



**DONALD
HOFFMAN**

**WHAT DO YOU BECOME
AFTER DEATH?**

1
00:00:03,110 --> 00:00:01,510
i mean you're asking the right questions

2
00:00:04,070 --> 00:00:03,120
for anybody that really knows their math

3
00:00:05,990 --> 00:00:04,080
and science

4
00:00:06,950 --> 00:00:06,000
and it must be hard knows about you

5
00:00:07,430 --> 00:00:06,960
you're asking exactly the right

6
00:00:12,629 --> 00:00:07,440
questions

7
00:00:17,109 --> 00:00:15,749
how's it going man great how about you

8
00:00:19,029 --> 00:00:17,119
it's going well how's the weather it's

9
00:00:20,550 --> 00:00:19,039
been like an irvine oh it's well

10
00:00:21,990 --> 00:00:20,560
it's it's probably the best weather you

11
00:00:23,349 --> 00:00:22,000
could have in the world i mean it's

12
00:00:23,750 --> 00:00:23,359
almost like we have a thermostatist

13
00:00:25,589 --> 00:00:23,760

that's

14

00:00:26,790 --> 00:00:25,599

it's just gorgeous here year round so i

15

00:00:30,070 --> 00:00:26,800

have no complaints

16

00:00:32,470 --> 00:00:30,080

it's warm with all the

17

00:00:34,229 --> 00:00:32,480

quarantine and lockdowns are you okay is

18

00:00:38,069 --> 00:00:34,239

it all right in your mental health

19

00:00:40,389 --> 00:00:38,079

do you prefer it i'm okay i it's um

20

00:00:41,590 --> 00:00:40,399

for me it's great in the sense that i'm

21

00:00:44,150 --> 00:00:41,600

i'm enjoying um

22

00:00:45,990 --> 00:00:44,160

less distraction and i'm able to focus

23

00:00:47,590 --> 00:00:46,000

on studying some mathematics and physics

24

00:00:49,510 --> 00:00:47,600

that i'm interested in studying so

25

00:00:52,470 --> 00:00:49,520

it's it's good it's of course very very

26

00:00:54,549 --> 00:00:52,480

sad to see the millions infected and

27

00:00:55,910 --> 00:00:54,559

hundreds of thousands 140 000 at this

28

00:00:58,069 --> 00:00:55,920

point that are

29

00:00:59,029 --> 00:00:58,079

dead so yeah that's that's that's

30

00:01:02,229 --> 00:00:59,039

horrific and

31

00:01:04,789 --> 00:01:02,239

you know the threat of the pandemic

32

00:01:05,429 --> 00:01:04,799

expanding and so forth is you know not

33

00:01:08,310 --> 00:01:05,439

much fun

34

00:01:09,830 --> 00:01:08,320

um so and i got family and relatives and

35

00:01:10,469 --> 00:01:09,840

so forth that i'm concerned about so

36

00:01:15,109 --> 00:01:10,479

yeah

37

00:01:17,590 --> 00:01:15,119

about it i like it because

38

00:01:18,950 --> 00:01:17,600

it removes any distractions and i too am

39

00:01:19,510 --> 00:01:18,960

studying math and physics on the side

40

00:01:22,630 --> 00:01:19,520

and

41

00:01:25,670 --> 00:01:22,640

salutary for me

42

00:01:27,109 --> 00:01:25,680

but it's obviously not for everyone has

43

00:01:28,710 --> 00:01:27,119

it changed your views at all

44

00:01:30,789 --> 00:01:28,720

has covered giving you given you any

45

00:01:32,310 --> 00:01:30,799

insight or any different ideas with

46

00:01:33,990 --> 00:01:32,320

regards to your theories which we'll get

47

00:01:36,310 --> 00:01:34,000

into

48

00:01:38,230 --> 00:01:36,320

uh it just confirms what we learned from

49

00:01:40,870 --> 00:01:38,240

evolutionary psychology about that

50

00:01:41,910 --> 00:01:40,880

about human nature and in groups and out

51
00:01:45,030 --> 00:01:41,920
groups and

52
00:01:46,870 --> 00:01:45,040
um the one the reasons we evolved logic

53
00:01:47,830 --> 00:01:46,880
and reason it wasn't in pursuit of truth

54
00:01:49,830 --> 00:01:47,840
but to

55
00:01:51,830 --> 00:01:49,840
to support ideas that we already believe

56
00:01:52,310 --> 00:01:51,840
so so we just see this being played out

57
00:01:55,670 --> 00:01:52,320
in

58
00:01:58,950 --> 00:01:55,680
forth that are

59
00:02:00,550 --> 00:01:58,960
that are going on and and you know the

60
00:02:02,550 --> 00:02:00,560
yeah we see human nature being played

61
00:02:04,389 --> 00:02:02,560
out in a big way and we and we see the

62
00:02:07,190 --> 00:02:04,399
results in terms of

63
00:02:07,990 --> 00:02:07,200

uh you know a big failure in our country

64

00:02:09,669 --> 00:02:08,000

right now the the

65

00:02:12,550 --> 00:02:09,679

rates of infection are going up the

66

00:02:14,630 --> 00:02:12,560

deaths are we're number one in the world

67

00:02:16,150 --> 00:02:14,640

in terms of the number of deaths and

68

00:02:18,869 --> 00:02:16,160

infections and so forth

69

00:02:19,430 --> 00:02:18,879

maybe not per capita but um but but

70

00:02:23,030 --> 00:02:19,440

still

71

00:02:24,470 --> 00:02:23,040

for the world's richest country with

72

00:02:26,229 --> 00:02:24,480

the the wonderful scientific

73

00:02:27,190 --> 00:02:26,239

establishment that we have you would

74

00:02:29,430 --> 00:02:27,200

think that there would be

75

00:02:31,110 --> 00:02:29,440

just no problem in us getting together

76

00:02:34,390 --> 00:02:31,120

organizing and defeating this thing

77

00:02:36,150 --> 00:02:34,400

but but there there's the whole aspect

78

00:02:38,229 --> 00:02:36,160

of human evolutionary psychology

79

00:02:39,350 --> 00:02:38,239

and um that that's playing playing

80

00:02:42,150 --> 00:02:39,360

itself out uh

81

00:02:43,589 --> 00:02:42,160

large and so so and i study evolutionary

82

00:02:46,710 --> 00:02:43,599

psychology and what's going on

83

00:02:48,869 --> 00:02:46,720

does does make sense it's tragic for us

84

00:02:51,670 --> 00:02:48,879

as a as a population but it makes sense

85

00:02:55,350 --> 00:02:51,680

in terms of human nature

86

00:02:57,030 --> 00:02:55,360

do you meditate yes daily

87

00:02:58,869 --> 00:02:57,040

what kind of meditation mindfulness or

88

00:03:02,830 --> 00:02:58,879

transcendental or

89

00:03:09,509 --> 00:03:06,149

silence nothing else

90

00:03:11,750 --> 00:03:09,519

pure silence no poses i do whatever

91

00:03:15,750 --> 00:03:11,760

feels comfortable but it's i spend

92

00:03:18,949 --> 00:03:15,760

probably at least three hours a day

93

00:03:20,949 --> 00:03:18,959

in pure silence that's it not looking at

94

00:03:25,270 --> 00:03:20,959

a screen or reading

95

00:03:27,830 --> 00:03:25,280

nothing not walking not walking

96

00:03:28,789 --> 00:03:27,840

just silence sitting lying the pose

97

00:03:32,229 --> 00:03:28,799

doesn't matter to me

98

00:03:35,430 --> 00:03:32,239

but it's just pure silence and um

99

00:03:35,830 --> 00:03:35,440

being just being aware of whatever i

100

00:03:39,190 --> 00:03:35,840

feel

101
00:03:40,949 --> 00:03:39,200
in the moment in being aware of thoughts

102
00:03:42,550 --> 00:03:40,959
as they come up and just

103
00:03:44,550 --> 00:03:42,560
if they come up then i'll let them go

104
00:03:47,750 --> 00:03:44,560
and go back to silence

105
00:03:49,110 --> 00:03:47,760
it's very very simple what's what i find

106
00:03:49,990 --> 00:03:49,120
tricky about meditation this is why i

107
00:03:52,149 --> 00:03:50,000
don't do it

108
00:03:53,830 --> 00:03:52,159
is that as soon as i start to not that

109
00:03:55,910 --> 00:03:53,840
the thoughts intrude but

110
00:03:57,429 --> 00:03:55,920
that great productive thoughts come up

111
00:04:00,149 --> 00:03:57,439
and then i have to write them down

112
00:04:01,670 --> 00:04:00,159
because i find that when i don't it's

113
00:04:03,429 --> 00:04:01,680

rare that i get them again

114

00:04:04,630 --> 00:04:03,439

so do you sit with a pen and paper if

115

00:04:05,990 --> 00:04:04,640

you have a particularly brilliant

116

00:04:09,270 --> 00:04:06,000

thought do you just allow that to

117

00:04:11,350 --> 00:04:09,280

escape i let it go it's over the years

118

00:04:12,949 --> 00:04:11,360

it's only maybe one or two times that

119

00:04:16,069 --> 00:04:12,959

i've actually written something down

120

00:04:17,110 --> 00:04:16,079

it's i i just don't i just let it come

121

00:04:19,030 --> 00:04:17,120

and i let it go

122

00:04:20,949 --> 00:04:19,040

i have a fairly good memory for the

123

00:04:21,909 --> 00:04:20,959

stuff that comes up if i want to later

124

00:04:23,670 --> 00:04:21,919

so so

125

00:04:25,030 --> 00:04:23,680

maybe maybe if i was really concerned

126

00:04:26,550 --> 00:04:25,040

that i would forget something that i

127

00:04:27,990 --> 00:04:26,560

really wanted i might be doing that but

128

00:04:29,270 --> 00:04:28,000

i'm not too concerned about it i can

129

00:04:32,310 --> 00:04:29,280

remember stuff later

130

00:04:34,629 --> 00:04:32,320

but i just you know it's it's a matter

131

00:04:36,070 --> 00:04:34,639

what i find it's the meditation process

132

00:04:39,909 --> 00:04:36,080

for me

133

00:04:44,150 --> 00:04:39,919

is what i can imagine it's like for a

134

00:04:49,830 --> 00:04:46,469

it turns out when the caterpillar is

135

00:04:53,030 --> 00:04:49,840

inside the chrysalis the immune cells

136

00:04:54,550 --> 00:04:53,040

of the caterpillar attack

137

00:04:56,070 --> 00:04:54,560

and try to kill that in fact they do

138

00:04:57,270 --> 00:04:56,080

kill the cells

139

00:04:59,990 --> 00:04:57,280

that are responsible for the

140

00:05:01,670 --> 00:05:00,000

transformation into a butterfly

141

00:05:03,189 --> 00:05:01,680

they attack and kill attack and kill

142

00:05:05,830 --> 00:05:03,199

until they're overwhelmed

143

00:05:08,629 --> 00:05:05,840

and and then all most of the structure

144

00:05:10,629 --> 00:05:08,639

of the caterpillar liquefies

145

00:05:12,469 --> 00:05:10,639

and then it's reformed into the

146

00:05:13,270 --> 00:05:12,479

butterfly from the point of view of the

147

00:05:15,189 --> 00:05:13,280

caterpillar

148

00:05:16,629 --> 00:05:15,199

that that can't be fun and the immune

149

00:05:19,029 --> 00:05:16,639

system indicates

150

00:05:21,110 --> 00:05:19,039

that it's it's not welcomed by the

151

00:05:23,350 --> 00:05:21,120

caterpillar at all it's it's fought

152

00:05:25,110 --> 00:05:23,360

to the death by the immune system until

153

00:05:26,230 --> 00:05:25,120

the immune system's overwhelmed

154

00:05:28,790 --> 00:05:26,240

but from the point of view of the

155

00:05:30,790 --> 00:05:28,800

butterfly it's it's

156

00:05:31,909 --> 00:05:30,800

a brand new creation so it depends on

157

00:05:33,189 --> 00:05:31,919

whether you take the

158

00:05:35,350 --> 00:05:33,199

the point of view of the caterpillar or

159

00:05:36,629 --> 00:05:35,360

the butterfly most of the time i've been

160

00:05:39,830 --> 00:05:36,639

the caterpillar

161

00:05:42,710 --> 00:05:39,840

um but i'm starting a little bit to

162

00:05:43,430 --> 00:05:42,720

welcome the destruction of everything i

163

00:05:47,110 --> 00:05:43,440

know

164

00:05:48,629 --> 00:05:47,120

the destruction of deeply held beliefs

165

00:05:52,310 --> 00:05:48,639

the destruction of

166

00:05:54,790 --> 00:05:52,320

my fears and so forth defense mechanisms

167

00:05:56,309 --> 00:05:54,800

letting all that stuff slowly be

168

00:05:59,350 --> 00:05:56,319

destroyed

169

00:06:02,150 --> 00:05:59,360

just in pure silence and then watching

170

00:06:02,870 --> 00:06:02,160

whatever new might might come up i mean

171

00:06:04,469 --> 00:06:02,880

it's hard

172

00:06:06,629 --> 00:06:04,479

to imagine that the caterpillar has any

173

00:06:07,990 --> 00:06:06,639

idea what it's going to be turned into

174

00:06:09,029 --> 00:06:08,000

it's just fighting it to the death until

175

00:06:10,550 --> 00:06:09,039

he can't fight anymore

176

00:06:12,070 --> 00:06:10,560

and then it liquefies so from the

177

00:06:15,189 --> 00:06:12,080

caterpillar's point of view it's just

178

00:06:16,790 --> 00:06:15,199

all loss and death and destruction

179

00:06:19,110 --> 00:06:16,800

but there's a rebirth and that's the way

180

00:06:21,990 --> 00:06:19,120

i feel about

181

00:06:23,350 --> 00:06:22,000

meditation that it's i'm allowing a

182

00:06:25,430 --> 00:06:23,360

transformation

183

00:06:26,950 --> 00:06:25,440

to occur of which i'm arbitrarily

184

00:06:29,590 --> 00:06:26,960

ignorant about

185

00:06:31,270 --> 00:06:29,600

its true nature and i can only tell you

186

00:06:32,830 --> 00:06:31,280

after i've taken the next step what it

187

00:06:35,830 --> 00:06:32,840

was like

188

00:06:36,629 --> 00:06:35,840

so are you aware of any studies that

189

00:06:38,469 --> 00:06:36,639

have been done

190

00:06:40,390 --> 00:06:38,479

as to the memory of a caterpillar when

191

00:06:41,909 --> 00:06:40,400

it becomes into its butterfly phase that

192

00:06:45,110 --> 00:06:41,919

it has and that it retains

193

00:06:46,710 --> 00:06:45,120

certain memories that's right i i have

194

00:06:49,189 --> 00:06:46,720

i mean i'm not an expert on it but i do

195

00:06:50,629 --> 00:06:49,199

recall um stories about that that if you

196

00:06:52,309 --> 00:06:50,639

give some kind of

197

00:06:53,830 --> 00:06:52,319

like aversive training to the

198

00:06:55,430 --> 00:06:53,840

caterpillar it might be there

199

00:06:58,309 --> 00:06:55,440

um the reactions might be there on the

200

00:07:00,629 --> 00:06:58,319

butterfly that kind of thing

201
00:07:02,629 --> 00:07:00,639
i was watching a neuroscientist say that

202
00:07:05,510 --> 00:07:02,639
some memories might be non-vocal or not

203
00:07:06,150 --> 00:07:05,520
localized into the neuronal formation in

204
00:07:07,909 --> 00:07:06,160
the brain

205
00:07:09,189 --> 00:07:07,919
and the reason why he thinks so is

206
00:07:10,710 --> 00:07:09,199
controversial and it's extremely

207
00:07:12,150 --> 00:07:10,720
rudimentary in his research right now is

208
00:07:13,350 --> 00:07:12,160
because of the arctic squirrel

209
00:07:15,510 --> 00:07:13,360
the arctic squirrel when it goes into

210
00:07:18,070 --> 00:07:15,520
hibernation and i believe most creatures

211
00:07:19,350 --> 00:07:18,080
experience this their brain degenerates

212
00:07:21,909 --> 00:07:19,360
to such a degree that

213
00:07:22,629 --> 00:07:21,919

it's it's not clear that memory should

214

00:07:24,070 --> 00:07:22,639

certain memories

215

00:07:27,029 --> 00:07:24,080

should survive yet they do with the

216

00:07:28,469 --> 00:07:27,039

arctic squirrel it's interesting

217

00:07:30,710 --> 00:07:28,479

do you eat a certain kind of breakfast

218

00:07:34,870 --> 00:07:30,720

or follow a diet

219

00:07:38,390 --> 00:07:34,880

uh i i try to um have a

220

00:07:41,029 --> 00:07:38,400

low acid diet so i have lots of oatmeal

221

00:07:42,309 --> 00:07:41,039

i have oatmeal you know for breakfast

222

00:07:45,909 --> 00:07:42,319

and

223

00:07:48,950 --> 00:07:45,919

try to do low acid low fat so i'll have

224

00:07:50,070 --> 00:07:48,960

um an omelet with mostly egg whites

225

00:07:53,589 --> 00:07:50,080

maybe one egg yolk

226

00:07:56,309 --> 00:07:53,599

um and some fresh fruit

227

00:07:56,950 --> 00:07:56,319

my wife is a vegetarian i'm not but um

228

00:07:58,869 --> 00:07:56,960

so she

229

00:08:00,550 --> 00:07:58,879

is she makes up vegetables all the time

230

00:08:01,749 --> 00:08:00,560

so eat her vegetables and then i'll cook

231

00:08:04,629 --> 00:08:01,759

some fish

232

00:08:05,510 --> 00:08:04,639

um chicken i don't do beef that often

233

00:08:09,430 --> 00:08:05,520

but i

234

00:08:10,550 --> 00:08:09,440

focus on fish and chicken

235

00:08:12,869 --> 00:08:10,560

but you know i'll have a little bit of

236

00:08:15,029 --> 00:08:12,879

red meat so i try to eat

237

00:08:15,990 --> 00:08:15,039

i eat three times a day i don't snack at

238

00:08:18,790 --> 00:08:16,000

all

239

00:08:19,990 --> 00:08:18,800

and i after dinner i don't eat any

240

00:08:22,950 --> 00:08:20,000

snacks so i

241

00:08:23,430 --> 00:08:22,960

don't eat usually from 6 30 in the

242

00:08:26,869 --> 00:08:23,440

evening

243

00:08:27,430 --> 00:08:26,879

until at least 7 30 the next day i i

244

00:08:30,070 --> 00:08:27,440

never eat

245

00:08:31,350 --> 00:08:30,080

a bite and that's just been my habit for

246

00:08:33,589 --> 00:08:31,360

for decades

247

00:08:34,709 --> 00:08:33,599

i don't need it all for like 12 hours 13

248

00:08:37,509 --> 00:08:34,719

hours

249

00:08:39,269 --> 00:08:37,519

see i intermittent fast but i do so

250

00:08:42,389 --> 00:08:39,279

because i'm filled with

251
00:08:43,589 --> 00:08:42,399
with avarice and i i just want to eat

252
00:08:45,110 --> 00:08:43,599
whatever i see so i

253
00:08:47,509 --> 00:08:45,120
fast for like when i spoke to eric

254
00:08:49,829 --> 00:08:47,519
weinstein i think at that point during

255
00:08:53,430 --> 00:08:49,839
the interview i had not eaten for 65

256
00:08:55,190 --> 00:08:53,440
hours or so not plenty but but i do that

257
00:08:57,509 --> 00:08:55,200
before i conduct my

258
00:08:58,389 --> 00:08:57,519
podcasts or interviews generally do you

259
00:09:00,310 --> 00:08:58,399
have any

260
00:09:01,430 --> 00:09:00,320
rituals that or habits that you do

261
00:09:05,829 --> 00:09:01,440
before you

262
00:09:09,430 --> 00:09:05,839
meditation

263
00:09:10,230 --> 00:09:09,440

no i i'm pretty comfortable talking i

264

00:09:12,150 --> 00:09:10,240

i you know

265

00:09:14,150 --> 00:09:12,160

i was a professor at the university of

266

00:09:15,590 --> 00:09:14,160

california for 37 years and had to give

267

00:09:19,030 --> 00:09:15,600

lectures all the time

268

00:09:23,190 --> 00:09:19,040

to big audiences and so for me it

269

00:09:24,949 --> 00:09:23,200

talking is is is not an issue at all so

270

00:09:26,230 --> 00:09:24,959

i mean i was working out just until a

271

00:09:28,710 --> 00:09:26,240

couple minutes before we got on

272

00:09:30,230 --> 00:09:28,720

onto this podcast i had had an hour

273

00:09:32,630 --> 00:09:30,240

window so i i

274

00:09:34,150 --> 00:09:32,640

i got a little um you know bench and you

275

00:09:37,269 --> 00:09:34,160

know dumbbells that

276

00:09:38,949 --> 00:09:37,279

that i use and i i weight train three

277

00:09:40,790 --> 00:09:38,959

times a week and do aerobics

278

00:09:42,310 --> 00:09:40,800

three or four times the other three or

279

00:09:43,590 --> 00:09:42,320

four days of the week so i try to have a

280

00:09:45,190 --> 00:09:43,600

regular thing so i was doing that just

281

00:09:49,110 --> 00:09:45,200

before the podcast

282

00:09:51,269 --> 00:09:49,120

so so yeah no i i don't

283

00:09:52,150 --> 00:09:51,279

you usually have to i mean i i usually

284

00:09:55,829 --> 00:09:52,160

just

285

00:09:57,190 --> 00:09:55,839

go and and talk and enjoy it

286

00:09:59,430 --> 00:09:57,200

i was looking at your background and it

287

00:10:00,230 --> 00:09:59,440

said you studied initially computational

288

00:10:05,509 --> 00:10:00,240

psychology

289

00:10:07,350 --> 00:10:05,519

it was

290

00:10:08,630 --> 00:10:07,360

computational psychology was the name of

291

00:10:12,389 --> 00:10:08,640

my my phd

292

00:10:13,990 --> 00:10:12,399

at mit and there i was in the artificial

293

00:10:17,030 --> 00:10:14,000

intelligence laboratory

294

00:10:18,870 --> 00:10:17,040

at mit and in what's now the brain and

295

00:10:20,470 --> 00:10:18,880

cognitive sciences department

296

00:10:22,949 --> 00:10:20,480

and so what i was doing was a

297

00:10:25,829 --> 00:10:22,959

combination of studying

298

00:10:28,310 --> 00:10:25,839

just artificial intelligence and at the

299

00:10:30,870 --> 00:10:28,320

time it was you know good old-fashioned

300

00:10:32,550 --> 00:10:30,880

artificial intelligence it wasn't the

301

00:10:34,389 --> 00:10:32,560

neural network stuff

302

00:10:36,630 --> 00:10:34,399

at that point because that was from 1979

303

00:10:38,470 --> 00:10:36,640

to 1983 neural networks came

304

00:10:39,750 --> 00:10:38,480

into their own a little bit a few years

305

00:10:41,110 --> 00:10:39,760

later um

306

00:10:43,590 --> 00:10:41,120

so i was doing more of the good

307

00:10:46,150 --> 00:10:43,600

old-fashioned ai stuff but still it was

308

00:10:48,310 --> 00:10:46,160

you know i was studying human vision and

309

00:10:49,670 --> 00:10:48,320

computer vision and the idea was

310

00:10:51,670 --> 00:10:49,680

you had a good theory if you could build

311

00:10:52,949 --> 00:10:51,680

a computer that could work

312

00:10:55,030 --> 00:10:52,959

so if you have a theory about how we see

313

00:10:56,790 --> 00:10:55,040

in 3d build it if you have

314

00:10:58,230 --> 00:10:56,800

you know if you can't build it then i'm

315

00:10:59,990 --> 00:10:58,240

not sure you have a theory so it was

316

00:11:01,750 --> 00:11:00,000

that really hard-nosed attitude so

317

00:11:03,670 --> 00:11:01,760

and then on the other side i was looking

318

00:11:04,550 --> 00:11:03,680

with in the brain and cognitive science

319

00:11:06,310 --> 00:11:04,560

department

320

00:11:07,829 --> 00:11:06,320

um at human vision and the

321

00:11:09,670 --> 00:11:07,839

neurophysiology of human vision

322

00:11:10,949 --> 00:11:09,680

psychophysical experiments about how we

323

00:11:13,110 --> 00:11:10,959

see in 3d

324

00:11:14,710 --> 00:11:13,120

object recognition colors and so forth

325

00:11:17,990 --> 00:11:14,720

so the idea was to

326

00:11:18,550 --> 00:11:18,000

reverse engineer biological vision

327

00:11:19,829 --> 00:11:18,560

systems

328

00:11:23,110 --> 00:11:19,839

which are the only ones that worked at

329

00:11:24,710 --> 00:11:23,120

the time and take the insights and try

330

00:11:26,710 --> 00:11:24,720

to build

331

00:11:27,990 --> 00:11:26,720

computer vision systems that implemented

332

00:11:29,509 --> 00:11:28,000

what we learned

333

00:11:31,430 --> 00:11:29,519

and that way we would know we weren't

334

00:11:32,389 --> 00:11:31,440

just you know fooling ourselves into

335

00:11:33,910 --> 00:11:32,399

thinking we understood

336

00:11:35,990 --> 00:11:33,920

if it doesn't work then you don't

337

00:11:36,949 --> 00:11:36,000

understand go back and

338

00:11:38,550 --> 00:11:36,959

scratch your head a little bit and

339

00:11:39,269 --> 00:11:38,560

figure out what's really going on so it

340

00:11:42,630 --> 00:11:39,279

was sorry

341

00:11:46,310 --> 00:11:42,640

around what year was this i was there um

342

00:11:49,030 --> 00:11:46,320

from 1979 until 1983 at mit

343

00:11:50,870 --> 00:11:49,040

and i was very fortunate to have two

344

00:11:52,150 --> 00:11:50,880

wonderful advisors david maher and

345

00:11:56,069 --> 00:11:52,160

whitman richards

346

00:11:58,230 --> 00:11:56,079

um so both of them had their foot

347

00:12:00,310 --> 00:11:58,240

in the ai lab and in the brain and

348

00:12:02,870 --> 00:12:00,320

cognitive science department

349

00:12:04,230 --> 00:12:02,880

cool cool you know i i see a few

350

00:12:04,790 --> 00:12:04,240

different strands to your theories and

351
00:12:05,990 --> 00:12:04,800
this

352
00:12:08,069 --> 00:12:06,000
just for the people listening or

353
00:12:10,389 --> 00:12:08,079
watching this is going to be

354
00:12:11,670 --> 00:12:10,399
extremely technical or much more so than

355
00:12:12,629 --> 00:12:11,680
most of the other interviews that you

356
00:12:15,110 --> 00:12:12,639
have online and

357
00:12:15,750 --> 00:12:15,120
which i think stay on at a cursory level

358
00:12:19,269 --> 00:12:15,760
particularly

359
00:12:21,110 --> 00:12:19,279
with people who don't have a

360
00:12:23,269 --> 00:12:21,120
mathematical background or a physics

361
00:12:25,030 --> 00:12:23,279
background so as far as i can delineate

362
00:12:26,310 --> 00:12:25,040
you have the consciousness the conscious

363
00:12:27,750 --> 00:12:26,320

agent model

364

00:12:29,990 --> 00:12:27,760

interface theory of perception that's

365

00:12:31,110 --> 00:12:30,000

number two bayesian decision theory

366

00:12:34,389 --> 00:12:31,120

which i believe you

367

00:12:36,150 --> 00:12:34,399

mended to computational

368

00:12:37,590 --> 00:12:36,160

evolutionary perception i could be wrong

369

00:12:39,590 --> 00:12:37,600

about that and then

370

00:12:41,509 --> 00:12:39,600

number four you have some new papers on

371

00:12:43,509 --> 00:12:41,519

eigenforms which i haven't studied much

372

00:12:46,069 --> 00:12:43,519

because i don't know much about

373

00:12:48,069 --> 00:12:46,079

modular forms and heck algebras so i

374

00:12:50,870 --> 00:12:48,079

didn't get a chance to read them

375

00:12:52,230 --> 00:12:50,880

but uh but are those is that a fair

376

00:12:55,350 --> 00:12:52,240

summary of your work or

377

00:12:56,710 --> 00:12:55,360

are there more yeah so evolutionary game

378

00:13:01,670 --> 00:12:56,720

theory i i work on

379

00:13:03,750 --> 00:13:01,680

um yeah um bayesian models of perception

380

00:13:08,790 --> 00:13:03,760

markovian models of the dynamics of

381

00:13:12,310 --> 00:13:11,190

out of curiosity this this is getting

382

00:13:14,949 --> 00:13:12,320

somewhat out of left field

383

00:13:16,069 --> 00:13:14,959

why did you choose g to represent the

384

00:13:18,310 --> 00:13:16,079

the braille space for

385

00:13:19,269 --> 00:13:18,320

decisions because when i was for those

386

00:13:22,230 --> 00:13:19,279

listening

387

00:13:23,750 --> 00:13:22,240

there's this it's there's a relatively

388

00:13:25,269 --> 00:13:23,760

simple structure though

389

00:13:26,710 --> 00:13:25,279

non-trivial called sigma algebras and

390

00:13:27,269 --> 00:13:26,720

then there's markup kernels and then you

391

00:13:30,870 --> 00:13:27,279

have w

392

00:13:32,470 --> 00:13:30,880

you have x which x experience i

393

00:13:35,750 --> 00:13:32,480

imagine you chose x because of

394

00:13:36,949 --> 00:13:35,760

experience world w okay great but g

395

00:13:38,710 --> 00:13:36,959

what does that have to do with decisions

396

00:13:39,509 --> 00:13:38,720

why did you choose that to just run out

397

00:13:41,350 --> 00:13:39,519

of letters or

398

00:13:43,430 --> 00:13:41,360

yeah we're running out of letters and we

399

00:13:44,150 --> 00:13:43,440

already had a for the kernel fractions i

400

00:13:45,590 --> 00:13:44,160

mean

401
00:13:46,550 --> 00:13:45,600
in some sense g is the set of actions

402
00:13:47,430 --> 00:13:46,560
that you're going to take we already

403
00:13:49,350 --> 00:13:47,440
used action

404
00:13:51,990 --> 00:13:49,360
a for the action kernel so i used g for

405
00:13:52,710 --> 00:13:52,000
the group of of actions that you could

406
00:13:54,310 --> 00:13:52,720
take

407
00:13:56,069 --> 00:13:54,320
i was thinking about at the time that it

408
00:13:57,750 --> 00:13:56,079
might be have a group structure as well

409
00:13:59,030 --> 00:13:57,760
as a measurable structure

410
00:14:00,629 --> 00:13:59,040
so use that's why i use g because

411
00:14:01,430 --> 00:14:00,639
already take taken a for the kernel

412
00:14:03,590 --> 00:14:01,440
itself

413
00:14:05,269 --> 00:14:03,600

but the easiest way to think about the

414

00:14:07,110 --> 00:14:05,279

definition of a conscious agent

415

00:14:09,030 --> 00:14:07,120

is that it's just three kernels there's

416

00:14:10,949 --> 00:14:09,040

a perception kernel

417

00:14:12,389 --> 00:14:10,959

you so you get the world that influences

418

00:14:13,590 --> 00:14:12,399

you through a perception kernel

419

00:14:15,829 --> 00:14:13,600

in other words whatever the state of the

420

00:14:17,430 --> 00:14:15,839

world is it probabilistically affects

421

00:14:18,629 --> 00:14:17,440

what your experiences are that's what a

422

00:14:20,150 --> 00:14:18,639

kernel p does

423

00:14:21,829 --> 00:14:20,160

so whatever the state of the world is

424

00:14:22,870 --> 00:14:21,839

you get a probabilistic effect on your

425

00:14:24,470 --> 00:14:22,880

experiences

426
00:14:26,550 --> 00:14:24,480
then the d kernel is whatever my

427
00:14:29,030 --> 00:14:26,560
experiences are they probabilistically

428
00:14:30,550 --> 00:14:29,040
affect the actions that i choose

429
00:14:32,310 --> 00:14:30,560
and then my action kernel is whatever

430
00:14:33,670 --> 00:14:32,320
actions i choose they probabilistically

431
00:14:35,670 --> 00:14:33,680
affect the state of the world

432
00:14:37,590 --> 00:14:35,680
very very simple triangle the state of

433
00:14:40,470 --> 00:14:37,600
the world affects my experiences

434
00:14:41,509 --> 00:14:40,480
my experiences affect the choices i make

435
00:14:44,710 --> 00:14:41,519
the choices i make

436
00:14:46,870 --> 00:14:44,720
affect the state of the world right okay

437
00:14:50,069 --> 00:14:46,880
now please forgive me if i jump around i

438
00:14:54,069 --> 00:14:50,079

have 90 questions here

439

00:14:55,670 --> 00:14:54,079

and what you're saying right now

440

00:14:58,710 --> 00:14:55,680

brings me to question number 80 let's

441

00:15:02,389 --> 00:14:58,720

say so it's gonna go all over the place

442

00:15:05,110 --> 00:15:02,399

why did you have x when you could just

443

00:15:05,670 --> 00:15:05,120

go from w to g directly by composing d

444

00:15:08,230 --> 00:15:05,680

after

445

00:15:09,350 --> 00:15:08,240

p so that is to say for the people you

446

00:15:10,949 --> 00:15:09,360

can explain what i'm saying to the

447

00:15:14,150 --> 00:15:10,959

people so in case

448

00:15:21,990 --> 00:15:19,030

the the idea when i was working on this

449

00:15:23,590 --> 00:15:22,000

model of the perception decision in

450

00:15:26,710 --> 00:15:23,600

action the idea

451

00:15:30,470 --> 00:15:26,720

is first i'm trying to

452

00:15:32,949 --> 00:15:30,480

model the process of observation

453

00:15:35,269 --> 00:15:32,959

so you know i studied computational

454

00:15:39,110 --> 00:15:35,279

vision at mit and now and then

455

00:15:41,269 --> 00:15:39,120

uc irvine and it turns out when you look

456

00:15:42,230 --> 00:15:41,279

at all the specific mathematical models

457

00:15:43,670 --> 00:15:42,240

that we have

458

00:15:45,509 --> 00:15:43,680

they all have a similar structure i was

459

00:15:47,509 --> 00:15:45,519

trying to capture that similar structure

460

00:15:49,509 --> 00:15:47,519

a sort of a bayesian inference kind of

461

00:15:50,069 --> 00:15:49,519

structure but i wanted to actually

462

00:15:51,749 --> 00:15:50,079

capture

463

00:15:53,110 --> 00:15:51,759

the fact that we we do have these

464

00:15:54,870 --> 00:15:53,120

conscious experiences like i'm

465

00:15:56,389 --> 00:15:54,880

perceiving a three-dimensional

466

00:15:58,230 --> 00:15:56,399

object like an apple and i'm seeing its

467

00:16:00,310 --> 00:15:58,240

three-dimensional shape as colors

468

00:16:01,269 --> 00:16:00,320

it's textures and so forth so i needed a

469

00:16:03,910 --> 00:16:01,279

space x

470

00:16:05,670 --> 00:16:03,920

of experiences to capture what what it

471

00:16:08,550 --> 00:16:05,680

was that i was perceiving

472

00:16:10,069 --> 00:16:08,560

but then you know perception doesn't

473

00:16:12,150 --> 00:16:10,079

occur in a void

474

00:16:14,550 --> 00:16:12,160

there's a perspective perception action

475

00:16:17,269 --> 00:16:14,560

loop right there's this a point that

476

00:16:18,710 --> 00:16:17,279

sort of an activist um approaches uh

477

00:16:20,949 --> 00:16:18,720

highlighting that is that

478

00:16:23,030 --> 00:16:20,959

perception and action sort of work

479

00:16:23,509 --> 00:16:23,040

together and so i i want a model in

480

00:16:25,670 --> 00:16:23,519

which

481

00:16:27,350 --> 00:16:25,680

i have experiences but those are tied to

482

00:16:29,829 --> 00:16:27,360

my actions and those actions

483

00:16:30,949 --> 00:16:29,839

affect the world and my experiences in

484

00:16:32,870 --> 00:16:30,959

in a loop

485

00:16:34,470 --> 00:16:32,880

and so that's why there's this this loop

486

00:16:36,230 --> 00:16:34,480

structure to it and to leave

487

00:16:37,670 --> 00:16:36,240

out the experiences would actually be to

488

00:16:39,990 --> 00:16:37,680

leave out um

489

00:16:41,749 --> 00:16:40,000

the whole point which is to understand

490

00:16:44,949 --> 00:16:41,759

my perceptions

491

00:16:46,629 --> 00:16:44,959

okay when i watch your interviews with

492

00:16:48,870 --> 00:16:46,639

people who most of the time aren't

493

00:16:51,670 --> 00:16:48,880

physicists they seem to be resistant

494

00:16:52,710 --> 00:16:51,680

on that space time is emergent like

495

00:16:54,230 --> 00:16:52,720

michael schermer

496

00:16:55,590 --> 00:16:54,240

and he was saying well you probably

497

00:16:56,069 --> 00:16:55,600

talked to the minority of physicists

498

00:16:58,550 --> 00:16:56,079

that think that

499

00:16:59,509 --> 00:16:58,560

space time is emerging that's not in

500

00:17:01,350 --> 00:16:59,519

fact true

501
00:17:02,790 --> 00:17:01,360
most physicists as far as i know

502
00:17:03,590 --> 00:17:02,800
actually believe that space time is

503
00:17:07,429 --> 00:17:03,600
emergent

504
00:17:10,470 --> 00:17:09,429
so why do you think that there's this

505
00:17:14,230 --> 00:17:10,480
aversion

506
00:17:15,990 --> 00:17:14,240
to modest that is monoism

507
00:17:17,350 --> 00:17:16,000
theory is predicated on the primacy of

508
00:17:18,470 --> 00:17:17,360
consciousness rather than the primacy

509
00:17:21,510 --> 00:17:18,480
being material

510
00:17:24,710 --> 00:17:21,520
why is it that that's the sticking point

511
00:17:26,710 --> 00:17:24,720
right well and even among physicists

512
00:17:28,230 --> 00:17:26,720
who recognize that space time isn't

513
00:17:33,029 --> 00:17:28,240

fundamental

514

00:17:35,590 --> 00:17:33,039

um you won't find very many of them

515

00:17:38,070 --> 00:17:35,600

arguing that therefore consciousness is

516

00:17:41,590 --> 00:17:38,080

a good candidate for what is fundamental

517

00:17:44,310 --> 00:17:41,600

um i've been to an fqxi

518

00:17:45,669 --> 00:17:44,320

um meeting of physicists where they were

519

00:17:46,070 --> 00:17:45,679

looking at the role of the observer in

520

00:17:49,590 --> 00:17:46,080

physics

521

00:17:51,990 --> 00:17:49,600

at banff a few years ago and

522

00:17:53,510 --> 00:17:52,000

even in that context where where they

523

00:17:57,350 --> 00:17:53,520

were looking at the role of the observer

524

00:18:00,230 --> 00:17:57,360

in physics i didn't see any of the

525

00:18:01,110 --> 00:18:00,240

physicists there interested in taking

526

00:18:04,230 --> 00:18:01,120

consciousness

527

00:18:08,470 --> 00:18:04,240

as fundamental and and i think

528

00:18:10,070 --> 00:18:08,480

the attitude is why take such a huge

529

00:18:11,830 --> 00:18:10,080

leap

530

00:18:13,990 --> 00:18:11,840

i mean letting go of space time is one

531

00:18:15,750 --> 00:18:14,000

thing but jumping into consciousness

532

00:18:17,430 --> 00:18:15,760

i mean that that for i think most

533

00:18:19,270 --> 00:18:17,440

physicists would say that's a much

534

00:18:22,230 --> 00:18:19,280

bigger leap than we need to take let's

535

00:18:23,270 --> 00:18:22,240

try to find just some deeper structure

536

00:18:26,470 --> 00:18:23,280

beyond space

537

00:18:28,630 --> 00:18:26,480

time and for example this is i think the

538

00:18:29,990 --> 00:18:28,640

brilliant work that nema or kanye hamed

539

00:18:33,270 --> 00:18:30,000

is doing where he's saying

540

00:18:36,150 --> 00:18:33,280

look we can look

541

00:18:38,070 --> 00:18:36,160

at these so-called positive geometries

542

00:18:40,870 --> 00:18:38,080

behind space-time the amplitude

543

00:18:41,510 --> 00:18:40,880

a sociohedron and other things that he's

544

00:18:43,590 --> 00:18:41,520

finding

545

00:18:44,549 --> 00:18:43,600

positive grasmanians the bigger

546

00:18:47,669 --> 00:18:44,559

structure that

547

00:18:49,750 --> 00:18:47,679

includes many of these and and

548

00:18:51,350 --> 00:18:49,760

he doesn't know what that realm is about

549

00:18:52,870 --> 00:18:51,360

which is fine but he's finding the

550

00:18:54,390 --> 00:18:52,880

mathematical structure so he's finding

551
00:18:56,230 --> 00:18:54,400
that there are these symmetries like in

552
00:18:59,350 --> 00:18:56,240
the amplitude

553
00:19:01,669 --> 00:18:59,360
um that can't be captured

554
00:19:03,510 --> 00:19:01,679
in space-time they also have found that

555
00:19:05,110 --> 00:19:03,520
the mathematical

556
00:19:06,390 --> 00:19:05,120
description of the scattering amplitudes

557
00:19:07,590 --> 00:19:06,400
the computations of the scattering

558
00:19:09,350 --> 00:19:07,600
amplitudes

559
00:19:10,789 --> 00:19:09,360
become much much simpler when you let go

560
00:19:12,950 --> 00:19:10,799
of space time if you use

561
00:19:14,470 --> 00:19:12,960
um feynman diagrams and have virtual

562
00:19:16,150 --> 00:19:14,480
particles in space time then you could

563
00:19:17,990 --> 00:19:16,160

have hundreds or thousands of pages

564

00:19:19,909 --> 00:19:18,000

but in this deeper space that he's

565

00:19:22,630 --> 00:19:19,919

finding this pure math

566

00:19:23,990 --> 00:19:22,640

um it collapses to a few terms that you

567

00:19:28,150 --> 00:19:24,000

can compute by hand

568

00:19:31,909 --> 00:19:28,160

and so so i think that the physicists

569

00:19:34,310 --> 00:19:31,919

are saying let's you know let's not

570

00:19:35,669 --> 00:19:34,320

jump further than we have to let's if we

571

00:19:36,150 --> 00:19:35,679

have to let go of spacetime let's just

572

00:19:37,830 --> 00:19:36,160

find

573

00:19:39,350 --> 00:19:37,840

some let's let's let the mathematics

574

00:19:41,750 --> 00:19:39,360

guide us first

575

00:19:43,430 --> 00:19:41,760

um and we can try things like well let's

576

00:19:43,830 --> 00:19:43,440

just try like quantum bits in quantum

577

00:19:46,870 --> 00:19:43,840

case

578

00:19:47,669 --> 00:19:46,880

seth lloyd i think at mit took a a an

579

00:19:49,750 --> 00:19:47,679

approach

580

00:19:51,029 --> 00:19:49,760

and quantum what quantum bits and

581

00:19:53,190 --> 00:19:51,039

quantum gates

582

00:19:54,789 --> 00:19:53,200

gates right okay right so your space

583

00:19:57,270 --> 00:19:54,799

time isn't fundamental let's

584

00:19:59,029 --> 00:19:57,280

let's pause it something that's not

585

00:19:59,990 --> 00:19:59,039

conscious just quantum bits and quantum

586

00:20:02,390 --> 00:20:00,000

gates

587

00:20:03,350 --> 00:20:02,400

and what what seth lloyd was able to

588

00:20:05,990 --> 00:20:03,360

show is that you could

589

00:20:07,270 --> 00:20:06,000

in some sense get little patches of

590

00:20:11,750 --> 00:20:07,280

space time

591

00:20:12,789 --> 00:20:11,760

the curvature of this little patch was

592

00:20:15,830 --> 00:20:12,799

proportional to the

593

00:20:17,190 --> 00:20:15,840

action of the gate and so instead of

594

00:20:18,950 --> 00:20:17,200

starting with space time is fundamental

595

00:20:21,270 --> 00:20:18,960

you start with quantum bits and quantum

596

00:20:21,909 --> 00:20:21,280

gates um where those bits and gates come

597

00:20:23,350 --> 00:20:21,919

from again

598

00:20:24,789 --> 00:20:23,360

that's now that's that's your new

599

00:20:25,990 --> 00:20:24,799

assumption it's not space time it's just

600

00:20:27,750 --> 00:20:26,000

bits and gates and you can ask

601
00:20:30,310 --> 00:20:27,760
you know who ordered that why should the

602
00:20:34,149 --> 00:20:30,320
universe be fundamentally that

603
00:20:35,590 --> 00:20:34,159
now so the reason why i go there

604
00:20:37,830 --> 00:20:35,600
even though i think most physicists

605
00:20:39,909 --> 00:20:37,840
don't is that

606
00:20:41,190 --> 00:20:39,919
as a cognitive neuroscientist i'm very

607
00:20:43,990 --> 00:20:41,200
interested

608
00:20:45,830 --> 00:20:44,000
in the problem what's called the heart

609
00:20:48,070 --> 00:20:45,840
problem of consciousness

610
00:20:49,669 --> 00:20:48,080
right we have lots of correlations

611
00:20:52,549 --> 00:20:49,679
between brain activity

612
00:20:55,029 --> 00:20:52,559
and conscious experiences like i i like

613
00:20:57,430 --> 00:20:55,039

to use the example of area v4

614

00:20:58,470 --> 00:20:57,440

of cortex left hemispheres back over

615

00:21:00,789 --> 00:20:58,480

here somewhere

616

00:21:02,630 --> 00:21:00,799

if you take a magnet and just touch it

617

00:21:04,950 --> 00:21:02,640

to your skull there a transcranial

618

00:21:07,190 --> 00:21:04,960

magnetic stimulator and inhibit before

619

00:21:08,789 --> 00:21:07,200

you will lose all color experiences in

620

00:21:09,909 --> 00:21:08,799

the right visual field everything to the

621

00:21:11,990 --> 00:21:09,919

right of where you're looking

622

00:21:13,750 --> 00:21:12,000

you will lose color experiences you turn

623

00:21:14,789 --> 00:21:13,760

off the magnet color experiences come

624

00:21:16,630 --> 00:21:14,799

back

625

00:21:18,390 --> 00:21:16,640

and we have dozens maybe hundreds of

626
00:21:19,909 --> 00:21:18,400
correlations like that between specific

627
00:21:21,909 --> 00:21:19,919
kinds of neural activity

628
00:21:23,830 --> 00:21:21,919
and specific conscious experiences but

629
00:21:26,710 --> 00:21:23,840
we have no scientific theories

630
00:21:27,830 --> 00:21:26,720
that can explain um that correlation

631
00:21:29,909 --> 00:21:27,840
there are none

632
00:21:31,430 --> 00:21:29,919
um for any specific there's not a

633
00:21:32,470 --> 00:21:31,440
scientific theory that can explain even

634
00:21:33,909 --> 00:21:32,480
one specific

635
00:21:35,830 --> 00:21:33,919
conscious experience like the taste of

636
00:21:37,190 --> 00:21:35,840
chocolate or the smell of garlic that

637
00:21:39,750 --> 00:21:37,200
says for example

638
00:21:42,070 --> 00:21:39,760

this pattern of brain activity or this

639

00:21:44,549 --> 00:21:42,080

functional aspect of brain activity

640

00:21:46,070 --> 00:21:44,559

um must be the taste of chocolate it

641

00:21:49,029 --> 00:21:46,080

couldn't be the the smell of

642

00:21:50,870 --> 00:21:49,039

um you know a rose and these are the

643

00:21:53,270 --> 00:21:50,880

precise reasons why

644

00:21:55,909 --> 00:21:53,280

there's just nothing on the table and so

645

00:22:00,710 --> 00:21:55,919

i'm trying to

646

00:22:03,909 --> 00:22:00,720

reason why space time is

647

00:22:05,350 --> 00:22:03,919

not fundamental is because something

648

00:22:07,430 --> 00:22:05,360

else is consciousness

649

00:22:09,830 --> 00:22:07,440

and if i start with consciousness i can

650

00:22:11,510 --> 00:22:09,840

perhaps get a theory that explains

651
00:22:13,909 --> 00:22:11,520
this correlation between conscious

652
00:22:15,110 --> 00:22:13,919
experiences and brain states but i don't

653
00:22:16,710 --> 00:22:15,120
start with

654
00:22:18,789 --> 00:22:16,720
something in space time namely brain

655
00:22:20,310 --> 00:22:18,799
states i don't start with brain states

656
00:22:22,310 --> 00:22:20,320
and and figure out how they cause

657
00:22:23,909 --> 00:22:22,320
consciousness i go the other way around

658
00:22:24,470 --> 00:22:23,919
to start with consciousness and show how

659
00:22:27,110 --> 00:22:24,480
it

660
00:22:27,590 --> 00:22:27,120
creates space time as a data structure

661
00:22:32,710 --> 00:22:27,600
and

662
00:22:35,510 --> 00:22:32,720
within that data structure

663
00:22:37,110 --> 00:22:35,520

so so the idea of the big picture idea

664

00:22:45,110 --> 00:22:37,120

is

665

00:22:46,789 --> 00:22:45,120

then objects in space time

666

00:22:48,870 --> 00:22:46,799

and just so people are clear this is not

667

00:22:50,710 --> 00:22:48,880

as this is not new that space time isn't

668

00:22:53,029 --> 00:22:50,720

fundamental it's not like a kooky theory

669

00:22:54,070 --> 00:22:53,039

this has been going around since the 80s

670

00:22:56,789 --> 00:22:54,080

just so that they don't think you're

671

00:22:59,909 --> 00:22:56,799

glumming onto some fat

672

00:23:01,990 --> 00:22:59,919

that that that's right and yeah you know

673

00:23:03,590 --> 00:23:02,000

i think mo as you said most physicists

674

00:23:05,350 --> 00:23:03,600

now most you know first ranked

675

00:23:06,390 --> 00:23:05,360

theoretical physicist just recognize

676

00:23:08,630 --> 00:23:06,400

that it's sort of just

677

00:23:10,149 --> 00:23:08,640

of course space time isn't fundamental

678

00:23:11,909 --> 00:23:10,159

and of course our job is to try to

679

00:23:15,590 --> 00:23:11,919

figure out what's the next step

680

00:23:17,029 --> 00:23:15,600

um and it's not such a crazy idea either

681

00:23:18,630 --> 00:23:17,039

right when you're speaking with michael

682

00:23:20,149 --> 00:23:18,640

schumer he was just blown away there's

683

00:23:20,950 --> 00:23:20,159

no way that space time can't be

684

00:23:22,390 --> 00:23:20,960

fundamental

685

00:23:25,270 --> 00:23:22,400

there's a cup in front of me i see the

686

00:23:26,630 --> 00:23:25,280

cup that's that's beside the point

687

00:23:27,909 --> 00:23:26,640

there's been many times where we have an

688

00:23:29,430 --> 00:23:27,919

effective theory and then we find one

689

00:23:30,070 --> 00:23:29,440

that's more fundamental that produces

690

00:23:34,470 --> 00:23:30,080

that

691

00:23:37,270 --> 00:23:34,480

current theories aren't effective

692

00:23:38,870 --> 00:23:37,280

right and and my colleagues in the

693

00:23:39,750 --> 00:23:38,880

cognitive neurosciences can can be

694

00:23:41,269 --> 00:23:39,760

forgiven

695

00:23:43,269 --> 00:23:41,279

if they don't understand the state of

696

00:23:44,710 --> 00:23:43,279

the play in in physics right i mean

697

00:23:47,909 --> 00:23:44,720

they're they

698

00:23:50,789 --> 00:23:47,919

were taught some physics

699

00:23:51,750 --> 00:23:50,799

in their backgrounds and they have just

700

00:23:53,669 --> 00:23:51,760

absorbed

701
00:23:55,350 --> 00:23:53,679
the idea that space-time is fundamental

702
00:23:56,630 --> 00:23:55,360
and that's perfectly fine in a newtonian

703
00:23:59,669 --> 00:23:56,640
universe and

704
00:24:02,070 --> 00:23:59,679
even in special relativity um it's and

705
00:24:03,990 --> 00:24:02,080
in general relativity is when you put

706
00:24:05,909 --> 00:24:04,000
einstein's theory of gravity together

707
00:24:08,470 --> 00:24:05,919
with quantum theory

708
00:24:09,430 --> 00:24:08,480
that you get the problem and that that's

709
00:24:11,269 --> 00:24:09,440
sort of beyond

710
00:24:13,269 --> 00:24:11,279
what you could expect a normal cognitive

711
00:24:13,750 --> 00:24:13,279
neuroscientist to to really have studied

712
00:24:15,669 --> 00:24:13,760
and so

713
00:24:16,789 --> 00:24:15,679

so you know i don't i don't blame my

714

00:24:20,070 --> 00:24:16,799

colleagues there

715

00:24:22,710 --> 00:24:20,080

for for not understanding this um but

716

00:24:23,269 --> 00:24:22,720

but for for any real professional

717

00:24:25,430 --> 00:24:23,279

physicist

718

00:24:26,870 --> 00:24:25,440

is just obviously you generally quantum

719

00:24:28,630 --> 00:24:26,880

field they don't play well

720

00:24:30,070 --> 00:24:28,640

i see there's two problems one if you

721

00:24:31,510 --> 00:24:30,080

encounter the general public and when i

722

00:24:33,269 --> 00:24:31,520

say general public i mean

723

00:24:35,430 --> 00:24:33,279

the rationally minded skeptics like

724

00:24:36,950 --> 00:24:35,440

michael sherman or maybe even sam harris

725

00:24:39,590 --> 00:24:36,960

and they'll their sticking point might

726

00:24:40,870 --> 00:24:39,600

be the space-time fundamental aspect

727

00:24:42,549 --> 00:24:40,880

right but then when you speak to a

728

00:24:43,430 --> 00:24:42,559

physicist their sticking point would be

729

00:24:44,630 --> 00:24:43,440

consciousness you're saying

730

00:24:46,470 --> 00:24:44,640

consciousness is fun like i agree with

731

00:24:48,710 --> 00:24:46,480

you space time is emerging but then

732

00:24:49,830 --> 00:24:48,720

consciousness is complicated that's an

733

00:24:52,870 --> 00:24:49,840

emerging phenomenon

734

00:24:55,430 --> 00:24:52,880

for a neuroscientist to figure out or or

735

00:24:56,950 --> 00:24:55,440

some people like penrose there's some

736

00:24:57,269 --> 00:24:56,960

quantum mechanical aspect to it but it's

737

00:24:59,269 --> 00:24:57,279

still

738

00:25:01,110 --> 00:24:59,279

somewhat complicated it's not simple why

739

00:25:03,830 --> 00:25:01,120

would you start with consciousness

740

00:25:05,190 --> 00:25:03,840

right okay i have a question about sure

741

00:25:08,310 --> 00:25:05,200

can you just respond to

742

00:25:11,029 --> 00:25:08,320

why that is the idea

743

00:25:12,549 --> 00:25:11,039

is very very simple if space time isn't

744

00:25:13,990 --> 00:25:12,559

fundamental

745

00:25:15,990 --> 00:25:14,000

then objects in spacetime aren't

746

00:25:17,430 --> 00:25:16,000

fundamental either

747

00:25:19,269 --> 00:25:17,440

and if they're not fundamental then they

748

00:25:21,029 --> 00:25:19,279

aren't this true source of causal

749

00:25:22,549 --> 00:25:21,039

power in the universe physical objects

750

00:25:24,789 --> 00:25:22,559

have no cause of powers

751
00:25:25,990 --> 00:25:24,799
it's a useful fiction to think that the

752
00:25:29,029 --> 00:25:26,000
eight ball

753
00:25:30,870 --> 00:25:29,039
being hit by the cue ball um has

754
00:25:32,630 --> 00:25:30,880
there's a causal interaction or that

755
00:25:34,549 --> 00:25:32,640
neurons have causal effects

756
00:25:36,310 --> 00:25:34,559
but it's just a fiction and so that's

757
00:25:40,149 --> 00:25:36,320
why i tied the two together

758
00:25:41,510 --> 00:25:40,159
neurons being objects in space time has

759
00:25:44,390 --> 00:25:41,520
no have no causal powers

760
00:25:47,430 --> 00:25:44,400
my brain causes none of my behavior it

761
00:25:51,029 --> 00:25:47,440
causes none of my experiences

762
00:25:53,190 --> 00:25:51,039
but that that means that therefore

763
00:25:54,470 --> 00:25:53,200

any attempt to show how we solve the

764

00:25:55,750 --> 00:25:54,480

hard problem of consciousness starting

765

00:25:57,190 --> 00:25:55,760

with brain activity and trying to boot

766

00:25:58,870 --> 00:25:57,200

up consciousness will fail

767

00:26:00,870 --> 00:25:58,880

so my idea is simple let's start with

768

00:26:03,750 --> 00:26:00,880

the theory of consciousness and show how

769

00:26:05,830 --> 00:26:03,760

space-time is not fundamental it's just

770

00:26:07,750 --> 00:26:05,840

a data structure within consciousness

771

00:26:10,149 --> 00:26:07,760

that's why space-time isn't fundamental

772

00:26:11,430 --> 00:26:10,159

it's merely a data structure a

773

00:26:13,350 --> 00:26:11,440

visualization tool

774

00:26:15,029 --> 00:26:13,360

that con that consciousness uses to

775

00:26:17,350 --> 00:26:15,039

interact with other consciousnesses

776

00:26:18,149 --> 00:26:17,360

so so i'm the reason so this is all tied

777

00:26:21,110 --> 00:26:18,159

together

778

00:26:22,710 --> 00:26:21,120

the the space time being not fundamental

779

00:26:23,990 --> 00:26:22,720

and the move to make consciousness

780

00:26:27,110 --> 00:26:24,000

fundamental is all part

781

00:26:29,430 --> 00:26:27,120

of one big move recognizing that

782

00:26:32,470 --> 00:26:29,440

that brain activity could not possibly

783

00:26:33,990 --> 00:26:32,480

cause our conscious experiences

784

00:26:35,350 --> 00:26:34,000

so why don't we try the other way let's

785

00:26:38,390 --> 00:26:35,360

start with conscious experiences and

786

00:26:40,710 --> 00:26:38,400

show how they cause

787

00:26:41,590 --> 00:26:40,720

and objects to arise merely as data

788

00:26:43,909 --> 00:26:41,600

structures

789

00:26:45,750 --> 00:26:43,919

within consciousness okay getting to the

790

00:26:48,390 --> 00:26:45,760

neural correlates aspect

791

00:26:50,230 --> 00:26:48,400

you mentioned that it would be to say

792

00:26:52,149 --> 00:26:50,240

that hey because our brain is correlated

793

00:26:54,070 --> 00:26:52,159

with certain conscious experiences

794

00:26:55,909 --> 00:26:54,080

it's that's one thing but then to say

795

00:26:57,350 --> 00:26:55,919

that the brain causes it is another it

796

00:26:58,950 --> 00:26:57,360

would be akin to saying

797

00:27:00,870 --> 00:26:58,960

there's a train track there's a subway

798

00:27:01,990 --> 00:27:00,880

station and people form right before the

799

00:27:03,110 --> 00:27:02,000

train comes

800

00:27:05,029 --> 00:27:03,120

right but it doesn't mean that the

801
00:27:05,830 --> 00:27:05,039
people themselves caused the train to

802
00:27:08,470 --> 00:27:05,840
come

803
00:27:10,470 --> 00:27:08,480
however you just mentioned that there's

804
00:27:14,630 --> 00:27:10,480
transcranial magnetic stimulation

805
00:27:16,870 --> 00:27:14,640
where we can in fact perturb neurons

806
00:27:18,230 --> 00:27:16,880
and then see it would be one thing if we

807
00:27:19,830 --> 00:27:18,240
saw conscious experience

808
00:27:20,950 --> 00:27:19,840
then looked at the neurons and then saw

809
00:27:21,590 --> 00:27:20,960
that there's some association that's

810
00:27:23,350 --> 00:27:21,600
correlation

811
00:27:25,350 --> 00:27:23,360
but then if we can perturb the neurons

812
00:27:27,830 --> 00:27:25,360
to elicit a conscious experience

813
00:27:29,590 --> 00:27:27,840

why is that not evidence for the causal

814

00:27:31,669 --> 00:27:29,600

power going from neurons to

815

00:27:32,789 --> 00:27:31,679

conscious experience great question and

816

00:27:34,470 --> 00:27:32,799

that's what my colleagues would all

817

00:27:36,870 --> 00:27:34,480

point to is that look they'd say

818

00:27:37,990 --> 00:27:36,880

look we can intervene i can literally

819

00:27:40,070 --> 00:27:38,000

manipulate the brain

820

00:27:42,070 --> 00:27:40,080

and get a change in conscious experience

821

00:27:42,870 --> 00:27:42,080

the fact that i can intervene means i'm

822

00:27:44,389 --> 00:27:42,880

showing you

823

00:27:46,070 --> 00:27:44,399

the true causal structure of what's

824

00:27:46,789 --> 00:27:46,080

going on there and that's a logical

825

00:27:48,470 --> 00:27:46,799

error

826

00:27:49,750 --> 00:27:48,480

and it's very easy to see the logical

827

00:27:50,710 --> 00:27:49,760

air imagine you're playing a virtual

828

00:27:52,710 --> 00:27:50,720

reality game and

829

00:27:55,110 --> 00:27:52,720

you're driving a car you're driving a

830

00:27:56,870 --> 00:27:55,120

mustang in a virtual reality game right

831

00:27:58,630 --> 00:27:56,880

and you have a steering wheel and it

832

00:28:00,310 --> 00:27:58,640

turns out you can you can

833

00:28:02,710 --> 00:28:00,320

intervene in that if i turn the steering

834

00:28:03,669 --> 00:28:02,720

wheel to the left my car actually turns

835

00:28:04,789 --> 00:28:03,679

left in the game

836

00:28:06,310 --> 00:28:04,799

if i turn the steering wheel to the

837

00:28:07,669 --> 00:28:06,320

right the car turns right therefore

838

00:28:09,590 --> 00:28:07,679

there must be a real steering wheel and

839

00:28:11,909 --> 00:28:09,600

it must have real causal powers

840

00:28:13,430 --> 00:28:11,919

nope there's no real steering wheel that

841

00:28:13,830 --> 00:28:13,440

that's not that's not the claim well

842

00:28:16,149 --> 00:28:13,840

that's

843

00:28:17,029 --> 00:28:16,159

that might be their claim my claim or my

844

00:28:20,230 --> 00:28:17,039

question

845

00:28:22,389 --> 00:28:20,240

is it is correct to say that the turning

846

00:28:22,950 --> 00:28:22,399

of the steering wheel causes turning in

847

00:28:24,710 --> 00:28:22,960

the game

848

00:28:27,029 --> 00:28:24,720

now it might not be that the turning of

849

00:28:29,110 --> 00:28:27,039

the steering wheel

850

00:28:30,070 --> 00:28:29,120

is akin in causal power to weigh the to

851

00:28:31,430 --> 00:28:30,080

the way that we would think that the

852

00:28:35,990 --> 00:28:31,440

turning of the steering wheel in a

853

00:28:39,190 --> 00:28:36,000

real car changes the wheels and the axes

854

00:28:40,710 --> 00:28:39,200

but all that we need for for causation

855

00:28:41,590 --> 00:28:40,720

to be shown is a implies b

856

00:28:44,549 --> 00:28:41,600

it doesn't matter that they're

857

00:28:45,830 --> 00:28:44,559

intermediate steps

858

00:28:47,909 --> 00:28:45,840

do you understand what i'm saying or am

859

00:28:48,549 --> 00:28:47,919

i not well i'm not explaining it

860

00:28:50,149 --> 00:28:48,559

correctly

861

00:28:52,070 --> 00:28:50,159

well the the thing about the steering

862

00:28:53,590 --> 00:28:52,080

wheel that you see in in the virtual

863

00:28:56,630 --> 00:28:53,600

reality game is that

864

00:28:58,549 --> 00:28:56,640

if you turn your headset to the side

865

00:28:59,669 --> 00:28:58,559

the steering wheel ceases to exist there

866

00:29:00,710 --> 00:28:59,679

is no steering wheel because i'm not

867

00:29:02,870 --> 00:29:00,720

looking at it anymore

868

00:29:03,990 --> 00:29:02,880

the steering when i look back over to

869

00:29:05,750 --> 00:29:04,000

where the steering wheel should be

870

00:29:07,990 --> 00:29:05,760

i see a steering wheel the steering

871

00:29:10,950 --> 00:29:08,000

wheel is something

872

00:29:11,590 --> 00:29:10,960

that i create and destroy as i need it's

873

00:29:14,310 --> 00:29:11,600

gone

874

00:29:15,350 --> 00:29:14,320

now it's back it has no causal powers

875

00:29:17,909 --> 00:29:15,360

the steering wheel

876
00:29:19,750 --> 00:29:17,919
literally has no causal powers it it

877
00:29:21,990 --> 00:29:19,760
informs

878
00:29:23,269 --> 00:29:22,000
me as the player about actions that i

879
00:29:25,350 --> 00:29:23,279
can take

880
00:29:26,870 --> 00:29:25,360
to to interact with the game but the stu

881
00:29:30,070 --> 00:29:26,880
but and the way i

882
00:29:30,789 --> 00:29:30,080
see myself the way i visualize what i'm

883
00:29:32,389 --> 00:29:30,799
doing is i

884
00:29:34,149 --> 00:29:32,399
visualize myself turning the steering

885
00:29:35,029 --> 00:29:34,159
wheel but that's all just a useful

886
00:29:36,710 --> 00:29:35,039
fiction

887
00:29:38,830 --> 00:29:36,720
and the steering wheel itself literally

888
00:29:41,350 --> 00:29:38,840

has no causal powers it's

889

00:29:43,830 --> 00:29:41,360

literally only in my head

890

00:29:45,029 --> 00:29:43,840

there is no external steering wheel with

891

00:29:46,710 --> 00:29:45,039

with causal powers

892

00:29:49,029 --> 00:29:46,720

and i'm saying that that's true not just

893

00:29:50,149 --> 00:29:49,039

in virtual reality but in everyday life

894

00:29:52,710 --> 00:29:50,159

because

895

00:29:53,990 --> 00:29:52,720

space-time is not fundamental it's just

896

00:29:56,310 --> 00:29:54,000

your headset

897

00:29:58,389 --> 00:29:56,320

when you go around in everyday life

898

00:30:01,269 --> 00:29:58,399

think virtual reality

899

00:30:02,070 --> 00:30:01,279

i create the moon when i look up in the

900

00:30:04,470 --> 00:30:02,080

sky

901
00:30:05,269 --> 00:30:04,480
i delete it when i look away there is no

902
00:30:06,549 --> 00:30:05,279
moon just

903
00:30:08,070 --> 00:30:06,559
in the same way that there is no

904
00:30:08,789 --> 00:30:08,080
steering wheel in the virtual reality

905
00:30:12,549 --> 00:30:08,799
game

906
00:30:14,630 --> 00:30:12,559
so when einstein you know asked uh

907
00:30:16,789 --> 00:30:14,640
someone that was with him um do you

908
00:30:18,310 --> 00:30:16,799
really believe the moon is only there

909
00:30:20,789 --> 00:30:18,320
when you look and it's not there when

910
00:30:22,230 --> 00:30:20,799
when no one looks um my answer is yeah

911
00:30:23,269 --> 00:30:22,240
it does it's not there when no one looks

912
00:30:25,590 --> 00:30:23,279
there is no moon

913
00:30:26,710 --> 00:30:25,600

because there is no space time it's and

914

00:30:28,070 --> 00:30:26,720

see that's the part

915

00:30:29,350 --> 00:30:28,080

that einstein wouldn't like right

916

00:30:30,230 --> 00:30:29,360

because his theory was the theory of

917

00:30:34,230 --> 00:30:30,240

space time

918

00:30:37,350 --> 00:30:34,240

really understand what that means

919

00:30:39,430 --> 00:30:37,360

nothing inside space-time is fundamental

920

00:30:41,909 --> 00:30:39,440

nothing and therefore nothing inside

921

00:30:44,149 --> 00:30:41,919

space-time has genuine causal powers it

922

00:30:46,470 --> 00:30:44,159

emerges from something deeper

923

00:30:47,750 --> 00:30:46,480

it's a useful fiction that our species

924

00:30:50,070 --> 00:30:47,760

has to think that

925

00:30:50,870 --> 00:30:50,080

physical objects have causal powers i

926

00:30:52,710 --> 00:30:50,880

throw a rock

927

00:30:55,510 --> 00:30:52,720

it hits a window the rock caused the

928

00:30:59,669 --> 00:30:55,520

window to break that's a useful fiction

929

00:31:02,630 --> 00:30:59,679

i inhibit area v4 color disappears

930

00:31:04,630 --> 00:31:02,640

aha therefore v4 causes color it's a

931

00:31:05,990 --> 00:31:04,640

useful fiction but it's just a fiction

932

00:31:08,470 --> 00:31:06,000

just like the steering wheel

933

00:31:09,990 --> 00:31:08,480

in the virtual reality game okay let's

934

00:31:11,909 --> 00:31:10,000

remove the virtual reality let's just

935

00:31:13,350 --> 00:31:11,919

pretend it's a regular game with a tv

936

00:31:13,990 --> 00:31:13,360

screen and you have a controller in

937

00:31:15,669 --> 00:31:14,000

front of you

938

00:31:17,110 --> 00:31:15,679

right and then you move your analog

939

00:31:18,230 --> 00:31:17,120

stick to the left and the character

940

00:31:20,149 --> 00:31:18,240

moves to the left

941

00:31:22,070 --> 00:31:20,159

then would you say that the move that

942

00:31:24,710 --> 00:31:22,080

you moving the analog stick to the left

943

00:31:26,950 --> 00:31:24,720

causes the character to move to the left

944

00:31:28,789 --> 00:31:26,960

yeah in that metaphor now you within

945

00:31:30,710 --> 00:31:28,799

that metaphor you would say that the

946

00:31:32,310 --> 00:31:30,720

the the icon on the screen was the thing

947

00:31:33,990 --> 00:31:32,320

that caused things to move right

948

00:31:35,830 --> 00:31:34,000

so if i saw myself right now like a

949

00:31:38,950 --> 00:31:35,840

paddle hit the thing like in pawn

950

00:31:40,310 --> 00:31:38,960

i hit hit a ball with the no it's really

951
00:31:41,669 --> 00:31:40,320
in that in that metaphor would be the

952
00:31:43,830 --> 00:31:41,679
joystick that was the real thing

953
00:31:44,789 --> 00:31:43,840
but i'm saying once you get that

954
00:31:47,509 --> 00:31:44,799
recognize that

955
00:31:49,190 --> 00:31:47,519
the world around you is just the screen

956
00:31:50,789 --> 00:31:49,200
even the joystick in your head

957
00:31:52,389 --> 00:31:50,799
like the joystick in your hand the

958
00:31:54,630 --> 00:31:52,399
joystick is in your head okay

959
00:31:56,470 --> 00:31:54,640
is in your head itself because space see

960
00:31:57,509 --> 00:31:56,480
that's the real point about what physics

961
00:32:00,549 --> 00:31:57,519
has discovered

962
00:32:03,269 --> 00:32:00,559
space-time is not fundamental it's hard

963
00:32:06,789 --> 00:32:03,279

for us to really grasp that

964

00:32:09,750 --> 00:32:06,799

it's really we so deeply believe

965

00:32:12,149 --> 00:32:09,760

that of course space-time is fundamental

966

00:32:14,470 --> 00:32:12,159

of course the moon is there

967

00:32:17,190 --> 00:32:14,480

when no one looks but when you really

968

00:32:19,590 --> 00:32:17,200

grasp space-time is not fundamental

969

00:32:20,470 --> 00:32:19,600

it and it's actually our construction

970

00:32:22,070 --> 00:32:20,480

then

971

00:32:23,909 --> 00:32:22,080

physical objects don't even exist when

972

00:32:26,070 --> 00:32:23,919

they're not perceived

973

00:32:27,430 --> 00:32:26,080

they don't have causal powers they don't

974

00:32:29,909 --> 00:32:27,440

even exist

975

00:32:31,830 --> 00:32:29,919

you can think of this what i'm doing

976

00:32:34,630 --> 00:32:31,840

right now as

977

00:32:36,549 --> 00:32:34,640

as partly to convince because i already

978

00:32:37,269 --> 00:32:36,559

have a predilection towards your ideas i

979

00:32:39,350 --> 00:32:37,279

already like

980

00:32:40,630 --> 00:32:39,360

you and i like your ideas so you don't

981

00:32:42,230 --> 00:32:40,640

need to convince me too much although i

982

00:32:45,909 --> 00:32:42,240

do have some objections

983

00:32:48,149 --> 00:32:45,919

but i'm i'm demarcating where i feel

984

00:32:48,950 --> 00:32:48,159

people like michael shermer and so on

985

00:32:51,909 --> 00:32:48,960

have problems

986

00:32:52,630 --> 00:32:51,919

because they take that virtual reality

987

00:32:54,230 --> 00:32:52,640

metaphor

988

00:32:56,870 --> 00:32:54,240

and there's some there are some problems

989

00:32:58,230 --> 00:32:56,880

with it because well like i said forget

990

00:32:59,750 --> 00:32:58,240

the virtual reality just imagine a

991

00:33:02,310 --> 00:32:59,760

screen and then you have an analog stick

992

00:33:02,870 --> 00:33:02,320

and then those two get conflated right

993

00:33:04,710 --> 00:33:02,880

okay

994

00:33:06,149 --> 00:33:04,720

there's another problem that i see with

995

00:33:10,630 --> 00:33:06,159

the virtual reality

996

00:33:12,789 --> 00:33:10,640

metaphor when you take off the headset

997

00:33:13,990 --> 00:33:12,799

there is still the computer rendering it

998

00:33:15,909 --> 00:33:14,000

to the lcd

999

00:33:17,750 --> 00:33:15,919

now there are some monitors there are

1000

00:33:18,870 --> 00:33:17,760

some virtual reality headsets that

1001

00:33:20,389 --> 00:33:18,880

detect when your

1002

00:33:22,310 --> 00:33:20,399

forehead is there and then just shut it

1003

00:33:23,830 --> 00:33:22,320

off but let's imagine that's not there

1004

00:33:25,430 --> 00:33:23,840

then they're like well it still persists

1005

00:33:26,789 --> 00:33:25,440

even if when i look to the left it

1006

00:33:27,750 --> 00:33:26,799

renders what's on the left or look to

1007

00:33:31,269 --> 00:33:27,760

the right it renders

1008

00:33:33,430 --> 00:33:31,279

but i can even simulate someone

1009

00:33:34,389 --> 00:33:33,440

going through a game without a conscious

1010

00:33:36,789 --> 00:33:34,399

perceiver

1011

00:33:37,669 --> 00:33:36,799

and then i can set my video camera up to

1012

00:33:39,509 --> 00:33:37,679

record that

1013

00:33:41,590 --> 00:33:39,519

and that person that character is moving

1014

00:33:42,870 --> 00:33:41,600

through the game there is no perceiver

1015

00:33:47,269 --> 00:33:42,880

right then and there

1016

00:33:50,549 --> 00:33:47,279

that's that's that's why i see this

1017

00:33:51,990 --> 00:33:50,559

virtual reality metaphor as having some

1018

00:33:55,509 --> 00:33:52,000

limitations but what would you say to

1019

00:33:56,950 --> 00:33:55,519

that that look even without a perceiver

1020

00:33:59,029 --> 00:33:56,960

i put the headset down it's still

1021

00:34:03,669 --> 00:33:59,039

rendering

1022

00:34:07,029 --> 00:34:03,679

well um that now in terms of physics

1023

00:34:10,069 --> 00:34:07,039

is the question of um

1024

00:34:12,470 --> 00:34:10,079

do physical objects literally

1025

00:34:13,109 --> 00:34:12,480

exist and have definite values of their

1026

00:34:15,430 --> 00:34:13,119

properties

1027

00:34:16,869 --> 00:34:15,440

when they're not perceived so that's the

1028

00:34:19,190 --> 00:34:16,879

question of

1029

00:34:19,990 --> 00:34:19,200

local realism right so local so this is

1030

00:34:21,510 --> 00:34:20,000

a technical question

1031

00:34:23,109 --> 00:34:21,520

in physics and this is what we're really

1032

00:34:23,909 --> 00:34:23,119

addressing here is the question of local

1033

00:34:26,069 --> 00:34:23,919

realism

1034

00:34:27,669 --> 00:34:26,079

do physical objects really exist and

1035

00:34:29,349 --> 00:34:27,679

have definite values

1036

00:34:31,109 --> 00:34:29,359

of physical properties like position

1037

00:34:31,990 --> 00:34:31,119

momentum and spin when they're not

1038

00:34:34,230 --> 00:34:32,000

observed

1039

00:34:35,750 --> 00:34:34,240

and is it true that those properties

1040

00:34:37,430 --> 00:34:35,760

have effects that propagate no faster

1041

00:34:40,710 --> 00:34:37,440

than the speed of light

1042

00:34:41,669 --> 00:34:40,720

and you might intuitively think well of

1043

00:34:43,829 --> 00:34:41,679

course

1044

00:34:45,510 --> 00:34:43,839

the moon has a position it has a

1045

00:34:46,869 --> 00:34:45,520

momentum an electron has a position a

1046

00:34:49,990 --> 00:34:46,879

momentum

1047

00:34:51,510 --> 00:34:50,000

a spin value spin axis when it's not

1048

00:34:55,190 --> 00:34:51,520

observed of course

1049

00:34:57,190 --> 00:34:55,200

but when we do the experiments um

1050

00:34:58,390 --> 00:34:57,200

first you know when this was first

1051
00:34:59,829 --> 00:34:58,400
raised you know

1052
00:35:02,390 --> 00:34:59,839
einstein was one of the ones who asked

1053
00:35:03,510 --> 00:35:02,400
this question back in the epr paper back

1054
00:35:07,030 --> 00:35:03,520
in 1935

1055
00:35:08,710 --> 00:35:07,040
right and a number of physicists

1056
00:35:10,870 --> 00:35:08,720
including wolfgang paulie thought that

1057
00:35:13,030 --> 00:35:10,880
this was ludicrous that einstein was

1058
00:35:15,030 --> 00:35:13,040
asking a question like you know that was

1059
00:35:16,550 --> 00:35:15,040
no more

1060
00:35:18,310 --> 00:35:16,560
interesting than how many angels can

1061
00:35:20,230 --> 00:35:18,320
dance on the head of a pen how could you

1062
00:35:20,470 --> 00:35:20,240
possibly answer einstein's question does

1063
00:35:27,670 --> 00:35:20,480

a

1064

00:35:28,950 --> 00:35:27,680

silly by definition

1065

00:35:30,310 --> 00:35:28,960

if you're not observing how could you

1066

00:35:31,670 --> 00:35:30,320

tell whether it has a positional

1067

00:35:36,230 --> 00:35:31,680

momentum or not

1068

00:35:38,790 --> 00:35:36,240

but it when it turned out in 1963 or so

1069

00:35:40,950 --> 00:35:38,800

uh the physicist john bell discovered

1070

00:35:43,270 --> 00:35:40,960

that we can answer that question you

1071

00:35:44,550 --> 00:35:43,280

there is a series of experiments you

1072

00:35:45,589 --> 00:35:44,560

know that you can do measurements that

1073

00:35:47,670 --> 00:35:45,599

you can do

1074

00:35:49,030 --> 00:35:47,680

that will give you certain statistics

1075

00:35:50,870 --> 00:35:49,040

that can

1076
00:35:52,470 --> 00:35:50,880
allow you to decide whether or not local

1077
00:35:54,150 --> 00:35:52,480
realism is true

1078
00:35:55,349 --> 00:35:54,160
and that was a real stunning achievement

1079
00:35:56,790 --> 00:35:55,359
one of the greatest intellectual

1080
00:36:00,310 --> 00:35:56,800
achievements in human history

1081
00:36:03,030 --> 00:36:00,320
john bell's inequalities

1082
00:36:05,190 --> 00:36:03,040
and and then a year later john bell and

1083
00:36:08,310 --> 00:36:05,200
coken and specker

1084
00:36:09,589 --> 00:36:08,320
apparently independently also came up

1085
00:36:13,310 --> 00:36:09,599
with a way to

1086
00:36:15,510 --> 00:36:13,320
to test non-contextual realism

1087
00:36:16,470 --> 00:36:15,520
non-contextualism realism is the claim

1088
00:36:18,630 --> 00:36:16,480

that

1089

00:36:19,829 --> 00:36:18,640

objects exist and have definite values

1090

00:36:21,030 --> 00:36:19,839

of their properties when they're not

1091

00:36:24,870 --> 00:36:21,040

observed that's

1092

00:36:26,950 --> 00:36:24,880

the the realism and the values of those

1093

00:36:28,470 --> 00:36:26,960

properties don't depend on the way you

1094

00:36:31,910 --> 00:36:28,480

measure them

1095

00:36:35,030 --> 00:36:31,920

that's the non-contextual part and

1096

00:36:38,630 --> 00:36:35,040

once again quantum theory entails

1097

00:36:40,470 --> 00:36:38,640

that non-contextual realism is false

1098

00:36:42,630 --> 00:36:40,480

it also entails that local realism is

1099

00:36:45,349 --> 00:36:42,640

false and

1100

00:36:46,550 --> 00:36:45,359

it's been tested and it's true local

1101

00:36:52,630 --> 00:36:46,560

realism is false

1102

00:36:54,870 --> 00:36:52,640

that is that electron has a position

1103

00:36:56,150 --> 00:36:54,880

when it's not observed or locality is

1104

00:36:57,990 --> 00:36:56,160

false

1105

00:36:59,750 --> 00:36:58,000

the influences propagate no faster than

1106

00:37:02,470 --> 00:36:59,760

the speed of light or both

1107

00:37:04,069 --> 00:37:02,480

and i think that both both are false

1108

00:37:06,470 --> 00:37:04,079

local realism is just plain false

1109

00:37:07,670 --> 00:37:06,480

non-contextual realism is false and once

1110

00:37:09,750 --> 00:37:07,680

we understand that

1111

00:37:13,109 --> 00:37:09,760

that means that there right did you say

1112

00:37:14,470 --> 00:37:13,119

that non-local realism is also false

1113

00:37:16,150 --> 00:37:14,480

uh yeah because space time is not

1114

00:37:18,230 --> 00:37:16,160

fundamental so the right

1115

00:37:19,349 --> 00:37:18,240

right now space time itself is just i

1116

00:37:21,510 --> 00:37:19,359

mean the big

1117

00:37:22,790 --> 00:37:21,520

take home is space time is not

1118

00:37:24,790 --> 00:37:22,800

fundamental therefore

1119

00:37:26,390 --> 00:37:24,800

particles and their properties inside

1120

00:37:28,790 --> 00:37:26,400

space-time are not fundamental

1121

00:37:29,670 --> 00:37:28,800

for a physicist this is obvious because

1122

00:37:31,990 --> 00:37:29,680

um you know

1123

00:37:33,750 --> 00:37:32,000

as soon as you say space-time is not

1124

00:37:34,790 --> 00:37:33,760

fundamental it's emergent from something

1125

00:37:36,390 --> 00:37:34,800

else

1126

00:37:38,950 --> 00:37:36,400

well that takes particles with them

1127

00:37:42,069 --> 00:37:38,960

because particles are nothing

1128

00:37:43,670 --> 00:37:42,079

but irreducible representations of the

1129

00:37:46,310 --> 00:37:43,680

symmetries of space-time

1130

00:37:47,750 --> 00:37:46,320

the poincare group so particles are

1131

00:37:48,950 --> 00:37:47,760

irreducible representations of the

1132

00:37:50,150 --> 00:37:48,960

poincare group which are just the

1133

00:37:51,670 --> 00:37:50,160

symmetries of space time

1134

00:37:53,190 --> 00:37:51,680

the space time's not fundamental neither

1135

00:37:55,430 --> 00:37:53,200

are particles so

1136

00:37:56,550 --> 00:37:55,440

so my colleagues in cognitive

1137

00:37:58,390 --> 00:37:56,560

neurosciences

1138

00:37:59,990 --> 00:37:58,400

we're still back thinking that oh we

1139

00:38:01,349 --> 00:38:00,000

have this reductionist view space time

1140

00:38:03,670 --> 00:38:01,359

is fundamental

1141

00:38:04,470 --> 00:38:03,680

you start off with protons and neutrons

1142

00:38:07,589 --> 00:38:04,480

or if you're

1143

00:38:10,710 --> 00:38:07,599

more sophisticated quarks and leptons

1144

00:38:12,550 --> 00:38:10,720

in gluons than gravitons and

1145

00:38:13,750 --> 00:38:12,560

those are the elementary particles the

1146

00:38:14,870 --> 00:38:13,760

laws that govern them are the

1147

00:38:17,190 --> 00:38:14,880

fundamental laws of

1148

00:38:18,630 --> 00:38:17,200

of all of reality and we can in a

1149

00:38:20,870 --> 00:38:18,640

reductive fashion

1150

00:38:22,710 --> 00:38:20,880

fashion build up everything from that

1151

00:38:24,630 --> 00:38:22,720

well that whole foundation is gone

1152

00:38:26,150 --> 00:38:24,640

space-time is not fundamental those

1153

00:38:28,310 --> 00:38:26,160

particles are not fundamental

1154

00:38:29,750 --> 00:38:28,320

reductionism is dead space-time

1155

00:38:32,870 --> 00:38:29,760

reductionism is dead

1156

00:38:34,790 --> 00:38:32,880

we need a completely new framework now

1157

00:38:37,030 --> 00:38:34,800

brilliant physicists like neymar connie

1158

00:38:37,510 --> 00:38:37,040

hamid going after the amplitude and so

1159

00:38:41,270 --> 00:38:37,520

forth

1160

00:38:44,150 --> 00:38:41,280

are looking for new foundations for

1161

00:38:45,750 --> 00:38:44,160

physics outside of space time

1162

00:38:47,510 --> 00:38:45,760

but it's not a reductionist kind of

1163

00:38:50,069 --> 00:38:47,520

approach does

1164

00:38:51,030 --> 00:38:50,079

nema say that consciousness is

1165

00:38:52,550 --> 00:38:51,040

fundamental or

1166

00:38:54,390 --> 00:38:52,560

are you just saying well nema has a

1167

00:38:55,430 --> 00:38:54,400

theory that simplifies space and time

1168

00:38:58,069 --> 00:38:55,440

down to something else

1169

00:39:00,310 --> 00:38:58,079

and maybe with your theory the cognitive

1170

00:39:02,230 --> 00:39:00,320

the conscious agent theory you can imply

1171

00:39:05,030 --> 00:39:02,240

the amplitude of hedron and therefore

1172

00:39:06,870 --> 00:39:05,040

you can apply whatever neem is implying

1173

00:39:08,310 --> 00:39:06,880

or does not does nima think that

1174

00:39:11,750 --> 00:39:08,320

consciousness is fundamental

1175

00:39:12,870 --> 00:39:11,760

i i i have no idea what nema thinks

1176

00:39:15,109 --> 00:39:12,880

about consciousness

1177

00:39:16,710 --> 00:39:15,119

i haven't seen him talk about it myself

1178

00:39:19,589 --> 00:39:16,720

in any of his

1179

00:39:21,190 --> 00:39:19,599

writings or or lectures um i mean i

1180

00:39:24,310 --> 00:39:21,200

would be surprised

1181

00:39:25,589 --> 00:39:24,320

if it turned out he thinks consciousness

1182

00:39:26,150 --> 00:39:25,599

is fundamental i would be very very

1183

00:39:27,910 --> 00:39:26,160

surprised

1184

00:39:29,349 --> 00:39:27,920

but i but the right answer is i don't i

1185

00:39:31,510 --> 00:39:29,359

don't know what he thinks about that

1186

00:39:33,030 --> 00:39:31,520

i would bet good odds that he doesn't

1187

00:39:34,950 --> 00:39:33,040

think consciousness is fundamental but

1188

00:39:36,390 --> 00:39:34,960

but i don't know i certainly would not

1189

00:39:36,870 --> 00:39:36,400

want to ascribe that point of view to

1190

00:39:39,589 --> 00:39:36,880

him

1191

00:39:40,470 --> 00:39:39,599

all all i've seen from his lectures in

1192

00:39:42,150 --> 00:39:40,480

writing is that

1193

00:39:43,990 --> 00:39:42,160

there are these beautiful mathematical

1194

00:39:46,069 --> 00:39:44,000

structures these positive geometries

1195

00:39:49,670 --> 00:39:46,079

amplitude sociohedra

1196

00:39:50,470 --> 00:39:49,680

that are that are more fundamental than

1197

00:39:53,270 --> 00:39:50,480

space-time

1198

00:39:55,510 --> 00:39:53,280

and that in magical ways seem to give

1199

00:39:57,030 --> 00:39:55,520

rise to the scattering amplitude so like

1200

00:39:58,950 --> 00:39:57,040

two glones hitting each other four

1201
00:40:01,670 --> 00:39:58,960
gluons go spraying out

1202
00:40:02,230 --> 00:40:01,680
those scattering amplitudes turn out to

1203
00:40:05,349 --> 00:40:02,240
be

1204
00:40:07,670 --> 00:40:05,359
volumes of these geometric objects he's

1205
00:40:10,470 --> 00:40:07,680
finding these positive geometries

1206
00:40:11,430 --> 00:40:10,480
but what this new deeper realm is about

1207
00:40:14,309 --> 00:40:11,440
i haven't seen him

1208
00:40:16,069 --> 00:40:14,319
speculate about you know what is this

1209
00:40:18,309 --> 00:40:16,079
telling us

1210
00:40:19,829 --> 00:40:18,319
is the realm behind spacetime what is

1211
00:40:21,910 --> 00:40:19,839
that realm about i haven't seen him

1212
00:40:23,589 --> 00:40:21,920
speculate that he might have some

1213
00:40:25,829 --> 00:40:23,599

some speculations but i haven't seen him

1214

00:40:27,510 --> 00:40:25,839

he just goes with the math

1215

00:40:28,950 --> 00:40:27,520

ask for bell's inequality i'm sure

1216

00:40:29,589 --> 00:40:28,960

you're aware that there are some ways

1217

00:40:32,230 --> 00:40:29,599

around it

1218

00:40:33,990 --> 00:40:32,240

so for example super determinism as well

1219

00:40:34,550 --> 00:40:34,000

as a couple others that i can't recall

1220

00:40:36,710 --> 00:40:34,560

right now

1221

00:40:38,630 --> 00:40:36,720

edwin james he didn't particularly think

1222

00:40:39,990 --> 00:40:38,640

bell's inequalities or the experiments

1223

00:40:43,349 --> 00:40:40,000

that validate those inequalities

1224

00:40:44,230 --> 00:40:43,359

demonstrate that non-realism is is the

1225

00:40:47,109 --> 00:40:44,240

way to go

1226

00:40:48,309 --> 00:40:47,119

what do you say to those objections well

1227

00:40:53,190 --> 00:40:48,319

i i would say

1228

00:40:54,870 --> 00:40:53,200

that um the deeper

1229

00:40:56,309 --> 00:40:54,880

problems between general relativity and

1230

00:40:57,910 --> 00:40:56,319

quantum field theory

1231

00:40:59,829 --> 00:40:57,920

that force us to recognize that

1232

00:41:01,270 --> 00:40:59,839

space-time isn't fundamental

1233

00:41:03,190 --> 00:41:01,280

are the ones that clinch it for me

1234

00:41:05,750 --> 00:41:03,200

against realism because

1235

00:41:07,349 --> 00:41:05,760

realism about art but entities that are

1236

00:41:07,829 --> 00:41:07,359

that are merely representations of space

1237

00:41:11,510 --> 00:41:07,839

time

1238

00:41:13,910 --> 00:41:11,520

fundamental is is is now beside the

1239

00:41:17,670 --> 00:41:15,750

why what made you choose nema's

1240

00:41:19,030 --> 00:41:17,680

amplitude of hedron as opposed to the

1241

00:41:21,190 --> 00:41:19,040

other

1242

00:41:22,470 --> 00:41:21,200

perhaps simpler models that demonstrate

1243

00:41:24,069 --> 00:41:22,480

the space time is emergent

1244

00:41:26,150 --> 00:41:24,079

we mentioned a few others before this

1245

00:41:27,990 --> 00:41:26,160

call like causal causal dynamic

1246

00:41:30,230 --> 00:41:28,000

triangulation there's also spin foam

1247

00:41:33,670 --> 00:41:30,240

networks

1248

00:41:40,710 --> 00:41:33,680

right um i've been

1249

00:41:44,470 --> 00:41:43,349

because he explains in ways that i

1250

00:41:48,870 --> 00:41:44,480

really understand

1251
00:41:51,910 --> 00:41:48,880
why we can't really

1252
00:41:52,950 --> 00:41:51,920
even have a vestige of space-time as

1253
00:41:56,550 --> 00:41:52,960
being fundamental

1254
00:41:57,990 --> 00:41:56,560
right so we we can't we can't take one

1255
00:41:59,750 --> 00:41:58,000
part of a time

1256
00:42:01,190 --> 00:41:59,760
or one part of its space and and try to

1257
00:42:04,150 --> 00:42:01,200
boot up the other we

1258
00:42:04,950 --> 00:42:04,160
and and and nemo recognizes that we we

1259
00:42:06,790 --> 00:42:04,960
also

1260
00:42:08,069 --> 00:42:06,800
can't expect that quantum theory is

1261
00:42:10,950 --> 00:42:08,079
fundamental

1262
00:42:13,510 --> 00:42:10,960
he's saying look it's it's it's deeper

1263
00:42:14,630 --> 00:42:13,520

than just space time

1264

00:42:16,710 --> 00:42:14,640

we're going to have to have a deeper

1265

00:42:19,750 --> 00:42:16,720

framework in which space-time

1266

00:42:23,270 --> 00:42:19,760

and quantum theory together

1267

00:42:25,510 --> 00:42:23,280

arise joined at the hip and

1268

00:42:26,470 --> 00:42:25,520

and so many of the techniques are saying

1269

00:42:29,990 --> 00:42:26,480

look what

1270

00:42:31,990 --> 00:42:30,000

let's if general relativity

1271

00:42:33,589 --> 00:42:32,000

is a you know is not a quantum theory

1272

00:42:36,630 --> 00:42:33,599

it's it's a classical theory

1273

00:42:39,589 --> 00:42:36,640

it's continuous space and so forth so

1274

00:42:40,630 --> 00:42:39,599

maybe what we need to do is let quantum

1275

00:42:42,550 --> 00:42:40,640

be fundamental

1276
00:42:44,630 --> 00:42:42,560
and then we'll try to somehow quantize

1277
00:42:47,510 --> 00:42:44,640
space time and nema is going

1278
00:42:48,630 --> 00:42:47,520
far more deep he's saying we need a new

1279
00:42:51,750 --> 00:42:48,640
framework in which

1280
00:42:55,829 --> 00:42:51,760
locality and space time and

1281
00:42:57,750 --> 00:42:55,839
unitarity of quantum theory

1282
00:42:59,750 --> 00:42:57,760
arise together from something that's

1283
00:43:03,030 --> 00:42:59,760
neither local in space-time and

1284
00:43:05,829 --> 00:43:03,040
non-unitary and that's

1285
00:43:06,710 --> 00:43:05,839
i think so i'm going i'm going after

1286
00:43:09,109 --> 00:43:06,720
nema

1287
00:43:11,349 --> 00:43:09,119
um partly because i think that he makes

1288
00:43:12,230 --> 00:43:11,359

a good case that that space-time and

1289

00:43:14,150 --> 00:43:12,240

quantum theory

1290

00:43:16,630 --> 00:43:14,160

both have to emerge from something

1291

00:43:18,470 --> 00:43:16,640

deeper and that we really need them

1292

00:43:20,309 --> 00:43:18,480

we need to bite the bullet and recognize

1293

00:43:23,990 --> 00:43:20,319

we can't go halfway we need

1294

00:43:26,150 --> 00:43:24,000

to go really a radical new foundation

1295

00:43:28,470 --> 00:43:26,160

the constraint on the new foundation of

1296

00:43:30,150 --> 00:43:28,480

course is that it has to give rise to

1297

00:43:32,630 --> 00:43:30,160

space time and quantum theory in ways

1298

00:43:35,910 --> 00:43:32,640

that we know and love and in particular

1299

00:43:44,470 --> 00:43:40,790

the only observable

1300

00:43:46,390 --> 00:43:44,480

of quantum gravity in our space in

1301
00:43:48,390 --> 00:43:46,400
an asymptotically flat space time like

1302
00:43:52,230 --> 00:43:48,400
ours the only observable

1303
00:43:53,430 --> 00:43:52,240
that there is is scattering amplitude

1304
00:43:55,109 --> 00:43:53,440
the scouting objects that's the only

1305
00:43:55,910 --> 00:43:55,119
observer there are no local observables

1306
00:43:59,589 --> 00:43:55,920
and

1307
00:44:02,390 --> 00:43:59,599
nemo explains that so so when we look at

1308
00:44:05,190 --> 00:44:02,400
how to get the only

1309
00:44:10,870 --> 00:44:05,200
observable in asymptotically flat space

1310
00:44:15,030 --> 00:44:13,190
what i'm asking is that there are

1311
00:44:16,550 --> 00:44:15,040
several contenders to

1312
00:44:18,150 --> 00:44:16,560
fundamental theories of everything which

1313
00:44:19,109 --> 00:44:18,160

they have to be fundamental theory of

1314

00:44:21,270 --> 00:44:19,119

everything

1315

00:44:22,150 --> 00:44:21,280

but there there are several and i'm glad

1316

00:44:24,150 --> 00:44:22,160

that you're pursuing

1317

00:44:25,829 --> 00:44:24,160

nema's amplitude of hedron because i'm

1318

00:44:27,190 --> 00:44:25,839

also interested in how consciousness can

1319

00:44:28,790 --> 00:44:27,200

give rise to some of those other

1320

00:44:30,309 --> 00:44:28,800

potential theories of everything and i

1321

00:44:32,069 --> 00:44:30,319

only have a finite amount of time

1322

00:44:34,150 --> 00:44:32,079

so i'm glad that you're doing it but i'm

1323

00:44:36,390 --> 00:44:34,160

curious as to why you chose that one

1324

00:44:38,390 --> 00:44:36,400

the criteria you just said which is qft

1325

00:44:40,390 --> 00:44:38,400

and general relativity have to come

1326
00:44:41,510 --> 00:44:40,400
from something else and you would prefer

1327
00:44:43,190 --> 00:44:41,520
that not

1328
00:44:44,470 --> 00:44:43,200
be embedded within space time but in

1329
00:44:45,750 --> 00:44:44,480
fact have some other structure that

1330
00:44:47,349 --> 00:44:45,760
gives rise to space time

1331
00:44:49,270 --> 00:44:47,359
but there are quite a there are quite a

1332
00:44:51,750 --> 00:44:49,280
few for example

1333
00:44:53,430 --> 00:44:51,760
i just have a list here and i'm just

1334
00:44:55,109 --> 00:44:53,440
curious why you chose

1335
00:44:56,470 --> 00:44:55,119
the amplitude of heatron other than you

1336
00:44:57,990 --> 00:44:56,480
have to start somewhere so for example

1337
00:44:59,109 --> 00:44:58,000
wolfram's theory of everything

1338
00:45:00,870 --> 00:44:59,119

which starts with computation which

1339

00:45:01,829 --> 00:45:00,880

seems so similar to yours actually we

1340

00:45:04,790 --> 00:45:01,839

can get to that later

1341

00:45:05,990 --> 00:45:04,800

and there's pati salaam there's sl-10

1342

00:45:08,870 --> 00:45:06,000

there is e8

1343

00:45:09,750 --> 00:45:08,880

as well right right right and there's

1344

00:45:11,990 --> 00:45:09,760

strand model

1345

00:45:13,190 --> 00:45:12,000

from christopher schiller there's also

1346

00:45:15,910 --> 00:45:13,200

one more frightens

1347

00:45:16,710 --> 00:45:15,920

frightens frighten his name is bernard

1348

00:45:20,230 --> 00:45:16,720

royd friden

1349

00:45:22,950 --> 00:45:20,240

he believes that the the laws of

1350

00:45:24,710 --> 00:45:22,960

physics i believe can be unified under

1351
00:45:25,510 --> 00:45:24,720
fischer information so they're purely

1352
00:45:28,550 --> 00:45:25,520
informational

1353
00:45:29,990 --> 00:45:28,560
at their base i'm curious why nemo's

1354
00:45:31,829 --> 00:45:30,000
as opposed to those that i just listed

1355
00:45:34,870 --> 00:45:31,839
well there's there's a couple reasons

1356
00:45:37,030 --> 00:45:34,880
one is i'm convinced

1357
00:45:37,990 --> 00:45:37,040
by nemo's argument that scattering

1358
00:45:41,910 --> 00:45:38,000
amplitudes aren't

1359
00:45:44,950 --> 00:45:41,920
are the only observable and

1360
00:45:46,069 --> 00:45:44,960
his is the only theory that predicts

1361
00:45:47,829 --> 00:45:46,079
from first principles

1362
00:45:49,190 --> 00:45:47,839
the exact scattering amplitudes and

1363
00:45:50,470 --> 00:45:49,200

shows deep symmetries behind those

1364

00:45:53,510 --> 00:45:50,480

scattering amplitudes

1365

00:45:55,430 --> 00:45:53,520

right and that also you know

1366

00:45:58,150 --> 00:45:55,440

explains why when we look at these

1367

00:46:00,550 --> 00:45:58,160

deeper symmetries outside of space time

1368

00:46:02,069 --> 00:46:00,560

um hundreds or thousands of pages of

1369

00:46:03,589 --> 00:46:02,079

computation that you get

1370

00:46:06,069 --> 00:46:03,599

from fineman diagrams on the scattering

1371

00:46:10,710 --> 00:46:06,079

amplitudes turns into two or three terms

1372

00:46:12,150 --> 00:46:10,720

so so he's got the beef he's actually

1373

00:46:14,630 --> 00:46:12,160

he starts with something outside of

1374

00:46:15,910 --> 00:46:14,640

space-time he gives rise to quantum

1375

00:46:19,109 --> 00:46:15,920

theory unitarity

1376

00:46:22,550 --> 00:46:19,119

and locality and the the precise phi

1377

00:46:25,670 --> 00:46:22,560

cube theory fight of the four theory um

1378

00:46:28,630 --> 00:46:25,680

yang mills super yang mills gravit

1379

00:46:30,230 --> 00:46:28,640

he's getting one after another he's

1380

00:46:32,710 --> 00:46:30,240

getting these scattering amplitudes

1381

00:46:33,589 --> 00:46:32,720

he's got the beef these other theories

1382

00:46:34,950 --> 00:46:33,599

are you know

1383

00:46:37,109 --> 00:46:34,960

saying we can do this we can do this

1384

00:46:39,430 --> 00:46:37,119

he's doing it i see in other words he's

1385

00:46:40,870 --> 00:46:39,440

the closest so far

1386

00:46:43,270 --> 00:46:40,880

yeah he's the closest and then there's

1387

00:46:47,910 --> 00:46:43,280

one other thing that that also

1388

00:46:49,030 --> 00:46:47,920

is is making me pursue this and that is

1389

00:46:51,430 --> 00:46:49,040

i'm starting with this theory of

1390

00:46:54,069 --> 00:46:51,440

markovian kernels this this dynamical

1391

00:46:56,550 --> 00:46:54,079

system of conscious agents

1392

00:46:58,390 --> 00:46:56,560

now markovian kernels in general are not

1393

00:47:00,309 --> 00:46:58,400

associated with positive geometries

1394

00:47:02,630 --> 00:47:00,319

right and nema's saying this deeper

1395

00:47:04,550 --> 00:47:02,640

structure is positive geometries

1396

00:47:05,670 --> 00:47:04,560

but and this is what i'm working with my

1397

00:47:08,150 --> 00:47:05,680

mathematician

1398

00:47:08,829 --> 00:47:08,160

uh colleague chaitan prakash and and

1399

00:47:11,829 --> 00:47:08,839

others

1400

00:47:14,309 --> 00:47:11,839

on i claim and we're

1401
00:47:16,950 --> 00:47:14,319
and we'll see if i'm right i claim that

1402
00:47:20,069 --> 00:47:16,960
the asymptotic

1403
00:47:21,750 --> 00:47:20,079
and invariant behavior of markovian

1404
00:47:26,470 --> 00:47:21,760
systems

1405
00:47:29,829 --> 00:47:26,480
is identified with positive geometries

1406
00:47:31,109 --> 00:47:29,839
so even though the step-by-step dynamics

1407
00:47:33,270 --> 00:47:31,119
repeat that one more time repeat that

1408
00:47:35,670 --> 00:47:33,280
one more time the so so

1409
00:47:37,430 --> 00:47:35,680
when you have a markovian system right

1410
00:47:37,990 --> 00:47:37,440
you have the step-by-step dynamics but

1411
00:47:40,710 --> 00:47:38,000
you can also

1412
00:47:42,390 --> 00:47:40,720
ask what happens long term if you look

1413
00:47:45,109 --> 00:47:42,400

at the long the broads

1414

00:47:48,309 --> 00:47:45,119

okay broad view technically i have a

1415

00:47:53,829 --> 00:47:51,589

i'm looking at p to the end

1416

00:47:56,950 --> 00:47:53,839

which is p composed with p composed of p

1417

00:48:00,470 --> 00:47:56,960

n times as n goes to infinity

1418

00:48:02,230 --> 00:48:00,480

those kernels i claim are are

1419

00:48:05,109 --> 00:48:02,240

invariably associated with positive

1420

00:48:08,150 --> 00:48:05,119

geometries without adding more structure

1421

00:48:08,470 --> 00:48:08,160

that's all you need p to the n if you

1422

00:48:10,950 --> 00:48:08,480

take

1423

00:48:12,230 --> 00:48:10,960

kernel p p to the n will be associated

1424

00:48:13,109 --> 00:48:12,240

with positive geometry as n goes to

1425

00:48:14,870 --> 00:48:13,119

infinity

1426

00:48:16,470 --> 00:48:14,880

okay that's interesting i gotta i gotta

1427

00:48:18,710 --> 00:48:16,480

think about that

1428

00:48:20,710 --> 00:48:18,720

one of your papers with your friend your

1429

00:48:23,349 --> 00:48:20,720

i love this guy for prakash

1430

00:48:25,270 --> 00:48:23,359

right yeah i haven't had a chance to

1431

00:48:27,430 --> 00:48:25,280

look at any of his papers that weren't

1432

00:48:28,790 --> 00:48:27,440

co-authored with you though either way

1433

00:48:30,870 --> 00:48:28,800

one of the papers

1434

00:48:33,109 --> 00:48:30,880

a recent one was showing that the payoff

1435

00:48:34,710 --> 00:48:33,119

functions

1436

00:48:36,309 --> 00:48:34,720

that are homomorphic to totally ordered

1437

00:48:37,349 --> 00:48:36,319

sets as well as permutation groups

1438

00:48:39,750 --> 00:48:37,359

cyclic groups

1439

00:48:41,109 --> 00:48:39,760

and one other right if you take their

1440

00:48:43,670 --> 00:48:41,119

number

1441

00:48:44,950 --> 00:48:43,680

and you divide it by the total amount

1442

00:48:47,430 --> 00:48:44,960

that's admissible

1443

00:48:48,950 --> 00:48:47,440

that it tends to zero and for the people

1444

00:48:52,150 --> 00:48:48,960

listening

1445

00:48:53,829 --> 00:48:52,160

what i've what i hear from you is saying

1446

00:48:54,790 --> 00:48:53,839

that therefore the probability that we

1447

00:48:57,829 --> 00:48:54,800

see

1448

00:48:59,349 --> 00:48:57,839

reality as it is is zero but

1449

00:49:00,790 --> 00:48:59,359

i don't know if that was but but i see

1450

00:49:01,510 --> 00:49:00,800

that as a leap so i must be missing a

1451

00:49:04,069 --> 00:49:01,520

step

1452

00:49:05,829 --> 00:49:04,079

because the leap is that there's a

1453

00:49:08,069 --> 00:49:05,839

hidden claim

1454

00:49:09,270 --> 00:49:08,079

you can go from the total size of the

1455

00:49:13,030 --> 00:49:09,280

set of admissible

1456

00:49:16,470 --> 00:49:13,040

functions over the sorry

1457

00:49:18,309 --> 00:49:16,480

under as the denominator of the total

1458

00:49:21,349 --> 00:49:18,319

functions that are homomorphic to

1459

00:49:22,950 --> 00:49:21,359

certain groups and certain structures

1460

00:49:24,950 --> 00:49:22,960

that's fine you can say that that goes

1461

00:49:26,549 --> 00:49:24,960

to zero but then you have to say

1462

00:49:27,750 --> 00:49:26,559

that there's an even probability

1463

00:49:29,190 --> 00:49:27,760

distribution that we could have gotten

1464

00:49:30,470 --> 00:49:29,200

any one of them for you to say that the

1465

00:49:33,109 --> 00:49:30,480

probability then

1466

00:49:34,790 --> 00:49:33,119

as n goes to infinity of us seeing truth

1467

00:49:35,670 --> 00:49:34,800

or reality as it is or homomorphic to

1468

00:49:39,030 --> 00:49:35,680

the structure

1469

00:49:40,630 --> 00:49:39,040

is also zero excellent point so this is

1470

00:49:41,670 --> 00:49:40,640

a very technical point but it's an

1471

00:49:45,109 --> 00:49:41,680

important one

1472

00:49:46,790 --> 00:49:45,119

so so in evolutionary theory the fitness

1473

00:49:47,990 --> 00:49:46,800

payoff functions

1474

00:49:49,589 --> 00:49:48,000

depend on the state of the world

1475

00:49:50,630 --> 00:49:49,599

whatever objective reality might be it

1476

00:49:52,549 --> 00:49:50,640

depends on that

1477

00:49:54,309 --> 00:49:52,559

but it also depends on the organism its

1478

00:49:55,030 --> 00:49:54,319

state its action and the competitors and

1479

00:49:57,030 --> 00:49:55,040

so forth

1480

00:49:59,030 --> 00:49:57,040

so it's a complicated function with a

1481

00:50:01,270 --> 00:49:59,040

very complicated domain

1482

00:50:02,390 --> 00:50:01,280

including the state of the world and the

1483

00:50:04,870 --> 00:50:02,400

range of the function

1484

00:50:05,510 --> 00:50:04,880

are the payoff values you may like from

1485

00:50:09,510 --> 00:50:05,520

one to n

1486

00:50:11,510 --> 00:50:09,520

if they're n you know payoff values and

1487

00:50:13,510 --> 00:50:11,520

of course evolutionary theory

1488

00:50:16,309 --> 00:50:13,520

evolutionary game theory

1489

00:50:17,990 --> 00:50:16,319

is saying that our we're tuned our

1490

00:50:18,549 --> 00:50:18,000

senses will be tuned to the payoffs

1491

00:50:21,829 --> 00:50:18,559

right

1492

00:50:24,870 --> 00:50:21,839

in other words organisms that

1493

00:50:26,230 --> 00:50:24,880

uh better perceive how to get high

1494

00:50:28,470 --> 00:50:26,240

payoffs are the ones that are going to

1495

00:50:29,510 --> 00:50:28,480

survive so it's our senses will be tuned

1496

00:50:30,950 --> 00:50:29,520

to the payoffs

1497

00:50:32,950 --> 00:50:30,960

so the question then the technical

1498

00:50:35,270 --> 00:50:32,960

question is what is the probability that

1499

00:50:38,230 --> 00:50:35,280

the payoff functions

1500

00:50:39,829 --> 00:50:38,240

preserve information about the structure

1501
00:50:40,710 --> 00:50:39,839
of the world say the world has a group

1502
00:50:44,069 --> 00:50:40,720
structure

1503
00:50:45,990 --> 00:50:44,079
or total order u and i ask what is the

1504
00:50:48,549 --> 00:50:46,000
probability that a payoff function will

1505
00:50:50,150 --> 00:50:48,559
will preserve that structure you know

1506
00:50:51,589 --> 00:50:50,160
and we looked at two kinds of symmetry

1507
00:50:53,990 --> 00:50:51,599
groups and total orders and also

1508
00:50:58,150 --> 00:50:54,000
measurable structures

1509
00:51:01,190 --> 00:50:58,160
and in what we did is we used

1510
00:51:02,150 --> 00:51:01,200
just we assumed a discrete set of states

1511
00:51:04,790 --> 00:51:02,160
on the world

1512
00:51:06,150 --> 00:51:04,800
a finite set of states and a finite set

1513
00:51:09,270 --> 00:51:06,160

of payoff values so like

1514

00:51:12,390 --> 00:51:09,280

you know n states in the world

1515

00:51:14,950 --> 00:51:12,400

m states of the payoff values and

1516

00:51:16,870 --> 00:51:14,960

and then what we can do is literally

1517

00:51:20,230 --> 00:51:16,880

using combinatorial

1518

00:51:21,990 --> 00:51:20,240

combinatorial arguments count the number

1519

00:51:25,030 --> 00:51:22,000

of payoff functions that preserve

1520

00:51:26,870 --> 00:51:25,040

the structure like the group structure

1521

00:51:28,390 --> 00:51:26,880

and divide as you say by the total

1522

00:51:29,270 --> 00:51:28,400

number which is a finite number this is

1523

00:51:32,790 --> 00:51:29,280

a finite number

1524

00:51:35,430 --> 00:51:32,800

of total payoff functions and

1525

00:51:36,790 --> 00:51:35,440

there of course counting measure

1526
00:51:37,349 --> 00:51:36,800
literally counting the number of

1527
00:51:39,589 --> 00:51:37,359
functions

1528
00:51:40,870 --> 00:51:39,599
is the canonical measure and then we

1529
00:51:42,870 --> 00:51:40,880
take the limit as the

1530
00:51:44,309 --> 00:51:42,880
number of states in the world and the

1531
00:51:47,270 --> 00:51:44,319
number of payoff values

1532
00:51:48,230 --> 00:51:47,280
goes to infinity now now someone could

1533
00:51:49,670 --> 00:51:48,240
argue as

1534
00:51:51,589 --> 00:51:49,680
raised the question that you just raised

1535
00:51:52,309 --> 00:51:51,599
why is counting measure the measure that

1536
00:51:54,790 --> 00:51:52,319
we used

1537
00:51:56,230 --> 00:51:54,800
why should there be some other measure

1538
00:51:58,790 --> 00:51:56,240

and the answer is that

1539

00:52:00,309 --> 00:51:58,800

evolutionary theory gives us no argument

1540

00:52:03,109 --> 00:52:00,319

for any other measure

1541

00:52:03,990 --> 00:52:03,119

so if someone wants to say we use the

1542

00:52:05,670 --> 00:52:04,000

wrong measure

1543

00:52:07,589 --> 00:52:05,680

then the burden of proof is on them to

1544

00:52:11,109 --> 00:52:07,599

say what is the new measure

1545

00:52:12,710 --> 00:52:11,119

and on principled evolutionary grounds

1546

00:52:15,030 --> 00:52:12,720

what is the measure that we should use

1547

00:52:17,990 --> 00:52:15,040

instead of counting measure and why

1548

00:52:19,270 --> 00:52:18,000

and that will be a brand new addition to

1549

00:52:19,990 --> 00:52:19,280

the theory of evolution of natural

1550

00:52:24,950 --> 00:52:20,000

selection

1551

00:52:28,150 --> 00:52:26,390

extra condition doesn't come from

1552

00:52:30,790 --> 00:52:28,160

evolutionary theory but instead

1553

00:52:32,470 --> 00:52:30,800

classical physics like people like nema

1554

00:52:35,510 --> 00:52:32,480

or even michael shermer might think

1555

00:52:38,309 --> 00:52:35,520

which is saying that okay there is

1556

00:52:40,069 --> 00:52:38,319

a probability distribution that favors

1557

00:52:41,829 --> 00:52:40,079

certain structure preservedness for

1558

00:52:43,270 --> 00:52:41,839

whatever reason much like we don't know

1559

00:52:44,470 --> 00:52:43,280

why the fundamental laws are the way

1560

00:52:46,069 --> 00:52:44,480

they are now of course you're saying

1561

00:52:47,990 --> 00:52:46,079

well i can derive the fundamental laws

1562

00:52:49,829 --> 00:52:48,000

forget that because i'm going to another

1563

00:52:51,349 --> 00:52:49,839

model them saying that the fundamental

1564

00:52:53,109 --> 00:52:51,359

laws are fundamental

1565

00:52:55,190 --> 00:52:53,119

and one of them is that the probability

1566

00:52:57,589 --> 00:52:55,200

distribution of your perceptions

1567

00:52:59,510 --> 00:52:57,599

will tend not necessarily tend to but

1568

00:53:02,309 --> 00:52:59,520

they're not uniform

1569

00:53:03,030 --> 00:53:02,319

absolutely and and i if someone can do

1570

00:53:06,069 --> 00:53:03,040

that

1571

00:53:09,510 --> 00:53:06,079

so

1572

00:53:11,589 --> 00:53:09,520

think of our theorem

1573

00:53:14,790 --> 00:53:11,599

as putting out that challenge come up

1574

00:53:15,750 --> 00:53:14,800

with some new principle that explains

1575

00:53:19,109 --> 00:53:15,760

why

1576

00:53:20,710 --> 00:53:19,119

there's a bias toward payoff functions

1577

00:53:22,150 --> 00:53:20,720

that are homomorphic to the structure of

1578

00:53:25,190 --> 00:53:22,160

reality what is

1579

00:53:25,829 --> 00:53:25,200

the conspiracy in nature that makes that

1580

00:53:27,910 --> 00:53:25,839

happen

1581

00:53:29,510 --> 00:53:27,920

there's i mean evolution by natural

1582

00:53:30,870 --> 00:53:29,520

selection this is currently formulated

1583

00:53:31,670 --> 00:53:30,880

and physics says it's currently

1584

00:53:33,670 --> 00:53:31,680

formulated

1585

00:53:35,109 --> 00:53:33,680

gives us no belief that there's a

1586

00:53:37,270 --> 00:53:35,119

conspiracy

1587

00:53:38,950 --> 00:53:37,280

going on to make the homomorphic

1588

00:53:40,870 --> 00:53:38,960

functions more probable

1589

00:53:43,109 --> 00:53:40,880

but if someone can come up with a theory

1590

00:53:45,430 --> 00:53:43,119

that explains why

1591

00:53:46,150 --> 00:53:45,440

nature conspires that way i'm i'll be

1592

00:53:48,790 --> 00:53:46,160

the first to

1593

00:53:50,150 --> 00:53:48,800

to listen very intently by the way do

1594

00:53:52,790 --> 00:53:50,160

you also have a measure

1595

00:53:53,430 --> 00:53:52,800

of structure preservedness that isn't a

1596

00:53:56,710 --> 00:53:53,440

strict

1597

00:53:59,829 --> 00:53:56,720

homomorphism because if okay

1598

00:54:00,710 --> 00:53:59,839

just for people listening in the way

1599

00:54:03,030 --> 00:54:00,720

that it's written

1600

00:54:04,069 --> 00:54:03,040

that i saw from the paper that that you

1601
00:54:05,510 --> 00:54:04,079
published recently is

1602
00:54:07,030 --> 00:54:05,520
it's like you have one two three four

1603
00:54:08,390 --> 00:54:07,040
five imagine that's a totally order set

1604
00:54:09,109 --> 00:54:08,400
one two three four five and that's how

1605
00:54:11,109 --> 00:54:09,119
the world is

1606
00:54:12,470 --> 00:54:11,119
but if someone sees the world as one two

1607
00:54:14,870 --> 00:54:12,480
three four five

1608
00:54:16,150 --> 00:54:14,880
four i'd be like nope no you're not

1609
00:54:19,030 --> 00:54:16,160
seeing the world as it is

1610
00:54:20,630 --> 00:54:19,040
but yet it's still similar right so you

1611
00:54:22,790 --> 00:54:20,640
can use things like the l_2 norm or the l_1

1612
00:54:25,270 --> 00:54:22,800
infinity norm to to look at how many

1613
00:54:26,630 --> 00:54:25,280

so for you could say suppose that here's

1614

00:54:29,030 --> 00:54:26,640

a payoff function that's

1615

00:54:29,670 --> 00:54:29,040

that's purely homomorphic we can ask how

1616

00:54:31,829 --> 00:54:29,680

many

1617

00:54:33,910 --> 00:54:31,839

payoff functions are within a certain

1618

00:54:35,349 --> 00:54:33,920

distance like an l_2 distance or an l_1

1619

00:54:37,349 --> 00:54:35,359

infinity distance

1620

00:54:38,549 --> 00:54:37,359

of that payoff function and we can for

1621

00:54:41,430 --> 00:54:38,559

each

1622

00:54:42,470 --> 00:54:41,440

distance that we look at we can ask how

1623

00:54:43,910 --> 00:54:42,480

many

1624

00:54:45,829 --> 00:54:43,920

payoff functions even though if they're

1625

00:54:47,030 --> 00:54:45,839

not exactly homomorphic are that close

1626
00:54:48,390 --> 00:54:47,040
to homomorphism

1627
00:54:50,230 --> 00:54:48,400
and then we can look at the ratio of

1628
00:54:53,190 --> 00:54:50,240
those to all payoff and see

1629
00:54:55,190 --> 00:54:53,200
again if they go to zero or not um and

1630
00:54:58,309 --> 00:54:55,200
and so in the case of total orders

1631
00:55:02,230 --> 00:54:58,319
um it turns out that

1632
00:55:05,270 --> 00:55:04,549
generous width like i think there's like

1633
00:55:08,150 --> 00:55:05,280
20

1634
00:55:08,710 --> 00:55:08,160
variation sure um the set of payoff

1635
00:55:11,910 --> 00:55:08,720
functions

1636
00:55:15,829 --> 00:55:11,920
that were within 20 variation of of any

1637
00:55:20,630 --> 00:55:15,839
homomorphic function still went to zero

1638
00:55:23,990 --> 00:55:20,640

in the case of um

1639

00:55:26,230 --> 00:55:24,000

symmetric groups that was not true um

1640

00:55:27,190 --> 00:55:26,240

if you allowed just a small window

1641

00:55:29,910 --> 00:55:27,200

around

1642

00:55:31,430 --> 00:55:29,920

the the homomorphisms then most of

1643

00:55:32,789 --> 00:55:31,440

them

1644

00:55:36,069 --> 00:55:32,799

then it would they would have full

1645

00:55:39,109 --> 00:55:36,079

weight so most functions were

1646

00:55:40,710 --> 00:55:39,119

most payoff functions were very close to

1647

00:55:43,670 --> 00:55:40,720

a function which was homomorphic

1648

00:55:45,589 --> 00:55:43,680

to um you know for automorphism of the

1649

00:55:47,109 --> 00:55:45,599

symmetry

1650

00:55:49,510 --> 00:55:47,119

same thing for measurable structures in

1651

00:55:53,270 --> 00:55:49,520

measurable structures

1652

00:55:55,910 --> 00:55:53,280

almost every function was close to

1653

00:55:56,390 --> 00:55:55,920

a payoff function that is homomorphic

1654

00:56:00,829 --> 00:55:56,400

but

1655

00:56:04,230 --> 00:56:00,839

anything

1656

00:56:07,910 --> 00:56:04,240

because there are

1657

00:56:11,190 --> 00:56:07,920

countless structures that

1658

00:56:13,829 --> 00:56:11,200

nature might have countless

1659

00:56:15,349 --> 00:56:13,839

the fact that a random function a

1660

00:56:18,390 --> 00:56:15,359

randomly chosen pail function

1661

00:56:19,349 --> 00:56:18,400

is close to a symmetric something that's

1662

00:56:22,390 --> 00:56:19,359

homomorphic

1663

00:56:23,349 --> 00:56:22,400

a symmetry preserving function also a

1664

00:56:25,270 --> 00:56:23,359

measurable function

1665

00:56:26,390 --> 00:56:25,280

you could now give me thousands of

1666

00:56:29,030 --> 00:56:26,400

different

1667

00:56:29,670 --> 00:56:29,040

kinds of homomorphisms it's close to

1668

00:56:31,589 --> 00:56:29,680

well

1669

00:56:32,950 --> 00:56:31,599

which one is natural selection choosing

1670

00:56:35,670 --> 00:56:32,960

to shape you to

1671

00:56:36,710 --> 00:56:35,680

there are a random function is is close

1672

00:56:38,789 --> 00:56:36,720

to all of these

1673

00:56:40,950 --> 00:56:38,799

where is the where's the selection

1674

00:56:41,430 --> 00:56:40,960

pressure to push you toward one or the

1675

00:56:47,910 --> 00:56:41,440

other

1676
00:56:49,430 --> 00:56:47,920
yeah a randomly chosen fail function you

1677
00:56:51,030 --> 00:56:49,440
could show us it's it's

1678
00:56:52,789 --> 00:56:51,040
close to lots of different things that

1679
00:56:54,230 --> 00:56:52,799
are homomorphic to all else

1680
00:56:55,589 --> 00:56:54,240
but where's the selection pressure there

1681
00:56:57,430 --> 00:56:55,599
there's no selection pressure there at

1682
00:57:00,549 --> 00:56:57,440
all

1683
00:57:03,910 --> 00:57:00,559
yeah now let's one more

1684
00:57:04,309 --> 00:57:03,920
critique is that gravity is not a cyclic

1685
00:57:06,870 --> 00:57:04,319
group

1686
00:57:08,069 --> 00:57:06,880
it's not a totally ordered set it's not

1687
00:57:10,950 --> 00:57:08,079
a permutation group

1688
00:57:12,309 --> 00:57:10,960

it's not a measure well maybe but but

1689

00:57:13,829 --> 00:57:12,319

either way the structure of the

1690

00:57:14,950 --> 00:57:13,839

fundamental physics coming from a

1691

00:57:17,990 --> 00:57:14,960

different frame that is where

1692

00:57:20,630 --> 00:57:18,000

consciousness is not fundamental

1693

00:57:21,750 --> 00:57:20,640

it doesn't follow what i've seen so far

1694

00:57:23,190 --> 00:57:21,760

i think you've done totally ordered

1695

00:57:24,069 --> 00:57:23,200

permutations cyclic and measurable

1696

00:57:25,750 --> 00:57:24,079

spaces

1697

00:57:28,069 --> 00:57:25,760

right but it's not as if the fundamental

1698

00:57:31,109 --> 00:57:28,079

laws or the fundamental space of being

1699

00:57:34,549 --> 00:57:31,119

from the materialist point of view

1700

00:57:38,549 --> 00:57:34,559

are those so what you're counting isn't

1701
00:57:39,190 --> 00:57:38,559
necessarily reality per se it could be

1702
00:57:40,789 --> 00:57:39,200
it could be

1703
00:57:42,390 --> 00:57:40,799
but right it's not as if as far as we

1704
00:57:42,870 --> 00:57:42,400
know and the lagrangian is a condition

1705
00:57:44,150 --> 00:57:42,880
on that

1706
00:57:46,630 --> 00:57:44,160
and it's not as if the lagrangian is a

1707
00:57:49,670 --> 00:57:46,640
cyclical group so right

1708
00:57:52,789 --> 00:57:52,309
fair point okay so why is so why does

1709
00:57:54,470 --> 00:57:52,799
that

1710
00:57:55,910 --> 00:57:54,480
does what you've studied demonstrate

1711
00:57:59,510 --> 00:57:55,920
anything about reality right

1712
00:58:01,750 --> 00:57:59,520
so yeah so i think a good

1713
00:58:03,750 --> 00:58:01,760

argument against our paper is we we've

1714

00:58:05,109 --> 00:58:03,760

looked at four different structures

1715

00:58:08,309 --> 00:58:05,119

and we showed in each case that the

1716

00:58:09,349 --> 00:58:08,319

probability is zero that um a randomly

1717

00:58:10,789 --> 00:58:09,359

chosen payoff function would be a

1718

00:58:13,829 --> 00:58:10,799

homomorphism

1719

00:58:17,030 --> 00:58:13,839

and what we want

1720

00:58:17,990 --> 00:58:17,040

is a paper that proves that for any

1721

00:58:19,349 --> 00:58:18,000

possible structure

1722

00:58:20,630 --> 00:58:19,359

right not just the four structures that

1723

00:58:21,349 --> 00:58:20,640

we looked at we don't have that theorem

1724

00:58:25,990 --> 00:58:21,359

yet

1725

00:58:27,589 --> 00:58:26,000

so someone could come along and say look

1726

00:58:29,270 --> 00:58:27,599

we have independent evidence that this

1727

00:58:30,789 --> 00:58:29,280

is the structure of the world and we can

1728

00:58:31,349 --> 00:58:30,799

prove that for that structure of the

1729

00:58:33,990 --> 00:58:31,359

world

1730

00:58:36,470 --> 00:58:34,000

payoff almost every payoff function is a

1731

00:58:37,829 --> 00:58:36,480

homomorphism of that structure so

1732

00:58:39,510 --> 00:58:37,839

we're throwing down that ghana we're

1733

00:58:42,230 --> 00:58:39,520

saying for you

1734

00:58:44,630 --> 00:58:42,240

for someone to argue that natural

1735

00:58:47,510 --> 00:58:44,640

selection will of course

1736

00:58:49,589 --> 00:58:47,520

favor vertical perceptions seeing the

1737

00:58:51,910 --> 00:58:49,599

truth of the true structure of the world

1738

00:58:53,510 --> 00:58:51,920

then what you have to do you it's it's

1739

00:58:55,190 --> 00:58:53,520

not obvious that that's the case

1740

00:58:58,150 --> 00:58:55,200

here's four counter examples we give

1741

00:59:01,589 --> 00:58:58,160

four counter examples right total orders

1742

00:59:03,589 --> 00:59:01,599

so here are four counter examples so so

1743

00:59:05,109 --> 00:59:03,599

it's not just obviously true that that's

1744

00:59:06,630 --> 00:59:05,119

going to happen for the structure of the

1745

00:59:08,470 --> 00:59:06,640

world so you now

1746

00:59:09,910 --> 00:59:08,480

to convince me that natural selection

1747

00:59:11,270 --> 00:59:09,920

favors vertical perceptions you have to

1748

00:59:11,670 --> 00:59:11,280

tell me exactly the structure of the

1749

00:59:15,030 --> 00:59:11,680

world

1750

00:59:15,349 --> 00:59:15,040

and prove that in fact the homomorphisms

1751
00:59:17,670 --> 00:59:15,359
have

1752
00:59:18,470 --> 00:59:17,680
full measure so so we've thrown the

1753
00:59:20,549 --> 00:59:18,480
gauntlet down

1754
00:59:22,390 --> 00:59:20,559
all of my colleagues almost all of my

1755
00:59:23,510 --> 00:59:22,400
colleagues in cognitive neuroscience who

1756
00:59:25,589 --> 00:59:23,520
study perception

1757
00:59:27,589 --> 00:59:25,599
have just assumed that of course natural

1758
00:59:29,589 --> 00:59:27,599
selection favors vertical perception

1759
00:59:31,109 --> 00:59:29,599
we gave four counter examples and we're

1760
00:59:31,990 --> 00:59:31,119
basically throwing down the gauntlet to

1761
00:59:33,910 --> 00:59:32,000
our field and saying

1762
00:59:35,589 --> 00:59:33,920
if you believe that you you need to come

1763
00:59:37,190 --> 00:59:35,599

up with a beef where is the beef

1764

00:59:39,109 --> 00:59:37,200

what is the structure of the world that

1765

00:59:41,190 --> 00:59:39,119

would have full measure

1766

00:59:42,789 --> 00:59:41,200

for the homomorphisms if you can't do

1767

00:59:45,510 --> 00:59:42,799

that then then

1768

00:59:46,630 --> 00:59:45,520

what is the conspiracy in the laws of

1769

00:59:49,510 --> 00:59:46,640

nature

1770

00:59:50,950 --> 00:59:49,520

that would so in other words what we've

1771

00:59:53,270 --> 00:59:50,960

done is thrown down the gauntlet

1772

00:59:55,589 --> 00:59:53,280

in some sense we're saying hey the

1773

00:59:58,390 --> 00:59:55,599

burden of proof is now on the person

1774

00:59:59,670 --> 00:59:58,400

who claims that evolution is going to

1775

01:00:01,750 --> 00:59:59,680

shape vertical perceptions

1776

01:00:03,510 --> 01:00:01,760

here for here are four counter examples

1777

01:00:04,069 --> 01:00:03,520

give us an example of where it possibly

1778

01:00:06,870 --> 01:00:04,079

could

1779

01:00:07,430 --> 01:00:06,880

and good luck because here's why they're

1780

01:00:11,190 --> 01:00:07,440

not going to

1781

01:00:13,109 --> 01:00:11,200

succeed to be a homomorphism

1782

01:00:14,870 --> 01:00:13,119

a function has to satisfy some strict

1783

01:00:17,349 --> 01:00:14,880

equations

1784

01:00:19,589 --> 01:00:17,359

most functions don't satisfy them end of

1785

01:00:22,069 --> 01:00:19,599

proof

1786

01:00:23,670 --> 01:00:22,079

it's just that simple good luck but but

1787

01:00:25,829 --> 01:00:23,680

so we've thrown down the gauntlet

1788

01:00:26,950 --> 01:00:25,839

that the argument i just gave you is

1789

01:00:29,190 --> 01:00:26,960

going to be the heart

1790

01:00:30,390 --> 01:00:29,200

of a deeper theory a deeper paper that

1791

01:00:32,150 --> 01:00:30,400

will that we hope to get

1792

01:00:33,990 --> 01:00:32,160

in which we just proved that no matter

1793

01:00:36,309 --> 01:00:34,000

what yeah i'm excited about that

1794

01:00:37,589 --> 01:00:36,319

right have you pursued category theory

1795

01:00:38,950 --> 01:00:37,599

that's what works as far as

1796

01:00:40,230 --> 01:00:38,960

like the most abstract of all the

1797

01:00:41,829 --> 01:00:40,240

mathematical theories that's where we're

1798

01:00:42,309 --> 01:00:41,839

headed exactly right category theorem

1799

01:00:45,670 --> 01:00:42,319

inside

1800

01:00:47,030 --> 01:00:45,680

okay cool cool i just said with category

1801

01:00:49,109 --> 01:00:47,040

three right

1802

01:00:50,549 --> 01:00:49,119

what about partially ordered sets not as

1803

01:00:51,270 --> 01:00:50,559

if even if you proved in the partially

1804

01:00:54,150 --> 01:00:51,280

ordered set

1805

01:00:56,150 --> 01:00:54,160

case it's like okay that's it's yeah

1806

01:00:57,030 --> 01:00:56,160

we'd like to do partial orders and also

1807

01:00:59,990 --> 01:00:57,040

topologies

1808

01:01:01,829 --> 01:01:00,000

right so those are some obvious big ones

1809

01:01:02,789 --> 01:01:01,839

so if we can't get the full category

1810

01:01:05,270 --> 01:01:02,799

i mean we'd like to get the full

1811

01:01:06,870 --> 01:01:05,280

category theory um proof

1812

01:01:08,710 --> 01:01:06,880

that just basically says you got a

1813

01:01:10,069 --> 01:01:08,720

structure in the world your payoff

1814

01:01:12,150 --> 01:01:10,079

functions won't preserve it almost

1815

01:01:14,870 --> 01:01:12,160

surely and destroy that's what we want

1816

01:01:15,430 --> 01:01:14,880

we've got only four examples um and then

1817

01:01:17,270 --> 01:01:15,440

we've got this

1818

01:01:19,030 --> 01:01:17,280

high level argument that i gave you that

1819

01:01:20,390 --> 01:01:19,040

to be a homomorphism you have to satisfy

1820

01:01:23,109 --> 01:01:20,400

these equations so good luck

1821

01:01:23,589 --> 01:01:23,119

most won't be so that suggests to me

1822

01:01:25,910 --> 01:01:23,599

that there's

1823

01:01:27,270 --> 01:01:25,920

going to be probably a very simple

1824

01:01:29,750 --> 01:01:27,280

category theoretic

1825

01:01:30,870 --> 01:01:29,760

proof of this thing uh and that will

1826

01:01:32,870 --> 01:01:30,880

take care of it

1827

01:01:34,950 --> 01:01:32,880

or perhaps you find the one structure

1828

01:01:36,069 --> 01:01:34,960

maybe there's even one or two structures

1829

01:01:38,470 --> 01:01:36,079

a finite amount

1830

01:01:39,750 --> 01:01:38,480

that's satisfied that the vertical

1831

01:01:40,549 --> 01:01:39,760

perception and then from that you're

1832

01:01:41,990 --> 01:01:40,559

like okay

1833

01:01:43,750 --> 01:01:42,000

that's interesting that's uniqueness

1834

01:01:45,349 --> 01:01:43,760

among all the structures and therefore

1835

01:01:47,030 --> 01:01:45,359

something special and maybe we can imply

1836

01:01:48,069 --> 01:01:47,040

the laws of physics from that either way

1837

01:01:50,230 --> 01:01:48,079

would be interesting

1838

01:01:51,349 --> 01:01:50,240

oh absolutely so you know i don't care

1839

01:01:53,430 --> 01:01:51,359

how it comes out

1840

01:01:54,950 --> 01:01:53,440

um i i just want to pursue and see what

1841

01:01:56,789 --> 01:01:54,960

see what does come out right

1842

01:01:58,549 --> 01:01:56,799

but what i am saying is this way too

1843

01:01:59,670 --> 01:01:58,559

fast my colleagues thinking oh of course

1844

01:02:01,670 --> 01:01:59,680

natural selection

1845

01:02:03,349 --> 01:02:01,680

favors two percent oh that's way way too

1846

01:02:05,190 --> 01:02:03,359

fast

1847

01:02:06,710 --> 01:02:05,200

why do they think that if they come from

1848

01:02:09,029 --> 01:02:06,720

an evolutionary background

1849

01:02:09,750 --> 01:02:09,039

because evolution just is all about what

1850

01:02:13,829 --> 01:02:09,760

works

1851
01:02:14,789 --> 01:02:13,839
true true in the in the materialist

1852
01:02:18,710 --> 01:02:14,799
sense

1853
01:02:20,789 --> 01:02:18,720
i agree and i should say um there are

1854
01:02:21,990 --> 01:02:20,799
many of my colleagues and friends like

1855
01:02:24,230 --> 01:02:22,000
steve pinker

1856
01:02:27,029 --> 01:02:24,240
a good colleague and long time friend

1857
01:02:30,470 --> 01:02:27,039
who clearly understands

1858
01:02:33,670 --> 01:02:30,480
that natural selection does not

1859
01:02:35,750 --> 01:02:33,680
in general favor true beliefs right and

1860
01:02:39,670 --> 01:02:35,760
he's got a brilliant paper

1861
01:02:41,670 --> 01:02:39,680
um a published um called

1862
01:02:43,029 --> 01:02:41,680
so how does the mind work it's a

1863
01:02:44,870 --> 01:02:43,039

wonderful paper so if you look up steve

1864

01:02:47,430 --> 01:02:44,880

pinker so how does the mind work

1865

01:02:48,630 --> 01:02:47,440

he he gives in that paper five good

1866

01:02:51,430 --> 01:02:48,640

reasons for

1867

01:02:51,990 --> 01:02:51,440

why evolution will not lead us to have

1868

01:02:55,270 --> 01:02:52,000

true

1869

01:02:58,789 --> 01:02:55,280

beliefs in general um

1870

01:03:00,630 --> 01:02:58,799

and also real robert trevors has

1871

01:03:01,990 --> 01:03:00,640

argued you know brilliantly on

1872

01:03:03,589 --> 01:03:02,000

evolutionary grounds that there are

1873

01:03:05,990 --> 01:03:03,599

reasons why we should be deeply

1874

01:03:08,390 --> 01:03:06,000

self-deceived we the best

1875

01:03:09,829 --> 01:03:08,400

liar the best the most convincing liar

1876

01:03:11,670 --> 01:03:09,839

in social situations is the one who

1877

01:03:13,190 --> 01:03:11,680

believes his own lie

1878

01:03:15,109 --> 01:03:13,200

and so there are selection pressures for

1879

01:03:19,029 --> 01:03:15,119

us to be deeply deceived

1880

01:03:20,470 --> 01:03:19,039

now in trevor's case however he then

1881

01:03:22,309 --> 01:03:20,480

even though he understands that aspect

1882

01:03:24,150 --> 01:03:22,319

of evolution and

1883

01:03:25,349 --> 01:03:24,160

leading to false beliefs when it came to

1884

01:03:28,950 --> 01:03:25,359

perception

1885

01:03:32,710 --> 01:03:28,960

trevors still believed and wrote

1886

01:03:34,390 --> 01:03:32,720

that seeing the structure of reality as

1887

01:03:35,829 --> 01:03:34,400

it is would make you more fit

1888

01:03:38,870 --> 01:03:35,839

and that's the argument that most people

1889

01:03:41,029 --> 01:03:38,880

believe it's

1890

01:03:42,069 --> 01:03:41,039

the argument goes like this those of our

1891

01:03:45,910 --> 01:03:42,079

ancestors

1892

01:03:47,750 --> 01:03:45,920

who saw reality more accurately

1893

01:03:50,390 --> 01:03:47,760

had a competitive advantage over those

1894

01:03:51,990 --> 01:03:50,400

who saw the world less accurately

1895

01:03:53,990 --> 01:03:52,000

a new competitive advantage in the you

1896

01:03:55,670 --> 01:03:54,000

know the the basic

1897

01:03:58,789 --> 01:03:55,680

activities of life feeding fighting

1898

01:04:00,470 --> 01:03:58,799

fleeing and mating right and therefore

1899

01:04:02,950 --> 01:04:00,480

those who saw more accurately were more

1900

01:04:04,470 --> 01:04:02,960

likely to pass on their genes

1901

01:04:06,069 --> 01:04:04,480

that code for the more accurate

1902

01:04:07,910 --> 01:04:06,079

perceptions

1903

01:04:10,309 --> 01:04:07,920

and therefore we can be quite confident

1904

01:04:12,470 --> 01:04:10,319

that we may not see all of the truth

1905

01:04:14,470 --> 01:04:12,480

but we see those aspects of the truth

1906

01:04:16,470 --> 01:04:14,480

that we need to survive

1907

01:04:17,829 --> 01:04:16,480

and that kind of argument completely

1908

01:04:21,109 --> 01:04:17,839

persuades most of my

1909

01:04:23,270 --> 01:04:21,119

my colleagues it apparently persuaded

1910

01:04:25,270 --> 01:04:23,280

trivers because he he wrote that you

1911

01:04:26,309 --> 01:04:25,280

know yeah it's more fit to see reality

1912

01:04:28,630 --> 01:04:26,319

as it is

1913

01:04:30,630 --> 01:04:28,640

it didn't persuade pinker although

1914

01:04:32,069 --> 01:04:30,640

pinker in the in that paper that i

1915

01:04:34,069 --> 01:04:32,079

the brilliant paper that i mentioned you

1916

01:04:37,029 --> 01:04:34,079

know so how does the mind work

1917

01:04:38,829 --> 01:04:37,039

he does at the at the end of his

1918

01:04:41,910 --> 01:04:38,839

discussion of the five

1919

01:04:45,349 --> 01:04:41,920

reasons uh why evolution wouldn't

1920

01:04:47,029 --> 01:04:45,359

lead to to true beliefs he does make an

1921

01:04:49,109 --> 01:04:47,039

exception for everyday middle-sized

1922

01:04:51,349 --> 01:04:49,119

objects

1923

01:04:52,710 --> 01:04:51,359

and for the quotidian beliefs of of our

1924

01:04:53,029 --> 01:04:52,720

friends the everyday quotation beliefs

1925

01:04:55,510 --> 01:04:53,039

are

1926

01:04:56,390 --> 01:04:55,520

so he he he doesn't explain why he makes

1927

01:04:57,910 --> 01:04:56,400

those exceptions

1928

01:04:59,430 --> 01:04:57,920

but he does make those two exceptions

1929

01:05:00,950 --> 01:04:59,440

and so i'm really focusing on that

1930

01:05:02,630 --> 01:05:00,960

exception about everyday middle-sized

1931

01:05:04,390 --> 01:05:02,640

objects yeah i'm saying

1932

01:05:05,670 --> 01:05:04,400

that our perception of everyday

1933

01:05:08,710 --> 01:05:05,680

middle-sized objects

1934

01:05:11,109 --> 01:05:08,720

is also not an example of a true belief

1935

01:05:12,069 --> 01:05:11,119

it's just an example of something as you

1936

01:05:15,190 --> 01:05:12,079

said that's

1937

01:05:16,390 --> 01:05:15,200

fit enough to keep you alive uh okay

1938

01:05:18,789 --> 01:05:16,400

well this is a question

1939

01:05:20,150 --> 01:05:18,799

more about evolutionary modeling in

1940

01:05:21,589 --> 01:05:20,160

general

1941

01:05:23,109 --> 01:05:21,599

and please forgive me as i verbally

1942

01:05:24,069 --> 01:05:23,119

fumble through this because i haven't my

1943

01:05:27,109 --> 01:05:24,079

thoughts on this aren't

1944

01:05:27,990 --> 01:05:27,119

fully developed are fitness payoffs as

1945

01:05:30,390 --> 01:05:28,000

simple as just

1946

01:05:31,910 --> 01:05:30,400

a one-dimensional case so for example

1947

01:05:33,270 --> 01:05:31,920

some issue that i an issue that i have

1948

01:05:35,029 --> 01:05:33,280

with utilitarians

1949

01:05:37,270 --> 01:05:35,039

is that they will project pleasure and

1950

01:05:39,750 --> 01:05:37,280

pain down to one dimensional axis

1951

01:05:41,349 --> 01:05:39,760

which to me neglects that there are

1952

01:05:41,990 --> 01:05:41,359

different kinds of pleasures or that you

1953

01:05:43,190 --> 01:05:42,000

can combine

1954

01:05:45,270 --> 01:05:43,200

pleasure and pain or that there are

1955

01:05:49,510 --> 01:05:45,280

different kinds of pain

1956

01:05:52,870 --> 01:05:51,190

this means to me that projecting onto

1957

01:05:55,270 --> 01:05:52,880

the real line is either not possible

1958

01:05:56,549 --> 01:05:55,280

or it's not trivial or it's not useful

1959

01:05:58,789 --> 01:05:56,559

and i've always wondered the same

1960

01:06:01,029 --> 01:05:58,799

about fitness payoffs i see something

1961

01:06:03,670 --> 01:06:01,039

similar happening so perhaps fitness

1962

01:06:06,230 --> 01:06:03,680

is a complex multi-dimensional space and

1963

01:06:07,430 --> 01:06:06,240

the choice between any given two points

1964

01:06:09,349 --> 01:06:07,440

in order for you to make it you need to

1965

01:06:10,630 --> 01:06:09,359

employ a metric or norm and then that

1966

01:06:13,510 --> 01:06:10,640

would need to be justified

1967

01:06:16,789 --> 01:06:13,520

in other words do you have do you see

1968

01:06:21,190 --> 01:06:16,799

any problems with fitness payoffs being

1969

01:06:24,390 --> 01:06:21,200

real r_1 to r_1 uh well

1970

01:06:27,750 --> 01:06:24,400

yes i do and the the reason

1971

01:06:29,829 --> 01:06:27,760

is that the domain need not be r_1

1972

01:06:31,190 --> 01:06:29,839

the domain could be as high dimensional

1973

01:06:33,349 --> 01:06:31,200

as you want or the very notion of

1974

01:06:36,069 --> 01:06:33,359

dimension may not even apply

1975

01:06:37,349 --> 01:06:36,079

so but but you sticking with you know

1976

01:06:39,349 --> 01:06:37,359

the domain having

1977

01:06:41,190 --> 01:06:39,359

it could be you know a 50 dimensional

1978

01:06:44,230 --> 01:06:41,200

image going down to r1

1979

01:06:47,349 --> 01:06:44,240

yeah so going down to r1 now

1980

01:06:50,069 --> 01:06:47,359

fitness in terms of evolution is very

1981

01:06:54,150 --> 01:06:52,230

do you have more kids in the competition

1982

01:06:57,589 --> 01:06:54,160

end of story

1983

01:06:58,870 --> 01:06:57,599

that's r1 so the but

1984

01:07:01,109 --> 01:06:58,880

what you were talking about though the

1985

01:07:04,069 --> 01:07:01,119

pain and pleasure and so forth

1986

01:07:05,510 --> 01:07:04,079

the the kinds of emotions that we may

1987

01:07:06,950 --> 01:07:05,520

evolve

1988

01:07:08,870 --> 01:07:06,960

to guide our behaviors in an

1989

01:07:10,789 --> 01:07:08,880

evolutionary theory could be as

1990

01:07:14,549 --> 01:07:10,799

complicated as you want

1991

01:07:17,510 --> 01:07:14,559

right so so the payoff is

1992

01:07:20,069 --> 01:07:17,520

reproductive success that's it that's

1993

01:07:22,789 --> 01:07:20,079

the only payoff that there is

1994

01:07:23,510 --> 01:07:22,799

we we we will talk about you know payoff

1995

01:07:25,910 --> 01:07:23,520

functions as

1996

01:07:26,950 --> 01:07:25,920

like points in the game but ultimately

1997

01:07:28,870 --> 01:07:26,960

the idea is that

1998

01:07:30,470 --> 01:07:28,880

you you gather the number of points you

1999

01:07:31,829 --> 01:07:30,480

get in playing the game is really

2000

01:07:34,710 --> 01:07:31,839

translated into how many kids do you

2001

01:07:36,549 --> 01:07:34,720

have how many genes do you pass on so

2002

01:07:39,349 --> 01:07:36,559

that's why in evolutionary theory

2003

01:07:39,910 --> 01:07:39,359

the the domain can be as complicated as

2004

01:07:43,190 --> 01:07:39,920

you want

2005

01:07:44,870 --> 01:07:43,200

the range is r1 kids

2006

01:07:47,510 --> 01:07:44,880

what is it's not the absolute number of

2007

01:07:50,069 --> 01:07:47,520

kids it all that matters is that you

2008

01:07:51,430 --> 01:07:50,079

have more than the competition right so

2009

01:07:52,710 --> 01:07:51,440

it's not like it you have to be perfect

2010

01:07:54,630 --> 01:07:52,720

or anything like that it's just a

2011

01:07:57,670 --> 01:07:54,640

satisficing solution

2012

01:08:02,230 --> 01:07:57,680

so so we have to distinguish the

2013

01:08:05,270 --> 01:08:02,240

payoff value which is

2014

01:08:06,710 --> 01:08:05,280

reproductive success versus all the

2015

01:08:09,910 --> 01:08:06,720

complicated emotions

2016

01:08:11,190 --> 01:08:09,920

that will guide our behaviors to get

2017

01:08:13,190 --> 01:08:11,200

enough payoff value right

2018

01:08:15,430 --> 01:08:13,200

so so so we don't want to conflate those

2019

01:08:16,950 --> 01:08:15,440

two things so evolutionary theory allows

2020

01:08:17,829 --> 01:08:16,960

you to have as complicated a set of

2021

01:08:20,149 --> 01:08:17,839

emotions and

2022

01:08:21,189 --> 01:08:20,159

motivations as as you want very very

2023

01:08:24,390 --> 01:08:21,199

complicated

2024

01:08:26,149 --> 01:08:24,400

the payoff value is r1

2025

01:08:27,430 --> 01:08:26,159

i got it all right thanks man i

2026

01:08:29,189 --> 01:08:27,440

appreciate that we're gonna have to

2027

01:08:31,030 --> 01:08:29,199

schedule another call if you don't mind

2028

01:08:33,349 --> 01:08:31,040

no you're asking um it's fun for me

2029

01:08:36,789 --> 01:08:33,359

because this is far more technical than

2030

01:08:37,510 --> 01:08:36,799

most um questions so and uh it's it's

2031

01:08:39,510 --> 01:08:37,520

enjoyable

2032

01:08:41,430 --> 01:08:39,520

i i just hope that your audience will be

2033

01:08:42,870 --> 01:08:41,440

able to follow this is probably

2034

01:08:45,110 --> 01:08:42,880

some of them won't be able to but that's

2035

01:08:46,470 --> 01:08:45,120

fine i feel like most people

2036

01:08:48,149 --> 01:08:46,480

one of the reasons why i've been

2037

01:08:51,430 --> 01:08:48,159

successful to the degree that i have

2038

01:08:54,550 --> 01:08:51,440

is that people are watching more because

2039

01:08:55,829 --> 01:08:54,560

i as an interviewer i'm engaged like i'm

2040

01:08:56,390 --> 01:08:55,839

asking questions that i want to know the

2041

01:08:57,590 --> 01:08:56,400

answer to

2042

01:08:59,510 --> 01:08:57,600

right rather than what i think the

2043

01:09:00,149 --> 01:08:59,520

audience cares about and there's a bit

2044

01:09:02,630 --> 01:09:00,159

of a

2045

01:09:03,189 --> 01:09:02,640

facade there on manufacturing good well

2046

01:09:05,510 --> 01:09:03,199

well

2047

01:09:07,030 --> 01:09:05,520

i think for a certain audience then

2048

01:09:07,349 --> 01:09:07,040

these are the right questions absolutely

2049

01:09:09,349 --> 01:09:07,359

for

2050

01:09:10,630 --> 01:09:09,359

any i mean you're asking the right

2051
01:09:12,229 --> 01:09:10,640
questions for anybody that really knows

2052
01:09:14,070 --> 01:09:12,239
their math and science

2053
01:09:15,110 --> 01:09:14,080
and it must be hard knows about you

2054
01:09:15,749 --> 01:09:15,120
you're asking exactly the right

2055
01:09:17,990 --> 01:09:15,759
questions

2056
01:09:19,990 --> 01:09:18,000
thanks man i i appreciate that you know

2057
01:09:21,749 --> 01:09:20,000
like it gets a bit more technical like

2058
01:09:23,590 --> 01:09:21,759
like why did you why are you choosing

2059
01:09:24,229 --> 01:09:23,600
the geometric algebra with the signature

2060
01:09:25,910 --> 01:09:24,239
one three

2061
01:09:27,430 --> 01:09:25,920
and then saying that implies space time

2062
01:09:30,470 --> 01:09:27,440
because because that to me is

2063
01:09:36,709 --> 01:09:30,480

putting extra structure on but okay well

2064

01:09:40,550 --> 01:09:38,309

all right i'm gonna have to i don't

2065

01:09:42,070 --> 01:09:40,560

recall exactly where we left off but

2066

01:09:44,390 --> 01:09:42,080

it's all right i'll put intermission and

2067

01:09:45,990 --> 01:09:44,400

people will understand if there's a

2068

01:09:49,590 --> 01:09:46,000

change in topic

2069

01:09:51,829 --> 01:09:49,600

sure okay how's it going donald

2070

01:09:53,749 --> 01:09:51,839

i'm doing great how about you kurt good

2071

01:09:55,750 --> 01:09:53,759

man okay you were just mentioning that

2072

01:09:56,229 --> 01:09:55,760

some of your practices of meditation are

2073

01:09:58,229 --> 01:09:56,239

intense

2074

01:09:59,990 --> 01:09:58,239

and they usually are today was

2075

01:10:02,550 --> 01:10:00,000

particularly intense or

2076

01:10:03,830 --> 01:10:02,560

average intensity just average but it's

2077

01:10:05,750 --> 01:10:03,840

always pretty intense

2078

01:10:08,070 --> 01:10:05,760

it's um okay what do you see what

2079

01:10:12,229 --> 01:10:08,080

happens during it

2080

01:10:16,390 --> 01:10:14,229

it's going into the unknown letting go

2081

01:10:20,790 --> 01:10:16,400

of all thoughts

2082

01:10:23,830 --> 01:10:20,800

and there's innate fear

2083

01:10:27,350 --> 01:10:23,840

of the unknown and

2084

01:10:30,229 --> 01:10:27,360

so facing that fear and letting it go

2085

01:10:31,830 --> 01:10:30,239

can be can be very very intense just so

2086

01:10:36,229 --> 01:10:31,840

if you you know tried

2087

01:10:40,709 --> 01:10:36,239

just sitting for 10 minutes

2088

01:10:42,390 --> 01:10:40,719

with absolutely no thoughts just being

2089

01:10:43,990 --> 01:10:42,400

in the moment you'll find that thoughts

2090

01:10:47,510 --> 01:10:44,000

just come up and they

2091

01:10:49,830 --> 01:10:47,520

invade and and and

2092

01:10:51,590 --> 01:10:49,840

if you let them go and and go back into

2093

01:10:52,149 --> 01:10:51,600

quiet you'll see the thoughts just keep

2094

01:10:54,870 --> 01:10:52,159

coming back

2095

01:10:56,229 --> 01:10:54,880

up and and but when you actually go into

2096

01:10:59,430 --> 01:10:56,239

a space where

2097

01:11:02,550 --> 01:10:59,440

you do let go of thoughts and it is

2098

01:11:04,790 --> 01:11:02,560

it's utter silence then

2099

01:11:07,350 --> 01:11:04,800

it starts to appear that those thoughts

2100

01:11:10,390 --> 01:11:07,360

are part of a defense mechanism

2101

01:11:14,950 --> 01:11:10,400

that they're they're they're hiding

2102

01:11:17,910 --> 01:11:14,960

uh behind them uh a good deal of um

2103

01:11:18,550 --> 01:11:17,920

fear of the unknown and yeah we're

2104

01:11:20,390 --> 01:11:18,560

always you know

2105

01:11:22,550 --> 01:11:20,400

one thing about our species is that we

2106

01:11:24,470 --> 01:11:22,560

build models of our environment

2107

01:11:26,470 --> 01:11:24,480

and we rely on our models to protect us

2108

01:11:29,910 --> 01:11:26,480

right we predict

2109

01:11:30,470 --> 01:11:29,920

you know some some creatures don't build

2110

01:11:32,149 --> 01:11:30,480

models

2111

01:11:33,430 --> 01:11:32,159

or or don't very build very

2112

01:11:34,550 --> 01:11:33,440

sophisticated models of their

2113

01:11:36,790 --> 01:11:34,560

environment

2114

01:11:39,430 --> 01:11:36,800

and their strategy is like you know with

2115

01:11:42,310 --> 01:11:39,440

back some bacteria

2116

01:11:42,870 --> 01:11:42,320

you just multiply multiply multiply and

2117

01:11:44,950 --> 01:11:42,880

and

2118

01:11:46,070 --> 01:11:44,960

um that's that's how you survive you

2119

01:11:48,229 --> 01:11:46,080

know just

2120

01:11:50,229 --> 01:11:48,239

vast multiplication our species is

2121

01:11:54,310 --> 01:11:50,239

different we have

2122

01:11:56,790 --> 01:11:54,320

very few kids and um

2123

01:11:58,149 --> 01:11:56,800

we have a big cerebral cortex a frontal

2124

01:11:59,669 --> 01:11:58,159

lobe that's building models

2125

01:12:01,750 --> 01:11:59,679

of of our environment and we're

2126

01:12:04,790 --> 01:12:01,760

simulating what will happen

2127

01:12:06,470 --> 01:12:04,800

um and so that we you know in the

2128

01:12:07,590 --> 01:12:06,480

simulation something goes wrong we see

2129

01:12:09,189 --> 01:12:07,600

oh i shouldn't do that

2130

01:12:10,790 --> 01:12:09,199

instead of sacrificing our bodies we

2131

01:12:12,310 --> 01:12:10,800

sacrifice our virtual body in the

2132

01:12:14,229 --> 01:12:12,320

simulation right

2133

01:12:17,110 --> 01:12:14,239

and we learn so when you start letting

2134

01:12:19,510 --> 01:12:17,120

go of all of your thoughts

2135

01:12:21,270 --> 01:12:19,520

you're letting go of this very deeply

2136

01:12:23,110 --> 01:12:21,280

ingrained

2137

01:12:24,709 --> 01:12:23,120

protective mechanism that we have of

2138

01:12:26,790 --> 01:12:24,719

building models and and

2139

01:12:28,390 --> 01:12:26,800

analyzing things and looking into the

2140

01:12:30,550 --> 01:12:28,400

future and

2141

01:12:32,070 --> 01:12:30,560

running through scenarios and so forth

2142

01:12:33,669 --> 01:12:32,080

it's one of the great strengths of our

2143

01:12:36,870 --> 01:12:33,679

species

2144

01:12:38,310 --> 01:12:36,880

it's all a big difference

2145

01:12:40,870 --> 01:12:38,320

do you feel like all our thoughts are

2146

01:12:43,910 --> 01:12:40,880

defense mechanisms

2147

01:12:45,669 --> 01:12:43,920

well uh no but

2148

01:12:48,310 --> 01:12:45,679

it's it's pretty much like this it's

2149

01:12:51,430 --> 01:12:48,320

it's like um

2150

01:12:53,990 --> 01:12:51,440

if we look at eating

2151

01:12:56,950 --> 01:12:54,000

we all have to eat and so it's a

2152

01:12:59,990 --> 01:12:56,960

necessary part of life to to eat

2153

01:13:01,350 --> 01:13:00,000

but but if um

2154

01:13:02,790 --> 01:13:01,360

you decide that you know you're gonna

2155

01:13:03,350 --> 01:13:02,800

you know you've had lunch and you're

2156

01:13:04,630 --> 01:13:03,360

just going to

2157

01:13:06,470 --> 01:13:04,640

do something else but you find that you

2158

01:13:08,390 --> 01:13:06,480

can't stop thinking about food and you

2159

01:13:09,669 --> 01:13:08,400

keep walking over to the refrigerator

2160

01:13:11,270 --> 01:13:09,679

and you get that well that's that's

2161

01:13:12,790 --> 01:13:11,280

different that's that's now something

2162

01:13:14,790 --> 01:13:12,800

healthy that's turned into an obsession

2163

01:13:16,709 --> 01:13:14,800

it's a problem right

2164

01:13:19,030 --> 01:13:16,719

and it's the same thing with thoughts

2165

01:13:19,510 --> 01:13:19,040

thoughts are great we use them to go to

2166

01:13:21,590 --> 01:13:19,520

the moon

2167

01:13:23,669 --> 01:13:21,600

we use them to build all this technology

2168

01:13:27,830 --> 01:13:23,679

we use them to cure disease

2169

01:13:29,590 --> 01:13:27,840

they're wonderful but if you find

2170

01:13:31,590 --> 01:13:29,600

that when you say okay you know thought

2171

01:13:31,990 --> 01:13:31,600

is a great tool but for the next 10

2172

01:13:33,669 --> 01:13:32,000

minutes

2173

01:13:35,750 --> 01:13:33,679

i would just like to relax without any

2174

01:13:36,630 --> 01:13:35,760

thoughts and then you find you can't do

2175

01:13:39,750 --> 01:13:36,640

it

2176
01:13:40,630 --> 01:13:39,760
you find that these thoughts invade and

2177
01:13:42,149 --> 01:13:40,640
that when you

2178
01:13:43,830 --> 01:13:42,159
let go of the thoughts and you just go

2179
01:13:47,510 --> 01:13:43,840
into pure silence

2180
01:13:50,070 --> 01:13:47,520
that um you're afraid

2181
01:13:51,590 --> 01:13:50,080
and you retreat back into the thoughts

2182
01:13:54,390 --> 01:13:51,600
well that that suggests that

2183
01:13:57,669 --> 01:13:54,400
um just like in the case of of the food

2184
01:14:01,110 --> 01:14:00,390
usage of food and it's very very

2185
01:14:02,870 --> 01:14:01,120
necessary

2186
01:14:04,229 --> 01:14:02,880
but there's a case where it becomes an

2187
01:14:05,910 --> 01:14:04,239
obsession and there's a problem

2188
01:14:08,229 --> 01:14:05,920

same thing with thought it's a great

2189

01:14:10,310 --> 01:14:08,239

tool but but when you can't let go of

2190

01:14:12,310 --> 01:14:10,320

thought for 10 minutes

2191

01:14:13,990 --> 01:14:12,320

in it and the thoughts invade and you

2192

01:14:18,070 --> 01:14:14,000

find that going into the

2193

01:14:19,189 --> 01:14:18,080

silence triggers um an innate fear

2194

01:14:21,110 --> 01:14:19,199

then you know that there's something

2195

01:14:24,070 --> 01:14:21,120

else that's going on and so

2196

01:14:25,430 --> 01:14:24,080

so in the meditation it's it's a matter

2197

01:14:28,790 --> 01:14:25,440

of

2198

01:14:32,470 --> 01:14:28,800

for me facing the silence

2199

01:14:34,390 --> 01:14:32,480

and the fears that come up um without

2200

01:14:36,229 --> 01:14:34,400

judgment without condemnation without

2201

01:14:37,830 --> 01:14:36,239

trying just being

2202

01:14:39,669 --> 01:14:37,840

being with that and just watching that

2203

01:14:41,990 --> 01:14:39,679

whole amazing process to

2204

01:14:43,590 --> 01:14:42,000

is sort of finding out wow i didn't know

2205

01:14:44,709 --> 01:14:43,600

that this was part of me i just was

2206

01:14:47,750 --> 01:14:44,719

living in my thoughts

2207

01:14:50,229 --> 01:14:47,760

i had no idea that it would be so hard

2208

01:14:51,910 --> 01:14:50,239

to let go of thoughts so it's nothing

2209

01:14:54,630 --> 01:14:51,920

wrong about thoughts

2210

01:14:56,229 --> 01:14:54,640

but when they're obsessive then that's a

2211

01:14:58,390 --> 01:14:56,239

different thing

2212

01:15:00,229 --> 01:14:58,400

and in the case the analogy with the

2213

01:15:02,229 --> 01:15:00,239

fridge and the food

2214

01:15:04,070 --> 01:15:02,239

it's me it's an obsession when it

2215

01:15:05,270 --> 01:15:04,080

becomes maladaptive

2216

01:15:07,350 --> 01:15:05,280

is that what you're defining as

2217

01:15:08,950 --> 01:15:07,360

obsession right yeah so

2218

01:15:10,470 --> 01:15:08,960

you can't your thoughts are always about

2219

01:15:12,070 --> 01:15:10,480

the refrigerator and getting the next

2220

01:15:13,590 --> 01:15:12,080

food and you find yourself gaining tons

2221

01:15:14,950 --> 01:15:13,600

of tons of weight and to the point where

2222

01:15:15,750 --> 01:15:14,960

you have heart disease and things like

2223

01:15:19,669 --> 01:15:15,760

that

2224

01:15:22,709 --> 01:15:19,679

realize okay well maybe i've got

2225

01:15:24,229 --> 01:15:22,719

uh you know food is necessary but but

2226

01:15:26,709 --> 01:15:24,239

too much food and too much thinking

2227

01:15:29,990 --> 01:15:26,719

about food is food is a sign of

2228

01:15:32,149 --> 01:15:30,000

of something maladaptive um

2229

01:15:33,750 --> 01:15:32,159

okay you also mentioned in the case

2230

01:15:35,669 --> 01:15:33,760

against reality that illusions are a

2231

01:15:37,030 --> 01:15:35,679

failure to guide adaptive behavior

2232

01:15:38,870 --> 01:15:37,040

i don't know if you mentioned that

2233

01:15:39,189 --> 01:15:38,880

quoting someone else or if you mention

2234

01:15:41,590 --> 01:15:39,199

that

2235

01:15:43,590 --> 01:15:41,600

and because you believe it and either

2236

01:15:46,149 --> 01:15:43,600

way do you agree with that statement or

2237

01:15:46,790 --> 01:15:46,159

disagree yeah i i do agree with that

2238

01:15:50,070 --> 01:15:46,800

that that

2239

01:15:51,430 --> 01:15:50,080

um and it was sort of a statement that i

2240

01:15:53,189 --> 01:15:51,440

was making

2241

01:15:55,510 --> 01:15:53,199

in contrast to what most of my

2242

01:15:57,350 --> 01:15:55,520

colleagues in in perception science

2243

01:15:58,950 --> 01:15:57,360

would say most of my colleagues would

2244

01:16:01,270 --> 01:15:58,960

say that an elite

2245

01:16:02,870 --> 01:16:01,280

is a perception that fails to match

2246

01:16:07,110 --> 01:16:02,880

reality

2247

01:16:08,390 --> 01:16:07,120

right so i see a stick in the water it

2248

01:16:09,830 --> 01:16:08,400

looks bent

2249

01:16:11,750 --> 01:16:09,840

but the stick isn't bent so my

2250

01:16:12,950 --> 01:16:11,760

perception fails to match the reality i

2251

01:16:13,830 --> 01:16:12,960

see something that looks bent but the

2252

01:16:18,390 --> 01:16:13,840

stick isn't bent

2253

01:16:21,510 --> 01:16:18,400

right that kind of thing and

2254

01:16:24,709 --> 01:16:21,520

i'm suggesting on evolutionary grounds

2255

01:16:27,669 --> 01:16:24,719

well i'm claiming

2256

01:16:29,189 --> 01:16:27,679

that the theory of evolution entails

2257

01:16:31,350 --> 01:16:29,199

mathematically

2258

01:16:32,950 --> 01:16:31,360

that the probability that any of our

2259

01:16:35,189 --> 01:16:32,960

perceptions

2260

01:16:36,229 --> 01:16:35,199

in any way match the structure of

2261

01:16:40,070 --> 01:16:36,239

reality is zero

2262

01:16:43,030 --> 01:16:41,669

tell us truths about the structure of

2263

01:16:44,390 --> 01:16:43,040

objective reality according to

2264

01:16:48,149 --> 01:16:44,400

evolutionary theory

2265

01:16:50,390 --> 01:16:48,159

that's just are you aware of the various

2266

01:16:52,790 --> 01:16:50,400

notions of truth such as correspondence

2267

01:16:55,910 --> 01:16:52,800

and deflationary and pragmatic

2268

01:16:57,430 --> 01:16:55,920

sure absolutely so so most

2269

01:16:59,030 --> 01:16:57,440

most of my colleagues are taking a

2270

01:17:03,110 --> 01:16:59,040

correspondence notion right

2271

01:17:06,229 --> 01:17:03,120

they're saying that that i see

2272

01:17:07,910 --> 01:17:06,239

a red apple

2273

01:17:09,750 --> 01:17:07,920

that's because in fact in objective

2274

01:17:11,750 --> 01:17:09,760

reality there is something with that

2275

01:17:13,590 --> 01:17:11,760

that shape and that color that would

2276

01:17:15,510 --> 01:17:13,600

continue to exist even if no one were

2277

01:17:17,110 --> 01:17:15,520

there to perceive it and so there's

2278

01:17:19,510 --> 01:17:17,120

a correspondence no one thinks it's

2279

01:17:20,709 --> 01:17:19,520

perfect correspondence we don't see

2280

01:17:22,709 --> 01:17:20,719

all of the structure of objective

2281

01:17:24,790 --> 01:17:22,719

reality but but the

2282

01:17:25,910 --> 01:17:24,800

idea of truth that i'm talking about is

2283

01:17:28,390 --> 01:17:25,920

reality

2284

01:17:28,950 --> 01:17:28,400

whatever it is has certain structures to

2285

01:17:32,310 --> 01:17:28,960

it

2286

01:17:35,189 --> 01:17:32,320

topologies perhaps

2287

01:17:36,390 --> 01:17:35,199

group structures metrics whatever it

2288

01:17:38,310 --> 01:17:36,400

might be whatever the structures of

2289

01:17:41,990 --> 01:17:38,320

reality are

2290

01:17:45,189 --> 01:17:42,000

and our perceptions then

2291

01:17:46,310 --> 01:17:45,199

tell us truths about those structures

2292

01:17:48,229 --> 01:17:46,320

some of the structures of our

2293

01:17:49,830 --> 01:17:48,239

perceptions are

2294

01:17:51,189 --> 01:17:49,840

matching the structures of objective

2295

01:17:53,030 --> 01:17:51,199

reality the structure of the shape of

2296

01:17:56,229 --> 01:17:53,040

the apple that we perceive

2297

01:17:57,430 --> 01:17:56,239

is homomorphic to the structure that the

2298

01:18:01,110 --> 01:17:57,440

apple really has

2299

01:18:05,750 --> 01:18:01,120

and so forth and that's what i'm saying

2300

01:18:11,430 --> 01:18:08,550

now are you taking more of a pragmatic

2301

01:18:15,750 --> 01:18:11,440

stance on the definition of truth

2302

01:18:20,310 --> 01:18:18,950

so what's what's interesting is when i

2303

01:18:22,229 --> 01:18:20,320

talk about

2304

01:18:23,510 --> 01:18:22,239

if you don't mind just for the audience

2305

01:18:25,189 --> 01:18:23,520

do you mind defining

2306

01:18:26,790 --> 01:18:25,199

the difference between correspondence

2307

01:18:28,070 --> 01:18:26,800

and then pragmatic and then where you

2308

01:18:29,669 --> 01:18:28,080

defer from pragmatic

2309

01:18:31,430 --> 01:18:29,679

as far as i can tell it sounds like

2310

01:18:33,830 --> 01:18:31,440

yours is pragmatic because it's

2311

01:18:35,910 --> 01:18:33,840

about adaptive behavior so i'm curious

2312

01:18:37,910 --> 01:18:35,920

to know where the difference is

2313

01:18:39,590 --> 01:18:37,920

right so in the correspondence theory of

2314

01:18:42,709 --> 01:18:39,600

truth the

2315

01:18:44,229 --> 01:18:42,719

the idea is that um there is an

2316

01:18:47,590 --> 01:18:44,239

objective reality that has

2317

01:18:51,590 --> 01:18:47,600

a definite state a definite structure

2318

01:18:53,350 --> 01:18:51,600

and to see truly to perceive truly

2319

01:18:54,709 --> 01:18:53,360

is to have the structures of your

2320

01:18:58,310 --> 01:18:54,719

perception

2321

01:18:59,590 --> 01:18:58,320

be homomorphic to at least

2322

01:19:01,590 --> 01:18:59,600

some of the structures in objective

2323

01:19:02,550 --> 01:19:01,600

reality so to to preserve those

2324

01:19:05,590 --> 01:19:02,560

structures

2325

01:19:10,070 --> 01:19:05,600

um a

2326

01:19:14,070 --> 01:19:10,080

pragmatist would would say

2327

01:19:16,390 --> 01:19:14,080

that's not possible we there are no

2328

01:19:18,149 --> 01:19:16,400

true perceptions of that kind all we can

2329

01:19:21,430 --> 01:19:18,159

ask of our perceptions

2330

01:19:23,910 --> 01:19:21,440

is do they work

2331

01:19:25,510 --> 01:19:23,920

so do our concepts work do our

2332

01:19:28,470 --> 01:19:25,520

perceptions work

2333

01:19:30,870 --> 01:19:28,480

and you know and what i'm saying is that

2334

01:19:34,550 --> 01:19:30,880

from an evolutionary point of view

2335

01:19:38,149 --> 01:19:34,560

the theory of evolution gives us

2336

01:19:41,350 --> 01:19:38,159

no reason to believe that our cognitive

2337

01:19:43,510 --> 01:19:41,360

or perceptual systems were shaped

2338

01:19:44,390 --> 01:19:43,520

to give us the correspondence kinds of

2339

01:19:46,149 --> 01:19:44,400

truths

2340

01:19:48,149 --> 01:19:46,159

no reason now that doesn't mean that

2341

01:19:50,630 --> 01:19:48,159

evolutionary theory is true i i

2342

01:19:52,229 --> 01:19:50,640

write i my attitude about scientific

2343

01:19:53,750 --> 01:19:52,239

theories is is

2344

01:19:56,149 --> 01:19:53,760

very very pragmatic in the following

2345

01:19:59,270 --> 01:19:56,159

sense i don't think that any of our

2346

01:20:01,669 --> 01:19:59,280

scientific theories are true

2347

01:20:03,110 --> 01:20:01,679

including mine but they're the best

2348

01:20:05,590 --> 01:20:03,120

tools that we have so far

2349

01:20:07,110 --> 01:20:05,600

and so what we do as scientists is to

2350

01:20:10,070 --> 01:20:07,120

very carefully study

2351

01:20:11,350 --> 01:20:10,080

these tools we study evolution by

2352

01:20:12,709 --> 01:20:11,360

natural selection we study

2353

01:20:14,950 --> 01:20:12,719

general relativity we study quantum

2354

01:20:18,470 --> 01:20:14,960

field theory and we

2355

01:20:20,229 --> 01:20:18,480

see what these theories entail because

2356

01:20:21,590 --> 01:20:20,239

not because they're the final answer

2357

01:20:23,350 --> 01:20:21,600

they're not i don't think any good

2358

01:20:25,110 --> 01:20:23,360

scientists think so the final answer

2359

01:20:26,470 --> 01:20:25,120

is they're they're the answers we've got

2360

01:20:29,669 --> 01:20:26,480

so far the the

2361

01:20:31,030 --> 01:20:29,679

the tools that we have so far so

2362

01:20:34,470 --> 01:20:31,040

i'm saying that evolution by natural

2363

01:20:38,070 --> 01:20:34,480

selection absolutely entails

2364

01:20:39,669 --> 01:20:38,080

that none of our perceptions correspond

2365

01:20:41,830 --> 01:20:39,679

to a true structure of an objective

2366

01:20:44,149 --> 01:20:41,840

reality

2367

01:20:45,030 --> 01:20:44,159

now does that mean that i'm a pragmatist

2368

01:20:46,870 --> 01:20:45,040

no i'm just telling you what

2369

01:20:48,550 --> 01:20:46,880

evolutionary theory entails that's all

2370

01:20:50,229 --> 01:20:48,560

that's done so i'm just being very very

2371

01:20:51,830 --> 01:20:50,239

hard-nosed this is what the theory

2372

01:20:53,350 --> 01:20:51,840

entails we've got theorems about it if

2373

01:20:54,950 --> 01:20:53,360

someone wants to argue i can show

2374

01:20:56,950 --> 01:20:54,960

my theorem and they can we can argue

2375

01:20:58,709 --> 01:20:56,960

about the theorems but now once i've

2376

01:21:00,709 --> 01:20:58,719

said that about evolutionary theory i

2377

01:21:02,950 --> 01:21:00,719

can step back and say is there a deeper

2378

01:21:05,350 --> 01:21:02,960

point of view that i would like to take

2379

01:21:07,830 --> 01:21:05,360

in which i still argue for a

2380

01:21:11,270 --> 01:21:07,840

correspondence theory of truth

2381

01:21:12,470 --> 01:21:11,280

and i'm i'm absolutely open to a deeper

2382

01:21:13,750 --> 01:21:12,480

point of view

2383

01:21:15,669 --> 01:21:13,760

in which there is a correspondence

2384

01:21:17,350 --> 01:21:15,679

theory of truth whatever that deeper

2385

01:21:19,830 --> 01:21:17,360

point of view is though and this is the

2386

01:21:23,750 --> 01:21:19,840

interesting and tricky part about it

2387

01:21:31,590 --> 01:21:28,149

it better be the case that i can explain

2388

01:21:34,870 --> 01:21:31,600

why within space and time

2389

01:21:38,390 --> 01:21:34,880

and evolution by natural selection that

2390

01:21:44,470 --> 01:21:41,430

entail only a pragmatic view

2391

01:21:46,629 --> 01:21:44,480

of perceptions not a truth view

2392

01:21:47,830 --> 01:21:46,639

so if i'm going to take a deeper point

2393

01:21:49,590 --> 01:21:47,840

of view in which i say there is a

2394

01:21:52,229 --> 01:21:49,600

correspondence theory of truth

2395

01:21:53,030 --> 01:21:52,239

then for that to work i have to be able

2396

01:21:55,270 --> 01:21:53,040

to explain

2397

01:21:56,709 --> 01:21:55,280

why such a successful theory as

2398

01:21:58,950 --> 01:21:56,719

evolution by natural selection and is

2399

01:22:01,910 --> 01:21:58,960

spectacularly successful

2400

01:22:05,910 --> 01:22:01,920

why that theory entails a pragmatic view

2401

01:22:09,669 --> 01:22:07,990

abilities they're all pragmatic not not

2402

01:22:12,709 --> 01:22:09,679

about truth

2403

01:22:14,629 --> 01:22:12,719

and so that's so that's sort of the

2404

01:22:16,149 --> 01:22:14,639

subtlety of of this point of view a lot

2405

01:22:18,470 --> 01:22:16,159

of people will will

2406

01:22:20,709 --> 01:22:18,480

contradict or or you know critique what

2407

01:22:23,990 --> 01:22:20,719

i'm saying on on two counts they'll say

2408

01:22:26,070 --> 01:22:24,000

first how in the world can you

2409

01:22:27,510 --> 01:22:26,080

say that we don't see the truth about

2410

01:22:29,030 --> 01:22:27,520

the world

2411

01:22:30,149 --> 01:22:29,040

do you know what the truth about reality

2412

01:22:31,430 --> 01:22:30,159

is if you don't know what the truth

2413

01:22:31,910 --> 01:22:31,440

about reality is then how could you ever

2414

01:22:34,629 --> 01:22:31,920

know

2415

01:22:35,430 --> 01:22:34,639

that we don't see it okay that's the

2416

01:22:39,270 --> 01:22:35,440

first argument

2417

01:22:41,430 --> 01:22:39,280

and and the reply is

2418

01:22:42,870 --> 01:22:41,440

and this is the power of mathematical

2419

01:22:43,830 --> 01:22:42,880

models like evolution by natural

2420

01:22:46,950 --> 01:22:43,840

selection

2421

01:22:48,790 --> 01:22:46,960

that mathematical model entails that

2422

01:22:49,750 --> 01:22:48,800

whatever the structure of objective

2423

01:22:52,470 --> 01:22:49,760

reality is

2424

01:22:54,149 --> 01:22:52,480

it we don't need to propose that we know

2425

01:22:58,070 --> 01:22:54,159

what the structure objective really is

2426

01:22:59,750 --> 01:22:58,080

whatever it is the probability is zero

2427

01:23:01,110 --> 01:22:59,760

that natural selection would shape us to

2428

01:23:04,070 --> 01:23:01,120

see it

2429

01:23:05,189 --> 01:23:04,080

so the nice thing about that answer is i

2430

01:23:08,629 --> 01:23:05,199

don't need

2431

01:23:10,229 --> 01:23:08,639

to guess or know what objective reality

2432

01:23:11,990 --> 01:23:10,239

is

2433

01:23:13,830 --> 01:23:12,000

to know that evolution by natural

2434

01:23:16,070 --> 01:23:13,840

selection entails

2435

01:23:17,910 --> 01:23:16,080

that whatever the reality is we don't

2436

01:23:20,229 --> 01:23:17,920

see it we don't perceive it

2437

01:23:21,910 --> 01:23:20,239

okay so so that the first objection is

2438

01:23:22,950 --> 01:23:21,920

is a very natural objection by the way

2439

01:23:23,910 --> 01:23:22,960

right how could you know that we don't

2440

01:23:24,470 --> 01:23:23,920

see reality because you don't know

2441

01:23:26,550 --> 01:23:24,480

reality

2442

01:23:27,830 --> 01:23:26,560

is well the answer is the mathematics is

2443

01:23:29,910 --> 01:23:27,840

so sophisticated

2444

01:23:31,669 --> 01:23:29,920

it's allowing you to say that whatever

2445

01:23:34,790 --> 01:23:31,679

reality is you don't see it

2446

01:23:36,390 --> 01:23:34,800

without ever claiming to know what

2447

01:23:38,870 --> 01:23:36,400

reality is

2448

01:23:39,430 --> 01:23:38,880

the the second point then is that you

2449

01:23:43,590 --> 01:23:39,440

know

2450

01:23:46,149 --> 01:23:43,600

you've just said

2451

01:23:48,149 --> 01:23:46,159

that none of our perceptions none of our

2452

01:23:49,350 --> 01:23:48,159

cognitive capacities are about the truth

2453

01:23:51,350 --> 01:23:49,360

and then you try to come up with a model

2454

01:23:53,270 --> 01:23:51,360

of objective reality right this theory

2455

01:23:56,629 --> 01:23:53,280

of conscious agents and so forth

2456

01:23:57,990 --> 01:23:56,639

well and indeed i am and and that's

2457

01:23:59,430 --> 01:23:58,000

because

2458

01:24:01,510 --> 01:23:59,440

i don't take evolution by natural

2459

01:24:03,910 --> 01:24:01,520

selection as the final word

2460

01:24:05,030 --> 01:24:03,920

is just a tool that tool entails a

2461

01:24:07,110 --> 01:24:05,040

pragmatic view

2462

01:24:08,629 --> 01:24:07,120

great that's what that tool entails i

2463

01:24:10,950 --> 01:24:08,639

would like to get a deeper view

2464

01:24:13,189 --> 01:24:10,960

in which consciousness is fundamental

2465

01:24:16,709 --> 01:24:13,199

and from that deep review

2466

01:24:18,470 --> 01:24:16,719

show how space time emerges as

2467

01:24:19,750 --> 01:24:18,480

an interface representation of this

2468

01:24:23,030 --> 01:24:19,760

deeper reality

2469

01:24:26,470 --> 01:24:23,040

and show within that interface why

2470

01:24:28,790 --> 01:24:26,480

the dynamics of this deeper realm looks

2471

01:24:29,990 --> 01:24:28,800

at least in certain cases like evolution

2472

01:24:33,189 --> 01:24:30,000

by natural selection and why

2473

01:24:34,950 --> 01:24:33,199

it looks like the kind of structure that

2474

01:24:38,550 --> 01:24:34,960

we see in evolutionary theory

2475

01:24:42,229 --> 01:24:38,560

so so evolution of natural selection

2476

01:24:44,550 --> 01:24:42,239

will be a constraint on any deeper

2477

01:24:47,189 --> 01:24:44,560

theory of reality that i propose

2478

01:24:48,470 --> 01:24:47,199

any deeper theory when it projects into

2479

01:24:51,270 --> 01:24:48,480

space time

2480

01:24:52,550 --> 01:24:51,280

it better look like general relativity

2481

01:24:54,470 --> 01:24:52,560

quantum field theory

2482

01:24:56,229 --> 01:24:54,480

evolution of natural selection when you

2483

01:24:59,350 --> 01:24:56,239

project it into space time

2484

01:25:01,030 --> 01:24:59,360

or improvements on those theories

2485

01:25:02,390 --> 01:25:01,040

but not less than those theories you

2486

01:25:03,669 --> 01:25:02,400

know it it

2487

01:25:06,629 --> 01:25:03,679

has to explain everything those theories

2488

01:25:09,990 --> 01:25:06,639

explain and more within space time

2489

01:25:10,790 --> 01:25:10,000

so so but and this is maybe subtle for

2490

01:25:12,550 --> 01:25:10,800

those who

2491

01:25:14,790 --> 01:25:12,560

who aren't scientists but this is just

2492

01:25:18,550 --> 01:25:14,800

standard i mean what i'm saying here is

2493

01:25:22,470 --> 01:25:18,560

is just the standard view of scientists

2494

01:25:24,709 --> 01:25:22,480

we take our theories not as the truth

2495

01:25:25,990 --> 01:25:24,719

just the best accounts that we have so

2496

01:25:29,669 --> 01:25:26,000

far the best tools that we have

2497

01:25:30,550 --> 01:25:29,679

so far a good theory will tell you where

2498

01:25:33,830 --> 01:25:30,560

it stops

2499

01:25:35,189 --> 01:25:33,840

where it fails but no no

2500

01:25:37,270 --> 01:25:35,199

and by the way general relativity and

2501

01:25:40,629 --> 01:25:37,280

quantum field theory

2502

01:25:44,310 --> 01:25:40,639

very very clearly tell us that they fail

2503

01:25:46,629 --> 01:25:44,320

that space time itself

2504

01:25:47,669 --> 01:25:46,639

is only an emerging concept it cannot be

2505

01:25:49,510 --> 01:25:47,679

fundamental

2506

01:25:50,950 --> 01:25:49,520

and so the very foundations of quantum

2507

01:25:53,510 --> 01:25:50,960

field theory which is

2508

01:25:55,110 --> 01:25:53,520

fields on space time and the very nature

2509

01:25:58,950 --> 01:25:55,120

of general relativity which is

2510

01:26:03,750 --> 01:26:00,950

can't be fundamental so those theories

2511

01:26:06,550 --> 01:26:03,760

are good enough to tell us

2512

01:26:08,550 --> 01:26:06,560

that despite their successes they're not

2513

01:26:10,790 --> 01:26:08,560

the final answer there's something

2514

01:26:12,870 --> 01:26:10,800

deeper but they can't tell us

2515

01:26:14,390 --> 01:26:12,880

what that deeper thing is and that's

2516

01:26:17,430 --> 01:26:14,400

where the creativity

2517

01:26:18,070 --> 01:26:17,440

of the of the scientific endeavor kicks

2518

01:26:22,149 --> 01:26:18,080

in

2519

01:26:26,390 --> 01:26:22,159

it's up to the scientists to take a leap

2520

01:26:28,390 --> 01:26:26,400

of imagination what deeper notion

2521

01:26:30,709 --> 01:26:28,400

of reality what deeper theoretical

2522

01:26:34,870 --> 01:26:30,719

structures can we come up with

2523

01:26:37,350 --> 01:26:34,880

that would project down

2524

01:26:39,110 --> 01:26:37,360

into what we call space-time and in that

2525

01:26:41,110 --> 01:26:39,120

projection they would look like general

2526
01:26:41,910 --> 01:26:41,120
relativity they would look like quantum

2527
01:26:43,910 --> 01:26:41,920
field therian

2528
01:26:45,430 --> 01:26:43,920
and evolution by natural selection

2529
01:26:46,950 --> 01:26:45,440
what's the deeper dynamics in this

2530
01:26:51,030 --> 01:26:46,960
deeper realm that would project

2531
01:26:53,910 --> 01:26:51,040
into that and so there

2532
01:26:54,790 --> 01:26:53,920
our current theories can only give us

2533
01:26:57,510 --> 01:26:54,800
very very

2534
01:26:58,550 --> 01:26:57,520
loose guidance there's a lot of creative

2535
01:27:00,390 --> 01:26:58,560
imagination

2536
01:27:01,669 --> 01:27:00,400
that then is required to go into this

2537
01:27:03,430 --> 01:27:01,679
deeper realm and

2538
01:27:05,270 --> 01:27:03,440

and that's where the most creative

2539

01:27:09,910 --> 01:27:05,280

scientists of course want to go

2540

01:27:12,870 --> 01:27:09,920

it's it's great fun when we find a hole

2541

01:27:13,750 --> 01:27:12,880

in our current theories and get the

2542

01:27:16,310 --> 01:27:13,760

chance

2543

01:27:18,390 --> 01:27:16,320

to discover something new and so that's

2544

01:27:19,990 --> 01:27:18,400

that's the fun part of it now when it

2545

01:27:22,070 --> 01:27:20,000

comes to space and time i've heard you

2546

01:27:24,790 --> 01:27:22,080

describe it as a data compression tool

2547

01:27:27,430 --> 01:27:24,800

for us conscious agents

2548

01:27:28,950 --> 01:27:27,440

why do we need as conscious agents data

2549

01:27:31,990 --> 01:27:28,960

compression why is there a limit to how

2550

01:27:33,350 --> 01:27:32,000

much we can process

2551

01:27:35,590 --> 01:27:33,360

well that's going to be a very

2552

01:27:38,310 --> 01:27:35,600

interesting

2553

01:27:39,270 --> 01:27:38,320

thing for this deeper theory to to try

2554

01:27:42,629 --> 01:27:39,280

to explain

2555

01:27:46,070 --> 01:27:42,639

why is there this limit it

2556

01:27:50,550 --> 01:27:46,080

it may be that all conscious

2557

01:27:57,030 --> 01:27:51,990

and that's one theory that i'm playing

2558

01:28:00,950 --> 01:27:59,430

the realm of conscious agents may be

2559

01:28:03,750 --> 01:28:00,960

such that

2560

01:28:06,070 --> 01:28:03,760

there is no bound to the complexity that

2561

01:28:08,870 --> 01:28:06,080

a conscious agent can have

2562

01:28:11,669 --> 01:28:08,880

but it's but it's always finite so it's

2563

01:28:13,669 --> 01:28:11,679

as big as you wish but but always finite

2564

01:28:15,110 --> 01:28:13,679

and in which case no matter how complex

2565

01:28:17,990 --> 01:28:15,120

you are compared

2566

01:28:19,669 --> 01:28:18,000

to all the possible complexity your

2567

01:28:20,870 --> 01:28:19,679

measure zero your probability zero right

2568

01:28:24,709 --> 01:28:20,880

you have

2569

01:28:28,629 --> 01:28:24,719

so so in that sense

2570

01:28:29,189 --> 01:28:28,639

if but but there may be a really really

2571

01:28:35,110 --> 01:28:29,199

deep

2572

01:28:41,350 --> 01:28:39,110

may be taking these

2573

01:28:43,110 --> 01:28:41,360

dividing itself into sort of

2574

01:28:44,550 --> 01:28:43,120

subconsciousnesses which are sort of

2575

01:28:46,629 --> 01:28:44,560

different perspectives

2576

01:28:48,629 --> 01:28:46,639

that are looking at the whole and these

2577

01:28:50,390 --> 01:28:48,639

different perspectives would necessarily

2578

01:28:52,229 --> 01:28:50,400

then have limited

2579

01:28:54,229 --> 01:28:52,239

information about the whole they'll only

2580

01:28:55,189 --> 01:28:54,239

be able to see through an interface but

2581

01:28:57,590 --> 01:28:55,199

necessarily

2582

01:28:58,950 --> 01:28:57,600

right this is it's sort of the kind of

2583

01:29:02,870 --> 01:28:58,960

thing like right

2584

01:29:05,110 --> 01:29:02,880

in the twitterverse i can

2585

01:29:06,390 --> 01:29:05,120

it's a there's tens of millions of users

2586

01:29:07,990 --> 01:29:06,400

billions of tweets

2587

01:29:09,990 --> 01:29:08,000

i could talk with one or two twitter

2588

01:29:12,470 --> 01:29:10,000

users extensively and

2589

01:29:13,990 --> 01:29:12,480

follow all of their tweets maybe if i

2590

01:29:15,990 --> 01:29:14,000

really into it maybe

2591

01:29:17,830 --> 01:29:16,000

a hundred of them and follow all their

2592

01:29:20,709 --> 01:29:17,840

tweets but there's

2593

01:29:22,149 --> 01:29:20,719

10 million or more twitter users so i ca

2594

01:29:24,709 --> 01:29:22,159

there's no way

2595

01:29:25,830 --> 01:29:24,719

there's absolutely no way so if i want

2596

01:29:29,270 --> 01:29:25,840

to get a

2597

01:29:30,709 --> 01:29:29,280

feel for what's happening in general in

2598

01:29:31,990 --> 01:29:30,719

the twitterverse

2599

01:29:34,070 --> 01:29:32,000

i'm going to need to have some kind of

2600

01:29:34,550 --> 01:29:34,080

data compression tool some visualization

2601
01:29:36,550 --> 01:29:34,560
tool

2602
01:29:37,990 --> 01:29:36,560
right we see this all the time whenever

2603
01:29:41,350 --> 01:29:38,000
whenever there's big

2604
01:29:43,110 --> 01:29:41,360
social media data we use visualization

2605
01:29:45,669 --> 01:29:43,120
tools to see what's going on

2606
01:29:48,149 --> 01:29:45,679
and that's what i think space time is

2607
01:29:50,470 --> 01:29:48,159
space time

2608
01:29:53,189 --> 01:29:50,480
is our headset we've mistaken the

2609
01:29:55,590 --> 01:29:53,199
headset for reality we've assumed that

2610
01:29:57,030 --> 01:29:55,600
space and time are fundamental or space

2611
01:29:58,390 --> 01:29:57,040
time is fundamental

2612
01:30:00,550 --> 01:29:58,400
we've assumed that that's subjective

2613
01:30:02,950 --> 01:30:00,560

reality and it's just a rookie mistake

2614

01:30:03,830 --> 01:30:02,960

it's our headset it's our visualization

2615

01:30:06,790 --> 01:30:03,840

tool

2616

01:30:08,790 --> 01:30:06,800

and what what's behind it is this vast

2617

01:30:11,669 --> 01:30:08,800

network of other conscious agents

2618

01:30:13,590 --> 01:30:11,679

now it's one thing for me to say this it

2619

01:30:16,470 --> 01:30:13,600

sounds you know

2620

01:30:18,149 --> 01:30:16,480

interesting but where's the beef and

2621

01:30:19,270 --> 01:30:18,159

where the beef is going to have to come

2622

01:30:21,990 --> 01:30:19,280

from

2623

01:30:23,830 --> 01:30:22,000

is a precise mathematical description of

2624

01:30:26,709 --> 01:30:23,840

the dynamics of conscious agents

2625

01:30:27,750 --> 01:30:26,719

so it's for those interested in the math

2626

01:30:31,430 --> 01:30:27,760

it's

2627

01:30:32,950 --> 01:30:31,440

theory

2628

01:30:34,790 --> 01:30:32,960

so the kind of stuff that you use when

2629

01:30:37,990 --> 01:30:34,800

you're studying like the internet and

2630

01:30:39,189 --> 01:30:38,000

um the dynamics of information flow on

2631

01:30:40,629 --> 01:30:39,199

the internet and so forth there's that

2632

01:30:43,669 --> 01:30:40,639

kind of mathematics

2633

01:30:44,870 --> 01:30:43,679

so it's it's it's proposing a specific

2634

01:30:48,070 --> 01:30:44,880

mathematical dynamics

2635

01:30:50,470 --> 01:30:48,080

on a network of conscious agents

2636

01:30:52,149 --> 01:30:50,480

then the way i think it'll go is that

2637

01:30:55,270 --> 01:30:52,159

the asymptotic behavior

2638

01:30:57,510 --> 01:30:55,280

of that dynamics which is that

2639

01:30:58,470 --> 01:30:57,520

that just means you can't see every

2640

01:30:59,750 --> 01:30:58,480

single tweet

2641

01:31:01,669 --> 01:30:59,760

you can't interact with every single

2642

01:31:02,550 --> 01:31:01,679

user but you can see the long-term

2643

01:31:03,990 --> 01:31:02,560

trends

2644

01:31:05,910 --> 01:31:04,000

what are the things that are trending

2645

01:31:07,430 --> 01:31:05,920

long-term what are the big

2646

01:31:09,110 --> 01:31:07,440

picture kinds of that's what i mean by

2647

01:31:11,030 --> 01:31:09,120

the asymptotics what what happens

2648

01:31:12,629 --> 01:31:11,040

if you look at it over a long period of

2649

01:31:14,310 --> 01:31:12,639

time what are the like the patterns over

2650

01:31:18,790 --> 01:31:14,320

a long period of time

2651

01:31:21,990 --> 01:31:18,800

and i think that that is

2652

01:31:24,310 --> 01:31:22,000

what is behind space time and and in

2653

01:31:25,750 --> 01:31:24,320

modern physics what they're seeing what

2654

01:31:28,830 --> 01:31:25,760

with the physicists right now

2655

01:31:30,310 --> 01:31:28,840

when they try to get structures beyond

2656

01:31:31,510 --> 01:31:30,320

space-time

2657

01:31:33,430 --> 01:31:31,520

you know they're trying to take the next

2658

01:31:35,030 --> 01:31:33,440

step beyond space-time

2659

01:31:37,510 --> 01:31:35,040

they they are seeing some interesting

2660

01:31:40,070 --> 01:31:37,520

structures called positive geometries

2661

01:31:42,390 --> 01:31:40,080

amplitude sociohedra and so forth these

2662

01:31:44,310 --> 01:31:42,400

positive geometries

2663

01:31:46,550 --> 01:31:44,320

i want the direction i'm going is to

2664

01:31:48,870 --> 01:31:46,560

show that those positive geometry

2665

01:31:51,830 --> 01:31:48,880

structures that they're coming up with

2666

01:31:53,510 --> 01:31:51,840

are representations of the asymptotic

2667

01:31:55,990 --> 01:31:53,520

behavior

2668

01:31:57,110 --> 01:31:56,000

of this dynamics of conscious agents and

2669

01:31:58,790 --> 01:31:57,120

if i can do that

2670

01:32:00,470 --> 01:31:58,800

then i will be able to use their work

2671

01:32:01,590 --> 01:32:00,480

and pull the thread all the way from a

2672

01:32:02,629 --> 01:32:01,600

theory of conscious agents and their

2673

01:32:05,350 --> 01:32:02,639

dynamics

2674

01:32:06,950 --> 01:32:05,360

through the asymptotics of that into

2675

01:32:07,750 --> 01:32:06,960

these positive geometries that they

2676

01:32:09,350 --> 01:32:07,760

found

2677

01:32:12,470 --> 01:32:09,360

and then they tell you how to go from

2678

01:32:14,709 --> 01:32:12,480

that to the actual

2679

01:32:16,550 --> 01:32:14,719

prediction of scattering events like at

2680

01:32:18,709 --> 01:32:16,560

the large hadron collider

2681

01:32:20,790 --> 01:32:18,719

so that's my goal the beef will be if i

2682

01:32:22,470 --> 01:32:20,800

can start with a theory of consciousness

2683

01:32:23,910 --> 01:32:22,480

look at it at its asymptotics and show

2684

01:32:25,430 --> 01:32:23,920

that the asymptotics of that theory

2685

01:32:26,709 --> 01:32:25,440

consciousness

2686

01:32:28,550 --> 01:32:26,719

through this route that the physicists

2687

01:32:29,750 --> 01:32:28,560

have found already leads to the

2688

01:32:31,430 --> 01:32:29,760

scattering amplitudes

2689

01:32:33,270 --> 01:32:31,440

that we can then test at the at the

2690

01:32:34,790 --> 01:32:33,280

large hadron collider that's where we

2691

01:32:36,390 --> 01:32:34,800

have the beef

2692

01:32:38,149 --> 01:32:36,400

space and time aren't fundamental in

2693

01:32:41,430 --> 01:32:38,159

your theory

2694

01:32:42,870 --> 01:32:41,440

is cause it's causality fundamental um

2695

01:32:44,790 --> 01:32:42,880

certainly not causality in space and

2696

01:32:46,229 --> 01:32:44,800

time right so when we think about

2697

01:32:49,030 --> 01:32:46,239

causality

2698

01:32:50,470 --> 01:32:49,040

we think about for example the um the

2699

01:32:53,110 --> 01:32:50,480

cue ball hitting the eight ball and

2700

01:32:54,790 --> 01:32:53,120

making a crane into the corner pocket

2701

01:32:57,669 --> 01:32:54,800

and or we think about

2702

01:33:00,550 --> 01:32:57,679

uh neurons in the brain causing our

2703

01:33:05,110 --> 01:33:00,560

behaviors and causing our experiences

2704

01:33:08,550 --> 01:33:05,120

and and so i flat out deny

2705

01:33:12,390 --> 01:33:08,560

that anything in space-time

2706

01:33:14,229 --> 01:33:12,400

has any causal powers can you help me

2707

01:33:16,149 --> 01:33:14,239

something i'm working on is a definition

2708

01:33:19,990 --> 01:33:16,159

of causality it turns out it's extremely

2709

01:33:23,830 --> 01:33:22,390

it's intuitive the closer you look the

2710

01:33:25,990 --> 01:33:23,840

more slippery it gets

2711

01:33:27,669 --> 01:33:26,000

how are you defining causality in your

2712

01:33:29,990 --> 01:33:27,679

theory

2713

01:33:31,110 --> 01:33:30,000

so you're absolutely right in fact there

2714

01:33:33,430 --> 01:33:31,120

are there's the

2715

01:33:34,149 --> 01:33:33,440

what there's there's a handbook of

2716

01:33:36,310 --> 01:33:34,159

causality

2717

01:33:37,830 --> 01:33:36,320

a bunch of philosophers and and others

2718

01:33:39,189 --> 01:33:37,840

talking about causality of the oxford

2719

01:33:40,390 --> 01:33:39,199

handbook of causality or something like

2720

01:33:44,629 --> 01:33:40,400

that

2721

01:33:48,149 --> 01:33:44,639

if you read through it there are

2722

01:33:51,830 --> 01:33:48,159

many many different views on causality

2723

01:33:54,390 --> 01:33:51,840

and there is no agreed upon

2724

01:33:56,790 --> 01:33:54,400

universal definition of causality

2725

01:33:59,990 --> 01:33:56,800

mathematically

2726

01:34:02,709 --> 01:34:00,000

in computer science when we

2727

01:34:04,229 --> 01:34:02,719

when we talk about causality some of the

2728

01:34:05,990 --> 01:34:04,239

best work there

2729

01:34:08,390 --> 01:34:06,000

is based on the notion of directed

2730

01:34:11,430 --> 01:34:08,400

acyclic graphs

2731

01:34:14,709 --> 01:34:11,440

judea pearl professor at ucla

2732

01:34:18,629 --> 01:34:14,719

and his students and many collaborators

2733

01:34:20,470 --> 01:34:18,639

have been modeling causality

2734

01:34:22,870 --> 01:34:20,480

whatever it is as directed acyclic

2735

01:34:24,790 --> 01:34:22,880

graphs but i think that even judea pearl

2736

01:34:26,390 --> 01:34:24,800

um doesn't hazard definition of

2737

01:34:29,510 --> 01:34:26,400

causality right

2738

01:34:31,590 --> 01:34:29,520

he it's it's much like how do you define

2739

01:34:34,950 --> 01:34:31,600

if you're in geometry how do you define

2740

01:34:36,470 --> 01:34:34,960

a point well it's it's sort of a

2741

01:34:39,669 --> 01:34:36,480

primitive concept you

2742

01:34:41,990 --> 01:34:39,679

you but two of them make a line right

2743

01:34:42,950 --> 01:34:42,000

two of them define a line and so you

2744

01:34:45,109 --> 01:34:42,960

start

2745

01:34:47,270 --> 01:34:45,119

so for for many scientific theories the

2746

01:34:50,070 --> 01:34:47,280

notion of causality

2747

01:34:51,030 --> 01:34:50,080

is a primitive it's a place where

2748

01:34:54,070 --> 01:34:51,040

explanation

2749

01:34:57,189 --> 01:34:54,080

stops and

2750

01:34:59,590 --> 01:34:57,199

and that's not a unique problem to the

2751

01:35:03,590 --> 01:34:59,600

notion of causality

2752

01:35:07,189 --> 01:35:06,310

must stop at some point it can't explain

2753

01:35:09,830 --> 01:35:07,199

everything

2754

01:35:11,430 --> 01:35:09,840

there will be some primitive notions and

2755

01:35:13,270 --> 01:35:11,440

this is unavoidable

2756

01:35:14,629 --> 01:35:13,280

so there are no scientific theories that

2757

01:35:17,270 --> 01:35:14,639

explain everything

2758

01:35:18,310 --> 01:35:17,280

every scientific theory will have some

2759

01:35:20,550 --> 01:35:18,320

handful

2760

01:35:22,149 --> 01:35:20,560

hopefully as small as possible of

2761

01:35:24,709 --> 01:35:22,159

primitive notions

2762

01:35:26,950 --> 01:35:24,719

that where you just say you know like if

2763

01:35:28,390 --> 01:35:26,960

you have a little kid that says but what

2764

01:35:30,070 --> 01:35:28,400

why is that you tell them and say but

2765

01:35:32,070 --> 01:35:30,080

but how come that and then so

2766

01:35:33,990 --> 01:35:32,080

at some point you just say it it just is

2767

01:35:36,310 --> 01:35:34,000

right your theory just stops and says

2768

01:35:38,629 --> 01:35:36,320

that's just the way it is and so so for

2769

01:35:39,750 --> 01:35:38,639

causality

2770

01:35:42,229 --> 01:35:39,760

we you know we tend to think of

2771

01:35:45,669 --> 01:35:42,239

causality well

2772

01:35:47,830 --> 01:35:45,679

if i can intervene in

2773

01:35:48,790 --> 01:35:47,840

some system and then change things

2774

01:35:50,870 --> 01:35:48,800

change

2775

01:35:52,950 --> 01:35:50,880

as a result of my intervention that's a

2776

01:35:56,390 --> 01:35:52,960

proof of causality

2777

01:36:00,470 --> 01:35:56,400

but that turns out not to work um

2778

01:36:02,550 --> 01:36:00,480

you can get counter examples to that um

2779

01:36:04,229 --> 01:36:02,560

what about causes always perceive their

2780

01:36:07,430 --> 01:36:04,239

facts well

2781

01:36:09,350 --> 01:36:07,440

you can have you can

2782

01:36:11,590 --> 01:36:09,360

set up thought experiments where that

2783

01:36:13,109 --> 01:36:11,600

where the the effects

2784

01:36:15,430 --> 01:36:13,119

um don't perceive the causes but where

2785

01:36:16,709 --> 01:36:15,440

there's yes right so that's the reason

2786

01:36:18,390 --> 01:36:16,719

why

2787

01:36:20,870 --> 01:36:18,400

i forget the person's name pearl you

2788

01:36:23,189 --> 01:36:20,880

mentioned jay pearl right

2789

01:36:24,070 --> 01:36:23,199

that's why he said acyclic because he

2790

01:36:26,470 --> 01:36:24,080

doesn't want

2791

01:36:28,470 --> 01:36:26,480

the causes to proceed effect or because

2792

01:36:31,510 --> 01:36:28,480

he doesn't want it to

2793

01:36:32,790 --> 01:36:31,520

to get to some place where you cause

2794

01:36:34,709 --> 01:36:32,800

yourself

2795

01:36:36,229 --> 01:36:34,719

right yeah once once you get cycles it

2796

01:36:37,109 --> 01:36:36,239

gets pretty complicated and the notion

2797

01:36:39,270 --> 01:36:37,119

of causality

2798

01:36:40,950 --> 01:36:39,280

would start to slip through your fingers

2799

01:36:43,750 --> 01:36:40,960

things where you were in everyday life

2800

01:36:46,070 --> 01:36:43,760

you see cycles

2801
01:36:46,950 --> 01:36:46,080
you can you can unwrap them as an ever

2802
01:36:49,590 --> 01:36:46,960
extending

2803
01:36:51,109 --> 01:36:49,600
directed acyclic graph so you can just

2804
01:36:52,870 --> 01:36:51,119
take the time parameter instead of

2805
01:36:54,550 --> 01:36:52,880
cycling back you go to new states

2806
01:36:57,830 --> 01:36:54,560
downward so

2807
01:36:58,870 --> 01:36:57,840
ways to to avoid cycles even in what we

2808
01:37:01,910 --> 01:36:58,880
in everyday life

2809
01:37:02,790 --> 01:37:01,920
think of as as cyclic behavior so i

2810
01:37:05,990 --> 01:37:02,800
would say that

2811
01:37:10,629 --> 01:37:06,000
causality you're you're right to pick

2812
01:37:12,070 --> 01:37:10,639
on it it's the the best and brightest

2813
01:37:13,830 --> 01:37:12,080

when i look at i think it's the oxford

2814

01:37:16,550 --> 01:37:13,840

handbook of causality

2815

01:37:17,270 --> 01:37:16,560

wonderful articles brilliant thinkers

2816

01:37:20,310 --> 01:37:17,280

and they

2817

01:37:22,790 --> 01:37:20,320

disagree they don't know so there's no

2818

01:37:24,550 --> 01:37:22,800

received opinion about what causality is

2819

01:37:32,830 --> 01:37:24,560

and is there one that you feel like

2820

01:37:32,840 --> 01:37:36,310

um

2821

01:37:42,550 --> 01:37:39,350

i'll tell you why i asked all these

2822

01:37:43,830 --> 01:37:42,560

yeah all the ones i saw there um i think

2823

01:37:44,950 --> 01:37:43,840

that they all were were touching

2824

01:37:47,910 --> 01:37:44,960

different parts of

2825

01:37:48,709 --> 01:37:47,920

the elephant in interesting ways right

2826

01:37:52,070 --> 01:37:48,719

but but that

2827

01:37:54,550 --> 01:37:52,080

um it may be that ultimately causality

2828

01:37:57,750 --> 01:37:54,560

is one of these primitives like points

2829

01:38:04,629 --> 01:38:01,750

okay when you say that reality is

2830

01:38:08,070 --> 01:38:04,639

innately objective

2831

01:38:09,430 --> 01:38:08,080

so there's the w the world state x g

2832

01:38:11,109 --> 01:38:09,440

experience so that's like the conscious

2833

01:38:13,430 --> 01:38:11,119

agent then

2834

01:38:14,470 --> 01:38:13,440

i assume what you're saying is objective

2835

01:38:18,550 --> 01:38:14,480

reality is the w

2836

01:38:20,950 --> 01:38:18,560

the world state and the agents right

2837

01:38:21,590 --> 01:38:20,960

then later you do this i love this you

2838

01:38:23,590 --> 01:38:21,600

then take

2839

01:38:26,070 --> 01:38:23,600

well w could also be composed of

2840

01:38:28,229 --> 01:38:26,080

different conscious agents

2841

01:38:29,990 --> 01:38:28,239

and then we can have a string of them

2842

01:38:32,629 --> 01:38:30,000

why are you calling that

2843

01:38:33,590 --> 01:38:32,639

objective to me and this just might be

2844

01:38:35,350 --> 01:38:33,600

semantics

2845

01:38:37,430 --> 01:38:35,360

i hear that as subjective given that

2846

01:38:39,590 --> 01:38:37,440

it's a conscious agent

2847

01:38:41,030 --> 01:38:39,600

that is it's a subject all the way

2848

01:38:42,709 --> 01:38:41,040

through the chain

2849

01:38:44,550 --> 01:38:42,719

right if it was just if you were like

2850

01:38:45,590 --> 01:38:44,560

hey there's one world or there's a few

2851

01:38:47,270 --> 01:38:45,600

but w

2852

01:38:48,870 --> 01:38:47,280

is not dependent on other causal

2853

01:38:50,550 --> 01:38:48,880

necessary conscious agents

2854

01:38:52,149 --> 01:38:50,560

then i could see using the term

2855

01:38:52,709 --> 01:38:52,159

objective why is it that you still use

2856

01:38:56,310 --> 01:38:52,719

the term

2857

01:39:00,950 --> 01:38:56,320

objective when we can extend the graph

2858

01:39:03,990 --> 01:39:00,960

to just conscious agents right so

2859

01:39:07,830 --> 01:39:04,000

so the the proposal is

2860

01:39:11,270 --> 01:39:07,840

that what the universe is

2861

01:39:13,590 --> 01:39:11,280

fundamentally is a vast network of

2862

01:39:15,270 --> 01:39:13,600

interacting conscious agents

2863

01:39:17,350 --> 01:39:15,280

so when i say that that's the objective

2864

01:39:21,189 --> 01:39:17,360

truth of course each agent is a subject

2865

01:39:24,310 --> 01:39:21,199

right each agent is a conscious entity

2866

01:39:27,430 --> 01:39:24,320

but what i'm saying is that even

2867

01:39:30,950 --> 01:39:27,440

when i'm asleep the network

2868

01:39:32,790 --> 01:39:30,960

still exists that's all so even if i'm

2869

01:39:34,390 --> 01:39:32,800

sound asleep and i'm not having any

2870

01:39:35,189 --> 01:39:34,400

conscious experiences or anything like

2871

01:39:38,229 --> 01:39:35,199

that

2872

01:39:41,109 --> 01:39:38,239

right now

2873

01:39:42,229 --> 01:39:41,119

the that that network of conscious

2874

01:39:45,109 --> 01:39:42,239

agents

2875

01:39:47,510 --> 01:39:45,119

is just like a twitter user right um

2876

01:39:49,750 --> 01:39:47,520

whether or not i happen to be

2877

01:39:51,030 --> 01:39:49,760

reading tweets or sending tweets the

2878

01:39:53,030 --> 01:39:51,040

twitterverse exists

2879

01:39:55,350 --> 01:39:53,040

it's out there even though really the

2880

01:39:58,350 --> 01:39:55,360

twitter verse is just a bunch of other

2881

01:39:59,510 --> 01:39:58,360

subjects people people tweeting

2882

01:40:03,030 --> 01:39:59,520

intersubjectivity

2883

01:40:05,830 --> 01:40:03,040

implies the objectivity that's right

2884

01:40:07,109 --> 01:40:05,840

and and and specifically the fact that

2885

01:40:11,990 --> 01:40:07,119

it's

2886

01:40:13,669 --> 01:40:12,000

it still exists even if i

2887

01:40:15,669 --> 01:40:13,679

don't perceive it okay we're going to

2888

01:40:17,189 --> 01:40:15,679

get philosophical there

2889

01:40:19,350 --> 01:40:17,199

i was going to get to this later but now

2890

01:40:21,270 --> 01:40:19,360

that we're here how

2891

01:40:23,350 --> 01:40:21,280

what's the i in this conscious agent

2892

01:40:25,990 --> 01:40:23,360

model right

2893

01:40:27,990 --> 01:40:26,000

so in the conscious agent model the

2894

01:40:31,430 --> 01:40:28,000

notion of a self

2895

01:40:33,270 --> 01:40:31,440

is not fundamental so conscious agents

2896

01:40:35,189 --> 01:40:33,280

are just these mathematical structures

2897

01:40:38,310 --> 01:40:35,199

that have experiences

2898

01:40:39,430 --> 01:40:38,320

i'll make decisions and then act on

2899

01:40:41,350 --> 01:40:39,440

those decisions

2900

01:40:42,550 --> 01:40:41,360

but the notion of a self is not

2901
01:40:45,430 --> 01:40:42,560
fundamental

2902
01:40:46,950 --> 01:40:45,440
a self is something that a network of

2903
01:40:51,590 --> 01:40:46,960
conscious agents can build

2904
01:40:53,590 --> 01:40:51,600
so it can be a an experience

2905
01:40:56,070 --> 01:40:53,600
dead okay i might stop you every once in

2906
01:40:57,830 --> 01:40:56,080
a while to clarify just for myself

2907
01:40:59,189 --> 01:40:57,840
you're saying that a self is a

2908
01:41:01,510 --> 01:40:59,199
conglomeration of

2909
01:41:04,149 --> 01:41:01,520
conscious agents it's a data structure

2910
01:41:05,910 --> 01:41:04,159
that they build

2911
01:41:07,669 --> 01:41:05,920
does that mean that right now i'm

2912
01:41:10,149 --> 01:41:07,679
talking to donald

2913
01:41:11,270 --> 01:41:10,159

you're not one conscious agent i'm

2914

01:41:15,270 --> 01:41:11,280

speaking to

2915

01:41:18,070 --> 01:41:15,280

quite a few uh probably a countless

2916

01:41:19,510 --> 01:41:18,080

collection of countries uncountable well

2917

01:41:21,430 --> 01:41:19,520

i don't know if it's uncountable but

2918

01:41:23,430 --> 01:41:21,440

i certainly couldn't count them but as

2919

01:41:24,470 --> 01:41:23,440

you know uncountable as a technical term

2920

01:41:25,669 --> 01:41:24,480

in mathematics so i just want to make

2921

01:41:27,830 --> 01:41:25,679

sure people

2922

01:41:29,350 --> 01:41:27,840

who know that i'm not saying it is

2923

01:41:31,270 --> 01:41:29,360

uncountable in that sense it may be but

2924

01:41:32,790 --> 01:41:31,280

i'm not claiming that um

2925

01:41:35,189 --> 01:41:32,800

but it's it's certainly not countable by

2926

01:41:38,790 --> 01:41:35,199

me so the idea is that you'll

2927

01:41:40,390 --> 01:41:38,800

for example we know that

2928

01:41:41,830 --> 01:41:40,400

there are at least two different

2929

01:41:45,030 --> 01:41:41,840

subjects

2930

01:41:46,950 --> 01:41:45,040

in in me we can see that if i take a

2931

01:41:49,430 --> 01:41:46,960

knife and cut the corpus callosum

2932

01:41:50,470 --> 01:41:49,440

which which um i have a left hemisphere

2933

01:41:52,310 --> 01:41:50,480

in the right hemisphere

2934

01:41:54,149 --> 01:41:52,320

you do too there's a band of fibers

2935

01:41:57,270 --> 01:41:54,159

called the core hopefully i do

2936

01:41:59,750 --> 01:41:57,280

yeah and sometimes i wonder

2937

01:42:01,270 --> 01:41:59,760

where's there 225 million fibers and if

2938

01:42:02,390 --> 01:42:01,280

you cut those fibers it turns out you

2939

01:42:05,510 --> 01:42:02,400

can actually

2940

01:42:07,270 --> 01:42:05,520

get clear evidence in a few people that

2941

01:42:10,310 --> 01:42:07,280

this has been done with

2942

01:42:11,350 --> 01:42:10,320

that there's a different personality in

2943

01:42:11,990 --> 01:42:11,360

the left hemisphere than the right

2944

01:42:17,270 --> 01:42:12,000

hemisphere

2945

01:42:19,430 --> 01:42:17,280

an atheist

2946

01:42:21,189 --> 01:42:19,440

the left hemisphere wanted to be have a

2947

01:42:22,709 --> 01:42:21,199

desk job the right hemisphere wanted to

2948

01:42:24,950 --> 01:42:22,719

be a race car driver

2949

01:42:26,550 --> 01:42:24,960

and they can even fight the the left

2950

01:42:27,910 --> 01:42:26,560

hemisphere controls the right hand

2951

01:42:30,229 --> 01:42:27,920

the right hemisphere controls the left

2952

01:42:30,950 --> 01:42:30,239

hand and the they can fight the left

2953

01:42:32,950 --> 01:42:30,960

hand can be

2954

01:42:34,470 --> 01:42:32,960

fighting what the right hand is doing

2955

01:42:36,550 --> 01:42:34,480

you know trying to cook

2956

01:42:37,669 --> 01:42:36,560

the the left hand might destroy an

2957

01:42:39,189 --> 01:42:37,679

omelet that you're making

2958

01:42:40,550 --> 01:42:39,199

you try to put on some clothes the left

2959

01:42:42,390 --> 01:42:40,560

hand might be taking off the clothes the

2960

01:42:45,350 --> 01:42:42,400

right hand is trying to put on

2961

01:42:46,709 --> 01:42:45,360

so these two different consciousnesses

2962

01:42:48,629 --> 01:42:46,719

and i'm saying the

2963

01:42:50,550 --> 01:42:48,639

tip of an iceberg there's this whole

2964

01:42:53,910 --> 01:42:50,560

lattice of conscious agents that

2965

01:42:57,990 --> 01:42:53,920

that together um cooperate

2966

01:43:02,070 --> 01:42:58,000

to create um the the conscious age

2967

01:43:04,390 --> 01:43:02,080

that's me but but the self that i have

2968

01:43:05,750 --> 01:43:04,400

the the sense of of myself with my

2969

01:43:09,270 --> 01:43:05,760

personal history and so forth

2970

01:43:11,750 --> 01:43:09,280

is a data structure that i create okay i

2971

01:43:12,870 --> 01:43:11,760

you know i i feel like i'm slipping up

2972

01:43:14,310 --> 01:43:12,880

because i don't know

2973

01:43:16,310 --> 01:43:14,320

and this is another one by the way

2974

01:43:17,830 --> 01:43:16,320

causality is elusive identity

2975

01:43:19,750 --> 01:43:17,840

is also one of those where the closer

2976

01:43:23,350 --> 01:43:19,760

you look the more

2977

01:43:26,629 --> 01:43:23,360

liquid liquid it gets are you using

2978

01:43:29,990 --> 01:43:26,639

self and identity synonymously

2979

01:43:32,229 --> 01:43:30,000

well so no

2980

01:43:33,830 --> 01:43:32,239

so i'm thinking about self in the

2981

01:43:34,550 --> 01:43:33,840

colloquial sense that we most of you

2982

01:43:37,350 --> 01:43:34,560

know think about

2983

01:43:38,870 --> 01:43:37,360

you know i am so and so here's my name

2984

01:43:40,950 --> 01:43:38,880

this is my personal history

2985

01:43:42,870 --> 01:43:40,960

this is what's important to me this is

2986

01:43:47,350 --> 01:43:42,880

my goals and so

2987

01:43:51,590 --> 01:43:49,189

self that we that we that we experience

2988

01:43:54,229 --> 01:43:51,600

ourselves the thing that we're afraid of

2989

01:43:55,109 --> 01:43:54,239

losing in death and so forth right that

2990

01:44:05,189 --> 01:43:55,119

that

2991

01:44:07,189 --> 01:44:05,199

data structure yes

2992

01:44:08,390 --> 01:44:07,199

that's right okay sorry continue at

2993

01:44:11,750 --> 01:44:08,400

least in this theory

2994

01:44:13,109 --> 01:44:11,760

that i'm working on um and i can explain

2995

01:44:17,109 --> 01:44:13,119

why we're going that direction if you

2996

01:44:20,229 --> 01:44:17,119

want but but but the notion of a self

2997

01:44:21,350 --> 01:44:20,239

right so there's certain views of the

2998

01:44:24,550 --> 01:44:21,360

self that it's

2999

01:44:25,189 --> 01:44:24,560

um there's no such thing as a persisting

3000

01:44:26,950 --> 01:44:25,199

self

3001

01:44:28,790 --> 01:44:26,960

but this like this is called the pearl

3002

01:44:31,750 --> 01:44:28,800

view it's like the number of pearls on

3003

01:44:33,109 --> 01:44:31,760

a string so there's a pearl a different

3004

01:44:35,669 --> 01:44:33,119

instantiation of the self

3005

01:44:36,390 --> 01:44:35,679

at each moment along this string so

3006

01:44:38,149 --> 01:44:36,400

there are certain

3007

01:44:39,669 --> 01:44:38,159

eastern mystical traditions but also

3008

01:44:41,830 --> 01:44:39,679

certain western philosophers

3009

01:44:43,350 --> 01:44:41,840

who take this this point of view that

3010

01:44:44,550 --> 01:44:43,360

this there's not you don't have one

3011

01:44:47,750 --> 01:44:44,560

persisting self

3012

01:44:50,870 --> 01:44:47,760

but you have a sequence of cells and so

3013

01:44:52,629 --> 01:44:50,880

william james point of view um but

3014

01:44:54,070 --> 01:44:52,639

but the the pearl analogy would imply

3015

01:44:55,030 --> 01:44:54,080

that there's a continuum there's a

3016

01:44:59,510 --> 01:44:55,040

string

3017

01:45:03,270 --> 01:44:59,520

said the thought itself

3018

01:45:05,030 --> 01:45:03,280

is the thinker um which is interesting i

3019

01:45:07,030 --> 01:45:05,040

don't know exactly what james means by

3020

01:45:10,470 --> 01:45:07,040

that but he was saying that there's no

3021

01:45:14,950 --> 01:45:10,480

there's no thinker no self

3022

01:45:17,109 --> 01:45:14,960

beyond the occurring thought right now

3023

01:45:18,629 --> 01:45:17,119

but the but the thought itself is

3024

01:45:21,590 --> 01:45:18,639

creating the illusion

3025

01:45:22,470 --> 01:45:21,600

of a persisting thinker of a persisting

3026

01:45:24,229 --> 01:45:22,480

self

3027

01:45:25,669 --> 01:45:24,239

now many western religions on the other

3028

01:45:27,109 --> 01:45:25,679

hand will take

3029

01:45:28,709 --> 01:45:27,119

just the opposite point of view they'll

3030

01:45:30,550 --> 01:45:28,719

say there's a

3031

01:45:33,990 --> 01:45:30,560

there is of course a self and it's

3032

01:45:35,270 --> 01:45:34,000

eternal and what you do here

3033

01:45:37,590 --> 01:45:35,280

determines whether that self will go to

3034

01:45:40,070 --> 01:45:37,600

heaven or to hell or something like that

3035

01:45:41,750 --> 01:45:40,080

so so so you can see there's a lot

3036

01:45:43,430 --> 01:45:41,760

riding on this notion of self and there

3037

01:45:46,950 --> 01:45:43,440

are widely differing

3038

01:45:48,709 --> 01:45:46,960

points of view and the reason in

3039

01:45:50,390 --> 01:45:48,719

in my theory that i've been working by

3040

01:45:53,030 --> 01:45:50,400

the way by my throat of course i'm

3041

01:45:53,750 --> 01:45:53,040

not alone i've got a bunch of wonderful

3042

01:45:56,149 --> 01:45:53,760

collaborators

3043

01:45:57,590 --> 01:45:56,159

chaitan prakash bruce bennett when

3044

01:46:00,550 --> 01:45:57,600

you've seen chris fields

3045

01:46:01,669 --> 01:46:00,560

robert prentner federico fajin a bunch

3046

01:46:03,750 --> 01:46:01,679

of really

3047

01:46:04,790 --> 01:46:03,760

brilliant people so when i say my theory

3048

01:46:06,550 --> 01:46:04,800

you know that's

3049

01:46:07,830 --> 01:46:06,560

in quotes and also when you say maya

3050

01:46:08,790 --> 01:46:07,840

that you're implying itself

3051

01:46:10,550 --> 01:46:08,800

myself that's right but you're

3052

01:46:11,430 --> 01:46:10,560

questioning at the same time yourself

3053

01:46:14,149 --> 01:46:11,440

itself

3054

01:46:16,229 --> 01:46:14,159

sorry continue it's so tricky to talk

3055

01:46:19,430 --> 01:46:16,239

about this but anyway

3056

01:46:23,350 --> 01:46:19,440

that's right but it's fun when

3057

01:46:28,310 --> 01:46:26,390

that we have never questioned in many

3058

01:46:30,070 --> 01:46:28,320

cases or just assumed

3059

01:46:31,669 --> 01:46:30,080

it's i think i find it really refreshing

3060

01:46:32,550 --> 01:46:31,679

to have everything that i thought i knew

3061

01:46:34,870 --> 01:46:32,560

blown away

3062

01:46:35,990 --> 01:46:34,880

i mean it's really quite fun it's it's

3063

01:46:38,390 --> 01:46:36,000

maybe an acquired taste

3064

01:46:39,430 --> 01:46:38,400

like you know but but but it's an

3065

01:46:42,390 --> 01:46:39,440

interesting

3066

01:46:43,750 --> 01:46:42,400

thing to be surprised what i thought i

3067

01:46:45,590 --> 01:46:43,760

knew i don't know

3068

01:46:47,270 --> 01:46:45,600

but in the case of the self when i was

3069

01:46:48,790 --> 01:46:47,280

trying to come up with the theory of

3070

01:46:51,109 --> 01:46:48,800

consciousness

3071

01:46:51,830 --> 01:46:51,119

as a scientist what you try to do when

3072

01:46:56,229 --> 01:46:51,840

you're

3073

01:46:57,510 --> 01:46:56,239

put as few assumptions as possible up

3074

01:47:01,189 --> 01:46:57,520

front

3075

01:47:02,470 --> 01:47:01,199

right because every assumption you build

3076

01:47:03,910 --> 01:47:02,480

in is something you're not explaining is

3077

01:47:05,430 --> 01:47:03,920

something you're assuming

3078

01:47:07,669 --> 01:47:05,440

so you want to assume as little as

3079

01:47:08,950 --> 01:47:07,679

possible so in the theory of conscious

3080

01:47:11,189 --> 01:47:08,960

agents

3081

01:47:12,870 --> 01:47:11,199

i don't i mean of course i could have

3082

01:47:14,629 --> 01:47:12,880

said okay they also have a self and they

3083

01:47:17,590 --> 01:47:14,639

have an i and so forth but

3084

01:47:19,270 --> 01:47:17,600

but i decided not to do that because it

3085

01:47:22,550 --> 01:47:19,280

turned out if i just said

3086

01:47:23,910 --> 01:47:22,560

there are these entities just call them

3087

01:47:25,189 --> 01:47:23,920

formal structural entities called

3088

01:47:27,030 --> 01:47:25,199

conscious agents

3089

01:47:28,950 --> 01:47:27,040
they may not at all be aware of

3090

01:47:31,350 --> 01:47:28,960
themselves

3091

01:47:32,550 --> 01:47:31,360
as entities so they may not have any

3092

01:47:34,870 --> 01:47:32,560
self-awareness at all

3093

01:47:36,470 --> 01:47:34,880
they just have conscious experiences

3094

01:47:38,229 --> 01:47:36,480
that's all they have

3095

01:47:39,669 --> 01:47:38,239
they make decisions and they take

3096

01:47:42,070 --> 01:47:39,679
actions but those actions

3097

01:47:43,669 --> 01:47:42,080
all they do is affect the conscious

3098

01:47:46,470 --> 01:47:43,679
experience of the other entities

3099

01:47:47,510 --> 01:47:46,480
that's it there's no self there's

3100

01:47:49,270 --> 01:47:47,520
nothing like that

3101
01:47:50,629 --> 01:47:49,280
there's no memory by the way there's no

3102
01:47:54,470 --> 01:47:50,639
intelligence

3103
01:47:57,030 --> 01:47:54,480
nothing it's just experiences leading to

3104
01:47:58,070 --> 01:47:57,040
decisions at the fundamental atomic

3105
01:48:02,390 --> 01:47:58,080
level

3106
01:48:05,189 --> 01:48:02,400
so that that and i do this on purpose

3107
01:48:06,070 --> 01:48:05,199
the the goal is to make the foundations

3108
01:48:09,669 --> 01:48:06,080
of your theory

3109
01:48:13,270 --> 01:48:09,679
as sparse as possible that's different

3110
01:48:14,149 --> 01:48:13,280
we do a scientist as few assumptions as

3111
01:48:15,830 --> 01:48:14,159
possible

3112
01:48:17,510 --> 01:48:15,840
sure i could have thrown in myself i

3113
01:48:19,350 --> 01:48:17,520

could throw in the kitchen sink let me

3114

01:48:21,270 --> 01:48:19,360

throw in intelligence let me throw in

3115

01:48:22,790 --> 01:48:21,280

just well there's nothing left to

3116

01:48:23,510 --> 01:48:22,800

explain i've just i've just assumed it

3117

01:48:25,189 --> 01:48:23,520

all right

3118

01:48:26,629 --> 01:48:25,199

there we go that's well there's no

3119

01:48:30,830 --> 01:48:26,639

theory there so that

3120

01:48:33,990 --> 01:48:30,840

so the reason i stopped where i stopped

3121

01:48:37,030 --> 01:48:34,000

was very nice

3122

01:48:37,910 --> 01:48:37,040

theorem by writing down a set of

3123

01:48:42,390 --> 01:48:37,920

experiences

3124

01:48:44,070 --> 01:48:42,400

markovian kernel

3125

01:48:45,510 --> 01:48:44,080

which is a way of talking about the

3126

01:48:47,830 --> 01:48:45,520

probabilities of the different decisions

3127

01:48:50,790 --> 01:48:47,840

that you could take

3128

01:48:52,870 --> 01:48:50,800

the markovian kernels are provably

3129

01:48:56,310 --> 01:48:52,880

computationally universal

3130

01:49:00,550 --> 01:48:56,320

that means that with that

3131

01:49:03,109 --> 01:49:00,560

little foundation experiences and

3132

01:49:04,790 --> 01:49:03,119

decisions to act that are modeled by

3133

01:49:06,870 --> 01:49:04,800

markovian kernels

3134

01:49:10,390 --> 01:49:06,880

i am computationally universal anything

3135

01:49:13,990 --> 01:49:10,400

that can be simulated by any computer

3136

01:49:16,070 --> 01:49:14,000

quantum or otherwise i believe can be

3137

01:49:18,790 --> 01:49:16,080

simulated by this network of conscious

3138

01:49:20,470 --> 01:49:18,800

agents so

3139

01:49:22,709 --> 01:49:20,480

even though my foundations are

3140

01:49:25,830 --> 01:49:22,719

incredibly

3141

01:49:27,830 --> 01:49:25,840

sparse there are there are agents

3142

01:49:31,510 --> 01:49:27,840

which have experiences and make choices

3143

01:49:35,270 --> 01:49:33,669

networks of agents can provably compute

3144

01:49:38,390 --> 01:49:35,280

anything that's computable at all

3145

01:49:39,910 --> 01:49:38,400

period so because i know in cognitive

3146

01:49:41,189 --> 01:49:39,920

neuroscience for example that we have

3147

01:49:44,229 --> 01:49:41,199

mathematical models that are

3148

01:49:47,430 --> 01:49:44,239

very very good at problem solving

3149

01:49:49,910 --> 01:49:47,440

um intelligence

3150

01:49:51,350 --> 01:49:49,920

creating all sorts of structures um i

3151
01:49:52,550 --> 01:49:51,360
can build networks of conscious agents

3152
01:49:54,390 --> 01:49:52,560
that can do anything that cognitive

3153
01:49:57,189 --> 01:49:54,400
neuroscience can do right now

3154
01:49:58,390 --> 01:49:57,199
so that's why i stopped i i don't need

3155
01:50:00,149 --> 01:49:58,400
anything more

3156
01:50:01,830 --> 01:50:00,159
i can build models of the self out of

3157
01:50:04,870 --> 01:50:01,840
networks of conscious agents

3158
01:50:06,149 --> 01:50:04,880
if if so so there's no reason for me to

3159
01:50:08,229 --> 01:50:06,159
assume them

3160
01:50:09,750 --> 01:50:08,239
i should force myself to build them from

3161
01:50:10,390 --> 01:50:09,760
networks of conscious agents and so

3162
01:50:14,070 --> 01:50:10,400
that's

3163
01:50:16,550 --> 01:50:14,080

so i've what we've got is

3164

01:50:17,830 --> 01:50:16,560

essentially the tinker toys of

3165

01:50:19,189 --> 01:50:17,840

consciousness

3166

01:50:22,470 --> 01:50:19,199

now we can build up any structure that

3167

01:50:27,830 --> 01:50:25,910

going back to this d and a and

3168

01:50:29,510 --> 01:50:27,840

p model let's forget about the p because

3169

01:50:31,189 --> 01:50:29,520

it's just conscious agents

3170

01:50:33,189 --> 01:50:31,199

the decisions and the actions are

3171

01:50:36,830 --> 01:50:33,199

stochastic so they're markov kernels

3172

01:50:39,750 --> 01:50:36,840

right where's the free will there right

3173

01:50:42,470 --> 01:50:39,760

so

3174

01:50:43,669 --> 01:50:42,480

all the of course this raises a deep

3175

01:50:44,790 --> 01:50:43,679

question about the relationship between

3176
01:50:45,990 --> 01:50:44,800
mathematics

3177
01:50:47,990 --> 01:50:46,000
and the thing that you're modeling with

3178
01:50:48,550 --> 01:50:48,000
the mathematics right all right so all

3179
01:50:51,910 --> 01:50:48,560
i've got

3180
01:50:53,270 --> 01:50:51,920
are measurable structures that i say are

3181
01:50:54,629 --> 01:50:53,280
conscious experiences spaces of

3182
01:50:56,709 --> 01:50:54,639
conscious experiences

3183
01:50:58,310 --> 01:50:56,719
right and then i've got these markovian

3184
01:51:01,109 --> 01:50:58,320
kernels which i say are

3185
01:51:01,510 --> 01:51:01,119
modeling the choices and you can say

3186
01:51:02,709 --> 01:51:01,520
well

3187
01:51:04,229 --> 01:51:02,719
you know i just see that i see

3188
01:51:05,109 --> 01:51:04,239

probabilities there but i don't see any

3189

01:51:06,709 --> 01:51:05,119

free will

3190

01:51:08,870 --> 01:51:06,719

and so it's a matter of how i interpret

3191

01:51:11,030 --> 01:51:08,880

those probabilities

3192

01:51:12,070 --> 01:51:11,040

i'm one could interpret those

3193

01:51:15,270 --> 01:51:12,080

probabilities as

3194

01:51:18,390 --> 01:51:15,280

pure objective chance and i think many

3195

01:51:19,510 --> 01:51:18,400

of my physicalist colleagues would

3196

01:51:21,430 --> 01:51:19,520

would say you know if you see

3197

01:51:24,870 --> 01:51:21,440

probability somewhere then um

3198

01:51:26,149 --> 01:51:24,880

if it's not due to ignorance if

3199

01:51:27,990 --> 01:51:26,159

the probabilities are not due to my

3200

01:51:28,629 --> 01:51:28,000

ignorance then it's due to an objective

3201
01:51:32,709 --> 01:51:28,639
chance

3202
01:51:35,830 --> 01:51:32,719
in nature and but i

3203
01:51:37,830 --> 01:51:35,840
want to be a monist in

3204
01:51:39,350 --> 01:51:37,840
my theory i don't want to be a dualist i

3205
01:51:41,350 --> 01:51:39,360
if i'm going to say that consciousness

3206
01:51:45,109 --> 01:51:41,360
is fundamental

3207
01:51:48,629 --> 01:51:45,119
then i don't also want

3208
01:51:50,149 --> 01:51:48,639
to propose as a dualist that there are

3209
01:51:52,709 --> 01:51:50,159
other sources of novelty

3210
01:51:54,070 --> 01:51:52,719
outside of consciousness into the

3211
01:51:56,470 --> 01:51:54,080
universe

3212
01:51:58,070 --> 01:51:56,480
i want consciousness to be the only

3213
01:52:01,109 --> 01:51:58,080

source of novelty

3214

01:52:03,030 --> 01:52:01,119

in in this universe objective chance

3215

01:52:04,310 --> 01:52:03,040

i mean what do we mean when we say

3216

01:52:06,709 --> 01:52:04,320

objective chance

3217

01:52:08,550 --> 01:52:06,719

in as a physicalist right so i suppose

3218

01:52:11,109 --> 01:52:08,560

i'm a physicalist i believe space-time

3219

01:52:12,950 --> 01:52:11,119

say is fundamental and i believe that

3220

01:52:14,709 --> 01:52:12,960

there are things called objective chances

3221

01:52:16,310 --> 01:52:14,719

that are not just due to my ignorance

3222

01:52:18,790 --> 01:52:16,320

this is something

3223

01:52:19,589 --> 01:52:18,800

objective that we call objective chances

3224

01:52:23,030 --> 01:52:19,599

what i'm saying

3225

01:52:26,070 --> 01:52:24,709

these probabilities objective chance i'm

3226
01:52:29,109 --> 01:52:26,080
saying

3227
01:52:31,510 --> 01:52:29,119
there is a source of novelty

3228
01:52:33,430 --> 01:52:31,520
coming into my universe that i cannot

3229
01:52:35,189 --> 01:52:33,440
explain

3230
01:52:38,229 --> 01:52:35,199
there is where a miracle is happening so

3231
01:52:41,030 --> 01:52:38,239
to be very very clear objective chance

3232
01:52:43,030 --> 01:52:41,040
is a miracle it's you're in in the

3233
01:52:46,149 --> 01:52:43,040
following sense you're saying

3234
01:52:48,790 --> 01:52:46,159
my theory has no resources

3235
01:52:49,589 --> 01:52:48,800
to explain those outcomes i cannot

3236
01:52:50,870 --> 01:52:49,599
predict

3237
01:52:53,510 --> 01:52:50,880
those outcomes that's why i'm calling it

3238
01:52:57,910 --> 01:52:53,520

objective chance well

3239

01:52:59,350 --> 01:52:57,920

that that reinterpreted re-explained is

3240

01:53:01,350 --> 01:52:59,360

in the language of your theory you have

3241

01:53:04,550 --> 01:53:01,360

no resources to explain

3242

01:53:06,070 --> 01:53:04,560

what's happening so in terms of your

3243

01:53:10,070 --> 01:53:06,080

theory that's a miracle

3244

01:53:11,830 --> 01:53:10,080

it's unexplainable now so every theory

3245

01:53:13,270 --> 01:53:11,840

and this is not a put down every theory

3246

01:53:14,390 --> 01:53:13,280

has its miracles we just have to own

3247

01:53:16,310 --> 01:53:14,400

that every scientific thing

3248

01:53:19,750 --> 01:53:16,320

right right and you're using miracles as

3249

01:53:22,629 --> 01:53:19,760

a synonym for axioms

3250

01:53:23,910 --> 01:53:22,639

that's right it's where it's a miracle

3251
01:53:26,149 --> 01:53:23,920
for your theory

3252
01:53:27,430 --> 01:53:26,159
if your theory has to assume it can't

3253
01:53:30,870 --> 01:53:27,440
explain it

3254
01:53:33,189 --> 01:53:30,880
okay right okay now when you have

3255
01:53:36,470 --> 01:53:33,199
probabilities

3256
01:53:37,350 --> 01:53:36,480
there are two kinds of miracles that you

3257
01:53:40,149 --> 01:53:37,360
can

3258
01:53:41,350 --> 01:53:40,159
imagine if it's not just due to lack of

3259
01:53:43,109 --> 01:53:41,360
knowledge right so sometimes you have

3260
01:53:44,709 --> 01:53:43,119
probabilities just because

3261
01:53:45,830 --> 01:53:44,719
there's a true state of affairs but

3262
01:53:46,790 --> 01:53:45,840
you're you're you don't have enough

3263
01:53:47,669 --> 01:53:46,800

knowledge that's a different kind of

3264

01:53:50,310 --> 01:53:47,679

thing

3265

01:53:51,589 --> 01:53:50,320

but when it's a fundamental probability

3266

01:53:53,669 --> 01:53:51,599

you can

3267

01:53:55,350 --> 01:53:53,679

either ascribe it to the miracle of

3268

01:53:58,550 --> 01:53:55,360

objective chance

3269

01:54:01,910 --> 01:53:58,560

or free will they're both

3270

01:54:03,430 --> 01:54:01,920

equally miracles but i since i'm trying

3271

01:54:05,510 --> 01:54:03,440

to have a monist theory

3272

01:54:06,950 --> 01:54:05,520

i interpret probability not as a as

3273

01:54:10,070 --> 01:54:06,960

objective chance but as

3274

01:54:11,990 --> 01:54:10,080

free will choices and then it's you know

3275

01:54:14,950 --> 01:54:12,000

up to me then in the mathematics to

3276

01:54:17,830 --> 01:54:14,960

unpack what does that free will choice

3277

01:54:19,350 --> 01:54:17,840

idea amount to and it's really quite

3278

01:54:20,550 --> 01:54:19,360

interesting because this is a network

3279

01:54:23,350 --> 01:54:20,560

dynamics

3280

01:54:23,830 --> 01:54:23,360

each agent at each level of the net of

3281

01:54:26,390 --> 01:54:23,840

the

3282

01:54:28,149 --> 01:54:26,400

dynamics is making its own contributions

3283

01:54:29,830 --> 01:54:28,159

to free will choices and there

3284

01:54:31,350 --> 01:54:29,840

there are bottom-up influences the free

3285

01:54:32,709 --> 01:54:31,360

will choices of lower level agents

3286

01:54:36,310 --> 01:54:32,719

influence higher agents

3287

01:54:39,350 --> 01:54:36,320

and vice versa and the whole system

3288

01:54:41,669 --> 01:54:39,360

of conscious agents also itself

3289

01:54:42,870 --> 01:54:41,679

is an agent by the mathematics of

3290

01:54:45,510 --> 01:54:42,880

mathematics says

3291

01:54:46,470 --> 01:54:45,520

collections of agents also form an agent

3292

01:54:49,270 --> 01:54:46,480

and so

3293

01:54:50,629 --> 01:54:49,280

what you get is this really interesting

3294

01:54:53,189 --> 01:54:50,639

analysis and synthesis

3295

01:54:54,149 --> 01:54:53,199

approach where i can get a dynamical

3296

01:54:57,510 --> 01:54:54,159

model

3297

01:54:59,189 --> 01:54:57,520

of free will bottom up and top down

3298

01:55:01,830 --> 01:54:59,199

at the same time and that would be my

3299

01:55:04,629 --> 01:55:01,840

model of the free will choice of the one

3300

01:55:05,350 --> 01:55:04,639

single agent and so it's it's going to

3301

01:55:08,790 --> 01:55:05,360

be

3302

01:55:12,229 --> 01:55:08,800

it's again forcing me to do the work

3303

01:55:15,510 --> 01:55:12,239

um is forcing me to do the work of what

3304

01:55:17,589 --> 01:55:15,520

what ultimately do i mean by free will

3305

01:55:18,629 --> 01:55:17,599

by by assigning it only to local agents

3306

01:55:20,070 --> 01:55:18,639

and then saying what

3307

01:55:21,669 --> 01:55:20,080

what do you mean by free will when you

3308

01:55:24,470 --> 01:55:21,679

have agents interact

3309

01:55:25,030 --> 01:55:24,480

what is right right so a question i have

3310

01:55:26,470 --> 01:55:25,040

for you

3311

01:55:28,070 --> 01:55:26,480

let's imagine we have this graph and

3312

01:55:28,629 --> 01:55:28,080

it's extended and they're all conscious

3313

01:55:31,830 --> 01:55:28,639

agents

3314

01:55:33,189 --> 01:55:31,840

okay we pick one of them but and there's

3315

01:55:34,629 --> 01:55:33,199

free will associated

3316

01:55:36,790 --> 01:55:34,639

and they influence one another does that

3317

01:55:40,390 --> 01:55:36,800

mean from sheer will

3318

01:55:42,390 --> 01:55:40,400

can one drastically change the game for

3319

01:55:44,550 --> 01:55:42,400

the rest

3320

01:55:47,589 --> 01:55:44,560

um there may be cases where that can

3321

01:55:51,189 --> 01:55:47,599

happen but it looks like

3322

01:55:57,189 --> 01:55:51,199

it's every agent

3323

01:56:01,510 --> 01:55:59,270

it's a it's almost like a symphony right

3324

01:56:03,510 --> 01:56:01,520

every member of the symphony

3325

01:56:05,030 --> 01:56:03,520

makes their contribution to the hole

3326

01:56:08,070 --> 01:56:05,040

there may be a conductor

3327

01:56:10,470 --> 01:56:08,080

but but um

3328

01:56:12,550 --> 01:56:10,480

it's it's an organic hole so where would

3329

01:56:14,790 --> 01:56:12,560

the conductor be in this model

3330

01:56:15,830 --> 01:56:14,800

well that's the thing there wouldn't

3331

01:56:17,990 --> 01:56:15,840

there would only be

3332

01:56:18,950 --> 01:56:18,000

like relative conductors that the agents

3333

01:56:22,470 --> 01:56:18,960

above

3334

01:56:25,270 --> 01:56:22,480

would have sort of top-down influence

3335

01:56:26,149 --> 01:56:25,280

but the agents below have really strong

3336

01:56:28,229 --> 01:56:26,159

bottom-up

3337

01:56:29,750 --> 01:56:28,239

influence on the free will decisions so

3338

01:56:31,350 --> 01:56:29,760

it's hard for me to say at this point

3339

01:56:32,229 --> 01:56:31,360

that one is more important than the

3340

01:56:33,750 --> 01:56:32,239

other

3341

01:56:35,910 --> 01:56:33,760

yeah and i'm having a difficult time

3342

01:56:38,149 --> 01:56:35,920

when you say that one is above another

3343

01:56:39,270 --> 01:56:38,159

because as far as i know from just from

3344

01:56:40,470 --> 01:56:39,280

reading the papers and it could be

3345

01:56:43,189 --> 01:56:40,480

mistaken it

3346

01:56:45,189 --> 01:56:43,199

it's not as if one is privileged one

3347

01:56:47,270 --> 01:56:45,199

node is privileged over another

3348

01:56:48,790 --> 01:56:47,280

right so so that's right when i say

3349

01:56:51,750 --> 01:56:48,800

above it's it's

3350

01:56:52,149 --> 01:56:51,760

it's like um my two hemispheres in my

3351

01:56:55,750 --> 01:56:52,159

brain

3352

01:56:58,149 --> 01:56:55,760

right when the corpus callosum is intact

3353

01:56:59,030 --> 01:56:58,159

there seems to be a unified me that i

3354

01:57:02,870 --> 01:56:59,040

called on

3355

01:57:04,870 --> 01:57:02,880

right but if you cut my corpus closum

3356

01:57:07,189 --> 01:57:04,880

you could easily it turns out and this

3357

01:57:11,830 --> 01:57:07,199

is how strange it can get

3358

01:57:14,390 --> 01:57:11,840

they would they were able um to get

3359

01:57:15,910 --> 01:57:14,400

these split brain patients to have to

3360

01:57:17,109 --> 01:57:15,920

play 20 questions with each other with

3361

01:57:19,830 --> 01:57:17,119

themselves

3362

01:57:20,629 --> 01:57:19,840

you the right hemisphere has a word in

3363

01:57:22,070 --> 01:57:20,639

mind

3364

01:57:24,950 --> 01:57:22,080

the left hemisphere doesn't know what it

3365

01:57:25,750 --> 01:57:24,960

is and then the left hemisphere which

3366

01:57:27,910 --> 01:57:25,760

can talk

3367

01:57:29,750 --> 01:57:27,920

can start asking questions is it uh

3368

01:57:31,030 --> 01:57:29,760

animal is it vegetable is it mineral

3369

01:57:33,270 --> 01:57:31,040

things like that

3370

01:57:35,270 --> 01:57:33,280

and the right hemisphere which can't

3371

01:57:36,629 --> 01:57:35,280

talk but can understand language can use

3372

01:57:39,350 --> 01:57:36,639

say the left hand to

3373

01:57:39,990 --> 01:57:39,360

thumbs up for yes thumbs down for no and

3374

01:57:43,830 --> 01:57:40,000

so

3375

01:57:45,109 --> 01:57:43,840

these a split brain patient

3376

01:57:47,189 --> 01:57:45,119

has two separate spheres of

3377

01:57:48,629 --> 01:57:47,199

consciousness so separate that they can

3378

01:57:50,790 --> 01:57:48,639

play 20 questions and the left

3379

01:57:53,510 --> 01:57:50,800

hemisphere doesn't know the answer

3380

01:57:55,669 --> 01:57:53,520

right the left hemisphere does not know

3381

01:57:57,270 --> 01:57:55,679

and sometimes will fail to guess in 20

3382

01:57:58,310 --> 01:57:57,280

questions what's in the mind of the

3383

01:57:59,750 --> 01:57:58,320

right hemisphere

3384

01:58:01,669 --> 01:57:59,760

now you might some people argue that

3385

01:58:03,270 --> 01:58:01,679

there's no separate personalities no

3386

01:58:06,070 --> 01:58:03,280

separate consciousnesses

3387

01:58:06,310 --> 01:58:06,080

um good luck making that point when you

3388

01:58:08,709 --> 01:58:06,320

know

3389

01:58:09,750 --> 01:58:08,719

the left hemisphere can fail to to win a

3390

01:58:11,750 --> 01:58:09,760

20 questions

3391

01:58:13,030 --> 01:58:11,760

game with the right hemisphere even

3392

01:58:14,390 --> 01:58:13,040

giving its level best

3393

01:58:16,870 --> 01:58:14,400

and i'm saying that's just the tip of an

3394

01:58:18,550 --> 01:58:16,880

iceberg but it goes all the way

3395

01:58:20,950 --> 01:58:18,560

it goes all the way down to what i call

3396

01:58:23,830 --> 01:58:20,960

these one-bit agents that have just

3397

01:58:25,990 --> 01:58:23,840

basically two conscious experiences say

3398

01:58:27,830 --> 01:58:26,000

red or nothing or something like that

3399

01:58:30,229 --> 01:58:27,840

um and and so it's in that sense when i

3400

01:58:33,910 --> 01:58:30,239

talk about agents being above

3401
01:58:34,629 --> 01:58:33,920
and whatever agent is me that's talking

3402
01:58:36,390 --> 01:58:34,639
to you

3403
01:58:37,910 --> 01:58:36,400
seems to be a combination of my left

3404
01:58:38,709 --> 01:58:37,920
hemisphere and my right hemisphere

3405
01:58:41,430 --> 01:58:38,719
agents

3406
01:58:42,390 --> 01:58:41,440
if we split my corpus closum that higher

3407
01:58:44,229 --> 01:58:42,400
level agent

3408
01:58:45,589 --> 01:58:44,239
apparently would be gone and there would

3409
01:58:47,270 --> 01:58:45,599
be two different agents

3410
01:58:49,189 --> 01:58:47,280
that could now play 20 questions with it

3411
01:58:50,870 --> 01:58:49,199
with each other and lose lose the game

3412
01:58:52,709 --> 01:58:50,880
of 20 questions with each other

3413
01:58:54,629 --> 01:58:52,719

whereas i couldn't play 20 questions

3414

01:58:56,790 --> 01:58:54,639

with myself right now and lose

3415

01:58:58,390 --> 01:58:56,800

but if you if you told me something i

3416

01:58:59,189 --> 01:58:58,400

would all i would know my left minister

3417

01:59:03,270 --> 01:58:59,199

would know

3418

01:59:03,830 --> 01:59:03,280

which i talk about agents being higher

3419

01:59:06,870 --> 01:59:03,840

and lower

3420

01:59:08,070 --> 01:59:06,880

agents can combine to create new agents

3421

01:59:11,030 --> 01:59:08,080

are you familiar with douglas

3422

01:59:13,189 --> 01:59:11,040

hofstede's work a bit

3423

01:59:14,950 --> 01:59:13,199

what do you think of his theory of

3424

01:59:16,390 --> 01:59:14,960

consciousness it sounds similar to what

3425

01:59:17,669 --> 01:59:16,400

you're describing in the sense of a

3426

01:59:20,070 --> 01:59:17,679

strange loop that

3427

01:59:22,709 --> 01:59:20,080

well you can do a much better job at

3428

01:59:25,910 --> 01:59:22,719

describing it than i can

3429

01:59:32,470 --> 01:59:29,189

there's a fundamental difference in

3430

01:59:34,390 --> 01:59:32,480

the approach that we're taking um

3431

01:59:36,390 --> 01:59:34,400

and you know hofstadter is brilliant

3432

01:59:40,149 --> 01:59:36,400

right he's

3433

01:59:42,629 --> 01:59:40,159

a world-class genius um he's

3434

01:59:44,950 --> 01:59:42,639

going after the notion of of

3435

01:59:47,350 --> 01:59:44,960

self-referential systems

3436

01:59:47,990 --> 01:59:47,360

and those have really interesting

3437

01:59:50,629 --> 01:59:48,000

properties

3438

01:59:51,350 --> 01:59:50,639

right if i have a sentence that of the

3439

01:59:54,550 --> 01:59:51,360

form

3440

01:59:56,390 --> 01:59:54,560

um this sentence is false

3441

01:59:58,149 --> 01:59:56,400

that the sentence is referring to itself

3442

02:00:00,470 --> 01:59:58,159

by saying this sentence

3443

02:00:03,189 --> 02:00:00,480

is false the sentence is is got an a

3444

02:00:06,790 --> 02:00:03,199

strange loop it's got a self-referential

3445

02:00:08,870 --> 02:00:06,800

loop in it and then you get all sorts of

3446

02:00:10,550 --> 02:00:08,880

weird things that happen because is that

3447

02:00:11,350 --> 02:00:10,560

sentence true i mean the sentence says

3448

02:00:14,709 --> 02:00:11,360

the sentence

3449

02:00:15,510 --> 02:00:14,719

is false well if it's true then it's

3450

02:00:18,550 --> 02:00:15,520

false

3451

02:00:22,070 --> 02:00:18,560

get

3452

02:00:23,510 --> 02:00:22,080

caught in this weird thing and so

3453

02:00:25,430 --> 02:00:23,520

i mean hofstadter has a lot of brilliant

3454

02:00:26,870 --> 02:00:25,440

ideas and i don't want to claim that i'm

3455

02:00:31,589 --> 02:00:26,880

doing justice to them but but

3456

02:00:37,270 --> 02:00:34,510

there's a an essential role to this

3457

02:00:37,910 --> 02:00:37,280

self-referential kind of structure that

3458

02:00:39,189 --> 02:00:37,920

that we see

3459

02:00:41,030 --> 02:00:39,199

in in that kind of sentence this

3460

02:00:43,990 --> 02:00:41,040

sentence is so is false

3461

02:00:45,510 --> 02:00:44,000

and that you get um in the work of kurt

3462

02:00:47,830 --> 02:00:45,520

gerdel when he proves his incompleteness

3463

02:00:50,390 --> 02:00:47,840

theorems and so forth there's this this

3464

02:00:51,109 --> 02:00:50,400

really clever use of mathematics to to

3465

02:00:54,310 --> 02:00:51,119

refer

3466

02:00:56,310 --> 02:00:54,320

of loops and

3467

02:00:57,910 --> 02:00:56,320

and his idea is that these kinds of

3468

02:01:00,709 --> 02:00:57,920

self-referential loops

3469

02:01:02,950 --> 02:01:00,719

are somehow critical perhaps to booting

3470

02:01:05,990 --> 02:01:02,960

up consciousness to booting up

3471

02:01:10,149 --> 02:01:06,000

what we call a self and so forth

3472

02:01:13,990 --> 02:01:11,510

there's a fundamental difference in

3473

02:01:18,550 --> 02:01:14,000

philosophy um

3474

02:01:21,990 --> 02:01:21,189

do you mean between you and hofstetter

3475

02:01:25,030 --> 02:01:22,000

that's right

3476

02:01:26,470 --> 02:01:25,040

and and my colleagues who who

3477

02:01:28,070 --> 02:01:26,480

and many of my colleagues are taking a

3478

02:01:28,709 --> 02:01:28,080

similar kind of thing that that's saying

3479

02:01:33,430 --> 02:01:28,719

that

3480

02:01:36,950 --> 02:01:33,440

property

3481

02:01:39,030 --> 02:01:36,960

of computational systems

3482

02:01:40,790 --> 02:01:39,040

like this ability to have self-reference

3483

02:01:41,910 --> 02:01:40,800

and so forth

3484

02:01:43,990 --> 02:01:41,920

but it could be other properties it

3485

02:01:45,990 --> 02:01:44,000

could be some kind of um

3486

02:01:49,350 --> 02:01:46,000

compute other computational properties

3487

02:01:50,310 --> 02:01:49,360

of of systems

3488

02:01:52,229 --> 02:01:50,320

this is called you know like the

3489

02:01:52,790 --> 02:01:52,239

computational theory of mind and so

3490

02:01:55,030 --> 02:01:52,800

forth

3491

02:01:56,229 --> 02:01:55,040

but the idea is that you start with

3492

02:01:58,950 --> 02:01:56,239

systems that are

3493

02:01:59,990 --> 02:01:58,960

that are not conscious but if they have

3494

02:02:01,109 --> 02:02:00,000

certain

3495

02:02:03,510 --> 02:02:01,119

interesting properties like

3496

02:02:06,550 --> 02:02:03,520

self-reference or other computational

3497

02:02:10,870 --> 02:02:08,470

for example certain kind of integrated

3498

02:02:13,030 --> 02:02:10,880

information that tanoni and koch

3499

02:02:14,470 --> 02:02:13,040

are looking at so they have certain

3500

02:02:15,830 --> 02:02:14,480

kinds of computational properties like

3501

02:02:16,950 --> 02:02:15,840

that they call high integrated

3502

02:02:21,430 --> 02:02:16,960

information

3503

02:02:25,030 --> 02:02:21,440

then these unconscious systems

3504

02:02:27,750 --> 02:02:25,040

give rise to consciousness now

3505

02:02:28,229 --> 02:02:27,760

i that's a fundamentally different point

3506

02:02:30,390 --> 02:02:28,239

of view

3507

02:02:31,270 --> 02:02:30,400

than the one i'm taking i'm saying look

3508

02:02:34,310 --> 02:02:31,280

i'm not

3509

02:02:37,910 --> 02:02:34,320

that's unconscious

3510

02:02:39,350 --> 02:02:37,920

i'm proposing at the foundation

3511

02:02:41,270 --> 02:02:39,360

the conscious experiences are

3512

02:02:42,790 --> 02:02:41,280

fundamental this that's where

3513

02:02:44,790 --> 02:02:42,800

explanation stops

3514

02:02:45,990 --> 02:02:44,800

this i'm not explaining how conscious

3515

02:02:48,229 --> 02:02:46,000

experiences arise

3516

02:02:49,270 --> 02:02:48,239

i'm saying that they are what what

3517

02:02:50,709 --> 02:02:49,280

exists

3518

02:02:52,550 --> 02:02:50,719

just like a physicalist who believes in

3519

02:02:53,030 --> 02:02:52,560

space-time and takes it as fundamental

3520

02:02:54,550 --> 02:02:53,040

says

3521

02:02:56,149 --> 02:02:54,560

i don't know where space time comes from

3522

02:02:58,149 --> 02:02:56,159

i'm assuming it i'm assuming that

3523

02:03:00,790 --> 02:02:58,159

space-time and fundamental particles

3524

02:03:01,350 --> 02:03:00,800

exist right every theory is going to

3525

02:03:03,830 --> 02:03:01,360

make

3526

02:03:05,750 --> 02:03:03,840

its its own assumptions so so we're all

3527

02:03:07,910 --> 02:03:05,760

equal footing in that

3528

02:03:09,430 --> 02:03:07,920

regard we all have miracles at the start

3529

02:03:10,310 --> 02:03:09,440

the question is what miracles do you

3530

02:03:13,350 --> 02:03:10,320

pick

3531

02:03:16,950 --> 02:03:13,360

and the reason i don't go

3532

02:03:18,629 --> 02:03:16,960

with a physical starting point like a

3533

02:03:20,229 --> 02:03:18,639

computational system that

3534

02:03:21,669 --> 02:03:20,239

that most of the time is going to be

3535

02:03:23,350 --> 02:03:21,679

unconscious but if it has the right

3536

02:03:24,709 --> 02:03:23,360

integrated information or has the right

3537

02:03:26,390 --> 02:03:24,719

kind of self-reference

3538

02:03:28,310 --> 02:03:26,400

then the magic of consciousness somehow

3539

02:03:32,390 --> 02:03:28,320

emerges the reason i don't go after that

3540

02:03:35,430 --> 02:03:32,400

is a couple of reasons

3541

02:03:38,550 --> 02:03:37,109

no one has been able to use that

3542

02:03:41,109 --> 02:03:38,560

approach

3543

02:03:42,149 --> 02:03:41,119

to predict exactly even how one specific

3544

02:03:45,510 --> 02:03:42,159

conscious experience

3545

02:03:48,870 --> 02:03:45,520

could arise right so how could

3546

02:03:52,229 --> 02:03:48,880

self-reference or integrated information

3547

02:03:53,830 --> 02:03:52,239

or collapse

3548

02:03:55,669 --> 02:03:53,840

orchestrated collapses microtubule

3549

02:03:58,470 --> 02:03:55,679

states and certain neurons

3550

02:03:59,910 --> 02:03:58,480

be or cause my experience of the taste

3551
02:04:04,149 --> 02:03:59,920
of vanilla

3552
02:04:06,629 --> 02:04:04,159
what specific patterns of activity

3553
02:04:08,550 --> 02:04:06,639
of the brain or computational system

3554
02:04:09,270 --> 02:04:08,560
must be or must cause the taste of

3555
02:04:11,109 --> 02:04:09,280
vanilla

3556
02:04:12,629 --> 02:04:11,119
and why is it that it could not be the

3557
02:04:13,750 --> 02:04:12,639
taste of chocolate or the smell of

3558
02:04:15,830 --> 02:04:13,760
garlic

3559
02:04:17,669 --> 02:04:15,840
there's those theories have utterly

3560
02:04:20,390 --> 02:04:17,679
failed

3561
02:04:21,109 --> 02:04:20,400
to explain even one specific conscious

3562
02:04:23,350 --> 02:04:21,119
experience

3563
02:04:25,189 --> 02:04:23,360

in other words there's not one success

3564

02:04:26,870 --> 02:04:25,199

for even one specific conscious

3565

02:04:28,950 --> 02:04:26,880

experience on the table

3566

02:04:31,030 --> 02:04:28,960

that is to say why does this brain state

3567

02:04:32,390 --> 02:04:31,040

or this computational model correspond

3568

02:04:35,189 --> 02:04:32,400

to this qualia

3569

02:04:36,550 --> 02:04:35,199

it's not another and does your theory

3570

02:04:39,510 --> 02:04:36,560

deal with that

3571

02:04:40,629 --> 02:04:39,520

so so i i choose a different miracle so

3572

02:04:42,550 --> 02:04:40,639

their miracle is

3573

02:04:43,669 --> 02:04:42,560

grant me computational systems in space

3574

02:04:46,229 --> 02:04:43,679

and time

3575

02:04:47,589 --> 02:04:46,239

i will predict qualia well they can't

3576

02:04:49,350 --> 02:04:47,599

predict qualia

3577

02:04:50,629 --> 02:04:49,360

so i've granted them what they want and

3578

02:04:52,390 --> 02:04:50,639

they can't give me what they promised

3579

02:04:53,189 --> 02:04:52,400

they can't give me even one specific

3580

02:04:56,229 --> 02:04:53,199

qualia

3581

02:04:59,030 --> 02:04:56,239

it's a failure and by the way the

3582

02:04:59,669 --> 02:04:59,040

these are friends they're brilliant this

3583

02:05:02,310 --> 02:04:59,679

is good

3584

02:05:03,030 --> 02:05:02,320

they're doing great work there's not

3585

02:05:05,270 --> 02:05:03,040

absolutely

3586

02:05:06,870 --> 02:05:05,280

but i but i think that they've given

3587

02:05:08,149 --> 02:05:06,880

themselves an impossible task

3588

02:05:10,229 --> 02:05:08,159

you can't start with unconscious

3589

02:05:11,669 --> 02:05:10,239

ingredients and boot up consciousness

3590

02:05:14,229 --> 02:05:11,679

can't be done

3591

02:05:15,189 --> 02:05:14,239

so what i'm doing is i'm saying look

3592

02:05:17,430 --> 02:05:15,199

they can't explain

3593

02:05:18,470 --> 02:05:17,440

qualia no one's been able to explain

3594

02:05:20,229 --> 02:05:18,480

conscious experiences

3595

02:05:22,629 --> 02:05:20,239

i'm going to start with quiet i'm going

3596

02:05:23,990 --> 02:05:22,639

to start with

3597

02:05:26,149 --> 02:05:24,000

conscious experiences the taste of

3598

02:05:28,069 --> 02:05:26,159

garlic the smell of chocolate

3599

02:05:29,430 --> 02:05:28,079

all of these things those are the things

3600

02:05:31,189 --> 02:05:29,440

i'm going to start with

3601
02:05:32,550 --> 02:05:31,199
those are my so those are my miracles

3602
02:05:36,149 --> 02:05:32,560
right i'm not

3603
02:05:39,350 --> 02:05:36,159
explaining them i'm assuming them now

3604
02:05:40,069 --> 02:05:39,360
my goal is to say grant me this model of

3605
02:05:43,030 --> 02:05:40,079
that

3606
02:05:44,310 --> 02:05:43,040
my conscious agent model then i will

3607
02:05:46,550 --> 02:05:44,320
show you how space

3608
02:05:47,830 --> 02:05:46,560
time and quantum mechanics and general

3609
02:05:48,790 --> 02:05:47,840
relativity and evolution by natural

3610
02:05:51,830 --> 02:05:48,800
selection

3611
02:05:55,350 --> 02:05:51,840
come out as interface representations

3612
02:05:59,589 --> 02:05:55,360
of the dynamics of consciousness so

3613
02:06:04,790 --> 02:06:02,629

and as my my miracle and booting up

3614

02:06:06,229 --> 02:06:04,800

consciousness i'm going the other way

3615

02:06:08,069 --> 02:06:06,239

start with conscious experiences of my

3616

02:06:09,270 --> 02:06:08,079

miracle i will show you how to boot up

3617

02:06:12,629 --> 02:06:09,280

space time

3618

02:06:16,069 --> 02:06:12,639

now the

3619

02:06:18,149 --> 02:06:16,079

the winner will be whoever can explain

3620

02:06:19,430 --> 02:06:18,159

the most with the least assumptions

3621

02:06:23,750 --> 02:06:19,440

right

3622

02:06:25,990 --> 02:06:23,760

who are physicalists are assuming

3623

02:06:28,790 --> 02:06:26,000

space-time and computational systems

3624

02:06:30,709 --> 02:06:28,800

and they have yet failed to explain even

3625

02:06:32,229 --> 02:06:30,719

one conscious experience

3626

02:06:33,990 --> 02:06:32,239

i'm starting with conscious experiences

3627

02:06:35,830 --> 02:06:34,000

that no one can explain i can't explain

3628

02:06:38,069 --> 02:06:35,840

them either i'm assuming them

3629

02:06:39,669 --> 02:06:38,079

but if i can explain how space-time and

3630

02:06:41,589 --> 02:06:39,679

quantum mechanics and general relativity

3631

02:06:43,589 --> 02:06:41,599

come out then i have fewer miracles than

3632

02:06:45,750 --> 02:06:43,599

them so that wins

3633

02:06:47,270 --> 02:06:45,760

whichever theory has the fewer miracles

3634

02:06:49,589 --> 02:06:47,280

is the one we should prefer that's sort

3635

02:06:53,030 --> 02:06:49,599

of occam's razor

3636

02:06:55,270 --> 02:06:53,040

in your theory why is it that we would

3637

02:06:56,629 --> 02:06:55,280

let's say taste vanilla why is it that

3638

02:06:57,109 --> 02:06:56,639

we would have one experience taste of

3639

02:07:00,870 --> 02:06:57,119

villain

3640

02:07:04,470 --> 02:07:00,880

vanilla versus the sight of tico mielmo

3641

02:07:06,870 --> 02:07:04,480

which is another conscious experience

3642

02:07:07,589 --> 02:07:06,880

well i don't have an answer to that

3643

02:07:10,709 --> 02:07:07,599

right now

3644

02:07:14,310 --> 02:07:10,719

so and and the

3645

02:07:16,310 --> 02:07:14,320

very existence of conscious experiences

3646

02:07:17,589 --> 02:07:16,320

is something that i don't explain it's

3647

02:07:20,629 --> 02:07:17,599

something i assume

3648

02:07:22,390 --> 02:07:20,639

right so so my colleagues and

3649

02:07:23,830 --> 02:07:22,400

my physicalist colleagues would like to

3650

02:07:27,589 --> 02:07:23,840

say

3651
02:07:28,709 --> 02:07:27,599
the conscious experiences are

3652
02:07:30,629 --> 02:07:28,719
fundamental

3653
02:07:32,229 --> 02:07:30,639
in fact at the big bang there were no

3654
02:07:33,430 --> 02:07:32,239
conscious experiences there was just

3655
02:07:36,310 --> 02:07:33,440
space time and matter

3656
02:07:37,430 --> 02:07:36,320
and energy and so we will tell you how

3657
02:07:39,510 --> 02:07:37,440
conscious experiences

3658
02:07:40,550 --> 02:07:39,520
emerge from that but they failed to do

3659
02:07:43,669 --> 02:07:40,560
so

3660
02:07:45,350 --> 02:07:43,679
i'm saying you guys assume space time

3661
02:07:55,669 --> 02:07:45,360
and

3662
02:07:58,950 --> 02:07:55,679
you're assuming the

3663
02:08:01,750 --> 02:07:58,960

various qualia but why is it that one

3664

02:08:03,510 --> 02:08:01,760

is chosen versus another it sounds to me

3665

02:08:05,750 --> 02:08:03,520

like a similar problem that the

3666

02:08:09,189 --> 02:08:05,760

physicalists have which is to explain

3667

02:08:10,470 --> 02:08:09,199

why one qualia over another

3668

02:08:12,069 --> 02:08:10,480

and i don't have an answer to that

3669

02:08:12,950 --> 02:08:12,079

that's that's that's a very very good

3670

02:08:19,990 --> 02:08:12,960

question

3671

02:08:22,069 --> 02:08:20,000

intense

3672

02:08:23,750 --> 02:08:22,079

we can look at people with synesthesia

3673

02:08:26,310 --> 02:08:23,760

right so

3674

02:08:27,510 --> 02:08:26,320

um there was a synesthesia about four

3675

02:08:29,669 --> 02:08:27,520

percent of the population has

3676

02:08:33,109 --> 02:08:29,679

synesthesia a human population has four

3677

02:08:36,149 --> 02:08:33,119

synesthesia and to be

3678

02:08:37,270 --> 02:08:36,159

100 if you take lsd i want to talk about

3679

02:08:39,830 --> 02:08:37,280

psychedelics by the way

3680

02:08:40,470 --> 02:08:39,840

sorry continue right so so there's this

3681

02:08:43,270 --> 02:08:40,480

one guy like

3682

02:08:44,870 --> 02:08:43,280

michael watson um his synesthesia was

3683

02:08:46,870 --> 02:08:44,880

that everything he tasted

3684

02:08:47,910 --> 02:08:46,880

with his tongue he felt as a

3685

02:08:50,950 --> 02:08:47,920

three-dimensional shape

3686

02:08:52,470 --> 02:08:50,960

in space that's your friend uh he wasn't

3687

02:08:54,709 --> 02:08:52,480

a friend of mine but he um

3688

02:08:55,510 --> 02:08:54,719

he was studied um extensively by a

3689

02:08:58,950 --> 02:08:55,520

neurologist

3690

02:09:02,149 --> 02:08:58,960

um he he died

3691

02:09:05,350 --> 02:09:02,159

he's dead now but but okay but

3692

02:09:06,870 --> 02:09:05,360

but he was a great cook um everything

3693

02:09:07,430 --> 02:09:06,880

that he tasted that's interesting that's

3694

02:09:09,830 --> 02:09:07,440

interesting

3695

02:09:10,790 --> 02:09:09,840

he felt with his hands so mint was a

3696

02:09:13,910 --> 02:09:10,800

tall

3697

02:09:15,350 --> 02:09:13,920

cold smooth column of glass he could

3698

02:09:16,950 --> 02:09:15,360

feel it he could feel the weight of it

3699

02:09:18,390 --> 02:09:16,960

he could feel the the coldness of the

3700

02:09:19,910 --> 02:09:18,400

surface he could feel the smoothness of

3701

02:09:22,310 --> 02:09:19,920

the surface with his hand

3702

02:09:23,830 --> 02:09:22,320

angostura bitters which is a something

3703

02:09:26,550 --> 02:09:23,840

you put in drinks

3704

02:09:28,310 --> 02:09:26,560

felt like a basket of ivy he could feel

3705

02:09:29,510 --> 02:09:28,320

the leaves the sponginess the texture

3706

02:09:32,550 --> 02:09:29,520

the warmth

3707

02:09:34,069 --> 02:09:32,560

so it was a very rich sensory experience

3708

02:09:37,669 --> 02:09:34,079

that he had

3709

02:09:39,030 --> 02:09:37,679

and so you and i don't have

3710

02:09:40,709 --> 02:09:39,040

most of us don't have those experiences

3711

02:09:42,629 --> 02:09:40,719

when we cook he did

3712

02:09:46,390 --> 02:09:42,639

and it allowed him to be an exceptional

3713

02:09:49,030 --> 02:09:46,400

cook he had this other way of of

3714

02:09:49,510 --> 02:09:49,040

dealing with complex tastes when he was

3715

02:09:52,229 --> 02:09:49,520

putting

3716

02:09:54,149 --> 02:09:52,239

you know foods together so so that

3717

02:09:57,589 --> 02:09:54,159

raises your question really really

3718

02:09:59,830 --> 02:09:57,599

sharply why is it that we experience

3719

02:10:01,109 --> 02:09:59,840

when we put something on our tongue why

3720

02:10:04,229 --> 02:10:01,119

do we experience it as

3721

02:10:05,750 --> 02:10:04,239

what we call taste saltiness sugar you

3722

02:10:07,350 --> 02:10:05,760

know sweetness and so forth

3723

02:10:09,189 --> 02:10:07,360

why don't we all experience it like

3724

02:10:11,189 --> 02:10:09,199

michael watson did as

3725

02:10:12,310 --> 02:10:11,199

shapes that we feel with our hands in

3726

02:10:15,189 --> 02:10:12,320

space

3727

02:10:15,510 --> 02:10:15,199

now what was what's interesting is that

3728

02:10:19,589 --> 02:10:15,520

there

3729

02:10:21,510 --> 02:10:19,599

kind of homomorphism

3730

02:10:23,030 --> 02:10:21,520

that you could write down mathematically

3731

02:10:24,629 --> 02:10:23,040

between the shapes

3732

02:10:26,310 --> 02:10:24,639

and the textures and the weights and so

3733

02:10:29,510 --> 02:10:26,320

forth he felt with his hands

3734

02:10:31,510 --> 02:10:29,520

and the experiences of taste

3735

02:10:32,870 --> 02:10:31,520

that we all feel so so there's probably

3736

02:10:36,310 --> 02:10:32,880

some homomorphism that

3737

02:10:37,910 --> 02:10:36,320

some mapping some dictionary between

3738

02:10:39,830 --> 02:10:37,920

what he felt with his hand and what we

3739

02:10:40,870 --> 02:10:39,840

taste uh what we experienced with her

3740

02:10:42,629 --> 02:10:40,880

taste

3741

02:10:45,750 --> 02:10:42,639

and and that's why your question is so

3742

02:10:49,350 --> 02:10:45,760

difficult in in many cases

3743

02:10:52,069 --> 02:10:49,360

from a functional point of view

3744

02:10:53,750 --> 02:10:52,079

the details of exactly why you have that

3745

02:10:57,589 --> 02:10:53,760

experience

3746

02:10:59,189 --> 02:10:57,599

don't matter lots of other kinds of qual

3747

02:11:01,510 --> 02:10:59,199

qualitative experiences could have the

3748

02:11:02,310 --> 02:11:01,520

same functional structure as those

3749

02:11:04,790 --> 02:11:02,320

experiences

3750

02:11:05,990 --> 02:11:04,800

so in fact you count them in one of your

3751

02:11:07,350 --> 02:11:06,000

papers you count the amount of

3752

02:11:11,189 --> 02:11:07,360

homomorphisms

3753

02:11:13,669 --> 02:11:11,199

that's right which which makes me wonder

3754

02:11:16,229 --> 02:11:13,679

like erase like why why this and not

3755

02:11:19,589 --> 02:11:16,239

another given that there are so many

3756

02:11:20,069 --> 02:11:19,599

homomorphisms so here's the best i

3757

02:11:22,390 --> 02:11:20,079

mentioned

3758

02:11:23,189 --> 02:11:22,400

okay this is the best i've got so far on

3759

02:11:24,870 --> 02:11:23,199

this right

3760

02:11:26,470 --> 02:11:24,880

so you so first of all i just wanted to

3761

02:11:28,790 --> 02:11:26,480

say hats off you asked a really

3762

02:11:29,669 --> 02:11:28,800

good good question it's a really tough

3763

02:11:32,629 --> 02:11:29,679

question and this

3764

02:11:33,350 --> 02:11:32,639

synesthesia thing really makes it clear

3765

02:11:37,589 --> 02:11:33,360

how

3766

02:11:44,470 --> 02:11:40,790

the only idea i've got right now

3767

02:11:46,310 --> 02:11:44,480

that i think is interesting enough

3768

02:11:48,709 --> 02:11:46,320

is based on girdle's incompleteness

3769

02:11:50,709 --> 02:11:48,719

theorem great

3770

02:11:52,790 --> 02:11:50,719

familiar with this girl so yeah yeah i'm

3771

02:11:55,510 --> 02:11:52,800

gonna ask you about that later yeah

3772

02:11:56,470 --> 02:11:55,520

right so girdles incompleteness theorem

3773

02:11:59,910 --> 02:11:56,480

um

3774

02:12:01,109 --> 02:11:59,920

in intuitively basically says that

3775

02:12:02,629 --> 02:12:01,119

there's no end

3776

02:12:05,430 --> 02:12:02,639

to the exploration of mathematical

3777

02:12:05,440 --> 02:12:08,709

and

3778

02:12:16,149 --> 02:12:12,870

if we take consciousness as fundamental

3779

02:12:17,589 --> 02:12:16,159

as as i'm proposing then there's only

3780

02:12:19,270 --> 02:12:17,599

one thing that mathematical structure

3781

02:12:21,189 --> 02:12:19,280

could be about

3782

02:12:22,870 --> 02:12:21,199

which is consciousness conscious

3783

02:12:27,350 --> 02:12:22,880

experiences

3784

02:12:28,790 --> 02:12:27,360

and so in that context girdles

3785

02:12:29,990 --> 02:12:28,800

incompleteness theorem would i would

3786

02:12:31,830 --> 02:12:30,000

interpret as saying that there's an

3787

02:12:34,709 --> 02:12:31,840

infinite variety

3788

02:12:36,470 --> 02:12:34,719

of kinds of conscious experience that

3789

02:12:38,310 --> 02:12:36,480

are out there of possible structures of

3790

02:12:39,990 --> 02:12:38,320

conscious experience

3791

02:12:41,350 --> 02:12:40,000

and for each kind of structure that

3792

02:12:42,790 --> 02:12:41,360

there is there's an infinite variety of

3793

02:12:45,350 --> 02:12:42,800

conscious experiences that all share

3794

02:12:47,589 --> 02:12:45,360

that structure

3795

02:12:48,709 --> 02:12:47,599

right so i would so i would call this

3796

02:12:51,990 --> 02:12:48,719

girls candy store

3797

02:12:54,790 --> 02:12:52,000

this infinite variety of possible

3798

02:12:57,270 --> 02:12:54,800

structures of conscious experiences

3799

02:12:58,709 --> 02:12:57,280

and with each with for each structure

3800

02:13:00,470 --> 02:12:58,719

probably an infinite variety of

3801
02:13:03,830 --> 02:13:00,480
conscious experiences that that share

3802
02:13:08,149 --> 02:13:03,840
that structure so this very very rich

3803
02:13:09,669 --> 02:13:08,159
and the goal of consciousness then on

3804
02:13:11,589 --> 02:13:09,679
this theory would be

3805
02:13:13,350 --> 02:13:11,599
to explore girdle's candy store that's

3806
02:13:15,669 --> 02:13:13,360
what consciousness is up to

3807
02:13:17,030 --> 02:13:15,679
girdle basically his incompleteness

3808
02:13:19,990 --> 02:13:17,040
theorem is saying

3809
02:13:21,910 --> 02:13:20,000
no matter how much mathematics you have

3810
02:13:23,350 --> 02:13:21,920
you haven't even begun

3811
02:13:25,589 --> 02:13:23,360
no matter how much structure you've

3812
02:13:27,430 --> 02:13:25,599
explored you've not even begun

3813
02:13:29,589 --> 02:13:27,440

because there's endless endless

3814

02:13:31,589 --> 02:13:29,599

exploration in some sense

3815

02:13:34,229 --> 02:13:31,599

god could never know it all there would

3816

02:13:36,149 --> 02:13:34,239

be and so god has endless

3817

02:13:37,669 --> 02:13:36,159

whatever you think about god there's an

3818

02:13:40,629 --> 02:13:37,679

endless structure

3819

02:13:42,149 --> 02:13:40,639

for even god to explore right and so

3820

02:13:45,270 --> 02:13:42,159

that

3821

02:13:46,310 --> 02:13:45,280

endless exploration of all the rich

3822

02:13:49,270 --> 02:13:46,320

varieties and

3823

02:13:50,470 --> 02:13:49,280

it's it's here i don't know here i don't

3824

02:13:53,669 --> 02:13:50,480

know how to think about it yet

3825

02:13:56,470 --> 02:13:53,679

is it an exploration

3826

02:13:56,830 --> 02:13:56,480

of a pre-existing candy store or is it

3827

02:14:00,470 --> 02:13:56,840

an

3828

02:14:03,270 --> 02:14:00,480

endless store

3829

02:14:04,069 --> 02:14:03,280

my my feeling right now is it's an

3830

02:14:06,950 --> 02:14:04,079

invention

3831

02:14:08,709 --> 02:14:06,960

that girdle is telling us girdles

3832

02:14:11,430 --> 02:14:08,719

incompleteness theorem is saying

3833

02:14:13,510 --> 02:14:11,440

there's an infinite variety of

3834

02:14:15,189 --> 02:14:13,520

structures to be invented

3835

02:14:16,790 --> 02:14:15,199

and then in the context of consciousness

3836

02:14:18,310 --> 02:14:16,800

i interpret it as saying

3837

02:14:21,750 --> 02:14:18,320

an infinite variety of conscious

3838

02:14:25,030 --> 02:14:21,760

experiences to be

3839

02:14:26,870 --> 02:14:25,040

invented i think it's invented not

3840

02:14:28,870 --> 02:14:26,880

explored you know in terms of

3841

02:14:31,510 --> 02:14:28,880

pre-existing conscious experiences

3842

02:14:33,750 --> 02:14:31,520

but there i must say my my intuitions at

3843

02:14:35,510 --> 02:14:33,760

this point fail me i don't know

3844

02:14:36,950 --> 02:14:35,520

okay let's go even further off the deep

3845

02:14:38,709 --> 02:14:36,960

end sure you're

3846

02:14:41,189 --> 02:14:38,719

completely allowed to speculate i'm not

3847

02:14:43,830 --> 02:14:41,199

michael schumer i'm not gonna

3848

02:14:45,669 --> 02:14:43,840

throw skepticism at you skepticism to

3849

02:14:50,390 --> 02:14:45,679

you straight out the gate

3850

02:14:53,589 --> 02:14:50,400

what where in your model does

3851
02:14:56,790 --> 02:14:53,599
god lie well

3852
02:14:58,550 --> 02:14:56,800
it's the the word god

3853
02:15:00,229 --> 02:14:58,560
is something that's been used in various

3854
02:15:01,350 --> 02:15:00,239
forms for thousands of years by human

3855
02:15:03,430 --> 02:15:01,360
beings

3856
02:15:04,709 --> 02:15:03,440
and it's never been precisely defined

3857
02:15:06,470 --> 02:15:04,719
right

3858
02:15:07,669 --> 02:15:06,480
never been precisely defined there's

3859
02:15:09,669 --> 02:15:07,679
there's quite a few of those words

3860
02:15:13,030 --> 02:15:09,679
causality free will identity

3861
02:15:14,069 --> 02:15:13,040
god slippery slippery but they all might

3862
02:15:15,910 --> 02:15:14,079
be related

3863
02:15:17,910 --> 02:15:15,920

but we don't kill each other over our

3864

02:15:19,430 --> 02:15:17,920

differences about the word causality

3865

02:15:21,270 --> 02:15:19,440

we do kill each other over our

3866

02:15:24,149 --> 02:15:21,280

differences about the word god

3867

02:15:24,790 --> 02:15:24,159

and we then so that's a particularly

3868

02:15:27,030 --> 02:15:24,800

troublesome

3869

02:15:29,270 --> 02:15:27,040

problem that we have that that we think

3870

02:15:31,270 --> 02:15:29,280

that's a very very important word

3871

02:15:32,790 --> 02:15:31,280

and in many cases in human history we've

3872

02:15:33,830 --> 02:15:32,800

proven that we're willing to kill

3873

02:15:36,229 --> 02:15:33,840

millions of people

3874

02:15:37,830 --> 02:15:36,239

who disagree with us about what we mean

3875

02:15:40,550 --> 02:15:37,840

by that word

3876
02:15:42,470 --> 02:15:40,560
and the remarkable thing is that's when

3877
02:15:45,510 --> 02:15:42,480
there's no precise definition

3878
02:15:47,109 --> 02:15:45,520
so i would like to propose a precise

3879
02:15:49,750 --> 02:15:47,119
definition of god

3880
02:15:51,510 --> 02:15:49,760
all right let's hear it and of course

3881
02:15:55,430 --> 02:15:51,520
i'm wrong

3882
02:15:56,629 --> 02:15:55,440
have something on the table so that we

3883
02:15:59,189 --> 02:15:56,639
can now

3884
02:16:00,550 --> 02:15:59,199
begin to figure out why it's wrong so i

3885
02:16:01,270 --> 02:16:00,560
have this definition of a conscious

3886
02:16:04,790 --> 02:16:01,280
agent

3887
02:16:07,669 --> 02:16:04,800
i'll just propose that a con that god is

3888
02:16:08,229 --> 02:16:07,679

any conscious agent that has an infinite

3889

02:16:12,390 --> 02:16:08,239

set of

3890

02:16:15,030 --> 02:16:12,400

of possible conscious experiences

3891

02:16:16,709 --> 02:16:15,040

start there now of course i'm wrong but

3892

02:16:19,510 --> 02:16:16,719

now the fun part is

3893

02:16:20,629 --> 02:16:19,520

where what's wrong with it now oh wait

3894

02:16:22,149 --> 02:16:20,639

that to me sounds like there could be

3895

02:16:24,149 --> 02:16:22,159

multiple guns

3896

02:16:25,430 --> 02:16:24,159

because you could have multiple agents

3897

02:16:28,470 --> 02:16:25,440

that's for infinite sets

3898

02:16:30,470 --> 02:16:28,480

that's exactly right one so now

3899

02:16:32,230 --> 02:16:30,480

by the way with that definition it may

3900

02:16:34,549 --> 02:16:32,240

end up being a theorem

3901
02:16:35,910 --> 02:16:34,559
that polytheism is true not monotheism

3902
02:16:38,790 --> 02:16:35,920
but so what but notice

3903
02:16:39,830 --> 02:16:38,800
all of a sudden that we we get this

3904
02:16:42,070 --> 02:16:39,840
thing where

3905
02:16:44,230 --> 02:16:42,080
we're now i gave you a definition of god

3906
02:16:46,389 --> 02:16:44,240
and you immediately saw an implication

3907
02:16:48,230 --> 02:16:46,399
try that with with most other religious

3908
02:16:49,429 --> 02:16:48,240
views of god that they're not precise

3909
02:16:51,589 --> 02:16:49,439
enough

3910
02:16:53,110 --> 02:16:51,599
to to have these kinds of inferential

3911
02:16:53,990 --> 02:16:53,120
implications where we can actually what

3912
02:16:56,070 --> 02:16:54,000
if someone said

3913
02:16:57,830 --> 02:16:56,080

okay i can save monotheism by saying

3914

02:16:59,270 --> 02:16:57,840

that god is the amalgam of all the

3915

02:17:01,190 --> 02:16:59,280

conscious agents

3916

02:17:02,629 --> 02:17:01,200

and that would be that would be another

3917

02:17:04,389 --> 02:17:02,639

way to to go at it

3918

02:17:05,669 --> 02:17:04,399

and you might not and that might be the

3919

02:17:07,110 --> 02:17:05,679

critique that you give of my first

3920

02:17:09,190 --> 02:17:07,120

definition of god it would be my

3921

02:17:12,709 --> 02:17:09,200

critique of my first definition of god

3922

02:17:15,589 --> 02:17:12,719

would be to say well no let god

3923

02:17:16,629 --> 02:17:15,599

be the top conscious agent the the the

3924

02:17:18,870 --> 02:17:16,639

one that's the unit

3925

02:17:20,469 --> 02:17:18,880

um you know the super saiyan nation the

3926

02:17:21,429 --> 02:17:20,479

combination of all the other agents that

3927

02:17:23,349 --> 02:17:21,439

exist

3928

02:17:25,349 --> 02:17:23,359

but then we may turn out as we look at

3929

02:17:26,150 --> 02:17:25,359

the dynamics of conscious agents and the

3930

02:17:28,389 --> 02:17:26,160

combination

3931

02:17:30,150 --> 02:17:28,399

we may find that there is no at any

3932

02:17:32,150 --> 02:17:30,160

moment there may not be a single

3933

02:17:33,190 --> 02:17:32,160

maximum so it may not be a lattice where

3934

02:17:34,950 --> 02:17:33,200

there's one peak

3935

02:17:37,030 --> 02:17:34,960

to the whole network there may be

3936

02:17:40,309 --> 02:17:37,040

multiple and and no single

3937

02:17:41,990 --> 02:17:40,319

maximal at any one at any one moment in

3938

02:17:44,549 --> 02:17:42,000

the dynamics so so again

3939

02:17:46,389 --> 02:17:44,559

it would be a matter of and it may turn

3940

02:17:47,910 --> 02:17:46,399

out to be a

3941

02:17:49,910 --> 02:17:47,920

property of the kind of dynamics of

3942

02:17:52,150 --> 02:17:49,920

conscious agents that you propose

3943

02:17:53,750 --> 02:17:52,160

that in these kinds of dynamics it's a

3944

02:17:55,110 --> 02:17:53,760

polytheism and this one there's a

3945

02:17:58,709 --> 02:17:55,120

monotheism

3946

02:18:02,230 --> 02:17:58,719

so so that's what's so fun about this is

3947

02:18:04,309 --> 02:18:02,240

now all of a sudden we're

3948

02:18:05,669 --> 02:18:04,319

we're already engaging by the way like

3949

02:18:07,509 --> 02:18:05,679

this on on

3950

02:18:09,190 --> 02:18:07,519

the word god in a way that we could

3951

02:18:11,669 --> 02:18:09,200

never before engaged

3952

02:18:13,190 --> 02:18:11,679

this is now a technical term now and

3953

02:18:14,709 --> 02:18:13,200

again of course

3954

02:18:17,509 --> 02:18:14,719

everything that we've said so far is

3955

02:18:20,790 --> 02:18:17,519

almost surely deeply wrong

3956

02:18:22,709 --> 02:18:20,800

but it's precise and so we can find out

3957

02:18:24,950 --> 02:18:22,719

precisely where it's wrong

3958

02:18:26,070 --> 02:18:24,960

and and by the way notice now we're in a

3959

02:18:29,509 --> 02:18:26,080

very different space

3960

02:18:31,190 --> 02:18:29,519

i'm not tempted to kill you or or hurt

3961

02:18:33,110 --> 02:18:31,200

you because you disagree with me

3962

02:18:35,429 --> 02:18:33,120

i'm rather tempted to listen to your

3963

02:18:37,110 --> 02:18:35,439

ideas and go oh wow that's really cool

3964

02:18:38,709 --> 02:18:37,120

i hadn't thought about that let me let

3965

02:18:40,469 --> 02:18:38,719

me rethink my position

3966

02:18:42,549 --> 02:18:40,479

it's a very very different kind of thing

3967

02:18:44,709 --> 02:18:42,559

and so can we

3968

02:18:46,790 --> 02:18:44,719

i mean it seems that the word god is

3969

02:18:48,950 --> 02:18:46,800

very very important to us

3970

02:18:49,830 --> 02:18:48,960

instead of having it be an ambiguous

3971

02:18:51,589 --> 02:18:49,840

term that we

3972

02:18:53,030 --> 02:18:51,599

fight to the death over and hate each

3973

02:18:56,070 --> 02:18:53,040

other over

3974

02:19:03,030 --> 02:18:59,429

since we think it's so important

3975

02:19:04,549 --> 02:19:03,040

it's important enough to be precise

3976

02:19:05,669 --> 02:19:04,559

if it's that important to us then it's

3977

02:19:08,230 --> 02:19:05,679

important enough that we should be

3978

02:19:14,469 --> 02:19:08,240

precise about what we mean

3979

02:19:15,830 --> 02:19:14,479

then we can start to have a dialogue and

3980

02:19:17,349 --> 02:19:15,840

try to refine it

3981

02:19:18,870 --> 02:19:17,359

and and come to some kind of mutual

3982

02:19:20,790 --> 02:19:18,880

understanding

3983

02:19:22,070 --> 02:19:20,800

so so that's sort of the scientific

3984

02:19:26,549 --> 02:19:22,080

attitude of

3985

02:19:28,389 --> 02:19:26,559

um be precise so that we

3986

02:19:29,830 --> 02:19:28,399

don't get stuck in the same thoughts

3987

02:19:30,230 --> 02:19:29,840

that we've had for thousands of years we

3988

02:19:32,629 --> 02:19:30,240

don't

3989

02:19:35,190 --> 02:19:32,639

end up being dogmatic defenders of

3990

02:19:39,669 --> 02:19:35,200

something that's not even well defined

3991

02:19:42,230 --> 02:19:39,679

rather we it's it's a sense of humility

3992

02:19:42,790 --> 02:19:42,240

these are the best ideas that i and my

3993

02:19:45,910 --> 02:19:42,800

tradition

3994

02:19:46,549 --> 02:19:45,920

have had so far about god there's

3995

02:19:48,950 --> 02:19:46,559

probably

3996

02:19:51,830 --> 02:19:48,960

a lot of insight in those ideas and

3997

02:19:54,950 --> 02:19:51,840

there's probably some mistakes

3998

02:19:58,150 --> 02:19:54,960

let me listen to your ideas

3999

02:20:02,150 --> 02:19:58,160

let's have you listen to my ideas

4000

02:20:04,870 --> 02:20:02,160

and can we then get to a new and deeper

4001
02:20:06,550 --> 02:20:04,880
and more precise notion of god

4002
02:20:08,790 --> 02:20:06,560
since we agree that this seems to be an

4003
02:20:12,070 --> 02:20:08,800
important concept for us

4004
02:20:13,990 --> 02:20:12,080
can we together work in humility

4005
02:20:15,670 --> 02:20:14,000
and both admit up front that maybe we

4006
02:20:17,270 --> 02:20:15,680
don't have it quite right

4007
02:20:18,710 --> 02:20:17,280
that's sort of the scientific attitude

4008
02:20:23,270 --> 02:20:18,720
about this thing being pre

4009
02:20:26,870 --> 02:20:23,280
being precise is an ultimate act

4010
02:20:28,469 --> 02:20:26,880
of humility on the one hand because

4011
02:20:30,230 --> 02:20:28,479
you're making yourself vulnerable to

4012
02:20:32,870 --> 02:20:30,240
being shown wrong

4013
02:20:34,469 --> 02:20:32,880

but it's also the ultimate act of true

4014

02:20:38,070 --> 02:20:34,479

inquisitiveness

4015

02:20:39,990 --> 02:20:38,080

it's saying this is precisely the best

4016

02:20:42,150 --> 02:20:40,000

idea i've got so far

4017

02:20:43,750 --> 02:20:42,160

but i really want to understand so i'm

4018

02:20:45,750 --> 02:20:43,760

stating it precisely

4019

02:20:46,870 --> 02:20:45,760

so i can figure out where i'm wrong and

4020

02:20:49,110 --> 02:20:46,880

then we can move on

4021

02:20:50,550 --> 02:20:49,120

into a deeper inquiry so that's what i

4022

02:20:51,590 --> 02:20:50,560

would like to see in the in the

4023

02:20:54,309 --> 02:20:51,600

discussion

4024

02:20:55,830 --> 02:20:54,319

of god i would love to see in this sense

4025

02:21:28,230 --> 02:20:55,840

a

4026
02:21:31,670 --> 02:21:28,240
terms how will we ever

4027
02:21:33,830 --> 02:21:31,680
make progress on the deeper questions

4028
02:21:34,710 --> 02:21:33,840
okay we're in the defend already let's

4029
02:21:38,830 --> 02:21:34,720
go to the

4030
02:21:40,950 --> 02:21:38,840
mariana trench what happens when you

4031
02:21:44,710 --> 02:21:40,960
die well

4032
02:21:47,110 --> 02:21:44,720
if you're a physicalist

4033
02:21:48,550 --> 02:21:47,120
it's quite clear right your

4034
02:21:52,389 --> 02:21:48,560
consciousness

4035
02:21:55,750 --> 02:21:52,399
is entirely the product

4036
02:21:57,830 --> 02:21:55,760
of your brain or your embodied

4037
02:21:59,030 --> 02:21:57,840
brain i mean some of my colleagues will

4038
02:22:02,070 --> 02:21:59,040

will emphasize

4039

02:22:02,950 --> 02:22:02,080

the cycle between sort of an inactive

4040

02:22:04,230 --> 02:22:02,960

point of view that

4041

02:22:05,670 --> 02:22:04,240

it's not just the brain it's the brain

4042

02:22:06,230 --> 02:22:05,680

and the body in the environment in that

4043

02:22:14,309 --> 02:22:06,240

loop

4044

02:22:16,389 --> 02:22:14,319

therefore your consciousness stops and

4045

02:22:18,150 --> 02:22:16,399

so from that point of view it's it's

4046

02:22:19,510 --> 02:22:18,160

the prediction is quite clear there's

4047

02:22:23,590 --> 02:22:19,520

nothing that survives death

4048

02:22:27,270 --> 02:22:23,600

um from you that that i'm proposing here

4049

02:22:30,950 --> 02:22:27,280

space time itself is not fundamental

4050

02:22:34,550 --> 02:22:33,830

including our conscious experiences

4051
02:22:38,870 --> 02:22:34,560
instead

4052
02:22:44,950 --> 02:22:38,880
it's a virtual reality headset

4053
02:22:51,670 --> 02:22:48,070
does not have to die

4054
02:22:55,270 --> 02:22:51,680
when the body dies but as i said

4055
02:22:57,510 --> 02:22:55,280
the self is not fundamental in the

4056
02:22:59,750 --> 02:22:57,520
theory that i'm developing

4057
02:23:03,030 --> 02:22:59,760
the self is just a data structure like

4058
02:23:05,110 --> 02:23:03,040
space time is a data structure

4059
02:23:06,870 --> 02:23:05,120
so from the point of view that i'm

4060
02:23:10,309 --> 02:23:06,880
working on right now

4061
02:23:13,030 --> 02:23:10,319
my death does not mean that

4062
02:23:14,309 --> 02:23:13,040
my consciousness disappears but myself

4063
02:23:15,750 --> 02:23:14,319

may

4064

02:23:18,230 --> 02:23:15,760

i don't know yet i mean that's going to

4065

02:23:20,389 --> 02:23:18,240

be something i want to work on in

4066

02:23:21,830 --> 02:23:20,399

this theory the self just being a data

4067

02:23:23,190 --> 02:23:21,840

structure maybe that data structure

4068

02:23:25,430 --> 02:23:23,200

dissolves

4069

02:23:26,790 --> 02:23:25,440

um or maybe it's like

4070

02:23:30,550 --> 02:23:26,800

[Music]

4071

02:23:33,910 --> 02:23:30,560

what happens in metamorphosis

4072

02:23:36,150 --> 02:23:33,920

a caterpillar becoming a butterfly

4073

02:23:38,389 --> 02:23:36,160

right in some sense there's not much

4074

02:23:40,230 --> 02:23:38,399

recognizable

4075

02:23:42,389 --> 02:23:40,240

left of the caterpillar when the

4076
02:23:46,469 --> 02:23:42,399
butterfly emerges

4077
02:23:50,150 --> 02:23:46,479
um there is a a continuity

4078
02:23:53,910 --> 02:23:50,160
but you know the butterfly has

4079
02:23:56,070 --> 02:23:53,920
only six legs the the caterpillar

4080
02:23:57,270 --> 02:23:56,080
had quite a few more the caterpillar

4081
02:23:59,190 --> 02:23:57,280
eats leaves

4082
02:24:01,270 --> 02:23:59,200
the butterfly can't eat leaves the

4083
02:24:02,710 --> 02:24:01,280
butterfly drinks nectar the caterpillar

4084
02:24:04,630 --> 02:24:02,720
never drank nectar

4085
02:24:06,309 --> 02:24:04,640
the butterfly has wings caterpillar has

4086
02:24:07,830 --> 02:24:06,319
no concept of wings

4087
02:24:10,309 --> 02:24:07,840
they're they're the same creature at

4088
02:24:13,110 --> 02:24:10,319

different stages but they're utterly

4089

02:24:13,750 --> 02:24:13,120

alien and and maybe the thing that

4090

02:24:15,910 --> 02:24:13,760

survives

4091

02:24:17,670 --> 02:24:15,920

death is as different from me as a

4092

02:24:20,309 --> 02:24:17,680

butterfly is from a caterpillar

4093

02:24:21,030 --> 02:24:20,319

um and it you know so i i just don't

4094

02:24:24,150 --> 02:24:21,040

know so

4095

02:24:25,429 --> 02:24:24,160

um i'm still on that i'll be

4096

02:24:27,429 --> 02:24:25,439

be very interested to work on the

4097

02:24:32,230 --> 02:24:27,439

mathematics and see

4098

02:24:36,070 --> 02:24:34,469

that maybe that may be helpful here so

4099

02:24:38,070 --> 02:24:36,080

suppose you go to a virtual reality

4100

02:24:40,950 --> 02:24:38,080

arcade with some friends

4101
02:24:41,990 --> 02:24:40,960
to place a virtual volleyball you put on

4102
02:24:44,389 --> 02:24:42,000
your headset and bodysuit

4103
02:24:45,110 --> 02:24:44,399
and you see yourself emerge immersed in

4104
02:24:51,349 --> 02:24:45,120
a

4105
02:24:53,270 --> 02:24:51,359
cross the net

4106
02:24:54,630 --> 02:24:53,280
and so you serve the virtual volleyball

4107
02:24:56,150 --> 02:24:54,640
and you guys play for a while

4108
02:24:58,630 --> 02:24:56,160
and then one of your friends you know

4109
02:24:59,590 --> 02:24:58,640
bob says excuse me i'm thirsty i'm gonna

4110
02:25:01,349 --> 02:24:59,600
go get a drink

4111
02:25:02,630 --> 02:25:01,359
and he takes off his headset in his body

4112
02:25:07,429 --> 02:25:02,640
suit to go get a drink

4113
02:25:11,030 --> 02:25:07,439

and his avatar collapses on the sand

4114

02:25:14,150 --> 02:25:11,040

well within that virtual reality

4115

02:25:15,750 --> 02:25:14,160

he's effectively dead but

4116

02:25:17,190 --> 02:25:15,760

of course bob isn't dead he just stepped

4117

02:25:20,230 --> 02:25:17,200

out of the interface

4118

02:25:21,830 --> 02:25:20,240

and so there's the sense in the theory

4119

02:25:25,590 --> 02:25:21,840

that i'm developing

4120

02:25:28,630 --> 02:25:25,600

that your body is just an avatar

4121

02:25:29,750 --> 02:25:28,640

the death of your body just like the

4122

02:25:31,349 --> 02:25:29,760

death of bob

4123

02:25:33,110 --> 02:25:31,359

in the virtual reality game is not the

4124

02:25:33,830 --> 02:25:33,120

death of bob bob just was not getting a

4125

02:25:35,910 --> 02:25:33,840

drink

4126
02:25:38,870 --> 02:25:35,920
so death may just be stepping out of the

4127
02:25:40,150 --> 02:25:38,880
interface but even if consciousness

4128
02:25:43,830 --> 02:25:40,160
survives

4129
02:25:45,510 --> 02:25:43,840
different from the consciousness that

4130
02:25:46,870 --> 02:25:45,520
you now have as

4131
02:25:48,790 --> 02:25:46,880
you could imagine a butterfly being

4132
02:25:51,990 --> 02:25:48,800
different from a caterpillar

4133
02:25:53,590 --> 02:25:52,000
even more in the analogy of bob going to

4134
02:25:54,630 --> 02:25:53,600
get a drink there's a retainment of

4135
02:25:57,910 --> 02:25:54,640
memory

4136
02:26:00,150 --> 02:25:57,920
in your model i recall you

4137
02:26:01,349 --> 02:26:00,160
saying earlier in the conversation that

4138
02:26:02,790 --> 02:26:01,359

you don't have a

4139

02:26:04,630 --> 02:26:02,800

a theory for memory or there is no

4140

02:26:08,150 --> 02:26:04,640

memory i could be wrong you might but

4141

02:26:11,349 --> 02:26:08,160

regardless does memory survive death

4142

02:26:12,469 --> 02:26:11,359

is it possible memories are data

4143

02:26:15,830 --> 02:26:12,479

structures as well

4144

02:26:18,230 --> 02:26:15,840

so those data structures

4145

02:26:19,830 --> 02:26:18,240

may may or may not be preserved so that

4146

02:26:20,710 --> 02:26:19,840

would be another aspect of this whole

4147

02:26:23,429 --> 02:26:20,720

thing but

4148

02:26:23,990 --> 02:26:23,439

right now i have no reason to say up

4149

02:26:26,230 --> 02:26:24,000

front

4150

02:26:27,270 --> 02:26:26,240

that i would claim that they necessarily

4151
02:26:29,429 --> 02:26:27,280
are preserved so

4152
02:26:31,349 --> 02:26:29,439
i can't claim that that your current

4153
02:26:32,830 --> 02:26:31,359
notion of self would be preserved

4154
02:26:34,710 --> 02:26:32,840
or your current memories would be

4155
02:26:37,030 --> 02:26:34,720
preserved and

4156
02:26:37,990 --> 02:26:37,040
the issue would then be could i build

4157
02:26:41,190 --> 02:26:38,000
models

4158
02:26:43,429 --> 02:26:41,200
of conscious agents in which

4159
02:26:44,389 --> 02:26:43,439
i first modeled what the death process

4160
02:26:45,830 --> 02:26:44,399
is as

4161
02:26:48,230 --> 02:26:45,840
in terms of stepping out of a particular

4162
02:26:49,910 --> 02:26:48,240
interface and can i find models

4163
02:26:52,070 --> 02:26:49,920

so but but notice what i'm saying here

4164

02:26:53,670 --> 02:26:52,080

now i'm actually trying to model the

4165

02:26:55,670 --> 02:26:53,680

death process

4166

02:26:57,349 --> 02:26:55,680

with a mathematical model in terms of

4167

02:26:58,710 --> 02:26:57,359

conscious agents and then i'm asking a

4168

02:27:01,990 --> 02:26:58,720

technical question

4169

02:27:02,870 --> 02:27:02,000

could certain data structures self data

4170

02:27:05,349 --> 02:27:02,880

structure

4171

02:27:06,469 --> 02:27:05,359

memory my own personal episodic memory

4172

02:27:09,830 --> 02:27:06,479

data structures

4173

02:27:12,230 --> 02:27:09,840

be retained

4174

02:27:14,150 --> 02:27:12,240

in this other process that that is

4175

02:27:15,510 --> 02:27:14,160

leading to the extraction of

4176
02:27:17,190 --> 02:27:15,520
a conscious agent out of a particular

4177
02:27:19,349 --> 02:27:17,200
interface

4178
02:27:20,870 --> 02:27:19,359
that i don't know the answer to it but

4179
02:27:22,230 --> 02:27:20,880
for me it's a technical question and a

4180
02:27:26,550 --> 02:27:22,240
really interesting one

4181
02:27:28,070 --> 02:27:26,560
and and one that i don't think is beyond

4182
02:27:29,910 --> 02:27:28,080
our scope i think it's one that we can

4183
02:27:30,950 --> 02:27:29,920
address we can try to find what i like

4184
02:27:35,110 --> 02:27:30,960
about

4185
02:27:36,950 --> 02:27:35,120
reminds me of newtonian approximation

4186
02:27:38,469 --> 02:27:36,960
where you just guess at what one of the

4187
02:27:40,710 --> 02:27:38,479
roots are and you're

4188
02:27:42,469 --> 02:27:40,720

knowing you know full well that it's

4189

02:27:44,150 --> 02:27:42,479

likely to be wrong

4190

02:27:46,389 --> 02:27:44,160

but because of that guess you can get

4191

02:27:48,309 --> 02:27:46,399

closer and closer to the truth

4192

02:27:50,630 --> 02:27:48,319

that's how science works right you you

4193

02:27:52,309 --> 02:27:50,640

you guess at the foundations

4194

02:27:55,349 --> 02:27:52,319

you guess of what the right assumptions

4195

02:27:57,270 --> 02:27:55,359

are newton did a brilliant job i mean

4196

02:27:59,510 --> 02:27:57,280

he's probably one of the smartest men

4197

02:28:02,710 --> 02:27:59,520

that ever lived maybe the smartest

4198

02:28:07,030 --> 02:28:02,720

uh incredible brilliance and and

4199

02:28:11,990 --> 02:28:10,870

the new theories give i give newton as

4200

02:28:14,710 --> 02:28:12,000

an approximation

4201

02:28:16,070 --> 02:28:14,720

like well einstein gives newton as a

4202

02:28:17,030 --> 02:28:16,080

limiting case as the speed of light goes

4203

02:28:20,309 --> 02:28:17,040

to infinity

4204

02:28:23,349 --> 02:28:20,319

right newton um is wrong but but he's

4205

02:28:23,750 --> 02:28:23,359

deeply right too he had his hands on

4206

02:28:26,790 --> 02:28:23,760

something

4207

02:28:28,710 --> 02:28:26,800

so we would like to have assumptions in

4208

02:28:32,710 --> 02:28:28,720

this area of consciousness

4209

02:28:36,469 --> 02:28:34,870

but that then lead that turn all the

4210

02:28:38,309 --> 02:28:36,479

kinds of questions you're asking

4211

02:28:39,670 --> 02:28:38,319

into technical problems that we can in

4212

02:28:41,830 --> 02:28:39,680

principle solve and

4213

02:28:43,670 --> 02:28:41,840

all the questions you're asking so far

4214

02:28:45,349 --> 02:28:43,680

are ones i think that we can

4215

02:28:47,910 --> 02:28:45,359

pose as technical questions and try to

4216

02:28:51,750 --> 02:28:49,030

let's get back to girdles and

4217

02:28:55,030 --> 02:28:51,760

completeness theorem people like penrose

4218

02:28:57,110 --> 02:28:55,040

and lucas would say that

4219

02:28:59,270 --> 02:28:57,120

any system that's computational in

4220

02:29:00,630 --> 02:28:59,280

nature which yours sounds like

4221

02:29:02,389 --> 02:29:00,640

or at least it's algorithmic or

4222

02:29:04,550 --> 02:29:02,399

rule-based

4223

02:29:07,670 --> 02:29:04,560

would necessarily fail at a model of

4224

02:29:10,550 --> 02:29:07,680

consciousness because

4225

02:29:12,070 --> 02:29:10,560

within that system there are truths that

4226
02:29:15,750 --> 02:29:12,080
that system cannot see

4227
02:29:17,590 --> 02:29:15,760
as being true but we can

4228
02:29:20,830 --> 02:29:17,600
how does your how do you deal with that

4229
02:29:20,840 --> 02:29:24,550
well so

4230
02:29:31,429 --> 02:29:28,550
there are non-computable functions

4231
02:29:32,230 --> 02:29:31,439
right and this is something that penrose

4232
02:29:35,750 --> 02:29:32,240
knows quite well

4233
02:29:38,710 --> 02:29:35,760
and is focused on in some of his work so

4234
02:29:40,469 --> 02:29:38,720
in fact it's quite remarkable if you

4235
02:29:44,230 --> 02:29:40,479
just look

4236
02:29:47,590 --> 02:29:44,240
at the integers or even just the natural

4237
02:29:52,150 --> 02:29:49,750
and you ask look at all the functions

4238
02:29:55,190 --> 02:29:52,160

from the integers to the integers

4239

02:29:57,750 --> 02:29:55,200

right well it's

4240

02:29:59,349 --> 02:29:57,760

mathematicians can show that there's an

4241

02:30:00,469 --> 02:29:59,359

uncountable set of functions

4242

02:30:01,990 --> 02:30:00,479

from the integers to the integers

4243

02:30:03,670 --> 02:30:02,000

because the number of functions is the

4244

02:30:06,550 --> 02:30:03,680

power set of the integer so it's it's

4245

02:30:06,950 --> 02:30:06,560

higher cardinality than the energies so

4246

02:30:10,389 --> 02:30:06,960

it's an

4247

02:30:14,870 --> 02:30:10,399

uncountable set but

4248

02:30:18,070 --> 02:30:14,880

turing proved that the set

4249

02:30:21,429 --> 02:30:18,080

of all computable functions

4250

02:30:26,950 --> 02:30:25,670

therefore when we look at just

4251
02:30:29,110 --> 02:30:26,960
the collection of functions from the

4252
02:30:31,349 --> 02:30:29,120
integers to the integers

4253
02:30:32,309 --> 02:30:31,359
which is uncountable what that means is

4254
02:30:36,150 --> 02:30:32,319
that

4255
02:30:37,190 --> 02:30:36,160
almost no function is computable

4256
02:30:38,870 --> 02:30:37,200
when you look at the set of all

4257
02:30:39,750 --> 02:30:38,880
functions the set of computable

4258
02:30:42,389 --> 02:30:39,760
functions

4259
02:30:44,870 --> 02:30:42,399
is probability zero for some interesting

4260
02:30:51,990 --> 02:30:48,790
so so the reason we

4261
02:30:53,590 --> 02:30:52,000
focus on computable functions is partly

4262
02:30:55,510 --> 02:30:53,600
because of our lack of imagination it's

4263
02:30:58,550 --> 02:30:55,520

hard for us to imagine

4264

02:31:00,389 --> 02:30:58,560

uncomputable functions right if you've

4265

02:31:02,070 --> 02:31:00,399

taken a class in computer science where

4266

02:31:05,429 --> 02:31:02,080

you actually have to like

4267

02:31:08,150 --> 02:31:05,439

deal with uncomputable functions um

4268

02:31:09,510 --> 02:31:08,160

you can get there you can study in a

4269

02:31:11,830 --> 02:31:09,520

non-computable function

4270

02:31:12,710 --> 02:31:11,840

but boy is it hard it really strips all

4271

02:31:15,429 --> 02:31:12,720

the gears in your head

4272

02:31:17,030 --> 02:31:15,439

it's just so hard for us but so most

4273

02:31:19,030 --> 02:31:17,040

functions are not computable

4274

02:31:20,469 --> 02:31:19,040

our brains have a hard time even

4275

02:31:23,910 --> 02:31:20,479

understanding one of them

4276

02:31:27,030 --> 02:31:23,920

so it's a real limitation of our brains

4277

02:31:34,230 --> 02:31:30,150

in my field cognitive neuroscience we're

4278

02:31:37,429 --> 02:31:34,240

giving computational theories of mind

4279

02:31:39,990 --> 02:31:37,439

there is a way to look at this to

4280

02:31:40,950 --> 02:31:40,000

what my my field is doing um and say

4281

02:31:42,070 --> 02:31:40,960

what are you guys up to

4282

02:31:44,070 --> 02:31:42,080

you're you're trying to give

4283

02:31:47,030 --> 02:31:44,080

computational theories of

4284

02:31:48,550 --> 02:31:47,040

cognition if you're if you're saying

4285

02:31:49,510 --> 02:31:48,560

that cognition is only based on

4286

02:31:50,950 --> 02:31:49,520

computation

4287

02:31:52,550 --> 02:31:50,960

you're claiming that of all the

4288

02:31:54,230 --> 02:31:52,560

functions that are available there's

4289

02:31:56,469 --> 02:31:54,240

this probability zero subset of

4290

02:31:58,550 --> 02:31:56,479

functions that that are only responsible

4291

02:32:01,030 --> 02:31:58,560

for our minds and for consciousness

4292

02:32:01,990 --> 02:32:01,040

right you know if like you know the

4293

02:32:04,790 --> 02:32:02,000

tinonian

4294

02:32:05,429 --> 02:32:04,800

coke approach of you know integrated

4295

02:32:08,950 --> 02:32:05,439

information

4296

02:32:10,950 --> 02:32:08,960

it's a computational function so why

4297

02:32:12,790 --> 02:32:10,960

should we assume that cognition in

4298

02:32:16,230 --> 02:32:12,800

general in consciousness

4299

02:32:18,389 --> 02:32:16,240

um is restricted to this probability

4300

02:32:20,950 --> 02:32:18,399

zero subset of functions

4301
02:32:21,990 --> 02:32:20,960
what what's what's the principled reason

4302
02:32:24,150 --> 02:32:22,000
for that

4303
02:32:25,429 --> 02:32:24,160
and most of my colleagues don't even

4304
02:32:26,550 --> 02:32:25,439
understand that this is an issue and

4305
02:32:27,830 --> 02:32:26,560
certainly don't have an answer for it

4306
02:32:29,510 --> 02:32:27,840
but but of course

4307
02:32:32,550 --> 02:32:29,520
penrose is an exception penrose is

4308
02:32:34,710 --> 02:32:32,560
saying he unders he understands all this

4309
02:32:36,389 --> 02:32:34,720
but but i still don't agree with what

4310
02:32:39,510 --> 02:32:36,399
where penrose goes on this right

4311
02:32:41,110 --> 02:32:39,520
penrose is is saying

4312
02:32:42,950 --> 02:32:41,120
he still wants to start with a

4313
02:32:46,389 --> 02:32:42,960

physicalist framework

4314

02:32:47,429 --> 02:32:46,399

and get consciousness to emerge by some

4315

02:32:50,870 --> 02:32:47,439

kind of

4316

02:32:51,510 --> 02:32:50,880

um objective reduction of forget about

4317

02:32:54,630 --> 02:32:51,520

that

4318

02:32:57,830 --> 02:32:54,640

i i'd say it's more fundamental the

4319

02:33:00,389 --> 02:32:57,840

w the conscious agent model looks to me

4320

02:33:02,790 --> 02:33:00,399

to be algorithmic or rule-based

4321

02:33:03,750 --> 02:33:02,800

and the statement from penrose

4322

02:33:05,270 --> 02:33:03,760

independent of whether or not

4323

02:33:06,710 --> 02:33:05,280

consciousness emerges from physicality

4324

02:33:09,590 --> 02:33:06,720

just forget about that

4325

02:33:10,389 --> 02:33:09,600

is that a rule-based system can't

4326

02:33:12,469 --> 02:33:10,399

account for

4327

02:33:14,150 --> 02:33:12,479

our conscious behavior given that we

4328

02:33:17,030 --> 02:33:14,160

have an understanding of what's

4329

02:33:17,750 --> 02:33:17,040

true but not provable within that

4330

02:33:21,910 --> 02:33:17,760

rule-based

4331

02:33:25,990 --> 02:33:21,920

we have that quality

4332

02:33:29,270 --> 02:33:26,000

our consciousness can't be relegated to

4333

02:33:30,710 --> 02:33:29,280

an algorithm which yours seems like now

4334

02:33:33,110 --> 02:33:30,720

it could just be this is rudimentary

4335

02:33:34,950 --> 02:33:33,120

form kurt i'm like i'm a step one

4336

02:33:37,030 --> 02:33:34,960

or there might be another counter and

4337

02:33:39,910 --> 02:33:37,040

i'm just curious to know what you think

4338

02:33:41,110 --> 02:33:39,920

well so again the framework of what i'm

4339

02:33:44,150 --> 02:33:41,120

doing is different from what

4340

02:33:44,790 --> 02:33:44,160

what what he's trying to do right i i'm

4341

02:33:46,870 --> 02:33:44,800

not too

4342

02:33:48,150 --> 02:33:46,880

i'm not trying to explain how

4343

02:33:50,070 --> 02:33:48,160

consciousness arises

4344

02:33:51,510 --> 02:33:50,080

i'm assuming it so consciousness is

4345

02:33:53,349 --> 02:33:51,520

given

4346

02:33:55,429 --> 02:33:53,359

now there's a question do

4347

02:33:57,670 --> 02:33:55,439

consciousnesses interact only by rule

4348

02:34:00,830 --> 02:33:57,680

right now i'm studying rules

4349

02:34:02,870 --> 02:34:00,840

and but but i'm completely open to

4350

02:34:04,389 --> 02:34:02,880

non-computational

4351
02:34:06,389 --> 02:34:04,399
modes of interaction among these

4352
02:34:08,070 --> 02:34:06,399
countries has no

4353
02:34:10,070 --> 02:34:08,080
bearing because see i'm not trying to

4354
02:34:12,790 --> 02:34:10,080
say how consciousness arises

4355
02:34:13,910 --> 02:34:12,800
i'm saying it it's it exists it's

4356
02:34:15,510 --> 02:34:13,920
fundamental

4357
02:34:17,910 --> 02:34:15,520
but the kinds of interactions the

4358
02:34:20,750 --> 02:34:17,920
consciousnesses have

4359
02:34:21,910 --> 02:34:20,760
surely if they're i don't want to

4360
02:34:24,870 --> 02:34:21,920
exclude

4361
02:34:26,469 --> 02:34:24,880
rule-based interactions but i may find

4362
02:34:27,910 --> 02:34:26,479
that i don't want to restrict to

4363
02:34:29,510 --> 02:34:27,920

rule-based interaction

4364

02:34:30,870 --> 02:34:29,520

so i'm starting with the rule-based ones

4365

02:34:31,590 --> 02:34:30,880

partly because of my background and my

4366

02:34:33,830 --> 02:34:31,600

limitations

4367

02:34:36,630 --> 02:34:33,840

but eventually i'd love to to go beyond

4368

02:34:38,469 --> 02:34:36,640

so i so i would say point well taken

4369

02:34:40,070 --> 02:34:38,479

non-computational approaches may be very

4370

02:34:41,910 --> 02:34:40,080

very interesting um

4371

02:34:43,270 --> 02:34:41,920

in this absolutely there's a cockpit of

4372

02:34:45,750 --> 02:34:43,280

scientist named jonathan

4373

02:34:49,030 --> 02:34:45,760

verveiki or john verveicky and he says

4374

02:34:52,150 --> 02:34:50,870

i i don't know if they're all orthogonal

4375

02:34:53,429 --> 02:34:52,160

they're definitely related but there's

4376

02:34:55,270 --> 02:34:53,439

four different modes of

4377

02:34:57,030 --> 02:34:55,280

knowledge and one is propositional and

4378

02:34:58,550 --> 02:34:57,040

that's what since the science since the

4379

02:35:00,550 --> 02:34:58,560

development of the scientific method

4380

02:35:02,550 --> 02:35:00,560

we've relegated our knowledge to

4381

02:35:03,830 --> 02:35:02,560

the propositions are what are true but

4382

02:35:05,349 --> 02:35:03,840

he says well there are others there's

4383

02:35:07,110 --> 02:35:05,359

participatory knowing

4384

02:35:08,469 --> 02:35:07,120

there's procedural knowledge obviously

4385

02:35:11,429 --> 02:35:08,479

like that one anyone can get

4386

02:35:12,070 --> 02:35:11,439

and then there's perspective and i'm

4387

02:35:15,510 --> 02:35:12,080

curious

4388

02:35:16,950 --> 02:35:15,520

it's like how would one even if your

4389

02:35:18,950 --> 02:35:16,960

if your theory would incorporate then

4390

02:35:20,070 --> 02:35:18,960

how the heck can you even write down

4391

02:35:23,590 --> 02:35:20,080

because this

4392

02:35:26,950 --> 02:35:23,600

notion of writing down is a proposition

4393

02:35:29,990 --> 02:35:26,960

how would one model the other three

4394

02:35:33,190 --> 02:35:30,000

fundamentally well so

4395

02:35:36,230 --> 02:35:33,200

in current neural network models

4396

02:35:40,070 --> 02:35:36,240

um the way that the network learns

4397

02:35:41,190 --> 02:35:40,080

is not by acquiring new propositions is

4398

02:35:44,150 --> 02:35:41,200

by updating

4399

02:35:45,190 --> 02:35:44,160

connection weights in the network that's

4400

02:35:48,230 --> 02:35:45,200

a procedural knowledge

4401

02:35:50,790 --> 02:35:48,240

what what the so the

4402

02:35:53,270 --> 02:35:50,800

the history of ai i i was in the

4403

02:35:55,510 --> 02:35:53,280

artificial intelligence lab at mit

4404

02:35:56,710 --> 02:35:55,520

um that's did my phd there and in the

4405

02:35:58,550 --> 02:35:56,720

brain and cognitive science department

4406

02:36:01,830 --> 02:35:58,560

at mit from 79 to 83.

4407

02:36:03,830 --> 02:36:01,840

at the time ai was mostly about

4408

02:36:05,429 --> 02:36:03,840

propositional right it was good

4409

02:36:08,550 --> 02:36:05,439

old-fashioned ai so we were

4410

02:36:09,590 --> 02:36:08,560

it was explicit algorithms with specific

4411

02:36:12,389 --> 02:36:09,600

things that you could write down as

4412

02:36:14,790 --> 02:36:12,399

propositions and so forth um

4413

02:36:15,830 --> 02:36:14,800

but with neural networks you have this

4414

02:36:17,990 --> 02:36:15,840

kind of thing where

4415

02:36:19,429 --> 02:36:18,000

um the system learns but it's not

4416

02:36:21,110 --> 02:36:19,439

learning propositions

4417

02:36:23,349 --> 02:36:21,120

you're just updating weights and you're

4418

02:36:25,670 --> 02:36:23,359

getting behaviors

4419

02:36:27,030 --> 02:36:25,680

and that turns out to be very very

4420

02:36:28,790 --> 02:36:27,040

effective for modeling

4421

02:36:31,270 --> 02:36:28,800

procedural memories like like motor

4422

02:36:34,870 --> 02:36:31,280

memories and so forth and in fact

4423

02:36:37,270 --> 02:36:34,880

at boston dynamics i believe um

4424

02:36:39,110 --> 02:36:37,280

they've made great progress by by doing

4425

02:36:41,590 --> 02:36:39,120

that by having

4426
02:36:42,230 --> 02:36:41,600
robots that fall down and try things and

4427
02:36:44,150 --> 02:36:42,240
they they

4428
02:36:45,910 --> 02:36:44,160
they walk fall down but their neural

4429
02:36:46,710 --> 02:36:45,920
networks are just updating and updating

4430
02:36:48,469 --> 02:36:46,720
and updating

4431
02:36:50,469 --> 02:36:48,479
and they they don't get any list of

4432
02:36:52,389 --> 02:36:50,479
propositions do this you know do this

4433
02:36:55,670 --> 02:36:52,399
actuator then do that actuator

4434
02:36:58,870 --> 02:36:55,680
no it's just this procedural memory

4435
02:37:00,550 --> 02:36:58,880
um so so we have

4436
02:37:02,070 --> 02:37:00,560
so there's been this big debate between

4437
02:37:02,550 --> 02:37:02,080
propositional procedural that's gone on

4438
02:37:04,309 --> 02:37:02,560

between

4439

02:37:06,710 --> 02:37:04,319

the neural network modelers and the good

4440

02:37:08,150 --> 02:37:06,720

old-fashioned ai kinds of modelers and

4441

02:37:10,550 --> 02:37:08,160

and so forth and you know it's a

4442

02:37:13,590 --> 02:37:10,560

profitable debate

4443

02:37:15,270 --> 02:37:13,600

and and then there's the inactive

4444

02:37:16,790 --> 02:37:15,280

or embody cognition kind of thing that

4445

02:37:18,710 --> 02:37:16,800

comes into it as well

4446

02:37:20,309 --> 02:37:18,720

i'm taking a perspectival thing as well

4447

02:37:21,670 --> 02:37:20,319

right so i'm saying that that in some

4448

02:37:22,710 --> 02:37:21,680

sense conscious experiences and

4449

02:37:26,309 --> 02:37:22,720

perspectives therefore

4450

02:37:27,750 --> 02:37:26,319

are are fundamental but i i see

4451
02:37:30,230 --> 02:37:27,760
within the network of conscious agents

4452
02:37:33,590 --> 02:37:30,240
being able to get both procedural

4453
02:37:35,910 --> 02:37:33,600
and explicit propositional kinds of

4454
02:37:37,349 --> 02:37:35,920
representations coming out but i think

4455
02:37:39,429 --> 02:37:37,359
also as you said

4456
02:37:40,550 --> 02:37:39,439
i should be looking at non-computational

4457
02:37:43,349 --> 02:37:40,560
approaches to this

4458
02:37:43,990 --> 02:37:43,359
and um i've got some mathematician

4459
02:37:45,750 --> 02:37:44,000
friends

4460
02:37:47,030 --> 02:37:45,760
working with me who are expert in

4461
02:37:51,990 --> 02:37:47,040
category theory

4462
02:37:53,830 --> 02:37:52,000
to explode this into a very very general

4463
02:37:55,190 --> 02:37:53,840

mathematical framework and we intend to

4464

02:37:56,950 --> 02:37:55,200

go there

4465

02:37:58,469 --> 02:37:56,960

i know you got to go soon i'm going to

4466

02:37:59,830 --> 02:37:58,479

just get to the

4467

02:38:01,510 --> 02:37:59,840

the best of questions are the ones that

4468

02:38:02,550 --> 02:38:01,520

i like answered which might be more

4469

02:38:04,630 --> 02:38:02,560

technical

4470

02:38:06,230 --> 02:38:04,640

okay at some point you use landauer's

4471

02:38:08,389 --> 02:38:06,240

limit

4472

02:38:09,990 --> 02:38:08,399

i you know what i'm you recall what i'm

4473

02:38:13,270 --> 02:38:10,000

referring to okay

4474

02:38:15,830 --> 02:38:13,280

why do you use that when landorus limit

4475

02:38:17,590 --> 02:38:15,840

presupposes space and time why do you

4476

02:38:18,309 --> 02:38:17,600

use that as a limit for the amount of

4477

02:38:21,270 --> 02:38:18,319

ticks

4478

02:38:21,990 --> 02:38:21,280

or the energy that goes into a tick um

4479

02:38:25,190 --> 02:38:22,000

we've

4480

02:38:27,349 --> 02:38:25,200

used that and this is um largely the uh

4481

02:38:29,110 --> 02:38:27,359

the brilliance of my friend chris fields

4482

02:38:30,790 --> 02:38:29,120

who's who's a

4483

02:38:32,309 --> 02:38:30,800

physicist who's been working on that so

4484

02:38:34,150 --> 02:38:32,319

he likes to look at the

4485

02:38:36,389 --> 02:38:34,160

information theoretic things using

4486

02:38:38,630 --> 02:38:36,399

landauer's principle and to look

4487

02:38:39,750 --> 02:38:38,640

so most of his analyses are in terms of

4488

02:38:40,950 --> 02:38:39,760

quantum theory

4489

02:38:42,950 --> 02:38:40,960
and what what are the limits of

4490

02:38:45,190 --> 02:38:42,960
information transfer in quantum systems

4491

02:38:46,550 --> 02:38:45,200
so that's usually the context in which

4492

02:38:49,670 --> 02:38:46,560
we bring that up

4493

02:38:51,830 --> 02:38:49,680
um ultimately if we

4494

02:38:53,830 --> 02:38:51,840
get a theory of space time trying to

4495

02:38:55,349 --> 02:38:53,840
emerge from our theory of conscious

4496

02:38:57,349 --> 02:38:55,359
agents

4497

02:38:59,429 --> 02:38:57,359
then once again we will face landauer's

4498

02:39:03,190 --> 02:38:59,439
kind of limit when we look at

4499

02:39:06,469 --> 02:39:03,200
how our space-time model

4500

02:39:09,190 --> 02:39:06,479
um is capturing features of the

4501
02:39:10,070 --> 02:39:09,200
information dynamics of conscious agents

4502
02:39:11,670 --> 02:39:10,080
so

4503
02:39:13,830 --> 02:39:11,680
it will come there as a property of the

4504
02:39:17,349 --> 02:39:13,840
interface but not as a fundamental limit

4505
02:39:19,429 --> 02:39:17,359
of of consciousness okay okay and

4506
02:39:20,550 --> 02:39:19,439
does that give a bound for the amount of

4507
02:39:22,550 --> 02:39:20,560
time

4508
02:39:24,070 --> 02:39:22,560
for each click so just so people are

4509
02:39:25,990 --> 02:39:24,080
aware there was that model that i'll

4510
02:39:28,230 --> 02:39:26,000
show on the screen there's the wxg

4511
02:39:29,590 --> 02:39:28,240
i was simplifying it there's a t that's

4512
02:39:32,070 --> 02:39:29,600
in the middle that counts

4513
02:39:33,429 --> 02:39:32,080

the amount of revolutions in the system

4514

02:39:36,870 --> 02:39:33,439

i could be wrong just correct me

4515

02:39:37,510 --> 02:39:36,880

but either way that to me seems akin to

4516

02:39:39,349 --> 02:39:37,520

time

4517

02:39:41,030 --> 02:39:39,359

and then in the paper it seemed like you

4518

02:39:41,510 --> 02:39:41,040

were giving a lower limit to time saying

4519

02:39:44,389 --> 02:39:41,520

that

4520

02:39:45,670 --> 02:39:44,399

experience is something like 100

4521

02:39:47,990 --> 02:39:45,680

femtoseconds

4522

02:39:49,349 --> 02:39:48,000

please correct me if i'm incorrect here

4523

02:39:50,710 --> 02:39:49,359

and i thought that

4524

02:39:52,710 --> 02:39:50,720

well that sounds like a theoretical

4525

02:39:53,429 --> 02:39:52,720

prediction too that if we can get a

4526
02:39:57,910 --> 02:39:53,439
camera or

4527
02:39:59,510 --> 02:39:57,920
conscious experience of a quicker time

4528
02:40:02,309 --> 02:39:59,520
then that would invalidate it or if we

4529
02:40:05,590 --> 02:40:02,319
can't then that would be evidence for it

4530
02:40:06,309 --> 02:40:05,600
right so so i i don't go that direction

4531
02:40:08,469 --> 02:40:06,319
with it

4532
02:40:09,590 --> 02:40:08,479
um and i don't think that chris fields

4533
02:40:16,630 --> 02:40:09,600
goes that direction with it

4534
02:40:24,630 --> 02:40:20,070
there there is no

4535
02:40:29,349 --> 02:40:24,640
fundamental pixelation of space-time

4536
02:40:32,070 --> 02:40:29,359
right so space-time is doomed

4537
02:40:33,269 --> 02:40:32,080
not because we run into pixels at the

4538
02:40:35,590 --> 02:40:33,279

planck scale

4539

02:40:37,269 --> 02:40:35,600

but rather because space time itself

4540

02:40:39,269 --> 02:40:37,279

ceases to be well defined

4541

02:40:41,750 --> 02:40:39,279

it's not a it's not an empirically

4542

02:40:45,429 --> 02:40:41,760

observable construct

4543

02:40:47,670 --> 02:40:45,439

at that level the attempts

4544

02:40:48,870 --> 02:40:47,680

to think about space time as being

4545

02:40:52,630 --> 02:40:48,880

pixelated

4546

02:40:53,990 --> 02:40:52,640

at roughly the blank scale run into a

4547

02:40:57,030 --> 02:40:54,000

very serious problem

4548

02:40:58,070 --> 02:40:57,040

um they're not lorenz invariant the

4549

02:41:00,070 --> 02:40:58,080

pixels

4550

02:41:01,269 --> 02:41:00,080

what's tiny for you may not be tiny for

4551

02:41:03,750 --> 02:41:01,279

someone else so

4552

02:41:05,510 --> 02:41:03,760

it's been no one has a way to make the

4553

02:41:06,550 --> 02:41:05,520

pixelation of space-time lorenz

4554

02:41:09,910 --> 02:41:06,560

invariant

4555

02:41:11,190 --> 02:41:09,920

and and so i wouldn't want to go there

4556

02:41:12,950 --> 02:41:11,200

and i don't think

4557

02:41:15,030 --> 02:41:12,960

chris fields would would want to go

4558

02:41:17,429 --> 02:41:15,040

there nevertheless we may find

4559

02:41:18,950 --> 02:41:17,439

i mean the the landauer limit does play

4560

02:41:20,950 --> 02:41:18,960

a role in information transfers

4561

02:41:22,710 --> 02:41:20,960

in space time so we will want to

4562

02:41:24,309 --> 02:41:22,720

understand where that limit comes from

4563

02:41:27,830 --> 02:41:24,319

from our theory of consciousness

4564

02:41:29,910 --> 02:41:27,840

and our theory of emergent space time

4565

02:41:32,550 --> 02:41:29,920

but i don't see us getting any

4566

02:41:35,190 --> 02:41:32,560

predictions about a pixelation of time

4567

02:41:35,670 --> 02:41:35,200

or pixelation of space because it would

4568

02:41:40,389 --> 02:41:35,680

violate

4569

02:41:42,710 --> 02:41:40,399

lorenz and variance okay

4570

02:41:45,110 --> 02:41:42,720

on the interface theory when i'm not

4571

02:41:47,349 --> 02:41:45,120

looking at let's say the moon

4572

02:41:48,710 --> 02:41:47,359

it's it doesn't necessarily exist but

4573

02:41:50,710 --> 02:41:48,720

you're saying that the

4574

02:41:52,150 --> 02:41:50,720

what doesn't exist is our idea of the

4575

02:41:53,910 --> 02:41:52,160

moon or that the

4576
02:41:55,590 --> 02:41:53,920
that our idea is representing something

4577
02:41:59,030 --> 02:41:55,600
that something still persists it's just

4578
02:42:00,309 --> 02:41:59,040
our idea of the moon doesn't exist

4579
02:42:02,309 --> 02:42:00,319
right so when i say the moon doesn't

4580
02:42:04,309 --> 02:42:02,319
exist um

4581
02:42:05,510 --> 02:42:04,319
i'm i'm saying it in the same way that

4582
02:42:08,790 --> 02:42:05,520
if i look

4583
02:42:10,150 --> 02:42:08,800
like at a an image and see an illusory

4584
02:42:11,830 --> 02:42:10,160
cube

4585
02:42:13,910 --> 02:42:11,840
and i say and then someone and then and

4586
02:42:15,349 --> 02:42:13,920
sometimes the cube i see one corner

4587
02:42:17,190 --> 02:42:15,359
one face in front and sometimes it flips

4588
02:42:20,550 --> 02:42:17,200

and i see another face in front

4589

02:42:21,910 --> 02:42:20,560

um and then when i look away i say that

4590

02:42:23,510 --> 02:42:21,920

there is no such thing as the cube

4591

02:42:24,830 --> 02:42:23,520

because the cube only exists when i look

4592

02:42:26,070 --> 02:42:24,840

at it and then i see the cube and it's

4593

02:42:27,750 --> 02:42:26,080

flipping

4594

02:42:29,590 --> 02:42:27,760

the same thing with the moon the moon is

4595

02:42:32,389 --> 02:42:29,600

like that cube

4596

02:42:34,309 --> 02:42:32,399

now there is some reality that i'm

4597

02:42:35,910 --> 02:42:34,319

interacting with

4598

02:42:38,469 --> 02:42:35,920

and it continues to exist whether or not

4599

02:42:41,110 --> 02:42:38,479

i look but that that reality

4600

02:42:43,269 --> 02:42:41,120

is not inside space and time at all much

4601
02:42:46,389 --> 02:42:43,279
less is at the moon

4602
02:42:47,750 --> 02:42:46,399
space and time themselves are not a

4603
02:42:49,910 --> 02:42:47,760
fundamental reality

4604
02:42:52,150 --> 02:42:49,920
they are data structures that we create

4605
02:42:54,230 --> 02:42:52,160
so anything that's in space time

4606
02:42:56,469 --> 02:42:54,240
is in some sense no more real than the

4607
02:42:58,070 --> 02:42:56,479
illusory cube that i look

4608
02:42:59,750 --> 02:42:58,080
and then destroy when i look away

4609
02:43:01,510 --> 02:42:59,760
spacetime itself is created and

4610
02:43:03,830 --> 02:43:01,520
destroyed by us

4611
02:43:05,510 --> 02:43:03,840
also only exists in the same way that

4612
02:43:06,790 --> 02:43:05,520
that illusory cube exists

4613
02:43:08,710 --> 02:43:06,800

which isn't to say that there isn't

4614

02:43:10,389 --> 02:43:08,720

something that exists but it's not even

4615

02:43:12,469 --> 02:43:10,399

in space and time whenever it exists

4616

02:43:16,550 --> 02:43:12,479

it's outside of space and time

4617

02:43:18,870 --> 02:43:16,560

um it's outside of my headset

4618

02:43:20,070 --> 02:43:18,880

spacetime see i see so let's imagine

4619

02:43:21,429 --> 02:43:20,080

there's tickle me elmo

4620

02:43:23,110 --> 02:43:21,439

and there's a cat and i see that tickle

4621

02:43:24,710 --> 02:43:23,120

me elmo but you're like okay you don't

4622

02:43:26,790 --> 02:43:24,720

you look it's gone it's destroyed it's

4623

02:43:27,910 --> 02:43:26,800

not rendered anymore but a camera that i

4624

02:43:29,750 --> 02:43:27,920

just pressed record on

4625

02:43:31,269 --> 02:43:29,760

can record the tickle memo then i can go

4626
02:43:33,670 --> 02:43:31,279
and press play

4627
02:43:35,269 --> 02:43:33,680
how do you account for that well notice

4628
02:43:36,710 --> 02:43:35,279
you only see the elmo on the camera when

4629
02:43:37,429 --> 02:43:36,720
you look you only see the camera when

4630
02:43:40,230 --> 02:43:37,439
you look

4631
02:43:41,830 --> 02:43:40,240
so the camera itself is again um just

4632
02:43:43,510 --> 02:43:41,840
something that exists when you

4633
02:43:45,590 --> 02:43:43,520
when you perceive it it's pointing to

4634
02:43:46,150 --> 02:43:45,600
another reality there is a reality that

4635
02:43:48,150 --> 02:43:46,160
exists

4636
02:43:49,990 --> 02:43:48,160
independent of you but the reality is

4637
02:43:52,230 --> 02:43:50,000
not the camera and it's not the digital

4638
02:43:54,070 --> 02:43:52,240

recording on the camera those are just

4639

02:43:56,950 --> 02:43:54,080

again your own icons

4640

02:43:58,309 --> 02:43:56,960

so the camera itself is just a simple

4641

02:43:59,750 --> 02:43:58,319

and how does the

4642

02:44:01,750 --> 02:43:59,760

how does your theory i know you've

4643

02:44:02,230 --> 02:44:01,760

covered this before but um just for the

4644

02:44:03,429 --> 02:44:02,240

people

4645

02:44:05,750 --> 02:44:03,439

who are listening how does your theory

4646

02:44:06,309 --> 02:44:05,760

account for inter-subject subjective

4647

02:44:10,790 --> 02:44:06,319

agreement

4648

02:44:12,630 --> 02:44:10,800

is one of our current projects

4649

02:44:13,910 --> 02:44:12,640

right so one of the one of the papers

4650

02:44:21,590 --> 02:44:13,920

we're working on right now

4651
02:44:24,870 --> 02:44:24,150
is critical to science right the way

4652
02:44:27,510 --> 02:44:24,880
scientists

4653
02:44:28,870 --> 02:44:27,520
typically talk about it about what

4654
02:44:30,550 --> 02:44:28,880
science is doing is

4655
02:44:32,870 --> 02:44:30,560
is that what makes science special in

4656
02:44:34,469 --> 02:44:32,880
some sense is that one scientist can

4657
02:44:37,670 --> 02:44:34,479
look at a physical system like

4658
02:44:41,110 --> 02:44:40,389
animal or this planet and another

4659
02:44:42,469 --> 02:44:41,120
scientist

4660
02:44:43,830 --> 02:44:42,479
can make their own independent

4661
02:44:45,590 --> 02:44:43,840
measurements of that animal that

4662
02:44:47,190 --> 02:44:45,600
specific animal or that planet

4663
02:44:48,710 --> 02:44:47,200

and then we can go and compare notes in

4664

02:44:52,230 --> 02:44:48,720

other words we have this notion of

4665

02:44:53,750 --> 02:44:52,240

public physical objects objects that are

4666

02:44:56,230 --> 02:44:53,760

really there

4667

02:44:56,870 --> 02:44:56,240

whether or not we exist like dinosaur

4668

02:44:58,389 --> 02:44:56,880

bones right

4669

02:45:00,070 --> 02:44:58,399

the dinosaur bones have been there for

4670

02:45:01,590 --> 02:45:00,080

200 million years

4671

02:45:03,110 --> 02:45:01,600

they were there if no one had ever been

4672

02:45:04,550 --> 02:45:03,120

around they would still be there i can

4673

02:45:05,830 --> 02:45:04,560

look at the dinosaur bones you can look

4674

02:45:07,030 --> 02:45:05,840

at the dinosaur bones they're public

4675

02:45:07,670 --> 02:45:07,040

physical objects we can make our

4676

02:45:10,950 --> 02:45:07,680

measurements

4677

02:45:13,110 --> 02:45:10,960

get the dna and so forth that's gone

4678

02:45:13,990 --> 02:45:13,120

in my point of view that whole point of

4679

02:45:16,790 --> 02:45:14,000

view is gone because

4680

02:45:18,309 --> 02:45:16,800

space time itself is doomed space time

4681

02:45:19,269 --> 02:45:18,319

isn't fundamental there are no public

4682

02:45:21,990 --> 02:45:19,279

physical objects

4683

02:45:22,950 --> 02:45:22,000

so how do we rethink what we mean by

4684

02:45:26,790 --> 02:45:22,960

objectivity

4685

02:45:29,910 --> 02:45:26,800

with again

4686

02:45:31,510 --> 02:45:29,920

having independent scientists do their

4687

02:45:32,550 --> 02:45:31,520

own experiments and come to some

4688

02:45:34,950 --> 02:45:32,560

agreement

4689

02:45:35,910 --> 02:45:34,960

so the framework that i'm working on

4690

02:45:38,950 --> 02:45:35,920

right now

4691

02:45:41,190 --> 02:45:38,960

poses that as a really serious question

4692

02:45:42,309 --> 02:45:41,200

and so we're writing a paper on that

4693

02:45:43,670 --> 02:45:42,319

right now we're going to be running

4694

02:45:45,349 --> 02:45:43,680

simulations but but

4695

02:45:48,950 --> 02:45:45,359

here's the kind of idea that i'm playing

4696

02:45:54,550 --> 02:45:52,230

i think that we have to take the

4697

02:45:57,429 --> 02:45:54,560

possibility of synesthesia

4698

02:45:59,990 --> 02:45:57,439

very seriously we actually know

4699

02:46:03,190 --> 02:46:00,000

synesthesia occurs

4700

02:46:04,790 --> 02:46:03,200

it could be easily in the cards that

4701
02:46:07,910 --> 02:46:04,800
your

4702
02:46:08,710 --> 02:46:07,920
visual experiences that you described

4703
02:46:11,750 --> 02:46:08,720
with the words

4704
02:46:12,710 --> 02:46:11,760
red and round and square and so forth

4705
02:46:15,429 --> 02:46:12,720
and i described

4706
02:46:15,990 --> 02:46:15,439
if i could get inside your head for all

4707
02:46:18,550 --> 02:46:16,000
i know

4708
02:46:19,190 --> 02:46:18,560
i would go whoa whoa that's not what i

4709
02:46:22,630 --> 02:46:19,200
would call

4710
02:46:26,070 --> 02:46:22,640
the smell of garlic and the taste of

4711
02:46:29,190 --> 02:46:26,080
butter um or a headache those are

4712
02:46:32,469 --> 02:46:29,200
the just like michael watson

4713
02:46:34,550 --> 02:46:32,479

he he tastes mint but he feels a tall

4714

02:46:36,790 --> 02:46:34,560

cold smooth column of glass i don't feel

4715

02:46:38,309 --> 02:46:36,800

that if all michael watson ever

4716

02:46:39,190 --> 02:46:38,319

experienced were the feelings in his

4717

02:46:42,309 --> 02:46:39,200

hand

4718

02:46:43,910 --> 02:46:42,319

he would have a perfectly good taste

4719

02:46:46,950 --> 02:46:43,920

sensation he could cook

4720

02:46:49,429 --> 02:46:46,960

he could figure out what what foods are

4721

02:46:50,790 --> 02:46:49,439

so in other words we could you and i as

4722

02:46:54,870 --> 02:46:50,800

scientists

4723

02:46:58,389 --> 02:46:56,230

believe that we're talking the same

4724

02:47:00,469 --> 02:46:58,399

language and yet your

4725

02:47:01,990 --> 02:47:00,479

experiences could be synesthetically

4726
02:47:04,710 --> 02:47:02,000
utterly different from mine

4727
02:47:05,670 --> 02:47:04,720
and we would never know and i think that

4728
02:47:09,590 --> 02:47:05,680
that's

4729
02:47:13,429 --> 02:47:09,600
going to turn out to be a fundamental

4730
02:47:16,469 --> 02:47:13,439
and unbreachable limit

4731
02:47:18,309 --> 02:47:16,479
to what we can know and to

4732
02:47:19,670 --> 02:47:18,319
the degree of objectivity that we can

4733
02:47:22,309 --> 02:47:19,680
have in science

4734
02:47:23,429 --> 02:47:22,319
we the technical thing would be that we

4735
02:47:26,630 --> 02:47:23,439
can only agree

4736
02:47:28,790 --> 02:47:26,640
up to effectively a homomorphism

4737
02:47:30,630 --> 02:47:28,800
a homomorphism of your set of perceptual

4738
02:47:33,910 --> 02:47:30,640

representations and experiences

4739

02:47:35,349 --> 02:47:33,920

and mine the homomorphism could be as

4740

02:47:37,590 --> 02:47:35,359

radical as the difference between

4741

02:47:39,030 --> 02:47:37,600

the taste of mint and the tall cold

4742

02:47:42,469 --> 02:47:39,040

smooth column of glass it could be

4743

02:47:43,670 --> 02:47:42,479

that different and we would never know

4744

02:47:45,030 --> 02:47:43,680

the only reason we know in michael

4745

02:47:46,389 --> 02:47:45,040

watson's case is because he had both and

4746

02:47:48,150 --> 02:47:46,399

he could tell us about both

4747

02:47:50,230 --> 02:47:48,160

we could say oh well i understand the

4748

02:47:50,870 --> 02:47:50,240

one but gee i never thought about the

4749

02:47:54,389 --> 02:47:50,880

other

4750

02:47:57,030 --> 02:47:54,399

that's that's incredible um so

4751
02:48:01,269 --> 02:47:57,040
so we're gonna have to understand what

4752
02:48:05,510 --> 02:48:04,150
confirmation and what's the greatest

4753
02:48:09,030 --> 02:48:05,520
level of agreement

4754
02:48:10,550 --> 02:48:09,040
that scientists can have given this

4755
02:48:13,830 --> 02:48:10,560
possibility of

4756
02:48:16,870 --> 02:48:13,840
synesthetic complete divergence

4757
02:48:19,990 --> 02:48:16,880
between us

4758
02:48:21,030 --> 02:48:20,000
and i would love to i was talking with

4759
02:48:22,630 --> 02:48:21,040
my colleagues on this

4760
02:48:24,309 --> 02:48:22,640
in the paper that we're writing we may

4761
02:48:25,750 --> 02:48:24,319
actually do this

4762
02:48:28,830 --> 02:48:25,760
not just as a thought experiment paper

4763
02:48:31,510 --> 02:48:28,840

we may actually do this i would love to

4764

02:48:33,030 --> 02:48:31,520

create this really interesting virtual

4765

02:48:36,150 --> 02:48:33,040

reality game

4766

02:48:37,110 --> 02:48:36,160

two-player game or multiplayer but for

4767

02:48:39,750 --> 02:48:37,120

one player

4768

02:48:42,790 --> 02:48:39,760

it's it it they're immersed in what

4769

02:48:44,070 --> 02:48:42,800

seems like say grand theft auto

4770

02:48:46,230 --> 02:48:44,080

player is immersed in a completely

4771

02:48:49,510 --> 02:48:46,240

different game like super mario brothers

4772

02:48:50,870 --> 02:48:49,520

but i've arranged it so they both think

4773

02:48:52,790 --> 02:48:50,880

that they're playing the same game

4774

02:48:53,910 --> 02:48:52,800

and they are actually playing and they

4775

02:48:55,670 --> 02:48:53,920

win and lose

4776
02:48:57,269 --> 02:48:55,680
and but they have no idea that the other

4777
02:48:58,630 --> 02:48:57,279
person is in a completely different

4778
02:49:00,150 --> 02:48:58,640
virtual world

4779
02:49:01,830 --> 02:49:00,160
and they but they're also they're

4780
02:49:02,469 --> 02:49:01,840
they're using language they seem to

4781
02:49:04,150 --> 02:49:02,479
agree

4782
02:49:05,510 --> 02:49:04,160
right you take them out of their heads

4783
02:49:07,190 --> 02:49:05,520
and have them swap and

4784
02:49:08,950 --> 02:49:07,200
blow their minds when they find out what

4785
02:49:09,990 --> 02:49:08,960
the other person was doing i think we

4786
02:49:12,469 --> 02:49:10,000
can do that

4787
02:49:14,230 --> 02:49:12,479
and so we have to be if that's true if

4788
02:49:16,070 --> 02:49:14,240

that's possible

4789

02:49:17,990 --> 02:49:16,080

in category theory that would be the

4790

02:49:20,309 --> 02:49:18,000

idea that you might have

4791

02:49:21,429 --> 02:49:20,319

this one category for your

4792

02:49:22,790 --> 02:49:21,439

representation

4793

02:49:25,110 --> 02:49:22,800

the other scientists might have another

4794

02:49:27,990 --> 02:49:25,120

category but if there's some functor

4795

02:49:29,830 --> 02:49:28,000

if there's some functor that maps the

4796

02:49:32,389 --> 02:49:29,840

objects and relations

4797

02:49:35,110 --> 02:49:32,399

that you have in your interface to the

4798

02:49:37,990 --> 02:49:35,120

objects and relations that the other

4799

02:49:39,030 --> 02:49:38,000

scientist has in their interface if you

4800

02:49:40,790 --> 02:49:39,040

have the right functor

4801
02:49:42,309 --> 02:49:40,800
then the scientists will have the

4802
02:49:43,670 --> 02:49:42,319
appearance of agreement and they will

4803
02:49:46,710 --> 02:49:43,680
never know that they're

4804
02:49:51,510 --> 02:49:46,720
separated by this functor

4805
02:49:54,630 --> 02:49:51,520
and so i think that there's going to be

4806
02:49:55,990 --> 02:49:54,640
category theoretic analyses ahead

4807
02:49:57,670 --> 02:49:56,000
on this that are going to be really

4808
02:49:59,110 --> 02:49:57,680
quite stunning but i think that's going

4809
02:49:59,830 --> 02:49:59,120
to be the future of the philosophy of

4810
02:50:02,389 --> 02:49:59,840
science

4811
02:50:05,910 --> 02:50:02,399
is this category theoretic fundamental

4812
02:50:10,790 --> 02:50:09,110
agreement that scientists can have there

4813
02:50:15,349 --> 02:50:10,800

are no public physical objects

4814

02:50:18,870 --> 02:50:17,830

laboratory independent verification my

4815

02:50:21,990 --> 02:50:18,880

laboratory gets it

4816

02:50:24,150 --> 02:50:22,000

really doing in that case it's going to

4817

02:50:26,230 --> 02:50:24,160

be up to some functor

4818

02:50:27,190 --> 02:50:26,240

right it sounds to me i only have three

4819

02:50:28,870 --> 02:50:27,200

three more questions

4820

02:50:30,550 --> 02:50:28,880

and they might be long but i have three

4821

02:50:30,950 --> 02:50:30,560

questions it sounds to me like you're

4822

02:50:33,429 --> 02:50:30,960

saying

4823

02:50:34,630 --> 02:50:33,439

that there are some homomorphic

4824

02:50:37,110 --> 02:50:34,640

functions between us

4825

02:50:39,269 --> 02:50:37,120

and that's responsible for why we feel

4826

02:50:42,469 --> 02:50:39,279

like we share a similar world

4827

02:50:43,110 --> 02:50:42,479

however can we not use the same argument

4828

02:50:45,990 --> 02:50:43,120

that you use

4829

02:50:47,429 --> 02:50:46,000

to show that the probability that we see

4830

02:50:48,710 --> 02:50:47,439

the truth is zero that is that the

4831

02:50:51,030 --> 02:50:48,720

immiscible functions

4832

02:50:52,550 --> 02:50:51,040

grow much larger than the homomorphic

4833

02:50:54,230 --> 02:50:52,560

functions to the structure

4834

02:50:55,590 --> 02:50:54,240

can we not use that to say that the

4835

02:50:58,870 --> 02:50:55,600

probability that we share

4836

02:51:00,950 --> 02:50:58,880

any interface is also zero including

4837

02:51:04,790 --> 02:51:00,960

homomorphic

4838

02:51:06,710 --> 02:51:04,800

right aspects um not not at least

4839

02:51:08,230 --> 02:51:06,720

within the theory of conscious agents in

4840

02:51:09,990 --> 02:51:08,240

the dynamics that i'm

4841

02:51:12,790 --> 02:51:10,000

talking about now because what we can do

4842

02:51:15,030 --> 02:51:12,800

is we can ask are there certain

4843

02:51:16,070 --> 02:51:15,040

strategies of interaction that conscious

4844

02:51:18,309 --> 02:51:16,080

agents can have

4845

02:51:19,590 --> 02:51:18,319

where they would converge in the limit

4846

02:51:21,670 --> 02:51:19,600

to homomorphic things

4847

02:51:23,030 --> 02:51:21,680

right so that's different evolutionary

4848

02:51:24,630 --> 02:51:23,040

game theory where the rules have been

4849

02:51:26,150 --> 02:51:24,640

spelled out i mean i i

4850

02:51:27,349 --> 02:51:26,160

in that i don't get to play with it

4851
02:51:29,030 --> 02:51:27,359
because they're constraints so it's not

4852
02:51:31,510 --> 02:51:29,040
just uniform probability

4853
02:51:33,190 --> 02:51:31,520
that that's right so i see i see so in

4854
02:51:36,790 --> 02:51:33,200
the case of conscious agents

4855
02:51:38,630 --> 02:51:36,800
the question is can we find dynamics

4856
02:51:42,150 --> 02:51:38,640
in which the agents can converge up to

4857
02:51:43,590 --> 02:51:42,160
homomorphisms and i think we can

4858
02:51:45,510 --> 02:51:43,600
okay here's one that's super

4859
02:51:46,070 --> 02:51:45,520
philosophical if what you're saying is

4860
02:51:48,790 --> 02:51:46,080
that

4861
02:51:50,389 --> 02:51:48,800
we are not tuned for truth because truth

4862
02:51:51,349 --> 02:51:50,399
is deleterious at least compared to

4863
02:51:54,150 --> 02:51:51,359

fitness which is

4864

02:51:55,510 --> 02:51:54,160

so lubricious however let's imagine your

4865

02:51:57,670 --> 02:51:55,520

theory is correct

4866

02:51:59,190 --> 02:51:57,680

then we're starting to see the truth

4867

02:52:01,030 --> 02:51:59,200

does that not mean that

4868

02:52:03,590 --> 02:52:01,040

it's deleterious we shouldn't do that

4869

02:52:05,349 --> 02:52:03,600

we're not designed for that

4870

02:52:06,870 --> 02:52:05,359

um absolutely not and so here's where

4871

02:52:08,950 --> 02:52:06,880

it's very very careful to

4872

02:52:10,550 --> 02:52:08,960

to again see the game that i'm playing

4873

02:52:14,230 --> 02:52:10,560

the game that i'm playing is

4874

02:52:15,830 --> 02:52:14,240

i take evolution at us on its own terms

4875

02:52:17,750 --> 02:52:15,840

and i see what its implications are i

4876
02:52:19,110 --> 02:52:17,760
don't i don't say i believe evolution

4877
02:52:21,110 --> 02:52:19,120
i'm just playing the game

4878
02:52:22,630 --> 02:52:21,120
this is what the math of evolution says

4879
02:52:23,110 --> 02:52:22,640
it says very clearly we don't see the

4880
02:52:25,110 --> 02:52:23,120
truth

4881
02:52:26,230 --> 02:52:25,120
okay that's what evolution says

4882
02:52:28,469 --> 02:52:26,240
probability of zero that we see the

4883
02:52:30,550 --> 02:52:28,479
truth that's not what hoffman says

4884
02:52:32,150 --> 02:52:30,560
hoffman doesn't care about that except

4885
02:52:32,630 --> 02:52:32,160
to understand that that's what evolution

4886
02:52:36,150 --> 02:52:32,640
says

4887
02:52:38,870 --> 02:52:36,160
believe it so i'm free

4888
02:52:40,150 --> 02:52:38,880

on the one hand to prove that evolution

4889

02:52:41,750 --> 02:52:40,160

entails we don't see the truth

4890

02:52:43,349 --> 02:52:41,760

i'm free to prove that and then to step

4891

02:52:44,710 --> 02:52:43,359

back and say i still believe we see the

4892

02:52:45,670 --> 02:52:44,720

truth here's my theory in which we see

4893

02:52:48,630 --> 02:52:45,680

the truth

4894

02:52:49,269 --> 02:52:48,640

but the constraint will then be okay

4895

02:52:50,710 --> 02:52:49,279

then

4896

02:52:53,030 --> 02:52:50,720

you if you have this theory in which we

4897

02:52:54,150 --> 02:52:53,040

see the truth you have to explain how it

4898

02:52:55,670 --> 02:52:54,160

is

4899

02:52:57,269 --> 02:52:55,680

in that framework where you see the

4900

02:53:00,070 --> 02:52:57,279

truth that you

4901

02:53:01,269 --> 02:53:00,080

end up arriving at the theory of

4902

02:53:02,710 --> 02:53:01,279

evolution of natural selection which

4903

02:53:04,790 --> 02:53:02,720

says otherwise

4904

02:53:06,150 --> 02:53:04,800

if you can't do that then you're wrong

4905

02:53:07,830 --> 02:53:06,160

so so so this is

4906

02:53:09,110 --> 02:53:07,840

a really and by the way it's a great

4907

02:53:09,990 --> 02:53:09,120

question because i get this question in

4908

02:53:14,150 --> 02:53:10,000

emails quite quite

4909

02:53:15,590 --> 02:53:14,160

a bit um so so the the key thing is this

4910

02:53:18,469 --> 02:53:15,600

hofmann doesn't say we don't see the

4911

02:53:20,630 --> 02:53:18,479

truth evolution by natural selection

4912

02:53:22,469 --> 02:53:20,640

says we don't see the truth

4913

02:53:24,550 --> 02:53:22,479

i don't say that evolution of natural

4914

02:53:27,349 --> 02:53:24,560

selection says that i just

4915

02:53:28,230 --> 02:53:27,359

i'm just the messenger right that's what

4916

02:53:30,630 --> 02:53:28,240

evolution is

4917

02:53:31,830 --> 02:53:30,640

don't shoot me i'm just the messenger um

4918

02:53:33,830 --> 02:53:31,840

i'm just pointing out what

4919

02:53:35,030 --> 02:53:33,840

one of our best theories entails now i'm

4920

02:53:37,030 --> 02:53:35,040

stepping back and i'm going

4921

02:53:38,950 --> 02:53:37,040

i i would like to see the truth of

4922

02:53:41,030 --> 02:53:38,960

course maybe i can't

4923

02:53:42,550 --> 02:53:41,040

i'm not saying i know that we can see

4924

02:53:44,230 --> 02:53:42,560

the truth i'm just saying

4925

02:53:45,830 --> 02:53:44,240

as a scientist i would like to come up

4926

02:53:47,190 --> 02:53:45,840

with a theory

4927

02:53:48,389 --> 02:53:47,200

which entails that we see the truth and

4928

02:53:48,870 --> 02:53:48,399

that's why i'm looking at consciousness

4929

02:53:51,110 --> 02:53:48,880

because

4930

02:53:52,309 --> 02:53:51,120

i am conscious so if i'm conscious and

4931

02:53:54,469 --> 02:53:52,319

the reality is consciousness

4932

02:53:55,830 --> 02:53:54,479

there is some connection between me and

4933

02:53:57,190 --> 02:53:55,840

the reality i might actually be able to

4934

02:54:00,469 --> 02:53:57,200

understand that reality because

4935

02:54:01,510 --> 02:54:00,479

i'm conscious but then the burden is on

4936

02:54:03,590 --> 02:54:01,520

me

4937

02:54:05,990 --> 02:54:03,600

to then explain how my theory where i

4938

02:54:10,070 --> 02:54:06,000

see the truth of these conscious agents

4939

02:54:12,230 --> 02:54:10,080

leads to an interface of space time

4940

02:54:13,910 --> 02:54:12,240

and in that interface this theory of

4941

02:54:17,750 --> 02:54:13,920

evolution natural selection

4942

02:54:20,389 --> 02:54:17,760

which says you don't see the truth well

4943

02:54:21,910 --> 02:54:20,399

that won't be so strikingly strange

4944

02:54:23,830 --> 02:54:21,920

because

4945

02:54:26,309 --> 02:54:23,840

evolution is telling you that what you

4946

02:54:27,750 --> 02:54:26,319

see in the interface isn't the truth

4947

02:54:29,590 --> 02:54:27,760

well i'm also saying that from this

4948

02:54:30,150 --> 02:54:29,600

bigger picture i'm saying that there's

4949

02:54:33,269 --> 02:54:30,160

this

4950

02:54:33,750 --> 02:54:33,279

the space time interface that's the

4951

02:54:35,030 --> 02:54:33,760

truth

4952

02:54:36,550 --> 02:54:35,040

and you can't see it within the

4953

02:54:37,910 --> 02:54:36,560

interface well it's not going to be a

4954

02:54:38,950 --> 02:54:37,920

surprise that evolution by natural

4955

02:54:40,950 --> 02:54:38,960

selection says that

4956

02:54:42,150 --> 02:54:40,960

inside the interface so it'll all work

4957

02:54:45,190 --> 02:54:42,160

out so

4958

02:54:46,150 --> 02:54:45,200

so so that's i hope that gives that's a

4959

02:54:48,710 --> 02:54:46,160

great question okay

4960

02:54:49,910 --> 02:54:48,720

let me quick let me rephrase it so that

4961

02:54:51,269 --> 02:54:49,920

i get it across

4962

02:54:53,110 --> 02:54:51,279

because i don't think i portrayed it

4963

02:54:54,870 --> 02:54:53,120

correctly

4964

02:54:56,550 --> 02:54:54,880

you're saying that and i'm sorry

4965

02:54:57,590 --> 02:54:56,560

evolutionary theory is saying that we're

4966

02:54:59,510 --> 02:54:57,600

not designed for

4967

02:55:01,030 --> 02:54:59,520

the truth we're designed for fitness

4968

02:55:03,110 --> 02:55:01,040

right and those are two completely

4969

02:55:05,030 --> 02:55:03,120

separate phenomena okay

4970

02:55:06,870 --> 02:55:05,040

the cl if we were designed for truth if

4971

02:55:09,750 --> 02:55:06,880

we were able to see the truth

4972

02:55:10,469 --> 02:55:09,760

that would be horrible for us but at the

4973

02:55:12,950 --> 02:55:10,479

same time

4974

02:55:13,830 --> 02:55:12,960

you're like i want to look at the truth

4975

02:55:15,990 --> 02:55:13,840

so i'm gonna

4976
02:55:17,190 --> 02:55:16,000
let's say you're actually uncovering the

4977
02:55:20,309 --> 02:55:17,200
truth is that not

4978
02:55:22,070 --> 02:55:20,319
harmful given the presupposition that

4979
02:55:23,349 --> 02:55:22,080
we should be pursuing fitness and not

4980
02:55:25,670 --> 02:55:23,359
truth

4981
02:55:27,349 --> 02:55:25,680
no it's not because by stepping outside

4982
02:55:29,110 --> 02:55:27,359
of the entire framework of evolution i'm

4983
02:55:30,550 --> 02:55:29,120
stepping outside of its assumptions

4984
02:55:31,670 --> 02:55:30,560
i'm saying there's a deeper framework in

4985
02:55:32,630 --> 02:55:31,680
which the assumptions of evolution

4986
02:55:35,990 --> 02:55:32,640
aren't true

4987
02:55:37,830 --> 02:55:36,000
i see i see only true within the headset

4988
02:55:40,070 --> 02:55:37,840

the headset is just a headset there's

4989

02:55:42,389 --> 02:55:40,080

this deeper reality outside the headset

4990

02:55:43,429 --> 02:55:42,399

it's it's like if i see the twitterverse

4991

02:55:44,790 --> 02:55:43,439

only through my headset

4992

02:55:46,150 --> 02:55:44,800

and there's certain rules about how i

4993

02:55:47,269 --> 02:55:46,160

perceive in the headset and i assume

4994

02:55:47,830 --> 02:55:47,279

that those rules of what i see in the

4995

02:55:49,349 --> 02:55:47,840

headset

4996

02:55:50,950 --> 02:55:49,359

must apply to all the twitter users well

4997

02:55:52,230 --> 02:55:50,960

that's stupid the twitter users are

4998

02:55:55,030 --> 02:55:52,240

doing their own thing

4999

02:55:56,070 --> 02:55:55,040

my headset is is just smashing all this

5000

02:55:57,990 --> 02:55:56,080

complexity

5001

02:56:00,150 --> 02:55:58,000

into this trivial little headset and

5002

02:56:01,510 --> 02:56:00,160

that's why evolution has to tell us

5003

02:56:02,710 --> 02:56:01,520

that it's not seeing the truth because

5004

02:56:03,910 --> 02:56:02,720

what's happened from this bigger

5005

02:56:06,950 --> 02:56:03,920

framework is

5006

02:56:09,910 --> 02:56:06,960

space time and and objects in spacetime

5007

02:56:12,630 --> 02:56:09,920

is this incredible smashing down

5008

02:56:14,309 --> 02:56:12,640

information losing map from the reality

5009

02:56:17,510 --> 02:56:14,319

this vast social network into

5010

02:56:19,830 --> 02:56:17,520

this trivial little space-time

5011

02:56:21,590 --> 02:56:19,840

interface so it's no surprise that

5012

02:56:22,790 --> 02:56:21,600

evolution by natural selection is saying

5013

02:56:24,070 --> 02:56:22,800

you know what

5014

02:56:25,190 --> 02:56:24,080

you're not going to see the truth you're

5015

02:56:25,990 --> 02:56:25,200

just going to see little interface

5016

02:56:27,910 --> 02:56:26,000

symbols

5017

02:56:29,990 --> 02:56:27,920

that's what it's telling us and i say i

5018

02:56:31,190 --> 02:56:30,000

agree we're only seeing interface

5019

02:56:33,269 --> 02:56:31,200

symbols but

5020

02:56:35,110 --> 02:56:33,279

that's only in space time we're not

5021

02:56:35,910 --> 02:56:35,120

stuck in space time you and i are not in

5022

02:56:40,309 --> 02:56:35,920

space time

5023

02:56:41,349 --> 02:56:40,319

game apply within the game but you can

5024

02:56:43,670 --> 02:56:41,359

step out of the game

5025

02:56:44,950 --> 02:56:43,680

that's right okay okay the authors of

5026

02:56:48,150 --> 02:56:44,960

the game

5027

02:56:51,269 --> 02:56:48,160

okay cool cool i'm gonna

5028

02:56:51,830 --> 02:56:51,279

i'm gonna instead of asking you i'm

5029

02:56:53,269 --> 02:56:51,840

gonna

5030

02:56:54,230 --> 02:56:53,279

list the last questions and then you

5031

02:56:55,349 --> 02:56:54,240

just choose one because i know you've

5032

02:56:57,429 --> 02:56:55,359

got to go

5033

02:56:58,950 --> 02:56:57,439

yeah okay so i was going to say where

5034

02:57:00,790 --> 02:56:58,960

does p where do people like deepak

5035

02:57:02,790 --> 02:57:00,800

chopra take your message too far

5036

02:57:05,110 --> 02:57:02,800

so that's an option you can answer that

5037

02:57:07,510 --> 02:57:05,120

another one is when jesus says i am the

5038

02:57:09,110 --> 02:57:07,520

way the truth and the light

5039

02:57:11,269 --> 02:57:09,120

what truth do you think he was referring

5040

02:57:15,750 --> 02:57:11,279

to and then the other question

5041

02:57:19,830 --> 02:57:18,230

well those are all all tough um with

5042

02:57:22,070 --> 02:57:19,840

with deepak

5043

02:57:23,670 --> 02:57:22,080

deepak and i have been good friends for

5044

02:57:27,110 --> 02:57:23,680

for several years now

5045

02:57:30,710 --> 02:57:27,120

um it's he's

5046

02:57:35,110 --> 02:57:30,720

a spiritual teacher i'm not

5047

02:57:39,190 --> 02:57:35,120

uh we respect each

5048

02:57:42,070 --> 02:57:39,200

i other respect him as as a seeker

5049

02:57:43,510 --> 02:57:42,080

and he's he's he's learning to be

5050

02:57:45,190 --> 02:57:43,520

careful about how he

5051
02:57:47,030 --> 02:57:45,200
throws around words like quantum

5052
02:57:49,510 --> 02:57:47,040
mechanics and so forth i mean he's been

5053
02:57:50,950 --> 02:57:49,520
he's been i'm aware he's taken hits in

5054
02:57:55,510 --> 02:57:50,960
the past and i think that

5055
02:57:58,389 --> 02:57:55,520
that but i have really he and i

5056
02:57:59,910 --> 02:57:58,399
and this is really important science and

5057
02:58:02,870 --> 02:57:59,920
spirituality

5058
02:58:04,469 --> 02:58:02,880
do need to have a dialogue and whenever

5059
02:58:07,190 --> 02:58:04,479
there's a dialogue

5060
02:58:08,469 --> 02:58:07,200
even within members of two different

5061
02:58:09,910 --> 02:58:08,479
scientific disciplines

5062
02:58:11,670 --> 02:58:09,920
you have to have a lot of patience with

5063
02:58:13,349 --> 02:58:11,680

the other person so you know

5064

02:58:15,190 --> 02:58:13,359

someone who is not a cognitive scientist

5065

02:58:16,550 --> 02:58:15,200

coming to talk to me say he's a chemist

5066

02:58:18,309 --> 02:58:16,560

well when i start talking chemistry with

5067

02:58:20,710 --> 02:58:18,319

him i'm going to feel like and

5068

02:58:22,550 --> 02:58:20,720

be really stupid compared to him when he

5069

02:58:24,790 --> 02:58:22,560

talks cognitive science to me it's

5070

02:58:25,830 --> 02:58:24,800

he's going to be really pedestrian to me

5071

02:58:27,030 --> 02:58:25,840

it's going to be the same thing in

5072

02:58:30,150 --> 02:58:27,040

science and spirituality

5073

02:58:31,110 --> 02:58:30,160

so if i want productive dialogue of

5074

02:58:32,630 --> 02:58:31,120

course

5075

02:58:35,190 --> 02:58:32,640

i'm going to be saying things that to

5076

02:58:37,510 --> 02:58:35,200

someone who's spiritually

5077

02:58:39,030 --> 02:58:37,520

trained is going to sound you know

5078

02:58:41,750 --> 02:58:39,040

scientific

5079

02:58:42,950 --> 02:58:41,760

nonsense and immature and not very deep

5080

02:58:46,389 --> 02:58:42,960

and vice versa

5081

02:58:47,110 --> 02:58:46,399

so so of of course i'll have said things

5082

02:58:51,190 --> 02:58:47,120

that that

5083

02:58:52,550 --> 02:58:51,200

deepak thinks are spiritually stupid

5084

02:58:54,630 --> 02:58:52,560

and then he says things that you know on

5085

02:58:56,550 --> 02:58:54,640

quantum mechanics and so forth that that

5086

02:58:57,990 --> 02:58:56,560

you know most scientists would say

5087

02:58:59,349 --> 02:58:58,000

that's not what a

5088

02:59:01,590 --> 02:58:59,359

you know a really trained scientist

5089

02:59:04,950 --> 02:59:01,600

would say

5090

02:59:05,429 --> 02:59:04,960

fine but if we want to have a dialogue

5091

02:59:10,150 --> 02:59:05,439

that's

5092

02:59:13,590 --> 02:59:10,160

really productive we have to

5093

02:59:15,990 --> 02:59:13,600

cut each other some slack we have to

5094

02:59:17,990 --> 02:59:16,000

listen past the barriers and understand

5095

02:59:19,510 --> 02:59:18,000

you know it took me many many years to

5096

02:59:20,630 --> 02:59:19,520

understand what i know about cognitive

5097

02:59:22,309 --> 02:59:20,640

science

5098

02:59:23,510 --> 02:59:22,319

i can't expect someone to just pop into

5099

02:59:24,790 --> 02:59:23,520

my field and sound like they know what

5100

02:59:26,309 --> 02:59:24,800

they're talking about

5101
02:59:28,070 --> 02:59:26,319
if i'm not willing to cut them some

5102
02:59:28,630 --> 02:59:28,080
slack we'll never get a dialogue so for

5103
02:59:31,349 --> 02:59:28,640
me

5104
02:59:33,429 --> 02:59:31,359
that that's so i i and i learned from my

5105
02:59:35,030 --> 02:59:33,439
dialogue with deepak he he learns

5106
02:59:36,630 --> 02:59:35,040
in his dialogue with me and we've

5107
02:59:38,469 --> 02:59:36,640
learned to have this respect

5108
02:59:39,750 --> 02:59:38,479
of what each other knows and trying to

5109
02:59:43,269 --> 02:59:39,760
learn from the other so

5110
02:59:46,389 --> 02:59:43,279
so that's what i hope um we we mirror

5111
02:59:48,790 --> 02:59:46,399
um and of course it's my job to

5112
02:59:50,309 --> 02:59:48,800
gently correct him when i see things

5113
02:59:52,309 --> 02:59:50,319

that he says that might be wrong and

5114

02:59:53,990 --> 02:59:52,319

it's his job to gently correct me when i

5115

02:59:57,590 --> 02:59:54,000

misstate his tradition for example

5116

02:59:58,950 --> 02:59:57,600

so that's that's perfectly fine on jesus

5117

03:00:03,510 --> 02:59:58,960

i don't know what to say about

5118

03:00:05,670 --> 03:00:03,520

um i mean i was raised uh

5119

03:00:07,030 --> 03:00:05,680

my father was a fundamentalist christian

5120

03:00:08,870 --> 03:00:07,040

minister and so i

5121

03:00:11,990 --> 03:00:08,880

i've read the bible cover to cover more

5122

03:00:17,510 --> 03:00:14,870

i know what the standard interpretation

5123

03:00:20,150 --> 03:00:17,520

of the bible is

5124

03:00:21,670 --> 03:00:20,160

among protestant fundamentals christians

5125

03:00:24,230 --> 03:00:21,680

what jesus meant when he said i am the

5126
03:00:28,550 --> 03:00:24,240
way the truth and life

5127
03:00:32,150 --> 03:00:28,560
um i don't know i i'll just say

5128
03:00:39,590 --> 03:00:36,790
i i will say that

5129
03:00:42,230 --> 03:00:39,600
i think that there are many beautiful

5130
03:00:44,790 --> 03:00:42,240
insights in the bible

5131
03:00:46,469 --> 03:00:44,800
and and i think there's also nonsense

5132
03:00:48,550 --> 03:00:46,479
and i think that

5133
03:00:50,469 --> 03:00:48,560
just like in scientific theories there

5134
03:00:52,070 --> 03:00:50,479
are many beautiful insights

5135
03:00:54,309 --> 03:00:52,080
and then there are places where we know

5136
03:00:55,429 --> 03:00:54,319
we're absolutely wrong and and my

5137
03:00:57,110 --> 03:00:55,439
attitude

5138
03:00:59,110 --> 03:00:57,120

in for any scripture and for any

5139

03:01:02,469 --> 03:00:59,120

scientific theory is the same

5140

03:01:06,230 --> 03:01:02,479

let's treasure the insights

5141

03:01:08,870 --> 03:01:06,240

and let's recognize humbly

5142

03:01:09,670 --> 03:01:08,880

that we can be wrong any religious

5143

03:01:12,469 --> 03:01:09,680

tradition

5144

03:01:15,269 --> 03:01:12,479

any scripture any scientific theory if

5145

03:01:18,469 --> 03:01:15,279

we're not willing

5146

03:01:20,550 --> 03:01:18,479

to be wrong

5147

03:01:22,150 --> 03:01:20,560

to open up to the possibility that

5148

03:01:23,190 --> 03:01:22,160

something we deeply believe could be

5149

03:01:25,429 --> 03:01:23,200

deeply wrong

5150

03:01:26,469 --> 03:01:25,439

we can't grow that's the place where we

5151
03:01:31,830 --> 03:01:26,479
stop growing

5152
03:01:34,950 --> 03:01:31,840
so it's it's a matter of humility

5153
03:01:37,349 --> 03:01:34,960
both to listen to to other traditions

5154
03:01:40,150 --> 03:01:37,359
other points of view to be open that

5155
03:01:41,750 --> 03:01:40,160
they may have insights i've never had

5156
03:01:43,990 --> 03:01:41,760
i may have insights that they've never

5157
03:01:45,830 --> 03:01:44,000
had i may have nonsense

5158
03:01:47,269 --> 03:01:45,840
that they can point out they may have

5159
03:01:48,950 --> 03:01:47,279
nonsense that i can point out

5160
03:01:50,070 --> 03:01:48,960
if we can do it in this respectful way

5161
03:01:51,349 --> 03:01:50,080
again like the kind of thing i'm trying

5162
03:01:52,550 --> 03:01:51,359
to do with with depop

5163
03:01:53,910 --> 03:01:52,560

i i don't want to have them say

5164

03:01:54,710 --> 03:01:53,920

something wrong about quantum mechanics

5165

03:01:56,469 --> 03:01:54,720

and go

5166

03:01:57,750 --> 03:01:56,479

ugh you said that about quantum

5167

03:01:59,429 --> 03:01:57,760

mechanics forget it i'm not going to

5168

03:02:00,710 --> 03:01:59,439

talk to you anymore you got that wrong

5169

03:02:03,190 --> 03:02:00,720

that's that's not the way to do it

5170

03:02:05,349 --> 03:02:03,200

that's it it's it's to have

5171

03:02:06,630 --> 03:02:05,359

a respectful dialogue if others are

5172

03:02:09,429 --> 03:02:06,640

willing to

5173

03:02:10,389 --> 03:02:09,439

humbly also put out their ideas and

5174

03:02:11,830 --> 03:02:10,399

listen

5175

03:02:13,590 --> 03:02:11,840

that i think is the heart of true

5176
03:02:14,469 --> 03:02:13,600
religion when we talk about loving each

5177
03:02:16,150 --> 03:02:14,479
other

5178
03:02:17,990 --> 03:02:16,160
what deeper love can you have than to

5179
03:02:20,070 --> 03:02:18,000
respectfully

5180
03:02:21,429 --> 03:02:20,080
and carefully listen to the thoughts and

5181
03:02:23,510 --> 03:02:21,439
opinions of others

5182
03:02:24,469 --> 03:02:23,520
and be willing to entertain the

5183
03:02:26,950 --> 03:02:24,479
possibility

5184
03:02:28,389 --> 03:02:26,960
that they may be right in some places

5185
03:02:31,590 --> 03:02:28,399
and you may be wrong

5186
03:02:32,630 --> 03:02:31,600
that's a deep respectful and humble kind

5187
03:02:33,910 --> 03:02:32,640
of interaction

5188
03:02:37,349 --> 03:02:33,920

and that's how we will learn and that's

5189

03:02:41,750 --> 03:02:39,830

thank you don where can the audience

5190

03:02:44,870 --> 03:02:41,760

find out more about you

5191

03:02:48,230 --> 03:02:44,880

um i if you google

5192

03:02:49,830 --> 03:02:48,240

donald hoffman hof fman my um home page

5193

03:02:51,750 --> 03:02:49,840

at university california comes up and

5194

03:02:53,590 --> 03:02:51,760

i've got links to my papers and

5195

03:02:55,030 --> 03:02:53,600

i have a book um the case against

5196

03:02:56,630 --> 03:02:55,040

reality

5197

03:02:59,750 --> 03:02:56,640

published by norton so the case against

5198

03:03:01,670 --> 03:02:59,760

reality is a great place to get