PROFESSOR: Everyone has pretty much seen a science fiction movie in this day and age, and I'm pretty sure everyone has seen at least one that involves time traveling, maybe *Star Trek, Interstellar,* or more recently, *Predestination.*

And it's such a widely-explored topic in science fiction-- the whole genre of time traveling. But many times, Hollywood films always have these little, little loopholes in their story line and their plot lines. And they often use weird theories and science to explain themselves, which are just like god-from-the-machine solutions. Totally not efficient.

However, scientists have actually put forward three main theories when it comes to time traveling. The first theory-- the fixed timeline theory. Say, for example, you're trying to prevent World War II, and you travel back in time after inventing a time machine. And after killing the baby that was supposed to be Hitler, you put, I don't know, some other baby you found in an orphanage and put it in the same cot.

However, when you travel back in the future, you realize that the baby that you had replaced it with was still one that turned out to be Hitler. And there is no changing of the past effectively, or the future or the present-- it's all on a fixed timeline.

And these particular motions are actually often seen in movies such as *Harry Potter.* It was seen in *Interstellar* as well. It was also seen in *Predestination.* It's a good film-- you have to catch it.

The second theory is the multiverse theory, which says that every time you go back in time and you alter history-- for example, you step on a butterfly and that butterfly could actually maybe be the prevention of, I don't know, a hurricane that sweeps through Orlando right now-- you spawn a new set of events which happens in a separate universe. Which, in other words, means that you have actually got infinite number of universes after you have all these different decisions and different chain of events occurring.

And this particular timeline concept has actually been explored many times as well. It's been featured in the recent reboot of *Star Trek* movies. It's also been featured in the recent *Fringe* series, which kind of died because J.J. Abrams ran out of money or something.

And, yeah. This multiverse theory is actually quite popular because it's the easiest for

producers to just throw this illusion, and then they say, oh, we actually spawned off a new timeline. So that's when you get sloppy and lazy.

The third theory we have is what we call the dynamic timeline theory. It's also a theory which induces all the paradoxes, which you often hear about as [INAUDIBLE], such as the grandfather paradox, where you go back in time, and you kill your grandfather. And because you killed your grandfather, you won't exist. And because you won't exist, you can't go back in time to kill your grandfather. And that's where the whole paradox comes in. Who kills who? God knows.

The third theory we have is called the dynamic timeline theory, which is also where all your grandfather paradoxes come in. Let's say your grandfather is a really, really evil man-- Hitler-- and you have to go back in time to kill him. And you go back, you do the deed, and then you realize that, oh no, after I killed him, I can't exist. And because you can't exist, you can't go back in time to kill him.

And because of that, he comes back, and then you have to come back, and you have to go back in time again and kill him. And that's where the paradox starts. It's an infinite circle of never-ending events. And that's how the grandfather paradox came about to be in the first place.

And I think you may have seen it in, like, *Back to the Future.* And I can't really think of any other films right now.

So this is a brief history of time travel and the three theories associated with it, as well as a quick touch on the paradox of time-- grandfather paradox.