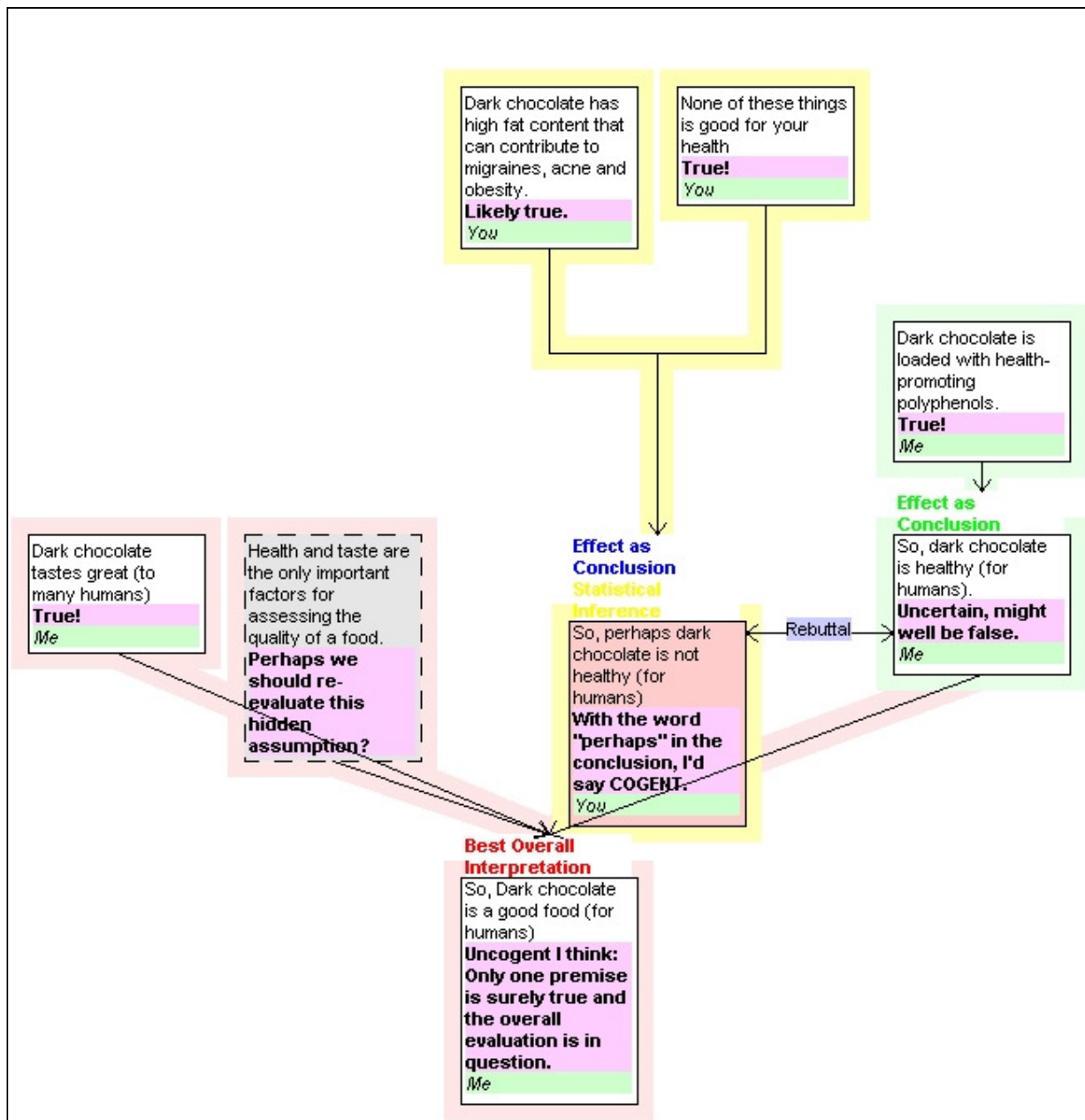
So, sadly, it's not very clear that this argument is cogent.

3. Informal Fallacies of Relevance

Fallacies of Relevance		
Arguments that give the *illusion* that premises support a conclusion while instead only making irrelevant assertions. Often the assertions are relevant to some related matter. (I try to use fairly generic terminology and description here so that the reader can utilize Web resources to greatest benefit.)		
Appeal to Force	The arguer threatens some kind of harm to those not accepting his or her conclusion. The threat may be implicit.	"Believe me or I'll flunk you."
	The arguer attempt to "support" a conclusion but bases this only on	

Appeal to the People	sentiments of popularity and the need to belong. There are two important subcategories. We use Teall's lingo here:	
	Bandwagon Appeal...the appeal to join in with "everyone" (arouse the passions, mob mentality, us v. them--we all should hold together in our thinking)	"Buy Ajax, most everyone does."
	Snob Appeal...the appeal to the "in crowd"	"Shop Rochester Villiage...where the posh browse and buy"
Appeal to Pity	elicit pity in lieu of reasons	"I deserve a passing grade because otherwise I won't be able to graduate."
Argumentum ad hominem	An attempt at *counterargument* or *rebuttal*, but fallacious because the counter is against the person rather than against the reasons he or she adduces.	
	Abusive ad Hominem: A Character Attack in lieu of evidence against the alternative position.	"Hah! He's a philanderer so his views on logic are all wrong."
	Circumstantial ad hominem: Dismissive of someone's claims because of their circumstances. It's fallacious because the claims themselves are not rebutted.	"She's a professor, so her defense of the U. is no good. She's just biased."
	Tu Quoque ad hominem: claim of hypocrisy in lieu of reasons. "You too" are doing it; so don't give me reasons against the thing.	"You say don't do drugs. But I've seen you smoke. Thus drugs are fine."
Ignorance	Some claim is not proven true, so it's denial is accepted.	"Ha! I'm right. You can't prove me wrong."
Red Herring	*Irrelevancies* presented to throw one "off the scent"--always an attempt to counter another argument. Usually there is a "subtle" change of subject making the it appear that the issues at hand are being addressed.	Student to Instructor: "Halpin, you say we should spend more class time reviewing homework. But think about the importance of spending time at home on homework. You need to do homework on your own to really learn."
Straw Man	The *misrepresentation* of another's position in attempt to unfairly discredit it. (This seems to be the normal mode of political discourse in the U.S.)	Instructor to Student: " You say we should have fewer problems assigned. So you really think that you should just be able to sit around all day and night, drink away your lives and amount to nothing. That's just wrong. So, I'll assign the problems."
Unqualified Authority	An argument based on "authorities" who really are *not trustworthy* in the circumstances. Perhaps they are biased, outnumbered, or just out of their area of expertise.	"Halpin tell us to eat chocolate. Therefore, we should."

4. Informal Fallacies of Presumption

Fallacies of Presumption
Arguments that give the *illusion* that premises support a conclusion by leaving important aspects of the reasoning unspoken and mistaken.

Begging the Question	Assuming one of the mains points at issue, while trying to hide this fact.	Circular Reasoning: "God is real because the bible says so; and the good book is all true because it is divine inspiration." Hiding the main Point: "Harming sentient beings is wrong so we shouldn't eat shrimp." (hidden assumption about sentience of shrimp)
Complex Question	A question which conceals a presumption...best to see these as two part questions.	"So have you finally stopped partying away your life?"
False Dilemma or *False Dichotomy*	Premises presume that there are only a few possibilities when there are many.	"You study all day or you'll flunk."
False Cause	Using mere correlations or other weak evidence for causality.	"You made it rain, I saw you scream at the heavens minutes before the storm!"
Hasty generalization	Generalizing without enough evidence, perhaps based on an unrepresentative sample.	"The first two time the die came up 6. Therefore it always does."
Suppressed Evidence	An inductive argument is "all things considered". If an arguer knowingly and deceptively keeps relevant considerations out of the argument, then the reasoning is fallacious.	"It's a beautiful island, great views, great swimming, you should buy it" says the agent, neglecting to mention that the island is submerged by the tides every week or so...
Unreliable or *Unqualified Authority*	An argument based on "authorities" who really are *not trustworthy* in the circumstances. Perhaps they are biased, outnumbered, or just out of their area of expertise.	"Halpin says that we should eat chocolate; he must be right he's an OU prof."
Weak Analogy	Presuming that a few minor, similarities can mean complete similarity. We have discussed many reasons for the failure of analogical reasoning: The main ones are relevance of similarities and disanalogies. See 3.1 and 3.2 for details.	"The university is like an army, so when the philosophy professor says 'believe me about what is good', I should say 'yes sir or yes ma'am'!"

5. Informal Fallacies of Ambiguity

Fallacies of Ambiguity		
Arguments that give the *illusion* that premises support a conclusion only because of unclarity in their meaning. (I try to use fairly generic terminology and description here so that the reader can utilize Web resources to greatest benefit.)		
Fallacies of Meaning		
Amphiboly	An ambiguous premise misleads due to faulty grammar.	"Headline: 'Zoo Staff Mothers Abandoned Chimp'. So, clearly, their staff should be punished."
Equivocation	Misleading reasoning based on a word or phrase with different meanings.	"Socrates is a man, so too is Plato. Socrates is man, so Socrates = man. Plato is man, so Plato = man. Therefore, buy the properties of identity, Socrates = Plato, indeed we all are one."
Parts/Wholes Reasoning Problems		
	Mistakes properties of the	"My brain can't really think, because my neurons

Composition	part as properties also of the whole.	don't think, they just electro-chemically signal."
Division	Mistakes properties of the whole as properties also of the parts.	"The table is visible, so all its parts are. Therefore, the atomic theory of matter must be wrong."