1

00:00:00,000 --> 00:00:11,000

It's August 15, 1977. Astrophysicist Jerry Elman is scanning the cosmos with his radio telescope at the University of Ohio.

2

00:00:11,000 --> 00:00:21,000

It is connected to a 100 meter long antenna used by the SETI project, whose goal is to listen to the cosmos in the hopes of discovering a message of alien origin.

3

00:00:21,000 --> 00:00:27,000

Glancing briefly at the data printout, the astrophysicist is shocked by what he sees.

4

00:00:27,000 --> 00:00:34,000

A few minutes earlier, at exactly 11.16 p.m., a strong radio signal was captured.

5

00:00:34,000 --> 00:00:40,000

Elman is so surprised that he even writes the word WOW in the margin.

6

00:00:40,000 --> 00:00:47,000

Did this signal really come from somewhere else? And if it did, from where?

7

00:00:57,000 --> 00:01:03,000

The astrophysicist is shocked by the fact that the antenna is a satellite.

8

00:01:03,000 --> 00:01:09,000

The astrophysicist is shocked by the fact that the antenna is a satellite.

9

00:01:09,000 --> 00:01:15,000

The astrophysicist is shocked by the fact that the antenna is a satellite.

10

00:01:15,000 --> 00:01:21,000

The astrophysicist is shocked by the fact that the antenna is a satellite.

11

00:01:21,000 --> 00:01:26,000

The astrophysicist is shocked by the fact that the antenna is a satellite.

12

00:01:26,000 --> 00:01:31,000

The astrophysicist is shocked by the fact that the antenna is a satellite.

13

00:01:31,000 --> 00:01:36,000

The astrophysicist is shocked by the fact that the antenna is a satellite.

14

00:01:36,000 --> 00:01:44,000

To most people, the expression, unidentified flying object, brings to mind images of interplanetary spacecraft.

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00:01:44,000 --> 00:01:49,000

However, the theory that aliens exist has met with many objections.

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00:01:49,000 --> 00:01:53,000

Some scientists will even say that it's nothing more than nonsense.

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00:01:53,000 --> 00:01:58,000

According to them, if we consider the vast distances that separate the stars,

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00:01:58,000 --> 00:02:02,000

it is ridiculous to think that aliens could be visiting us.

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00:02:02,000 --> 00:02:07,000

For instance, if we look at the star that is closest to our sun, Alpha Centauri,

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00:02:07,000 --> 00:02:11,000

we see that it is slightly more than four light years away from Earth.

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00:02:11,000 --> 00:02:15,000

In other words, it is as far as light would travel in four years.

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00:02:15,000 --> 00:02:19,000

Since light travels at a speed of 300,000 km per second,

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00:02:19,000 --> 00:02:23,000

we're talking about a distance of approximately 38 billion km.

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00:02:23,000 --> 00:02:27,000

That would be the number 38, followed by 12 zeros.

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00:02:27,000 --> 00:02:32,000

Even if we could imagine an alien civilization capable of traveling at close to the speed of light,

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00:02:32,000 --> 00:02:38,000

they would take at least four years to get to our planet and another four to get back home.

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00:02:38,000 --> 00:02:44,000

And if they decided to trade in their spaceship for a car driving down the highway at 60 miles per hour,

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00:02:44,000 --> 00:02:49,000

our intergalactic travelers would take 120 million years to cross the same distance.

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00:02:49,000 --> 00:02:51,000

And to do what?

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00:02:51,000 --> 00:02:54,000

To butcher a few cows in the US Midwest?

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00:02:54,000 --> 00:02:56,000

To kidnap a Boston postal worker?

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00:02:56,000 --> 00:02:59,000

To gather a few samples of lavender in France?

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00:02:59,000 --> 00:03:01,000

Let's get serious.

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00:03:02,000 --> 00:03:09,000

We now know, based on certain criteria, that Alpha Centauri cannot have any habitable planets orbiting it.

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00:03:09,000 --> 00:03:13,000

This means that if aliens do exist and are visiting our planet,

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00:03:13,000 --> 00:03:18,000

they must have come from somewhere else, somewhere much farther away.

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00:03:18,000 --> 00:03:20,000

But where could that be?

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00:03:23,000 --> 00:03:25,000

We might be getting off track.

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00:03:25,000 --> 00:03:28,000

It might not be as far away as we think.

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00:03:28,000 --> 00:03:32,000

The speed of light might not be as absolute as astrophysicists claim,

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00:03:32,000 --> 00:03:36,000

and somewhere else may turn out to be nowhere.

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00:03:36,000 --> 00:03:41,000

The universe has by no means revealed all of its secrets.

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00:03:41,000 --> 00:03:45,000

The UFO problem raises two questions with regards to aliens.

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00:03:45,000 --> 00:03:49,000

First of all, do intelligent life forms exist in the universe?

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00:03:49,000 --> 00:03:53,000

Secondly, do they have the means to visit us?

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00:03:54,000 --> 00:03:59,000

In terms of biochemistry, life as we know it is like a cake recipe.

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00:03:59,000 --> 00:04:01,000

Certain ingredients are required.

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00:04:01,000 --> 00:04:06,000

Professor Rene Racine is considered by many as one of Quebec's leading astronomers.

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00:04:07,000 --> 00:04:16,000

I'm no expert, but they think that life is carbon-based,

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00:04:16,000 --> 00:04:24,000

and only a mixture of elements such as carbon, nitrogen, oxygen and hydrogen could produce life,

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00:04:24,000 --> 00:04:29,000

or the level of molecular complexity necessary to generate life forms.

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00:04:32,000 --> 00:04:34,000

Other combinations also exist.

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00:04:34,000 --> 00:04:39,000

For instance, silicon mixed with oxygen gives sand,

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00:04:39,000 --> 00:04:45,000

but it's far from being as malleable and fertile as say, blood, for example,

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00:04:45,000 --> 00:04:50,000

which is composed of carbon, nitrogen and oxygen.

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00:04:54,000 --> 00:05:00,000

Carbon, nitrogen, oxygen and hydrogen exist everywhere in the universe,

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00:05:01,000 --> 00:05:06,000

so all we need is the right conditions for these elements to combine,

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00:05:06,000 --> 00:05:11,000

then increase in complexity and evolve into a life form.

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00:05:19,000 --> 00:05:24,000

Obviously, simply mixing elements such as hydrogen, oxygen and carbon together

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00:05:24,000 --> 00:05:28,000

is not enough to spark the complex process that produces life.

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00:05:29,000 --> 00:05:34,000

Going back to our cake recipe, tossing a couple of eggs, some flour and sugar into a bowl

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00:05:34,000 --> 00:05:37,000

and mixing them together doesn't give us a cake.

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00:05:37,000 --> 00:05:42,000

The mixture needs to spend a certain amount of time cooking in the oven at a specific temperature.

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00:05:42,000 --> 00:05:48,000

In cosmic terms, the equivalent of the cooking process for this hydrogen, oxygen and carbon mixture

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00:05:48,000 --> 00:05:51,000

is referred to as planetary conditions.

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00:05:52,000 --> 00:06:00,000

We need to understand that the conditions required to create this biological or living soup are very precise.

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00:06:00,000 --> 00:06:07,000

There's the time element, the stability of the planet's orbit and surface temperatures,

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00:06:07,000 --> 00:06:12,000

and it's hard to find ideal conditions where all of these elements coexist.

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00:06:12,000 --> 00:06:15,000

We've known that for a long time.

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00:06:16,000 --> 00:06:20,000

It makes us realize how incredibly unlikely it was for life,

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00:06:20,000 --> 00:06:26,000

especially intelligent life, to emerge here on Earth, and yet it happened.

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00:06:26,000 --> 00:06:32,000

To be more precise, it's believed that a planet's surface temperatures

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00:06:32,000 --> 00:06:39,000

must allow for biochemical reactions to take place, therefore they must remain within a certain range.

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00:06:39,000 --> 00:06:43,000

They have to stay between water's freezing point and evaporation point, for example,

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00:06:43,000 --> 00:06:46,000

since water is an essential element.

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00:06:46,000 --> 00:06:51,000

And the orbit of the planet, or the object on which a life form might develop,

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00:06:51,000 --> 00:06:54,000

must be very constant.

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00:06:54,000 --> 00:06:59,000

Planets orbit around stars, just like Earth orbits around the Sun.

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00:06:59,000 --> 00:07:06,000

And if the distance between the planet and its star varies over time, surface temperatures will change.

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00:07:07,000 --> 00:07:13,000

Now you can see why we are so concerned with the effects of an increase in temperature on Earth's ecosystem.

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00:07:13,000 --> 00:07:19,000

Even a change of one or two degrees can have a catastrophic result.

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00:07:19,000 --> 00:07:25,000

To keep the temperature constant, it's crucial that Earth's orbit remain as circular as possible.

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00:07:25,000 --> 00:07:29,000

Earth is always the same distance from the Sun within a one percent margin.

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00:07:29,000 --> 00:07:32,000

That's just one example among several others.

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00:07:33,000 --> 00:07:39,000

From our observations, we now know that when planets, or other protoplanetary objects,

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00:07:39,000 --> 00:07:45,000

form around young stars, there is a dynamic of intense agitation.

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00:07:45,000 --> 00:07:50,000

And it's not easy to explain how a solar system such as ours could have come about,

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00:07:50,000 --> 00:07:58,000

in which there are eight or nine planets, if we include Pluto, whose orbits are nearly perfectly circular.

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00:07:58,000 --> 00:08:00,000

So those are the conditions.

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00:08:00,000 --> 00:08:05,000

And I've given you an idea of how difficult it is for all of those conditions to be present at once.

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00:08:05,000 --> 00:08:08,000

It happened here in our solar system.

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00:08:08,000 --> 00:08:14,000

There was a planet called Earth just the right distance away from its star for the water to maintain its fertile properties.

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00:08:14,000 --> 00:08:17,000

Water can be too hot or too cold.

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00:08:17,000 --> 00:08:20,000

The temperature of Earth's water may not have been ideal at first.

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00:08:20,000 --> 00:08:22,000

The Sun may have been hotter in the beginning.

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00:08:22,000 --> 00:08:25,000

Mars might have had a relatively high surface temperature.

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00:08:26,000 --> 00:08:29,000

There may have been archbiology on Mars. Who knows?

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00:08:29,000 --> 00:08:33,000

The point is, it's very difficult to meet all of the conditions at once.

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00:08:35,000 --> 00:08:41,000

In the early 1960s, scientists were optimistic about the existence of extraterrestrial life forms.

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00:08:41,000 --> 00:08:45,000

They used planetary conditions found here in our solar system as a model,

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00:08:45,000 --> 00:08:49,000

believing that the same model must exist everywhere else in the universe.

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00:08:50,000 --> 00:08:56,000

But recent discoveries of planets outside of our solar system have put a damper on their optimism.

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00:08:56,000 --> 00:09:02,000

It seems that stable planetary systems are actually a lot rarer than we had thought up until now.

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00:09:09,000 --> 00:09:13,000

Establishing our level of knowledge or confidence is a question of statistics.

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00:09:14,000 --> 00:09:21,000

In the 1960s and 70s, Frank Drake came up with a relatively simple mathematical equation

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00:09:21,000 --> 00:09:26,000

that included the probabilities of each factor required for life to emerge.

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00:09:26,000 --> 00:09:29,000

What is the probability that a star will have planets?

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00:09:29,000 --> 00:09:33,000

What is the probability that these planets will have a stable orbit?

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00:09:33,000 --> 00:09:38,000

What is the probability that the planet will be far enough away from the star?

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00:09:39,000 --> 00:09:44,000

If we want to calculate the probability of communicating with extraterrestrial life forms,

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00:09:44,000 --> 00:09:49,000

what is the lifespan of a civilization capable of communication?

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00:09:50,000 --> 00:09:57,000

I recall at the time, we would multiply all of these factors by the number of stars in the galaxy.

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00:09:57,000 --> 00:09:59,000

And the answer would be a few units.

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00:09:59,000 --> 00:10:06,000

There would only be a few habitable planets where life could develop in our galaxy the Milky Way.

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00:10:07,000 --> 00:10:12,000

But back then, we were going on the supposition that all stars have planets.

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00:10:12,000 --> 00:10:15,000

And now we know that's not true.

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00:10:15,000 --> 00:10:21,000

There has been a lot of talk about discoveries of planets outside of our solar system.

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00:10:21,000 --> 00:10:28,000

But we have to remember that the 80 or so planets that have been discovered so far

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00:10:28,000 --> 00:10:32,000

were among 3,000 stars that were examined.

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00:10:33,000 --> 00:10:38,000

This shows that it's not 100% certain that a star will have a planet.

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00:10:38,000 --> 00:10:43,000

In reality, the probability is more like 2 or 3%.

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00:10:50,000 --> 00:10:57,000

What's even worse, if we include in our probabilities the total number of planets discovered around stars,

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00:10:57,000 --> 00:11:02,000

there are planets whose orbit is irregular or elliptical

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00:11:02,000 --> 00:11:08,000

or whose surface temperature varies between 100 and 300 degrees Celsius,

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00:11:08,000 --> 00:11:15,000

not over a period of millions of years, but over a period of weeks or days.

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00:11:17,000 --> 00:11:22,000

I would say that recently, over the past five years or so,

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00:11:22,000 --> 00:11:30,000

the consensus has been that the creation of life as it occurred here on Earth happens very rarely elsewhere.

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00:11:34,000 --> 00:11:38,000

The optimism of Drake at the beginning was based on...

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00:11:38,000 --> 00:11:44,000

Drake's initial optimism was based on the fact that there are over 10 billion stars in our galaxy.

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00:11:45,000 --> 00:11:53,000

At the time, it was believed that chances were pretty good of finding stars with planets orbiting around them.

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00:12:04,000 --> 00:12:07,000

We have since discovered a lot of massive planets.

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00:12:08,000 --> 00:12:15,000

But according to the basic criteria, these massive planets could not have formed close to their star.

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00:12:20,000 --> 00:12:25,000

They would have had to form far away from the star like Jupiter did in our solar system.

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00:12:25,000 --> 00:12:29,000

Jupiter is five times further away from the Sun than the Earth is,

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00:12:29,000 --> 00:12:34,000

so these massive planets must have moved closer to their star over time.

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00:12:35,000 --> 00:12:38,000

At first, we wondered how that could happen,

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00:12:38,000 --> 00:12:45,000

but after much study, we realized that it was relatively easy for a planet as big as Jupiter to evolve

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00:12:45,000 --> 00:12:51,000

and then migrate from the position where it was formed to a new position closer to the star,

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00:12:51,000 --> 00:12:57,000

which makes us wonder if this is possible, then why is Earth still in the same place where it is now?

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00:12:57,000 --> 00:13:00,000

If Jupiter had moved closer to its star,

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00:13:01,000 --> 00:13:06,000

like the other massive planets that we observed, then Earth wouldn't be here anymore.

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00:13:11,000 --> 00:13:15,000

Now we're asking ourselves the question, why are we still here?

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00:13:22,000 --> 00:13:28,000

It seems that Jupiter is different from a lot of the planets that we discovered outside of our solar system.

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00:13:31,000 --> 00:13:36,000

The good news is that once all of the conditions have been met, it's easy for life to spring forth.

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00:13:36,000 --> 00:13:46,000

In 1953, Stanley Miller, a young biochemistry student, took a sphere and filled it with the gases that were present on Earth a billion years ago.

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00:13:46,000 --> 00:13:53,000

He then bombarded the sphere with strong electrical charges, recreating Earth's original climatic conditions.

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00:13:53,000 --> 00:13:59,000

At the end of the experiment, Miller observed that his mixture had become enriched with an additional substance.

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00:13:59,000 --> 00:14:03,000

Amino acids, the building blocks of life.

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00:14:03,000 --> 00:14:09,000

Miller's experiment proved that it was possible to create life from inorganic matter.

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00:14:09,000 --> 00:14:16,000

As for the transition from organic life to intelligent life, it was just a question of time and ability.

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00:14:16,000 --> 00:14:24,000

To help you understand this long process, let's imagine the Earth's entire evolution reduced to the length of a 24-hour day.

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00:14:24,000 --> 00:14:27,000

We start with the formation of the planet Earth at 12 a.m.

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00:14:27,000 --> 00:14:30,000

Then life does not appear until 5 a.m.

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00:14:30,000 --> 00:14:35,000

The planet takes all day to develop, and the first mollusks do not appear until 8 p.m.

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00:14:35,000 --> 00:14:38,000

Dinosaurs don't show up until 11 p.m.

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00:14:38,000 --> 00:14:43,000

Then our human ancestors appear on the scene at 11.55 p.m.

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00:14:43,000 --> 00:14:47,000

On this scale, the Industrial Revolution was a mere hundredth of a second,

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00:14:47,000 --> 00:14:52,000

and space exploration has only been taking place for three thousandths of a second.

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00:14:52,000 --> 00:14:56,000

If we try to imagine this long process taking place on another planet,

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00:14:56,000 --> 00:15:02,000

it is almost certain that the original life form will eventually evolve into an intelligent species.

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00:15:02,000 --> 00:15:06,000

However, it is highly unlikely that it would lead to humanoid beings.

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00:15:06,000 --> 00:15:09,000

Unlikely, but not impossible.

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00:15:09,000 --> 00:15:13,000

Michio Kaku is a professor of theoretical physics at the University of New York.

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00:15:15,000 --> 00:15:21,000

Exo-biologists, that is biologists that look for perhaps intelligent life forms in other planets,

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00:15:21,000 --> 00:15:26,000

say that there are really three ingredients for intelligence, just three.

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00:15:26,000 --> 00:15:30,000

First is the ability to have some kind of language, culture,

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00:15:30,000 --> 00:15:34,000

to be able to hand down communication from generation to generation.

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00:15:34,000 --> 00:15:42,000

Second is a hand of some sort, a way to grab a tentacle, perhaps a claw, fingers,

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00:15:42,000 --> 00:15:44,000

to manipulate the environment.

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00:15:44,000 --> 00:15:50,000

And the third, eyeballs of some sort, some way to sense the environment.

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00:15:50,000 --> 00:15:55,000

But that's it. I sight of some sort, some sort of grappling instrument,

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00:15:55,000 --> 00:15:59,000

and some sort of culture, communication, language.

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00:15:59,000 --> 00:16:01,000

Beyond that, anything goes.

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00:16:01,000 --> 00:16:04,000

Look at the animal kingdom on the planet Earth.

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00:16:04,000 --> 00:16:10,000

There are many animals that could, given a few millimetres, probably become intelligent.

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00:16:10,000 --> 00:16:14,000

Octopus, for example, they have tentacles, lobsters have claws,

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00:16:14,000 --> 00:16:19,000

mammals, if they had opposable thumbs, they would be able to manipulate the environment.

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00:16:19,000 --> 00:16:24,000

Just on the planet Earth, we have a fantastic variety of animals

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00:16:24,000 --> 00:16:29,000

without two eyes, nose, mouth, ears, chin, forehead,

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00:16:29,000 --> 00:16:32,000

in the exact proportion of a human.

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00:16:32,000 --> 00:16:37,000

Therefore, when I see a picture of an alien that looks just like us,

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00:16:37,000 --> 00:16:43,000

I tend to think that these are simply memories of 1950s science fiction movies

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00:16:43,000 --> 00:16:45,000

when we saw bug-eyed monsters.

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00:16:45,000 --> 00:16:50,000

Even on the planet Earth, the diversity of life forms is fantastic

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00:16:50,000 --> 00:16:54,000

compared to what we see in science fiction movies.

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00:16:54,000 --> 00:16:58,000

I would be more convinced if I saw an intelligent octopus or intelligent lobster,

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00:16:58,000 --> 00:17:04,000

I would really be quite impressed if somebody says they were abducted by an intelligent octopus.

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00:17:05,000 --> 00:17:09,000

If anatomical shapes are infinite, then what about intelligence levels?

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00:17:09,000 --> 00:17:12,000

Can you imagine what an extraterrestrial civilization,

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00:17:12,000 --> 00:17:16,000

one thousand or ten thousand years ahead of us, might be like?

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00:17:18,000 --> 00:17:21,000

We physicists believe that when you look in outer space,

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00:17:21,000 --> 00:17:26,000

we have type 1, type 2, and type 3 civilizations.

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00:17:26,000 --> 00:17:32,000

A type 1 civilization is perhaps a hundred, two hundred years more advanced than ours.

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00:17:32,000 --> 00:17:36,000

They control planetary energy, anything involved with the planet,

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00:17:36,000 --> 00:17:40,000

the weather, perhaps earthquake and volcanoes they can control.

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00:17:40,000 --> 00:17:47,000

However, eventually they expand by a factor of ten billion to have the power of a star.

197

00:17:47,000 --> 00:17:52,000

They control solar flares, a type 2 civilization.

198

00:17:52,000 --> 00:17:56,000

A type 2 civilization can roam across the parts of the galaxy.

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00:17:56,000 --> 00:18:01,000

They have the power of thermonuclear fusion, the power of stars themselves.

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00:18:01,000 --> 00:18:06,000

Eventually they exhaust the power of a star and they become galactic.

201

00:18:06,000 --> 00:18:08,000

They become type 3.

202

00:18:08,000 --> 00:18:13,000

They have tremendous accesses to huge vast regions of our galaxy.

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00:18:13,000 --> 00:18:18,000

A type 2 civilization is ten billion times more powerful than type 1.

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00:18:18,000 --> 00:18:23,000

A type 3 is ten billion times more powerful than type 2.

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00:18:23,000 --> 00:18:26,000

But on this scale, what are we?

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00:18:26,000 --> 00:18:29,000

We are type 0.

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00:18:29,000 --> 00:18:33,000

We get our energy from dead plants.

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00:18:33,000 --> 00:18:38,000

We can only speculate what it would be to be like a planetary civilization,

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00:18:38,000 --> 00:18:43,000

to be able to energize volcanoes and earthquakes and change the weather at will.

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00:18:43,000 --> 00:18:49,000

If such civilizations exist in the universe, what do these beings look like?

211

00:18:49,000 --> 00:18:52,000

And how can we detect their presence?

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00:18:52,000 --> 00:18:56,000

In the early 1960s, anxious to obtain an answer to this question,

213

00:18:56,000 --> 00:19:01,000

scientists set up an ambitious project designed to listen to space.

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00:19:02,000 --> 00:19:07,000

It was called Project City, search for extraterrestrial intelligence.

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00:19:07,000 --> 00:19:11,000

The idea was to use radio telescopes to listen in on the interstellar void,

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00:19:11,000 --> 00:19:15,000

in the hopes of picking up a radio signal of alien origin.

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00:19:15,000 --> 00:19:21,000

Here on Earth, we use radio waves in practically all forms of communication.

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00:19:21,000 --> 00:19:25,000

If extraterrestrials were living on a planet orbiting the star Zeta reticuli,

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00:19:25,000 --> 00:19:29,000

some 30 light years away from Earth, and doing the same experiment,

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00:19:29,000 --> 00:19:35,000

they would just now be picking up old episodes of Hawaii 5-0, or the invaders.

221

00:19:35,000 --> 00:19:39,000

City researchers had to choose a specific wavelength to listen in on.

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00:19:39,000 --> 00:19:42,000

For convenience sake, astrophysicists decided to choose a wavelength

223

00:19:42,000 --> 00:19:48,000

that was equivalent or close to that of hydrogen, the most common element in the universe.

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00:19:48,000 --> 00:19:51,000

So they chose 1420 MHz.

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00:19:51,000 --> 00:19:54,000

Since then, space has been hopelessly silent.

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00:19:54,000 --> 00:19:59,000

Apart from a few abnormalities, like the signal picked up on August 15, 1977,

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00:19:59,000 --> 00:20:04,000

which was dubbed the Wow signal, Project City has not recorded any signals

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00:20:04,000 --> 00:20:09,000

that could be indisputably interpreted as a message from alien intelligence.

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00:20:09,000 --> 00:20:13,000

The apparent failure of Project City has led several scientists to conclude

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00:20:13,000 --> 00:20:17,000

that there are no advanced civilizations anywhere in the cosmos,

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00:20:17,000 --> 00:20:20,000

a conclusion that some feel is a bit premature.

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00:20:21,000 --> 00:20:25,000

Many scientists look at the city program and they say,

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00:20:25,000 --> 00:20:31,000

see, we've scanned the heavens and we see no evidence of any intelligent life in outer space.

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00:20:31,000 --> 00:20:33,000

Well, I don't think so.

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00:20:33,000 --> 00:20:39,000

I don't think that perhaps in the next century we'll find any usable signal from outer space.

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00:20:39,000 --> 00:20:45,000

First of all, we've only scanned perhaps 100 light years from the planet Earth in some detail.

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00:20:45,000 --> 00:20:49,000

Our galaxy is 100,000 light years across,

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00:20:49,000 --> 00:20:53,000

and galaxies are tens of millions of light years distant.

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00:20:53,000 --> 00:20:57,000

So we've only scanned a small neighborhood of our galaxy.

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00:20:57,000 --> 00:21:02,000

Second of all, we've only looked at frequencies near the frequency of hydrogen.

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00:21:02,000 --> 00:21:04,000

That's silly.

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00:21:04,000 --> 00:21:08,000

This goes back to the person who lost his key.

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00:21:08,000 --> 00:21:13,000

A person who drops his key will often look next to a lamp post.

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00:21:13,000 --> 00:21:16,000

But if you say to the man, why are you looking next to a lamp post?

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00:21:16,000 --> 00:21:18,000

You dropped your key over there.

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00:21:18,000 --> 00:21:20,000

The person will say, well, that's where the light is.

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00:21:20,000 --> 00:21:22,000

There's no light over there.

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00:21:22,000 --> 00:21:24,000

Therefore, I will look over here.

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00:21:24,000 --> 00:21:27,000

We look at hydrogen frequencies because they're convenient.

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00:21:27,000 --> 00:21:33,000

However, we don't think, scientists don't think that these aliens will communicate at hydrogen frequencies.

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00:21:33,000 --> 00:21:36,000

Perhaps they use laser technology.

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00:21:36,000 --> 00:21:39,000

We've only barely begun to scan other frequencies.

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00:21:39,000 --> 00:21:42,000

Therefore, we have to look at the broadband.

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00:21:42,000 --> 00:21:49,000

Also, when you communicate across vast distances, we sometimes take a signal and chop it up.

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00:21:49,000 --> 00:21:53,000

And then we send each piece, and it reforms at the other end.

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00:21:53,000 --> 00:21:55,000

That's how the internet works.

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00:21:55,000 --> 00:21:59,000

Email is chopped up, sent through various cities, and is reformed at the other end.

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00:21:59,000 --> 00:22:06,000

But if you were to intercept one fragment of email, you'd get nonsense, gibberish, until it's reformed.

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00:22:06,000 --> 00:22:11,000

Therefore, in outer space, they probably send signals not on one frequency,

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00:22:11,000 --> 00:22:17,000

but perhaps on the entire spectrum, so that a passing star will not interrupt the entire signal.

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00:22:17,000 --> 00:22:20,000

Then at the other end, they reassemble the signal.

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00:22:20,000 --> 00:22:25,000

If you were to listen in on their signal, you would hear gibberish, nonsense.

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00:22:25,000 --> 00:22:34,000

In other words, we could be in the middle of an intergalactic conversation, and we wouldn't even know.

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00:22:34,000 --> 00:22:39,000

Our technology is so primitive, we look on simply one frequency.

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00:22:39,000 --> 00:22:43,000

Any advanced civilization will send messages across all frequencies,

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00:22:43,000 --> 00:22:50,000

in order to compensate for passing stars, passing stellar explosions, and static interference.

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00:22:50,000 --> 00:22:52,000

That's real science.

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00:22:52,000 --> 00:22:58,000

However, scientists sometimes judge alien technology on the basis of what we can do.

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00:22:58,000 --> 00:23:05,000

Not on the basis of what a type 3 civilization millions of years more advanced than ours can do.

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00:23:09,000 --> 00:23:15,000

A lot of UFO followers find scientists' attitudes to be somewhat of a paradox.

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00:23:15,000 --> 00:23:21,000

On one hand, efforts are being made to listen to space, in the hopes of picking up an alien signal.

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00:23:21,000 --> 00:23:27,000

And on the other hand, scientists do not seem to be particularly interested in the UFO phenomenon.

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00:23:27,000 --> 00:23:35,000

From an objective point of view, we must admit that there has been no solid proof linking this phenomenon to visits by extraterrestrials.

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00:23:35,000 --> 00:23:37,000

But the theory is still valid.

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00:23:37,000 --> 00:23:43,000

Unfortunately, too many scientists continue to view this theory as nothing more than a popular fantasy.

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00:23:43,000 --> 00:23:47,000

To defend their view, scientists cite the Fermi Paradox.

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00:23:47,000 --> 00:23:52,000

Fifty years ago, Nobel Prize winner Enrico Fermi, an Italian physicist, a friend of Einstein,

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00:23:52,000 --> 00:23:57,000

once said, if there are extraterrestrials, where are they?

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00:23:57,000 --> 00:24:05,000

In asking this question, Fermi wanted to point out to his colleagues that if life was as widespread in the cosmos as they believed it was,

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00:24:05,000 --> 00:24:10,000

then it was reasonable to think that civilizations far more evolved than us existed.

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00:24:10,000 --> 00:24:16,000

According to Fermi, several of those civilizations should be technologically advanced enough to visit us.

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00:24:16,000 --> 00:24:24,000

By Fermi's logic, given the fact that extraterrestrials have not yet landed on our planet, it must mean that they don't exist.

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00:24:24,000 --> 00:24:29,000

This rather radical statement became known in scientific circles as Fermi's Paradox.

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00:24:29,000 --> 00:24:36,000

In fact, it was only a quick leap to say that people who believed they had met extraterrestrials were delusional.

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00:24:36,000 --> 00:24:44,000

As for the credibility of a witness or the assessment of a witness's credibility,

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00:24:44,000 --> 00:24:54,000

Enrico Fermi's name was often mentioned, saying, listen, if extraterrestrial beings had visited us and were among us,

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00:24:54,000 --> 00:24:58,000

we wouldn't be sitting here discussing it. It would be obvious.

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00:24:58,000 --> 00:25:05,000

We need only look at the example of Europeans arriving in North America in the 15th and 16th centuries.

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00:25:05,000 --> 00:25:13,000

It didn't take years for news to spread to the West Coast that ships had arrived in the Gulf of St. Lawrence.

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00:25:13,000 --> 00:25:16,000

It would be the same thing in modern times.

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00:25:16,000 --> 00:25:25,000

If extraterrestrial beings were visiting Earth, which is highly unlikely, then they would be on television.

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00:25:25,000 --> 00:25:27,000

They're not that shy.

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00:25:27,000 --> 00:25:34,000

The problem with Fermi's Paradox is that it considers alien visits in terms of our expectations and not reality.

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00:25:34,000 --> 00:25:39,000

Extraterrestrials may already be among us, unbeknownst to us.

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00:25:39,000 --> 00:25:47,000

There is the famous Fermi Paradox, that is, if there are extraterrestrial beings out there, then where are they?

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00:25:47,000 --> 00:25:54,000

Well, take a look at this. Let's say we have an anthill in the middle of a forest.

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00:25:55,000 --> 00:26:01,000

Right next to the anthill, they're building a 10-lane superhighway.

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00:26:01,000 --> 00:26:08,000

The question is, would the ants be able to communicate or understand what a 10-lane superhighway is?

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00:26:08,000 --> 00:26:16,000

Would the ants be able to understand the technology, the intentions of beings building a 10-lane superhighway right next to the ants?

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00:26:16,000 --> 00:26:20,000

Let's say, however, you go down to the ants and you say to the ants,

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00:26:20,000 --> 00:26:27,000

I bring you trinkets, I bring you beads, I bring you knowledge, I bring you nuclear energy, I bring you DNA technology,

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00:26:27,000 --> 00:26:31,000

I bring you utopia. Take me to your leader.

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00:26:31,000 --> 00:26:34,000

Is that what you say when you bump into ants?

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00:26:34,000 --> 00:26:38,000

No. Most people simply step on a few of them.

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00:26:38,000 --> 00:26:47,000

Now, if we are really a type zero civilization and beings of a type three civilization consortium,

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00:26:48,000 --> 00:26:53,000

they are perhaps millions of years more advanced than us.

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00:26:53,000 --> 00:27:02,000

The distance between us and ants would be the same comparable distance between type three and a type zero civilization.

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00:27:02,000 --> 00:27:06,000

In other words, we are so arrogant.

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00:27:06,000 --> 00:27:12,000

We're so conceited that we say they must visit us.

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00:27:13,000 --> 00:27:22,000

We're so important that they're going to interrupt all their business just to come to us and give us a little bit of super technology.

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00:27:22,000 --> 00:27:24,000

I don't think so.

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00:27:24,000 --> 00:27:31,000

Again, ants looking at a 10-lane superhighway, they would first of all not even know what a highway is.

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00:27:31,000 --> 00:27:38,000

They would not be able to detect the presence of a highway, understand their communications, and even if they did,

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00:27:38,000 --> 00:27:41,000

would the ants say, why don't they visit us?

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00:27:41,000 --> 00:27:45,000

Why don't they come and bring us this fantastic technology of ours?

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00:27:45,000 --> 00:27:47,000

I don't think so.

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00:27:47,000 --> 00:27:56,000

Other than the question of perception, scientists point to physics-related problems to disprove the theory that we are being visited by extraterrestrials.

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00:27:56,000 --> 00:28:03,000

Their main argument, of course, is the expansive distances that separate the stars, which seem at first glance uncrossable,

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00:28:03,000 --> 00:28:06,000

even traveling close to the speed of light.

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00:28:06,000 --> 00:28:10,000

In physics, we have something called the Giggle Factor.

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00:28:10,000 --> 00:28:16,000

That is, anyone talking about UFOs will find themselves drummed out of the scientific community.

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00:28:16,000 --> 00:28:19,000

UFO research is the third rail of science.

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00:28:19,000 --> 00:28:26,000

Any scientist who dares touch UFO research finds their scientific career electrocuted.

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00:28:26,000 --> 00:28:30,000

However, I think we have to look at the long-term perspective.

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00:28:30,000 --> 00:28:36,000

Many scientists say the stars are so far away, hundreds, thousands of light-years away,

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00:28:36,000 --> 00:28:42,000

that any intelligent being would take thousands of years to reach the Earth, making it impractical.

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00:28:42,000 --> 00:28:50,000

I think that's a mistake, because we assume that these extraterrestrial beings are only 100, 200 years more advanced than us.

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00:28:50,000 --> 00:28:52,000

Then that's a problem.

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00:28:52,000 --> 00:28:56,000

Einstein said that the speed of light is the ultimate speed limit.

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00:28:56,000 --> 00:28:59,000

You cannot go faster than the speed of light.

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00:28:59,000 --> 00:29:02,000

That's Einstein's special theory of relativity.

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00:29:02,000 --> 00:29:05,000

But you see, we have to go beyond Einstein.

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00:29:05,000 --> 00:29:10,000

We have to go to the general theory of relativity, where it is possible, we think,

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00:29:10,000 --> 00:29:14,000

that you might be able to go faster than the speed of light, and even beyond that,

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00:29:14,000 --> 00:29:20,000

to the quantum theory, to the unified field theory in which all bets are off.

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00:29:20,000 --> 00:29:25,000

So I think that the fundamental mistake that many scientists make is that they assume

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00:29:25,000 --> 00:29:31,000

that extraterrestrial beings are only 100, 200 years beyond our civilization,

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00:29:31,000 --> 00:29:35,000

not thousands, millions of years beyond ours.

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00:29:35,000 --> 00:29:42,000

What if extraterrestrials do not come from another planet, but rather from another dimension that we are unaware of?

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00:29:42,000 --> 00:29:45,000

A sort of parallel universe out of our grasp?

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00:29:45,000 --> 00:29:49,000

Five years ago, such a concept would have been considered ludicrous.

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00:29:49,000 --> 00:29:54,000

However, with the discovery of quantum physics, our vision of the universe is changing.

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00:29:56,000 --> 00:30:01,000

When I was a child, I used to go to the Japanese Tea Garden in San Francisco,

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00:30:01,000 --> 00:30:05,000

and I used to look at the fish, the carp swimming in a shallow pond.

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00:30:05,000 --> 00:30:12,000

I used to go down and look at the fish and wonder what would it be like to live in two dimensions.

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00:30:12,000 --> 00:30:16,000

These fish could only move forward, backward, left and right.

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00:30:16,000 --> 00:30:20,000

And I mentioned what a strange universe it must be.

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00:30:20,000 --> 00:30:25,000

The concept of up, up into the third dimension was alien to them.

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00:30:25,000 --> 00:30:32,000

I could put my nose right next to the fish, and they would never know that there was something

called hyperspace.

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00:30:32,000 --> 00:30:37,000

Today, many physicists believe that we are the fish.

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00:30:37,000 --> 00:30:42,000

We move forward, backward, left, right, up, down.

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00:30:42,000 --> 00:30:45,000

And we say, that's all there is.

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00:30:45,000 --> 00:30:47,000

What you see is what there is.

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00:30:47,000 --> 00:30:52,000

However, we now believe that there is a theory of everything that will allow us to quote

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00:30:52,000 --> 00:30:56,000

read the mind of God, as Albert Einstein would fondly say.

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00:30:56,000 --> 00:31:03,000

We think that there is a higher theory, called M-theory, that exists in eleven dimensions.

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00:31:03,000 --> 00:31:07,000

Dimensions where we have strings and membranes that pulsate.

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00:31:07,000 --> 00:31:11,000

And we now believe that our universe is nothing but a tiny bubble,

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00:31:11,000 --> 00:31:15,000

a bubble floating in a much larger hyperspace.

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00:31:16,000 --> 00:31:21,000

In other words, cosmologists don't really believe in a universe anymore.

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00:31:21,000 --> 00:31:28,000

We believe in a multiverse, a megaverse of bubbles that are constantly springing into existence,

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00:31:28,000 --> 00:31:30,000

expanding like in a big bang.

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00:31:30,000 --> 00:31:36,000

So in other words, our universe may coexist in an ocean of other universes.

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00:31:36,000 --> 00:31:43,000

Now, five, ten years ago, this notion was considered bizarre, science fiction, not anymore.

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00:31:44,000 --> 00:31:48,000

In the last five years, the data is almost conclusive.

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00:31:48,000 --> 00:31:50,000

We have something called inflation.

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00:31:50,000 --> 00:31:54,000

The fact that the universe expanded in many stages,

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00:31:54,000 --> 00:31:57,000

won an extremely rapid stage of expansion.

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00:31:57,000 --> 00:32:02,000

The only way to explain this rapid expansion is to assume that our universe is a bubble,

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00:32:02,000 --> 00:32:08,000

coexisting with other bubbles in a multiverse, in a megaverse of universes.

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00:32:09,000 --> 00:32:12,000

Just one universe among so many others.

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00:32:12,000 --> 00:32:14,000

It sounds like science fiction,

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00:32:14,000 --> 00:32:21,000

but over the past few years, new discoveries have greatly reduced the gap between science and science fiction.

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00:32:21,000 --> 00:32:24,000

Scottish genetic engineers cloned Dolly the sheep.

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00:32:24,000 --> 00:32:31,000

American, British and Dutch researchers succeeded in teleporting a photon, which is a particle of light.

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00:32:31,000 --> 00:32:35,000

Obviously, we are still a long ways away from the famous Star Trek line,

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00:32:35,000 --> 00:32:42,000

Be Me Up Scotty, but we're already taking steps towards the teleportation imagined by Gene Rottenberry.

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00:32:42,000 --> 00:32:44,000

What does the future hold?

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00:32:44,000 --> 00:32:47,000

What will science be like in the year 3000?

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00:32:47,000 --> 00:32:53,000

What might be the science of a civilization 100,000 years more technologically advanced than we are?

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00:32:53,000 --> 00:33:00,000

On Star Trek and many science fiction movies, we see an emerging type 2 civilization.

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00:33:00,000 --> 00:33:03,000

The Federation of Planets is type 2.

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00:33:03,000 --> 00:33:07,000

They have colonized a small fraction of our galaxy.

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00:33:07,000 --> 00:33:13,000

However, they live in fear of a type 3 civilization on their program called the Borg.

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00:33:13,000 --> 00:33:16,000

The Borg are a genuine type 3 civilization.

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00:33:16,000 --> 00:33:21,000

They are galactic. They go between star systems within the galaxy itself.

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00:33:21,000 --> 00:33:28,000

We physicists have looked carefully for type 1, type 2 and type 3 civilizations in outer space.

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00:33:28,000 --> 00:33:34,000

For example, a type 2 civilization may have what is called a Dyson Sphere.

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00:33:34,000 --> 00:33:38,000

A Dyson Sphere encapsulates an entire star.

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00:33:38,000 --> 00:33:51,000

They are able to use the entire energy output of a star, which in turn is about 10 billion times the energy that is contained within a planetary civilization, a type 1 civilization.

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00:33:51,000 --> 00:33:53,000

We've looked for them.

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00:33:53,000 --> 00:34:00,000

Even if they try to cloak themselves and hide themselves, they must obey the second law of thermodynamics.

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00:34:00,000 --> 00:34:04,000

They must emit waste heat in the infrared.

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00:34:04,000 --> 00:34:05,000

We've looked for them.

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00:34:05,000 --> 00:34:10,000

We've looked for the infrared signature of Dyson spheres in outer space.

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00:34:10,000 --> 00:34:18,000

Unfortunately, at the present time, we have found no evidence of type 1, type 2 or type 3 civilizations.

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00:34:19,000 --> 00:34:23,000

But we physicists, when we look in outer space, we don't look for little green men.

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00:34:23,000 --> 00:34:27,000

We look for civilizations on the basis of energy.

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00:34:27,000 --> 00:34:31,000

Energy hundreds, thousands, millions of years ahead of ours.

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00:34:31,000 --> 00:34:36,000

A type 1 civilization is about 100 to 200 years ahead of ours.

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00:34:36,000 --> 00:34:38,000

You can already see the beginning of it.

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00:34:38,000 --> 00:34:42,000

The internet is the birth of a type 1 telephone system.

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00:34:42,000 --> 00:34:45,000

The European Union is the birth of a type 1 economy.

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00:34:46,000 --> 00:34:51,000

English and a few European languages are the foundation of a type 1 language.

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00:34:51,000 --> 00:34:58,000

A type 2 civilization is perhaps 5,000, 10,000 years more advanced than ours

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00:34:58,000 --> 00:35:03,000

because growing at a simple 3% rate of their gross domestic product,

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00:35:03,000 --> 00:35:08,000

they would attain stellar energy on a scale of perhaps 10,000 years.

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00:35:09,000 --> 00:35:16,000

A type 3 civilization would be perhaps 100,000 to a million years more advanced than ours.

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00:35:16,000 --> 00:35:19,000

My point is very simple.

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00:35:19,000 --> 00:35:24,000

When we look at outer space, you cannot judge aliens by type 0 technology.

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00:35:24,000 --> 00:35:29,000

We assume that aliens are nothing but an advanced type 0 civilization.

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00:35:29,000 --> 00:35:35,000

However, once you obtain type 3 status, you have access to what is called the Planck energy.

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00:35:35,000 --> 00:35:40,000

The Planck energy is 10 to the 19 billion electron volts.

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00:35:40,000 --> 00:35:43,000

That's one with 19 zeros after it.

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00:35:43,000 --> 00:35:48,000

That's a quadrillion times more powerful than our most advanced atom smasher.

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00:35:48,000 --> 00:35:53,000

At the Planck energy, it may be possible to bend time into a pretzel,

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00:35:53,000 --> 00:35:58,000

punch a hole in space, and leap into the 11th dimension.

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00:35:58,000 --> 00:36:03,000

Recently, a few astrophysicists proposed the idea of wormholes

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00:36:03,000 --> 00:36:07,000

to explain the problem of crossing huge interstellar distances.

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00:36:07,000 --> 00:36:12,000

In theory, these wormholes are like tunnels that allow passage from point A in the universe

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00:36:12,000 --> 00:36:15,000

to point B using a shortcut.

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00:36:15,000 --> 00:36:18,000

They are a pathway for interstellar travelers.

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00:36:20,000 --> 00:36:23,000

In Einstein's general theory of relativity,

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00:36:23,000 --> 00:36:27,000

space-time is like a fabric, like a sheet of paper.

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00:36:27,000 --> 00:36:32,000

Einstein realized that perhaps the sheet of paper can fold on itself

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00:36:32,000 --> 00:36:35,000

and give us a shortcut through space and time.

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00:36:35,000 --> 00:36:37,000

In other words, take a sheet of paper.

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00:36:37,000 --> 00:36:39,000

We all know that if I take two points,

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00:36:39,000 --> 00:36:43,000

the shortest distance between two points is a straight line.

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00:36:43,000 --> 00:36:45,000

However, we now know that's not true.

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00:36:45,000 --> 00:36:49,000

The shortest distance between two points is a wormhole.

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00:36:49,000 --> 00:36:53,000

That is, if you can rip the fabric of space and time,

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00:36:53,000 --> 00:36:57,000

you can take a shortcut, like a subway ride through space and time.

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00:36:57,000 --> 00:36:59,000

Now, Einstein realized this.

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00:36:59,000 --> 00:37:02,000

We call them Einstein-Rosen bridges.

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00:37:02,000 --> 00:37:05,000

Bridges between two points in space and time.

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00:37:05,000 --> 00:37:09,000

Most people know this as Alice's looking glass.

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00:37:09,000 --> 00:37:13,000

In Through the Looking Glass, Alice was faced with a mirror.

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00:37:13,000 --> 00:37:15,000

She put her hand through the mirror,

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00:37:15,000 --> 00:37:19,000

and her hand went to the other side of Wonderland.

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00:37:19,000 --> 00:37:23,000

In Einstein's equations, we have many solutions,

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00:37:23,000 --> 00:37:28,000

in fact, hundreds of solutions in which we have Einstein-Rosen bridges.

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00:37:28,000 --> 00:37:31,000

For example, take a look at a black hole.

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00:37:31,000 --> 00:37:36,000

If I have a spinning black hole, the black hole does not collapse to a dot.

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00:37:36,000 --> 00:37:40,000

It collapses to a ring, a ring of neutrons.

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00:37:40,000 --> 00:37:44,000

This ring of neutrons forms the frame of Alice's looking glass.

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If you fall in between the ring, through the ring,

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then your hand may, in fact, go to the other side of the universe.

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Now, there are problems involved with wormholes.

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The main problem is stability.

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00:37:57,000 --> 00:37:59,000

We're not sure if they're stable.

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00:37:59,000 --> 00:38:03,000

We have to go to a quantum theory to calculate whether or not

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00:38:03,000 --> 00:38:07,000

you could really make a journey through the black hole itself.

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However, I should point out that astrophysicists have now discovered

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about 30 black holes in outer space.

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00:38:14,000 --> 00:38:18,000

All of them are spinning very rapidly, about a million miles an hour.

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And we do think that perhaps at the very center, there is a ring of neutrons,

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00:38:24,000 --> 00:38:29,000

such that perhaps at the very center, if you go through the bullseye,

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00:38:29,000 --> 00:38:32,000

you may go to perhaps another universe.

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Are we being visited by aliens?

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According to the most recent statistics, close to one out of two Americans think so.

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If UFOs are linked to these visits from outer space,

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00:38:43,000 --> 00:38:47,000

we can only marvel at their incredible discretion.

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History has shown that when two societies meet that are too far apart on the technological scale,

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00:38:52,000 --> 00:38:57,000

chaos ensues to the detriment of the more primitive society.

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Arthur C. Clarke once said,

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00:39:00,000 --> 00:39:05,000

whether intelligent life exists in outer space or whether it doesn't exist in outer space,

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00:39:05,000 --> 00:39:09,000

either thought is frightening.

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00:39:09,000 --> 00:39:13,000

If we are the only ones in the universe with intelligence, it's frightening,

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00:39:13,000 --> 00:39:15,000

because we're alone.

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00:39:15,000 --> 00:39:19,000

However, if we're not the only intelligent species on Earth,

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00:39:19,000 --> 00:39:24,000

then we are also frightened, because we wonder about their intentions.

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00:39:24,000 --> 00:39:31,000

Think about what happened when Cortez met Montezuma in Mexico City.

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The Aztecs were perhaps 500, perhaps a thousand years behind the technology of the West.

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00:39:38,000 --> 00:39:42,000

Cortez had gunpowder borrowed from the Chinese.

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He had horses.

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00:39:44,000 --> 00:39:50,000

He had a technology centuries, perhaps a thousand years, more advanced than the Aztecs.

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The Aztec civilization, which lasted perhaps 10,000 years since the last Ice Age,

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00:39:56,000 --> 00:40:00,000

collapsed in just a few months.

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That's what happens when two civilizations encounter each other,

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00:40:03,000 --> 00:40:07,000

when one civilization is more advanced by perhaps a few centuries,

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00:40:07,000 --> 00:40:10,000

but has malevolent designs.

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00:40:10,000 --> 00:40:15,000

I think that if a civilization that advanced, millions of years advanced,

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more advanced than ours were to meet ours, perhaps we would be ants to them.

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00:40:21,000 --> 00:40:26,000

If a 10-lane superhigh were being built next door, and there was an ant hill next to it,

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00:40:26,000 --> 00:40:29,000

what would the construction crew do?

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00:40:29,000 --> 00:40:31,000

They wouldn't even give it a thought.

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00:40:31,000 --> 00:40:34,000

They would simply pave the ant hill away.

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00:40:34,000 --> 00:40:37,000

My personal point of view is they're out there.

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In fact, many of my friends also believe they're out there.

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00:40:40,000 --> 00:40:44,000

What divides us is the question of whether or not they can reach us,

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00:40:44,000 --> 00:40:50,000

whether or not they can sail across millions of light years between different galaxies and star systems.

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However, most physicists believe in their heart of hearts.

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Yes, they're probably out there.

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And when they do encounter us, I hope that when the encounter is made,

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00:41:00,000 --> 00:41:03,000

an encounter of the third kind, that they are benevolent,

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00:41:03,000 --> 00:41:05,000

that they are type 3.

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00:41:05,000 --> 00:41:07,000

They are beyond planetary.

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00:41:07,000 --> 00:41:10,000

At the present time, we are type 0.

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We have all the sectarian, fundamentalist, racial hatreds coming from the swamp.

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00:41:16,000 --> 00:41:21,000

We are just barely out of the swamp with all the savagery of the swamp.

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00:41:21,000 --> 00:41:24,000

By the time we're type 1, we will become interesting.

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Civilized, a planetary civilization capable of working out their differences,

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00:41:30,000 --> 00:41:35,000

capable of being able to work out sectarian, nationalistic, regional differences.

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00:41:35,000 --> 00:41:41,000

By the time they are type 3, they will have had perhaps a million years

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00:41:41,000 --> 00:41:45,000

in which to sort out all their aggressive tendencies.

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00:41:45,000 --> 00:41:50,000

So I think that if we do encounter a type 3 civilization in outer space,

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it won't be like the encounter between Cortes and Montezuma.

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00:41:55,000 --> 00:41:57,000

Perhaps they will be benevolent.

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00:41:57,000 --> 00:42:01,000

Perhaps they will see intelligent life forms as precious.

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00:42:01,000 --> 00:42:06,000

The most precious commodity in the universe is consciousness and intelligence.

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00:42:08,000 --> 00:42:12,000

If extraterrestrial beings are visiting us, what do they want?

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00:42:12,000 --> 00:42:16,000

What interest could they possibly have in a civilization as primitive as ours?

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Nowadays, quantum physics is showing us a universe that is much more complex

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and dynamic than we thought.

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We no longer speak of a single universe, but rather multiple universes.

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00:42:28,000 --> 00:42:31,000

The speed of light is no longer an absolute value.

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It is a simple variable in an equation that is constantly changing.

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Scientists who have been discrediting UFO reports under the pretext

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00:42:38,000 --> 00:42:44,000

that alien visits are nothing more than a dream must now re-examine their arguments.

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While the data gathered today on UFOs does not conclusively support the theory

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of extraterrestrial visits more than any other theory,

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00:42:51,000 --> 00:42:55,000

science has not managed to exclude this possibility either.

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00:42:58,000 --> 00:43:02,000

We're aware that interstellar visits would require tools and means

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00:43:02,000 --> 00:43:05,000

far beyond any technology that we have here on Earth.

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00:43:05,000 --> 00:43:09,000

We would have to examine quantum physics,

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00:43:09,000 --> 00:43:12,000

reformulate the theory of general relativity,

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00:43:12,000 --> 00:43:16,000

and consider the possibility of traveling faster than the speed of light.

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00:43:16,000 --> 00:43:18,000

All of that is reasonable.

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00:43:18,000 --> 00:43:23,000

I'm certainly not going to sit here and tell you that science has gone as far as it can go,

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00:43:23,000 --> 00:43:28,000

that in a hundred years or a thousand years we won't know much more than we do now.

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00:43:28,000 --> 00:43:31,000

So it's just a question of means.

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00:43:31,000 --> 00:43:38,000

I think that if a civilization continues to survive and to develop over a long period of time,

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00:43:38,000 --> 00:43:42,000

it will eventually discover the means of interstellar travel.

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The question is, do many civilizations exist?

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00:43:47,000 --> 00:43:53,000

And do they have enough wisdom to continue to survive long enough to reach this point?

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00:43:53,000 --> 00:44:00,000

Earth has already launched two Voyager probes, which are now outside of our solar system.

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00:44:00,000 --> 00:44:06,000

And over the next tens of thousands of years, they'll be reaching stars other than our sun.

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00:44:06,000 --> 00:44:11,000

We're capable of sending out a small plaque with the drawing of a man and woman on it saying,

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00:44:11,000 --> 00:44:18,000

hi, we're here. Will it end up in the right place? It's doubtful.

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00:44:18,000 --> 00:44:22,000

There's a very small probability of it happening.

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00:44:22,000 --> 00:44:29,000

We're still not ready to build crafts capable of carrying an entire ecosystem on board for interstellar travel.

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Trips such as those would require extreme speeds, which we're thousands of years away from achieving.

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00:44:36,000 --> 00:44:41,000

The ship would need to have an entire ecosystem, including agriculture.

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00:44:41,000 --> 00:44:49,000

It would be a bit like putting Montreal Island into orbit with its entire population, which would continue to reproduce.

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00:44:49,000 --> 00:44:53,000

We're not there yet, but we might be someday.

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00:44:53,000 --> 00:45:02,000

If we're still a viable civilization in 10,000 years in human and technological terms, then why not?

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00:45:06,000 --> 00:45:11,000

We're still a viable civilization in 10,000 years in human and technological terms.

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00:45:11,000 --> 00:45:16,000

We're still a viable civilization in 10,000 years in human and technological terms.

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00:45:16,000 --> 00:45:21,000

We're still a viable civilization in 10,000 years in human and technological terms.

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00:45:21,000 --> 00:45:26,000

We're still a viable civilization in 10,000 years in human and technological terms.

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00:45:26,000 --> 00:45:31,000

We're still a viable civilization in 10,000 years in human and technological terms.

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00:45:31,000 --> 00:45:36,000

Music

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00:45:36,000 --> 00:45:41,000

Music

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00:45:41,000 --> 00:45:46,000

Music

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00:45:46,000 --> 00:45:51,000

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00:45:51,000 --> 00:45:56,000

Music

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00:45:56,000 --> 00:46:01,000

Music

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00:46:01,000 --> 00:46:06,000

Music

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00:46:06,000 --> 00:46:11,000

Music

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00:46:11,000 --> 00:46:16,000

Music

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00:46:16,000 --> 00:46:21,000

Music

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00:46:21,000 --> 00:46:26,000

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00:46:26,000 --> 00:46:31,000

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00:46:31,000 --> 00:46:33,000

Music