

TIME TRAVEL GRANDFATHER PARADOX

the

# Everything Else

SHOW

with Dr Doron Friedman

YouTube Live Stream On Air  
[everything-else-show.com](http://everything-else-show.com)

1  
00:00:06,289 --> 00:00:03,169  
okay welcome to the everything else show

2  
00:00:08,480 --> 00:00:06,299  
I'm here today with dr. Dorian Friedman

3  
00:00:11,749 --> 00:00:08,490  
and he's a computer scientist at the

4  
00:00:14,780 --> 00:00:11,759  
into bliss of interdisciplinary center

5  
00:00:17,630 --> 00:00:14,790  
and her zilla Israel i may have

6  
00:00:21,170 --> 00:00:17,640  
pronounced that wrong as possible and he

7  
00:00:25,040 --> 00:00:21,180  
has recently he is working on a

8  
00:00:27,769 --> 00:00:25,050  
published paper that basically works on

9  
00:00:30,589 --> 00:00:27,779  
time travel plot lines and this is going

10  
00:00:33,680 --> 00:00:30,599  
to be kind of a as said in this article

11  
00:00:34,970 --> 00:00:33,690  
kind of a brain melting show we're going

12  
00:00:37,540 --> 00:00:34,980  
to get into all different types of

13  
00:00:40,250 --> 00:00:37,550

things he's also involved in a brain

14

00:00:41,990 --> 00:00:40,260

wave virtual reality I'm not sure

15

00:00:44,270 --> 00:00:42,000

exactly what that's called he knows what

16

00:00:49,069 --> 00:00:44,280

it's called and welcome to the show dr.

17

00:00:50,630 --> 00:00:49,079

Friedman hi how are you doing I'm doing

18

00:00:53,689 --> 00:00:50,640

well thanks for joining us in your in

19

00:00:56,630 --> 00:00:53,699

Tel Aviv and you have jet lag so I

20

00:00:58,490 --> 00:00:56,640

appreciate you being on the show yeah

21

00:01:02,479 --> 00:00:58,500

yeah just back from your part of the

22

00:01:05,870 --> 00:01:02,489

world I guess yes yeah um so first of

23

00:01:08,030 --> 00:01:05,880

all before we get into any of these

24

00:01:11,149 --> 00:01:08,040

topics because time travel is always one

25

00:01:12,950 --> 00:01:11,159

that's you know baffled of the brain as

26

00:01:15,560 --> 00:01:12,960

far as you know there's all these

27

00:01:19,010 --> 00:01:15,570

different types of scenarios and before

28

00:01:21,440 --> 00:01:19,020

we get into that how did you get an

29

00:01:22,999 --> 00:01:21,450

interest in this type of thing I know

30

00:01:26,810 --> 00:01:23,009

you do all kinds of different things

31

00:01:28,789 --> 00:01:26,820

with computers but how did this how did

32

00:01:33,109 --> 00:01:28,799

this perplex you and get you involved in

33

00:01:36,859 --> 00:01:33,119

into looking into the topic yeah no it's

34

00:01:38,149 --> 00:01:36,869

true we look at so research is my second

35

00:01:41,030 --> 00:01:38,159

career you know I was intrapreneur in

36

00:01:44,210 --> 00:01:41,040

technology and now in research I look

37

00:01:46,280 --> 00:01:44,220

deliberately at all kinds of extreme

38

00:01:48,889 --> 00:01:46,290

cases of human-machine confluence and

39

00:01:52,389 --> 00:01:48,899

things like virtual reality and brain

40

00:01:56,420 --> 00:01:52,399

computer interface with virtual reality

41

00:02:02,030 --> 00:01:56,430

we realized that most interesting things

42

00:02:06,649 --> 00:02:02,040

is that you can do beyond reality you

43

00:02:08,359 --> 00:02:06,659

can have very concrete this is but you

44

00:02:10,309 --> 00:02:08,369

don't have you can violate the rules of

45

00:02:12,229 --> 00:02:10,319

reality so you know time travel is one

46

00:02:14,020 --> 00:02:12,239

of the favorite of course where you can

47

00:02:18,530 --> 00:02:14,030

try to play with

48

00:02:20,479 --> 00:02:18,540

yes well I you know that the the title

49

00:02:23,720 --> 00:02:20,489

the show was up solving the grandfather

50

00:02:25,280 --> 00:02:23,730

paradox up it's not I wouldn't say you

51  
00:02:27,470 --> 00:02:25,290  
solved you just ran a whole bunch of

52  
00:02:29,570 --> 00:02:27,480  
scenarios through a computer is that is

53  
00:02:35,390 --> 00:02:29,580  
that basically what what's involved in

54  
00:02:38,149 --> 00:02:35,400  
that in solving you can even say that a

55  
00:02:39,619 --> 00:02:38,159  
program so that if you like you can

56  
00:02:42,140 --> 00:02:39,629  
argue whether the solution is

57  
00:02:44,780 --> 00:02:42,150  
interesting or not but for me it was

58  
00:02:47,539 --> 00:02:44,790  
exciting because this is a solution to

59  
00:02:50,089 --> 00:02:47,549  
the grand and paradox that I haven't

60  
00:02:52,250 --> 00:02:50,099  
seen mentioned you know in science

61  
00:02:54,890 --> 00:02:52,260  
fiction literature or in literature and

62  
00:02:56,449 --> 00:02:54,900  
the computer helped us reach this

63  
00:03:01,580 --> 00:02:56,459

solution so for me it's kind of an

64

00:03:04,670 --> 00:03:01,590

interesting solution um yes and end that

65

00:03:07,099 --> 00:03:04,680

so why don't you throw out a couple of

66

00:03:08,990 --> 00:03:07,109

solutions that came up i know there were

67

00:03:13,520 --> 00:03:09,000

there were more than there were several

68

00:03:16,099 --> 00:03:13,530

weren't there yeah so first of all are

69

00:03:17,990 --> 00:03:16,109

you familiar with the with the

70

00:03:20,930 --> 00:03:18,000

grandfather paradox which is known as

71

00:03:22,699 --> 00:03:20,940

the primary paradox of time travel yeah

72

00:03:24,530 --> 00:03:22,709

basically if you go back and kill your

73

00:03:27,259 --> 00:03:24,540

father or grandfather or something like

74

00:03:32,839 --> 00:03:27,269

that then you wouldn't be there to begin

75

00:03:35,809 --> 00:03:32,849

with type of situation yeah until you're

76

00:03:38,659 --> 00:03:35,819

let's say your grandfather before he met

77

00:03:40,699 --> 00:03:38,669

your grandmother before so your parents

78

00:03:42,110 --> 00:03:40,709

weren't conceived so you weren't born so

79

00:03:44,569 --> 00:03:42,120

actually you can't go back in time and

80

00:03:49,280 --> 00:03:44,579

kill your grandfather so it's a real

81

00:03:51,800 --> 00:03:49,290

paradox and surreal because ok it's time

82

00:03:53,080 --> 00:03:51,810

isn't impossible you know physicists

83

00:03:56,240 --> 00:03:53,090

don't say the time travel is impossible

84

00:04:00,229 --> 00:03:56,250

so it's a real paradox and it's not just

85

00:04:03,140 --> 00:04:00,239

some confusion it's a real question the

86

00:04:05,059 --> 00:04:03,150

well you know when follow the killing of

87

00:04:06,680 --> 00:04:05,069

course it makes it more colorful you

88

00:04:10,030 --> 00:04:06,690

don't need to get into such extreme

89

00:04:12,979 --> 00:04:10,040

events you can talk about much gain

90

00:04:14,900 --> 00:04:12,989

examples of the paradox but it is a real

91

00:04:17,270 --> 00:04:14,910

question what happens when you go back

92

00:04:21,050 --> 00:04:17,280

and you change the preconditions of the

93

00:04:26,630 --> 00:04:21,060

future so bright moving so that's what

94

00:04:27,680 --> 00:04:26,640

we try um in fact you know I wasn't even

95

00:04:30,560 --> 00:04:27,690

trying to so

96

00:04:35,420 --> 00:04:30,570

eh I was trying to see what happens

97

00:04:38,000 --> 00:04:35,430

where and you simulate it and then in

98

00:04:41,020 --> 00:04:38,010

order to simulate it you teach the

99

00:04:43,310 --> 00:04:41,030

program which is based on some

100

00:04:46,550 --> 00:04:43,320

artificial intelligence trying to

101  
00:04:51,490 --> 00:04:46,560  
capture causality okay basically you

102  
00:04:54,350 --> 00:04:51,500  
know a entails be okay so you teach the

103  
00:04:56,300 --> 00:04:54,360  
computers causality and then you teach

104  
00:04:59,780 --> 00:04:56,310  
you teach it about you give it a few

105  
00:05:00,950 --> 00:04:59,790  
definitions of time and then you hug you

106  
00:05:03,770 --> 00:05:00,960  
know there's a condition that in order

107  
00:05:07,010 --> 00:05:03,780  
to be a lie or if you get shot and

108  
00:05:09,170 --> 00:05:07,020  
you're not alive if you get parents and

109  
00:05:11,390 --> 00:05:09,180  
if your parents are alive and they must

110  
00:05:13,010 --> 00:05:11,400  
have been born in such etc so you teach

111  
00:05:16,250 --> 00:05:13,020  
all that to the computer and I was

112  
00:05:18,740 --> 00:05:16,260  
waiting to see the computer complain any

113  
00:05:21,230 --> 00:05:18,750

books and in fact it didn't it kept

114

00:05:23,030 --> 00:05:21,240

coming up with solutions and some of

115

00:05:26,450 --> 00:05:23,040

them actually makes sense so that was

116

00:05:28,790 --> 00:05:26,460

really really no this was really fun wow

117

00:05:30,620 --> 00:05:28,800

wow he has the function this is the fun

118

00:05:34,400 --> 00:05:30,630

part of a I so the program tried to

119

00:05:40,250 --> 00:05:34,410

overcome the paradox and I can tell you

120

00:05:44,420 --> 00:05:40,260

right okay yes please do so yeah one of

121

00:05:47,450 --> 00:05:44,430

the examples is this okay so you go back

122

00:05:50,330 --> 00:05:47,460

in time and you kill your and that's in

123

00:05:54,320 --> 00:05:50,340

this case we i simplified it so you kill

124

00:05:56,090 --> 00:05:54,330

your parents before but that's not a big

125

00:05:58,280 --> 00:05:56,100

change i can prove that this is the same

126  
00:06:01,040 --> 00:05:58,290  
essence of the paradox just like getting

127  
00:06:05,240 --> 00:06:01,050  
your grandparent okay so you kill your

128  
00:06:07,220 --> 00:06:05,250  
parent before they gave I'm sorry before

129  
00:06:10,159 --> 00:06:07,230  
they gave birth to you now what you

130  
00:06:15,380 --> 00:06:10,169  
don't flow is that you go back in time

131  
00:06:18,520 --> 00:06:15,390  
but before you kill you're a parent your

132  
00:06:22,550 --> 00:06:18,530  
parent goes to the future gives birth to

133  
00:06:24,110 --> 00:06:22,560  
use back okay so now you kin it but oh

134  
00:06:27,590 --> 00:06:24,120  
hey Morty you know your mother or your

135  
00:06:29,210 --> 00:06:27,600  
father but you they are earth to you in

136  
00:06:31,130 --> 00:06:29,220  
the future so you see when time travel

137  
00:06:32,630 --> 00:06:31,140  
is allowed you also you're not allowed

138  
00:06:33,890 --> 00:06:32,640

only to time travel to the past year

139

00:06:36,200 --> 00:06:33,900

also allowed to time travel to the

140

00:06:37,820 --> 00:06:36,210

future and this is how the computer

141

00:06:40,100 --> 00:06:37,830

programs whether God I didn't make this

142

00:06:41,519 --> 00:06:40,110

up the computer program this is how it

143

00:06:44,309 --> 00:06:41,529

suggested to

144

00:06:45,959 --> 00:06:44,319

to solve the paradox which you know you

145

00:06:47,939 --> 00:06:45,969

can argue whether it's interesting feel

146

00:06:49,589 --> 00:06:47,949

so free CLE or physics point of view but

147

00:06:52,409 --> 00:06:49,599

it does it for me it's interesting that

148

00:06:56,189 --> 00:06:52,419

it is a good story and that the AI came

149

00:06:57,989 --> 00:06:56,199

up with it so it basically came up with

150

00:07:00,509 --> 00:06:57,999

it for all the and all the different

151  
00:07:03,149 --> 00:07:00,519  
solutions presented of the different

152  
00:07:05,429 --> 00:07:03,159  
scenarios so time travel has always

153  
00:07:07,109 --> 00:07:05,439  
fascinated me even when I was a little

154  
00:07:09,359 --> 00:07:07,119  
kid there used to be a show called I

155  
00:07:11,099 --> 00:07:09,369  
can't remember what it was but they used

156  
00:07:13,349 --> 00:07:11,109  
to walk into this little time travel

157  
00:07:15,899 --> 00:07:13,359  
machine it was a series on TV it was

158  
00:07:19,559 --> 00:07:15,909  
pretty bad but I my time doc and Tony

159  
00:07:23,609 --> 00:07:19,569  
know what was it it might have been with

160  
00:07:25,439 --> 00:07:23,619  
Doug and Tony hmm I don't know I a

161  
00:07:29,369 --> 00:07:25,449  
swirling thing I don't know that was

162  
00:07:30,659 --> 00:07:29,379  
popular in Israel like love yeah well I

163  
00:07:33,829 --> 00:07:30,669

was really into it now and probably

164

00:07:36,239 --> 00:07:33,839

horrible to watch but but still it

165

00:07:38,299 --> 00:07:36,249

because of the different scenarios and I

166

00:07:40,889 --> 00:07:38,309

remember as a little kid saying

167

00:07:42,389 --> 00:07:40,899

obviously time travel will never happen

168

00:07:45,509 --> 00:07:42,399

because we don't see anyone from the

169

00:07:48,389 --> 00:07:45,519

future but I've also heard that travel

170

00:07:50,759 --> 00:07:48,399

into the past is impossible compared to

171

00:07:54,269 --> 00:07:50,769

travel into the future what are you what

172

00:07:57,529 --> 00:07:54,279

do you think about that so I want to

173

00:08:00,869 --> 00:07:57,539

emphasize that a lot you know physicists

174

00:08:03,419 --> 00:08:00,879

these are the gabrito an understanding

175

00:08:06,659 --> 00:08:03,429

of physicists people in maybe some

176

00:08:08,129 --> 00:08:06,669

philosophers I did read choir I don't

177

00:08:11,219 --> 00:08:08,139

know it and talk to physicists and

178

00:08:14,519 --> 00:08:11,229

philosophers and so time travel into the

179

00:08:16,529 --> 00:08:14,529

future is relatively simple because you

180

00:08:19,979 --> 00:08:16,539

know all you have to do is hop on it on

181

00:08:21,899 --> 00:08:19,989

a space ship that goes really i'm close

182

00:08:25,439 --> 00:08:21,909

to the you know the speed of light and

183

00:08:28,619 --> 00:08:25,449

then come back and then you kind of time

184

00:08:31,259 --> 00:08:28,629

travel into the future time travel into

185

00:08:33,990 --> 00:08:31,269

the past i think and again i'm not the

186

00:08:35,069 --> 00:08:34,000

feast extent but they would say some of

187

00:08:37,889 --> 00:08:35,079

them would say it happens all the time

188

00:08:39,659 --> 00:08:37,899

on this quantum level you know all these

189

00:08:41,189 --> 00:08:39,669

really really small particles but these

190

00:08:44,579 --> 00:08:41,199

anyway don't make sense you know what

191

00:08:46,889 --> 00:08:44,589

goes on there it's so non-intuitive what

192

00:08:48,600 --> 00:08:46,899

happens in the quantum level so what

193

00:08:50,369 --> 00:08:48,610

they're saying is that there are all

194

00:08:54,449 --> 00:08:50,379

kinds of things going on on the quantum

195

00:08:54,810 --> 00:08:54,459

level which could be ensure ever but and

196

00:08:56,250 --> 00:08:54,820

it's

197

00:08:57,570 --> 00:08:56,260

not in person of course they don't know

198

00:09:00,870 --> 00:08:57,580

how to do that but it's not impossible

199

00:09:03,660 --> 00:09:00,880

that you could find either with this

200

00:09:05,910 --> 00:09:03,670

cuanto nor with them you know the

201  
00:09:07,710 --> 00:09:05,920  
einstein theories to come up with

202  
00:09:10,650 --> 00:09:07,720  
something that would be equivalent to

203  
00:09:13,230 --> 00:09:10,660  
time travel on the microscopic level

204  
00:09:18,510 --> 00:09:13,240  
that is on the level of passing you or

205  
00:09:21,330 --> 00:09:18,520  
me or some device in time so it advanced

206  
00:09:23,970 --> 00:09:21,340  
physics they are not out ruling it you

207  
00:09:28,790 --> 00:09:23,980  
know right right I know that it quite

208  
00:09:32,460 --> 00:09:28,800  
far from it but they're not think it

209  
00:09:34,530 --> 00:09:32,470  
yeah I know there's a you know there's a

210  
00:09:38,010 --> 00:09:34,540  
lot of talk about their about alternate

211  
00:09:41,640 --> 00:09:38,020  
universes and things like that and does

212  
00:09:46,470 --> 00:09:41,650  
this computer program take any of that

213  
00:09:52,140 --> 00:09:46,480

into you know into the process at all of

214

00:09:55,320 --> 00:09:52,150

of theorizing and that so that's a good

215

00:09:58,230 --> 00:09:55,330

question so the thing is that the

216

00:10:00,390 --> 00:09:58,240

computer program you are supposed to

217

00:10:02,490 --> 00:10:00,400

tell it how you think the universe

218

00:10:05,640 --> 00:10:02,500

behaves so you are supposed to give it a

219

00:10:10,800 --> 00:10:05,650

few principles about space and time okay

220

00:10:12,690 --> 00:10:10,810

so and since I don't Oh universe works i

221

00:10:14,910 --> 00:10:12,700

mean the physicists don't know but I'm

222

00:10:16,950 --> 00:10:14,920

even more current than they are so I

223

00:10:19,590 --> 00:10:16,960

gave it kind of the common sense

224

00:10:23,670 --> 00:10:19,600

interpretation which is probably wrong

225

00:10:26,760 --> 00:10:23,680

you know but I to give it other

226

00:10:29,070 --> 00:10:26,770

interpretations so you could play around

227

00:10:31,200 --> 00:10:29,080

with it and see what happens you see so

228

00:10:34,380 --> 00:10:31,210

you could give it the in fact we show it

229

00:10:36,900 --> 00:10:34,390

in the paper alternate world

230

00:10:38,910 --> 00:10:36,910

interpretation or you could insist there

231

00:10:41,640 --> 00:10:38,920

are not words and it's all about the

232

00:10:47,580 --> 00:10:41,650

axiom students you give to the computer

233

00:10:51,150 --> 00:10:47,590

program right right um one of the the

234

00:10:54,000 --> 00:10:51,160

things that has talked about a lot and

235

00:10:56,520 --> 00:10:54,010

in time travel people are actually

236

00:10:58,110 --> 00:10:56,530

saying that they're finding old pictures

237

00:11:00,510 --> 00:10:58,120

and you know I think that's kind of

238

00:11:02,430 --> 00:11:00,520

hokey it's just plain pictures of people

239

00:11:04,200 --> 00:11:02,440

that you know like there's one of a guy

240

00:11:05,820 --> 00:11:04,210

carrying a cell phone supposedly but

241

00:11:08,310 --> 00:11:05,830

it's probably a cigarette case or

242

00:11:12,330 --> 00:11:08,320

something like that but

243

00:11:14,850 --> 00:11:12,340

how how would someone you could never

244

00:11:17,400 --> 00:11:14,860

really prove or a computer couldn't

245

00:11:20,460 --> 00:11:17,410

prove that there was people traveling

246

00:11:22,170 --> 00:11:20,470

into the past in any type of way uh as

247

00:11:25,410 --> 00:11:22,180

far as I know or is that something you

248

00:11:28,560 --> 00:11:25,420

could throw into the mix no

249

00:11:33,990 --> 00:11:28,570

unfortunately I don't think we can help

250

00:11:35,910 --> 00:11:34,000

with this dispute I think you know

251  
00:11:39,240 --> 00:11:35,920  
whether empirically you could time

252  
00:11:42,450 --> 00:11:39,250  
travel in the future do they are not out

253  
00:11:45,390 --> 00:11:42,460  
ruling it I think most people would

254  
00:11:48,540 --> 00:11:45,400  
agree that you know if time travel to

255  
00:11:51,450 --> 00:11:48,550  
our paths would be possible then you

256  
00:11:52,770 --> 00:11:51,460  
know the the car they you know where are

257  
00:11:54,840 --> 00:11:52,780  
all these time travel is why are they

258  
00:11:56,310 --> 00:11:54,850  
showing up so some people are saying you

259  
00:11:58,680 --> 00:11:56,320  
know that maybe we are not interesting

260  
00:12:00,690 --> 00:11:58,690  
enough I don't know I think to be honest

261  
00:12:04,110 --> 00:12:00,700  
common sense wise I think if there was a

262  
00:12:06,210 --> 00:12:04,120  
time machine we would you can take you

263  
00:12:10,110 --> 00:12:06,220

back to any point in time than they

264

00:12:12,420 --> 00:12:10,120

would have come visit us but you know my

265

00:12:17,940 --> 00:12:12,430

view you know is always to keep an open

266

00:12:19,680 --> 00:12:17,950

mind but strong claim is required as so

267

00:12:21,660 --> 00:12:19,690

if I would if I were to believe in time

268

00:12:26,010 --> 00:12:21,670

travel I would need more than one you

269

00:12:28,470 --> 00:12:26,020

know photo but also I think the

270

00:12:31,290 --> 00:12:28,480

physicists would say that even if a time

271

00:12:32,880 --> 00:12:31,300

machine kind of you know working time

272

00:12:35,400 --> 00:12:32,890

space would be possible and you could

273

00:12:37,710 --> 00:12:35,410

only time travel to the vicinity of the

274

00:12:40,770 --> 00:12:37,720

time where there the machine is built

275

00:12:43,200 --> 00:12:40,780

right where I could be both of the

276

00:12:46,590 --> 00:12:43,210

reason we will not meet angle please all

277

00:12:48,540 --> 00:12:46,600

these two travels but no yeah someone

278

00:12:51,540 --> 00:12:48,550

just wrote on the yard in the chat room

279

00:12:54,510 --> 00:12:51,550

they wish they could have time travel so

280

00:12:57,960 --> 00:12:54,520

they could fix all their problems that

281

00:13:00,120 --> 00:12:57,970

would be nice to go back and change you

282

00:13:03,560 --> 00:13:00,130

know but that's exactly what that's

283

00:13:06,570 --> 00:13:03,570

exactly one of me imperii because the

284

00:13:10,980 --> 00:13:06,580

immersive virtual reality this is why

285

00:13:13,530 --> 00:13:10,990

after we did the algorithms up with with

286

00:13:15,150 --> 00:13:13,540

Mel Slater I mean I i have a very group

287

00:13:20,060 --> 00:13:15,160

but he has a really really good virtual

288

00:13:24,680 --> 00:13:23,210

piercing something very meaning full and

289

00:13:28,400 --> 00:13:24,690

vertically like going back and changing

290

00:13:30,890 --> 00:13:28,410

it and and this is again I think it's an

291

00:13:34,400 --> 00:13:30,900

interesting poem right where you know as

292

00:13:37,040 --> 00:13:34,410

we live more significant parts of our

293

00:13:39,110 --> 00:13:37,050

lives digitally well you know that

294

00:13:42,350 --> 00:13:39,120

digitally you're not less it's different

295

00:13:44,590 --> 00:13:42,360

than the physical world so if in the

296

00:13:48,260 --> 00:13:44,600

digital world we can have time travel

297

00:13:51,410 --> 00:13:48,270

maybe we could some of these decisions

298

00:13:55,240 --> 00:13:51,420

you know of some form of a real

299

00:13:58,490 --> 00:13:55,250

experiences time travel interesting Wow

300

00:14:03,250 --> 00:13:58,500

so what about the part of quantum

301  
00:14:05,360 --> 00:14:03,260  
mechanics of when you get into say

302  
00:14:08,560 --> 00:14:05,370  
entanglement and things like that is

303  
00:14:11,750 --> 00:14:08,570  
that something that ever comes up when

304  
00:14:13,520 --> 00:14:11,760  
when you're throwing this these

305  
00:14:16,040 --> 00:14:13,530  
different things and I mean that's so

306  
00:14:18,440 --> 00:14:16,050  
unexplainable by itself and I've always

307  
00:14:20,210 --> 00:14:18,450  
wondered if there could be some type of

308  
00:14:25,270 --> 00:14:20,220  
computer program to figure out how that

309  
00:14:28,370 --> 00:14:25,280  
works um yeah so this is beyond my

310  
00:14:33,830 --> 00:14:28,380  
expertise this is where you know I would

311  
00:14:35,840 --> 00:14:33,840  
need to work work with the experts so I

312  
00:14:37,430 --> 00:14:35,850  
did get contacted now by one group of

313  
00:14:41,420 --> 00:14:37,440

experts who are looking into a program

314

00:14:44,960 --> 00:14:41,430

in the context of relativity theory and

315

00:14:48,830 --> 00:14:44,970

maybe to try and help explain thing or

316

00:14:52,040 --> 00:14:48,840

illustrate things and I don't think I

317

00:14:54,140 --> 00:14:52,050

think all we're trying to do formal

318

00:14:56,870 --> 00:14:54,150

models and equations you know there's

319

00:14:59,570 --> 00:14:56,880

not a big difference between equations

320

00:15:02,090 --> 00:14:59,580

and AI i think our contribution with the

321

00:15:05,450 --> 00:15:02,100

AI and the virtual reality is it might

322

00:15:07,640 --> 00:15:05,460

help make it more concrete and even the

323

00:15:12,470 --> 00:15:07,650

physicists my i hope might may find it

324

00:15:14,720 --> 00:15:12,480

useful to you know not necessarily to

325

00:15:17,210 --> 00:15:14,730

arrive new breakthrough the size but to

326

00:15:20,810 --> 00:15:17,220

understand what they're doing maybe give

327

00:15:22,690 --> 00:15:20,820

them some insights right right i'll be a

328

00:15:25,820 --> 00:15:22,700

lot of friend to go with quantum physics

329

00:15:28,160 --> 00:15:25,830

now i have to take just this quick break

330

00:15:31,250 --> 00:15:28,170

just ask you is there a way you can look

331

00:15:32,900 --> 00:15:31,260

on your phone to see i'm not sure how

332

00:15:35,360 --> 00:15:32,910

the google hangout

333

00:15:36,920 --> 00:15:35,370

app works but are you able to speak

334

00:15:41,150 --> 00:15:36,930

through your headset like you would if

335

00:15:43,580 --> 00:15:41,160

you were talking on the phone um you

336

00:15:47,420 --> 00:15:43,590

mean without the speaker just through

337

00:15:50,600 --> 00:15:47,430

the speaker yeah I could that I could

338

00:15:52,160 --> 00:15:50,610

that I could do that okay because it's

339

00:15:55,100 --> 00:15:52,170

all I'm having a little bit of

340

00:16:01,640 --> 00:15:55,110

difficulty understanding um everything

341

00:16:05,480 --> 00:16:01,650

that you're saying um yes well you know

342

00:16:12,680 --> 00:16:05,490

what to good okay I'll try to figure out

343

00:16:16,100 --> 00:16:12,690

how to do that okay no problem when when

344

00:16:18,170 --> 00:16:16,110

you get into this topic you I know that

345

00:16:20,750 --> 00:16:18,180

you were doing a lot of other work and

346

00:16:26,210 --> 00:16:20,760

so let's talk a little bit about that to

347

00:16:28,100 --> 00:16:26,220

the brain thought and NVR or this sounds

348

00:16:29,870 --> 00:16:28,110

like some type of work that would be

349

00:16:33,890 --> 00:16:29,880

really good for people that are say

350

00:16:37,700 --> 00:16:33,900

paralyzed or yeah that sounds better can

351  
00:16:39,500 --> 00:16:37,710  
you hear me okay yeah yeah yeah other

352  
00:16:43,310 --> 00:16:39,510  
than the limitations of the internet I

353  
00:16:46,220 --> 00:16:43,320  
think we're quite good yeah so the other

354  
00:16:49,130 --> 00:16:46,230  
or the main line of research that we do

355  
00:16:52,600 --> 00:16:49,140  
is brain computer interfaces some would

356  
00:16:57,200 --> 00:16:52,610  
call it brain machine interfaces and

357  
00:17:01,160 --> 00:16:57,210  
only do the idea is very is relatively

358  
00:17:03,410 --> 00:17:01,170  
simple the idea is to pick up some

359  
00:17:05,900 --> 00:17:03,420  
information coming out from your brain

360  
00:17:08,510 --> 00:17:05,910  
you know we we can just a few ways we

361  
00:17:13,460 --> 00:17:08,520  
can record brain activity you know even

362  
00:17:15,980 --> 00:17:13,470  
if they are speaking now we could record

363  
00:17:19,990 --> 00:17:15,990

a brain activity and then in principle

364

00:17:22,280 --> 00:17:20,000

we know how to try to encode or decode

365

00:17:23,930 --> 00:17:22,290

some of these brain activity because

366

00:17:26,690 --> 00:17:23,940

some of the mental patterns you know

367

00:17:28,640 --> 00:17:26,700

so-called thoughts and then once we

368

00:17:31,280 --> 00:17:28,650

recorded it we can use it and send it to

369

00:17:34,400 --> 00:17:31,290

any kind of device and actually kind of

370

00:17:36,170 --> 00:17:34,410

device by thought so the idea is not

371

00:17:40,850 --> 00:17:36,180

very complicated it's been around since

372

00:17:44,240 --> 00:17:40,860

the 1970s I think in practice the main

373

00:17:46,080 --> 00:17:44,250

limitation is of course a extracting

374

00:17:48,060 --> 00:17:46,090

really good information from

375

00:17:51,690 --> 00:17:48,070

brain of a person you know who's alive

376

00:17:54,600 --> 00:17:51,700

and decoding this information but it's

377

00:17:57,000 --> 00:17:54,610

not impossible community you've been

378

00:18:01,590 --> 00:17:57,010

doing making progress especially in the

379

00:18:03,720 --> 00:18:01,600

last 20 years well now when I think of

380

00:18:06,210 --> 00:18:03,730

like brain activity it just seems like

381

00:18:10,409 --> 00:18:06,220

they would be like electronic pulses

382

00:18:13,140 --> 00:18:10,419

going through I just don't understand

383

00:18:14,940 --> 00:18:13,150

how a thought could be interpreted and

384

00:18:18,960 --> 00:18:14,950

turned into code can you kind of explain

385

00:18:21,600 --> 00:18:18,970

why don't ya it's it's so when you think

386

00:18:24,630 --> 00:18:21,610

right like that everyone was alive you

387

00:18:29,130 --> 00:18:24,640

have a lot of neurons in your brain that

388

00:18:32,730 --> 00:18:29,140

are firing in fact 10 to the power of 11

389

00:18:35,159 --> 00:18:32,740

or bronze to the power of 15 synapses so

390

00:18:39,330 --> 00:18:35,169

it's like very huge numbers but they

391

00:18:43,019 --> 00:18:39,340

generate electrical activity okay de la

392

00:18:44,730 --> 00:18:43,029

a cricket is very very weak and we need

393

00:18:46,409 --> 00:18:44,740

to measure it through your skull unless

394

00:18:50,940 --> 00:18:46,419

you know you're willing to go through

395

00:18:53,789 --> 00:18:50,950

some implant and which you know some

396

00:18:55,110 --> 00:18:53,799

medical reasons people do but unless you

397

00:18:58,110 --> 00:18:55,120

put an implant you have to learn either

398

00:19:00,450 --> 00:18:58,120

this electrical activity from wow so

399

00:19:04,500 --> 00:19:00,460

these are the challenges but still they

400

00:19:09,480 --> 00:19:04,510

after a hundred years of EG research we

401  
00:19:12,659 --> 00:19:09,490  
know how to detect certain thing is you

402  
00:19:15,120 --> 00:19:12,669  
know electrical fields generated by your

403  
00:19:19,230 --> 00:19:15,130  
brain so when you think about your right

404  
00:19:20,669 --> 00:19:19,240  
hand you know also your left hemisphere

405  
00:19:22,769 --> 00:19:20,679  
changes a little bit when you think

406  
00:19:26,870 --> 00:19:22,779  
about your left hand we see the response

407  
00:19:29,580 --> 00:19:26,880  
in the right hemisphere so we can try to

408  
00:19:32,340 --> 00:19:29,590  
decode you know it's very far from

409  
00:19:35,190 --> 00:19:32,350  
specific thoughts and especially with

410  
00:19:37,080 --> 00:19:35,200  
EEG but we can try to decode for example

411  
00:19:40,230 --> 00:19:37,090  
if you're imagining right hand movement

412  
00:19:43,830 --> 00:19:40,240  
or left hi by the way if we have

413  
00:19:47,519 --> 00:19:43,840

invasive electrodes we can train there

414

00:19:51,090 --> 00:19:47,529

are examples where that they can really

415

00:19:53,659 --> 00:19:51,100

very specific in mental patterns such as

416

00:19:57,000 --> 00:19:53,669

thinking about a very specific person

417

00:19:59,620 --> 00:19:57,010

and it's not impossible you don't even

418

00:20:01,360 --> 00:19:59,630

you don't even know

419

00:20:02,980 --> 00:20:01,370

need to know the code of the brain you

420

00:20:05,650 --> 00:20:02,990

just do a lot of machine learning and

421

00:20:06,820 --> 00:20:05,660

June and of course I'm just telling the

422

00:20:13,120 --> 00:20:06,830

brain helps are you there still by the

423

00:20:16,000 --> 00:20:13,130

way Wow uh so how how would this work in

424

00:20:18,400 --> 00:20:16,010

virtual reality in other words I saw a

425

00:20:20,770 --> 00:20:18,410

video where it showed where someone was

426

00:20:23,050 --> 00:20:20,780

actually like thinking them their way

427

00:20:28,750 --> 00:20:23,060

through this tropical island how does

428

00:20:31,440 --> 00:20:28,760

that how does that work right so and we

429

00:20:35,140 --> 00:20:31,450

were one of the first groups back in

430

00:20:40,140 --> 00:20:35,150

2003 that started connecting the brain

431

00:20:42,580 --> 00:20:40,150

computer interface to virtual reality

432

00:20:45,070 --> 00:20:42,590

imagine that we can detect if you are

433

00:20:47,260 --> 00:20:45,080

thinking about your right hand your left

434

00:20:50,050 --> 00:20:47,270

hand or feet and i will tell you okay

435

00:20:51,400 --> 00:20:50,060

here's this avatar and now you control

436

00:20:53,470 --> 00:20:51,410

it if you want to go forward just

437

00:20:55,600 --> 00:20:53,480

imagine your feet imagine that you're

438

00:20:57,340 --> 00:20:55,610

walking if you want to turn right

439

00:20:59,560 --> 00:20:57,350

imagine your right hand if you want to

440

00:21:01,810 --> 00:20:59,570

turn left and legend move in your left

441

00:21:06,820 --> 00:21:01,820

hand and this way you control an avatar

442

00:21:09,660 --> 00:21:06,830

and you start performing tasks so we've

443

00:21:12,720 --> 00:21:09,670

done this with eg starting in tooth

444

00:21:17,800 --> 00:21:12,730

fairy with colleagues in Austria and

445

00:21:20,440 --> 00:21:17,810

then in 2010 we started a large project

446

00:21:23,680 --> 00:21:20,450

where we did this with a with an fMRI

447

00:21:26,170 --> 00:21:23,690

machine so that's these very expensive

448

00:21:29,500 --> 00:21:26,180

large scanners that you can find in

449

00:21:32,020 --> 00:21:29,510

hospitals and these are not very

450

00:21:35,470 --> 00:21:32,030

accessible and quite expensive but they

451

00:21:38,140 --> 00:21:35,480

give you better resolution so better

452

00:21:44,260 --> 00:21:38,150

information from the brain we were able

453

00:21:50,500 --> 00:21:44,270

to squeeze your phone people perform

454

00:21:52,810 --> 00:21:50,510

more complex tasks um what so what do

455

00:21:54,970 --> 00:21:52,820

you think the future I mean it's

456

00:21:57,700 --> 00:21:54,980

probably your just probably on the the

457

00:21:59,950 --> 00:21:57,710

bottom floor on this as far as if the

458

00:22:02,710 --> 00:21:59,960

technology goes do you think eventually

459

00:22:06,370 --> 00:22:02,720

that will be able to control things say

460

00:22:10,750 --> 00:22:06,380

in our household stuff like that yeah

461

00:22:13,140 --> 00:22:10,760

yeah absolutely i think it's it's very

462

00:22:16,980 --> 00:22:13,150

very challenging

463

00:22:19,659 --> 00:22:16,990

very far from you know thought reading

464

00:22:22,840 --> 00:22:19,669

and certainly with you know with

465

00:22:25,930 --> 00:22:22,850

consumer level electronics but i also

466

00:22:28,780 --> 00:22:25,940

have a lot of respect to you know the

467

00:22:31,480 --> 00:22:28,790

Silicon Valley so you know once they

468

00:22:35,110 --> 00:22:31,490

figure out that this is the next thing

469

00:22:37,390 --> 00:22:35,120

they they think as consumers should be

470

00:22:41,110 --> 00:22:37,400

doing then they just put a lot of money

471

00:22:42,250 --> 00:22:41,120

a lot of very smart people and start how

472

00:22:45,100 --> 00:22:42,260

to make it you know a little bit easier

473

00:22:46,840 --> 00:22:45,110

a little faster and because in the

474

00:22:49,060 --> 00:22:46,850

science labs we know how to do that you

475

00:22:52,299 --> 00:22:49,070

see using very expensive and very

476  
00:22:55,240 --> 00:22:52,309  
invasive methods we know how to do this

477  
00:22:57,760 --> 00:22:55,250  
thing so that the it's not impossible

478  
00:23:00,250 --> 00:22:57,770  
again it's just a matter of faith

479  
00:23:01,870 --> 00:23:00,260  
engineering but it looks like one of

480  
00:23:05,950 --> 00:23:01,880  
these things that sooner or later I

481  
00:23:08,140 --> 00:23:05,960  
think Silicon Valley definitely try to

482  
00:23:09,970 --> 00:23:08,150  
build now I know this sounds kind of

483  
00:23:11,970 --> 00:23:09,980  
wacky but do you ever think there'll be

484  
00:23:16,840 --> 00:23:11,980  
a time where there could be a wireless

485  
00:23:19,350 --> 00:23:16,850  
almost like telepathy to to this through

486  
00:23:21,039 --> 00:23:19,360  
this type of thing or is it always

487  
00:23:26,169 --> 00:23:21,049  
someone always going to have to be

488  
00:23:28,270 --> 00:23:26,179

connected like wired in do you think so

489

00:23:31,450 --> 00:23:28,280

again this is very very challenging

490

00:23:34,299 --> 00:23:31,460

right now our challenges are just to get

491

00:23:38,140 --> 00:23:34,309

the information but the physicists are

492

00:23:40,930 --> 00:23:38,150

saying you know what if you can get the

493

00:23:43,919 --> 00:23:40,940

information from the electric field then

494

00:23:48,820 --> 00:23:43,929

it's possible to measure it remotely

495

00:23:50,799 --> 00:23:48,830

really wow so yeah so right now they're

496

00:23:52,840 --> 00:23:50,809

they're able to measure for example your

497

00:23:59,490 --> 00:23:52,850

heart rate remote remote key which is

498

00:24:01,840 --> 00:23:59,500

also i think quite impressive and friday

499

00:24:02,980 --> 00:24:01,850

some psychological you know if you do it

500

00:24:06,850 --> 00:24:02,990

really accurately in you know the

501  
00:24:09,659 --> 00:24:06,860  
context then you can infer some things

502  
00:24:13,960 --> 00:24:09,669  
about your responses and remotely

503  
00:24:15,640 --> 00:24:13,970  
without your being aware of that and in

504  
00:24:18,250 --> 00:24:15,650  
principle and again this is where i'm

505  
00:24:21,730 --> 00:24:18,260  
not the clear physicists and more into

506  
00:24:23,350 --> 00:24:21,740  
the algorithms i think right now our

507  
00:24:25,030 --> 00:24:23,360  
problems are much more difficult in

508  
00:24:26,850 --> 00:24:25,040  
other fronts but who knows maybe they'll

509  
00:24:28,410 --> 00:24:26,860  
be able to do it without

510  
00:24:32,220 --> 00:24:28,420  
actually attaching and Alex road to your

511  
00:24:34,020 --> 00:24:32,230  
brain aha someone in charge doesn't seem

512  
00:24:38,039 --> 00:24:34,030  
like a very doesn't seem very likely

513  
00:24:40,440 --> 00:24:38,049

right now but who knows I know look how

514

00:24:42,539 --> 00:24:40,450

much technology has changed just in you

515

00:24:45,000 --> 00:24:42,549

know 10 years or even think you know a

516

00:24:48,930 --> 00:24:45,010

few years so who knows what another

517

00:24:51,630 --> 00:24:48,940

actually 50 years will change in the

518

00:24:54,320 --> 00:24:51,640

chat room someone wanted to know are you

519

00:24:59,730 --> 00:24:54,330

familiar with Google's idea of super

520

00:25:02,150 --> 00:24:59,740

super AI uh yeah yeah i mean i muck they

521

00:25:05,310 --> 00:25:02,160

must have quite a lot of things by now

522

00:25:08,549 --> 00:25:05,320

thou research to understand the brain we

523

00:25:11,539 --> 00:25:08,559

use machine learning we use the same

524

00:25:13,980 --> 00:25:11,549

kind of techniques that the endow

525

00:25:15,870 --> 00:25:13,990

working really really hard on you know

526

00:25:19,049 --> 00:25:15,880

they are in Google they are mostly

527

00:25:21,450 --> 00:25:19,059

trying to understand images and maybe

528

00:25:23,880 --> 00:25:21,460

voice recognition and we are applying

529

00:25:27,409 --> 00:25:23,890

similar methods to understand brain

530

00:25:31,710 --> 00:25:27,419

signals images of brain scans for exam

531

00:25:34,740 --> 00:25:31,720

so it's relatively similar and once they

532

00:25:36,360 --> 00:25:34,750

they you know once they is important

533

00:25:38,520 --> 00:25:36,370

they get up all the smallest people in

534

00:25:42,409 --> 00:25:38,530

the world get them to work really hard

535

00:25:45,060 --> 00:25:42,419

and they get really outstanding results

536

00:25:49,350 --> 00:25:45,070

right now what are your what are your

537

00:25:52,200 --> 00:25:49,360

thoughts on I think it's ray kurzweil a

538

00:25:59,250 --> 00:25:52,210

singularity on do you think that's a

539

00:26:03,120 --> 00:25:59,260

possibility in the future so yeah you

540

00:26:07,530 --> 00:26:03,130

see this is the thing that I think ray

541

00:26:11,370 --> 00:26:07,540

quotes were raises good questions but my

542

00:26:13,770 --> 00:26:11,380

my problem as a scientist is that he has

543

00:26:18,510 --> 00:26:13,780

no evidence whatsoever for the answers

544

00:26:20,850 --> 00:26:18,520

he is providing you say so well the

545

00:26:21,900 --> 00:26:20,860

whole discussion about singularity is

546

00:26:24,690 --> 00:26:21,910

interesting by the way it's not very

547

00:26:26,430 --> 00:26:24,700

good sign the guy that first raised this

548

00:26:28,830 --> 00:26:26,440

issue of what happens with computers

549

00:26:31,980 --> 00:26:28,840

will be as smart as we are or smaller

550

00:26:34,770 --> 00:26:31,990

it's John for Newman very very serious

551  
00:26:37,680 --> 00:26:34,780  
scientists in this twentieth century so

552  
00:26:40,850 --> 00:26:37,690  
the questions are good but jumping from

553  
00:26:43,910 --> 00:26:40,860  
the questions to the conclusions

554  
00:26:46,250 --> 00:26:43,920  
that we thing in 20 29 and then deciding

555  
00:26:48,560 --> 00:26:46,260  
that we can upload our consciousness to

556  
00:26:51,350 --> 00:26:48,570  
the cloud or whatever we'll all live in

557  
00:26:54,650 --> 00:26:51,360  
some you know Google sphere or some are

558  
00:26:58,700 --> 00:26:54,660  
ever so these are very very these are

559  
00:27:00,890 --> 00:26:58,710  
conclusions that are not do not rely on

560  
00:27:03,710 --> 00:27:00,900  
any only evidence so I think what what

561  
00:27:07,970 --> 00:27:03,720  
happens in records violin and others

562  
00:27:09,980 --> 00:27:07,980  
were into singularities mixing hello lot

563  
00:27:16,760 --> 00:27:09,990

of evidence and science with a lot of

564

00:27:18,110 --> 00:27:16,770

which and in speculation I I think I you

565

00:27:22,460 --> 00:27:18,120

know you imagine if someone could

566

00:27:25,030 --> 00:27:22,470

actually download say thoughts of their

567

00:27:28,180 --> 00:27:25,040

brain for instance of someone that's a

568

00:27:30,919 --> 00:27:28,190

specialist someone that has a lot of

569

00:27:33,400 --> 00:27:30,929

knowledge of a certain subject or

570

00:27:35,930 --> 00:27:33,410

something like that I mean if you could

571

00:27:37,039 --> 00:27:35,940

instantly I think that was in the matrix

572

00:27:40,190 --> 00:27:37,049

or something like that where you could

573

00:27:43,159 --> 00:27:40,200

you know download uh you know memories

574

00:27:44,510 --> 00:27:43,169

or whatever it is but that would really

575

00:27:46,400 --> 00:27:44,520

be something you know a lot of times I

576

00:27:49,039 --> 00:27:46,410

I'm in the fine arts and antiques

577

00:27:50,570 --> 00:27:49,049

business authority this is science okay

578

00:27:55,580 --> 00:27:50,580

no no I know I'm off I'm off on

579

00:27:57,320 --> 00:27:55,590

something else sorry yeah okay yeah yeah

580

00:27:59,570 --> 00:27:57,330

I was just thinking you know a lot of

581

00:28:01,760 --> 00:27:59,580

times when someone has so much knowledge

582

00:28:03,860 --> 00:28:01,770

and then they're gone all that knowledge

583

00:28:05,570 --> 00:28:03,870

if it's not written into a book or

584

00:28:08,150 --> 00:28:05,580

something that is just plain gone it

585

00:28:11,510 --> 00:28:08,160

would be just really amazing if someday

586

00:28:13,700 --> 00:28:11,520

someone could actually download their

587

00:28:16,730 --> 00:28:13,710

specialty or whatever and you know to

588

00:28:19,100 --> 00:28:16,740

help education move ahead you know that

589

00:28:22,100 --> 00:28:19,110

I I'm kind of battling I are completely

590

00:28:25,280 --> 00:28:22,110

agree I completely agree so we had

591

00:28:27,730 --> 00:28:25,290

another project which was about the

592

00:28:31,909 --> 00:28:27,740

proxy and again this was funded by the

593

00:28:34,130 --> 00:28:31,919

Union and so we had a few years some

594

00:28:36,289 --> 00:28:34,140

budget to claim with it so the idea is

595

00:28:39,740 --> 00:28:36,299

that we try to build a clone of you you

596

00:28:42,080 --> 00:28:39,750

know from your digital whatever so again

597

00:28:43,760 --> 00:28:42,090

this thing institue them properly you

598

00:28:45,710 --> 00:28:43,770

have to have the whole industry be

599

00:28:48,190 --> 00:28:45,720

involved but it's not we show that it's

600

00:28:52,280 --> 00:28:48,200

not impossible you want to take on on

601  
00:28:54,440 --> 00:28:52,290  
digital life and then create a digital

602  
00:28:58,430 --> 00:28:54,450  
clone of fuel but

603  
00:29:01,340 --> 00:28:58,440  
being made to to respond to things and

604  
00:29:05,690 --> 00:29:01,350  
kind of maybe replace you to some extent

605  
00:29:09,260 --> 00:29:05,700  
to some extent so advanced we are

606  
00:29:11,900 --> 00:29:09,270  
playing with today at that possible to

607  
00:29:13,400 --> 00:29:11,910  
start playing with these ideas yeah you

608  
00:29:16,100 --> 00:29:13,410  
must really enjoy what you do that

609  
00:29:17,900 --> 00:29:16,110  
sounds pretty exciting actually you know

610  
00:29:20,770 --> 00:29:17,910  
what you are right you are right as i

611  
00:29:23,750 --> 00:29:20,780  
said this is my second career after

612  
00:29:27,050 --> 00:29:23,760  
intrapreneurial industry i realized that

613  
00:29:29,930 --> 00:29:27,060

you know to have fun i really i moved to

614

00:29:32,300 --> 00:29:29,940

to university and that's where where I'm

615

00:29:34,430 --> 00:29:32,310

allowed to really do what I'm you know

616

00:29:38,480 --> 00:29:34,440

what you were you're interested in yeah

617

00:29:42,290 --> 00:29:38,490

yeah it's a lot of fun these days I bet

618

00:29:43,640 --> 00:29:42,300

now someone like going back to the Act

619

00:29:48,380 --> 00:29:43,650

to the time travel thing in the chat

620

00:29:51,740 --> 00:29:48,390

room well let's see it in your

621

00:29:53,050 --> 00:29:51,750

understanding is time travel does time

622

00:29:57,800 --> 00:29:53,060

probably have anything to do with

623

00:30:01,130 --> 00:29:57,810

spiritual dimensions I don't know no I'm

624

00:30:04,070 --> 00:30:01,140

I'm again I'm open-minded but I have no

625

00:30:05,990 --> 00:30:04,080

belief in spiritual what so ever again

626

00:30:07,400 --> 00:30:06,000

because we don't need this you know we

627

00:30:09,920 --> 00:30:07,410

don't need to assume any spirituality

628

00:30:12,890 --> 00:30:09,930

you know the world is so complicated the

629

00:30:17,210 --> 00:30:12,900

brain is so complicated you know so

630

00:30:18,560 --> 00:30:17,220

science is very far from explaining

631

00:30:22,610 --> 00:30:18,570

everything there is to know about the

632

00:30:25,220 --> 00:30:22,620

brain and the mind so for me it's it's

633

00:30:27,830 --> 00:30:25,230

fast it's an ad for you start talking

634

00:30:29,570 --> 00:30:27,840

about spirituality okay yeah we're not

635

00:30:32,960 --> 00:30:29,580

even there you know there's the so many

636

00:30:35,600 --> 00:30:32,970

mysteries before oh you know the brain

637

00:30:39,860 --> 00:30:35,610

itself is just you know such a mystery

638

00:30:44,870 --> 00:30:39,870

there's so much exploring to do when it

639

00:30:47,660 --> 00:30:44,880

comes to that now are you I think this

640

00:30:49,880 --> 00:30:47,670

question in the message board is a are

641

00:30:53,380 --> 00:30:49,890

you optimistic or pessimistic about the

642

00:30:56,090 --> 00:30:53,390

future and I don't know if that means

643

00:30:58,330 --> 00:30:56,100

technology or but i'm sure you're

644

00:31:01,940 --> 00:30:58,340

probably optimistic about technology

645

00:31:04,870 --> 00:31:01,950

yeah i guess the quiz thing about your

646

00:31:07,940 --> 00:31:04,880

elected president or something like yeah

647

00:31:10,509 --> 00:31:07,950

it's about so

648

00:31:12,710 --> 00:31:10,519

the if you're talking about technology

649

00:31:15,799 --> 00:31:12,720

there is what we call the techno

650

00:31:17,600 --> 00:31:15,809

dystopia if we stop in view which is oh

651  
00:31:20,120 --> 00:31:17,610  
my God we're all going to turn in a row

652  
00:31:22,220 --> 00:31:20,130  
Oh boats are going to kill us or control

653  
00:31:24,620 --> 00:31:22,230  
the world or whatever or we're all going

654  
00:31:26,870 --> 00:31:24,630  
to be spending our lives there in the

655  
00:31:29,570 --> 00:31:26,880  
phones so that's a very pessimistic view

656  
00:31:32,299 --> 00:31:29,580  
which I'm really I'm not buying it i'll

657  
00:31:34,430 --> 00:31:32,309  
tell you why but then the very

658  
00:31:36,889 --> 00:31:34,440  
optimistic view which is a singer Larry

659  
00:31:39,860 --> 00:31:36,899  
you know some very very influential

660  
00:31:41,360 --> 00:31:39,870  
trends in Silicon Valley where they say

661  
00:31:44,120 --> 00:31:41,370  
you know technology is the solution to

662  
00:31:45,620 --> 00:31:44,130  
all our problems you know like global

663  
00:31:47,240 --> 00:31:45,630

warming yeah we'll just fix it with

664

00:31:49,820 --> 00:31:47,250

technology you know people killing each

665

00:31:51,649 --> 00:31:49,830

other yet I will know technology and

666

00:31:54,649 --> 00:31:51,659

technology will solve all humanity

667

00:31:57,769 --> 00:31:54,659

problems and I don't buy that either so

668

00:32:00,110 --> 00:31:57,779

I'm kind of more in the middle in terms

669

00:32:03,200 --> 00:32:00,120

that you know humans have always been

670

00:32:04,580 --> 00:32:03,210

dependent on technology and co-evolving

671

00:32:08,690 --> 00:32:04,590

with the technology we are developing

672

00:32:10,580 --> 00:32:08,700

and it's not going to change and it is

673

00:32:12,620 --> 00:32:10,590

going to change in the sense of the

674

00:32:15,769 --> 00:32:12,630

technology is changing but the

675

00:32:18,259 --> 00:32:15,779

dependence is all it's been around you

676

00:32:21,350 --> 00:32:18,269

offer many many thousands of years and

677

00:32:23,240 --> 00:32:21,360

we keep we keep inventing ourselves else

678

00:32:25,820 --> 00:32:23,250

knowledge ease but it's not about

679

00:32:31,180 --> 00:32:25,830

pessimistic or optimistic I think you

680

00:32:35,629 --> 00:32:33,440

you know someone made a good point in

681

00:32:38,299 --> 00:32:35,639

that kind of as a joke in the chat room

682

00:32:41,360 --> 00:32:38,309

but I've seen the movie it will happen

683

00:32:44,120 --> 00:32:41,370

and all the movies that you see on the

684

00:32:45,919 --> 00:32:44,130

future it does seem you know pretty

685

00:32:47,509 --> 00:32:45,929

pitiful like we're always being

686

00:32:50,450 --> 00:32:47,519

destroyed by or destroying ourselves

687

00:32:54,100 --> 00:32:50,460

which that is you know that is

688

00:32:57,080 --> 00:32:54,110

unfortunately a possibility you know

689

00:33:00,019 --> 00:32:57,090

there are different scenarios that could

690

00:33:05,830 --> 00:33:00,029

happen I think we have to grow a lot I'm

691

00:33:09,169 --> 00:33:05,840

still as socialite there no reason to

692

00:33:10,789 --> 00:33:09,179

yeah there is no reason to be too

693

00:33:14,060 --> 00:33:10,799

pessimistic because we can look at

694

00:33:15,740 --> 00:33:14,070

history you know and in history like for

695

00:33:19,250 --> 00:33:15,750

now if you look around do you have some

696

00:33:21,149 --> 00:33:19,260

amazing technologies that changed the

697

00:33:23,549 --> 00:33:21,159

word like we are now

698

00:33:25,789 --> 00:33:23,559

maybe with not perfect quality but we

699

00:33:29,479 --> 00:33:25,799

are talking on a very very low cost

700

00:33:31,830 --> 00:33:29,489

consumer device over huge distances and

701  
00:33:34,169 --> 00:33:31,840  
this is something that was unconceivable

702  
00:33:36,359 --> 00:33:34,179  
to our you know our grandparents or

703  
00:33:38,339 --> 00:33:36,369  
whatever if you look at the history

704  
00:33:39,599 --> 00:33:38,349  
there were always people saying wow this

705  
00:33:41,070 --> 00:33:39,609  
is going to be the end of the lecture

706  
00:33:45,149 --> 00:33:41,080  
you should read what people wrote

707  
00:33:48,629 --> 00:33:45,159  
winning van cameras in the middle of the

708  
00:33:51,269 --> 00:33:48,639  
19th century so people were always

709  
00:33:53,460 --> 00:33:51,279  
terrified of the possibilities and then

710  
00:33:55,560 --> 00:33:53,470  
you realize we just set up adapt or coed

711  
00:33:58,769 --> 00:33:55,570  
apt with technology so and it's not

712  
00:34:01,889 --> 00:33:58,779  
always perfect no we sometimes we lose

713  
00:34:03,810 --> 00:34:01,899

of the the good things we had before we

714

00:34:06,419 --> 00:34:03,820

had these technologies but it really

715

00:34:09,750 --> 00:34:06,429

never had leads to disaster I mean we're

716

00:34:11,730 --> 00:34:09,760

still here yes I think it's kind of

717

00:34:14,579 --> 00:34:11,740

working for us so far with a million in

718

00:34:18,029 --> 00:34:14,589

terms of humanity and technology right I

719

00:34:20,190 --> 00:34:18,039

think if there are some safeties set in

720

00:34:24,599 --> 00:34:20,200

place you know a lot of times I've heard

721

00:34:27,359 --> 00:34:24,609

the scenario where if a AI starts

722

00:34:29,760 --> 00:34:27,369

recreating itself and it's given a

723

00:34:31,799 --> 00:34:29,770

problem say solve this and which

724

00:34:35,129 --> 00:34:31,809

actually turned into destroying you know

725

00:34:36,869 --> 00:34:35,139

the human entities or whatever but if I

726

00:34:39,450 --> 00:34:36,879

think if there are safeties put in place

727

00:34:41,940 --> 00:34:39,460

no matter where we go in technology then

728

00:34:43,710 --> 00:34:41,950

we can eliminate the threats that could

729

00:34:46,529 --> 00:34:43,720

possibly happen but you have to have a

730

00:34:48,210 --> 00:34:46,539

lot of fail-safes so those things you

731

00:34:50,369 --> 00:34:48,220

know couldn't happen but but this is a

732

00:34:52,919 --> 00:34:50,379

very difficult good because you know

733

00:34:55,500 --> 00:34:52,929

who's gonna put these safety regulations

734

00:34:57,960 --> 00:34:55,510

do you trust the government's hmm I

735

00:34:59,460 --> 00:34:57,970

don't know do you trust you even if you

736

00:35:02,400 --> 00:34:59,470

trust your own government you trust the

737

00:35:07,200 --> 00:35:02,410

government of fellows Korea or Iran or

738

00:35:11,160 --> 00:35:07,210

whatever to to you know to regulate

739

00:35:13,470 --> 00:35:11,170

certain technologies why I agreed that

740

00:35:15,029 --> 00:35:13,480

you know when it to be edited and we

741

00:35:18,210 --> 00:35:15,039

need to understand implications and

742

00:35:19,559 --> 00:35:18,220

society engage understand and make

743

00:35:23,099 --> 00:35:19,569

regulations but i'm not sure i have

744

00:35:25,049 --> 00:35:23,109

anyone to trust here so this is where

745

00:35:27,930 --> 00:35:25,059

i'm a bit more and concerning the show

746

00:35:29,700 --> 00:35:27,940

Oh turn it's not so easy to put in

747

00:35:31,170 --> 00:35:29,710

regulations there's never been a case

748

00:35:32,760 --> 00:35:31,180

where humanity said no we don't want

749

00:35:34,760 --> 00:35:32,770

this technology so you know will not

750

00:35:39,350 --> 00:35:34,770

will not use it

751

00:35:42,140 --> 00:35:39,360

right right yeah yep interesting so as

752

00:35:44,240 --> 00:35:42,150

far as sup as far as the work you're

753

00:35:46,160 --> 00:35:44,250

doing you mentioned earlier that you had

754

00:35:49,070 --> 00:35:46,170

some funding and you were working on

755

00:35:51,860 --> 00:35:49,080

different projects what about someone

756

00:35:57,020 --> 00:35:51,870

that has handicapped oh you're doing any

757

00:36:01,250 --> 00:35:57,030

type of work as far as that goes yes yes

758

00:36:05,900 --> 00:36:01,260

this is the brain-computer community now

759

00:36:08,840 --> 00:36:05,910

is trying to help our people because

760

00:36:11,570 --> 00:36:08,850

again it has relatively little off to

761

00:36:13,430 --> 00:36:11,580

offer people who are who are healthy

762

00:36:17,620 --> 00:36:13,440

they would better off be using their

763

00:36:21,650 --> 00:36:17,630

bodies but there's people doing great

764

00:36:26,390 --> 00:36:21,660

gray Pro project or paralyzed people we

765

00:36:28,370 --> 00:36:26,400

have a project with ALS patients you

766

00:36:31,580 --> 00:36:28,380

know ALS you might remember it for this

767

00:36:34,640 --> 00:36:31,590

I s package it's the stable disease

768

00:36:36,500 --> 00:36:34,650

where you gradually boom you know

769

00:36:39,980 --> 00:36:36,510

parallel eyes and all you're almost

770

00:36:41,930 --> 00:36:39,990

completely locked in so we have we are

771

00:36:45,200 --> 00:36:41,940

trying to come up with a very very

772

00:36:47,210 --> 00:36:45,210

simple low-cost solution for them which

773

00:36:50,300 --> 00:36:47,220

is based not on your brain activities

774

00:36:52,910 --> 00:36:50,310

but also on all the residual muscles so

775

00:36:54,830 --> 00:36:52,920

we use the antennas which usually really

776

00:36:57,470 --> 00:36:54,840

are used for from measuring brain

777

00:36:58,940 --> 00:36:57,480

activity and we also measure whatever

778

00:37:02,030 --> 00:36:58,950

information they have left in the

779

00:37:03,650 --> 00:37:02,040

muscles in the face in the eyes and try

780

00:37:07,220 --> 00:37:03,660

to provide them with a practical

781

00:37:10,010 --> 00:37:07,230

solution and quite it's quite incredible

782

00:37:13,430 --> 00:37:10,020

how technology can change the life of

783

00:37:16,130 --> 00:37:13,440

such individuals yes it's i think that

784

00:37:20,030 --> 00:37:16,140

there's a real demand for for something

785

00:37:23,420 --> 00:37:20,040

like that when when someone has brain

786

00:37:25,790 --> 00:37:23,430

waves are they just limited to do they

787

00:37:28,550 --> 00:37:25,800

just go as far as say the scalp i know

788

00:37:30,650 --> 00:37:28,560

they put the electrodes on the scalp but

789

00:37:32,690 --> 00:37:30,660

do they actually go i know this is kind

790

00:37:34,700 --> 00:37:32,700

of a strange question but do they go

791

00:37:36,950 --> 00:37:34,710

outside of the scalp a little bit or is

792

00:37:40,790 --> 00:37:36,960

it just is that as far as they go is

793

00:37:44,090 --> 00:37:40,800

from what you know you know it's a good

794

00:37:45,890 --> 00:37:44,100

question I um I don't know exactly the

795

00:37:47,350 --> 00:37:45,900

physics but i would guess that you have

796

00:37:50,050 --> 00:37:47,360

an electrical field

797

00:37:51,910 --> 00:37:50,060

and you know of course we measure it on

798

00:37:54,250 --> 00:37:51,920

the scalp and we try to they will make

799

00:37:57,070 --> 00:37:54,260

it election to get the maximum

800

00:38:01,270 --> 00:37:57,080

information not impossible that the

801  
00:38:03,670 --> 00:38:01,280  
electrical field it goes out a few

802  
00:38:04,900 --> 00:38:03,680  
millimeters or you know maybe centimeter

803  
00:38:07,120 --> 00:38:04,910  
I don't know if it goes as far as

804  
00:38:09,850 --> 00:38:07,130  
sandwiches you know this is where you

805  
00:38:12,220 --> 00:38:09,860  
really I again my background is

806  
00:38:13,960 --> 00:38:12,230  
mathematics and I would love to know the

807  
00:38:15,460 --> 00:38:13,970  
answers exactly to understand your

808  
00:38:19,540 --> 00:38:15,470  
question but this is where you need to

809  
00:38:23,380 --> 00:38:19,550  
understand the electronics of how all

810  
00:38:28,000 --> 00:38:23,390  
these electrical fields behave right

811  
00:38:30,820 --> 00:38:28,010  
right but you hear of a you know you

812  
00:38:33,070 --> 00:38:30,830  
hear of possible telepathy you know and

813  
00:38:35,560 --> 00:38:33,080

that's a I don't know if there's ever

814

00:38:37,120 --> 00:38:35,570

any proof of that or whatever but it

815

00:38:40,240 --> 00:38:37,130

seems like that would be along the lines

816

00:38:44,350 --> 00:38:40,250

of you know energy coming out somehow a

817

00:38:46,090 --> 00:38:44,360

little further than just skin deep hey

818

00:38:47,920 --> 00:38:46,100

and there's no I don't know if there's

819

00:38:49,810 --> 00:38:47,930

any proof of telepathy out there it's

820

00:38:53,680 --> 00:38:49,820

just you know I try to be open minded on

821

00:38:57,160 --> 00:38:53,690

you know subjects like that yeah so

822

00:39:00,130 --> 00:38:57,170

again so I think and my position is yes

823

00:39:03,130 --> 00:39:00,140

we we have to be open-minded it be

824

00:39:05,050 --> 00:39:03,140

there's a lot of things again I you know

825

00:39:06,700 --> 00:39:05,060

if you look at history there's a lot of

826  
00:39:08,380 --> 00:39:06,710  
things that you people thought would be

827  
00:39:11,740 --> 00:39:08,390  
completely crazy but then turned out to

828  
00:39:14,830 --> 00:39:11,750  
be true like the earth being not flat

829  
00:39:16,840 --> 00:39:14,840  
and in order to imagine that they

830  
00:39:20,290 --> 00:39:16,850  
discovered that the world around us is

831  
00:39:24,160 --> 00:39:20,300  
full of these little creatures for

832  
00:39:26,260 --> 00:39:24,170  
example you know magic mr. goes around

833  
00:39:28,540 --> 00:39:26,270  
and says you know everywhere around us

834  
00:39:30,760 --> 00:39:28,550  
there's these little animals but we just

835  
00:39:33,370 --> 00:39:30,770  
can't see them so you know I think we

836  
00:39:36,670 --> 00:39:33,380  
really have to be open-minded but the

837  
00:39:40,300 --> 00:39:36,680  
point is again strong clear strong

838  
00:39:42,100 --> 00:39:40,310

evidence you know so if someone wants to

839

00:39:44,260 --> 00:39:42,110

know about telepathy fine you know i'm

840

00:39:46,300 --> 00:39:44,270

not i'm fine with any claim you can make

841

00:39:50,170 --> 00:39:46,310

but just come up with really really damn

842

00:39:52,630 --> 00:39:50,180

strong evidence now I it could be that

843

00:39:54,850 --> 00:39:52,640

you know there's all kinds of things

844

00:39:56,710 --> 00:39:54,860

were picking up I think most of the

845

00:40:00,470 --> 00:39:56,720

mostly people try to study these things

846

00:40:01,820 --> 00:40:00,480

um eventually

847

00:40:05,570 --> 00:40:01,830

it boils down to all kinds of

848

00:40:07,960 --> 00:40:05,580

psychological effects and I think that I

849

00:40:11,390 --> 00:40:07,970

I know some people who dedicated you're

850

00:40:14,630 --> 00:40:11,400

serious portion of their life trying to

851

00:40:18,500 --> 00:40:14,640

find something and coming up with a

852

00:40:23,420 --> 00:40:18,510

conclusion nope nothing there but you

853

00:40:25,849 --> 00:40:23,430

know it's amazing proof of some sense

854

00:40:29,270 --> 00:40:25,859

that we're not aware of I heard some

855

00:40:32,080 --> 00:40:29,280

Engineer found some senses on our skin

856

00:40:35,150 --> 00:40:32,090

that can pick up some radiation like

857

00:40:36,650 --> 00:40:35,160

whoo that's not impossible could be that

858

00:40:38,780 --> 00:40:36,660

we're not using it but it could be there

859

00:40:41,000 --> 00:40:38,790

it could be that's there and we're kind

860

00:40:46,070 --> 00:40:41,010

of using it in very rare occasions like

861

00:40:48,680 --> 00:40:46,080

theoretically flow will cope right right

862

00:40:50,960 --> 00:40:48,690

you know there are a lot of people would

863

00:40:54,800 --> 00:40:50,970

say coincidences but you know of certain

864

00:40:57,920 --> 00:40:54,810

things that have happened and also you

865

00:40:59,810 --> 00:40:57,930

know it gets into near-death experiences

866

00:41:01,400 --> 00:40:59,820

and all that you know these it just

867

00:41:04,910 --> 00:41:01,410

seems like there's so much to know and

868

00:41:07,250 --> 00:41:04,920

and but you're right these extraordinary

869

00:41:09,380 --> 00:41:07,260

claims needs extraordinary evidence as

870

00:41:14,810 --> 00:41:09,390

as they say we all enjoy that that's

871

00:41:17,720 --> 00:41:14,820

awesome yeah yeah yeah yeah well um

872

00:41:22,609 --> 00:41:17,730

I I think this is uh it's been really

873

00:41:23,990 --> 00:41:22,619

interesting let's see this is this is

874

00:41:26,870 --> 00:41:24,000

just one question that just popped up

875

00:41:28,580 --> 00:41:26,880

though I'd like to ask you you mentioned

876

00:41:30,950 --> 00:41:28,590

about you know government's whether we

877

00:41:34,490 --> 00:41:30,960

trust governments are not do you happen

878

00:41:38,410 --> 00:41:34,500

to know of any operations of any

879

00:41:41,810 --> 00:41:38,420

weaponizing of artificial intelligence

880

00:41:44,180 --> 00:41:41,820

absolutely I like absolutely a train

881

00:41:46,609 --> 00:41:44,190

wreck knowledge ease artificial

882

00:41:50,540 --> 00:41:46,619

intelligence absolutely there's they're

883

00:41:53,599 --> 00:41:50,550

putting a lot of resources they're

884

00:41:55,609 --> 00:41:53,609

working on very ambitious projects and

885

00:41:58,370 --> 00:41:55,619

you know I hope most of it is stuff that

886

00:42:00,050 --> 00:41:58,380

again we can trust our governments you

887

00:42:07,310 --> 00:42:00,060

know not to use against us and against

888

00:42:09,500 --> 00:42:07,320

each other but definitely it's it's

889

00:42:12,109 --> 00:42:09,510

going to get interesting yeah yeah I

890

00:42:13,440 --> 00:42:12,119

could see why I could see why that would

891

00:42:15,930 --> 00:42:13,450

be a big

892

00:42:19,380 --> 00:42:15,940

a you know a big thing to have the upper

893

00:42:23,220 --> 00:42:19,390

hand on on the enemy with any type of

894

00:42:27,060 --> 00:42:23,230

technology so being a is absolutely

895

00:42:29,819 --> 00:42:27,070

absolutely the spelling billions haha I

896

00:42:32,490 --> 00:42:29,829

don't doubt it all right well um where

897

00:42:34,319 --> 00:42:32,500

could someone find your work do you have

898

00:42:35,970 --> 00:42:34,329

I can't remember how I found you did I

899

00:42:39,089 --> 00:42:35,980

find you through the university is that

900

00:42:40,890 --> 00:42:39,099

how someone could contact you to be

901  
00:42:43,710 --> 00:42:40,900  
honest I don't remember but we do have a

902  
00:42:46,740 --> 00:42:43,720  
website it's quite you can't find I try

903  
00:42:49,079 --> 00:42:46,750  
I try to keep it updated there's a

904  
00:42:51,120 --> 00:42:49,089  
youtube channel with videos and you know

905  
00:42:52,650 --> 00:42:51,130  
it's very eclectic mix to some videos

906  
00:42:56,940 --> 00:42:52,660  
are really high quality and so much a

907  
00:43:00,030 --> 00:42:56,950  
student project but the web site is al

908  
00:43:04,319 --> 00:43:00,040  
that's for advanced virtuality lab so

909  
00:43:10,829 --> 00:43:04,329  
AVL dot IDC I this interdisciplinary

910  
00:43:12,359 --> 00:43:10,839  
Center IL IL for Israel so AVL advanced

911  
00:43:13,829 --> 00:43:12,369  
virtuality lab actually it's called it

912  
00:43:18,359 --> 00:43:13,839  
less reality lab but we keep it

913  
00:43:20,040 --> 00:43:18,369

deliberately um you know convey so

914

00:43:22,740 --> 00:43:20,050

search advanced reality level as

915

00:43:26,010 --> 00:43:22,750

virtuality level Google Oh Israel and

916

00:43:27,480 --> 00:43:26,020

you probably find it great well thanks

917

00:43:28,980 --> 00:43:27,490

you know it's really it's really going

918

00:43:31,319 --> 00:43:28,990

to be an interesting ride to see where

919

00:43:33,510 --> 00:43:31,329

all this goes you know it'd be great if

920

00:43:35,730 --> 00:43:33,520

you know you could just take a peek

921

00:43:37,260 --> 00:43:35,740

ahead time travel into the future and

922

00:43:39,599 --> 00:43:37,270

see where all technology goes that would

923

00:43:43,349 --> 00:43:39,609

be really exciting and interesting I

924

00:43:45,240 --> 00:43:43,359

sure hope anyway alright I think you

925

00:43:48,450 --> 00:43:45,250

shouldn't be too worried yeah yeah we

926

00:43:50,640 --> 00:43:48,460

should be feel full but optimistic ok

927

00:43:53,430 --> 00:43:50,650

it's great talking to ray talking you