

# Lecture 6

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## 6.1 Logic

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Today we're talking about the syllogism, the logic in the impact claim.

So we're talking about concepts here.

You don't have to use a concept, but I do think concepts are a great place to look for logic.

We're talking about the mechanism, how is something going to work,

why will this policy give us this benefit, what's the actual mechanism, what's going to follow, how is it going to work.

We talked about comparative advantage, we talked about diminishing marginal returns, opportunity costs, Dunning–Kruger effect. So I can take that general idea and apply it specifically, and then that gives me my impact. Does anyone know what we call this type of reasoning, a general concept, a general understanding applied to a specific thing that's used to make an argument? Yeah, very good, this is what we call **deductive reasoning**.

So from the big to the small, it is the best type of reasoning, or at least it's the most efficient type of reasoning.

In a short essay you are trying to be as efficient as possible, this is the efficient type of reasoning, so this is what I encourage you to try and use. Like Alex Tabarrok, he says that diverse skills improves economic efficiency, right? That's comparative advantage. Immigration brings more diverse skills, therefore immigration boosts the economy, seems logical and reasonable.

Looking at some other concepts from different areas of study, maybe you've heard of some of these.

Have you heard of the **Peter principle**? This comes from a study of management.

If I am good at my job, what will happen? I'll get promoted.

If I'm good at that new job, what will happen? I'll get promoted.

If I'm not good at that job, what will happen? I will stay here. I won't get promoted, right?

So the Peter principle is used to explain, why is it that managers are always bad at their job, why is it that when you go to a company, when you work in a company, it always seems like the manager is bad at their job. It's because everybody gets promoted until they are bad at their job. So people always get put in the position they are bad at, because if they're not bad at it, they won't be stuck in that position.

**Thucydides's trap**, this comes from international relations.

So Thucydides was a Greek historian who studied the war between Sparta and Athens.

Athens was the most famous Greek city state, right? Sparta was more powerful than Athens, but Athens was rising quickly. It was catching up to Sparta. So what's the logical thing for Sparta to do? Defeat them now while they're still weaker instead of waiting for them to become more powerful when Athens could destroy Sparta. Graham Allison, a Harvard professor, he looked at 16 examples throughout history where there is an existing power like Sparta and a rising power like Athens, and in 12 of those 16 examples war broke out between the two countries. How would we apply that today to our world? Gram Allison, once he wrote that paper, he came to Fudan to give a lecture many years ago, because a lot of people think this explains China and the United States. In this analogy, China is Athens and America is Sparta.

**Prisoners' dilemma**, this comes from game theory.

What does prisoners' dilemma tell us? It says that you should always act in a way that assumes the worst assumption about the other side. So if you and I get arrested by the police, we are taken to the jail. You're in one room, and I'm in the other room. And I know that if I confess to the crime and he does not, I will go to jail for 10 years. If I confess to the crime and he confesses to the crime, we will both go to jail for 5 years. And if I don't confess and he doesn't confess, neither of us will go to jail, right? I'm in that room by myself, what's the smartest thing for me to do? Deny or confess or accuse? The smartest thing for me to do is to accuse him, right? Because if I say it wasn't me and he says it was him, then he goes to jail and I don't, so we assume that the other person is not good, they're going to screw us over and this is a prisoners' dilemma. How could you apply the prisoners' dilemma today, or can you think of any examples where we've applied the prisoners' dilemma? I think a good example is artificial intelligence, right? Should America slow down and create safer AI? Yeah, probably. Should China slow down and create safer AI? Yeah, probably. But will America or China slow down? No, because if America slows down then China gets that first, if China slows down America gets that first. It's like a zero sum game, if you slow down, then you lose the game to the other side.

I don't know if you've heard of **elite overproduction**.

This was a historian who came up with this concept, and it's the idea that if you educate too many young people, if your society becomes prosperous and wealthy, you can afford to give more education to more people. And if you get a higher education, what do you expect? You maybe expect one day, you will become the elite. You will get that government job, you will be the headmaster of the school, you will be the executive of the company, right? But because you're educating so many people, there's not enough jobs for all of those educated people. So what do those educated people do when they have a high education, but low job prospects? They cause trouble, 😠 they go in politics, they create revolutions, they cause society to go into disorder. If you look at ancient Greece, ancient Rome, Renaissance, Italy, again and again, this example happens that revolutions are led by well-educated people that couldn't find a job, right? Do you think this explains why China is cutting the number of history and language positions in its colleges? Yeah, maybe, because those people, they don't find jobs they create social problems and it's bad for society, right?

Finally, has anyone heard of a **collective action problem**?

For example, most people think social media is bad for their mental health, but why do they not stop using social media, even though it's bad for their mental health? Because if they are the only one who stops and their friends don't, they get left out. They pay a cost, and their friends don't. Something only works if everybody does it and so people keep using social media even though it's bad for their mental health. Can anyone think of another example of collective action problem? Yeah, 内卷 is an excellent example. We all agree 内卷 is bad, but you keep doing it because everyone else is doing it, it only works that everyone stops 内卷. Another good example is climate change. If I stop burning coal and oil, my economy suffers, but it's good for the environment, right? But if I'm the only country that stops burning coal and oil and all the other countries keep doing it, my economy suffers and everyone else gets ahead of me 😠.

Anyway, these are a few examples I would like you please to try and think of another example of a concept. It could be a concept from your area of study or it could just be a general social sciences concept that you've heard before.

- **Maslow's Hierarchy of Needs** – A psychological theory that says human motivation is structured in levels, from basic physical needs like food and safety to higher needs like love, esteem, and self-actualization.

- **Tragedy of the Commons** – When individuals overuse and deplete a shared resource because each person acts in their own self-interest instead of protecting the common good.
- **Banality of Evil** – The idea that terrible acts can be committed by ordinary people simply following orders or social norms, without thinking deeply about the morality of their actions.
- **Adverse Selection** – A situation in economics where one party in a transaction has more information than the other, leading to unfair outcomes, such as when only sick people buy health insurance.
- **Cobra Effect** – When a policy or incentive meant to solve a problem accidentally makes the problem worse, like when paying people to kill cobras led them to breed more cobras to earn more money.

All right, pick one of these or one of these anyway if you like, try make a syllogism—give us your general concept, and then apply it to a specific thing and give us your impact that you're arguing for. For example, studying has **diminishing marginal returns**, the more you study, the less you learn for extra each extra hour. 内卷 causes students to study far beyond the most productive hours, therefore, abolishing the 30% rule would improve students learning ability. That's applying the concept of diminishing marginal returns to 内卷 to argue that this would improve student study efficiency. Or **Parkinson's Law**, have you heard of Parkinson's law? If I say you have one hour to complete this task, you will complete that task in one hour. But if I say you have three hours to complete this task, now it will take you three hours to complete the same task, right? The deadline affects your efficiency, so teachers giving shorter of deadlines would improve students efficiency. I've given you guys eight weeks to prepare your first essay. Maybe I should have just given you two weeks to prepare your first essay, and it would have been more efficient. So try and do something like this. You can pick any of those or any of those principles concepts and I'll give you five minutes.

- **(Cobra Effect)**

- ① When incentives are poorly designed, people adapt in ways that can worsen the original problem.
- ② School grading systems that reward only high test scores incentivize students to memorize rather than deeply understand.
- ③ Therefore, grading solely by test performance can reduce genuine learning and should be replaced with systems that reward comprehension and creativity.

When you're planning your essay, when you're planning your syllogisms, you can think more carefully and longer about these things or, you know, but just be as concise as possible so that it's obvious right away. 😊 And when you write it out, obviously I shouldn't need to say it, but obviously don't put the syllogism into the essay and I know 99% of you wouldn't do that, but I have had students who put the syllogism in the essay. Remember the syllogism is just expressing the logic. When you write it out, use that TEA format, so you've got your claim ("this would..."), you've got your evidence ("according to...") and then you explain the logic ("how does that work"). You can if you want to name the concept that you're using it's fine, if you say like think about Alex Tabarrok says immigrants can leverage their comparative advantage, it's fine to mention. But if you think about to kill the language requirements, he doesn't actually say opportunity cost, he just describes opportunity cost, so that's fine you can do it however you like as long as it's clear and logical.

Again, that's optional, you can have your syllogism if you want to, or two syllogisms if you want to. Remember values are often based on principles right, like people should be free to defend themselves and impacts are often based on concepts like Peter principle or Thucydides's trap. So try and make sure you're using the correct type of logic.

Besides deductive reasoning, what else could you do? What's the opposite of deductive? Inductive, which goes from the specific to the general, right? And you should avoid doing that right if I say I met this Fudan student and she likes this, therefore, all Fudan students like this. That's that's poor logic. But if I said I've worked at Fudan for many years and I've just spoken to many Fudan students and generally speaking, they think this right. Is that good reasoning? It's not bad. Better so if you can bring in multiple examples to back up your logic. Why would that not be a great type of reasoning to use in your first essay? It's too short. Your essay is too short if you're going to do this, it would be better in the second essay where you can give the examples that you're referring to and then base your logical so you need more time, you need more space to actually give those examples.

The other type of reasoning that we're going to talk about today is called abductive reasoning and that's the Sherlock Holmes type reasoning. If I know that one of you is the killer and it wasn't you because you were in the dining hall and it wasn't you, you were in the library, I know it must be him, not because I have specific evidence pointing to him but because it's not you. What type of job might use abductive reasoning? I think doctors, they often use this. Why do I have a pain here, is it this, no, is this, no, because it must be this, right? When you can rule out other things, you know what it must be, what is the culprit, so that was the Sherlock Holmes style of reason.

## 6.2 Class Reading

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Here's the essay [where are they](#), by Nick Bostrom.

He says if we find life on Mars that would be bad news, so he hopes that our Mars probes will discover nothing, it would be good news if we find Mars to be sterile. Is this policy, value or fact? It's value, because this is a subjective thing.

It starts by giving us a logical construction. Can anyone give us his logical construction? He points out two facts and then draws a conclusion, so he gives us a syllogism. Everyone would agree we have never encountered any kind of alien life, and yet, there are many, many, many, many possible places where alien life could come from, right? The galaxy is filled with other solar systems. The universe is filled with other galaxies. So why is it that despite this huge number of possible places, there is no alien life? Well, there must be a great filter.

$$\left\{ \begin{array}{l} \text{No aliens found} \\ \text{Many possible origins} \end{array} \right. \Rightarrow \text{Great Filter!}$$

So the question is essay seeks to answer is what could be the great filter and of course, why does that mean that finding life on Mars would be so terrible. It's worth noting that the essay uses abductive logic. What are possible candidates, what could it be, what could be the Great filter? I will give you five minutes to find as many possible candidates of a great filter as you can. What does Nick Bostrom say are the possibilities and what do you think could be the possibilities. So it could be your own ideas or the ideas in the essay, hopefully both.

- **① Evolution**

We often think that if a planet is warm and wet, then it probably has life, but Nick Bostrom says, there's really no evidence. Life coming from non-life actually might be very, very, very rare, it could just be that Earth is this really lucky coincidence and that most planets even if they're like Earth don't have life on the planet. We have never seen life coming from non-life. All the life here, you know, all of us came from our parents, all the plants and trees and animals outside came from other plants and trees and animals. There is no example ever of life coming from non-life. So for that to happen might just be very rare. and earth could be

the only place for that to ever happened. Could it be that evolution is common, but maybe we don't evolve into intelligent creatures like most creatures on earth are not very smart? Could it be there are alien planets out there filled with stupid animals and that earth is unusual in having smart creatures like humans? It's not just that we're smart, it's also, you know, we could have a very big brain, but if we couldn't talk, we wouldn't have human civilization, so we're quite lucky that we can speak as well as think as if we could think but we couldn't communicate our ideas, we couldn't work together. We also have hands like we didn't have hands and digits, we couldn't make things and we wouldn't have human civilization, so we're very unique, we have big brains, we have voices and we have digits and together we can use those things to create civilization. Do you think we could go into space one day and find alien planets filled with you know, cows and pigs and sheep with hardly any intelligence? That's a question I don't know how to answer. Could it be that intelligence isn't such an important thing for evolution? Think about it, what better in evolution, big teeth or big brain, big claw or voice? I think most animals with big claws and big teeth are more likely to be the top of the food chain, rather than the animals with big brain. But yeah, evolution is one possible thing.

- **② Matrix**

It's an idea that we're just a brain in a computer simulation. In fact, Nick Bostrom was the first philosopher to come up with this idea, the simulation hypothesis. You can look up his paper on that.

- **③ Capability**

Why are we confined to earth? What's the obvious limitation on our civilization? Yeah, it's technology, or putting that in a broad category, capability. We do not have perhaps the ability to go out into space because of technology, the distance, the time it would take to get there, our technology is a limiting factor.

Nick Bostrom talks about how it could be that aliens would colonize the universe and he talks about the idea of Von Neumann probe, which comes from John Von Neumann, the mathematician. Von Neumann says it should be possible to build some kind of artificial intelligent, self replicating probe, and send them out into space. They would go out to other planets, colonize the planets, make more of themselves and then move on to the next planet. And he says that even if they only traveled 1% the speed of light they could colonize the whole galaxy in 20 million years. Is 20 million years a long time? To you and me, 20 million years does seem like a long time. But in the universe, this could have happened many, many, many, many times already. The universe is tens of billions of years old. So 20 million years is a tiny amount of time. Artifc intelligent spaceships travelling 1% the speed of light should have been able to colonize the universe by now many times. Yeah, he says maybe it seems technologically difficult, but we are not talking about something we should build today. We are considering what would be possible with some advanced technology in the future, he says even space travel was science fiction in the 1950s so we should never rule something out unless it conflicts with the laws of physics. Does traveling 1% the speed of light conflict with the laws of physics, not at all. Going faster than the speed of light does going 1% speed of light does not, but he says given in the age of the universe and the possibilities for technology, it cannot be that capability is stopping aliens from colonizing the galaxy.

- **④ Desire**

But assuming that you have the technology, the distance and the time, you also need the the desire, you need the will, right? You have to want to go out into space. Could desire be the Great Filter? Nick Bostrom says, perhaps aliens would choose to stay at home and live in harmony with nature. Why not? Why does he think aliens would not choose to stay at home

and live in harmony with nature? Yeah, resources. If we could go into space easily, we would because we would want to mine metals and so on. He gives three other reasons, he brings up the principle like evolutionary theory, life will always go wherever it can, right? There's no particular reason for that. Life will just always go wherever life can exist, life will spread into that area. Why did humans go into space? Why did America go to the moon in 1969? Is it because they wanted resources from the moon? No. Like dog peeing on trees, we just have this desire to mark things. When Edmund Hillary, the first man to climb Mount Everest, was asked, why did you climb it, what did he say? "Cause it there". So there's this tendency of life for no good reason just to go wherever life can go.

And he also says that you know, even if they did decide not to go out into the universe, that would have to be a decision that they never changed for millions of years. That would have to be a permanent decision forever and ever, and it's very unlikely that one civilization would keep that decision for a long time.

Finally, he says even if one civilization did make that decision, it would have to be all civilizations who made the same decision and that's very hard to approach. So for these five rebuttals, we can say that desire is also not the Great filter, that is not why we haven't seen aliens.

- **⑤ Destruction**

So back to the original question, why is it so terrible if we find life on Mars? If we found life on Mars, we could say evolution is also not the great filter and that would leave only one thing and that is destruction. "Why would finding life on Mars mean evolution is not the Great Filter" is another logical syllogism, right? We found life on earth and we found life on Mars. Earth and Mars are very close together. Therefore, it is probably likely that, from inductive reasoning, life evolution is a common normal thing that usually happens, agree? Like if we only see life on earth, we can say "well, maybe we are just original, maybe we are just unique", but if we find life on Mars too we say "okay, it seems like life is pretty normal on every planet". So evolution cannot be the Great Filter. That means the only possibility remaining is that there is some terrible future technology which destroys every civilization. Do you find that persuasive? Why could it not be a natural disaster, that's the destructive thing because it has to be a 100% guarantee of destruction, even if it was a 99% chance there would still be some aliens who survive to colonize the galaxy, so it has to be some terrible thing which is common to every civilization and destroys it.

There must be a great filter. It cannot be capability, technology, distance, it cannot be the desire to travel around the universe. And if we found life on Mars, it cannot be evolution. Therefore, it would be terrible if we found life on Mars because the only other explanation would be that something destroys every advanced civilization and it will destroy us as well.

However, there's also an idea called **panspermia** (泛种说) and it's the idea that life came from somewhere else to Earth to Mars, you know, like bacteria on a asteroid floating through space that hit Earth and Mars and put the life on those planets.

- **⑥ Dark Forest**

Imagine the universe as a dark forest, every civilization is like a hunter hiding quietly among the trees.

Each hunter knows that others might exist, but cannot see them clearly.

In this dark forest, everyone has a gun, and no one can be sure of others' intentions.

Because if you reveal your location, you might be killed before you can defend yourself. There's no way to trust strangers in the dark.

So the safest strategy is to stay silent — or even destroy others before they destroy you. This idea helps explain why we may not have found any aliens yet.

- **⑦ Resource**

Would we have advanced civilization if we never discovered coal and oil? In a way, we're kind of lucky, right? Because we had millions and millions of years when the only life on the whole planet was stupid animals like dinosaurs. And then a big asteroid hit the earth, wiped them out, and then mammals began evolving and eventually humans evolved. But because of those millions and millions of years of dinosaurs, we have coal and oil and things like that under the ground. And it could just be that Earth is very, very lucky that we followed that timeline. What if humans had evolved before dinosaurs, we would just be like, you know medieval societies for all of our existence. We would never have become advanced because you need coal and oil to become an advanced civilization anyway.

- **⑧ Viruses Created by Science**

Well, we better not debate the origin of COVID-19, that's still a very, very controversial topic. But yes, this idea that you could engineer some super deadly virus to spread it and that was quite that issue. I do think the virus one is quite interesting. The idea that it might become easier and easier for people to make a deadly virus, right? Like if you could make a deadly virus, would you? If I could make my own deadly virus at home, would I? I don't think so, right? But would someone do it? Yeah, there are enough crazy people in the world that sooner or later somewhere someone who believes in, you know, some crazy religion wants the world to end would create this deadly virus, they would say COVID-19, Ebola and Spanish flu and put them all together and then release it into the world, go coughing on the New York subway and within a few weeks all civilization collapse.

**The End**