Thinking in a Straight Line

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Abstract

Rational human discourse is not as common as we imagine or as we would like it to be. Sometimes it is necessary to use fallacies and fabrication to get to the point we favor. This essay is an illustrated list of 33 handy tools for avoiding thinking straight.

I am an avid reader of editorials and letters to the editor. I also take notes in meetings. I review papers in the fields of dentistry, education, management, and philosophy. I watch the televised broadcasts of our city council and the water board.

I am a student of public thinking. Generally what draws my attention is the marvelous capacity of a group of humans to start from a common point in fact and end, in a few deft steps, in a full symphony of divergent conclusions, many of them pretty wobbly. The mind works in such wonderful and mysterious ways. Thinking straight is often not one of them. From the famous “motivated misunderstanding”—“I don’t see what you are getting at”—to naked name-calling, we muddle it when given a reasonable chance.

There is an entire realm of secondary considerations. “I was going to make this point, but since Wishywashy brought it up already, I need to go in a different direction or my contribution may not be recognized as ‘distinctive.’” “If I speak last I will have a chance to look like I am contributing the piece that leads to action.” “Well, I see that Flabbergast is going to argue for X. He’s a turkey, so I will start loading my gun to get him.” These are not flaws in reasoning. They are traits of human nature—and there are many more—that predispose us to bent logic.

I sat down a few hours ago to make a short list of human slips in logic and argumentation. This essay will mention and illustrate the first 33 that popped into my mind. Except for the final one, the Fallacy Fallacy, they are listed in alphabetical order because they tend to be pressed into use randomly, or “as needed,” rather than in any structured fashion.

ad Hominem

“You can’t believe everything you read in a supplement to JADA because they are financially supported by the companies whose products are featured in the ‘research’ reports.” “Who would believe him? He can’t even think in a straight line.” “It’s just another crazy idea from inside the Beltway.” “Chambers is a pointy-headed intellectual. What would he know about dentistry?”

The thrust of an ad hominem argument is at the person who is making the claim, not the merits of the claim itself. It is generally true that stupid people say stupid things, but the unsupportable position, not the person, should be the target of refutation. There is no logical reason, for example, that a dental product that is touted by an expert who has a financial stake in the firm that sells the produce is not in fact a superior product.

In its kindest form, the ad hominem argument is a corrective to the argument from authority that was common...
Leadership

through the dark ages and the middle ages. Thinkers seldom looked behind an argument if it had a famous name on it. This is the origin of the misconception that *primum non nocere* (first do no harm) is part of the Hippocratic Oath. It is not. As is obvious from the Latin phrase, this is a much later position (probably crafted by a lawyer for the plaintiff who wanted to give it a little weight by attributing it to the Father of Medicine).

A more familiar term for *ad hominem* argument is “name-calling.” Kids learn this technique early in life. In some cultures, notably the Chinese, name calling is a public admission of the weakness of one’s own argument. It translates “I know I have lost the argument, but I am just so angry.”

**Adjectives as Arguments**

“Based on careful consideration of the best evidence, some of the nation’s most respected experts at the prestigious Hokum Institute have prepared a fair-minded proposal that should please all rational patriots.” On the other hand, “It is rumored that some individuals of unknown background, allegedly connected with the so-called Humbug Institute, are furtively circulating a hastily contrived and pretty scary set of ‘unconventional’ ideas.” If we remove the adjectives from these two sentences what we are left with is little more than:

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**Affirming the Consequence**

“The best materials and careful techniques reliably lead to worthy results. The examples in the CE speaker’s slides are truly outstanding clinical results. Therefore, the clinician is careful and uses good materials—and I could expect the same.” “Unethical people give evasive answers and are afraid of transparency. She said she would rather not explain why she approached the matter the way she did. It begins to look like her motives could be questionable.” “If it quacks like a duck…”

This one was a classic teaching device among the sophists—the precursors to lawyers in Aristotle’s time. It is a perversion of the very sound logical tool called modus ponens. If A then B, A, therefore B. That is good logic. If A then B, B, therefore A is lousy logic. The rule might prove the result, but the result does not prove the rule. Like so many of the “thinkos” that follow, part of the process is sound: If A then B might be evidence-based from top to bottom. The conclusions of EBD can still be dangerously wrong, even when the evidence is ironclad.

**Anchoring**

“I have heard of dental students who are $700,000 in debt for their education. Do you think the average student debt is?” “I don’t know the exact statistics on suicide among dentists, but it wouldn’t surprise me to hear five or ten in a thousand, or more.” “We have been talking about how Americans are less trusting of their neighbors, or of professionals, and especially of politicians.

Before we get into this mess, let me tell you a personal story…” “I remember something that actually happened.” Have you ever wondered why the guy selling refrigerators starts with the top of the line or why executives of a company associated with an industrial disaster avoid guessing or guess low? They are attempting to “anchor” a number in your mind.

All humans are susceptible to this anchoring bias. Its use is as ubiquitous as the Ginsu Knife salesman who names a price and then systematically lowers it and piles on benefits so that the bargain is compelling even at twice what you might have had in mind to begin with. In some experiments by Nobel Prize winner Daniel Kahneman, people were told to write down the last two digits of their social security number and then asked how many African nations there are in the U.N. The guesses about countries very closely tracked the random number issued by the U.S. government. More men will opt for heart surgery when they know that it has a 90% success rate than if they are told that there is a one in ten chance of fatality. Anchoring depends very weakly on veracity—an anchor value can be a long way from the truth and exert a powerful pull. What matters most is that the anchor is concrete. Saying that the debt incurred in purchasing or establishing a dental practice is “pretty high” will be limp. Suggestions that it might be as much as a million dollars (or even stating the irrelevant fact that corporate jets for oil executives might range as high as $4 million) will move the needle.

**Argument from Ignorance**

“There is no conclusive evidence that fluoride is safe.” “How do you know that the speaker really did all the work that way and that these aren’t just the three best cases out of a couple dozen?” “I have been using the sledgehammer technique
for years. You have not bothered to look at ALL of my results, have you?” “You don't know everything.”

There is a very clever sleight of hand in the argument from ignorance. It works like this: “If you do not have proof positive that I am wrong, you had better keep your opinions to yourself. I am right unless you can demonstrate otherwise.” This is the “reasonable doubt” defense, but without overstressing the “reasonable” part. The correct logic is that a claim for which there is not conclusive evidence one way or the other is neither known to be true or false—depending on one’s preferences. The argument from ignorance places an inappropriate burden of proof on the denier. The burden should be on the person making the claim. That is how we get so many folks believing in Big Foot, flying saucers, and 15% guaranteed return investments. There is no irrefutable positive proof that it might not be so. All scientific claims are vulnerable to this challenge because it is impossible to prove the nonexistence of anything (except logically).

**Assuming a Possible Outcome as Certain**

“I don’t think either of us could live with ourselves if we voted this down and somebody died.” “Think of what might happen if you are wrong.” “Somebody should have known about the risks at the embassy, somebody should have known that this thing about the wire-tapping would get out, somebody should have check out Snowden. I want to get Somebody in front of our committee this week and I want some answers.” “I told you so.”

The most savvy individuals in America regarding how to make money are not the hedge fund operators. They are the lottery winners. Megamillions on a few dollars. Warren Buffet, eat your heart out, piker. The odds are better than 50:50 that at least every two months in this country a single individual will win TWO million-dollar-plus jackpots. Of course the chances of you or I winning like this are infinitesimal. What’s wrong with us?

Sometimes this is called “hindsight bias.” But it cuts a bit more deeply and is somewhat more treacherous. When we base our before-the-fact decisions on assumed after-the-fact data we are on turf we are not entitled to.

**Begging the Question**

“Let’s start with a straightforward premise. Everyone here wants better oral health. My plan promotes oral health. It seems to me that no one could be against my plan without being hypocritical.” “If we could only find a candidate as honorable and noble as Dr. Clayfeet, our program would be certain to advance.” “How can we stop young dentists from being unethical?” “Here is my recommendation for how to use diet to live a long, healthy life: eat spaghetti with lots of garlic for 100 years.”

Begging the question is a trick question. It is not pointing out that an answer must be given. “Calling the question” is a parliamentary procedure intended to end discussion and move to a vote. “Begging the question” means presenting an argument in the form of a question that contains the answer one is seeking. It is Trojan horse argument. Once the question has been let into the discussion, the outcome is prejudiced. “Have you finally stopped beating your wife” is the classic.

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There are two good defenses against a question that is being begged. First, and politicians are getting good at this now, “I do not believe I would characterize the matter just the way you have...” Second, “Man, there are a whole lot of consequences and considerations that follow from what you just said. What a great question. Let’s see if we can lay out all the implications here.”

When the speaker steps to the podium at the begging of a talk and asks, “Can everybody hear me? He or she is begging a question. Anyone who answers on behalf of “everyone” heard the question but did not understand it.

COMMITMENT TO LOST CAUSES
“Look, we have gone so far, it would be a shame to turn back now.” “I have no intention of letting anyone make me look like a fool.” “I really could have gone either way on this, but as long as you are going to take that attitude, I think you need to know...” “It has been tails five times in a row. It only stands to logic that the odds are now much greater that it will be heads.”

Commitment to lost causes is a quaint human characteristic. These authors were all considered unpublishable during the early part of their careers: Margaret Mitchell, Herman Melville, J. K. Rowling, Beatrix Potter, H. G. Wells, Ayn Rand, Rudyard Kipling, Shel Silverstein, John Grisham, and Agatha Christie. I am glad they were persistent. The very much more numerous nameless ones who pestered editors with real trash deserve the fame they do not have. Commitment to a lost cause is a sneaky form of fallacy.

Technically, there may be nothing wrong with any single decision in the argument. Where the danger comes is the serial sequence of decisions. The nature of the decision fails to appropriately consider previous attempts. Some people cannot stand to lose even a small argument or to be thought wrong about a minor point. They play double or nothing in hopes of covering these losses. This is something like the sunk cost fallacy in business. When considering whether to proceed with an investment, the previous costs are irrelevant. One should start from scratch at each decision point and ask whether the additional funds to be invested now justify the currently expected outcome.

DISJUNCTION
“He’s an academic. You know it’s a fact that many of them have rusty clinical skills through disuse. A lot of them favor mid-level providers. The rate of ADA membership is depressed in the schools. He probably is a non-ADA member with lousy clinical skill who favors mid-level providers.” “I read in the literature that the odds of having X condition are 20% for those from Group A and 5% of having condition Y. I know the chances of having both are less than 25%, maybe 22 or 23%.” “When it starts to go bad, it goes bad all the way.”

This is one of the most famous little fallacies in the literature. The legendary example is called “Linda.” It goes like this. “Linda is thirty-one years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations.”

Respondents are asked to read this description and then rank order the
following descriptions of Linda from the most to the least likely: (a) elementary school teacher, (b) works in a bookstore and takes yoga classes, (c) active in the feminist movement, (d) psychiatric social worker, (e) member of the League of Women Voters, (f) bank teller, (g) insurance salesperson (h) bank teller and active in the feminist movement. There is no right or wrong answer because there is no Linda. But what is interesting is the fact that 85% of Stanford graduate students believe it is more likely that Linda is (h) a bank teller who is active in feminist causes than that she is (f) a bank teller.

It is logically impossible for the combination of two events to be of greater likelihood than either of the events occurring alone. It is not a matter of this being unlikely; it just cannot be. We naturally, but erroneously, sum across probabilities instead of multiplying them. We fashion stereotype buckets and then throw everything that looks close into the buckets. The messy fact is that more details make the picture fuzzier, not clearer. Don’t pile on.

Don’t Mess with Success
“The characteristics that made dentistry great in previous generations are exactly the characteristics that will keep it great.” “The way we do dentistry around here works fine for us and it should work fine for you too. If you know what I mean.” “If it ain’t broke...”

All true claims are relative to the environment in which they are expected to work. It is just as pig-headed to try to force others to change because a new idea worked in one location as it is to cling to outdated notions when the world has moved on. The key to finding the difference has little to do with the quality of the idea or the evidence itself. We must become talented at reading the context.

False Analogy
“Using Wonder Stuff makes you a virtuoso of the dental art.” “Holding dental educators responsible for the clinical competence of their graduates is like setting the fox to guard the henhouse.” “What we need is a war on poverty.”

You know an analogy is coming when someone uses words such as “that reminds me of” or “this is just a case of.” Sometimes analogies are buried in homey stories; sometimes they are advertising slogans. The point of using an analogy in an argument is that its calls to mind a stereotypical prior pattern with an implication that we either already know how to handle these or what dangers to look out for. A good analogy is useful for highlighting some of the key features of an issue. A bad one is dysfunctional because it misclassifies the situation. This would be a case of saying that all faulty arguments are like the blind leading the blind.

False Continuum
“Let’s not consider the radical surgery because there are always varying degrees of danger.” “The problem with you is that you make everything black and white. There are always shades of gray.” “No, I think I’m just a little bit pregnant.”

Decisions—commitments to action—are dichotomous. We buy a luxury car or an economy car. We cannot buy an inexpensive luxury car. Not seeing all the features we want in one package or not being able to detect a big, bright boundary line predisposes us to take no action. A good way to block an action one resists is to begin pointing out the porous edges, the unclear distinctions, and the impossibility of getting exact measures. Usually a call for further study is a motion to kill by appointing a committee to document the vagueness of the idea.

False Dichotomy
“Either he is a conniving scoundrel or he is a fool.” “You need to have that tooth restored with an amalgam or a composite filling. Since amalgams show metal, we should probably go with the composite (or alternatively, since composites tend not to last as long, we should use amalgam)” “Time is running out. We have to make a decision one way or the other.” “If you really love me, you will take me to see pro wrestling.” “I think we should go for plan A because it only costs $50,000. I’m sure there are those who could figure out how to spend $75,000. Don’t you think it is good to save $25,000?”

Part of this is very good logic: Either A or B, not A, therefore B. Air tight! So what is wrong with the false dichotomy? It is either good logic or it is not. The problem is that the major premise may not adequately describe the situation. In many cases where A and B are at issue, there is also a C or even a D. Perhaps the best choice is not even on the table yet. Perhaps there really are only two, but they are A and E. False dichotomy is often attempted when an individual sees that Plan A, which is distasteful, is headed for adoption. If the matter can be reframed between Plan B or Plan C, the antagonist to Plan A will have pulled a fast one.
When you hear ultimatum language such as “either,” “must,” or “well, which is it?” immediately ask whether there are other alternatives that have not been considered yet.

**Inconsistent Criteria**

“I know I said a while ago that I don’t put much stock in government statistics, but in this case I think they have it exactly right.” “We have always been doing it this way for no particular reason, but it would only be prudent to demand a very high standard of evidence if we were to consider making changes.” “All we have to do is make a generally plausible case.” “Beat your plowshares into swords... [Joel 3:10] Beat your swords into plowshares [Isaiah 2:4]”

It is unnecessary to give any stronger reasons for one’s position than we would expect of others. Ralph Waldo Emerson’s advice about the hobgoblins of small minds only applied to “foolish inconsistencies.” If we never changed our minds about how to think, none of us would have gotten out of kindergarten. But trying to maintain both sides on an inconsistent position at the same time will be a sure signal to our friends that we need to tighten some of the bolts on the mental equipment.

**The J-Shaped Curve**

“As I recall, the first committees were formed in the 1960s and they were not this organization, but some of the officers who are also with a different group.” “If we check the records I think you will find that I am right about this.” “Most people in this room know a lot less than they think they do.”

The human memory is a shaky foundation for grounding decisions. The foundational difficulty is that we overestimate how secure the foundation is. Research shows that we claim to know 98% of the facts on typical tests of general knowledge, but we actually are accurate about 80% of the time. Or something like that. There’s a danger in acting on that gap. Actually, we sometimes underestimate our general factual knowledge as well. That is the meaning of the J-shaped curve. We underestimate how much we know of the easy stuff and overestimate how accurate we are with the difficult material. (If we plot confidence on the vertical axis and difficulty of the material—as a function of how many others get it right—on the horizontal axis, the scatter of the points forms a J.)

The lesson is clear: if you are unsure, look it up. And if it really matters, make absolutely sure to look it up. [Griffin, D. & Tversky, A. (1992). The weighing of evidence and the determinants of confidence. Cognitive Psychology, 24 (3), 411-435. I was wrong. When subjects know 80% of the facts, they claim to know 99% of them—on average!]

**Missing Premise**

“All things are possible to those who believe. Perhaps you weren’t believing hard enough just now.” “I can explain that, we just have to assume...” “The reason you cannot see examples of ESP is that disbelievers have traces of that knowledge erased.” “You cannot be expected to be in touch with the true feelings of young dentists because you are an old one, and they are not going to let you in on their secrets.”

The missing premise is a universal cure-all. It is the trump card in reasoning. If one comes up short, all that is needed is to hypothesize the existence of one more fact that would explain the discrepancy. This might seem to be nothing more than a holding tactic, but wait... If you get good at this sort of thing, it can really work. “Do you have any bullet-proof evidence that every conceivable test for toxicity of amalgam has been tried? Ahah!” Even better is the missing premise that cannot be verified. “The reason that I cannot prove the efficacy of thalidomide is that the government has banned research on it.” The latter kind of argument is called a self-sealing missing premise. It is good to carry a few of these in your wallet in case of emergencies.

**Moving the Goal Posts**

“Well, of course everyone is happy that the Deltas have agreed to cut back on the types of cases they are going to review, but it doesn’t go nearly far enough.” “Sure, there are a few studies that show, under very particular circumstances, that ARC is safe and effective, but there is nothing like a demonstration that such would be the case generally.” “You show me your best evidence and I’ll tell you whether I think it is good enough.”

The description “moving the goal posts” is not quite right. The goal remains the same for those who take cover under this trick. They always have and always want to maintain their general claim. To do so they must rule out any evidence to the contrary. If the evidence itself cannot be faulted, perhaps it can be ruled out of court as not addressing the deepest concerns. What has changed is their public price for surrendering their position. One suspects that this price is really infinite and the real purpose in moving the goal posts is getting others to quit the game.

**Non Sequitur**

“I know we have been talking about a dues increase, but I would like us not to lose sight of changing membership
profiles." “We have been talking so much about my research funding. I’d like to hear a little about your views. What did you think of my latest research paper in *JADA*? “The consensus is that the evidence places candidates A or B at the top of the list, but I don’t really like either, so I suggest we go with C.” “As a dentist, he is one marvelous clarinet player.”

*Non sequitur* means “it does not follow.” That can include everything from just drifting off in the meeting and coming back in on the wrong page to faulty logic of any type to changing the topic inappropriately to substituting one’s own definition of the issue under consideration for the common understanding others have been working with. If a rational person who has been tracking the argument up to that point is surprised by what you say next, there is a very good chance that you have just pulled a *non sequitur*. It is not so much muffed ratiocination as poor listening.

**No True Scotsman**

“All Scotsmen have a chip on their shoulder and are willing to defend their honor at the drop of an insult. Well, McPherson seems like an easygoing fellow. But he’s not a true Scotsman.”

“Because recent grads are so much in debt for their dental education, they tend to cut corners, overtreat, and join corporate dental practices. There may be exceptions, but the rule still holds.”

“I have been treating all my patients with X for years. Never a complaint, except for a few sorta strange folks.”

The No True Scotsman argument is simply a matter of refusing to credit examples that run counter to one’s favorite generalization. This dodge keeps the generalizations intact. In fact, I cannot think offhand of any plausible exceptions to this.

**Partial Reasons**

“Small businesses create jobs, so whatever is good for small business is good for the country.” “The research evidence is overwhelming that sealants are a cost-effective means of lowering caries rate, therefore every dentist should perform this procedures on all patients for which it is indicated.” “Hey, Mikey likes it!”

How could anybody be against a sound argument? This one is scary because a lot of deer have been run over while transfixed by the light of perfectly clear statements. The misstep comes in equating a sound reason for the best reason. An argument may be entirely true, but some other arguments might also be true and more to the point. If Mikey likes whatever cereal, he should eat it (not me), but only if there is nothing better available for breakfast. It is important to get all the considerations on the table early to avoid the trap of investigating the veracity of an ambiguous but unimportant claim, finding that the claim is either true or false, and making the entire decision on the outcome of the investigation. The claim may not have been pivotal to begin with, even if there was heated debate about whether it was defensible. Beware unreasonable narrowing of the question.

Groups are especially vulnerable to “the trap of the debatable second-best argument.” Dr. Easyanswer proposes a patchwork way forward. The committee balks. Dr. Easyanswer offers to prove that his system is at least free from the objections that have been raised. After a thorough investigation, it is determined
that Easyanswer’s method is not fatally flawed by the original arguments raised against it. The pressure to go Easyanswer’s way must be resisted. Although a lot of psychic energy went into a battle that Easyanswer won that does not mean other paths might not be better.

Incidentally, it is true that small businesses create the most jobs. It is also true that they create the most unemployment. They churn.

**Post Hoc Ergo Propter Hoc**
“Have you ever noticed how the odds of something unfortunate happening always seem to go up when we try new ideas?” “We have a pretty successful membership promotion program. Each year we give a list of those who have not paid their dues to a few volunteers. I don’t know what the volunteers do, but we always get some of these folks to come back.” “I’m sure we won the World Series because a bunch of us made a promise not to change our underwear until we had.”

The Latin translates roughly: “After the fact, therefore because of the fact.” The fallacy is to attribute a causal relationship to a temporal coincidence. It is true that causes always precede their consequences, but it is not true that everything that precedes a consequence was part of the cause.

A form of this fallacy that is dear to the hearts of so many statisticians is called regression toward the mean. It works like this. Begin with a pool of subjects, programs, or other items that can be arranged from the best to the worst and find the average value. Now pick the bottom 10% and do nothing else. Measure the bottom 10% again and you will find that their scores have improved on average. I guarantee it! They have regressed toward the mean. This is not magic. It is just a result of having misclassified a few of the folks in the bottom group because the original measurement system was not perfect. The same will happen at the top—they will drop toward the middle on subsequent measurement. Sometimes the placebo effect gets credit for nothing more than inexact initial diagnosis. Some pretty strange remedial programs have received high praise for just happening to be hanging around when faulty data were gathered.

**Red Herring**
“Gun registration makes no sense because crazy people need mental health help.” “There is little value in courses on ethics in dental school because students have formed their ethical values during childhood, if they are going to have any.” “Before we get too deep in the merits of the proposal, I want to explore a completely irrelevant matter.”

There was a time when riding to the hounds became too tame. True gentlemen wanted to give the foxes a more sporting chance. They sent the staff out early in the morning to drag dead fish around the park to mask the scent of the foxes and thus challenge dogs a little. The most typical fish used for this purpose was a red herring. The point of this deflected straight thinking is to substitute a faux issue for the real one. You know you are about to enjoy a dinner of red herring as soon as you hear “But I think the real question is...” Red herrings become very plentiful when one party wants to avoid a course of action and the other party has an effective but compromised solution. The strategy is to note that solving a different problem would produce much more favorable results, but since the more
attractive solution is not workable, we had best just not do anything. Red herrings are abundant in the Potomac River and can be studied to one’s great benefit by looking in the Congressional Record under the heading of “poison pill amendments.”

**Resemblance**

“It is certainly more likely that a daughter will have blue eyes if her mother does than that a mother will have blue eyes if her mother does.” “There are probably more murders each year in Detroit than there are in Michigan because Michigan has a high overall rate of literacy.” “I can recall a lot more studies that show the superiority of X than Y.” “Most newborn babies look like Winston Churchill.”

We exaggerate the familiar. We recall our successes. We overestimate the dramatic. The term “like,” as in looking like Winston Churchill, is a relative term and safe because there will always be some positive examples. So many people died needlessly following 9-11 because they were afraid to fly. They drove instead, and because driving is more dangerous, the deaths while traveling between cities increased. Confirmation bias is an example of resemblance. We see what we expect to see, and remember what is useful to our purposes. Research studies with statistically significant results are more likely to be published. And the chances of a mother and daughter having any inherited characteristic are exactly symmetrical.

Because of resemblance we tend to solve the problem we are familiar with rather than the problem we actually face. Here is an example: A bat and ball cost $1.10. The bat costs one dollar more than the ball. How much does the ball cost? Hint: if you said ten cents, stay out of the stock market or poker games. You are a mark.

**Selective Use of Evidence**

“All women are bad drivers, or at least those I know well are.” “I finally found a television station that gives me the news straight—Was it CNN or PBS?” “You just have to hear Dr. Pontificator or read the Journal of Fabulous Results.” “Whatever you do, don’t look at their Web site.”

This one is so obvious that there is really only one side of the issue...or...

We need to have a consistent point of view as a basis for starting our critical appraisal of any issue. When we cruise around with a completely open mind, things fall out. But there is always a chance of fooling ourselves and trying to fool others by privileging selective sources of information. This problem can become self-reinforcing. We naturally look for and listen better to information that reinforces our existing beliefs than to those that challenge them.

Here is an approach that might be of some use. Learn one perspective and learn it well. Then look for what you believe might be the strongest contrary point of view. Combine them based on their relative merits. Of course your original perspective will still predominate, as it should. Find another perspective that differs from both you have considered. Integrate it. Continue the process until additional information seems to be contributing little to your understanding of the issue.

Here is another strategy. Ask that all opinions (actions not arguments) be laid on the table. Identify the one that irritates you the most. Try to paraphrase it so that its proponents agree that you have understood it. Continue the process.

Finally, when stating your conclusion, mention the strengths of other positions you have explored. If you have not looked at other positions or cannot accurately characterize them, say so (and watch folks push back from the table). Remember you are looking for a better position. “Better” is a relative term and is vacuous unless you have made the relevant comparisons.

**Slippery Slope**

“Well, I don’t know. It sounds like we might be establishing an undesirable precedent here.” “First it’s going to be just a few little things, and then there will be more, and before you know it we will have agreed to give away the farm.”

“This one change seems fine, but who knows where it will all end?”

Slippery slope is based on a very sound psychological principle. Habituation is the natural process of letting our standards drift to accommodate the new reality. The Victorians were right to be worried about letting women show their shoes in public. If they had only been a bit firmer, we would have been spared Lady Gaga. Never mind the bare bosomed women of fashion in the late eighteenth century. That was a slope in the other direction.

I am sympathetic to the slippery slope argument because there are cases where small concessions lead to abuse. It is not, however, a generally valid form of argument. If it were, there would be no human progress. Most reasonable change should be incremental. To throw out gradual change is to kill innovation. What is needed is willingness to make the hard judgment calls about how much change is appropriate at the moment and not hide in an imaged future. We must all trust the leaders who follow us to make the hard judgment calls of their day. The slippery slope argument fails when we make our...
choices easier today by usurping the choices future leaders will have to make in their time.

**Special Pleading,**

“I appreciate the fact that research shows the superiority of approach X, but perhaps we shouldn’t be hasty. I have personal experience with this.” “Speed limits are fine for most people, but they should not always be enforced.” “There are lies, damn lies, and statistics.”

Special pleading is about dealing oneself an exemption. It is soothing because no effort is made to challenge the facts or the principles presented. “We all agree in theory...” One just sidesteps the matter by saying that the rule may not apply in inconvenient cases. One of the all-time virtuoso cases of special pleading concerns King David. He seduced a married woman named Bathsheba. Then he arranged to have her husband disposed of by placing him in the front lines of a battle. The priest Nathan confronted him by recounting a story of a rich man with many sheep who stole the only sheep of a poor man. David blustered that he would kill that scoundrel if Nathan would be kind enough to reveal his identity. David got the bad news but made a special pleading concerning King David. He reached for your “special pleading bib” when someone starts, “Well, I’m no expert, but...” or “Are you certain that is always true?”

**Spurious Correlation**

“The CIA has tracked income disparities in countries since the 1940s because greater wealth at the top is associated with and causes political instability.”

“The proportion of dentists who are women and the percentage of dentists who are members of the ADA are inversely associated, showing that women are less professional.” “We conclude that smoking causes cancer because thousands of studies have shown that the more one smokes the more one is likely to die of cancer.”

It is worth a few points at gatherings of researchers to casually mention that “correlation does not prove causation.” Mostly that is true. There are three classically accepted criteria for demonstrating causation. Co-occurrence (correlation is co-occurrence). The cause must also precede the effect and there should be no other factors that could have affected the relationship but have escaped notice. The latter is a high bar. When there are other factors that might be working, that is called a serious correlation. The tobacco industry tried that one: there might be genetic or environmental factors that cause cancer and also cause people to smoke. They even tried to say that cancer causes smoking. I subscribe to the argument of some researchers who want to see a fourth standard for claiming causation. There should be a plausible theoretical account of the mechanism of operation. Incidentally, proof of the causal relationship between smoking and cancer has finally been demonstrated using correlational methods. After all, RCTs in this area are strictly out of the question on ethical grounds. But good statisticians with multiple regression techniques have assembled overwhelming evidence.

The danger of relying on correlations in decision making when there is a risk that the association is spurious is that in the null variable. Changing the factor that is along for the ride rather than the one that is driving the phenomenon will be a waste of resources.

**Straw Man**

“I think I have just shown conclusively that you are wrong on any plausible interpretation of your position.” “No one would hold a ridiculous position like that.” “I think the evidence is pretty substantial that school lunch programs have been a failure in reducing the incidence of obesity in America.”

The straw man is a substitute for the real antagonist. It is usually easier to poke holes in a position that no one actually defends. Getting a victory there is not a wasted effort; the other party—regardless of the strength of his or her true position—is now on the defensive trying to explain what the real issue was. In the last presidential campaign, billions of dollars were spent by each party telling us why one of two trumped-up dummies would be ruinous to the country. The folks in the attack ads were caricatures. The Supreme Court, by a vote of 5 to 4 in the Citizens United decision, declared the straw man to be the new American. Unlimited and undisclosed funds can be spent on political advertising, provided that the advertising does not actually endorse a candidate who is running. That only leaves bashing an effigy of the other guy.

**Tautology**

“Reasonable people will see the wisdom of this position.” “We need to consider only those prudent actions that will advance the common good.” “I am doing this because I believe it is the right thing to do.” “I will get the material to you as soon as possible.”
A tautology is a claim that is true because of the meaning of the words, not because of the facts. Learning that our motion was defeated because the other side had more votes, does little to advance our understanding. Corporate literature is filled with this stuff. Companies do not apologize for failure of safety standards that have resulted in deaths; they issue press releases stating that their corporate policy is to promote the highest level of integrity and social welfare. It is not fallacious reasoning (both may be true); it is empty calories. Tautologies are red flags that bear careful monitoring. It is the sentence that immediately follows the true-by-definition claim that has the hook in it.

**True Because I Want It to Be True**

“The evidence that DHATs can do some procedures safely and effectively needs to be replicated before it can be accepted. But we are opposed to conducting such studies because we do not believe that is right.” “We do not disagree. You just haven’t seen the wisdom of my position yet.” “Inconvenient truths are a pain in the anatomy.” “This is the only thing that makes sense to me. If you deny this, the whole system just does not seem right,” “I have my own reasons, and, trust me, they are good ones.”

This is likely the most pernicious of the fallacies. Georgetown bioethicist Edwin Pellegrino classifies this as a species of unethical behavior, not faulty reasoning. To make a public claim based on wanting it to be true, and hoping others will not counter it, certainly appears to be fishy. Proving that there is a bad-faith motive is impossible. Only we and our consciences know about these sorts of things. But in the spirit of open reasoning about public matters, all of the motives should be available for inspection. If a better argument can carry the day—hurrah.

**What is Unexplained is Unexplainable**

“The reason all patients cannot be brought to good oral health is that we cannot control human behavior—at least not other people’s.” “If we were supposed to be practicing preventive biological or genetic dentistry rather than mechanical repair of teeth someone would have found the evidence by now.” “Now would be the right time for folks who still believe in the safety of amalgams to produce their conclusive evidence. We can only assume that since they have not done so, there is no such evidence.” “You can lead a horse to water...”

It is one thing to know that something is impossible and another to note that it has not yet been done. “Impossible” ≠ “Unknown.”

There are some very famous “impossibility” or “indeterminacy proofs.” These are rigorous arguments that, starting from a plausible common base, certain destinations cannot be reached. Kurt Gödel proved that our understanding of common numbers can be either complete or consistent—but not both at the same time. Werner Heisenberg proved that, in quantum physics, we can know the location of a particle or its speed and direction, but not both at the same time. Kenneth Arrow proved that three people cannot agree on how to prioritize welfare benefits over more than two alternatives.
You Too

“Bringing charges against me for having sex with an underage girl named Roxy is politically motivated.” “Your argument is about as old and moth-eaten as you say mine is.” “You have your expertise, I have mine; you think you see gaps in my logic, they clearly are not the flubs we have been hearing from you this afternoon.”

A good counterattack can draw attention away from a flimsy argument. Of course it is gummy logic. It does not make my argument true even if I prove that yours is false. This approach does gain a bit of traction when the same motive or even the same evidence is cited by both sides for diverse conclusions.

The high-brow denomination for this fallacy is *tu quoque*. The common moniker is “the pot calling the kettle black.”

The Fallacy Fallacy

“Got ya!” “We are recommending against publication of your manuscript because the eigenvalue of the Varimax factor rotation has not been specified.” “Logical fallacies have broken loose and are running amuck in American. If I had to throw out every claim that I know is based on fallacious reasoning, there would be nothing left to believe.”

Yes, there really is a fallacy fallacy. Philosophers mention it from time to time in order to add gravitas to their papers. The fact that a position has been defended by a fallacious argument—recognized as such or not—does not mean that the position is false. Even a blind pig finds a truffle every now and again. We should not get too uppity about fallacies.

Putting this as strongly and as positively as possible, the purpose of reasoned discussion is not to poke holes in others’ positions. Why we come together after studying the issues as carefully as we can is to find the solid arguments. We are after the good stuff. Although being bright about fallacies in reasoning is a handy and necessary tool in this process, no one ever reliably reasoned his or her way to the smart thing to do by making fun of others’ sloppy thinking. It would be fallacious to think so.

A Suggestion

Use this dictionary when reading the scientific literature, watching the news (especially the talking-heads shows), and at meetings. Make a photocopy and take it to your next committee meeting. I am pretty certain it will make you a better listener even if it does not make you the most popular person in the room. And remember, it is better to find your own faults in thinking than to let others do the job for you.