



Ask An Astrobiologist



EPISODE 27: DECEMBER 10<sup>TH</sup>, 2019

**DR. SUSAN SCHNEIDER**



**Astrobiology Program**

1  
00:00:00,690 --> 00:00:28,880

[Music]

2  
00:00:35,310 --> 00:00:32,190

greetings to our friends of astrobiology

3  
00:00:37,170 --> 00:00:35,320

and welcome to ask an astrobiologist the

4  
00:00:38,880 --> 00:00:37,180

show that celebrates the science and the

5  
00:00:41,940 --> 00:00:38,890

scientists involved in the realm of

6  
00:00:44,600 --> 00:00:41,950

astrobiology and today we're going a bit

7  
00:00:46,830 --> 00:00:44,610

beyond that even into the philosophy of

8  
00:00:48,360 --> 00:00:46,840

astrobiology but before we get to

9  
00:00:50,369 --> 00:00:48,370

today's guests and have an awesome

10  
00:00:52,229 --> 00:00:50,379

conversation in that round we have some

11  
00:00:54,960 --> 00:00:52,239

of our fun little things that we do

12  
00:00:57,990 --> 00:00:54,970

every month for starters we have our

13  
00:00:59,880 --> 00:00:58,000

background quiz so as our longtime

14

00:01:02,460 --> 00:00:59,890

viewers know we have a picture behind

15

00:01:04,829 --> 00:01:02,470

our host every single month like this

16

00:01:06,840 --> 00:01:04,839

wonderful picture behind me and it's up

17

00:01:09,600 --> 00:01:06,850

to you in the next month to guess what

18

00:01:11,730 --> 00:01:09,610

that image is so right now our producer

19

00:01:14,130 --> 00:01:11,740

and director Mike Toyota's gonna put up

20

00:01:16,649 --> 00:01:14,140

last month's picture onto the screen and

21

00:01:18,990 --> 00:01:16,659

your job was to guess what this image is

22

00:01:22,050 --> 00:01:19,000

showing that's actually fortescue falls

23

00:01:24,750 --> 00:01:22,060

in Western Australia in karijini

24

00:01:27,990 --> 00:01:24,760

national park you can see red staining

25

00:01:30,510 --> 00:01:28,000

of iron rich and oxide rich materials

26  
00:01:32,970 --> 00:01:30,520  
around the outside of that Canyon where

27  
00:01:34,950 --> 00:01:32,980  
waterfalls are flowing down this is part

28  
00:01:37,200 --> 00:01:34,960  
of an region that has a lot of banded

29  
00:01:39,780 --> 00:01:37,210  
iron formations these iron-rich

30  
00:01:42,900 --> 00:01:39,790  
structures that teach us a lot about the

31  
00:01:45,390 --> 00:01:42,910  
ancient history of the earth so we had

32  
00:01:49,140 --> 00:01:45,400  
several right guesses but this month our

33  
00:01:53,010 --> 00:01:49,150  
winner is Ben javi Dao or at beam javi

34  
00:01:55,670 --> 00:01:53,020  
Dao on Twitter and our winners always

35  
00:01:57,960 --> 00:01:55,680  
get some NASA stickers and some of our

36  
00:01:59,880 --> 00:01:57,970  
astrobiology graphic history books from

37  
00:02:02,810 --> 00:01:59,890  
last month's guest Aaron Gronstal

38  
00:02:05,490 --> 00:02:02,820

so congratulations for Ben ha for that

39

00:02:07,980 --> 00:02:05,500

also we like to celebrate our friends

40

00:02:10,259 --> 00:02:07,990

out there who share on Twitter and

41

00:02:11,570 --> 00:02:10,269

Facebook and Instagram and LinkedIn and

42

00:02:14,460 --> 00:02:11,580

read it in all these awesome places

43

00:02:17,040 --> 00:02:14,470

about our show about our guests and the

44

00:02:19,530 --> 00:02:17,050

awesome work they do so this month our

45

00:02:23,130 --> 00:02:19,540

ambassador of the month was actually

46

00:02:25,410 --> 00:02:23,140

doing a Roker or a rotating curation of

47

00:02:28,619 --> 00:02:25,420

an account called space of people on

48

00:02:32,460 --> 00:02:28,629

Twitter that user is Sara McIntyre or

49

00:02:34,979 --> 00:02:32,470

@xo bio Explorer so Sara thank you so

50

00:02:36,330 --> 00:02:34,989

much for doing all of your hard work for

51  
00:02:39,240 --> 00:02:36,340  
sharing so much awesome stuff about

52  
00:02:41,800 --> 00:02:39,250  
space and exoplanets at people of space

53  
00:02:43,990 --> 00:02:41,810  
and for being such a cool friend

54  
00:02:46,750 --> 00:02:44,000  
our show we really really appreciate it

55  
00:02:49,270 --> 00:02:46,760  
now with that out of the way I have the

56  
00:02:53,140 --> 00:02:49,280  
awesome chance to introduce this month's

57  
00:02:55,840 --> 00:02:53,150  
guests dr. Susan Schneider is joining us

58  
00:02:58,150 --> 00:02:55,850  
she is the current NASA Barret Bloomberg

59  
00:03:00,520 --> 00:02:58,160  
chair in astrobiology at the Library of

60  
00:03:02,559 --> 00:03:00,530  
Congress an associate professor of

61  
00:03:05,350 --> 00:03:02,569  
philosophy and cognitive science at

62  
00:03:08,760 --> 00:03:05,360  
UConn and also the director of the AI

63  
00:03:11,470 --> 00:03:08,770

mind and society or Ames group at UConn

64

00:03:13,870 --> 00:03:11,480

you've seen her before in talks like at

65

00:03:16,120 --> 00:03:13,880

TEDx and Google talks she's one on other

66

00:03:18,250 --> 00:03:16,130

podcasts and shows like star talk radio

67

00:03:19,870 --> 00:03:18,260

she's written in New York Times and

68

00:03:21,759 --> 00:03:19,880

Scientific American and have several

69

00:03:23,710 --> 00:03:21,769

awesome books out there and I'm really

70

00:03:25,900 --> 00:03:23,720

really excited for our conversation

71

00:03:28,660 --> 00:03:25,910

today so dr. Schneider thank you for

72

00:03:31,210 --> 00:03:28,670

joining ask an astrobiologist thanks for

73

00:03:32,440 --> 00:03:31,220

having me yeah it's great that you could

74

00:03:34,870 --> 00:03:32,450

join us and like I said when we first

75

00:03:37,020 --> 00:03:34,880

started off here normally our show is

76

00:03:38,979 --> 00:03:37,030

about the science and scientists of

77

00:03:41,559 --> 00:03:38,989

astrobiology but that was as you pointed

78

00:03:42,699 --> 00:03:41,569

out on Facebook and other places you're

79

00:03:44,170 --> 00:03:42,709

you don't consider yourself an

80

00:03:46,780 --> 00:03:44,180

astrobiologist but actually a

81

00:03:53,229 --> 00:03:46,790

philosopher right well that's what my

82

00:03:54,610 --> 00:03:53,239

PhD is in awesome I love it I mean we're

83

00:03:56,350 --> 00:03:54,620

gonna continue consider you an

84

00:03:58,509 --> 00:03:56,360

astrobiologist because you are the chair

85

00:04:00,069 --> 00:03:58,519

of astrobiology at the LSE

86

00:04:02,590 --> 00:04:00,079

and you considered astrobiology which is

87

00:04:05,350 --> 00:04:02,600

pretty awesome I love astrobiology I've

88

00:04:08,319 --> 00:04:05,360

been having so much fun and the chair at

89

00:04:12,580 --> 00:04:08,329

the Library of Congress allows for

90

00:04:15,009 --> 00:04:12,590

people who are philosophers you know and

91

00:04:18,009 --> 00:04:15,019

cognitive scientists people in any kind

92

00:04:20,620 --> 00:04:18,019

of field to get involved I love it yeah

93

00:04:22,300 --> 00:04:20,630

and I think sometimes people some of our

94

00:04:24,670 --> 00:04:22,310

fans of our show for instance who want

95

00:04:26,580 --> 00:04:24,680

to become astrobiologists they think

96

00:04:28,960 --> 00:04:26,590

they have to get there by going through

97

00:04:31,360 --> 00:04:28,970

traditional science degrees in chemistry

98

00:04:33,610 --> 00:04:31,370

or biology or physics but there's also

99

00:04:35,920 --> 00:04:33,620

many other ways in philosophy and other

100

00:04:37,930 --> 00:04:35,930

directions you can be involved in the

101  
00:04:39,520 --> 00:04:37,940  
realm of astrobiology so it's so cool to

102  
00:04:44,020 --> 00:04:39,530  
have you as the chair of astrobiology

103  
00:04:46,180 --> 00:04:44,030  
currently I was lucky because a few

104  
00:04:48,850 --> 00:04:46,190  
years ago NASA gave me a lot of training

105  
00:04:50,529 --> 00:04:48,860  
in astrobiology so you know if people do

106  
00:04:52,719 --> 00:04:50,539  
want to go the astrobiology route I

107  
00:04:55,480 --> 00:04:52,729  
think they do need a ton of science

108  
00:04:57,610 --> 00:04:55,490  
classes but the philosophy

109  
00:05:01,090 --> 00:04:57,620  
it's a lot of fun and I think a lot of

110  
00:05:03,520 --> 00:05:01,100  
the issues that are raised for instance

111  
00:05:06,640 --> 00:05:03,530  
Fermi paradox the question of how we

112  
00:05:10,809 --> 00:05:06,650  
would detect life do connect up with

113  
00:05:12,370 --> 00:05:10,819

issues in philosophy so absolutely yeah

114

00:05:14,260 --> 00:05:12,380

and I think for myself in my own

115

00:05:15,790 --> 00:05:14,270

training as a scientist I took many

116

00:05:17,620 --> 00:05:15,800

classes in philosophy and read a lot of

117

00:05:19,510 --> 00:05:17,630

works in philosophy and I think that

118

00:05:21,339 --> 00:05:19,520

really helped kind of with myself just

119

00:05:23,589 --> 00:05:21,349

gauging the questions I was asking as a

120

00:05:25,059 --> 00:05:23,599

scientist and I know that there are

121

00:05:26,710 --> 00:05:25,069

there are many many philosophers who are

122

00:05:29,080 --> 00:05:26,720

now getting involved in astrobiology in

123

00:05:30,850 --> 00:05:29,090

various ways from asking questions like

124

00:05:32,800 --> 00:05:30,860

can we define life or like you said you

125

00:05:34,029 --> 00:05:32,810

know asking the Fermi paradox and trying

126  
00:05:37,150 --> 00:05:34,039  
to find answers to some of these larger

127  
00:05:39,100 --> 00:05:37,160  
questions yeah that's right it's

128  
00:05:41,589 --> 00:05:39,110  
exciting to see that productive

129  
00:05:43,540 --> 00:05:41,599  
interdisciplinary interaction I found

130  
00:05:46,480 --> 00:05:43,550  
after biologists wonderfully

131  
00:05:49,420 --> 00:05:46,490  
interdisciplinary I thought it's awesome

132  
00:05:52,390 --> 00:05:49,430  
I'm so excited and stoked I have to

133  
00:05:54,879 --> 00:05:52,400  
admit I read and listened to artificial

134  
00:05:56,260 --> 00:05:54,889  
you your most recent book and there's so

135  
00:05:58,059 --> 00:05:56,270  
much from that book that I really really

136  
00:06:00,040 --> 00:05:58,069  
want to talk about but before we get

137  
00:06:02,439 --> 00:06:00,050  
there I'd love for our audience to hear

138  
00:06:05,050 --> 00:06:02,449

a little bit if you could about your

139

00:06:08,159 --> 00:06:05,060

early life and education and what what

140

00:06:13,290 --> 00:06:08,169

took you towards becoming a philosopher

141

00:06:16,959 --> 00:06:13,300

yeah I had a sort of unusual route I

142

00:06:19,420 --> 00:06:16,969

went to UC Berkeley because I grew up in

143

00:06:24,370 --> 00:06:19,430

Northern California and I loved the

144

00:06:27,010 --> 00:06:24,380

campus and I majored a very practical

145

00:06:32,520 --> 00:06:27,020

field probably because of my family

146

00:06:40,180 --> 00:06:32,530

background I was an economics major and

147

00:06:43,270 --> 00:06:40,190

so um I went to Eastern Europe to do a

148

00:06:47,770 --> 00:06:43,280

year abroad at the crow Marx University

149

00:06:50,050 --> 00:06:47,780

of Economics in Budapest Hungary so that

150

00:06:52,890 --> 00:06:50,060

was part of the Eastern Bloc and that

151  
00:06:55,480 --> 00:06:52,900  
was so intriguing because we had

152  
00:06:57,100 --> 00:06:55,490  
basically a lot of professors interested

153  
00:06:58,770 --> 00:06:57,110  
in philosophy who had been banned from

154  
00:07:01,180 --> 00:06:58,780  
teaching the Hungarians

155  
00:07:03,939 --> 00:07:01,190  
because of their views because you know

156  
00:07:06,430 --> 00:07:03,949  
under communism the only philosophy you

157  
00:07:08,890 --> 00:07:06,440  
ever read was that which was written by

158  
00:07:11,830 --> 00:07:08,900  
Marx and Engels right

159  
00:07:14,170 --> 00:07:11,840  
yeah no kidding it's like the philosophy

160  
00:07:16,360 --> 00:07:14,180  
underground we read people like Michel

161  
00:07:19,930 --> 00:07:16,370  
Foucault Frederick Nietzsche and then

162  
00:07:21,310 --> 00:07:19,940  
sociologists like Erving Goffman and at

163  
00:07:23,170 --> 00:07:21,320

the same time I was doing work in

164

00:07:28,270 --> 00:07:23,180

economics with people who were doing the

165

00:07:30,640 --> 00:07:28,280

five-year plans over there and anyway so

166

00:07:32,800 --> 00:07:30,650

if I'm really into philosophy and then I

167

00:07:34,540 --> 00:07:32,810

went back to UC Berkeley and it turned

168

00:07:37,120 --> 00:07:34,550

out that they have a really good

169

00:07:42,100 --> 00:07:37,130

philosophy program and so I started

170

00:07:45,550 --> 00:07:42,110

working with philosophers in different

171

00:07:48,220 --> 00:07:45,560

areas and my interest just over the time

172

00:07:50,320 --> 00:07:48,230

became interest in the boundary between

173

00:07:53,260 --> 00:07:50,330

science and philosophy and also the

174

00:07:55,030 --> 00:07:53,270

boundary between science and value sort

175

00:07:57,970 --> 00:07:55,040

of understanding the scope and limits of

176  
00:08:00,280 --> 00:07:57,980  
human knowledge understanding what we

177  
00:08:03,490 --> 00:08:00,290  
can't justify from within the realm of

178  
00:08:06,760 --> 00:08:03,500  
science versus what we could discuss in

179  
00:08:10,210 --> 00:08:06,770  
the realm of philosophy and so it was

180  
00:08:13,630 --> 00:08:10,220  
natural for me when a few years ago I

181  
00:08:15,940 --> 00:08:13,640  
learned of an interesting program that

182  
00:08:17,890 --> 00:08:15,950  
NASA was putting on to try to get people

183  
00:08:21,250 --> 00:08:17,900  
into astrobiology from different

184  
00:08:24,250 --> 00:08:21,260  
disciplines and it was near my house and

185  
00:08:26,020 --> 00:08:24,260  
so the center theological inquiry was

186  
00:08:29,460 --> 00:08:26,030  
kind enough to host me for two years and

187  
00:08:31,780 --> 00:08:29,470  
they brought in all these amazing

188  
00:08:33,610 --> 00:08:31,790

astrobiologists you know working on a

189

00:08:35,800 --> 00:08:33,620

range of topics

190

00:08:39,810 --> 00:08:35,810

you know life on how do you find life on

191

00:08:43,690 --> 00:08:39,820

other planets you know issues involving

192

00:08:45,550 --> 00:08:43,700

synthetic biology you know and so I

193

00:08:46,900 --> 00:08:45,560

really got involved in those debates I

194

00:08:49,380 --> 00:08:46,910

got involved pretty quickly because

195

00:08:50,950 --> 00:08:49,390

there were so many philosophical issues

196

00:08:53,530 --> 00:08:50,960

that's awesome

197

00:08:55,270 --> 00:08:53,540

and one think great thing in the field

198

00:08:56,710 --> 00:08:55,280

of astrobiology is we have so many

199

00:08:59,050 --> 00:08:56,720

people coming from these different areas

200

00:09:00,400 --> 00:08:59,060

we need common language to speak to each

201  
00:09:02,170 --> 00:09:00,410  
other and a lot of times that comes down

202  
00:09:03,790 --> 00:09:02,180  
to how we actually ask our questions how

203  
00:09:06,070 --> 00:09:03,800  
we share our knowledge and a lot of that

204  
00:09:07,750 --> 00:09:06,080  
comes from philosophy and in

205  
00:09:09,520 --> 00:09:07,760  
astrobiology then we have this issue of

206  
00:09:12,040 --> 00:09:09,530  
like what is life you know trying to

207  
00:09:15,370 --> 00:09:12,050  
define life you've spent a lot of time

208  
00:09:16,270 --> 00:09:15,380  
studying the mind and the self and some

209  
00:09:18,340 --> 00:09:16,280  
of these questions of what is

210  
00:09:19,990 --> 00:09:18,350  
consciousness which just like the

211  
00:09:22,510 --> 00:09:20,000  
question of what is life is kind of a

212  
00:09:25,000 --> 00:09:22,520  
nebulous realm that we really don't have

213  
00:09:26,770 --> 00:09:25,010

great explanation for I wonder if you

214

00:09:28,060 --> 00:09:26,780

could speak just for a moment about some

215

00:09:31,000 --> 00:09:28,070

of your work in that realm of trying to

216

00:09:35,580 --> 00:09:31,010

understand what consciousness is yeah

217

00:09:37,930 --> 00:09:35,590

it's so vexing right and like

218

00:09:39,760 --> 00:09:37,940

astrobiology the quest to understand

219

00:09:43,900 --> 00:09:39,770

consciousness is asking about mike's

220

00:09:46,690 --> 00:09:43,910

ultimate questions right why are we here

221

00:09:50,310 --> 00:09:46,700

well consciousness is the belt quality

222

00:09:53,310 --> 00:09:50,320

of experience right so when you're

223

00:09:56,200 --> 00:09:53,320

selling your Roma your espresso shots

224

00:09:59,650 --> 00:09:56,210

when you're hearing your dog bark these

225

00:10:04,030 --> 00:09:59,660

are inner experiences my dogs gonna go

226

00:10:07,210 --> 00:10:04,040

off Sue and start barking by the way he

227

00:10:10,060 --> 00:10:07,220

looks happy to be you right and no one

228

00:10:11,500 --> 00:10:10,070

can jump inside of your head and know

229

00:10:14,200 --> 00:10:11,510

exactly what it feels like to be you

230

00:10:17,200 --> 00:10:14,210

similarly we assume other people have

231

00:10:19,180 --> 00:10:17,210

feelings it feels like something to be

232

00:10:22,030 --> 00:10:19,190

there so consciousness is that felt

233

00:10:24,610 --> 00:10:22,040

quality of experience and it's natural

234

00:10:26,560 --> 00:10:24,620

to believe that non-human animals like

235

00:10:28,510 --> 00:10:26,570

our dogs and cats and you know it's hard

236

00:10:30,880 --> 00:10:28,520

sometimes to know we're in the animal

237

00:10:33,640 --> 00:10:30,890

kingdom consciousness begins probably

238

00:10:36,250 --> 00:10:33,650

gradual you know we can't find a firm

239

00:10:37,930 --> 00:10:36,260

place but we have a sense that it feels

240

00:10:40,540 --> 00:10:37,940

like something to be a nonhuman animal

241

00:10:44,130 --> 00:10:40,550

as well and in a similar way maybe it

242

00:10:46,090 --> 00:10:44,140

feels like something to be an alien it's

243

00:10:48,040 --> 00:10:46,100

it's a good question right because we

244

00:10:50,440 --> 00:10:48,050

don't know when we first meet aliens if

245

00:10:52,480 --> 00:10:50,450

we meet alien life what they're going to

246

00:10:54,610 --> 00:10:52,490

be like and whether or not they kind of

247

00:10:56,320 --> 00:10:54,620

have the same kind of experiences and

248

00:10:58,810 --> 00:10:56,330

feelings and understandings of their

249

00:11:00,610 --> 00:10:58,820

place in the cosmos as we do and for

250

00:11:03,880 --> 00:11:00,620

some people that becomes very terrifying

251  
00:11:05,830 --> 00:11:03,890  
very quickly and so you've also worked a

252  
00:11:07,300 --> 00:11:05,840  
lot in what the future of our species

253  
00:11:09,220 --> 00:11:07,310  
might be what the future of other

254  
00:11:11,530 --> 00:11:09,230  
biological species might be with regard

255  
00:11:13,720 --> 00:11:11,540  
to artificial intelligence super

256  
00:11:16,300 --> 00:11:13,730  
intelligence post biological beings and

257  
00:11:19,240 --> 00:11:16,310  
so I love first a little while to chat

258  
00:11:21,520 --> 00:11:19,250  
about some of those ideas do you think

259  
00:11:25,840 --> 00:11:21,530  
it's it's most likely that alien life

260  
00:11:29,260 --> 00:11:25,850  
would be post biological well the way

261  
00:11:31,510 --> 00:11:29,270  
that question was dispraise I probably

262  
00:11:35,129 --> 00:11:31,520  
say no but I'll tell you why okay and

263  
00:11:39,389 --> 00:11:35,139

then you'll be a guess answer coming up

264

00:11:41,249 --> 00:11:39,399

I think alien life that we find and most

265

00:11:44,639 --> 00:11:41,259

alien life out there will probably be

266

00:11:46,319 --> 00:11:44,649

like microbial so it won't be anything

267

00:11:48,809 --> 00:11:46,329

at the level of intellectual

268

00:11:52,319 --> 00:11:48,819

sophistication to where it will kind of

269

00:11:57,349 --> 00:11:52,329

become hosts biological but now here's

270

00:12:00,599 --> 00:11:57,359

where we get to the yes so the post that

271

00:12:04,259 --> 00:12:00,609

civilizations do emerge throughout the

272

00:12:06,840 --> 00:12:04,269

universe so you know assume that life

273

00:12:09,359 --> 00:12:06,850

gets started a lot and that

274

00:12:11,400 --> 00:12:09,369

civilizations are capable of surviving

275

00:12:13,319 --> 00:12:11,410

their technological maturity now of

276

00:12:16,829 --> 00:12:13,329

course that's a big issue right and we

277

00:12:18,299 --> 00:12:16,839

already see potential existential risks

278

00:12:20,009 --> 00:12:18,309

with nuclear weapons

279

00:12:22,590 --> 00:12:20,019

global warming maybe that's just a

280

00:12:25,590 --> 00:12:22,600

catastrophic risk but you know on earth

281

00:12:27,689 --> 00:12:25,600

we see a lot of issues it may be that

282

00:12:30,509 --> 00:12:27,699

civilizations inevitably do stupid

283

00:12:34,739 --> 00:12:30,519

things and don't survive sorry to be

284

00:12:38,039 --> 00:12:34,749

grim but if civilizations do survive

285

00:12:41,639 --> 00:12:38,049

their technological maturity and if life

286

00:12:44,699 --> 00:12:41,649

really is common out there right it may

287

00:12:46,409 --> 00:12:44,709

be that those civilizations are starting

288

00:12:48,150 --> 00:12:46,419

to develop their own computers and

289

00:12:50,069 --> 00:12:48,160

they're starting to enhance their own

290

00:12:52,499 --> 00:12:50,079

brains in radical ways so that they're

291

00:12:55,619 --> 00:12:52,509

augmenting their intelligence or it

292

00:13:00,289 --> 00:12:55,629

could be that the AIS they create

293

00:13:03,269 --> 00:13:00,299

eventually supplant them in these cases

294

00:13:07,019 --> 00:13:03,279

intelligent life tends to become most

295

00:13:09,479 --> 00:13:07,029

biological so here's my plan now to be

296

00:13:12,569 --> 00:13:09,489

very careful about my plan the most

297

00:13:15,569 --> 00:13:12,579

intelligent alien civilizations if they

298

00:13:17,609 --> 00:13:15,579

truly exist they will be post biological

299

00:13:21,689 --> 00:13:17,619

that's because I think that AI could

300

00:13:24,419 --> 00:13:21,699

outthink biological life-forms no

301  
00:13:25,919 --> 00:13:24,429  
intriguing yeah Fletcher put that up too

302  
00:13:28,079 --> 00:13:25,929  
because you know a lot of folks know of

303  
00:13:29,789 --> 00:13:28,089  
the Drake Equation for instance and we

304  
00:13:32,159 --> 00:13:29,799  
have this factor that I think is really

305  
00:13:34,109 --> 00:13:32,169  
educational for a lot of people that

306  
00:13:36,779 --> 00:13:34,119  
gives us an idea of the length of time

307  
00:13:38,939 --> 00:13:36,789  
that civilizations persist that they

308  
00:13:40,679 --> 00:13:38,949  
could be communicating via radio contact

309  
00:13:43,259 --> 00:13:40,689  
which is what the Drake Equation was

310  
00:13:44,879 --> 00:13:43,269  
initially for but so few of us ever

311  
00:13:47,039 --> 00:13:44,889  
considered that length of time to be

312  
00:13:48,350 --> 00:13:47,049  
also limited not just by a civilization

313  
00:13:49,730 --> 00:13:48,360

destroying itself

314

00:13:51,710 --> 00:13:49,740

so a civilization becoming post

315

00:13:53,960 --> 00:13:51,720

biological or developing artificial

316

00:13:55,579 --> 00:13:53,970

intelligence or changing from being a

317

00:13:58,310 --> 00:13:55,589

biological intelligence to becoming

318

00:14:00,769 --> 00:13:58,320

something other so that's really really

319

00:14:03,920 --> 00:14:00,779

intriguing you bring that up you know to

320

00:14:07,790 --> 00:14:03,930

give credit it's due here Steven dick

321

00:14:10,100 --> 00:14:07,800

who was I believe one of the first NASA

322

00:14:11,960 --> 00:14:10,110

chairs in astrobiology has made this

323

00:14:15,139 --> 00:14:11,970

point he calls with the short window

324

00:14:17,150 --> 00:14:15,149

observation right so you know you only

325

00:14:19,100 --> 00:14:17,160

have this very short window before a

326

00:14:22,190 --> 00:14:19,110

civilization from the time say they're

327

00:14:24,650 --> 00:14:22,200

turning on their radios and whatnot to

328

00:14:27,350 --> 00:14:24,660

the time at which they become hosts

329

00:14:31,730 --> 00:14:27,360

biological of course that assumes that

330

00:14:35,269 --> 00:14:31,740

life is really out there I mean you know

331

00:14:37,579 --> 00:14:35,279

I hope it is I think I think many of us

332

00:14:39,530 --> 00:14:37,589

here watching as well are very hopeful

333

00:14:40,970 --> 00:14:39,540

we grew up dreaming you know and

334

00:14:42,500 --> 00:14:40,980

watching a science fiction and wondering

335

00:14:44,540 --> 00:14:42,510

are we are we alone is there something

336

00:14:47,030 --> 00:14:44,550

out there and and trying to guess what

337

00:14:48,500 --> 00:14:47,040

it might be like and you actually don't

338

00:14:50,360 --> 00:14:48,510

know a lot that in studying philosophy

339

00:14:52,519 --> 00:14:50,370

and science fiction as well and some of

340

00:14:54,710 --> 00:14:52,529

these ideas we presented to ourselves

341

00:14:56,060 --> 00:14:54,720

what's possible I understand that you

342

00:14:59,560 --> 00:14:56,070

also wrote a book on philosophy and

343

00:15:02,530 --> 00:14:59,570

science fiction oh yeah when I was a

344

00:15:05,420 --> 00:15:02,540

graduate student I was teaching classes

345

00:15:07,689 --> 00:15:05,430

on that topic my students loved the

346

00:15:10,639 --> 00:15:07,699

class and so I did an anthology on and

347

00:15:12,590 --> 00:15:10,649

it's you know they put out new editions

348

00:15:15,740 --> 00:15:12,600

a lot because a lot of people still

349

00:15:18,710 --> 00:15:15,750

assign it and what I do is I blended

350

00:15:21,590 --> 00:15:18,720

together pieces by famous science

351

00:15:25,400 --> 00:15:21,600

fiction writers like Isaac Asimov and

352

00:15:28,040 --> 00:15:25,410

others and then I paired it up with a

353

00:15:32,050 --> 00:15:28,050

bunch of kind of papers and philosophy

354

00:15:34,910 --> 00:15:32,060

some in astrobiology some I wrote and

355

00:15:36,920 --> 00:15:34,920

you know it's fun it's a good route in I

356

00:15:39,560 --> 00:15:36,930

think you would technical common

357

00:15:41,750 --> 00:15:39,570

languages well I think science fiction

358

00:15:44,540 --> 00:15:41,760

is the kind of lingua franca with a lot

359

00:15:46,759 --> 00:15:44,550

of you know philosophers and in

360

00:15:49,610 --> 00:15:46,769

scientists so it's really easy to get

361

00:15:51,290 --> 00:15:49,620

started talking about issues of common

362

00:15:54,590 --> 00:15:51,300

interests we were able to just point to

363

00:15:55,759 --> 00:15:54,600

a film very quickly or you know a short

364

00:15:58,189 --> 00:15:55,769

story or something

365

00:15:59,600 --> 00:15:58,199

you know absolutely and when I was a

366

00:16:01,520 --> 00:15:59,610

student here at the University Colorado

367

00:16:03,920 --> 00:16:01,530

where I'm broadcasting from right now

368

00:16:05,660 --> 00:16:03,930

one of my favorite classes it wasn't

369

00:16:07,520 --> 00:16:05,670

planetary geology or biochemistry

370

00:16:09,020 --> 00:16:07,530

related my favorite course was a

371

00:16:11,060 --> 00:16:09,030

philosophy and science fiction course

372

00:16:12,320 --> 00:16:11,070

that we had here and kind of delving

373

00:16:14,120 --> 00:16:12,330

into some of these more philosophical

374

00:16:16,190 --> 00:16:14,130

issues and things that I thought about a

375

00:16:17,360 --> 00:16:16,200

lot and one thing in that course I'd

376

00:16:19,910 --> 00:16:17,370

like to bring up that that I thought

377

00:16:21,460 --> 00:16:19,920

about was was Frankenstein and Mary

378

00:16:24,440 --> 00:16:21,470

Shelley's Frankenstein which she

379

00:16:26,540 --> 00:16:24,450

subtitled the modern Prometheus we have

380

00:16:28,610 --> 00:16:26,550

this character of Victor Frankenstein he

381

00:16:31,130 --> 00:16:28,620

creates his creature and then it becomes

382

00:16:33,140 --> 00:16:31,140

the destruction of his life because he

383

00:16:35,540 --> 00:16:33,150

gave that creature the spark of fire the

384

00:16:37,940 --> 00:16:35,550

spark of life but didn't give it the

385

00:16:40,340 --> 00:16:37,950

love and the compassion and give it

386

00:16:42,080 --> 00:16:40,350

understanding of what it was and I

387

00:16:43,850 --> 00:16:42,090

wonder if in some way that relates to

388

00:16:46,580 --> 00:16:43,860

what we're looking at for the future

389

00:16:47,750 --> 00:16:46,590

with AI right now a lot of people who

390

00:16:49,160 --> 00:16:47,760

are worried about artificial

391

00:16:52,160 --> 00:16:49,170

intelligence in the future for our

392

00:16:55,430 --> 00:16:52,170

species are worried that if we don't do

393

00:16:57,800 --> 00:16:55,440

the work now to code in some level of

394

00:17:00,350 --> 00:16:57,810

morality or love or respect or

395

00:17:02,720 --> 00:17:00,360

understanding that kind of relates back

396

00:17:05,929 --> 00:17:02,730

to what we are as humans that we might

397

00:17:07,130 --> 00:17:05,939

lose control of that AI how often is

398

00:17:11,449 --> 00:17:07,140

that really discussed in the philosophy

399

00:17:14,990 --> 00:17:11,459

realm well I think it's discussed a lot

400

00:17:17,780 --> 00:17:15,000

now there was a book by me boström

401  
00:17:19,840 --> 00:17:17,790  
called super intelligence it came out

402  
00:17:23,960 --> 00:17:19,850  
about I think it's about four years ago

403  
00:17:25,370 --> 00:17:23,970  
that really raised these issues in a

404  
00:17:26,870 --> 00:17:25,380  
very public way it became a New York

405  
00:17:29,510 --> 00:17:26,880  
Times bestseller and really he was

406  
00:17:31,940 --> 00:17:29,520  
drawing from work by a lot of people

407  
00:17:35,330 --> 00:17:31,950  
that had been done over the last decade

408  
00:17:37,280 --> 00:17:35,340  
and one of the big issues that people

409  
00:17:40,000 --> 00:17:37,290  
worry about is the control problem and

410  
00:17:42,650 --> 00:17:40,010  
that's the problem it should we create

411  
00:17:44,810 --> 00:17:42,660  
human level intelligence or even

412  
00:17:48,260 --> 00:17:44,820  
intelligence it's not exactly like us

413  
00:17:50,390 --> 00:17:48,270

but you know is intellectually

414

00:17:53,330 --> 00:17:50,400

sophisticated it could be that it

415

00:17:56,450 --> 00:17:53,340

quickly surpasses us and becomes super

416

00:17:57,830 --> 00:17:56,460

intelligent which is the name for a

417

00:17:59,840 --> 00:17:57,840

hypothetical form of artificial

418

00:18:01,940 --> 00:17:59,850

intelligence that outsmarts us in every

419

00:18:04,340 --> 00:18:01,950

respect and then we'll lose control of

420

00:18:07,730 --> 00:18:04,350

it because obviously if it's super

421

00:18:09,110 --> 00:18:07,740

intelligent it's already thought of the

422

00:18:11,120 --> 00:18:09,120

different ways that we'll try to control

423

00:18:13,580 --> 00:18:11,130

it and so what you want to do is try to

424

00:18:15,379 --> 00:18:13,590

from the get-go

425

00:18:18,169 --> 00:18:15,389

you know create our

426

00:18:21,889 --> 00:18:18,179

official intelligent systems that are

427

00:18:24,139 --> 00:18:21,899

human friendly and there's \$90 going

428

00:18:26,749 --> 00:18:24,149

into the creation of human friendly AI

429

00:18:29,690 --> 00:18:26,759

it's tricky it's really tricky I mean

430

00:18:31,729 --> 00:18:29,700

you know just consider a bit ethicists

431

00:18:35,839 --> 00:18:31,739

don't even agree on what the correct

432

00:18:39,440 --> 00:18:35,849

ethical system is so if you want to code

433

00:18:40,940 --> 00:18:39,450

in rules which ones do you use and of

434

00:18:43,339 --> 00:18:40,950

course since the system super

435

00:18:45,019 --> 00:18:43,349

intelligent it's gonna just like rewrite

436

00:18:47,569 --> 00:18:45,029

them in fact it's gonna be rewriting

437

00:18:49,909 --> 00:18:47,579

itself it'll have what are called

438

00:18:52,069 --> 00:18:49,919

recursive self-improvement algorithms

439

00:18:54,079 --> 00:18:52,079

it'll be changing its architecture

440

00:18:56,269 --> 00:18:54,089

potentially in very fundamental ways and

441

00:18:59,629 --> 00:18:56,279

so you know you might think we'll just

442

00:19:01,969 --> 00:18:59,639

kind of give it give it like a childhood

443

00:19:04,009 --> 00:19:01,979

and see what it comes up with I mean

444

00:19:08,539 --> 00:19:04,019

it's a different strategies were being

445

00:19:11,839 --> 00:19:08,549

utilized right now is moving very

446

00:19:14,899 --> 00:19:11,849

quickly that's that's a thing right

447

00:19:17,810 --> 00:19:14,909

it could be in 30 years we have greater

448

00:19:19,789 --> 00:19:17,820

than human intelligence even my own

449

00:19:22,310 --> 00:19:19,799

views on this are pretty eating Socratic

450

00:19:24,259 --> 00:19:22,320

you know I think I don't even think

451  
00:19:27,319 --> 00:19:24,269  
we're gonna have technically human level

452  
00:19:29,680 --> 00:19:27,329  
intelligence I think we'll get smarter

453  
00:19:32,449 --> 00:19:29,690  
than human level intelligence

454  
00:19:35,029 --> 00:19:32,459  
interesting it reminds me of Isaac

455  
00:19:37,310 --> 00:19:35,039  
Asimov's I Robot as well a lot of folks

456  
00:19:38,810 --> 00:19:37,320  
loves to talk about these robot laws

457  
00:19:41,479 --> 00:19:38,820  
that he created for controlling robots

458  
00:19:43,190 --> 00:19:41,489  
but that the main point of the story was

459  
00:19:44,899 --> 00:19:43,200  
that the laws never worked the way that

460  
00:19:47,299 --> 00:19:44,909  
they were intended they always caused

461  
00:19:49,399 --> 00:19:47,309  
all of these paradoxes and catastrophes

462  
00:19:51,109 --> 00:19:49,409  
because the robots just didn't know how

463  
00:19:52,999 --> 00:19:51,119

to handle having these control laws so

464

00:19:54,279 --> 00:19:53,009

that's a really interesting point that

465

00:19:57,319 --> 00:19:54,289

you know it's important to start now

466

00:19:59,569 --> 00:19:57,329

trying to have some control I do in

467

00:20:01,430 --> 00:19:59,579

remind our viewers right now if you want

468

00:20:03,589 --> 00:20:01,440

to ask questions in the second net chat

469

00:20:06,169 --> 00:20:03,599

window or NASA Astrobiology Facebook

470

00:20:07,369 --> 00:20:06,179

page you can do that also any questions

471

00:20:10,749 --> 00:20:07,379

for dr. Schneider can come through

472

00:20:12,919 --> 00:20:10,759

twitter using the hashtag ask Astro bio

473

00:20:14,419 --> 00:20:12,929

so we have a little more time just

474

00:20:16,849 --> 00:20:14,429

chatting you and I before I open it up

475

00:20:18,379 --> 00:20:16,859

to the audience questions I wonder if

476

00:20:21,289 --> 00:20:18,389

you could just tell us for a little bit

477

00:20:23,060 --> 00:20:21,299

about what your primary research was or

478

00:20:27,680 --> 00:20:23,070

your work was at the Library of Congress

479

00:20:29,180 --> 00:20:27,690

as the chair in astrobiology um so it's

480

00:20:32,359 --> 00:20:29,190

an ongoing care

481

00:20:34,430 --> 00:20:32,369

so a last semester I was the

482

00:20:36,710 --> 00:20:34,440

distinguished scholar at the library and

483

00:20:38,479 --> 00:20:36,720

I finished a book called artificial you

484

00:20:42,019 --> 00:20:38,489

AI in the future of your mind which is

485

00:20:45,259 --> 00:20:42,029

now available for sale and that had some

486

00:20:47,479 --> 00:20:45,269

chapters in astrobiology and talks about

487

00:20:48,229 --> 00:20:47,489

the issues that we just discussed and

488

00:20:51,139 --> 00:20:48,239

many others

489

00:20:55,339 --> 00:20:51,149

and now as chair I'm writing another

490

00:20:58,190 --> 00:20:55,349

book coming out with Norton with Oxford

491

00:21:01,519 --> 00:20:58,200

as the Commonwealth distributor for

492

00:21:04,759 --> 00:21:01,529

publishers and it's going to be on the

493

00:21:07,879 --> 00:21:04,769

space of intelligent system and I'm so

494

00:21:09,469 --> 00:21:07,889

excited about that because I'm a

495

00:21:11,389 --> 00:21:09,479

cognitive scientist as well as a

496

00:21:14,810 --> 00:21:11,399

philosopher and so now I get to think

497

00:21:18,049 --> 00:21:14,820

through the details of deep learning

498

00:21:20,320 --> 00:21:18,059

systems versus different kinds of

499

00:21:22,849 --> 00:21:20,330

biological systems such as the octopus

500

00:21:24,830 --> 00:21:22,859

versus the human and then what I'm

501  
00:21:28,369 --> 00:21:24,840  
looking at is the limits of human

502  
00:21:30,440 --> 00:21:28,379  
intelligence so in what ways can we

503  
00:21:33,940 --> 00:21:30,450  
ought meant the brain and will we

504  
00:21:36,440 --> 00:21:33,950  
ultimately be able to out think AI and

505  
00:21:38,509 --> 00:21:36,450  
what's the potential for biological

506  
00:21:41,419 --> 00:21:38,519  
organisms throughout the universe to

507  
00:21:42,889 --> 00:21:41,429  
outthink AI so this is fun because it's

508  
00:21:45,799 --> 00:21:42,899  
like cognitive science meets

509  
00:21:47,989 --> 00:21:45,809  
astrobiology meets philosophy and then

510  
00:21:50,899 --> 00:21:47,999  
meets a hip hearty dose of ethics

511  
00:21:52,310 --> 00:21:50,909  
because one of the main concerns that

512  
00:21:55,849 --> 00:21:52,320  
the later chapters is what should we

513  
00:21:57,349 --> 00:21:55,859

value about intelligence systems and

514

00:21:59,930 --> 00:21:57,359

that which matters

515

00:22:01,580 --> 00:21:59,940

I look forward to reading that - I read

516

00:22:02,570 --> 00:22:01,590

artificial you and I'd look forward to

517

00:22:04,389 --> 00:22:02,580

reading this next book do you have a

518

00:22:06,039 --> 00:22:04,399

title for it yet but a chance

519

00:22:09,229 --> 00:22:06,049

tentatively called

520

00:22:12,289 --> 00:22:09,239

from bio to bit our place in a universe

521

00:22:16,879 --> 00:22:12,299

of intelligence systems ok love it

522

00:22:20,539 --> 00:22:16,889

sounds awesome work done on it why did

523

00:22:22,940 --> 00:22:20,549

you get over this stupid cold yeah that

524

00:22:24,139 --> 00:22:22,950

time of year we're flying or flying here

525

00:22:25,909 --> 00:22:24,149

a couple of weeks with my son for the

526

00:22:27,680 --> 00:22:25,919

very first time he's five months old and

527

00:22:30,169 --> 00:22:27,690

it's kind of worrisome right this time

528

00:22:32,149 --> 00:22:30,179

of year flying on airplanes with all the

529

00:22:34,129 --> 00:22:32,159

sickness in the air and the dry dryness

530

00:22:37,639 --> 00:22:34,139

of the air and stuff but should be

531

00:22:39,560 --> 00:22:37,649

exciting you know when I think of a baby

532

00:22:41,089 --> 00:22:39,570

on an airplane the first thing I think

533

00:22:44,870 --> 00:22:41,099

about it's not that they're gonna get

534

00:22:49,740 --> 00:22:47,490

beside us we'll be okay with the fact

535

00:22:51,600 --> 00:22:49,750

but I think he's only five months it's

536

00:22:53,310 --> 00:22:51,610

just the one and one-year-old kind of

537

00:22:56,190 --> 00:22:53,320

age I think where it's it's most

538

00:22:57,930 --> 00:22:56,200

worrisome so we'll see fingers crossed

539

00:22:59,430 --> 00:22:57,940

before we do open up the questions for

540

00:23:01,769 --> 00:22:59,440

our audience

541

00:23:04,620 --> 00:23:01,779

we always love just showcasing a bit

542

00:23:07,649 --> 00:23:04,630

about our guests beyond just their work

543

00:23:10,680 --> 00:23:07,659

relevant to astrobiology about their

544

00:23:13,289 --> 00:23:10,690

lives I understand in your case so for

545

00:23:15,840 --> 00:23:13,299

someone who studies how you know the

546

00:23:17,940 --> 00:23:15,850

mind and the self and the feeder future

547

00:23:20,340 --> 00:23:17,950

of artificial intelligence humanity and

548

00:23:22,380 --> 00:23:20,350

super intelligence and post biological

549

00:23:24,960 --> 00:23:22,390

aliens and all of these really kind of

550

00:23:28,620 --> 00:23:24,970

techno focused things I understand that

551  
00:23:36,380 --> 00:23:28,630  
you also live on an 1800s farm and you

552  
00:23:40,409 --> 00:23:38,519  
because you know if you write about all

553  
00:23:42,000 --> 00:23:40,419  
this I fight this topia stuff it's

554  
00:23:45,840 --> 00:23:42,010  
probably for the best that you don't

555  
00:23:47,310 --> 00:23:45,850  
live around all this technology internet

556  
00:23:50,970 --> 00:23:47,320  
and stuff but like you know all the

557  
00:23:53,159 --> 00:23:50,980  
furniture everything's old and I like

558  
00:23:55,560 --> 00:23:53,169  
just the peacefulness of it I'm pretty

559  
00:23:58,019 --> 00:23:55,570  
good cluesive actually I mean I don't

560  
00:24:00,870 --> 00:23:58,029  
know and I go out a lot I do think I

561  
00:24:06,510 --> 00:24:00,880  
like to come home to the farm you know

562  
00:24:09,269 --> 00:24:06,520  
service my husband you know that's

563  
00:24:11,159 --> 00:24:09,279

awesome I'm curious you know do you find

564

00:24:13,710 --> 00:24:11,169

that engaging with nature by kind of

565

00:24:15,330 --> 00:24:13,720

being around these animals in some way

566

00:24:18,269 --> 00:24:15,340

kind of helps you to kind of frame your

567

00:24:20,580 --> 00:24:18,279

understanding of these ideas of self and

568

00:24:23,039 --> 00:24:20,590

consciousness and life and and aliens

569

00:24:27,480 --> 00:24:23,049

and those kind of things yeah actually

570

00:24:30,810 --> 00:24:27,490

um you know I've been really worried

571

00:24:33,029 --> 00:24:30,820

about Animal Liberation lately um and I

572

00:24:34,470 --> 00:24:33,039

know that you know proponents of Animal

573

00:24:37,740 --> 00:24:34,480

Liberation will say you're not supposed

574

00:24:39,269 --> 00:24:37,750

to have like pets and a Barb and you

575

00:24:43,230 --> 00:24:39,279

know I get it I understand your point

576

00:24:46,950 --> 00:24:43,240

but but um I think what happened for me

577

00:24:50,610 --> 00:24:46,960

was you know it's the humbler creatures

578

00:24:53,580 --> 00:24:50,620

they have they could have very intense

579

00:24:55,049 --> 00:24:53,590

conscious experience and when I'm

580

00:24:56,730 --> 00:24:55,059

sitting here studying the possibility

581

00:24:58,950 --> 00:24:56,740

that

582

00:25:01,919 --> 00:24:58,960

the most intelligent systems may not

583

00:25:07,470 --> 00:25:01,929

even be conscious which is basically the

584

00:25:09,720 --> 00:25:07,480

upshot of part of my last book and then

585

00:25:13,560 --> 00:25:09,730

you contrast that to what's what's in

586

00:25:16,139 --> 00:25:13,570

the paddock right it becomes very

587

00:25:18,960 --> 00:25:16,149

important to try to reduce the amount of

588

00:25:20,489 --> 00:25:18,970

suffering on the planet you know you

589

00:25:24,139 --> 00:25:20,499

start to really care very deeply about

590

00:25:26,399 --> 00:25:24,149

that and in a way the relationship that

591

00:25:28,529 --> 00:25:26,409

advanced artificial intelligence could

592

00:25:32,070 --> 00:25:28,539

have to an unenhanced human could be

593

00:25:33,960 --> 00:25:32,080

quite similar to the way we relate to

594

00:25:37,350 --> 00:25:33,970

non-human animals so we should be

595

00:25:40,109 --> 00:25:37,360

careful the way we treat non-human

596

00:25:41,909 --> 00:25:40,119

animals so obviously like you know farm

597

00:25:45,029 --> 00:25:41,919

it taste it spoil be animal farm

598

00:25:46,980 --> 00:25:45,039

obviously yeah that's awesome let's we

599

00:25:49,619 --> 00:25:46,990

be judged by our robot overlords for how

600

00:25:50,820 --> 00:25:49,629

we treated other organisms and it is

601  
00:25:53,039 --> 00:25:50,830  
interesting you know we have this full

602  
00:25:56,009 --> 00:25:53,049  
range of human interaction with other

603  
00:25:57,570 --> 00:25:56,019  
organisms on our own planet and even

604  
00:25:59,340 --> 00:25:57,580  
though we have the N equals one problem

605  
00:26:01,379 --> 00:25:59,350  
you know what given this range of ways

606  
00:26:03,139 --> 00:26:01,389  
that we interact with other organisms I

607  
00:26:05,100 --> 00:26:03,149  
think it's a lot of fodder for us

608  
00:26:07,619 --> 00:26:05,110  
astrobiologists and philosophers to

609  
00:26:10,080 --> 00:26:07,629  
think about how will interact with alien

610  
00:26:11,730 --> 00:26:10,090  
life when we finally meet it whether it

611  
00:26:14,220 --> 00:26:11,740  
will be a benevolent malevolent or

612  
00:26:16,109 --> 00:26:14,230  
somewhere in between those are really

613  
00:26:18,570 --> 00:26:16,119

important points yeah and I actually

614

00:26:21,810 --> 00:26:18,580

have a position on that it's different

615

00:26:26,190 --> 00:26:21,820

from a lot of the astrobiologists who

616

00:26:28,619 --> 00:26:26,200

talk about post biological existence so

617

00:26:30,600 --> 00:26:28,629

you know a lot of people who like

618

00:26:33,899 --> 00:26:30,610

Stephen dick and Paul Davies and seth

619

00:26:36,619 --> 00:26:33,909

shostack many others they they're

620

00:26:38,820 --> 00:26:36,629

sympathetic to the idea that

621

00:26:42,930 --> 00:26:38,830

intelligence will evolve to become post

622

00:26:45,629 --> 00:26:42,940

biological okay but a lot of these

623

00:26:49,440 --> 00:26:45,639

individuals are also interested in a

624

00:26:52,049 --> 00:26:49,450

more active steady approach like seth

625

00:26:54,269 --> 00:26:52,059

paradigmatically right he's at the SETI

626  
00:26:58,049 --> 00:26:54,279  
Institute you know people who believe in

627  
00:27:01,139 --> 00:26:58,059  
active steady they want to actually call

628  
00:27:04,769 --> 00:27:01,149  
attention to earth they don't just want

629  
00:27:06,539 --> 00:27:04,779  
to passively listen right well my

630  
00:27:08,759 --> 00:27:06,549  
approach is a little different think

631  
00:27:10,200 --> 00:27:08,769  
about what we said a few minutes ago

632  
00:27:11,850 --> 00:27:10,210  
about the

633  
00:27:15,750 --> 00:27:11,860  
possibility of losing control of

634  
00:27:19,020 --> 00:27:15,760  
super-intelligent AI on earth so if your

635  
00:27:21,270 --> 00:27:19,030  
concerns that that issue and you believe

636  
00:27:24,210 --> 00:27:21,280  
that civilizations elsewhere could be

637  
00:27:26,070 --> 00:27:24,220  
post biological the next step should be

638  
00:27:28,710 --> 00:27:26,080

something like cloaking devices not

639

00:27:30,570 --> 00:27:28,720

active setting and passive listening

640

00:27:33,980 --> 00:27:30,580

right and that's not to diminish the

641

00:27:37,940 --> 00:27:33,990

import of the quest for finding life on

642

00:27:40,620 --> 00:27:37,950

100% behind that I'm so excited about it

643

00:27:42,030 --> 00:27:40,630

but I think we have to be very cautious

644

00:27:45,420 --> 00:27:42,040

because we don't know what's out there

645

00:27:47,990 --> 00:27:45,430

right now that means so much more

646

00:27:50,760 --> 00:27:48,000

advanced than us that we are so boring

647

00:27:52,530 --> 00:27:50,770

well we would never know I mean well if

648

00:27:53,880 --> 00:27:52,540

maybe we're in a zoo as some have talked

649

00:27:56,640 --> 00:27:53,890

about and they're just waiting for us to

650

00:27:58,710 --> 00:27:56,650

become more advanced we had Jill tarter

651  
00:28:00,780 --> 00:27:58,720  
on the show in a previous episode and

652  
00:28:03,420 --> 00:28:00,790  
she also kind of has that position that

653  
00:28:04,860 --> 00:28:03,430  
were not quite emotionally mature enough

654  
00:28:06,420 --> 00:28:04,870  
and and technologically mature enough

655  
00:28:10,380 --> 00:28:06,430  
yet to actually start broadcasting out

656  
00:28:12,180 --> 00:28:10,390  
for our audience this active SETI is

657  
00:28:15,060 --> 00:28:12,190  
also sometimes called Medi or messaging

658  
00:28:17,010 --> 00:28:15,070  
extraterrestrial intelligence the thing

659  
00:28:19,020 --> 00:28:17,020  
is regardless of some of our

660  
00:28:21,210 --> 00:28:19,030  
philosophical arguments for or against

661  
00:28:24,060 --> 00:28:21,220  
there are folks who are already doing

662  
00:28:25,590 --> 00:28:24,070  
this so for those who aren't aware there

663  
00:28:28,650 --> 00:28:25,600

is a group called Metis and they already

664

00:28:30,420 --> 00:28:28,660

are sending signals out into space which

665

00:28:31,710 --> 00:28:30,430

brings up a point my friend Mike to you

666

00:28:34,020 --> 00:28:31,720

know our producer director of the show

667

00:28:35,010 --> 00:28:34,030

and I love to talk about a lot from

668

00:28:37,650 --> 00:28:35,020

Lewis he Chen's

669

00:28:40,950 --> 00:28:37,660

science fiction novels this idea of the

670

00:28:44,190 --> 00:28:40,960

dark forest if you are alone at night in

671

00:28:46,650 --> 00:28:44,200

the dark forest should you call out for

672

00:28:49,170 --> 00:28:46,660

help or to meet other hunters or should

673

00:28:51,060 --> 00:28:49,180

you be quiet and fear that the animals

674

00:28:52,830 --> 00:28:51,070

of the night might come and attack you

675

00:28:55,130 --> 00:28:52,840

and so it's a very important question

676  
00:28:58,340 --> 00:28:55,140  
are we setting ourselves up for

677  
00:29:00,360 --> 00:28:58,350  
catastrophe by sending messages out now

678  
00:29:02,100 --> 00:29:00,370  
so I'm very glad you brought that point

679  
00:29:04,350 --> 00:29:02,110  
up dr. Schneider

680  
00:29:05,700 --> 00:29:04,360  
for our audience at home who are

681  
00:29:08,220 --> 00:29:05,710  
watching right now you can ask questions

682  
00:29:10,290 --> 00:29:08,230  
now in second net in the chat on the

683  
00:29:13,230 --> 00:29:10,300  
NASA Astrobiology Facebook page and on

684  
00:29:14,520 --> 00:29:13,240  
twitter using hashtag ask Astro bio and

685  
00:29:18,750 --> 00:29:14,530  
we'll start moving into some of these

686  
00:29:21,810 --> 00:29:18,760  
questions now from our audience so the

687  
00:29:23,940 --> 00:29:21,820  
first one comes from my friend Jim Paz

688  
00:29:25,710 --> 00:29:23,950

he's the director of the the CEO

689

00:29:30,480 --> 00:29:25,720

of the Astro sociology Research

690

00:29:32,550 --> 00:29:30,490

Institute or a RI Jim asks as AI becomes

691

00:29:34,380 --> 00:29:32,560

more sophisticated and longer duration

692

00:29:35,790 --> 00:29:34,390

space travel and permanent settlement

693

00:29:38,400 --> 00:29:35,800

continue to move forward

694

00:29:40,670 --> 00:29:38,410

how will the relationship between human

695

00:29:43,980 --> 00:29:40,680

and artificial intelligence evolve

696

00:29:46,980 --> 00:29:43,990

specifically dr. Paz wants to know how

697

00:29:52,140 --> 00:29:46,990

likely is a how scenario like in 2000 on

698

00:29:56,580 --> 00:29:52,150

a Space Odyssey oh man so it's hard to

699

00:29:59,400 --> 00:29:56,590

tell how likely that is you know really

700

00:30:03,780 --> 00:29:59,410

hard I mean I think we will end on our

701  
00:30:05,520 --> 00:30:03,790  
artificial intelligences and you know

702  
00:30:08,430 --> 00:30:05,530  
there are areas of computer science that

703  
00:30:11,400 --> 00:30:08,440  
seek to determine how trustworthy and

704  
00:30:14,480 --> 00:30:11,410  
verifiable programs are there are all

705  
00:30:16,680 --> 00:30:14,490  
kinds of problems right now with

706  
00:30:19,290 --> 00:30:16,690  
determining what exactly deep learning

707  
00:30:22,940 --> 00:30:19,300  
systems are even doing now that's called

708  
00:30:26,720 --> 00:30:22,950  
the black box problem so it could be

709  
00:30:29,220 --> 00:30:26,730  
that we do have problems like that now I

710  
00:30:30,420 --> 00:30:29,230  
don't think NASA wants to build a house

711  
00:30:32,130 --> 00:30:30,430  
so I don't think we're gonna have

712  
00:30:36,420 --> 00:30:32,140  
something like that in space right I

713  
00:30:41,000 --> 00:30:36,430

mean you know that's the good news but

714

00:30:45,150 --> 00:30:41,010

on earth you know gotta be careful

715

00:30:46,590 --> 00:30:45,160

mm-hmm awesome yeah I mean as a sci-fi

716

00:30:49,890 --> 00:30:46,600

nerd I've always wondered you know where

717

00:30:51,720 --> 00:30:49,900

we have machines coexisting with us or

718

00:30:52,950 --> 00:30:51,730

not and what would that look like but I

719

00:30:54,990 --> 00:30:52,960

can definitely see some issues right now

720

00:30:56,670 --> 00:30:55,000

with sending people into space with you

721

00:30:58,290 --> 00:30:56,680

know with minds having control of the

722

00:31:01,470 --> 00:30:58,300

ships and there are settlements without

723

00:31:05,520 --> 00:31:01,480

having us have as much control so our

724

00:31:07,250 --> 00:31:05,530

next question okay you know it's not

725

00:31:11,460 --> 00:31:07,260

even clear though for these long

726  
00:31:12,960 --> 00:31:11,470  
journeys at the body will be appropriate

727  
00:31:14,300 --> 00:31:12,970  
to send into space so they'd just be the

728  
00:31:17,550 --> 00:31:14,310  
computers fighting with each other

729  
00:31:20,010 --> 00:31:17,560  
mm-hmm that's true I've often lamented

730  
00:31:23,610 --> 00:31:20,020  
the fact that it might end up just being

731  
00:31:26,910 --> 00:31:23,620  
easier to send robots even in human form

732  
00:31:28,710 --> 00:31:26,920  
to Mars than sending us and what feels

733  
00:31:30,720 --> 00:31:28,720  
it just it just feels kind of sad

734  
00:31:33,330 --> 00:31:30,730  
because it feels like we should be there

735  
00:31:35,580 --> 00:31:33,340  
to experience it ourselves but maybe in

736  
00:31:37,680 --> 00:31:35,590  
the future as we start developing neuro

737  
00:31:39,180 --> 00:31:37,690  
and and links with these robots in

738  
00:31:42,840 --> 00:31:39,190

various ways maybe what we will

739

00:31:46,549 --> 00:31:42,850

experience it in a certain way so yeah I

740

00:31:53,039 --> 00:31:46,559

mean we could have very immersive beyond

741

00:31:55,110 --> 00:31:53,049

that's definitely indeed our next

742

00:31:57,389 --> 00:31:55,120

question comes from a longtime friend of

743

00:31:59,220 --> 00:31:57,399

the show Marian Denton and it's not

744

00:32:00,720 --> 00:31:59,230

exactly a question she felt that she

745

00:32:03,509 --> 00:32:00,730

couldn't ask an aster by a question

746

00:32:06,029 --> 00:32:03,519

necessarily but it's kind of cool she

747

00:32:09,419 --> 00:32:06,039

wants to know from you what is human

748

00:32:13,009 --> 00:32:09,429

learning and it feels like for her

749

00:32:16,590 --> 00:32:13,019

things like the Cylons and the Borg

750

00:32:18,570 --> 00:32:16,600

makes her uncomfortable with this idea

751  
00:32:20,580 --> 00:32:18,580  
that maybe going beyond human learning

752  
00:32:21,960 --> 00:32:20,590  
into something else I wonder what you

753  
00:32:24,180 --> 00:32:21,970  
would say to someone who wants to know

754  
00:32:26,159 --> 00:32:24,190  
what happens when we go beyond human

755  
00:32:29,609 --> 00:32:26,169  
learning and should we be scared or

756  
00:32:30,539 --> 00:32:29,619  
should we be hopeful that's an

757  
00:32:33,680 --> 00:32:30,549  
interesting question

758  
00:32:35,970 --> 00:32:33,690  
so I think the work

759  
00:32:39,299 --> 00:32:35,980  
that was designed to make us nervous

760  
00:32:47,369 --> 00:32:39,309  
right in the Cylon right I mean they

761  
00:32:50,009 --> 00:32:47,379  
were like right and I think we shouldn't

762  
00:32:51,690 --> 00:32:50,019  
expect though that artificial

763  
00:32:54,269 --> 00:32:51,700

intelligence will be like that I mean

764

00:32:57,450 --> 00:32:54,279

like what I always tell people is we

765

00:32:59,789 --> 00:32:57,460

shouldn't make the fallacy that advanced

766

00:33:03,029 --> 00:32:59,799

AI would be anything like us unless

767

00:33:06,180 --> 00:33:03,039

humans speak to design advanced AI to

768

00:33:07,799 --> 00:33:06,190

look just like us and they may not think

769

00:33:10,049 --> 00:33:07,809

like us and I think one of the things

770

00:33:11,909 --> 00:33:10,059

about the Borg that freaks us out is

771

00:33:15,139 --> 00:33:11,919

their lack of individuality the way they

772

00:33:18,720 --> 00:33:15,149

became part of the collective right back

773

00:33:21,629 --> 00:33:18,730

that could happen I mean I think it's

774

00:33:27,119 --> 00:33:21,639

really interesting to think about um you

775

00:33:29,460 --> 00:33:27,129

know would a very advanced AI have very

776

00:33:31,799 --> 00:33:29,470

different sense of identity and how a

777

00:33:35,100 --> 00:33:31,809

human does I mean we're biological

778

00:33:37,830 --> 00:33:35,110

organisms we've evolved you know from

779

00:33:40,350 --> 00:33:37,840

you know hunter-gatherers we have very

780

00:33:42,269 --> 00:33:40,360

limited intellectual capacities because

781

00:33:44,940 --> 00:33:42,279

of our evolutionary constraints like the

782

00:33:47,669 --> 00:33:44,950

size of the cranium metabolic demands AI

783

00:33:49,160 --> 00:33:47,679

won't have these constraints they will

784

00:33:52,010 --> 00:33:49,170

evolve but not through

785

00:33:53,390 --> 00:33:52,020

winny and evolution right so I think

786

00:33:55,130 --> 00:33:53,400

it's interesting to ask what

787

00:33:57,470 --> 00:33:55,140

evolutionary constraints they want up

788

00:33:59,300 --> 00:33:57,480

and I think that gives us less of a

789

00:33:59,630 --> 00:33:59,310

science fictiony view of what they'll be

790

00:34:02,630 --> 00:33:59,640

like

791

00:34:03,920 --> 00:34:02,640

and it's funny because the constraints

792

00:34:05,540 --> 00:34:03,930

I've come up with like I've been

793

00:34:08,500 --> 00:34:05,550

thinking about this for the book that

794

00:34:13,280 --> 00:34:08,510

I'm writing involve things like well

795

00:34:16,940 --> 00:34:13,290

market forces right how can we get a

796

00:34:19,130 --> 00:34:16,950

super efficient machine that you know

797

00:34:21,140 --> 00:34:19,140

does something that makes a lot of money

798

00:34:23,740 --> 00:34:21,150

as cheaply as possible because that's

799

00:34:25,820 --> 00:34:23,750

what a market force is and another

800

00:34:28,880 --> 00:34:25,830

evolutionary constraint will actually be

801  
00:34:32,500 --> 00:34:28,890  
the AI regulations that we impose on

802  
00:34:34,880 --> 00:34:32,510  
those system so given that those

803  
00:34:37,730 --> 00:34:34,890  
evolutionary factors are so vastly

804  
00:34:40,040 --> 00:34:37,740  
different than us I'm not so sure we'll

805  
00:34:45,740 --> 00:34:40,050  
have something like Cylons right that's

806  
00:34:48,260 --> 00:34:45,750  
amputee warfare yet I have to admit

807  
00:34:51,470 --> 00:34:48,270  
while reading artificial you it reminded

808  
00:34:53,240 --> 00:34:51,480  
me of the paperclip game so Nick Bostrom

809  
00:34:56,030 --> 00:34:53,250  
presented this this this thought

810  
00:34:58,580 --> 00:34:56,040  
experiment of the paperclip Maximizer an

811  
00:35:01,100 --> 00:34:58,590  
AI that's program is solely to create

812  
00:35:02,990 --> 00:35:01,110  
paper clips and if it became very very

813  
00:35:06,260 --> 00:35:03,000

good at doing that it could conceivably

814

00:35:08,270 --> 00:35:06,270

to consume the entire universe just to

815

00:35:10,640 --> 00:35:08,280

make paper clips so someone actually

816

00:35:12,980 --> 00:35:10,650

created the game where you can you can

817

00:35:14,420 --> 00:35:12,990

become the AI and create paper clips I

818

00:35:16,760 --> 00:35:14,430

actually have it running right now on my

819

00:35:18,590 --> 00:35:16,770

home system and as of right now I've

820

00:35:20,630 --> 00:35:18,600

taken over the entire earth now sending

821

00:35:22,840 --> 00:35:20,640

out Ben Newman probes to make paper

822

00:35:25,220 --> 00:35:22,850

clips around the galaxy and the universe

823

00:35:27,590 --> 00:35:25,230

and it's kind of interesting right in

824

00:35:29,750 --> 00:35:27,600

this game you start off in an economic

825

00:35:32,210 --> 00:35:29,760

position taking over the markets on the

826

00:35:33,800 --> 00:35:32,220

earth to make the markets be the ones

827

00:35:36,410 --> 00:35:33,810

who are once you want you to produce

828

00:35:37,700 --> 00:35:36,420

these paper clips and I'm guessing then

829

00:35:39,350 --> 00:35:37,710

this you know given your background in

830

00:35:42,350 --> 00:35:39,360

economics you kind of have a better edge

831

00:35:43,790 --> 00:35:42,360

on the fact that if AI gets control of

832

00:35:46,730 --> 00:35:43,800

our markets that a I could actually

833

00:35:48,650 --> 00:35:46,740

conceivably do whatever it wanted to do

834

00:35:50,690 --> 00:35:48,660

if it if it drove us economically in one

835

00:35:55,160 --> 00:35:50,700

direction yeah I'm so worried about that

836

00:35:58,520 --> 00:35:55,170

oh god it's awful it's don't you oh yeah

837

00:36:02,570 --> 00:35:58,530

oh it's bad um I mean because like if

838

00:36:05,000 --> 00:36:02,580

you think about IP intellectual property

839

00:36:06,650 --> 00:36:05,010

like this who's going to own the

840

00:36:08,300 --> 00:36:06,660

resources it's going to be the few

841

00:36:10,130 --> 00:36:08,310

individuals who have the intellectual

842

00:36:13,700 --> 00:36:10,140

property involving the algorithm since

843

00:36:16,040 --> 00:36:13,710

IP law is super complicated actually

844

00:36:19,100 --> 00:36:16,050

when it comes to algorithms right it's

845

00:36:20,930 --> 00:36:19,110

hard to patent algorithms but I mean you

846

00:36:23,000 --> 00:36:20,940

know getting issues involving the future

847

00:36:27,620 --> 00:36:23,010

where it could be that only a few

848

00:36:30,980 --> 00:36:27,630

individuals have vast amounts of

849

00:36:33,260 --> 00:36:30,990

resources or it could be that machines

850

00:36:36,050 --> 00:36:33,270

themselves have all the resources Matt

851  
00:36:40,130 --> 00:36:36,060  
gets into issues about who can own

852  
00:36:43,820 --> 00:36:40,140  
property right and you know with humans

853  
00:36:46,100 --> 00:36:43,830  
be willing to say that AIS are sentient

854  
00:36:49,070 --> 00:36:46,110  
systems I mean all sorts of issues so

855  
00:36:52,370 --> 00:36:49,080  
yeah I mean it's all too easy to think

856  
00:36:55,490 --> 00:36:52,380  
in a very dystopian way about these

857  
00:36:58,060 --> 00:36:55,500  
issues I read a lot of cyberpunk you

858  
00:37:00,290 --> 00:36:58,070  
know that genre a science fiction genre

859  
00:37:06,410 --> 00:37:00,300  
and by the way I want the link to your

860  
00:37:09,110 --> 00:37:06,420  
video game that sounds like yeah but I

861  
00:37:11,210 --> 00:37:09,120  
mean these are very real concerns and

862  
00:37:14,090 --> 00:37:11,220  
you know I think it's better to take a

863  
00:37:17,380 --> 00:37:14,100

precautionary stance and worry about

864

00:37:20,810 --> 00:37:17,390

them because the potential devastation

865

00:37:24,830 --> 00:37:20,820

to humanity the potential human

866

00:37:27,830 --> 00:37:24,840

suffering is so great that it's better

867

00:37:29,590 --> 00:37:27,840

to assume that these kinds of things

868

00:37:32,240 --> 00:37:29,600

could happen there's some probability

869

00:37:34,720 --> 00:37:32,250

than to just dismiss them as science

870

00:37:38,330 --> 00:37:34,730

fiction life right that's not rational

871

00:37:41,180 --> 00:37:38,340

but people like to do it people in AI do

872

00:37:43,610 --> 00:37:41,190

it they tend to see a dichotomy between

873

00:37:46,130 --> 00:37:43,620

this here are now concerns like

874

00:37:49,820 --> 00:37:46,140

algorithmic quietness and concerns that

875

00:37:51,440 --> 00:37:49,830

could come up in 30 years I agree and we

876

00:37:53,690 --> 00:37:51,450

see that across the board obviously with

877

00:37:55,040 --> 00:37:53,700

from climate change and politics and all

878

00:37:57,260 --> 00:37:55,050

kinds of issues that pop up in our

879

00:37:58,730 --> 00:37:57,270

society we are very focused on the

880

00:37:59,900 --> 00:37:58,740

present and often not thinking much

881

00:38:02,930 --> 00:37:59,910

about the past or the future

882

00:38:03,980 --> 00:38:02,940

unfortunately my producer has let me

883

00:38:05,480 --> 00:38:03,990

know that we have a whole bunch of

884

00:38:08,270 --> 00:38:05,490

questions to get to so I will keep

885

00:38:10,910 --> 00:38:08,280

moving here our next question comes from

886

00:38:12,420 --> 00:38:10,920

user Akash Nath who is a longtime friend

887

00:38:15,299 --> 00:38:12,430

of the show

888

00:38:18,539 --> 00:38:15,309

and she asks keeping the ideal world

889

00:38:21,410 --> 00:38:18,549

aside do you think that an artificial

890

00:38:26,029 --> 00:38:21,420

superintelligence can or will coexist

891

00:38:32,910 --> 00:38:26,039

with our human minds in the real world

892

00:38:37,200 --> 00:38:32,920

yes I do actually so here's my

893

00:38:38,880 --> 00:38:37,210

prediction all right um I don't think

894

00:38:42,450 --> 00:38:38,890

we'll have artificial general

895

00:38:46,160 --> 00:38:42,460

intelligence in a strict sense where

896

00:38:49,680 --> 00:38:46,170

that is often viewed as functionally

897

00:38:51,390 --> 00:38:49,690

like a human in every respect I think

898

00:38:54,809 --> 00:38:51,400

that'll be tricky too yes I think it's

899

00:38:57,120 --> 00:38:54,819

too difficult to understand or to build

900

00:38:59,789 --> 00:38:57,130

something that's exactly like us so I

901  
00:39:03,209 --> 00:38:59,799  
think we'll have savant systems these

902  
00:39:05,640 --> 00:39:03,219  
will be systems that have all kinds of

903  
00:39:08,160 --> 00:39:05,650  
cognitive deficits but are vastly

904  
00:39:11,359 --> 00:39:08,170  
smarter than us in other ways and I

905  
00:39:15,209 --> 00:39:11,369  
think we're already seeing that AI can

906  
00:39:17,549 --> 00:39:15,219  
beat us at games for example it has vast

907  
00:39:20,910 --> 00:39:17,559  
databases so you know we can remember

908  
00:39:24,450 --> 00:39:20,920  
more than s it has vast perceptual

909  
00:39:26,789 --> 00:39:24,460  
abilities that we laughs so I think a

910  
00:39:30,599 --> 00:39:26,799  
savant system is not unrealistic and

911  
00:39:34,469 --> 00:39:30,609  
from there I think we could see that it

912  
00:39:36,900 --> 00:39:34,479  
could move to an system that's actually

913  
00:39:39,930 --> 00:39:36,910

smarter than us in every respect without

914

00:39:41,519 --> 00:39:39,940

even achieving this AGI milestone that

915

00:39:44,999 --> 00:39:41,529

people like Nick Bostrom like to talk a

916

00:39:46,709 --> 00:39:45,009

lot about so anyway I do think that it

917

00:39:49,410 --> 00:39:46,719

couldn't live alongside us because

918

00:39:51,989 --> 00:39:49,420

humans will have options to enhance

919

00:39:54,269 --> 00:39:51,999

their brains in radical ways but many

920

00:39:58,049 --> 00:39:54,279

may not take it right I mean think about

921

00:40:00,120 --> 00:39:58,059

the Amish right now and so I think it's

922

00:40:03,900 --> 00:40:00,130

going to be very important for us to

923

00:40:06,839 --> 00:40:03,910

develop ways to live alongside augmented

924

00:40:08,910 --> 00:40:06,849

humans as well as smart artificial

925

00:40:11,819 --> 00:40:08,920

intelligences but again we shouldn't

926  
00:40:15,120 --> 00:40:11,829  
assume that it would feel like anything

927  
00:40:17,969 --> 00:40:15,130  
to be a savant system that it will have

928  
00:40:19,170 --> 00:40:17,979  
an emotional life like we have that it

929  
00:40:21,719 --> 00:40:19,180  
will have a felt quality to this

930  
00:40:24,029 --> 00:40:21,729  
experience or that a super intelligence

931  
00:40:26,089 --> 00:40:24,039  
will be conscious right so they may

932  
00:40:29,089 --> 00:40:26,099  
steal so this works

933  
00:40:30,190 --> 00:40:29,099  
us as tools but the control problem

934  
00:40:33,259 --> 00:40:30,200  
looms

935  
00:40:35,239 --> 00:40:33,269  
you know how interesting I am and I

936  
00:40:38,239 --> 00:40:35,249  
would suggest for our audience to go

937  
00:40:40,400 --> 00:40:38,249  
watch for instance IBM's Watson playing

938  
00:40:41,930 --> 00:40:40,410

jeopardy and doing an incredible job and

939

00:40:44,839 --> 00:40:41,940

looking into some of what's going on

940

00:40:47,299 --> 00:40:44,849

right now with using machine learning to

941

00:40:49,700 --> 00:40:47,309

beat the best chess players and beat the

942

00:40:50,839 --> 00:40:49,710

best go players it's a very important

943

00:40:53,900 --> 00:40:50,849

time for us right now to see these

944

00:40:55,400 --> 00:40:53,910

things happening and in that realm our

945

00:40:58,039 --> 00:40:55,410

next question comes from Mohammed

946

00:41:00,710 --> 00:40:58,049

Abdullah on Facebook Mohammed wants to

947

00:41:03,769 --> 00:41:00,720

know when is an algorithm or an AI

948

00:41:05,509 --> 00:41:03,779

system considered complete and maybe a

949

00:41:07,069 --> 00:41:05,519

little more basic side what is a neural

950

00:41:13,940 --> 00:41:07,079

network with regard to artificial

951  
00:41:15,170 --> 00:41:13,950  
intelligence oh boy okay um so what is

952  
00:41:19,039 --> 00:41:15,180  
the neural network it's gonna be a

953  
00:41:22,759 --> 00:41:19,049  
really ok so I think these are the kind

954  
00:41:25,609 --> 00:41:22,769  
of questions that need longer answers so

955  
00:41:28,519 --> 00:41:25,619  
let me suggest that MIT has a great

956  
00:41:31,120 --> 00:41:28,529  
machine learning intro course online for

957  
00:41:36,410 --> 00:41:31,130  
free that you might want to listen to ok

958  
00:41:39,890 --> 00:41:36,420  
but machine learning is a range of

959  
00:41:42,739 --> 00:41:39,900  
different techniques to get machines to

960  
00:41:45,200 --> 00:41:42,749  
do intelligence tasks deep learning

961  
00:41:48,559 --> 00:41:45,210  
which people like to talk about the most

962  
00:41:50,959 --> 00:41:48,569  
is only one type of machine learning ok

963  
00:41:53,690 --> 00:41:50,969

and that might be what you mean to ask

964

00:41:58,400 --> 00:41:53,700

about the multi-layered neural networks

965

00:42:01,459 --> 00:41:58,410

where information from rouble layer of

966

00:42:04,910 --> 00:42:01,469

the system and kind of goes up in levels

967

00:42:06,829 --> 00:42:04,920

of abstraction until an output is

968

00:42:09,109 --> 00:42:06,839

generated and there are all kinds of

969

00:42:12,739 --> 00:42:09,119

different deep learning systems there

970

00:42:15,709 --> 00:42:12,749

excitingly sophisticated so anyway

971

00:42:17,329 --> 00:42:15,719

that's a quick answer awesome well thank

972

00:42:20,059 --> 00:42:17,339

you and then we'll link that and mighty

973

00:42:21,950 --> 00:42:20,069

course as well then on the page for this

974

00:42:23,989 --> 00:42:21,960

episode when we finally launch that with

975

00:42:26,109 --> 00:42:23,999

the record version and the script and a

976  
00:42:28,670 --> 00:42:26,119  
transcript though so thank you for that

977  
00:42:32,390 --> 00:42:28,680  
we have another question from Kashi SH

978  
00:42:34,130 --> 00:42:32,400  
from Twitter she wasn't she asks while I

979  
00:42:38,010 --> 00:42:34,140  
was trying to understand and discover

980  
00:42:40,620 --> 00:42:38,020  
these areas of artificial intelligence

981  
00:42:43,829 --> 00:42:40,630  
are we also simultaneously progressing

982  
00:42:45,089 --> 00:42:43,839  
in our studies of the brain and our mind

983  
00:42:50,970 --> 00:42:45,099  
ourselves and where we're going

984  
00:42:53,520 --> 00:42:50,980  
oh yeah that's lovely I hope so I mean

985  
00:42:55,230 --> 00:42:53,530  
that's that's the exciting part right I

986  
00:42:57,059 --> 00:42:55,240  
mean when we think about the space of

987  
00:42:59,240 --> 00:42:57,069  
intelligent systems we are learning

988  
00:43:03,740 --> 00:42:59,250

something about what makes us special

989

00:43:06,030 --> 00:43:03,750

intellectually and emotionally ethically

990

00:43:10,380 --> 00:43:06,040

you know and I'm a philosopher of minds

991

00:43:13,349 --> 00:43:10,390

that's my primary specialization and so

992

00:43:16,410 --> 00:43:13,359

I look at the nature of the mind and ask

993

00:43:18,480 --> 00:43:16,420

what are me and you know these are

994

00:43:21,710 --> 00:43:18,490

actually age-old philosophical issues

995

00:43:24,359 --> 00:43:21,720

and the fun thing about astrobiology

996

00:43:27,839 --> 00:43:24,369

artificial intelligence cognitive

997

00:43:31,020 --> 00:43:27,849

science is that they're bringing to the

998

00:43:34,079 --> 00:43:31,030

fore all sorts of intriguing conceptual

999

00:43:37,049 --> 00:43:34,089

issues from science that dialogue with

1000

00:43:41,640 --> 00:43:37,059

these long-standing philosophical issues

1001  
00:43:45,569 --> 00:43:41,650  
inquiring into what are we know awesome

1002  
00:43:47,670 --> 00:43:45,579  
that is huge questions our next question

1003  
00:43:51,359 --> 00:43:47,680  
comes from user Andrew planet on Twitter

1004  
00:43:54,030 --> 00:43:51,369  
hi Andrew and Andrew asks would an AI

1005  
00:43:56,640 --> 00:43:54,040  
that can conceive of itself as a next

1006  
00:43:59,190 --> 00:43:56,650  
branch being evolved from humans

1007  
00:44:01,920 --> 00:43:59,200  
maybe then be inclined to take care of

1008  
00:44:05,010 --> 00:44:01,930  
its ancestors if it's already achieved

1009  
00:44:08,069 --> 00:44:05,020  
that level of higher-order thinking and

1010  
00:44:09,780 --> 00:44:08,079  
so he also asked sorry already that AI

1011  
00:44:11,849 --> 00:44:09,790  
for example in some ways because we've

1012  
00:44:15,839 --> 00:44:11,859  
used technology to attend this broadcast

1013  
00:44:18,839 --> 00:44:15,849

and watch us speaking and so I think the

1014

00:44:21,299 --> 00:44:18,849

general question is will our AI that

1015

00:44:26,450 --> 00:44:21,309

comes after us look back on us with some

1016

00:44:30,720 --> 00:44:26,460

care those are two great questions so

1017

00:44:34,020 --> 00:44:30,730

yeah I'm hoping that the AI is creative

1018

00:44:39,809 --> 00:44:34,030

sentience play pen and just keep us safe

1019

00:44:41,490 --> 00:44:39,819

and take care of us right if a virtual

1020

00:44:43,380 --> 00:44:41,500

reality longevity

1021

00:44:44,880 --> 00:44:43,390

I'd like to hang out until the death of

1022

00:44:47,680 --> 00:44:44,890

the universe I can't even get over this

1023

00:44:49,750 --> 00:44:47,690

cold right now but

1024

00:44:51,849 --> 00:44:49,760

um and let's see what we see the other

1025

00:44:53,920 --> 00:44:51,859

question there were two and I'm on so

1026

00:44:55,720 --> 00:44:53,930

much cold medicine that I forgot his

1027

00:44:59,500 --> 00:44:55,730

second question was basically are are we

1028

00:45:02,349 --> 00:44:59,510

ourselves kind of a form of AI because

1029

00:45:04,000 --> 00:45:02,359

we're already using technology yeah yeah

1030

00:45:06,420 --> 00:45:04,010

yeah yeah I'm interested in that

1031

00:45:11,319 --> 00:45:06,430

extended mind idea in fact I just

1032

00:45:13,530 --> 00:45:11,329

finished a paper on cyborgs with my

1033

00:45:16,120 --> 00:45:13,540

frequent collaborator Joe kuraby

1034

00:45:18,250 --> 00:45:16,130

you know and some people claim yes we

1035

00:45:20,710 --> 00:45:18,260

are already cyborgs because of our

1036

00:45:23,890 --> 00:45:20,720

technology the way we relate like for

1037

00:45:26,200 --> 00:45:23,900

example here's my smartphone I depends

1038

00:45:28,540 --> 00:45:26,210

on it as an external memory system and

1039

00:45:32,020 --> 00:45:28,550

so what's the difference if we like

1040

00:45:34,450 --> 00:45:32,030

stick chips in our heads then you know

1041

00:45:37,240 --> 00:45:34,460

it's really no difference in kind at all

1042

00:45:40,690 --> 00:45:37,250

um I actually disagree with that I mean

1043

00:45:41,950 --> 00:45:40,700

you know there are the thing is that the

1044

00:45:44,620 --> 00:45:41,960

biological brain is extremely

1045

00:45:47,440 --> 00:45:44,630

intricately Network and we actually

1046

00:45:49,990 --> 00:45:47,450

don't know if microchips could even

1047

00:45:52,540 --> 00:45:50,000

support much of the activity of the

1048

00:45:55,540 --> 00:45:52,550

brain like how it would even work in the

1049

00:45:58,059 --> 00:45:55,550

context of the human brain we don't know

1050

00:46:01,990 --> 00:45:58,069

if a chip could serve as the neural

1051  
00:46:05,349 --> 00:46:02,000  
basis of consciousness for example you

1052  
00:46:07,750 --> 00:46:05,359  
know I do think in principle you know my

1053  
00:46:10,720 --> 00:46:07,760  
relation my cell phone is too basic now

1054  
00:46:12,550 --> 00:46:10,730  
one day it could be that we put

1055  
00:46:14,109 --> 00:46:12,560  
microchips in the head at least in the

1056  
00:46:17,079 --> 00:46:14,119  
non conscious parts of the brain and

1057  
00:46:18,940 --> 00:46:17,089  
they're integrated in so well that we

1058  
00:46:21,309 --> 00:46:18,950  
would say there's a single system there

1059  
00:46:23,559 --> 00:46:21,319  
right but if it's into all kinds of

1060  
00:46:27,550 --> 00:46:23,569  
intriguing philosophical issues right I

1061  
00:46:30,849 --> 00:46:27,560  
mean I very carefully said combat system

1062  
00:46:37,450 --> 00:46:30,859  
because i'm aguii the expression minds

1063  
00:46:38,800 --> 00:46:37,460

or so the big question right how can you

1064

00:46:40,450 --> 00:46:38,810

even make playoffs if the mind is

1065

00:46:43,720 --> 00:46:40,460

extended if you don't say what the mind

1066

00:46:48,790 --> 00:46:43,730

or self is right oh my daughter just

1067

00:46:52,480 --> 00:46:48,800

came in she's talking to the dog it's

1068

00:46:54,490 --> 00:46:52,490

awesome barking up a storm

1069

00:46:57,309 --> 00:46:54,500

yeah that's awesome yeah I unfortunately

1070

00:46:59,359 --> 00:46:57,319

have to leave my two dogs and my son at

1071

00:47:02,209 --> 00:46:59,369

home when I come to do this

1072

00:47:04,339 --> 00:47:02,219

that's a great answer our next question

1073

00:47:06,949 --> 00:47:04,349

comes from pritho Jay Paul on a second

1074

00:47:08,509 --> 00:47:06,959

net and second net and it kind of goes

1075

00:47:09,739 --> 00:47:08,519

into the realm of some of these

1076

00:47:12,289 --> 00:47:09,749

philosophical questions of whether or

1077

00:47:13,969 --> 00:47:12,299

not we're living in a simulation so

1078

00:47:16,669 --> 00:47:13,979

Preetha wants to know if it's possible

1079

00:47:20,239 --> 00:47:16,679

that we actually could our cells be

1080

00:47:24,019 --> 00:47:20,249

complex programmed systems developed by

1081

00:47:25,729 --> 00:47:24,029

some superior beings or AI and if that's

1082

00:47:28,669 --> 00:47:25,739

the case are we then actually ourselves

1083

00:47:30,319 --> 00:47:28,679

a form of AI and when do we start

1084

00:47:34,099 --> 00:47:30,329

drawing the line between an artificial

1085

00:47:39,289 --> 00:47:34,109

and a natural intelligence lovely yeah

1086

00:47:41,539 --> 00:47:39,299

so your viewers may want to read about

1087

00:47:45,979 --> 00:47:41,549

the simulation argument it's quite good

1088

00:47:47,059 --> 00:47:45,989

to be honest and it suggests that we

1089

00:47:49,640 --> 00:47:47,069

could in fact be in a computer

1090

00:47:53,269 --> 00:47:49,650

simulation and to be honest I love

1091

00:47:55,219 --> 00:47:53,279

teaching it because it blows the

1092

00:47:57,409 --> 00:47:55,229

students away that there's a

1093

00:47:58,819 --> 00:47:57,419

philosophical argument suggesting that

1094

00:48:01,999 --> 00:47:58,829

we could actually be in a computer

1095

00:48:03,709 --> 00:48:02,009

simulation if it's true then we're

1096

00:48:05,569 --> 00:48:03,719

sitting here talking about conscious

1097

00:48:07,309 --> 00:48:05,579

experience and wondering if machines can

1098

00:48:10,839 --> 00:48:07,319

be conscious but in fact we are in a

1099

00:48:15,789 --> 00:48:10,849

simulation and so our ultimate

1100

00:48:18,229 --> 00:48:15,799

constituents are you know computer stays

1101

00:48:21,079 --> 00:48:18,239

right and so we are artificial

1102

00:48:22,729 --> 00:48:21,089

intelligences right and a guy is

1103

00:48:24,409 --> 00:48:22,739

conscious because each of us can

1104

00:48:29,899 --> 00:48:24,419

introspect and tell that we're conscious

1105

00:48:31,729 --> 00:48:29,909

and we're AI that's so awesome you know

1106

00:48:34,189 --> 00:48:31,739

there's so many things that that opens

1107

00:48:35,269 --> 00:48:34,199

up into from the brain-in-a-vat idea and

1108

00:48:37,849 --> 00:48:35,279

whether or not we could actually know if

1109

00:48:40,069 --> 00:48:37,859

we're a brain-in-a-vat to the philosophy

1110

00:48:41,479 --> 00:48:40,079

of the matrix and Plato's allegory of

1111

00:48:43,459 --> 00:48:41,489

the cave and some of these ideas of

1112

00:48:46,849 --> 00:48:43,469

whether or not we are actually aware of

1113

00:48:48,199 --> 00:48:46,859

our actual existence so yeah some of

1114

00:48:51,199 --> 00:48:48,209

those ideas of being a simulation

1115

00:48:52,759 --> 00:48:51,209

terrify me and also make me intrigued at

1116

00:48:53,899 --> 00:48:52,769

what's actually possible in this

1117

00:48:57,259 --> 00:48:53,909

universe of ours

1118

00:48:58,729 --> 00:48:57,269

oh yeah you know there's a paper by

1119

00:49:01,009 --> 00:48:58,739

David Chalmers it's really good on this

1120

00:49:02,929 --> 00:49:01,019

cause the matrix does philosophy or the

1121

00:49:04,189 --> 00:49:02,939

matrix is metaphysics which I recommend

1122

00:49:06,829 --> 00:49:04,199

and then in science fiction and

1123

00:49:10,219 --> 00:49:06,839

philosophy I put together a bunch of

1124

00:49:13,280 --> 00:49:10,229

pieces ranging from discussions of Plato

1125

00:49:16,610 --> 00:49:13,290

to the simulation

1126

00:49:18,980 --> 00:49:16,620

love it our next no worries

1127

00:49:21,200 --> 00:49:18,990

our next question comes from Kashi

1128

00:49:22,580 --> 00:49:21,210

Schnepp again on Twitter Kashi she's

1129

00:49:24,800 --> 00:49:22,590

always great she asked a bunch of

1130

00:49:28,340 --> 00:49:24,810

questions she's very thoughtful in her

1131

00:49:29,630 --> 00:49:28,350

approach she wants to know so we still

1132

00:49:32,510 --> 00:49:29,640

don't have cures for things like

1133

00:49:35,150 --> 00:49:32,520

Alzheimer's and Parkinson's and these

1134

00:49:37,730 --> 00:49:35,160

kinds of neurological disorders in your

1135

00:49:39,380 --> 00:49:37,740

TED talk one that we had shared you

1136

00:49:42,020 --> 00:49:39,390

talked about using microchips and

1137

00:49:43,550 --> 00:49:42,030

developing the artificial brain she

1138

00:49:46,130 --> 00:49:43,560

wants to know if you think that in that

1139

00:49:49,300 --> 00:49:46,140

process we might find here is for such

1140

00:49:54,230 --> 00:49:49,310

diseases as Alzheimer's and Parkinson's

1141

00:49:55,940 --> 00:49:54,240

yes I think that Parkinson's in

1142

00:50:00,530 --> 00:49:55,950

particular there's actual ongoing work

1143

00:50:04,550 --> 00:50:00,540

on brains right now Alzheimer's - I mean

1144

00:50:06,680 --> 00:50:04,560

um there's talk of now you know an

1145

00:50:08,990 --> 00:50:06,690

better understanding of the biological

1146

00:50:11,990 --> 00:50:09,000

basis so I don't mean to suggest that

1147

00:50:14,210 --> 00:50:12,000

there won't be biological yours but I

1148

00:50:18,830 --> 00:50:14,220

also think that the possibility that you

1149

00:50:21,620 --> 00:50:18,840

could improve memory circuits through AI

1150

00:50:23,960 --> 00:50:21,630

is already under development you won't

1151  
00:50:24,830 --> 00:50:23,970  
believe this but um Ted Berger over at

1152  
00:50:27,830 --> 00:50:24,840  
USC

1153  
00:50:31,340 --> 00:50:27,840  
he's been working for about 15 years on

1154  
00:50:35,150 --> 00:50:31,350  
the earth hippocampus so you have

1155  
00:50:37,610 --> 00:50:35,160  
individuals like Clive wearing and hm

1156  
00:50:39,980 --> 00:50:37,620  
their textbook cases in neuroscience

1157  
00:50:42,170 --> 00:50:39,990  
about people who have lost their ability

1158  
00:50:45,940 --> 00:50:42,180  
to lay down new memory because their

1159  
00:50:50,330 --> 00:50:45,950  
hippocampus is damaged Berger has a

1160  
00:50:52,100 --> 00:50:50,340  
study in detail the algorithm that the

1161  
00:50:54,770 --> 00:50:52,110  
human hippocampus runs I mean we don't

1162  
00:50:56,330 --> 00:50:54,780  
know you know a ton about it but we the

1163  
00:50:57,950 --> 00:50:56,340

hippocampus is relatively well

1164

00:51:00,170 --> 00:50:57,960

understood in neuroscience compared to

1165

00:51:02,960 --> 00:51:00,180

the rest of the brain and even a

1166

00:51:06,140 --> 00:51:02,970

coarse-grained chip that roughly

1167

00:51:08,000 --> 00:51:06,150

simulates the processing of the

1168

00:51:10,910 --> 00:51:08,010

hippocampus is something he's developing

1169

00:51:14,270 --> 00:51:10,920

right now and it is in phase 3 clinical

1170

00:51:16,070 --> 00:51:14,280

trials with successes so you can look at

1171

00:51:18,110 --> 00:51:16,080

his work if you google the artificial

1172

00:51:20,870 --> 00:51:18,120

hippocampus and so there are individuals

1173

00:51:23,060 --> 00:51:20,880

right now with horrible memory deficits

1174

00:51:26,030 --> 00:51:23,070

who are using the artificial hippocampus

1175

00:51:26,660 --> 00:51:26,040

in these trials it's awesome all right

1176

00:51:29,240 --> 00:51:26,670

that's we

1177

00:51:31,340 --> 00:51:29,250

humans know that's incredible I recall

1178

00:51:33,230 --> 00:51:31,350

reading Joshua Foer book moonwalking

1179

00:51:35,720 --> 00:51:33,240

with Einstein where he talks about

1180

00:51:37,460 --> 00:51:35,730

becoming a memory champion in the US and

1181

00:51:39,980 --> 00:51:37,470

competing on the world stage as a memory

1182

00:51:41,350 --> 00:51:39,990

champion and he brings up HM and some of

1183

00:51:44,630 --> 00:51:41,360

these other patients who've had these

1184

00:51:46,280 --> 00:51:44,640

extreme memory issues so that's really

1185

00:51:48,830 --> 00:51:46,290

intriguing research that's really cool

1186

00:51:51,160 --> 00:51:48,840

though that's going on for me and so

1187

00:51:54,200 --> 00:51:51,170

even if I'm kind of skeptical about

1188

00:51:56,450 --> 00:51:54,210

radical brain enhancement like I hit a

1189

00:51:58,340 --> 00:51:56,460

more cautionary note I'm extremely

1190

00:52:01,010 --> 00:51:58,350

excited about anything they can help

1191

00:52:03,280 --> 00:52:01,020

individuals who are suffering with these

1192

00:52:06,590 --> 00:52:03,290

awful brain disorders

1193

00:52:09,230 --> 00:52:06,600

yeah and indeed I think we're gonna ask

1194

00:52:10,760 --> 00:52:09,240

about maybe two more questions and then

1195

00:52:13,130 --> 00:52:10,770

we'll close it up here for this

1196

00:52:16,760 --> 00:52:13,140

wonderful show our next question comes

1197

00:52:19,460 --> 00:52:16,770

from user organism 1974 on Twitter and

1198

00:52:21,470 --> 00:52:19,470

they asked or they want to know if it's

1199

00:52:25,070 --> 00:52:21,480

possible to send multiple ai-controlled

1200

00:52:26,800 --> 00:52:25,080

missions to a variety of places to

1201

00:52:29,330 --> 00:52:26,810

search for alien life

1202

00:52:32,000 --> 00:52:29,340

the idea being maybe a mother ship of

1203

00:52:33,230 --> 00:52:32,010

advanced AI sending out probes and so I

1204

00:52:34,730 --> 00:52:33,240

think they're asking whether or not you

1205

00:52:37,550 --> 00:52:34,740

think like Vannoy moon probes or

1206

00:52:39,910 --> 00:52:37,560

ai-controlled probes to go do the work

1207

00:52:43,760 --> 00:52:39,920

for us of finding alien life is likely

1208

00:52:47,750 --> 00:52:43,770

yes um I talked about this in my book

1209

00:52:50,450 --> 00:52:47,760

because um I'm a frequent guest at the

1210

00:52:53,350 --> 00:52:50,460

Institute for Advanced Study and we have

1211

00:52:58,340 --> 00:52:53,360

a little group I think it's called um

1212

00:53:01,190 --> 00:52:58,350

sentient interstellar probes and so we

1213

00:53:03,050 --> 00:53:01,200

talk about these issues and so yeah

1214

00:53:06,170 --> 00:53:03,060

didn't it's in the latest book

1215

00:53:08,900 --> 00:53:06,180

artificial you and so here's one idea

1216

00:53:12,410 --> 00:53:08,910

okay so you've got project breakthrough

1217

00:53:14,600 --> 00:53:12,420

starshot right and you know the famous

1218

00:53:16,910 --> 00:53:14,610

yuri milner stephen hawking project well

1219

00:53:19,670 --> 00:53:16,920

one of the founders is one of my

1220

00:53:22,480 --> 00:53:19,680

co-authors and he's nature edwin turner

1221

00:53:28,640 --> 00:53:22,490

great guy Astro bye after business

1222

00:53:31,280 --> 00:53:28,650

anyway so why not put chips on these

1223

00:53:32,210 --> 00:53:31,290

little like cell shifts right so you

1224

00:53:34,400 --> 00:53:32,220

know there's already been a hundred

1225

00:53:36,680 --> 00:53:34,410

million dollars dedicated to

1226  
00:53:40,220 --> 00:53:36,690  
breakthrough starshot right and the idea

1227  
00:53:44,710 --> 00:53:40,230  
is to send these very ultra small

1228  
00:53:47,870 --> 00:53:44,720  
ships out to Alpha Centauri right and

1229  
00:53:52,130 --> 00:53:47,880  
this is right now but as far as I know

1230  
00:53:53,990 --> 00:53:52,140  
the fastest way to have interstellar

1231  
00:53:56,780 --> 00:53:54,000  
travel that we have potential to develop

1232  
00:54:00,680 --> 00:53:56,790  
it could go potentially a third of the

1233  
00:54:04,250 --> 00:54:00,690  
speed of light you know it so we have

1234  
00:54:06,109 --> 00:54:04,260  
that my suggestion is put some

1235  
00:54:07,790 --> 00:54:06,119  
microchips on these chefs there's gonna

1236  
00:54:09,230 --> 00:54:07,800  
be lots of them they're actually cheap

1237  
00:54:11,210 --> 00:54:09,240  
to produce and by the way the reason

1238  
00:54:13,790 --> 00:54:11,220

they go so fast is that their mass is so

1239

00:54:18,740 --> 00:54:13,800

long right that they can go much faster

1240

00:54:20,420 --> 00:54:18,750

than you know spaceships and whatnot so

1241

00:54:21,980 --> 00:54:20,430

anyway there are technical issues that

1242

00:54:23,359 --> 00:54:21,990

are being dealt with I mean we

1243

00:54:27,590 --> 00:54:23,369

definitely not small to worry about

1244

00:54:30,560 --> 00:54:27,600

stock you know Stardust you know it's

1245

00:54:34,820 --> 00:54:30,570

tearing but anyway I'm talking about

1246

00:54:38,740 --> 00:54:34,830

creating a collective intelligence as an

1247

00:54:41,990 --> 00:54:38,750

AI outpost there Alpha Centauri because

1248

00:54:43,880 --> 00:54:42,000

communication speed is so slow right

1249

00:54:47,660 --> 00:54:43,890

eight year round trip I think Alpha

1250

00:54:48,650 --> 00:54:47,670

Centauri so why not configure on these

1251  
00:54:52,310 --> 00:54:48,660  
starships

1252  
00:54:54,890 --> 00:54:52,320  
a kind of interrelated network right of

1253  
00:54:58,640 --> 00:54:54,900  
microchips that gives rise to something

1254  
00:55:00,800 --> 00:54:58,650  
like a collective mind if you will now I

1255  
00:55:04,160 --> 00:55:00,810  
don't know if AI can be conscious right

1256  
00:55:06,560 --> 00:55:04,170  
that's just kind of fun speculation but

1257  
00:55:09,680 --> 00:55:06,570  
any idea of having an intelligent system

1258  
00:55:13,670 --> 00:55:09,690  
an AI outpost is super cool on northern

1259  
00:55:15,380 --> 00:55:13,680  
probes don't come up but I know what

1260  
00:55:19,190 --> 00:55:15,390  
you're talking about it's exciting to

1261  
00:55:23,030 --> 00:55:19,200  
think about right but maybe they'll

1262  
00:55:24,230 --> 00:55:23,040  
decide to launch stuff mmm awesome it

1263  
00:55:25,790 --> 00:55:24,240

also makes me wonder then you know

1264

00:55:28,640 --> 00:55:25,800

looking for techno signatures these

1265

00:55:32,390 --> 00:55:28,650

signs of technological life if giant

1266

00:55:34,160 --> 00:55:32,400

swarms of AI drones around a star system

1267

00:55:36,170 --> 00:55:34,170

might be something that will actually be

1268

00:55:42,230 --> 00:55:36,180

able to detect some time soon with our

1269

00:55:47,530 --> 00:55:42,240

telescopes occurred to me definitely I

1270

00:55:50,390 --> 00:55:47,540

mean you know if it turns out that the

1271

00:55:53,359 --> 00:55:50,400

best most efficient method of

1272

00:55:53,930 --> 00:55:53,369

interstellar travel at least you know to

1273

00:55:56,839 --> 00:55:53,940

view

1274

00:56:00,770 --> 00:55:56,849

remotely like as opposed to carrying

1275

00:56:02,480 --> 00:56:00,780

equipment and get samples is this these

1276

00:56:05,510 --> 00:56:02,490

like cell ships they'd be very hard to

1277

00:56:08,440 --> 00:56:05,520

detect and you know yet another

1278

00:56:12,529 --> 00:56:08,450

potential answer to the Fermi paradox

1279

00:56:15,620 --> 00:56:12,539

you know they're still possible answers

1280

00:56:17,029 --> 00:56:15,630

to the Fermi hero mm-hmm I think we're

1281

00:56:20,180 --> 00:56:17,039

gonna end it with one more question from

1282

00:56:23,599 --> 00:56:20,190

our longtime friend Tom Caruso who right

1283

00:56:25,819 --> 00:56:23,609

now is watching on Facebook Tom wants to

1284

00:56:28,700 --> 00:56:25,829

know so he sets it up by saying

1285

00:56:31,010 --> 00:56:28,710

environmental conservation policy has

1286

00:56:35,390 --> 00:56:31,020

historically lagged behind exploitation

1287

00:56:38,089 --> 00:56:35,400

and space law so just like AI needs some

1288

00:56:39,799 --> 00:56:38,099

moral guidelines some control humans

1289

00:56:43,460 --> 00:56:39,809

also need some guidelines for our

1290

00:56:46,400 --> 00:56:43,470

self-control so he wants to know if you

1291

00:56:48,440 --> 00:56:46,410

can explain your opinions on if you

1292

00:56:51,079 --> 00:56:48,450

think planetary protection environmental

1293

00:56:56,900 --> 00:56:51,089

protection are pushed to explore to

1294

00:56:59,480 --> 00:56:56,910

learn more can be aided by AI oh that's

1295

00:57:02,930 --> 00:56:59,490

really interesting yeah I mean I know

1296

00:57:05,380 --> 00:57:02,940

that NASA has people working on

1297

00:57:07,430 --> 00:57:05,390

planetary protection attorneys

1298

00:57:12,349 --> 00:57:07,440

biologists and you know it's

1299

00:57:15,019 --> 00:57:12,359

super-important right yeah and I mean

1300

00:57:19,400 --> 00:57:15,029

maybe a I could facilitate some of that

1301  
00:57:21,559 --> 00:57:19,410  
science or even I mean this is you know

1302  
00:57:25,039 --> 00:57:21,569  
very cute ristic that even tell us when

1303  
00:57:26,809 --> 00:57:25,049  
something's been violated right so maybe

1304  
00:57:30,440 --> 00:57:26,819  
all that awful surveillance equipment

1305  
00:57:32,720 --> 00:57:30,450  
could be put to use right yeah they're

1306  
00:57:34,099 --> 00:57:32,730  
kidding their computer on earth and all

1307  
00:57:37,519 --> 00:57:34,109  
of a sudden you get like a notification

1308  
00:57:40,130 --> 00:57:37,529  
you know that such-and-such planet you

1309  
00:57:44,089 --> 00:57:40,140  
know somebody just completely ruined it

1310  
00:57:46,940 --> 00:57:44,099  
now we potential and it may be that yeah

1311  
00:57:52,370 --> 00:57:46,950  
you have drones out there that like go

1312  
00:57:54,170 --> 00:57:52,380  
look awesome I love that concept I think

1313  
00:57:56,180 --> 00:57:54,180

we are at the time now unfortunately dr.

1314

00:57:58,309 --> 00:57:56,190

Schneider I really appreciate you coming

1315

00:58:00,200 --> 00:57:58,319

on the show and talking with us I do

1316

00:58:02,240 --> 00:58:00,210

have to apologize to all of our viewers

1317

00:58:03,799 --> 00:58:02,250

who had questions we didn't get to we

1318

00:58:05,660 --> 00:58:03,809

actually had a whole bunch of them yet

1319

00:58:06,350 --> 00:58:05,670

so if you'd like to you can reach out

1320

00:58:08,990 --> 00:58:06,360

online

1321

00:58:11,930 --> 00:58:09,000

and find dr. Schneider her website is

1322

00:58:13,880 --> 00:58:11,940

Schneider website calm you can also find

1323

00:58:15,860 --> 00:58:13,890

her TED talks her google talk is out

1324

00:58:17,510 --> 00:58:15,870

there and you can find all of her books

1325

00:58:19,970 --> 00:58:17,520

out there artificial you is now

1326

00:58:21,830 --> 00:58:19,980

available it's a wonderful read and I

1327

00:58:24,080 --> 00:58:21,840

also listen to it it's a great listen as

1328

00:58:25,850 --> 00:58:24,090

well and hopefully we can keep our eye

1329

00:58:29,330 --> 00:58:25,860

out for your upcoming book and announced

1330

00:58:31,070 --> 00:58:29,340

that for our viewers as well yeah a lot

1331

00:58:34,040 --> 00:58:31,080

of these issues are in artificial you

1332

00:58:37,610 --> 00:58:34,050

and I just want to say thanks for having

1333

00:58:39,880 --> 00:58:37,620

me thanks to NASA response rate me this

1334

00:58:41,780 --> 00:58:39,890

year it's been really a lot of fun

1335

00:58:43,130 --> 00:58:41,790

awesome I'm so glad you were at the

1336

00:58:45,440 --> 00:58:43,140

Library of Congress and thank you so

1337

00:58:48,050 --> 00:58:45,450

much for joining us on the show for all

1338

00:58:49,670 --> 00:58:48,060

of our guests watching at home we love

1339

00:58:51,410 --> 00:58:49,680

to have a little call for action to have

1340

00:58:53,570 --> 00:58:51,420

you join us in the celebration of

1341

00:58:55,820 --> 00:58:53,580

astrobiology and all the things that our

1342

00:58:58,790 --> 00:58:55,830

guests are doing so for everyone

1343

00:59:01,310 --> 00:58:58,800

watching here's a question for you how

1344

00:59:04,190 --> 00:59:01,320

do you think artificial intelligence and

1345

00:59:06,980 --> 00:59:04,200

machine learning can help NASA search

1346

00:59:09,890 --> 00:59:06,990

for life in the universe feel free to

1347

00:59:11,540 --> 00:59:09,900

pop us messages where you can ideally

1348

00:59:14,330 --> 00:59:11,550

you can tweet us your answers and your

1349

00:59:17,090 --> 00:59:14,340

ideas using hashtag ask Astro bio on

1350

00:59:18,620 --> 00:59:17,100

Twitter so for everyone at home as

1351

00:59:22,240 --> 00:59:18,630

always thank you for joining us and

1352

01:00:02,870 --> 00:59:22,250

remember stay curious bye everyone