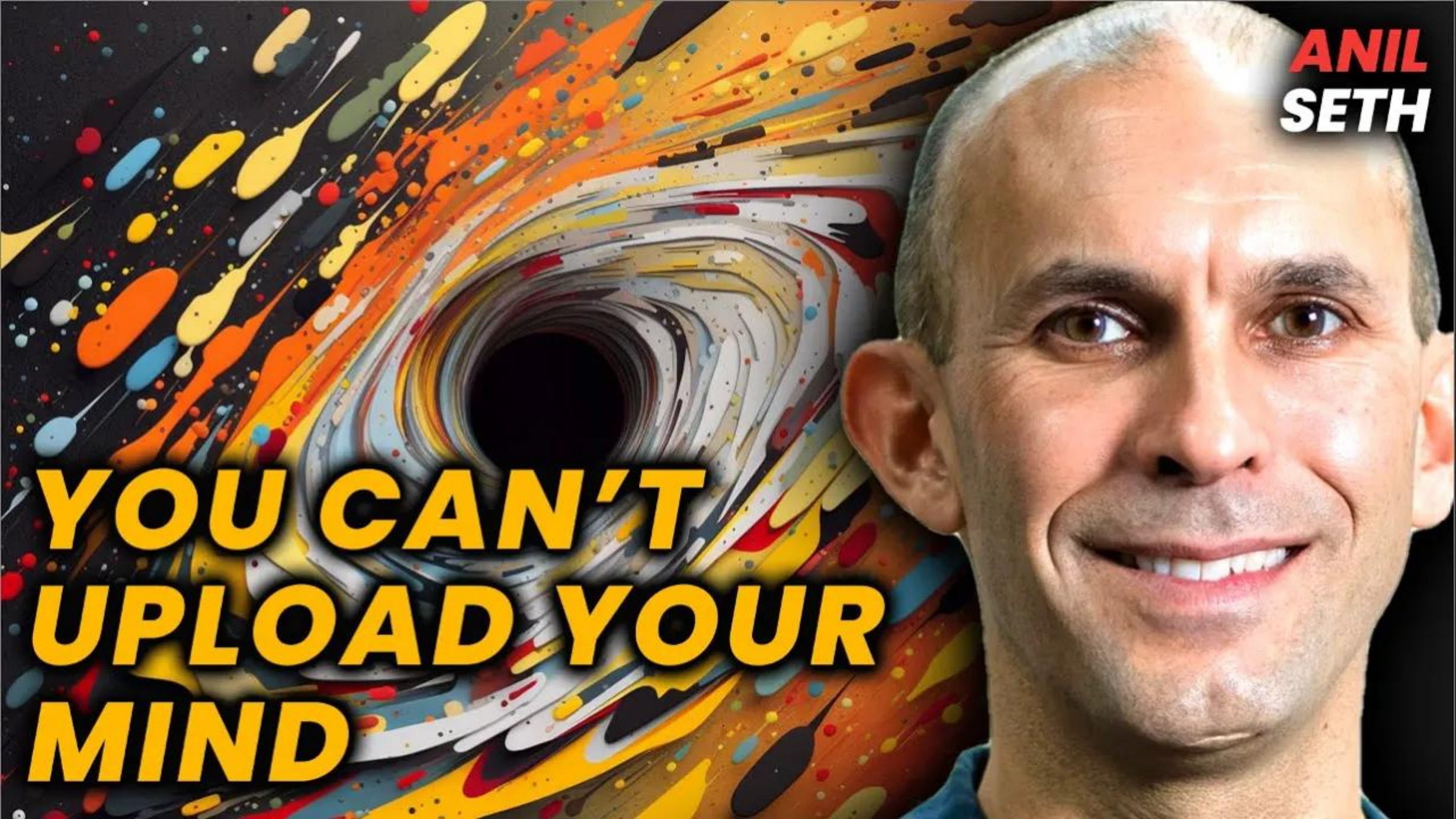
ANIL
SETH
YOU CAN'T
UPLOAD YOUR
MIND

1
00:00:04,150 --> 00:00:02,310
there's a lot of questions this looks

2
00:00:05,030 --> 00:00:04,160
like some sort of super hard interview

3
00:00:07,349 --> 00:00:05,040
for some

4
00:00:08,870 --> 00:00:07,359
things i hope you then expect me to have

5
00:00:14,470 --> 00:00:08,880
answers for

6
00:00:19,029 --> 00:00:16,470
i'm here with professor anil seth of

7
00:00:20,710 --> 00:00:19,039
neuroscience at the university of sussex

8
00:00:22,470 --> 00:00:20,720
there aren't many people who are brave

9
00:00:23,830 --> 00:00:22,480
enough to tackle consciousness

10
00:00:27,349 --> 00:00:23,840
scientifically maybe there's

11
00:00:29,669 --> 00:00:27,359
maybe there's 1 000 people and

12
00:00:31,429 --> 00:00:29,679
there's maybe five percent of that are

13
00:00:32,630 --> 00:00:31,439

paragons in the field so that's like 50

14
00:00:35,590 --> 00:00:32,640
people i'd say and i would

15
00:00:37,270 --> 00:00:35,600
include anil seth in that i'm super

16
00:00:39,430 --> 00:00:37,280
excited to speak with him if you look up

17
00:00:40,790 --> 00:00:39,440
his talk on ted i believe it's one of

18
00:00:41,350 --> 00:00:40,800
the most viewed that we hallucinate

19
00:00:42,790 --> 00:00:41,360
realities

20
00:00:44,709 --> 00:00:42,800
you might want to view that before

21
00:00:47,270 --> 00:00:44,719
watching this to get a an overview of

22
00:00:48,790 --> 00:00:47,280
seth point of views

23
00:00:50,709 --> 00:00:48,800
i'm also here with faraz who has a

24
00:00:52,229 --> 00:00:50,719
background in neuroscience

25
00:00:53,910 --> 00:00:52,239
and medical science a master's in it

26
00:00:56,310 --> 00:00:53,920
actually medical science and i thought

27
00:00:57,350 --> 00:00:56,320
it'd be great to have faraz tag along

28
00:00:58,950 --> 00:00:57,360
this is going to be somewhat

29
00:01:00,549 --> 00:00:58,960
free-flowing because me and fraz aren't

30
00:01:01,349 --> 00:01:00,559
communicating with each other off-screen

31
00:01:03,110 --> 00:01:01,359
in some way

32
00:01:05,109 --> 00:01:03,120
so at points he might interject and it

33
00:01:08,950 --> 00:01:05,119
might overlap with mine but that's fine

34
00:01:11,510 --> 00:01:08,960
we'll just take it as it goes

35
00:01:12,950 --> 00:01:11,520
welcome thank you professor thank oh

36
00:01:13,990 --> 00:01:12,960
thank you kurt and for us it's a

37
00:01:15,190 --> 00:01:14,000
pleasure to be here

38
00:01:16,149 --> 00:01:15,200

so professor what are you currently

39
00:01:17,030 --> 00:01:16,159
working on and how did you get

40
00:01:20,469 --> 00:01:17,040
interested

41
00:01:22,469 --> 00:01:20,479
in the field of consciousness so

42
00:01:24,310 --> 00:01:22,479
well two different things i mean

43
00:01:25,990 --> 00:01:24,320
consciousness for me has always been

44
00:01:27,190 --> 00:01:26,000
interesting it's one of those questions

45
00:01:28,710 --> 00:01:27,200
i think that

46
00:01:30,550 --> 00:01:28,720
pretty much everyone is interested in at

47
00:01:31,910 --> 00:01:30,560
some point in their lives certainly when

48
00:01:34,149 --> 00:01:31,920
you're a kid it's just one of these

49
00:01:36,550 --> 00:01:34,159
things these big mysteries

50
00:01:37,670 --> 00:01:36,560
how does it fit into our picture of the

51
00:01:39,350 --> 00:01:37,680
universe

52
00:01:40,710 --> 00:01:39,360
how does it depend on the brain what

53
00:01:43,109 --> 00:01:40,720
does it mean to be

54
00:01:45,030 --> 00:01:43,119
me what happens when i die and all these

55
00:01:47,030 --> 00:01:45,040
sort of big questions

56
00:01:49,030 --> 00:01:47,040
are things that most of us wonder about

57
00:01:52,310 --> 00:01:49,040
and then usually grow out of and

58
00:01:53,190 --> 00:01:52,320
and do something more normal with with

59
00:01:55,270 --> 00:01:53,200
life

60
00:01:57,510 --> 00:01:55,280
so i've just been lucky enough to never

61
00:02:00,789 --> 00:01:57,520
have been forced to grow out of these

62
00:02:04,310 --> 00:02:00,799
these questions but of course that

63
00:02:07,109 --> 00:02:04,320

doesn't mean that every day is like

64
00:02:07,510 --> 00:02:07,119
12 hours a day just trying to answer

65
00:02:10,790 --> 00:02:07,520
this

66
00:02:12,309 --> 00:02:10,800
big spooky mystery about consciousness

67
00:02:14,550 --> 00:02:12,319
in fact

68
00:02:16,790 --> 00:02:14,560
day to day working in this area working

69
00:02:18,630 --> 00:02:16,800
in this part of science translates into

70
00:02:19,990 --> 00:02:18,640
a whole variety of different things that

71
00:02:21,589 --> 00:02:20,000
are related

72
00:02:23,670 --> 00:02:21,599
more or less directly to this big

73
00:02:24,949 --> 00:02:23,680
question so just for example today we've

74
00:02:26,869 --> 00:02:24,959
been

75
00:02:28,550 --> 00:02:26,879
talking with my people from my research

76
00:02:30,550 --> 00:02:28,560
group and colleagues

77
00:02:32,630 --> 00:02:30,560
about various things like how do we

78
00:02:34,550 --> 00:02:32,640
mathematically get a grip on

79
00:02:36,150 --> 00:02:34,560
an emergent property people often talk

80
00:02:38,470 --> 00:02:36,160
about consciousness as being

81
00:02:40,470 --> 00:02:38,480
emergent from the brain somehow but what

82
00:02:42,150 --> 00:02:40,480
does that mean mathematically

83
00:02:44,949 --> 00:02:42,160
that's one thing another thing we were

84
00:02:47,270 --> 00:02:44,959
looking at developing

85
00:02:48,949 --> 00:02:47,280
uh computer simulations of different

86
00:02:50,949 --> 00:02:48,959
kinds of hallucinations to

87
00:02:52,790 --> 00:02:50,959
get a better grip on how different kinds

88
00:02:55,589 --> 00:02:52,800

of visual hallucinations differ

89
00:02:56,869 --> 00:02:55,599
and what the underlying mechanisms in

90
00:02:59,830 --> 00:02:56,879
the brain

91
00:03:00,229 --> 00:02:59,840
might be and then you know just before

92
00:03:03,990 --> 00:03:00,239
this

93
00:03:05,910 --> 00:03:04,000
the very early stages

94
00:03:07,589 --> 00:03:05,920
trying to develop new kinds of

95
00:03:10,229 --> 00:03:07,599
experiments to

96
00:03:10,790 --> 00:03:10,239
understand a difference between what we

97
00:03:13,670 --> 00:03:10,800
might call

98
00:03:16,070 --> 00:03:13,680
gist perception you know if you just see

99
00:03:19,110 --> 00:03:16,080
a scene very quickly you can usually

100
00:03:22,790 --> 00:03:19,120
tell that it's a landscape or it's

101
00:03:24,550 --> 00:03:22,800
some very very basic features

102
00:03:26,309 --> 00:03:24,560
of perception come out very quickly but

103
00:03:27,750 --> 00:03:26,319
others require a bit longer to figure

104
00:03:29,110 --> 00:03:27,760
out oh am i looking at this person or

105
00:03:31,430 --> 00:03:29,120
that person or is it a car

106
00:03:33,190 --> 00:03:31,440
or what's what are the details going on

107
00:03:36,229 --> 00:03:33,200
so i'm very interested in

108
00:03:38,710 --> 00:03:36,239
thinking about how to explain these

109
00:03:40,630 --> 00:03:38,720
differences in visual perception

110
00:03:42,550 --> 00:03:40,640
so just to say there's just an awful lot

111
00:03:44,830 --> 00:03:42,560
of different um

112
00:03:46,070 --> 00:03:44,840
different specific questions that we can

113
00:03:48,149 --> 00:03:46,080

ask

114
00:03:49,990 --> 00:03:48,159
when we're trying to understand more

115
00:03:51,589 --> 00:03:50,000
about consciousness

116
00:03:53,910 --> 00:03:51,599
is it cool if we get some definitions

117
00:03:55,750 --> 00:03:53,920
out of the way yeah i think it's always

118
00:03:58,550 --> 00:03:55,760
a good place to start

119
00:03:59,350 --> 00:03:58,560
right phenomenology the way that you use

120
00:04:02,949 --> 00:03:59,360
it

121
00:04:03,509 --> 00:04:02,959
philosophical doctrine of phenomenology

122
00:04:04,710 --> 00:04:03,519
which is

123
00:04:06,869 --> 00:04:04,720
cereals heidegger's and then there's

124
00:04:08,309 --> 00:04:06,879
particle phenomenology

125
00:04:10,149 --> 00:04:08,319
and i'm unclear when you say

126
00:04:11,750 --> 00:04:10,159
phenomenology exactly what do you mean

127
00:04:14,070 --> 00:04:11,760
well i mean i must admit i play a little

128
00:04:17,189 --> 00:04:14,080
fast and loose with with the definitions

129
00:04:18,629 --> 00:04:17,199
um and it's but the way i mean it is

130
00:04:20,550 --> 00:04:18,639
probably quite close to the

131
00:04:23,430 --> 00:04:20,560
the philosophical phenomenology of

132
00:04:25,590 --> 00:04:23,440
facile and pontian and people like that

133
00:04:26,790 --> 00:04:25,600
really it's just for me a way of drawing

134
00:04:31,189 --> 00:04:26,800
attention

135
00:04:34,710 --> 00:04:31,199
to the properties of experience

136
00:04:37,990 --> 00:04:34,720
so if we talk about let's say visual

137
00:04:40,310 --> 00:04:38,000
perception so perception here is

138
00:04:43,350 --> 00:04:40,320

how my brain interprets visual sensory

139
00:04:44,950 --> 00:04:43,360
data to form representations of the the

140
00:04:48,070 --> 00:04:44,960
world outside

141
00:04:49,670 --> 00:04:48,080
and you can think of that as having uh

142
00:04:52,710 --> 00:04:49,680
like a functional

143
00:04:54,629 --> 00:04:52,720
aspect so what does perceiving things

144
00:04:56,710 --> 00:04:54,639
visually allow me to do

145
00:04:58,950 --> 00:04:56,720
how do i behave with respect to visual

146
00:05:00,790 --> 00:04:58,960
information but there's also

147
00:05:02,870 --> 00:05:00,800
a phenomenological aspect there's how

148
00:05:06,230 --> 00:05:02,880
visual experience is seen

149
00:05:07,749 --> 00:05:06,240
you know the experience of redness is

150
00:05:11,110 --> 00:05:07,759
different from the experience of let's

151
00:05:12,870 --> 00:05:11,120
say an object in vision an object seems

152
00:05:14,390 --> 00:05:12,880
to have a back even though i can't see

153
00:05:15,670 --> 00:05:14,400
the back there's a phenomenology of

154
00:05:17,909 --> 00:05:15,680
object hood

155
00:05:19,830 --> 00:05:17,919
there's a phenomenology of spatiality

156
00:05:22,710 --> 00:05:19,840
all my visual experiences

157
00:05:24,710 --> 00:05:22,720
have a spatial character things

158
00:05:25,909 --> 00:05:24,720
organized in space in a way that let's

159
00:05:29,270 --> 00:05:25,919
say smell doesn't

160
00:05:31,430 --> 00:05:29,280
doesn't have so much um

161
00:05:32,950 --> 00:05:31,440
emotions would be have a very different

162
00:05:34,710 --> 00:05:32,960
kind of phenomenology

163
00:05:37,510 --> 00:05:34,720

and emotion feels different from any

164
00:05:40,950 --> 00:05:37,520
kind of visual experience

165
00:05:43,029 --> 00:05:40,960
so i use phenomenology just as a way of

166
00:05:43,990 --> 00:05:43,039
thinking about what a science of

167
00:05:46,550 --> 00:05:44,000
consciousness

168
00:05:48,150 --> 00:05:46,560
should explain what i think a scientific

169
00:05:50,710 --> 00:05:48,160
conscious should explain

170
00:05:51,350 --> 00:05:50,720
are phenomenological properties

171
00:05:54,550 --> 00:05:51,360
properties of

172
00:05:56,150 --> 00:05:54,560
experience why redness is the way it is

173
00:05:57,909 --> 00:05:56,160
in our experience and is different from

174
00:05:59,270 --> 00:05:57,919
an emotion or is different from a smell

175
00:06:01,430 --> 00:05:59,280
or a memory

176
00:06:03,350 --> 00:06:01,440
that's what i mean by phenomenology and

177
00:06:04,790 --> 00:06:03,360
when you say explain

178
00:06:06,469 --> 00:06:04,800
part of the problem with consciousness

179
00:06:08,070 --> 00:06:06,479
or at least people who are

180
00:06:09,430 --> 00:06:08,080
less scientifically minded who are

181
00:06:10,629 --> 00:06:09,440
disinclined to believe that

182
00:06:13,909 --> 00:06:10,639
consciousness can be studied

183
00:06:16,230 --> 00:06:13,919
materialistically i think part

184
00:06:17,749 --> 00:06:16,240
of the issue is what it means to explain

185
00:06:18,550 --> 00:06:17,759
consciousness what it means to explain

186
00:06:20,629 --> 00:06:18,560
any phenomenon

187
00:06:21,830 --> 00:06:20,639
so when you say we're trying to get an

188
00:06:24,950 --> 00:06:21,840

account of consciousness

189
00:06:27,430 --> 00:06:24,960
do you just mean correlates it's a very

190
00:06:29,830 --> 00:06:27,440
good question i think there's a lot of

191
00:06:31,350 --> 00:06:29,840
ambiguity and confusion about what

192
00:06:33,029 --> 00:06:31,360
explanation means i mean whole books

193
00:06:33,590 --> 00:06:33,039
have been written about what explanation

194
00:06:35,350 --> 00:06:33,600
means

195
00:06:36,870 --> 00:06:35,360
in science there's a beautiful book by

196
00:06:38,230 --> 00:06:36,880
carl craver called explanation in

197
00:06:39,670 --> 00:06:38,240
neuroscience what do you think

198
00:06:41,430 --> 00:06:39,680
anything in neuroscience what does it

199
00:06:42,230 --> 00:06:41,440
what does it mean to have an explanation

200
00:06:45,430 --> 00:06:42,240
of it

201
00:06:48,870 --> 00:06:45,440
um the way i think about it is

202
00:06:50,629 --> 00:06:48,880
is an explanation in consciousness

203
00:06:53,270 --> 00:06:50,639
science

204
00:06:54,150 --> 00:06:53,280
does not have to solve the whole problem

205
00:06:55,589 --> 00:06:54,160
of

206
00:06:57,909 --> 00:06:55,599
that we come up with this intuitive

207
00:07:01,430 --> 00:06:57,919
eureka moment about now i understand

208
00:07:03,909 --> 00:07:01,440
how the the electrochemical pate

209
00:07:04,870 --> 00:07:03,919
inside my skull gives rise to the

210
00:07:06,950 --> 00:07:04,880
redness of red i

211
00:07:08,629 --> 00:07:06,960
don't that's that's would be would be

212
00:07:10,230 --> 00:07:08,639
nice but we can have explanations that

213
00:07:13,510 --> 00:07:10,240

are relevant without

214
00:07:16,230 --> 00:07:13,520
that kind of big ticket prize

215
00:07:17,909 --> 00:07:16,240
so by explanation i mean more than

216
00:07:21,110 --> 00:07:17,919
correlation and that's key so

217
00:07:21,670 --> 00:07:21,120
so it's already a relatively standard

218
00:07:24,950 --> 00:07:21,680
method

219
00:07:27,670 --> 00:07:24,960
in neuroscience to look at the brain

220
00:07:28,950 --> 00:07:27,680
and see what changes in the brain as

221
00:07:29,990 --> 00:07:28,960
different aspects of consciousness

222
00:07:31,350 --> 00:07:30,000
change

223
00:07:32,629 --> 00:07:31,360
what happens in the brain when you fall

224
00:07:33,990 --> 00:07:32,639
asleep or when you go into general

225
00:07:36,150 --> 00:07:34,000
anesthesia

226
00:07:37,430 --> 00:07:36,160
or what happens in the brain when you

227
00:07:40,629 --> 00:07:37,440
consciously perceive

228
00:07:42,070 --> 00:07:40,639
a scene versus you still respond to it

229
00:07:44,869 --> 00:07:42,080
but you know you're not conscious of

230
00:07:46,309 --> 00:07:44,879
it so this is a standard method which is

231
00:07:48,390 --> 00:07:46,319
looking for the neural correlates of

232
00:07:51,670 --> 00:07:48,400
consciousness

233
00:07:54,070 --> 00:07:51,680
but just finding correlations is

234
00:07:55,830 --> 00:07:54,080
is not sufficient for explanations

235
00:07:58,390 --> 00:07:55,840
correlations provide constraints on

236
00:08:01,189 --> 00:07:58,400
explanations but they don't

237
00:08:02,309 --> 00:08:01,199
provide explanations themselves to

238
00:08:04,469 --> 00:08:02,319

explain something

239
00:08:06,790 --> 00:08:04,479
what you want to have is is in some way

240
00:08:08,790 --> 00:08:06,800
the correlation is no longer arbitrary

241
00:08:11,909 --> 00:08:08,800
you want to have a sense that ah yeah i

242
00:08:14,950 --> 00:08:11,919
see why that correlation obtains

243
00:08:18,070 --> 00:08:14,960
because it explains something about

244
00:08:21,430 --> 00:08:18,080
the thing it correlates with

245
00:08:23,909 --> 00:08:21,440
so which which for me means that

246
00:08:25,909 --> 00:08:23,919
the right way to think about this in

247
00:08:26,950 --> 00:08:25,919
terms of the brain and consciousness is

248
00:08:29,430 --> 00:08:26,960
not going to be so much

249
00:08:31,430 --> 00:08:29,440
this part of the brain is correlated

250
00:08:32,310 --> 00:08:31,440
with conjugations in this part isn't

251
00:08:34,149 --> 00:08:32,320
it's going to be at a sort of

252
00:08:35,430 --> 00:08:34,159
intermediate level consciousness

253
00:08:37,509 --> 00:08:35,440
correlates with

254
00:08:39,909 --> 00:08:37,519
this kind of process these kinds of

255
00:08:42,070 --> 00:08:39,919
dynamics in the brain because they have

256
00:08:45,110 --> 00:08:42,080
similar properties

257
00:08:46,070 --> 00:08:45,120
that the conscious experience has so we

258
00:08:48,710 --> 00:08:46,080
need a more

259
00:08:49,910 --> 00:08:48,720
kind of finessed bridge between what's

260
00:08:51,590 --> 00:08:49,920
happening in the brain and what's

261
00:08:53,269 --> 00:08:51,600
happening in experience

262
00:08:56,150 --> 00:08:53,279
and if i can come up with something in

263
00:09:00,949 --> 00:08:58,550

tells me you're like oh that's that's

264
00:09:02,870 --> 00:09:00,959
why consciousness in this case is the

265
00:09:06,389 --> 00:09:02,880
way it is and not some other way

266
00:09:09,350 --> 00:09:06,399
then that's an explanation uh

267
00:09:10,949 --> 00:09:09,360
in science in general we judge the

268
00:09:13,750 --> 00:09:10,959
success of science

269
00:09:16,150 --> 00:09:13,760
a scientific field usually if it can

270
00:09:17,430 --> 00:09:16,160
explain something if it can predict when

271
00:09:19,670 --> 00:09:17,440
things are going to happen and if you

272
00:09:21,590 --> 00:09:19,680
can control those things explanation

273
00:09:24,790 --> 00:09:21,600
prediction and control

274
00:09:26,230 --> 00:09:24,800
are good criteria for the success of

275
00:09:28,389 --> 00:09:26,240
science and i think we should apply

276
00:09:32,630 --> 00:09:28,399
those same criteria

277
00:09:35,750 --> 00:09:32,640
in this case too this doesn't mean that

278
00:09:37,750 --> 00:09:35,760
it has to be intuitive quantum physics

279
00:09:39,670 --> 00:09:37,760
is extremely counterintuitive but in

280
00:09:42,150 --> 00:09:39,680
terms of explaining phenomena predicting

281
00:09:44,710 --> 00:09:42,160
and controlling it's extremely good

282
00:09:47,509 --> 00:09:44,720
so this leaves open that we might come

283
00:09:49,590 --> 00:09:47,519
up with a good theory of consciousness

284
00:09:51,030 --> 00:09:49,600
and it might do the job of explanation

285
00:09:53,030 --> 00:09:51,040
prediction and control

286
00:09:54,310 --> 00:09:53,040
but we might never get the feeling that

287
00:09:56,470 --> 00:09:54,320
like oh yeah that's right

288
00:09:57,990 --> 00:09:56,480

now it all makes sense this might not

289
00:10:00,470 --> 00:09:58,000
happen don't know yet

290
00:10:01,829 --> 00:10:00,480
let's take quantum mechanics as an

291
00:10:04,230 --> 00:10:01,839
example

292
00:10:04,949 --> 00:10:04,240
the way that i view it is it's more

293
00:10:07,350 --> 00:10:04,959
instrumental

294
00:10:08,630 --> 00:10:07,360
people who are studying quantum physics

295
00:10:10,069 --> 00:10:08,640
they're hesitant to

296
00:10:12,310 --> 00:10:10,079
say that it's an explanation they're

297
00:10:14,389 --> 00:10:12,320
more i have to say it's a

298
00:10:17,190 --> 00:10:14,399
model and it provides some predictions

299
00:10:18,230 --> 00:10:17,200
and it's an operationalist approach

300
00:10:20,389 --> 00:10:18,240
some people might take a more

301
00:10:22,230 --> 00:10:20,399
philosophical bend and say you know this

302
00:10:24,230 --> 00:10:22,240
is an explanation but

303
00:10:25,269 --> 00:10:24,240
truly truly i don't it's difficult to be

304
00:10:26,310 --> 00:10:25,279
a scientist and not be an

305
00:10:29,670 --> 00:10:26,320
instrumentalist

306
00:10:31,110 --> 00:10:29,680
not

307
00:10:32,949 --> 00:10:31,120
it depends on what you mean by explain

308
00:10:34,470 --> 00:10:32,959
like is the fact that you can write

309
00:10:35,990 --> 00:10:34,480
equations that predict a certain number

310
00:10:37,430 --> 00:10:36,000
and then you find it in the data does

311
00:10:39,509 --> 00:10:37,440
that mean that you've explained it

312
00:10:40,630 --> 00:10:39,519
well well i don't know i don't know if

313
00:10:42,310 --> 00:10:40,640

that matches what people

314
00:10:44,150 --> 00:10:42,320
consider to be an explanation but

315
00:10:45,590 --> 00:10:44,160
explanation is a different it's a tricky

316
00:10:46,069 --> 00:10:45,600
like you said it's a tricky word to

317
00:10:47,829 --> 00:10:46,079
define

318
00:10:49,269 --> 00:10:47,839
okay now how's this related to the real

319
00:10:50,069 --> 00:10:49,279
problem you mentioned that there's a

320
00:10:51,990 --> 00:10:50,079
hard problem there's

321
00:10:53,750 --> 00:10:52,000
the easy problem and then there's the

322
00:10:55,910 --> 00:10:53,760
real problem that's your

323
00:10:57,430 --> 00:10:55,920
that's your anti so i'm curious is what

324
00:10:58,630 --> 00:10:57,440
you just described the real problem and

325
00:10:59,269 --> 00:10:58,640
how does that delineate from the heart

326
00:11:01,509 --> 00:10:59,279
problem

327
00:11:03,110 --> 00:11:01,519
yeah that's basically it um so again

328
00:11:04,310 --> 00:11:03,120
this is a little bit fast and loose with

329
00:11:06,310 --> 00:11:04,320
these terms as they're used in

330
00:11:09,750 --> 00:11:06,320
philosophy so the heart problem has

331
00:11:11,750 --> 00:11:09,760
has been one of the classic go-to's in

332
00:11:13,590 --> 00:11:11,760
people thinking about consciousness from

333
00:11:14,630 --> 00:11:13,600
a philosophical or neuroscientific

334
00:11:17,590 --> 00:11:14,640
perspective

335
00:11:18,710 --> 00:11:17,600
it's ju it's uh due primarily to david

336
00:11:22,069 --> 00:11:18,720
chalmers

337
00:11:23,430 --> 00:11:22,079
and the australian philosopher and he

338
00:11:25,269 --> 00:11:23,440

describes the heart problem of

339
00:11:27,269 --> 00:11:25,279
consciousness

340
00:11:28,630 --> 00:11:27,279
it's this metaphysical problem really

341
00:11:31,750 --> 00:11:28,640
it's it's the idea that

342
00:11:33,910 --> 00:11:31,760
even if we had a complete description of

343
00:11:36,949 --> 00:11:33,920
how the brain as a mechanism worked

344
00:11:40,790 --> 00:11:36,959
how it transformed sensory signals

345
00:11:43,750 --> 00:11:40,800
into actions into our behavior

346
00:11:44,550 --> 00:11:43,760
um if we understood everything about the

347
00:11:47,750 --> 00:11:44,560
brain as a

348
00:11:48,790 --> 00:11:47,760
as a physical chemical mechanism there

349
00:11:51,590 --> 00:11:48,800
would still be

350
00:11:52,870 --> 00:11:51,600
a mystery about why and how any of that

351
00:11:54,829 --> 00:11:52,880
activity

352
00:11:56,870 --> 00:11:54,839
should give rise to a conscious

353
00:11:59,910 --> 00:11:56,880
experience

354
00:12:01,269 --> 00:11:59,920
very broadly why is consciousness part

355
00:12:03,269 --> 00:12:01,279
of our universe

356
00:12:04,629 --> 00:12:03,279
at all how does it relate to the

357
00:12:08,389 --> 00:12:04,639
operation of physical stuff

358
00:12:10,949 --> 00:12:08,399
that's that's the hard problem and

359
00:12:11,430 --> 00:12:10,959
it is a very metaphysically loaded

360
00:12:15,350 --> 00:12:11,440
problem

361
00:12:17,829 --> 00:12:15,360
it's it's it's really a question about

362
00:12:19,509 --> 00:12:17,839
the capabilities and limitations of

363
00:12:23,430 --> 00:12:19,519

physical explanations

364
00:12:26,629 --> 00:12:23,440
explanations in terms of mechanisms um

365
00:12:28,870 --> 00:12:26,639
and it articulates

366
00:12:29,910 --> 00:12:28,880
the intuition that consciousness is

367
00:12:32,470 --> 00:12:29,920
somehow

368
00:12:34,550 --> 00:12:32,480
beyond the limits of physicalist and

369
00:12:37,750 --> 00:12:34,560
mechanistic explanation

370
00:12:39,030 --> 00:12:37,760
now there's all this debate in

371
00:12:39,750 --> 00:12:39,040
philosophy neuroscience about whether

372
00:12:42,470 --> 00:12:39,760
the heart problem

373
00:12:45,590 --> 00:12:42,480
exists whether it's an illusion uh or

374
00:12:48,550 --> 00:12:45,600
whether it can in fact be solved

375
00:12:49,990 --> 00:12:48,560
i put my cards on the table will want to

376
00:12:52,949 --> 00:12:50,000
remain agnostic about that

377
00:12:54,790 --> 00:12:52,959
i'm not sure whether the hard problem is

378
00:12:58,150 --> 00:12:54,800
a real problem

379
00:13:01,910 --> 00:12:58,160
that can or cannot be solved

380
00:13:03,430 --> 00:13:01,920
but what i do think is that

381
00:13:05,269 --> 00:13:03,440
we can still ask questions about

382
00:13:07,350 --> 00:13:05,279
consciousness without

383
00:13:09,910 --> 00:13:07,360
sweeping it and under the carpet

384
00:13:12,310 --> 00:13:09,920
entirely so the easy problems

385
00:13:13,829 --> 00:13:12,320
are again in chalmers distinction these

386
00:13:16,230 --> 00:13:13,839
are the problems that

387
00:13:17,190 --> 00:13:16,240
don't really appeal to consciousness at

388
00:13:19,030 --> 00:13:17,200

all they're

389
00:13:20,230 --> 00:13:19,040
questions about how the brain works as a

390
00:13:22,870 --> 00:13:20,240
mechanism

391
00:13:24,150 --> 00:13:22,880
how it can explain perception sure but

392
00:13:27,430 --> 00:13:24,160
any kind of perception

393
00:13:29,750 --> 00:13:27,440
action attention behavior language

394
00:13:31,829 --> 00:13:29,760
but we can answer all the easy questions

395
00:13:35,269 --> 00:13:31,839
without

396
00:13:36,949 --> 00:13:35,279
referring to consciousness now there's

397
00:13:38,389 --> 00:13:36,959
i think an enormously rich middle ground

398
00:13:39,990 --> 00:13:38,399
which is to

399
00:13:42,230 --> 00:13:40,000
appreciate that conscious experiences

400
00:13:45,030 --> 00:13:42,240
exist let's assume that they do and

401
00:13:46,949 --> 00:13:45,040
and we have experiences of color of

402
00:13:50,069 --> 00:13:46,959
shape of

403
00:13:53,350 --> 00:13:50,079
of emotion all sorts of things

404
00:13:55,910 --> 00:13:53,360
and we can start to

405
00:13:57,030 --> 00:13:55,920
try to explain the properties of these

406
00:14:00,790 --> 00:13:57,040
conscious experiences

407
00:14:02,710 --> 00:14:00,800
in terms of mechanisms this is exactly

408
00:14:04,710 --> 00:14:02,720
what we were talking about can i explain

409
00:14:06,470 --> 00:14:04,720
why a visual experience is the way it is

410
00:14:09,430 --> 00:14:06,480
and is different from let's say

411
00:14:11,110 --> 00:14:09,440
an emotional experience in terms of

412
00:14:12,949 --> 00:14:11,120
brain mechanisms

413
00:14:14,629 --> 00:14:12,959

and if i can do that i think i'm making

414
00:14:16,389 --> 00:14:14,639
progress on the

415
00:14:18,470 --> 00:14:16,399
scientific explanations of consciousness

416
00:14:20,870 --> 00:14:18,480
even if i'm not going directly after the

417
00:14:23,030 --> 00:14:20,880
heart problem

418
00:14:24,710 --> 00:14:23,040
now other people have expressed pretty

419
00:14:26,550 --> 00:14:24,720
similar ideas charles himself

420
00:14:29,269 --> 00:14:26,560
called the this approach something like

421
00:14:31,189 --> 00:14:29,279
the mapping problem how to build

422
00:14:32,790 --> 00:14:31,199
non-arbitrary correlations between

423
00:14:33,990 --> 00:14:32,800
things in the brain

424
00:14:36,389 --> 00:14:34,000
and things in the world of our

425
00:14:37,310 --> 00:14:36,399
experience other people have talked

426
00:14:38,949 --> 00:14:37,320
about

427
00:14:41,509 --> 00:14:38,959
neurophenomenology this goes back to

428
00:14:43,189 --> 00:14:41,519
francisco varela in particular

429
00:14:45,030 --> 00:14:43,199
it's just pretty much the same thing

430
00:14:47,269 --> 00:14:45,040
again how do we

431
00:14:48,949 --> 00:14:47,279
link things happening in the brain to

432
00:14:50,550 --> 00:14:48,959
things happening

433
00:14:52,470 --> 00:14:50,560
in in our experience so there's a

434
00:14:56,230 --> 00:14:52,480
tradition of of thinking

435
00:14:59,350 --> 00:14:56,240
this way do you see that the okay

436
00:15:01,350 --> 00:14:59,360
for us yeah sorry i just wanted to talk

437
00:15:02,069 --> 00:15:01,360
about the role of perception in all this

438
00:15:03,670 --> 00:15:02,079

because

439
00:15:05,269 --> 00:15:03,680
i find the way you have described in the

440
00:15:07,509 --> 00:15:05,279
past the perceptions

441
00:15:08,710 --> 00:15:07,519
relationship with reality quite

442
00:15:11,350 --> 00:15:08,720
fascinating

443
00:15:13,110 --> 00:15:11,360
you have previously said before that

444
00:15:14,870 --> 00:15:13,120
famously in a way you have said that

445
00:15:16,870 --> 00:15:14,880
normal perception is controlled

446
00:15:18,949 --> 00:15:16,880
hallucinations

447
00:15:20,870 --> 00:15:18,959
now this idea of hallucination or

448
00:15:22,069 --> 00:15:20,880
illusion i suppose first of all do you

449
00:15:23,829 --> 00:15:22,079
do you distinguish between these two

450
00:15:26,710 --> 00:15:23,839
words hallucination and illusion or

451
00:15:27,750 --> 00:15:26,720
can we use them interchangeably uh maybe

452
00:15:28,790 --> 00:15:27,760
you can answer this and then i have a

453
00:15:30,550 --> 00:15:28,800
follow-up question to this

454
00:15:32,470 --> 00:15:30,560
sure i mean well let me first say that

455
00:15:34,150 --> 00:15:32,480
this is i think it's a lovely phrase uh

456
00:15:35,670 --> 00:15:34,160
perception is controlled hallucination i

457
00:15:36,870 --> 00:15:35,680
did certainly didn't come up with it i

458
00:15:39,110 --> 00:15:36,880
heard it from

459
00:15:39,990 --> 00:15:39,120
one of my mentors chris frith who heard

460
00:15:42,710 --> 00:15:40,000
it somewhere

461
00:15:43,749 --> 00:15:42,720
else and and actually a few of us just

462
00:15:47,110 --> 00:15:43,759
we tried to

463
00:15:48,550 --> 00:15:47,120

find out the proper origin of it

464
00:15:50,470 --> 00:15:48,560
and i've never been able to sort of

465
00:15:53,990 --> 00:15:50,480
there's this legendary seminar

466
00:15:55,670 --> 00:15:54,000
ucsd sometime in 1990 uh

467
00:15:57,110 --> 00:15:55,680
which people refer to but it was never

468
00:15:59,590 --> 00:15:57,120
recorded and it's just

469
00:16:00,949 --> 00:15:59,600
so who knows um anyway the phrase does

470
00:16:02,150 --> 00:16:00,959
the rounds but i think it's a it's a

471
00:16:03,990 --> 00:16:02,160
good phrase

472
00:16:07,829 --> 00:16:04,000
and we'll get on to hallucinations in

473
00:16:11,030 --> 00:16:07,839
more detail i'm sure in a bit

474
00:16:13,110 --> 00:16:11,040
i not sure i would

475
00:16:14,949 --> 00:16:13,120
use it interchangeably with with

476
00:16:16,470 --> 00:16:14,959
illusion illusion i think is a very

477
00:16:19,829 --> 00:16:16,480
problematic word

478
00:16:20,829 --> 00:16:19,839
too because illusion sort of implies

479
00:16:26,069 --> 00:16:20,839
that there

480
00:16:26,710 --> 00:16:26,079
is a non-illusory perception that

481
00:16:28,310 --> 00:16:26,720
there's

482
00:16:30,470 --> 00:16:28,320
such a thing one might call veridical

483
00:16:31,269 --> 00:16:30,480
perception which is the sort of we're

484
00:16:34,150 --> 00:16:31,279
seeing the world

485
00:16:35,670 --> 00:16:34,160
as it really is and when we're

486
00:16:37,269 --> 00:16:35,680
hallucinating or experiencing an

487
00:16:39,110 --> 00:16:37,279
illusion

488
00:16:41,110 --> 00:16:39,120

then we're not seeing the world as it

489
00:16:45,189 --> 00:16:41,120
really is

490
00:16:45,990 --> 00:16:45,199
but my view on this is we never see the

491
00:16:48,470 --> 00:16:46,000
world

492
00:16:50,069 --> 00:16:48,480
as it really is everything that we

493
00:16:52,710 --> 00:16:50,079
perceive is a

494
00:16:53,590 --> 00:16:52,720
is or consciously experienced in our

495
00:16:55,590 --> 00:16:53,600
perceptual

496
00:16:57,430 --> 00:16:55,600
work is a construction that's only

497
00:17:00,470 --> 00:16:57,440
indirectly related

498
00:17:03,509 --> 00:17:00,480
to what's actually there uh

499
00:17:04,150 --> 00:17:03,519
it's just that the degree to which these

500
00:17:08,710 --> 00:17:04,160
perceptions

501
00:17:11,270 --> 00:17:08,720
are constrained by what's actually there

502
00:17:12,630 --> 00:17:11,280
differs so i think illusion for me and

503
00:17:13,590 --> 00:17:12,640
i'm thinking about this now really for

504
00:17:16,870 --> 00:17:13,600
the first time

505
00:17:20,470 --> 00:17:16,880
how i would distinguish it illusion is

506
00:17:21,669 --> 00:17:20,480
probably a very systematic relationship

507
00:17:22,870 --> 00:17:21,679
between what's there and what we

508
00:17:25,909 --> 00:17:22,880
perceive that is not

509
00:17:28,309 --> 00:17:25,919
necessarily maladaptive

510
00:17:29,750 --> 00:17:28,319
it can often be just useful it's sort of

511
00:17:31,029 --> 00:17:29,760
a quirk of the visual system where a

512
00:17:32,150 --> 00:17:31,039
normal way of constructing our

513
00:17:35,669 --> 00:17:32,160

perceptions is

514
00:17:39,830 --> 00:17:35,679
revealed to be quirky in some way

515
00:17:41,590 --> 00:17:39,840
and then hallucination is something a

516
00:17:43,110 --> 00:17:41,600
little bit more unusual hallucination

517
00:17:45,270 --> 00:17:43,120
usually means

518
00:17:47,190 --> 00:17:45,280
that i'm having an experience that

519
00:17:50,310 --> 00:17:47,200
you're not

520
00:17:51,590 --> 00:17:50,320
or that other people aren't and it is no

521
00:17:55,270 --> 00:17:51,600
longer

522
00:17:56,870 --> 00:17:55,280
necessarily so useful

523
00:17:58,950 --> 00:17:56,880
but i wouldn't say it's a hard and hard

524
00:18:01,990 --> 00:17:58,960
and fast distinction that there

525
00:18:04,150 --> 00:18:02,000
if you look at for instance if we

526
00:18:05,750 --> 00:18:04,160
look at fluffy clouds and see faces and

527
00:18:07,350 --> 00:18:05,760
clouds then this is probably something

528
00:18:08,310 --> 00:18:07,360
many of us do and you know you could

529
00:18:11,430 --> 00:18:08,320
equally call that an

530
00:18:13,110 --> 00:18:11,440
illusion or a hallucination and

531
00:18:14,950 --> 00:18:13,120
strictly the word for that from the

532
00:18:17,750 --> 00:18:14,960
greek term paradolia

533
00:18:18,150 --> 00:18:17,760
seeing patterns and things so i think

534
00:18:19,909 --> 00:18:18,160
there's

535
00:18:21,510 --> 00:18:19,919
yeah interesting sort of landscape of

536
00:18:24,390 --> 00:18:21,520
these terms

537
00:18:24,710 --> 00:18:24,400
right and then to follow up to this idea

538
00:18:27,029 --> 00:18:24,720

i mean

539
00:18:28,789 --> 00:18:27,039
the general population might think that

540
00:18:31,190 --> 00:18:28,799
for example illusions are

541
00:18:32,630 --> 00:18:31,200
in a way negative limitations that might

542
00:18:34,870 --> 00:18:32,640
prevent us from

543
00:18:35,990 --> 00:18:34,880
reaching the supposedly noble goal of

544
00:18:38,549 --> 00:18:36,000
for example searching

545
00:18:39,270 --> 00:18:38,559
for the truth let's say right but um you

546
00:18:41,110 --> 00:18:39,280
know you and

547
00:18:42,630 --> 00:18:41,120
others such as let's say donald huffman

548
00:18:45,110 --> 00:18:42,640
you've brilliantly

549
00:18:46,310 --> 00:18:45,120
argued that illusions are actually could

550
00:18:48,150 --> 00:18:46,320
be in a way a gift

551
00:18:49,350 --> 00:18:48,160
for example in your talk about

552
00:18:51,350 --> 00:18:49,360
consciousness you bring up the

553
00:18:55,110 --> 00:18:51,360
adolescence checkerboard illusion

554
00:18:56,630 --> 00:18:55,120
phenomenon and in a way

555
00:18:58,710 --> 00:18:56,640
my my question with this would be that

556
00:19:01,029 --> 00:18:58,720
if we have pragmatically evolved

557
00:19:02,789 --> 00:19:01,039
in a way not to experience reality in

558
00:19:04,470 --> 00:19:02,799
its true form

559
00:19:06,950 --> 00:19:04,480
you know it's about fitness in a lot of

560
00:19:09,029 --> 00:19:06,960
ways from an evolutionary perspective

561
00:19:10,070 --> 00:19:09,039
and are better off if truth is in a way

562
00:19:13,590 --> 00:19:10,080
evolutionarily or

563
00:19:15,830 --> 00:19:13,600

perceptively driven toward extinction

564
00:19:17,270 --> 00:19:15,840
then why should we want to get to the

565
00:19:21,029 --> 00:19:17,280
root of reality

566
00:19:23,590 --> 00:19:21,039
as a whole isn't ignorance bliss

567
00:19:25,350 --> 00:19:23,600
in this specific case i mean there's a

568
00:19:26,150 --> 00:19:25,360
lot of a lot of loaded phrases there

569
00:19:30,230 --> 00:19:26,160
about about

570
00:19:32,150 --> 00:19:30,240
truth and the of course truth matters

571
00:19:34,150 --> 00:19:32,160
and that there are things that we can't

572
00:19:35,909 --> 00:19:34,160
perceive which make a huge difference to

573
00:19:38,070 --> 00:19:35,919
us you know if we could perceive

574
00:19:40,470 --> 00:19:38,080
coronavirus particles i'm sure people

575
00:19:43,750 --> 00:19:40,480
would be much more willing to wear masks

576
00:19:44,310 --> 00:19:43,760
um and if you go and jump in front of a

577
00:19:46,470 --> 00:19:44,320
bus

578
00:19:47,830 --> 00:19:46,480
whether or not you're looking at it it's

579
00:19:50,789 --> 00:19:47,840
going to hurt

580
00:19:52,230 --> 00:19:50,799
so i'm i'm certainly not being

581
00:19:55,270 --> 00:19:52,240
anti-realist about this

582
00:19:56,789 --> 00:19:55,280
there's a real world out there we don't

583
00:19:58,710 --> 00:19:56,799
know quite what it is

584
00:20:00,230 --> 00:19:58,720
best to ask a physicist for that you

585
00:20:01,750 --> 00:20:00,240
know what the ultimate nature of reality

586
00:20:03,430 --> 00:20:01,760
is

587
00:20:05,510 --> 00:20:03,440
but it's certainly true that whatever it

588
00:20:07,110 --> 00:20:05,520

is is not we don't have and can never

589
00:20:08,470 --> 00:20:07,120
have direct access to it

590
00:20:11,110 --> 00:20:08,480
through perception and this is a very

591
00:20:13,029 --> 00:20:11,120
old point emmanuel kant i think

592
00:20:14,789 --> 00:20:13,039
says it plato said it but kant

593
00:20:18,070 --> 00:20:14,799
especially talked about the pneumonian

594
00:20:20,870 --> 00:20:18,080
that the sort of the external objective

595
00:20:24,630 --> 00:20:20,880
reality that's forever hidden behind a

596
00:20:27,029 --> 00:20:24,640
sensory veil so in a sense it's an

597
00:20:30,549 --> 00:20:27,039
elusive goal to think that we could ever

598
00:20:33,350 --> 00:20:30,559
perceive the true world in the sense of

599
00:20:36,310 --> 00:20:33,360
having direct perceptual access to

600
00:20:38,149 --> 00:20:36,320
physical reality but what we perceive is

601
00:20:39,750 --> 00:20:38,159
constrained by that reality that's what

602
00:20:42,070 --> 00:20:39,760
perception is all about it's a way of

603
00:20:45,590 --> 00:20:42,080
constructing a world for us

604
00:20:49,750 --> 00:20:45,600
that is usefully constrained by

605
00:20:51,430 --> 00:20:49,760
whatever's really out there and

606
00:20:52,870 --> 00:20:51,440
as you said and you know as don hoffman

607
00:20:54,549 --> 00:20:52,880
has said a whole bunch of people have

608
00:20:57,510 --> 00:20:54,559
said this really that

609
00:20:59,350 --> 00:20:57,520
as soon as you appreciate that our

610
00:21:01,750 --> 00:20:59,360
perceptual experience is not

611
00:21:03,669 --> 00:21:01,760
a direct reflection of an external

612
00:21:06,230 --> 00:21:03,679
objective reality

613
00:21:07,350 --> 00:21:06,240

then it's quite easy to to think that

614
00:21:10,390 --> 00:21:07,360
well what we perceive

615
00:21:13,110 --> 00:21:10,400
is going to be tuned by evolution

616
00:21:14,870 --> 00:21:13,120
to what best keeps us alive and i think

617
00:21:16,230 --> 00:21:14,880
there's there's a really deep truth to

618
00:21:17,669 --> 00:21:16,240
that

619
00:21:20,070 --> 00:21:17,679
and you can think about it in one of the

620
00:21:23,510 --> 00:21:20,080
very simple examples like color

621
00:21:25,590 --> 00:21:23,520
we experience colors as usually we

622
00:21:28,470 --> 00:21:25,600
experience them as really existing

623
00:21:30,230 --> 00:21:28,480
properties of objects in the world color

624
00:21:31,750 --> 00:21:30,240
seems to be a property of an external

625
00:21:33,110 --> 00:21:31,760
objective reality but

626
00:21:34,950 --> 00:21:33,120
we know that it isn't and we don't even

627
00:21:35,990 --> 00:21:34,960
need neuroscience for that i mean newton

628
00:21:39,750 --> 00:21:36,000
has shown

629
00:21:42,870 --> 00:21:39,760
that color is is not a thing

630
00:21:45,270 --> 00:21:42,880
in the physical universe it's there's

631
00:21:45,909 --> 00:21:45,280
this whole continuous spectrums any part

632
00:21:49,190 --> 00:21:45,919
of it that

633
00:21:51,029 --> 00:21:49,200
we were able to that can shape our

634
00:21:53,110 --> 00:21:51,039
experience at all

635
00:21:55,270 --> 00:21:53,120
uh you know we create this universe of

636
00:21:57,590 --> 00:21:55,280
colors from

637
00:21:59,990 --> 00:21:57,600
the fact that our eyes are responsive to

638
00:22:02,710 --> 00:22:00,000

roughly three different wavelengths

639
00:22:03,430 --> 00:22:02,720
but we see way more than three colors

640
00:22:04,789 --> 00:22:03,440
which

641
00:22:07,430 --> 00:22:04,799
for me is fascinating because in one

642
00:22:09,110 --> 00:22:07,440
sense we are perceiving

643
00:22:10,710 --> 00:22:09,120
much less than what's actually out there

644
00:22:13,190 --> 00:22:10,720
because we don't

645
00:22:14,470 --> 00:22:13,200
experience x-rays or infrared or

646
00:22:16,950 --> 00:22:14,480
ultraviolet

647
00:22:17,669 --> 00:22:16,960
at all but in another sense we're

648
00:22:19,270 --> 00:22:17,679
experiencing

649
00:22:21,270 --> 00:22:19,280
much more than what's out there because

650
00:22:22,870 --> 00:22:21,280
we create a universe of colors just from

651
00:22:24,870 --> 00:22:22,880
combinations of three

652
00:22:27,110 --> 00:22:24,880
wavelengths and the brain does this

653
00:22:28,950 --> 00:22:27,120
because colors are very useful

654
00:22:31,430 --> 00:22:28,960
to guide our interaction with the world

655
00:22:34,710 --> 00:22:31,440
they're a way for the brain in this case

656
00:22:37,669 --> 00:22:34,720
to keep track of surfaces when lighting

657
00:22:41,909 --> 00:22:40,390
and to what and to distinguish between

658
00:22:43,029 --> 00:22:41,919
different kinds of surfaces it's very

659
00:22:44,710 --> 00:22:43,039
very useful thing

660
00:22:46,149 --> 00:22:44,720
but the brains have figured out what to

661
00:22:49,510 --> 00:22:46,159
do

662
00:22:52,950 --> 00:22:49,520
it's not like

663
00:22:54,630 --> 00:22:52,960

we should the goal should be to

664
00:22:56,630 --> 00:22:54,640
not experience colors anymore and

665
00:22:58,710 --> 00:22:56,640
experience just those three wavelengths

666
00:23:01,430 --> 00:22:58,720
of light i mean no

667
00:23:03,350 --> 00:23:01,440
even though that's closer to objective

668
00:23:05,510 --> 00:23:03,360
reality in some way

669
00:23:06,789 --> 00:23:05,520
that seems like an odd goal to have i

670
00:23:07,909 --> 00:23:06,799
think you know the

671
00:23:10,710 --> 00:23:07,919
the interesting thing is just to

672
00:23:12,549 --> 00:23:10,720
understand much more about this relation

673
00:23:14,390 --> 00:23:12,559
how do we construct the universe of

674
00:23:17,750 --> 00:23:14,400
color from a very limited

675
00:23:19,510 --> 00:23:17,760
sampling of physical reality and why

676
00:23:21,110 --> 00:23:19,520
is that a useful thing for the organism

677
00:23:23,190 --> 00:23:21,120
to do

678
00:23:24,470 --> 00:23:23,200
i mean one example that comes to my mind

679
00:23:27,110 --> 00:23:24,480
regarding this was

680
00:23:28,470 --> 00:23:27,120
um the idea that for example you have an

681
00:23:30,950 --> 00:23:28,480
organism that is

682
00:23:31,590 --> 00:23:30,960
uh it might be tuned to fitness and in

683
00:23:34,230 --> 00:23:31,600
terms of

684
00:23:36,230 --> 00:23:34,240
um understanding small and large

685
00:23:37,830 --> 00:23:36,240
quantities of some resource as let's say

686
00:23:39,830 --> 00:23:37,840
one color let's say red

687
00:23:41,029 --> 00:23:39,840
and then anything that is in the middle

688
00:23:43,269 --> 00:23:41,039

adds another color

689
00:23:46,070 --> 00:23:43,279
so for that specific organism it doesn't

690
00:23:47,909 --> 00:23:46,080
really matter whether

691
00:23:50,070 --> 00:23:47,919
that resource is in a large or small

692
00:23:51,990 --> 00:23:50,080
quantity that's why it sees it as

693
00:23:53,590 --> 00:23:52,000
the same color and what matters is

694
00:23:55,750 --> 00:23:53,600
whether it's it's in the

695
00:23:57,669 --> 00:23:55,760
exact amount that the organism needs so

696
00:23:59,510 --> 00:23:57,679
you know in a way evolutionarily the

697
00:24:02,149 --> 00:23:59,520
organism evolves

698
00:24:02,870 --> 00:24:02,159
to not distinguish between small and

699
00:24:06,789 --> 00:24:02,880
large

700
00:24:10,630 --> 00:24:06,799
amount of a quantity but

701
00:24:13,430 --> 00:24:10,640
and and that leads to evolution in a way

702
00:24:14,549 --> 00:24:13,440
hiding the the truth that is that is

703
00:24:17,190 --> 00:24:14,559
behind it so

704
00:24:18,470 --> 00:24:17,200
that that idea just yeah there's

705
00:24:18,950 --> 00:24:18,480
something right about that and you know

706
00:24:20,870 --> 00:24:18,960
i know

707
00:24:22,070 --> 00:24:20,880
various people don often as well uses

708
00:24:25,110 --> 00:24:22,080
this idea of the

709
00:24:26,789 --> 00:24:25,120
the metaphor of the desktop right we

710
00:24:28,149 --> 00:24:26,799
the the desktop on your computer is

711
00:24:30,630 --> 00:24:28,159
useful because

712
00:24:32,070 --> 00:24:30,640
it hides all the stuff going on in the

713
00:24:33,669 --> 00:24:32,080

operating system

714
00:24:35,590 --> 00:24:33,679
that is not useful for the user of the

715
00:24:38,630 --> 00:24:35,600
computer to see we just want to

716
00:24:40,950 --> 00:24:38,640
drag a file into a folder and

717
00:24:42,789 --> 00:24:40,960
be and be unaware of what's actually

718
00:24:44,390 --> 00:24:42,799
happening to make that happen

719
00:24:47,190 --> 00:24:44,400
and so indeed i think there's every

720
00:24:50,870 --> 00:24:47,200
reason to think that perceptual systems

721
00:24:53,190 --> 00:24:50,880
are also built that way

722
00:24:53,909 --> 00:24:53,200
let's take this hofmannian argument a

723
00:24:55,510 --> 00:24:53,919
little further

724
00:24:57,110 --> 00:24:55,520
so the argument is that there's no

725
00:24:58,870 --> 00:24:57,120
relationship between or there's little

726
00:25:01,029 --> 00:24:58,880
relationship between truth and fitness

727
00:25:02,470 --> 00:25:01,039
and we're tuned for fitness given that

728
00:25:03,430 --> 00:25:02,480
we're not seeing reality or at least we

729
00:25:07,590 --> 00:25:03,440
can't claim to

730
00:25:09,830 --> 00:25:07,600
now given that how can we ever make any

731
00:25:11,430 --> 00:25:09,840
claim that there is an objective world

732
00:25:12,390 --> 00:25:11,440
or what the characteristics of this

733
00:25:15,269 --> 00:25:12,400
objective world

734
00:25:15,990 --> 00:25:15,279
is like now you made a claim in one of

735
00:25:18,149 --> 00:25:16,000
your talks

736
00:25:19,269 --> 00:25:18,159
about misperceiving yourself that some

737
00:25:21,510 --> 00:25:19,279
mental disorders can be

738
00:25:23,350 --> 00:25:21,520

seen as you have the wrong idea about

739
00:25:25,830 --> 00:25:23,360
yourself how can you have a wrong

740
00:25:27,269 --> 00:25:25,840
idea that to me implies objective but

741
00:25:29,990 --> 00:25:27,279
it's difficult to know the objective

742
00:25:32,870 --> 00:25:30,000
without making reference to adaptiveness

743
00:25:34,470 --> 00:25:32,880
okay so i think um i don't think

744
00:25:35,830 --> 00:25:34,480
anybody's saying there's no relationship

745
00:25:38,310 --> 00:25:35,840
between

746
00:25:39,590 --> 00:25:38,320
truth and fitness or perception it's

747
00:25:41,269 --> 00:25:39,600
just not they're not they're not the

748
00:25:44,310 --> 00:25:41,279
same thing

749
00:25:45,430 --> 00:25:44,320
so uh but there's gonna be some overlap

750
00:25:48,710 --> 00:25:45,440
like if my

751
00:25:50,630 --> 00:25:48,720
if my perceptual system reliably

752
00:25:52,789 --> 00:25:50,640
represents things as far away when

753
00:25:54,390 --> 00:25:52,799
they're close

754
00:25:56,710 --> 00:25:54,400
and i try and cross the road i'm gonna

755
00:26:00,149 --> 00:25:56,720
get run over

756
00:26:01,669 --> 00:26:00,159
and that's that's and so that's

757
00:26:03,510 --> 00:26:01,679
that's not a good way for perceptual

758
00:26:03,990 --> 00:26:03,520
system to be organized so that there is

759
00:26:14,549 --> 00:26:04,000
a

760
00:26:18,070 --> 00:26:14,559
me

761
00:26:20,149 --> 00:26:18,080
ways that you can form

762
00:26:21,669 --> 00:26:20,159
graphs there's something called quantum

763
00:26:23,110 --> 00:26:21,679

graphs i believe it's used in loop

764
00:26:25,830 --> 00:26:23,120
quantum gravity

765
00:26:27,269 --> 00:26:25,840
but regardless where you can represent

766
00:26:27,990 --> 00:26:27,279
what's far as close and what's closest

767
00:26:29,830 --> 00:26:28,000
far

768
00:26:31,590 --> 00:26:29,840
and this actually hoffman does make this

769
00:26:33,510 --> 00:26:31,600
argument that there is virtually no

770
00:26:35,350 --> 00:26:33,520
relationship between truth and fitness

771
00:26:37,269 --> 00:26:35,360
one of the ways he does it i have my

772
00:26:38,549 --> 00:26:37,279
objections and anyone who's listening

773
00:26:40,310 --> 00:26:38,559
can watch the podcast

774
00:26:42,470 --> 00:26:40,320
one of the ways that he does this is by

775
00:26:44,149 --> 00:26:42,480
saying let's imagine that the universe

776
00:26:45,909 --> 00:26:44,159
that the objective world has some

777
00:26:46,950 --> 00:26:45,919
property of structure let's say it's a

778
00:26:49,269 --> 00:26:46,960
group structure let's say it's a

779
00:26:51,750 --> 00:26:49,279
partially ordered set whatever it may be

780
00:26:53,510 --> 00:26:51,760
then let's imagine the totality of the

781
00:26:55,350 --> 00:26:53,520
ways that you can perceive

782
00:26:57,110 --> 00:26:55,360
you find that as the complexity of the

783
00:26:59,750 --> 00:26:57,120
system increases the

784
00:27:01,750 --> 00:26:59,760
amount that conforms with reality now in

785
00:27:03,269 --> 00:27:01,760
this example i gave

786
00:27:05,590 --> 00:27:03,279
is a group or a partially ordered set

787
00:27:06,789 --> 00:27:05,600
but there are various other structures

788
00:27:08,630 --> 00:27:06,799

that the amount of ways that you can

789
00:27:09,990 --> 00:27:08,640
form with reality divided by the total

790
00:27:12,230 --> 00:27:10,000
amount of ways you can experience it

791
00:27:14,630 --> 00:27:12,240
goes to zero

792
00:27:15,430 --> 00:27:14,640
so he may argue no he's not here and i

793
00:27:18,070 --> 00:27:15,440
could also be

794
00:27:18,710 --> 00:27:18,080
misrepresenting him but he may argue

795
00:27:20,630 --> 00:27:18,720
that

796
00:27:22,149 --> 00:27:20,640
there is virtually zero relationship

797
00:27:23,110 --> 00:27:22,159
between what's out there and how we

798
00:27:26,710 --> 00:27:23,120
perceive it

799
00:27:29,590 --> 00:27:26,720
and in fact okay sorry please

800
00:27:29,990 --> 00:27:29,600
i mean again we probably would need him

801
00:27:33,190 --> 00:27:30,000
to

802
00:27:35,110 --> 00:27:33,200
flag and

803
00:27:37,430 --> 00:27:35,120
but but i think i still suspect a slight

804
00:27:41,029 --> 00:27:37,440
confusion here because

805
00:27:43,750 --> 00:27:41,039
um i would

806
00:27:45,909 --> 00:27:43,760
i would also i'm also of the view that

807
00:27:49,510 --> 00:27:45,919
and we've said this earlier that

808
00:27:50,470 --> 00:27:49,520
i can never perceive what is actually

809
00:27:53,510 --> 00:27:50,480
there

810
00:27:57,430 --> 00:27:53,520
that the nature of the physical

811
00:28:01,269 --> 00:27:57,440
universe is humane there is one

812
00:28:05,110 --> 00:28:03,110
that is something that is not directly

813
00:28:07,029 --> 00:28:05,120

accessible can never be directly

814
00:28:08,310 --> 00:28:07,039
perceptual mechanisms just don't

815
00:28:12,470 --> 00:28:08,320
don't get that that's not what they can

816
00:28:19,590 --> 00:28:15,190
there will always be a gap between our

817
00:28:25,750 --> 00:28:24,149
however precisely because

818
00:28:29,110 --> 00:28:25,760
our perceptual mechanisms have been

819
00:28:31,190 --> 00:28:29,120
shaped by evolution

820
00:28:32,789 --> 00:28:31,200
they will have been shaped so as to be

821
00:28:35,269 --> 00:28:32,799
adaptively constrained

822
00:28:37,029 --> 00:28:35,279
by the regularities in the physical

823
00:28:38,149 --> 00:28:37,039
universe that are important for our

824
00:28:41,029 --> 00:28:38,159
survival

825
00:28:41,510 --> 00:28:41,039
which is precisely why if i'm crossing

826
00:28:43,430 --> 00:28:41,520
the road

827
00:28:44,950 --> 00:28:43,440
i will see things as far away when they

828
00:28:49,110 --> 00:28:44,960
are far away

829
00:28:52,710 --> 00:28:50,950
and the other the other thing useful

830
00:28:53,669 --> 00:28:52,720
distinction here i think goes back again

831
00:28:57,190 --> 00:28:53,679
in philosophy to

832
00:28:59,830 --> 00:28:57,200
to look and the british empiricists who

833
00:29:01,750 --> 00:28:59,840
who distinguished between primary and

834
00:29:03,750 --> 00:29:01,760
secondary qualities

835
00:29:04,870 --> 00:29:03,760
and a primary quality for lock is

836
00:29:06,950 --> 00:29:04,880
something that

837
00:29:08,710 --> 00:29:06,960
exists independently of a mind or of an

838
00:29:12,549 --> 00:29:08,720

observer

839
00:29:16,310 --> 00:29:12,559
so something like having solidity

840
00:29:19,269 --> 00:29:16,320
and moving are properties that exist

841
00:29:20,470 --> 00:29:19,279
independently of a mind or an observer

842
00:29:22,389 --> 00:29:20,480
which is why

843
00:29:24,230 --> 00:29:22,399
if i stand in front of a non-rushing bus

844
00:29:25,990 --> 00:29:24,240
it's not going to go well

845
00:29:28,230 --> 00:29:26,000
but then there are other properties like

846
00:29:31,430 --> 00:29:28,240
color

847
00:29:32,789 --> 00:29:31,440
um which are for lock secondary

848
00:29:36,310 --> 00:29:32,799
qualities because

849
00:29:37,830 --> 00:29:36,320
color requires the interaction between

850
00:29:42,070 --> 00:29:37,840
an observer or a mind

851
00:29:44,950 --> 00:29:43,669
you know suzanne also talked about this

852
00:29:47,590 --> 00:29:44,960
he said color is the place where the

853
00:29:50,549 --> 00:29:47,600
brain and the universe meet

854
00:29:52,630 --> 00:29:50,559
and so there's at least two ways of

855
00:29:55,830 --> 00:29:52,640
thinking about the kinds of

856
00:30:01,830 --> 00:29:55,840
things that are two ways of

857
00:30:08,789 --> 00:30:05,430
yeah and they they're both

858
00:30:11,909 --> 00:30:08,799
in but in neither case is our experience

859
00:30:14,389 --> 00:30:11,919
identical to whatever its hidden causes

860
00:30:16,070 --> 00:30:14,399
are in the world

861
00:30:17,510 --> 00:30:16,080
whether it's a primary quality or a

862
00:30:18,630 --> 00:30:17,520
secondary quality we're always

863
00:30:21,830 --> 00:30:18,640

constructing

864
00:30:23,110 --> 00:30:21,840
on the basis of those qualities or

865
00:30:24,230 --> 00:30:23,120
properties we're constructing our

866
00:30:27,830 --> 00:30:24,240
experience

867
00:30:29,350 --> 00:30:27,840
it's just that for a primary

868
00:30:30,870 --> 00:30:29,360
property for a primary thing like

869
00:30:32,630 --> 00:30:30,880
solidity

870
00:30:35,350 --> 00:30:32,640
it's gonna exist whether we are

871
00:30:37,430 --> 00:30:35,360
conscious of it or not

872
00:30:39,110 --> 00:30:37,440
and but our perceptual mechanism will

873
00:30:41,430 --> 00:30:39,120
still be constrained by it

874
00:30:43,430 --> 00:30:41,440
you know we will we a well-designed

875
00:30:46,630 --> 00:30:43,440
perceptual system

876
00:30:49,669 --> 00:30:46,640
will be constrained in ways that

877
00:30:52,149 --> 00:30:49,679
makes us behave appropriately

878
00:30:53,350 --> 00:30:52,159
to these things right i get i'm i don't

879
00:30:55,590 --> 00:30:53,360
want to meet

880
00:30:57,110 --> 00:30:55,600
i don't want to remain stuck on this but

881
00:31:00,149 --> 00:30:57,120
i guess my

882
00:31:02,830 --> 00:31:00,159
objection is the notion of fartness and

883
00:31:05,110 --> 00:31:02,840
nearness is dependent on space

884
00:31:06,470 --> 00:31:05,120
and space-time itself

885
00:31:08,549 --> 00:31:06,480
this is something donald hoffman likes

886
00:31:11,269 --> 00:31:08,559
to reference there's a physicist named

887
00:31:12,549 --> 00:31:11,279
nima armani hamed i believe but many

888
00:31:14,870 --> 00:31:12,559

physicists in

889
00:31:16,470 --> 00:31:14,880
almost every single physicist believes

890
00:31:17,990 --> 00:31:16,480
that space-time is not fundamental which

891
00:31:21,029 --> 00:31:18,000
means that location and just

892
00:31:23,509 --> 00:31:21,039
you may say that well we're constrained

893
00:31:25,990 --> 00:31:23,519
constrained is not the same as and you

894
00:31:27,029 --> 00:31:26,000
you're definitely admitting

895
00:31:29,509 --> 00:31:27,039
that there's not a one-to-one

896
00:31:31,190 --> 00:31:29,519
relationship between reality and then

897
00:31:33,029 --> 00:31:31,200
how we perceive it

898
00:31:35,509 --> 00:31:33,039
but then even in these examples of

899
00:31:37,509 --> 00:31:35,519
solidity well

900
00:31:38,630 --> 00:31:37,519
what's solid in quantum mechanics where

901
00:31:40,070 --> 00:31:38,640
the wave function spreads to the

902
00:31:42,870 --> 00:31:40,080
universe

903
00:31:43,509 --> 00:31:42,880
sure but there's something yeah okay but

904
00:31:45,190 --> 00:31:43,519
um

905
00:31:47,190 --> 00:31:45,200
firstly i think actually you bring up a

906
00:31:48,549 --> 00:31:47,200
very interesting point

907
00:31:50,149 --> 00:31:48,559
um we're getting very deep into the

908
00:31:51,430 --> 00:31:50,159
wheats here but for me one of the most

909
00:31:53,590 --> 00:31:51,440
interesting things about this way of

910
00:31:57,509 --> 00:31:53,600
thinking about perception

911
00:32:00,630 --> 00:31:57,519
is how far you can take it um and

912
00:32:02,710 --> 00:32:00,640
uh so for instance yeah i can i can

913
00:32:04,710 --> 00:32:02,720

perceive a color as and i can understand

914
00:32:05,509 --> 00:32:04,720
the perception of a colored surface in

915
00:32:08,149 --> 00:32:05,519
terms of an

916
00:32:09,110 --> 00:32:08,159
invariance in how a surface reflects

917
00:32:14,470 --> 00:32:09,120
light

918
00:32:16,389 --> 00:32:14,480
and so on but then

919
00:32:17,830 --> 00:32:16,399
what about what you might call the

920
00:32:19,190 --> 00:32:17,840
deeper structure of perceptual

921
00:32:21,350 --> 00:32:19,200
experience i mentioned this right the

922
00:32:24,230 --> 00:32:21,360
beginning as well the fact that visual

923
00:32:25,509 --> 00:32:24,240
experience is spatial that we overall

924
00:32:27,590 --> 00:32:25,519
tend to

925
00:32:29,350 --> 00:32:27,600
experience the world in this three plus

926
00:32:34,230 --> 00:32:29,360
one dimensional way in three spatial

927
00:32:39,029 --> 00:32:37,350
how is that can we understand that as

928
00:32:40,789 --> 00:32:39,039
constructed in the same way that we

929
00:32:42,310 --> 00:32:40,799
would understand the experience of color

930
00:32:45,430 --> 00:32:42,320
as being constructed

931
00:32:48,549 --> 00:32:45,440
you know is our brain generating

932
00:32:51,990 --> 00:32:48,559
this this architecture of experts

933
00:32:54,549 --> 00:32:52,000
right through the same principles um

934
00:32:55,990 --> 00:32:54,559
because yeah from a more physics-based

935
00:32:58,389 --> 00:32:56,000
perspective you might say

936
00:33:00,149 --> 00:32:58,399
well actually this three plus

937
00:33:02,789 --> 00:33:00,159
one-dimensional

938
00:33:04,710 --> 00:33:02,799

picture is not the most accurate picture

939
00:33:06,149 --> 00:33:04,720
of of the physical universe and we could

940
00:33:07,909 --> 00:33:06,159
argue and i would not have

941
00:33:09,350 --> 00:33:07,919
an expert view about what is but you

942
00:33:10,070 --> 00:33:09,360
know i know there are many options out

943
00:33:11,909 --> 00:33:10,080
there

944
00:33:13,190 --> 00:33:11,919
even relativity tells you that the three

945
00:33:16,870 --> 00:33:13,200
plus one distinction is

946
00:33:19,190 --> 00:33:16,880
is not as as solid as our perceptual

947
00:33:20,710 --> 00:33:19,200
world would lead us to to imagine and

948
00:33:21,269 --> 00:33:20,720
then of course you've got string theory

949
00:33:23,110 --> 00:33:21,279
and also

950
00:33:24,389 --> 00:33:23,120
block universes and all sorts of stuff

951
00:33:26,630 --> 00:33:24,399
um

952
00:33:28,230 --> 00:33:26,640
but in a sense you can you can be

953
00:33:30,389 --> 00:33:28,240
agnostic about what that

954
00:33:31,990 --> 00:33:30,399
ultimate reality is if there is such a

955
00:33:34,389 --> 00:33:32,000
thing and still ask the question

956
00:33:36,389 --> 00:33:34,399
okay so what's constructing how do we

957
00:33:38,149 --> 00:33:36,399
experience time and space not just

958
00:33:40,470 --> 00:33:38,159
objects within time and space

959
00:33:41,269 --> 00:33:40,480
and i think for me that's that's a

960
00:33:43,750 --> 00:33:41,279
really

961
00:33:44,950 --> 00:33:43,760
exciting direction to push this kind of

962
00:33:46,870 --> 00:33:44,960
research

963
00:33:48,310 --> 00:33:46,880

speaking of the perception of time i

964
00:33:50,070 --> 00:33:48,320
remember you said

965
00:33:51,990 --> 00:33:50,080
this is obviously known that the more

966
00:33:53,830 --> 00:33:52,000
adrenaline you have in your system

967
00:33:55,830 --> 00:33:53,840
let's say it peaks you feel like time

968
00:33:56,950 --> 00:33:55,840
has slowed down

969
00:33:58,310 --> 00:33:56,960
well i wasn't sure i said that i mean

970
00:34:00,230 --> 00:33:58,320
that you certainly there there's just

971
00:34:03,590 --> 00:34:00,240
this kind of

972
00:34:05,669 --> 00:34:03,600
popular assumption about um

973
00:34:07,350 --> 00:34:05,679
time slowing down under various sorts of

974
00:34:09,510 --> 00:34:07,360
high arousal situations

975
00:34:11,109 --> 00:34:09,520
right and actually time here is

976
00:34:13,589 --> 00:34:11,119
something that i've

977
00:34:15,349 --> 00:34:13,599
been working on just for the last uh

978
00:34:16,629 --> 00:34:15,359
four years or so and it's really due to

979
00:34:18,629 --> 00:34:16,639
i had this uh one of my colleagues

980
00:34:20,790 --> 00:34:18,639
warrick roseboom an australian

981
00:34:21,990 --> 00:34:20,800
cognitive scientists to join the group

982
00:34:24,230 --> 00:34:22,000
in 2015

983
00:34:26,230 --> 00:34:24,240
and brought a deep interest in a wealth

984
00:34:29,669 --> 00:34:26,240
of expertise on time perception so

985
00:34:32,710 --> 00:34:29,679
he's been leading our work there and

986
00:34:35,349 --> 00:34:32,720
uh one of the

987
00:34:36,869 --> 00:34:35,359
so one of the i think really fascinating

988
00:34:39,270 --> 00:34:36,879

lines of argument

989
00:34:40,950 --> 00:34:39,280
that he's making and i i agree with him

990
00:34:44,869 --> 00:34:40,960
it seems right is that

991
00:34:46,230 --> 00:34:44,879
um is to push back against this idea

992
00:34:48,790 --> 00:34:46,240
that we

993
00:34:52,550 --> 00:34:48,800
experience time in virtue of having a

994
00:34:58,310 --> 00:34:56,310
a lot of work in this area

995
00:35:00,310 --> 00:34:58,320
boils down to an assumption like that

996
00:35:03,430 --> 00:35:00,320
that that there's time

997
00:35:05,829 --> 00:35:03,440
unfolds in the world and

998
00:35:08,390 --> 00:35:05,839
certainly when we when we're making

999
00:35:10,630 --> 00:35:08,400
judgments about time

1000
00:35:12,950 --> 00:35:10,640
we often get it wrong if there's if we

1001
00:35:14,870 --> 00:35:12,960
measure an objective duration

1002
00:35:16,310 --> 00:35:14,880
and then we ask people how long that

1003
00:35:18,470 --> 00:35:16,320
duration was

1004
00:35:19,829 --> 00:35:18,480
people can be wrong about it and they're

1005
00:35:21,510 --> 00:35:19,839
systematically wrong

1006
00:35:23,829 --> 00:35:21,520
in the same way they're systematically

1007
00:35:27,670 --> 00:35:23,839
wrong about

1008
00:35:29,190 --> 00:35:27,680
many other things in perception um

1009
00:35:31,750 --> 00:35:29,200
and you know for instance there's

1010
00:35:34,550 --> 00:35:31,760
there's a a very general

1011
00:35:35,430 --> 00:35:34,560
law in perceptual psychophysics where

1012
00:35:37,349 --> 00:35:35,440
people

1013
00:35:40,390 --> 00:35:37,359

are biased towards the mean of the

1014
00:35:43,270 --> 00:35:40,400
things they they're judging perceptually

1015
00:35:45,510 --> 00:35:43,280
if you you know if you like see a whole

1016
00:35:48,390 --> 00:35:45,520
load of circles of different

1017
00:35:49,670 --> 00:35:48,400
size and then you're asked to judge the

1018
00:35:51,510 --> 00:35:49,680
size of

1019
00:35:52,710 --> 00:35:51,520
the next circle you'll be biased towards

1020
00:35:54,710 --> 00:35:52,720
the mean of the

1021
00:35:56,550 --> 00:35:54,720
circles that you've already seen it's

1022
00:35:58,069 --> 00:35:56,560
called regression to the mean

1023
00:35:59,910 --> 00:35:58,079
and in time perception you do exactly

1024
00:36:01,349 --> 00:35:59,920
the same if you

1025
00:36:02,870 --> 00:36:01,359
if you experience a load of different

1026
00:36:05,109 --> 00:36:02,880
durations let's say just beeps of

1027
00:36:07,270 --> 00:36:05,119
different lengths and you're judging

1028
00:36:08,870 --> 00:36:07,280
the duration of each beep you'll be

1029
00:36:13,270 --> 00:36:08,880
biased towards the mean

1030
00:36:16,790 --> 00:36:13,280
um and this is a very useful

1031
00:36:18,710 --> 00:36:16,800
signature that there's something like

1032
00:36:19,990 --> 00:36:18,720
bayesian inference going on here that

1033
00:36:22,230 --> 00:36:20,000
you are

1034
00:36:23,109 --> 00:36:22,240
your perceptual judgment about a

1035
00:36:25,430 --> 00:36:23,119
situation

1036
00:36:28,069 --> 00:36:25,440
is based not only on the sensory data

1037
00:36:30,630 --> 00:36:28,079
but on your prior expectations

1038
00:36:32,470 --> 00:36:30,640

about what's going on bayesian inference

1039
00:36:33,430 --> 00:36:32,480
is simply this way of combining what you

1040
00:36:35,030 --> 00:36:33,440
already know

1041
00:36:36,790 --> 00:36:35,040
with what new information you have to

1042
00:36:37,589 --> 00:36:36,800
come up with the best guess when you say

1043
00:36:39,030 --> 00:36:37,599
that

1044
00:36:41,030 --> 00:36:39,040
we're biased toward the mean do you mean

1045
00:36:42,470 --> 00:36:41,040
that of what we experience first so it's

1046
00:36:44,069 --> 00:36:42,480
like we take a sample of our first

1047
00:36:45,910 --> 00:36:44,079
experience and take the mean of that and

1048
00:36:46,710 --> 00:36:45,920
then our later experiences or then bias

1049
00:36:48,230 --> 00:36:46,720
toward that mean

1050
00:36:50,950 --> 00:36:48,240
or do you mean we're biased toward the

1051
00:36:52,390 --> 00:36:50,960
totality of the experiences means

1052
00:36:54,150 --> 00:36:52,400
uh well this is a this is a good

1053
00:36:57,670 --> 00:36:54,160
empirical question right we

1054
00:37:02,150 --> 00:36:57,680
it might depend so

1055
00:37:04,550 --> 00:37:02,160
it's it it probably depends on the

1056
00:37:08,230 --> 00:37:04,560
details of the experiment over what time

1057
00:37:11,670 --> 00:37:08,240
scale the brain is taking the mean um

1058
00:37:14,950 --> 00:37:11,680
and it's gonna it's gonna vary by task

1059
00:37:17,910 --> 00:37:14,960
by by context and and so on

1060
00:37:19,270 --> 00:37:17,920
um in this case i was really talking

1061
00:37:21,030 --> 00:37:19,280
about

1062
00:37:23,109 --> 00:37:21,040
fairly short time scales where you can

1063
00:37:24,710 --> 00:37:23,119

show that you're just on the last one or

1064
00:37:25,829 --> 00:37:24,720
two minutes of what's going on then

1065
00:37:28,550 --> 00:37:25,839
you'll be biased

1066
00:37:29,430 --> 00:37:28,560
in your next decision uh towards the

1067
00:37:30,950 --> 00:37:29,440
mean of that

1068
00:37:32,550 --> 00:37:30,960
but then you could make the argument

1069
00:37:33,670 --> 00:37:32,560
although it's much harder to demonstrate

1070
00:37:36,150 --> 00:37:33,680
empirically

1071
00:37:37,750 --> 00:37:36,160
that for instance maybe my experience of

1072
00:37:39,510 --> 00:37:37,760
duration in general is biased by the

1073
00:37:41,270 --> 00:37:39,520
mean of every experience that i've had

1074
00:37:42,710 --> 00:37:41,280
and my ancestors have had and so on

1075
00:37:44,790 --> 00:37:42,720
but of course i can't manipulate that in

1076
00:37:45,910 --> 00:37:44,800
the lab so in the lab i can only

1077
00:37:48,470 --> 00:37:45,920
manipulate

1078
00:37:49,990 --> 00:37:48,480
context over relatively short time

1079
00:37:53,510 --> 00:37:50,000
scales and see what the effect

1080
00:37:55,910 --> 00:37:53,520
is but but sorry

1081
00:37:56,870 --> 00:37:55,920
when this is very yes circuitous route

1082
00:38:00,630 --> 00:37:56,880
to this idea

1083
00:38:05,589 --> 00:38:00,640
of of time slowing down and

1084
00:38:07,270 --> 00:38:05,599
um so

1085
00:38:09,030 --> 00:38:07,280
firstly for me there's a very

1086
00:38:13,670 --> 00:38:09,040
interesting distinction here

1087
00:38:17,750 --> 00:38:13,680
between perception of duration

1088
00:38:18,870 --> 00:38:17,760

and the experience of the flow of time

1089
00:38:21,109 --> 00:38:18,880
that's interesting so there's a

1090
00:38:24,150 --> 00:38:21,119
difference between those two

1091
00:38:25,510 --> 00:38:24,160
yeah i think there is it's

1092
00:38:27,750 --> 00:38:25,520
you know we can perceive something as

1093
00:38:31,910 --> 00:38:27,760
lasting a certain duration

1094
00:38:34,470 --> 00:38:31,920
but the experience of just how fast time

1095
00:38:40,069 --> 00:38:37,670
is different um it's different in this

1096
00:38:41,030 --> 00:38:40,079
again in perception in general we can

1097
00:38:42,470 --> 00:38:41,040
separate

1098
00:38:45,510 --> 00:38:42,480
the change of perception from the

1099
00:38:48,230 --> 00:38:45,520
perception of change

1100
00:38:50,310 --> 00:38:48,240
so i can experience my perceptions

1101
00:38:52,630 --> 00:38:50,320
having changed but then the experience

1102
00:38:55,589 --> 00:38:52,640
of the change is itself

1103
00:38:56,550 --> 00:38:55,599
a kind of perception there are various

1104
00:38:58,069 --> 00:38:56,560
phenomena things like

1105
00:38:59,589 --> 00:38:58,079
change blindness which show this very

1106
00:39:01,670 --> 00:38:59,599
nicely that

1107
00:39:03,910 --> 00:39:01,680
it's something if i'm watching a just

1108
00:39:05,190 --> 00:39:03,920
like a an image which i'm assuming is

1109
00:39:07,030 --> 00:39:05,200
not changing

1110
00:39:09,430 --> 00:39:07,040
but actually maybe the background color

1111
00:39:11,990 --> 00:39:09,440
changes very slowly

1112
00:39:15,109 --> 00:39:12,000
you'll find that people won't notice

1113
00:39:16,630 --> 00:39:15,119

that change

1114
00:39:18,630 --> 00:39:16,640
and sometimes say people say there's a

1115
00:39:20,390 --> 00:39:18,640
paradox here because

1116
00:39:21,910 --> 00:39:20,400
they didn't notice that change but

1117
00:39:23,750 --> 00:39:21,920
they're now looking at a

1118
00:39:25,510 --> 00:39:23,760
different thing so how does that work

1119
00:39:25,910 --> 00:39:25,520
and i think that the resolution is to

1120
00:39:27,910 --> 00:39:25,920
say well

1121
00:39:29,349 --> 00:39:27,920
their perception has changed but they

1122
00:39:30,870 --> 00:39:29,359
didn't perceive the change because

1123
00:39:31,910 --> 00:39:30,880
change of perception is not the same as

1124
00:39:33,430 --> 00:39:31,920
perception of change

1125
00:39:34,950 --> 00:39:33,440
so i think the similar thing plays out

1126
00:39:36,790 --> 00:39:34,960
in time as well the perception of

1127
00:39:40,390 --> 00:39:36,800
duration is not the same thing as the

1128
00:39:42,950 --> 00:39:40,400
perceiving time flowing um

1129
00:39:44,390 --> 00:39:42,960
and it's much harder to to get an

1130
00:39:47,349 --> 00:39:44,400
empirical handle

1131
00:39:48,630 --> 00:39:47,359
on the flow of time my favorite

1132
00:39:50,310 --> 00:39:48,640
experiment here i don't know if you've

1133
00:39:53,030 --> 00:39:50,320
come across is by

1134
00:39:55,510 --> 00:39:53,040
uh a guy called david eagleman and and

1135
00:39:59,190 --> 00:39:55,520
chess statson i think was his

1136
00:40:03,750 --> 00:39:59,200
researcher at the time and so they

1137
00:40:06,390 --> 00:40:03,760
they had this idea that if indeed

1138
00:40:07,510 --> 00:40:06,400

my perception of time is slowing down at

1139
00:40:10,710 --> 00:40:07,520
moments of high

1140
00:40:12,470 --> 00:40:10,720
arousal so let's go back to that how can

1141
00:40:14,150 --> 00:40:12,480
i test that well

1142
00:40:15,510 --> 00:40:14,160
so they had they sort of thought well if

1143
00:40:19,190 --> 00:40:15,520
if time is

1144
00:40:19,910 --> 00:40:19,200
slowing down then maybe if i do have

1145
00:40:22,390 --> 00:40:19,920
some sort of

1146
00:40:23,990 --> 00:40:22,400
internal clock that's the ticking of

1147
00:40:26,230 --> 00:40:24,000
which is

1148
00:40:27,670 --> 00:40:26,240
underwriting this perception then maybe

1149
00:40:30,390 --> 00:40:27,680
there are more ticks of the clock

1150
00:40:31,190 --> 00:40:30,400
going on in a particular objective

1151
00:40:32,950 --> 00:40:31,200
duration

1152
00:40:34,390 --> 00:40:32,960
so then i would experience time as

1153
00:40:37,030 --> 00:40:34,400
dilated

1154
00:40:38,069 --> 00:40:37,040
and so that was the reasoning and so to

1155
00:40:40,550 --> 00:40:38,079
test it he had this

1156
00:40:42,790 --> 00:40:40,560
beautiful experiment he gave people

1157
00:40:46,069 --> 00:40:42,800
watches that were specially designed

1158
00:40:47,829 --> 00:40:46,079
so they would flash numbers but so

1159
00:40:48,230 --> 00:40:47,839
quickly that if you just looked at them

1160
00:40:50,230 --> 00:40:48,240
now

1161
00:40:51,510 --> 00:40:50,240
you just see a blur you wouldn't be able

1162
00:40:54,870 --> 00:40:51,520
to decipher what

1163
00:40:56,870 --> 00:40:54,880

the numbers or the letters were and so

1164
00:40:58,950 --> 00:40:56,880
he then had people bungee jump while

1165
00:41:02,230 --> 00:40:58,960
looking at this watch

1166
00:41:06,069 --> 00:41:02,240
several times then going to crane

1167
00:41:10,069 --> 00:41:06,079
look at the watch and and the hypothesis

1168
00:41:10,870 --> 00:41:10,079
was well if uh if subjective time is

1169
00:41:13,750 --> 00:41:10,880
slowing down

1170
00:41:14,150 --> 00:41:13,760
because an inner clock is increasing its

1171
00:41:17,510 --> 00:41:14,160
its

1172
00:41:19,270 --> 00:41:17,520
rate is frame rate let's say then

1173
00:41:21,030 --> 00:41:19,280
maybe these people should be able to

1174
00:41:22,870 --> 00:41:21,040
read what's being

1175
00:41:24,630 --> 00:41:22,880
reported back yeah yeah what do you

1176
00:41:27,270 --> 00:41:24,640
think happened

1177
00:41:28,630 --> 00:41:27,280
i would imagine they did right no they

1178
00:41:30,230 --> 00:41:28,640
didn't

1179
00:41:31,670 --> 00:41:30,240
no it was okay it was a really

1180
00:41:33,349 --> 00:41:31,680
interesting failed experiment i mean it

1181
00:41:35,430 --> 00:41:33,359
wasn't failed because it

1182
00:41:36,390 --> 00:41:35,440
came it was the evidence was pretty

1183
00:41:39,349 --> 00:41:36,400
clear

1184
00:41:41,190 --> 00:41:39,359
uh but it was it sort of ruled out that

1185
00:41:42,630 --> 00:41:41,200
simple explanation that yeah this clock

1186
00:41:45,109 --> 00:41:42,640
is speeding up because people you know

1187
00:41:47,430 --> 00:41:45,119
subjectively still had an experienced

1188
00:41:48,470 --> 00:41:47,440

dilation of time but it didn't seem to

1189
00:41:50,870 --> 00:41:48,480
be due to this

1190
00:41:52,630 --> 00:41:50,880
acceleration of an internal clock and of

1191
00:41:54,470 --> 00:41:52,640
course i think the reason for that

1192
00:41:57,349 --> 00:41:54,480
following my colleague warwick is that

1193
00:41:59,910 --> 00:41:57,359
because there isn't an internal clock

1194
00:42:01,430 --> 00:41:59,920
so that's super interesting to me

1195
00:42:03,109 --> 00:42:01,440
because to me it sounds like what you're

1196
00:42:05,190 --> 00:42:03,119
saying is we can be wrong about our own

1197
00:42:08,069 --> 00:42:05,200
perceptions

1198
00:42:08,790 --> 00:42:08,079
for example okay or i'm posing this as a

1199
00:42:11,990 --> 00:42:08,800
question

1200
00:42:14,829 --> 00:42:12,000
can i say i see this cup as red i see

1201
00:42:20,870 --> 00:42:14,839
sorry let's look at this i see this as

1202
00:42:24,390 --> 00:42:22,710
okay i see this cup is red i'm sorry i

1203
00:42:26,470 --> 00:42:24,400
see this cup is blue

1204
00:42:28,950 --> 00:42:26,480
could i be wrong about my own

1205
00:42:31,030 --> 00:42:28,960
perceptions i think i see it as blue

1206
00:42:32,550 --> 00:42:31,040
but is it possible like in the example

1207
00:42:33,190 --> 00:42:32,560
of these people who say that time has

1208
00:42:35,589 --> 00:42:33,200
slowed down

1209
00:42:36,630 --> 00:42:35,599
but they're wrong about that can i be

1210
00:42:38,150 --> 00:42:36,640
wrong about seeing this

1211
00:42:39,750 --> 00:42:38,160
now in fact you know with their shared

1212
00:42:41,750 --> 00:42:39,760
reality this you can may be able to

1213
00:42:46,710 --> 00:42:41,760

objectively measure it as blue

1214
00:42:48,630 --> 00:42:46,720
can i be wrong about my perceptions

1215
00:42:50,790 --> 00:42:48,640
i think there's two very at least two

1216
00:42:52,790 --> 00:42:50,800
very interesting responses to that

1217
00:42:54,230 --> 00:42:52,800
um philosophers often talk about the

1218
00:42:56,550 --> 00:42:54,240
ineffability

1219
00:42:57,750 --> 00:42:56,560
of of conscious experiences that this

1220
00:43:00,710 --> 00:42:57,760
idea that

1221
00:43:03,030 --> 00:43:00,720
we can't be wrong you know if if i'm in

1222
00:43:06,069 --> 00:43:03,040
if i'm in sharp pain now

1223
00:43:09,750 --> 00:43:06,079
that's just a fact and

1224
00:43:13,510 --> 00:43:11,910
when i think about claims like that the

1225
00:43:15,750 --> 00:43:13,520
first thing is

1226
00:43:17,829 --> 00:43:15,760
one problem is a sort of epistemological

1227
00:43:19,750 --> 00:43:17,839
problem like how would you know

1228
00:43:21,349 --> 00:43:19,760
when the claim is about a subjective

1229
00:43:22,710 --> 00:43:21,359
experience what's the right way to

1230
00:43:25,349 --> 00:43:22,720
validate that

1231
00:43:27,270 --> 00:43:25,359
against so does it even make sense as a

1232
00:43:31,030 --> 00:43:27,280
question being wrong about your

1233
00:43:34,309 --> 00:43:31,040
your own experience um

1234
00:43:36,470 --> 00:43:34,319
but what might it mean it might mean

1235
00:43:37,510 --> 00:43:36,480
that you are wrong in your

1236
00:43:40,630 --> 00:43:37,520
interpretation

1237
00:43:41,589 --> 00:43:40,640
about it and i think that's usually what

1238
00:43:44,150 --> 00:43:41,599

people

1239
00:43:45,030 --> 00:43:44,160
mean when they say that they're wrong

1240
00:43:49,349 --> 00:43:45,040
about their

1241
00:43:58,550 --> 00:43:52,870
they

1242
00:44:00,550 --> 00:43:58,560
experienced time as slowing down but

1243
00:44:02,309 --> 00:44:00,560
then if you actually look at

1244
00:44:03,750 --> 00:44:02,319
how they estimated the duration of

1245
00:44:06,870 --> 00:44:03,760
something

1246
00:44:10,870 --> 00:44:06,880
it may be basically the same

1247
00:44:14,309 --> 00:44:10,880
as in another case so

1248
00:44:17,109 --> 00:44:14,319
they are you know

1249
00:44:17,510 --> 00:44:17,119
right in the sense that they're giving a

1250
00:44:21,270 --> 00:44:17,520
a

1251
00:44:22,950 --> 00:44:21,280
they're experiencing

1252
00:44:24,309 --> 00:44:22,960
but all the ways one might interpret

1253
00:44:25,910 --> 00:44:24,319
that

1254
00:44:29,030 --> 00:44:25,920
might might be wrong take another

1255
00:44:32,790 --> 00:44:29,040
another very i think

1256
00:44:36,390 --> 00:44:32,800
illustrative example um

1257
00:44:39,589 --> 00:44:36,400
people for thousands of years have

1258
00:44:41,190 --> 00:44:39,599
reported out of body experiences they'll

1259
00:44:43,510 --> 00:44:41,200
have experiences where they're

1260
00:44:45,270 --> 00:44:43,520
floating above their physical body or

1261
00:44:48,950 --> 00:44:45,280
floating around a roof or going

1262
00:44:53,829 --> 00:44:48,960
out the window whatever

1263
00:45:00,069 --> 00:44:57,430

well in one sense

1264
00:45:02,230 --> 00:45:00,079
no you know if if that's the experience

1265
00:45:03,829 --> 00:45:02,240
they're having

1266
00:45:06,309 --> 00:45:03,839
um and they're not just sort of

1267
00:45:08,069 --> 00:45:06,319
confabulating it later on

1268
00:45:09,349 --> 00:45:08,079
then that's the experience they're

1269
00:45:12,710 --> 00:45:09,359
having

1270
00:45:15,430 --> 00:45:12,720
but if they interpret that experience as

1271
00:45:19,030 --> 00:45:15,440
evidence that their self has in fact

1272
00:45:22,150 --> 00:45:19,040
left their skull and gone flying around

1273
00:45:24,069 --> 00:45:22,160
then they're wrong that that's not the

1274
00:45:25,750 --> 00:45:24,079
right way to interpret those kinds of

1275
00:45:27,190 --> 00:45:25,760
experiences

1276
00:45:29,270 --> 00:45:27,200
or rather there are plenty of other

1277
00:45:32,230 --> 00:45:29,280
options to by which you might

1278
00:45:34,309 --> 00:45:32,240
interpret those kinds of experiences and

1279
00:45:36,390 --> 00:45:34,319
you can also be wrong

1280
00:45:38,390 --> 00:45:36,400
just in the small space that's open

1281
00:45:39,109 --> 00:45:38,400
opens up between the moment of your

1282
00:45:43,349 --> 00:45:39,119
experience

1283
00:45:45,750 --> 00:45:43,359
and the moment of your report and

1284
00:45:46,870 --> 00:45:45,760
if i tell you what i'm experiencing i

1285
00:45:51,510 --> 00:45:46,880
have to

1286
00:45:53,910 --> 00:45:51,520
for a very short time

1287
00:45:56,069 --> 00:45:53,920
and you could be misremembering you can

1288
00:45:59,190 --> 00:45:56,079

systematically misremember stuff

1289
00:46:01,190 --> 00:45:59,200
um there are

1290
00:46:02,950 --> 00:46:01,200
yeah there are many ways where we can

1291
00:46:06,870 --> 00:46:02,960
introduce

1292
00:46:08,470 --> 00:46:06,880
experience and your report of that

1293
00:46:11,510 --> 00:46:08,480
experience so you can be wrong

1294
00:46:13,190 --> 00:46:11,520
in that sense too i think

1295
00:46:16,550 --> 00:46:13,200
but there is some there is something for

1296
00:46:19,829 --> 00:46:18,230
it almost doesn't make sense to ask the

1297
00:46:21,349 --> 00:46:19,839
question can i be wrong about my

1298
00:46:22,710 --> 00:46:21,359
experience in the here and now

1299
00:46:24,710 --> 00:46:22,720
bracketing all these things about

1300
00:46:26,550 --> 00:46:24,720
interpretation and report

1301
00:46:30,150 --> 00:46:26,560
because there's no criteria to judge it

1302
00:46:33,910 --> 00:46:30,160
against apart from the experience itself

1303
00:46:35,589 --> 00:46:33,920
mm-hmm yeah for us if if i may because

1304
00:46:37,109 --> 00:46:35,599
and this is one of the questions i had

1305
00:46:37,589 --> 00:46:37,119
in mind which ties really nicely into

1306
00:46:40,069 --> 00:46:37,599
this

1307
00:46:41,190 --> 00:46:40,079
um you most likely know about um jill

1308
00:46:44,390 --> 00:46:41,200
both taylor's

1309
00:46:44,950 --> 00:46:44,400
famous ted talk the stroke of insight

1310
00:46:47,349 --> 00:46:44,960
the one

1311
00:46:48,630 --> 00:46:47,359
where she goes into detail about her

1312
00:46:52,150 --> 00:46:48,640
experience of having a

1313
00:46:54,309 --> 00:46:52,160

hemorrhagic stroke on the left side of

1314
00:46:55,430 --> 00:46:54,319
her brain and then she experiences these

1315
00:46:57,670 --> 00:46:55,440
feelings of

1316
00:46:59,109 --> 00:46:57,680
euphoria and she goes into the state of

1317
00:47:00,950 --> 00:46:59,119
nirvana because

1318
00:47:02,630 --> 00:47:00,960
the way she's describing it she thinks

1319
00:47:02,950 --> 00:47:02,640
her the right side of her brain is sort

1320
00:47:06,230 --> 00:47:02,960
of

1321
00:47:07,910 --> 00:47:06,240
taking over and then once

1322
00:47:09,670 --> 00:47:07,920
her left brain comes back again then

1323
00:47:11,349 --> 00:47:09,680
suddenly she she comes back to

1324
00:47:13,670 --> 00:47:11,359
her version of the version of reality

1325
00:47:15,109 --> 00:47:13,680
that that we experience and she realizes

1326
00:47:15,990 --> 00:47:15,119
okay something's wrong i have to go get

1327
00:47:18,390 --> 00:47:16,000
some help

1328
00:47:19,589 --> 00:47:18,400
and well that talk generally was really

1329
00:47:21,589 --> 00:47:19,599
fascinating to me but

1330
00:47:23,030 --> 00:47:21,599
i just wanted to know your thoughts on

1331
00:47:25,750 --> 00:47:23,040
on that kind of experience

1332
00:47:26,710 --> 00:47:25,760
and and and maybe we can follow up with

1333
00:47:28,870 --> 00:47:26,720
the idea of

1334
00:47:30,870 --> 00:47:28,880
um from a neuroscientific perspective

1335
00:47:33,349 --> 00:47:30,880
the left and right brain

1336
00:47:34,470 --> 00:47:33,359
uh dichotomy that is created and the way

1337
00:47:37,349 --> 00:47:34,480
she describes it

1338
00:47:38,870 --> 00:47:37,359

now her talk was 12 years ago or i think

1339
00:47:40,790 --> 00:47:38,880
was around 2008

1340
00:47:42,549 --> 00:47:40,800
and maybe since then have we had any

1341
00:47:44,549 --> 00:47:42,559
advancements any any new discoveries

1342
00:47:45,829 --> 00:47:44,559
that sort of shed light on the

1343
00:47:47,910 --> 00:47:45,839
on the differences between these two

1344
00:47:49,589 --> 00:47:47,920
well i suppose my question is twofold

1345
00:47:51,190 --> 00:47:49,599
one is what are your thoughts on on the

1346
00:47:53,589 --> 00:47:51,200
on the way she was describing

1347
00:47:55,589 --> 00:47:53,599
that out-of-body experience in a way you

1348
00:47:58,710 --> 00:47:55,599
could call it an out-of-body experience

1349
00:48:01,030 --> 00:47:58,720
and and secondly the distinction between

1350
00:48:03,990 --> 00:48:01,040
left and right brain

1351
00:48:05,430 --> 00:48:04,000
yeah i mean i i don't have i miss i

1352
00:48:07,109 --> 00:48:05,440
don't have too much to say about the

1353
00:48:08,549 --> 00:48:07,119
first one about the sort of experience

1354
00:48:12,309 --> 00:48:08,559
of bliss or nirvana or

1355
00:48:16,230 --> 00:48:14,390
you know people again people will do

1356
00:48:18,390 --> 00:48:16,240
report these kinds of experiences in

1357
00:48:19,349 --> 00:48:18,400
in various conditions there are there

1358
00:48:21,190 --> 00:48:19,359
are examples

1359
00:48:23,589 --> 00:48:21,200
what comes to my mind are these examples

1360
00:48:27,430 --> 00:48:23,599
of so-called ecstatic seizures

1361
00:48:30,790 --> 00:48:27,440
so some people with with epilepsy

1362
00:48:33,349 --> 00:48:30,800
uh experience reliably

1363
00:48:33,990 --> 00:48:33,359

these moments of bliss and awe and

1364
00:48:37,349 --> 00:48:34,000
presence

1365
00:48:40,549 --> 00:48:37,359
of the numinous and all sorts of

1366
00:48:42,870 --> 00:48:40,559
wonderful experiences um either

1367
00:48:44,390 --> 00:48:42,880
in the in the penumbra or the periphery

1368
00:48:45,030 --> 00:48:44,400
of their seizures or maybe even during

1369
00:48:47,990 --> 00:48:45,040
the season

1370
00:48:49,000 --> 00:48:48,000
i'm not entirely sure to the extent that

1371
00:48:50,870 --> 00:48:49,010
sometimes they

1372
00:48:53,750 --> 00:48:50,880
[Music]

1373
00:48:55,030 --> 00:48:53,760
would they don't want to be medicated if

1374
00:48:57,349 --> 00:48:55,040
they don't they don't want this

1375
00:48:58,870 --> 00:48:57,359
to be relieved from their seizures

1376
00:49:01,670 --> 00:48:58,880
because they get

1377
00:49:03,030 --> 00:49:01,680
this from them quite what's going on for

1378
00:49:05,349 --> 00:49:03,040
these sorts of experiences

1379
00:49:06,790 --> 00:49:05,359
is extremely hard to say i think and the

1380
00:49:09,589 --> 00:49:06,800
part of the problem is

1381
00:49:10,870 --> 00:49:09,599
it's been extremely difficult to

1382
00:49:12,309 --> 00:49:10,880
investigate them and

1383
00:49:14,710 --> 00:49:12,319
investigate them in controlled

1384
00:49:15,829 --> 00:49:14,720
conditions uh in the lab where you can

1385
00:49:17,349 --> 00:49:15,839
actually see okay this is

1386
00:49:18,549 --> 00:49:17,359
this is what's going on is it you know a

1387
00:49:19,910 --> 00:49:18,559
wash of a particular kind of

1388
00:49:21,510 --> 00:49:19,920

neurochemical or

1389
00:49:23,430 --> 00:49:21,520
activity in this or that part of the

1390
00:49:26,150 --> 00:49:23,440
brain it's unclear so

1391
00:49:27,670 --> 00:49:26,160
some of these stuff from epilepsy is it

1392
00:49:29,109 --> 00:49:27,680
shows that

1393
00:49:30,470 --> 00:49:29,119
some brain regions seem to be more

1394
00:49:30,870 --> 00:49:30,480
implicated than others but but i

1395
00:49:37,270 --> 00:49:30,880
wouldn't

1396
00:49:37,750 --> 00:49:37,280
stock in those but it's a fascinating

1397
00:49:39,349 --> 00:49:37,760
class of

1398
00:49:40,950 --> 00:49:39,359
experience sure and i think again

1399
00:49:43,430 --> 00:49:40,960
there's a lot of

1400
00:49:45,910 --> 00:49:43,440
certainly a lot of interest and there

1401
00:49:48,549 --> 00:49:45,920
has been a lot of activity for ages

1402
00:49:49,589 --> 00:49:48,559
about the neuroscience of meditative

1403
00:49:51,510 --> 00:49:49,599
experiences

1404
00:49:52,710 --> 00:49:51,520
and it doesn't have quite the same

1405
00:49:55,190 --> 00:49:52,720
endpoint but

1406
00:49:56,870 --> 00:49:55,200
that certainly there are there are

1407
00:50:00,470 --> 00:49:56,880
examples of people in

1408
00:50:02,790 --> 00:50:00,480
meditative states who will experience

1409
00:50:03,510 --> 00:50:02,800
the dissolution of the cell from the ego

1410
00:50:08,549 --> 00:50:03,520
and

1411
00:50:10,150 --> 00:50:08,559
see

1412
00:50:11,910 --> 00:50:10,160
back to where we started so what in the

1413
00:50:13,430 --> 00:50:11,920

brain can explain that kind of

1414
00:50:16,710 --> 00:50:13,440
phenomenology

1415
00:50:23,430 --> 00:50:20,150
an open question the second

1416
00:50:26,150 --> 00:50:23,440
thing about laterality in the brain left

1417
00:50:27,030 --> 00:50:26,160
versus right hemisphere and this is it's

1418
00:50:29,670 --> 00:50:27,040
a huge

1419
00:50:30,150 --> 00:50:29,680
it's uh as other thing most people will

1420
00:50:31,670 --> 00:50:30,160
know

1421
00:50:33,190 --> 00:50:31,680
we hear these tropes and these cultural

1422
00:50:33,990 --> 00:50:33,200
tropes about the left brain being

1423
00:50:35,670 --> 00:50:34,000
analytical

1424
00:50:38,390 --> 00:50:35,680
and the right brain being holistic and

1425
00:50:42,069 --> 00:50:38,400
artistic and left-bringing

1426
00:50:43,910 --> 00:50:42,079
and as with all these things

1427
00:50:45,349 --> 00:50:43,920
there's a grain of truth underlyingness

1428
00:50:49,589 --> 00:50:45,359
but it's only a grain

1429
00:50:51,910 --> 00:50:49,599
and um pretty much for everything you do

1430
00:50:53,670 --> 00:50:51,920
the both hemispheres of the brain are

1431
00:50:55,190 --> 00:50:53,680
working together

1432
00:50:57,750 --> 00:50:55,200
some things are more lateralized than

1433
00:50:59,109 --> 00:50:57,760
others and so this is

1434
00:51:01,510 --> 00:50:59,119
a few of these saying a couple of these

1435
00:51:03,910 --> 00:51:01,520
things when you get more towards

1436
00:51:05,589 --> 00:51:03,920
output and input things tend to get more

1437
00:51:08,230 --> 00:51:05,599
lateralized so if you have a stroke in

1438
00:51:11,270 --> 00:51:08,240

one half of your visual cortex that will

1439
00:51:13,270 --> 00:51:11,280
affect one half of your visual field

1440
00:51:14,870 --> 00:51:13,280
right if you have what a stroke in your

1441
00:51:16,950 --> 00:51:14,880
right hemisphere you will be

1442
00:51:18,870 --> 00:51:16,960
motor hemisphere your motor cortex will

1443
00:51:22,069 --> 00:51:18,880
be paralyzed on your left hand side

1444
00:51:24,630 --> 00:51:22,079
so these things are very lateralized um

1445
00:51:25,190 --> 00:51:24,640
and that's not to be mysterious thing to

1446
00:51:29,589 --> 00:51:25,200
say

1447
00:51:33,190 --> 00:51:31,510
less obviously lateralizable things then

1448
00:51:34,630 --> 00:51:33,200
language seems to be basically the only

1449
00:51:36,309 --> 00:51:34,640
thing that's reliably lateralized in

1450
00:51:38,390 --> 00:51:36,319
terms of brain function in

1451
00:51:41,190 --> 00:51:38,400
in humans which is usually on the left

1452
00:51:43,270 --> 00:51:41,200
but but not always

1453
00:51:44,230 --> 00:51:43,280
so most of the time it's it's it's

1454
00:51:47,270 --> 00:51:44,240
working together

1455
00:51:50,309 --> 00:51:47,280
i think the the super interesting

1456
00:51:52,630 --> 00:51:50,319
studies here

1457
00:51:54,710 --> 00:51:52,640
yeah so why i don't really like very

1458
00:51:56,309 --> 00:51:54,720
much decide this habit of

1459
00:51:57,589 --> 00:51:56,319
describing people as left-brained or

1460
00:51:59,990 --> 00:51:57,599
right-brained and you know i think

1461
00:52:03,589 --> 00:52:00,000
that's some kind of neo-phrenology

1462
00:52:05,430 --> 00:52:03,599
stuff but

1463
00:52:06,630 --> 00:52:05,440

what's still really interesting are

1464
00:52:10,230 --> 00:52:06,640
these

1465
00:52:10,710 --> 00:52:10,240
neurosurgical case series of people with

1466
00:52:12,549 --> 00:52:10,720
what we

1467
00:52:14,950 --> 00:52:12,559
call callistotomies these are people

1468
00:52:18,150 --> 00:52:14,960
who've had split brain operations

1469
00:52:21,190 --> 00:52:18,160
um this used to be done

1470
00:52:22,790 --> 00:52:21,200
uh it's pretty rare now because other

1471
00:52:24,790 --> 00:52:22,800
medications become more effective but

1472
00:52:26,549 --> 00:52:24,800
for people with really really severe and

1473
00:52:29,829 --> 00:52:26,559
intractable epilepsy

1474
00:52:31,349 --> 00:52:29,839
one of the options was to cut all the

1475
00:52:33,589 --> 00:52:31,359
well the majority of the fibers

1476
00:52:35,910 --> 00:52:33,599
connecting the two hemispheres hence the

1477
00:52:38,630 --> 00:52:35,920
term split brain

1478
00:52:40,309 --> 00:52:38,640
and there's some absolutely fascinating

1479
00:52:43,190 --> 00:52:40,319
observations this goes back to

1480
00:52:45,349 --> 00:52:43,200
people like mike gazaniger and joe bogan

1481
00:52:48,230 --> 00:52:45,359
someone who would

1482
00:52:49,190 --> 00:52:48,240
uh you should give the two hemispheres

1483
00:52:50,710 --> 00:52:49,200
different input

1484
00:52:52,390 --> 00:52:50,720
to try and ask the question are there

1485
00:52:53,030 --> 00:52:52,400
are there two separate conscious

1486
00:52:56,230 --> 00:52:53,040
subjects

1487
00:52:59,510 --> 00:52:56,240
now um now that you split the brain

1488
00:53:01,109 --> 00:52:59,520

like this and there are

1489
00:53:03,750 --> 00:53:01,119
very suggestive hints that there's

1490
00:53:07,190 --> 00:53:03,760
something weird going on like you can

1491
00:53:08,630 --> 00:53:07,200
you can show uh you have to always get

1492
00:53:10,309 --> 00:53:08,640
my left right mixed up because so many

1493
00:53:10,630 --> 00:53:10,319
things cross over here it's very hard to

1494
00:53:17,510 --> 00:53:10,640
keep

1495
00:53:21,750 --> 00:53:17,520
my hold on this has to be my right

1496
00:53:23,589 --> 00:53:21,760
visual uh

1497
00:53:25,270 --> 00:53:23,599
right don't forget about your questions

1498
00:53:27,190 --> 00:53:25,280
okay so if yeah anyway if

1499
00:53:29,190 --> 00:53:27,200
if information engages the right visual

1500
00:53:30,950 --> 00:53:29,200
cortex that doesn't get into my left

1501
00:53:32,230 --> 00:53:30,960
then typically the person does not is

1502
00:53:35,270 --> 00:53:32,240
not able to verbally

1503
00:53:38,790 --> 00:53:35,280
say what that is because the left

1504
00:53:40,950 --> 00:53:38,800
language side doesn't have access uh

1505
00:53:42,230 --> 00:53:40,960
but we'll maybe try to confabulate

1506
00:53:43,829 --> 00:53:42,240
what's going on

1507
00:53:45,589 --> 00:53:43,839
so the right hand side might still be

1508
00:53:46,630 --> 00:53:45,599
able to draw what they see and then the

1509
00:53:49,670 --> 00:53:46,640
left hand side

1510
00:53:52,630 --> 00:53:49,680
will make up some story to justify why

1511
00:53:54,230 --> 00:53:52,640
the right hand is drawn it and so these

1512
00:53:56,790 --> 00:53:54,240
are these are really really super

1513
00:53:59,109 --> 00:53:56,800

suggestive but it's still never been

1514
00:54:02,150 --> 00:53:59,119
entirely clear

1515
00:54:03,829 --> 00:54:02,160
this basic question of are there two

1516
00:54:06,150 --> 00:54:03,839
have you have you divided one person

1517
00:54:09,670 --> 00:54:06,160
into two or not

1518
00:54:11,349 --> 00:54:09,680
because a lot of the early studies

1519
00:54:13,030 --> 00:54:11,359
turned out to have been methodologically

1520
00:54:15,510 --> 00:54:13,040
limited in various ways and

1521
00:54:16,309 --> 00:54:15,520
and so now with sort of more modern

1522
00:54:18,069 --> 00:54:16,319
methods

1523
00:54:20,470 --> 00:54:18,079
in the few patients that are still

1524
00:54:21,349 --> 00:54:20,480
around perception does seem to be more

1525
00:54:23,349 --> 00:54:21,359
integrated

1526
00:54:25,190 --> 00:54:23,359
across the visual fields than we would

1527
00:54:26,710 --> 00:54:25,200
have thought but but to me it's still a

1528
00:54:30,630 --> 00:54:26,720
fascinating

1529
00:54:32,230 --> 00:54:30,640
case about could we divide a single

1530
00:54:32,950 --> 00:54:32,240
conscious person into two conscious

1531
00:54:34,549 --> 00:54:32,960
people

1532
00:54:38,230 --> 00:54:34,559
and what would it what would it be like

1533
00:54:40,549 --> 00:54:38,240
to be one or other half

1534
00:54:42,150 --> 00:54:40,559
yeah so so just just to clarify one

1535
00:54:44,069 --> 00:54:42,160
point then about it the idea that for

1536
00:54:46,390 --> 00:54:44,079
example the right brain

1537
00:54:48,069 --> 00:54:46,400
uh as i mean she was describing this way

1538
00:54:49,990 --> 00:54:48,079

where she sort of

1539
00:54:51,510 --> 00:54:50,000
when the right brain was coming into

1540
00:54:53,109 --> 00:54:51,520
into effect she was

1541
00:54:55,030 --> 00:54:53,119
she felt like she was connected to

1542
00:54:57,030 --> 00:54:55,040
everything around her she no longer felt

1543
00:54:57,589 --> 00:54:57,040
like an individual she felt like she she

1544
00:54:59,910 --> 00:54:57,599
was

1545
00:55:01,349 --> 00:54:59,920
everything and she describes it as the

1546
00:55:05,270 --> 00:55:01,359
we

1547
00:55:07,430 --> 00:55:05,280
left side comes back in

1548
00:55:08,390 --> 00:55:07,440
that's where the individual self comes

1549
00:55:11,750 --> 00:55:08,400
back on

1550
00:55:14,150 --> 00:55:11,760
now this definitely sounds like a really

1551
00:55:15,589 --> 00:55:14,160
interesting analogy dichotomy that sort

1552
00:55:17,829 --> 00:55:15,599
of thing but i just was wondering from a

1553
00:55:21,270 --> 00:55:17,839
neuroscientific perspective how much

1554
00:55:23,190 --> 00:55:21,280
truth uh um exists here and

1555
00:55:24,630 --> 00:55:23,200
and whether we have any evidence of this

1556
00:55:27,270 --> 00:55:24,640
i versus we

1557
00:55:27,910 --> 00:55:27,280
sort of distinction well i think there's

1558
00:55:31,750 --> 00:55:27,920
certainly

1559
00:55:34,470 --> 00:55:31,760
there there is a distinction between uh

1560
00:55:35,270 --> 00:55:34,480
or rather the experience of being as an

1561
00:55:37,910 --> 00:55:35,280
individual

1562
00:55:39,589 --> 00:55:37,920
separate from others and from the world

1563
00:55:40,470 --> 00:55:39,599

is something that varies and you know it

1564
00:55:43,510 --> 00:55:40,480
varies

1565
00:55:46,710 --> 00:55:43,520
for each of us at times if you're

1566
00:55:49,349 --> 00:55:46,720
fully immersed in something you tend to

1567
00:55:50,069 --> 00:55:49,359
experience yourself as less separate

1568
00:55:52,230 --> 00:55:50,079
from him and

1569
00:55:54,309 --> 00:55:52,240
people call this sometimes by the by the

1570
00:55:57,750 --> 00:55:54,319
term flow experience

1571
00:55:58,630 --> 00:55:57,760
um if you're in a crowd dancing or a

1572
00:56:01,670 --> 00:55:58,640
football game

1573
00:56:03,349 --> 00:56:01,680
the crowd you feel

1574
00:56:05,270 --> 00:56:03,359
part of the crowd and that's not just a

1575
00:56:07,030 --> 00:56:05,280
metaphor it picks out

1576
00:56:10,069 --> 00:56:07,040
i think a valid aspect of your

1577
00:56:14,390 --> 00:56:10,079
experience of reduced individuality

1578
00:56:17,109 --> 00:56:14,400
at that time people on lsd

1579
00:56:19,109 --> 00:56:17,119
that's also one of the classic uh

1580
00:56:21,430 --> 00:56:19,119
reports from psychedelic experiences is

1581
00:56:23,589 --> 00:56:21,440
a dissolution of the ego

1582
00:56:25,430 --> 00:56:23,599
um right and a feeling of connectedness

1583
00:56:26,069 --> 00:56:25,440
not now not just with other people but

1584
00:56:32,390 --> 00:56:26,079
with the

1585
00:56:38,150 --> 00:56:35,589
so that and all these things together

1586
00:56:39,109 --> 00:56:38,160
suggest that well there's a brain basis

1587
00:56:40,549 --> 00:56:39,119
for

1588
00:56:42,150 --> 00:56:40,559

the strength of our experience of

1589
00:56:45,430 --> 00:56:42,160
individuality

1590
00:56:46,549 --> 00:56:45,440
and um but i don't think it comes down

1591
00:56:49,349 --> 00:56:46,559
to simply right

1592
00:56:50,069 --> 00:56:49,359
right brain versus the brain that's all

1593
00:56:51,589 --> 00:56:50,079
i see

1594
00:56:53,109 --> 00:56:51,599
and just just so that i can go back to

1595
00:56:53,829 --> 00:56:53,119
one of your other statements that i

1596
00:56:55,510 --> 00:56:53,839
found

1597
00:56:57,270 --> 00:56:55,520
really interesting you you mentioned if

1598
00:56:58,549 --> 00:56:57,280
i'm please correct me if i'm wrong you

1599
00:57:02,390 --> 00:56:58,559
mentioned that

1600
00:57:05,270 --> 00:57:02,400
uh an object would exist regardless of

1601
00:57:06,870 --> 00:57:05,280
whether we perceive it or not and i

1602
00:57:09,349 --> 00:57:06,880
believe i believe that's what you said

1603
00:57:11,109 --> 00:57:09,359
i'm wondering how this ties to the i to

1604
00:57:13,910 --> 00:57:11,119
john wheeler's ideas

1605
00:57:17,190 --> 00:57:13,920
regarding for example he makes he makes

1606
00:57:21,109 --> 00:57:17,200
an assertion in the sense that

1607
00:57:23,349 --> 00:57:21,119
a conscious observer is a necessity

1608
00:57:24,789 --> 00:57:23,359
in order for us to declare that

1609
00:57:26,390 --> 00:57:24,799
something exists

1610
00:57:28,150 --> 00:57:26,400
without the conscious observer it's like

1611
00:57:28,950 --> 00:57:28,160
part of a formula that without it if we

1612
00:57:31,510 --> 00:57:28,960
remove it

1613
00:57:33,589 --> 00:57:31,520

we cannot make any claims whatsoever

1614
00:57:35,750 --> 00:57:33,599
about whether something exists or not

1615
00:57:37,589 --> 00:57:35,760
so how does how does the idea that you

1616
00:57:38,470 --> 00:57:37,599
brought up tie into that do you agree or

1617
00:57:39,910 --> 00:57:38,480
disagree with that

1618
00:57:41,510 --> 00:57:39,920
with that well you said two separate

1619
00:57:42,870 --> 00:57:41,520
things there which were different so one

1620
00:57:43,910 --> 00:57:42,880
is what are the conditions for something

1621
00:57:45,030 --> 00:57:43,920
to exist and what

1622
00:57:46,710 --> 00:57:45,040
and the other was what are our

1623
00:57:48,710 --> 00:57:46,720
conditions for us making claims that

1624
00:57:51,829 --> 00:57:48,720
something exists and i think if we

1625
00:57:54,150 --> 00:57:51,839
if it's the second then observer is

1626
00:57:56,950 --> 00:57:54,160
probably needed you don't make you

1627
00:57:57,829 --> 00:57:56,960
you can't make an inference about an

1628
00:58:00,710 --> 00:57:57,839
existence without

1629
00:58:01,829 --> 00:58:00,720
an inferior but but whether there are

1630
00:58:05,030 --> 00:58:01,839
objects

1631
00:58:07,270 --> 00:58:05,040
whether object hood or

1632
00:58:08,069 --> 00:58:07,280
intrinsically requires observer that

1633
00:58:10,870 --> 00:58:08,079
that's again that's

1634
00:58:12,710 --> 00:58:10,880
it i think that's a it's a deeply

1635
00:58:13,750 --> 00:58:12,720
physical metaphysical question so john

1636
00:58:15,990 --> 00:58:13,760
wheeler who you mentioned

1637
00:58:17,430 --> 00:58:16,000
is i mean i always associate him with

1638
00:58:21,670 --> 00:58:17,440

this idea of

1639
00:58:23,430 --> 00:58:21,680
of giving information

1640
00:58:25,589 --> 00:58:23,440
some real state of some ontological

1641
00:58:26,549 --> 00:58:25,599
status he's famous for the slogan it

1642
00:58:29,589 --> 00:58:26,559
from bit

1643
00:58:31,589 --> 00:58:29,599
that everything that we

1644
00:58:32,710 --> 00:58:31,599
measure whether it's using the tools of

1645
00:58:36,549 --> 00:58:32,720
science and physics or

1646
00:58:38,549 --> 00:58:36,559
experience fundamentally

1647
00:58:40,470 --> 00:58:38,559
our universe is is written in the

1648
00:58:43,670 --> 00:58:40,480
language of information

1649
00:58:45,349 --> 00:58:43,680
um and

1650
00:58:46,710 --> 00:58:45,359
then you know from that then there's all

1651
00:58:48,630 --> 00:58:46,720
sorts of

1652
00:58:50,390 --> 00:58:48,640
ways of understanding that that kind of

1653
00:58:52,069 --> 00:58:50,400
claim because

1654
00:58:54,870 --> 00:58:52,079
some sorts of informational

1655
00:58:57,589 --> 00:58:54,880
relationships are fundamentally

1656
00:58:58,390 --> 00:58:57,599
relative shannon information you think

1657
00:59:02,230 --> 00:58:58,400
of that way

1658
00:59:03,349 --> 00:59:02,240
it's a sort of uh depends on a sender

1659
00:59:06,390 --> 00:59:03,359
and a receiver

1660
00:59:08,950 --> 00:59:06,400
um other ways of thinking

1661
00:59:11,589 --> 00:59:08,960
uh don't but to me that that's that's

1662
00:59:15,430 --> 00:59:13,990
that's the sort of i'm not trying to

1663
00:59:17,430 --> 00:59:15,440

dismiss the interest of anything i think

1664
00:59:19,990 --> 00:59:17,440
they're fascinating and actually they do

1665
00:59:21,750 --> 00:59:20,000
play into how we might

1666
00:59:23,030 --> 00:59:21,760
read certain contemporary theories and

1667
00:59:24,549 --> 00:59:23,040
consciousness science in particular

1668
00:59:25,270 --> 00:59:24,559
things like integrated information

1669
00:59:27,589 --> 00:59:25,280
theory

1670
00:59:29,750 --> 00:59:27,599
from julio to noni then it makes a big

1671
00:59:32,470 --> 00:59:29,760
difference what you think information

1672
00:59:32,950 --> 00:59:32,480
is um what do you think it's if you

1673
00:59:35,430 --> 00:59:32,960
would

1674
00:59:39,109 --> 00:59:35,440
or not uh but for the most part i don't

1675
00:59:42,950 --> 00:59:40,630
you know i i want to bracket those

1676
00:59:46,710 --> 00:59:42,960
discussions away from from that

1677
00:59:49,190 --> 00:59:46,720
um and

1678
00:59:51,030 --> 00:59:49,200
maybe yeah it may be true that that in

1679
00:59:53,910 --> 00:59:51,040
some

1680
00:59:55,589 --> 00:59:53,920
physics-based way that we can't say

1681
01:00:00,950 --> 00:59:55,599
anything exists

1682
01:00:03,109 --> 01:00:00,960
unless there's an observer but but

1683
01:00:05,510 --> 01:00:03,119
for the story i'm trying to tell which

1684
01:00:07,750 --> 01:00:05,520
is just this idea that

1685
01:00:09,190 --> 01:00:07,760
what we perceive is is always a

1686
01:00:15,589 --> 01:00:09,200
construction

1687
01:00:16,870 --> 01:00:15,599
there are hidden causes that we can

1688
01:00:20,069 --> 01:00:16,880

never directly

1689
01:00:22,549 --> 01:00:20,079
have access to i think that stands

1690
01:00:23,829 --> 01:00:22,559
whatever you think about the ontological

1691
01:00:25,510 --> 01:00:23,839
status of information

1692
01:00:26,870 --> 01:00:25,520
right you're just looking at it at a

1693
01:00:28,630 --> 01:00:26,880
different level in a way these are

1694
01:00:30,470 --> 01:00:28,640
distinct levels that

1695
01:00:32,870 --> 01:00:30,480
might make sense on one aspect but not

1696
01:00:34,950 --> 01:00:32,880
on the other that makes sense

1697
01:00:38,630 --> 01:00:34,960
what are your views on the zapr sapir

1698
01:00:41,750 --> 01:00:39,910
now it really does feel like an

1699
01:00:44,470 --> 01:00:41,760
interview like bang bang one half

1700
01:00:47,109 --> 01:00:44,480
question another

1701
01:00:48,309 --> 01:00:47,119
um oh and just okay you can gather your

1702
01:00:49,910 --> 01:00:48,319
thoughts on that just as an aside

1703
01:00:51,349 --> 01:00:49,920
because this bothers me

1704
01:00:53,430 --> 01:00:51,359
i'm not a theoretical physicist but my

1705
01:00:55,430 --> 01:00:53,440
background is in theoretical physics

1706
01:00:56,630 --> 01:00:55,440
when people make claims of consciousness

1707
01:00:58,390 --> 01:00:56,640
being associated with the

1708
01:00:59,910 --> 01:00:58,400
observer and quantum mechanics much of

1709
01:01:02,150 --> 01:00:59,920
that is over exaggerated

1710
01:01:03,270 --> 01:01:02,160
and taken up by the new age community

1711
01:01:05,030 --> 01:01:03,280
because

1712
01:01:06,309 --> 01:01:05,040
they tend to like to use the word

1713
01:01:07,829 --> 01:01:06,319

consciousness and tend to

1714
01:01:10,069 --> 01:01:07,839
want it to have some ontological

1715
01:01:11,910 --> 01:01:10,079
foundational status and it might be

1716
01:01:13,510 --> 01:01:11,920
that might actually be the case but it's

1717
01:01:14,230 --> 01:01:13,520
over exaggerated and it's extremely

1718
01:01:15,910 --> 01:01:14,240
contentious

1719
01:01:17,430 --> 01:01:15,920
and i believe something like 90 percent

1720
01:01:18,549 --> 01:01:17,440
of physicists don't believe that to be

1721
01:01:20,069 --> 01:01:18,559
the case

1722
01:01:22,069 --> 01:01:20,079
the wave function can collapse when

1723
01:01:25,589 --> 01:01:22,079
there's a another electron or another

1724
01:01:27,510 --> 01:01:25,599
set of electrons

1725
01:01:29,510 --> 01:01:27,520
let's say objective quality like atoms

1726
01:01:30,630 --> 01:01:29,520
observing another photon then you can

1727
01:01:34,069 --> 01:01:30,640
collapse the photon

1728
01:01:35,510 --> 01:01:34,079
and but even that's a bit that's a bit

1729
01:01:36,390 --> 01:01:35,520
that has to be stated more technically

1730
01:01:38,069 --> 01:01:36,400
because there's something called

1731
01:01:39,910 --> 01:01:38,079
coherence and coherence

1732
01:01:41,510 --> 01:01:39,920
either way take those claims that the

1733
01:01:42,950 --> 01:01:41,520
conscious observer is necessary for the

1734
01:01:46,069 --> 01:01:42,960
collapse of a wave function

1735
01:01:47,589 --> 01:01:46,079
with a grain of salt absolutely and

1736
01:01:49,829 --> 01:01:47,599
you guys gonna know much more about

1737
01:01:50,870 --> 01:01:49,839
physics i mean i started off in physics

1738
01:01:52,549 --> 01:01:50,880

but i

1739
01:01:54,870 --> 01:01:52,559
i switched to psychology when physics

1740
01:01:55,990 --> 01:01:54,880
became too hard i i'm sorry i'm super

1741
01:01:57,910 --> 01:01:56,000
interested in your background man

1742
01:01:59,670 --> 01:01:57,920
because you also went back to do

1743
01:02:01,349 --> 01:01:59,680
a computer science master's and an

1744
01:02:02,630 --> 01:02:01,359
artificial intelligence phd if i'm

1745
01:02:04,630 --> 01:02:02,640
if i'm correct yeah that's right yeah

1746
01:02:05,750 --> 01:02:04,640
yeah okay that's that's super cool well

1747
01:02:07,670 --> 01:02:05,760
we'll talk about that after so let's

1748
01:02:10,710 --> 01:02:07,680
talk about sapir wharf

1749
01:02:12,230 --> 01:02:10,720
okay so sapo-warf hypothesis is really

1750
01:02:15,589 --> 01:02:12,240
is this idea

1751
01:02:18,950 --> 01:02:15,599
that language either determines or

1752
01:02:18,960 --> 01:02:22,390
that um

1753
01:02:29,750 --> 01:02:25,430
that the linguistic

1754
01:02:31,829 --> 01:02:29,760
environment we live in influences

1755
01:02:35,829 --> 01:02:31,839
the perceptual environment that we live

1756
01:02:37,589 --> 01:02:35,839
in i think is probably one way to say

1757
01:02:39,750 --> 01:02:37,599
technically people will talk about

1758
01:02:42,789 --> 01:02:39,760
cognitive penetrability here

1759
01:02:45,910 --> 01:02:42,799
that that um is the way we

1760
01:02:47,510 --> 01:02:45,920
see the world or hear it or smell it is

1761
01:02:51,829 --> 01:02:47,520
that

1762
01:02:53,670 --> 01:02:51,839
invaded by higher level beliefs

1763
01:02:55,029 --> 01:02:53,680

or cognitive processes of which language

1764
01:02:58,150 --> 01:02:55,039
is exemplary

1765
01:03:01,589 --> 01:02:58,160
so the sapphire wolf hypothesis is that

1766
01:03:06,549 --> 01:03:04,870
the the language that we use shapes

1767
01:03:08,549 --> 01:03:06,559
the way we perceive it and and this can

1768
01:03:12,150 --> 01:03:08,559
be you know this can be in kind of

1769
01:03:16,630 --> 01:03:12,160
sort of subtle ways like um

1770
01:03:17,349 --> 01:03:16,640
how do i perceive time is that dependent

1771
01:03:19,990 --> 01:03:17,359
on the

1772
01:03:21,029 --> 01:03:20,000
the way i use language there are there

1773
01:03:23,990 --> 01:03:21,039
are all sorts of

1774
01:03:24,870 --> 01:03:24,000
lots of interesting anthropological

1775
01:03:27,430 --> 01:03:24,880
experiments

1776
01:03:28,549 --> 01:03:27,440
looking for languages where for instance

1777
01:03:30,309 --> 01:03:28,559
uh

1778
01:03:32,150 --> 01:03:30,319
in western languages we tend to think of

1779
01:03:35,109 --> 01:03:32,160
the the

1780
01:03:36,309 --> 01:03:35,119
uh future as ahead of us and the pastors

1781
01:03:38,069 --> 01:03:36,319
behind us

1782
01:03:39,349 --> 01:03:38,079
but i think it's the imara there's this

1783
01:03:42,710 --> 01:03:39,359
is something i was from

1784
01:03:45,029 --> 01:03:42,720
very second hand on but i but there's a

1785
01:03:46,309 --> 01:03:45,039
reports of some indigenous south

1786
01:03:47,589 --> 01:03:46,319
american cultures

1787
01:03:49,029 --> 01:03:47,599
for which it's the other way around

1788
01:03:50,710 --> 01:03:49,039

languages for which the other way around

1789
01:03:53,910 --> 01:03:50,720
that the past

1790
01:03:55,430 --> 01:03:53,920
is uh ahead of you and the future's

1791
01:03:57,270 --> 01:03:55,440
behind you the reason being

1792
01:03:59,270 --> 01:03:57,280
kind of makes sense to me is that well

1793
01:04:00,549 --> 01:03:59,280
you know you can see

1794
01:04:02,230 --> 01:04:00,559
the past you know i know what happened

1795
01:04:02,549 --> 01:04:02,240
in the past it's happened so therefore

1796
01:04:04,069 --> 01:04:02,559
it's

1797
01:04:05,349 --> 01:04:04,079
within my line of sight but the future

1798
01:04:07,029 --> 01:04:05,359
is unknown i don't know what's going to

1799
01:04:07,670 --> 01:04:07,039
happen so i can't see it so it's behind

1800
01:04:10,710 --> 01:04:07,680
me

1801
01:04:13,029 --> 01:04:10,720
uh so these but with that linguistic

1802
01:04:14,950 --> 01:04:13,039
difference that sort of metaphorically

1803
01:04:17,029 --> 01:04:14,960
shapes how we talk about time but might

1804
01:04:18,150 --> 01:04:17,039
actually influence the way we perceive

1805
01:04:20,870 --> 01:04:18,160
time

1806
01:04:21,910 --> 01:04:20,880
um so there are all sorts of interesting

1807
01:04:24,870 --> 01:04:21,920
questions

1808
01:04:26,549 --> 01:04:24,880
about how deep these influences might go

1809
01:04:30,950 --> 01:04:26,559
uh to me it's

1810
01:04:34,789 --> 01:04:33,430
and i'd be surprised if the sapphire

1811
01:04:37,910 --> 01:04:34,799
hypothesis

1812
01:04:39,910 --> 01:04:37,920
is not true right that's why people

1813
01:04:41,109 --> 01:04:39,920

seem to find it appealing i think is

1814
01:04:44,069 --> 01:04:41,119
because of this

1815
01:04:44,789 --> 01:04:44,079
this idea that there's this modularity

1816
01:04:47,349 --> 01:04:44,799
in the brain

1817
01:04:48,150 --> 01:04:47,359
that that we have perception which is

1818
01:04:50,549 --> 01:04:48,160
some sort of

1819
01:04:52,309 --> 01:04:50,559
encapsulated at some lower level we form

1820
01:04:53,109 --> 01:04:52,319
this perceptual representation of the

1821
01:04:55,190 --> 01:04:53,119
world

1822
01:04:57,109 --> 01:04:55,200
and then we think about it and we talk

1823
01:04:58,710 --> 01:04:57,119
about it and we make decisions about it

1824
01:05:00,549 --> 01:04:58,720
and then we go and

1825
01:05:02,069 --> 01:05:00,559
we do stuff we make a plan for what i'm

1826
01:05:03,510 --> 01:05:02,079
going to do next we do stuff and then we

1827
01:05:05,430 --> 01:05:03,520
perceive the world again

1828
01:05:06,630 --> 01:05:05,440
but the brain doesn't work like that i

1829
01:05:08,069 --> 01:05:06,640
don't think and and

1830
01:05:09,910 --> 01:05:08,079
what you were describing was a bottom-up

1831
01:05:12,630 --> 01:05:09,920
approach well

1832
01:05:14,870 --> 01:05:12,640
it's sort of more just an approach of of

1833
01:05:16,309 --> 01:05:14,880
extreme modularity so people like jerry

1834
01:05:19,029 --> 01:05:16,319
fodor is known for

1835
01:05:20,630 --> 01:05:19,039
for this view that you know that one of

1836
01:05:22,230 --> 01:05:20,640
the longest-running arguments in

1837
01:05:25,510 --> 01:05:22,240
neuroscience has always been about

1838
01:05:27,589 --> 01:05:25,520

functional localization to what extent

1839
01:05:31,190 --> 01:05:27,599
are different things the brain does

1840
01:05:33,430 --> 01:05:31,200
localize different brain regions

1841
01:05:36,390 --> 01:05:33,440
um and the pendulum has swung back and

1842
01:05:38,390 --> 01:05:36,400
forth on this obviously both extremes

1843
01:05:40,710 --> 01:05:38,400
can be ruled out to start with you can't

1844
01:05:42,230 --> 01:05:40,720
have a brain where

1845
01:05:44,150 --> 01:05:42,240
bits different bits do different things

1846
01:05:46,870 --> 01:05:44,160
and don't talk to any other bits

1847
01:05:47,750 --> 01:05:46,880
um and you can there would be no point

1848
01:05:49,589 --> 01:05:47,760
to that because you'd have no

1849
01:05:51,109 --> 01:05:49,599
cross-communication anyway right exactly

1850
01:05:52,710 --> 01:05:51,119
and you can almost

1851
01:05:54,230 --> 01:05:52,720
equally rule out the other extreme

1852
01:05:55,750 --> 01:05:54,240
although you can't quite rule out

1853
01:05:58,710 --> 01:05:55,760
conceptually but

1854
01:06:00,150 --> 01:05:58,720
certainly um empirically it's ruled out

1855
01:06:02,829 --> 01:06:00,160
very quickly you have damage different

1856
01:06:04,150 --> 01:06:02,839
bits of the brain different things go

1857
01:06:07,829 --> 01:06:04,160
wrong

1858
01:06:09,190 --> 01:06:07,839
and but you can still but there's still

1859
01:06:11,990 --> 01:06:09,200
you know more subtle level there's still

1860
01:06:13,829 --> 01:06:12,000
this argument about the degree to which

1861
01:06:15,510 --> 01:06:13,839
functions let's say a function like

1862
01:06:19,589 --> 01:06:15,520
language

1863
01:06:23,029 --> 01:06:19,599

is is just served by

1864
01:06:24,630 --> 01:06:23,039
a particular network or brain region

1865
01:06:26,309 --> 01:06:24,640
and so those bits of the brain do

1866
01:06:27,510 --> 01:06:26,319
language yes they talk to other bits of

1867
01:06:30,390 --> 01:06:27,520
the brain

1868
01:06:32,549 --> 01:06:30,400
but they don't sort of bleed over into

1869
01:06:35,829 --> 01:06:32,559
those other bits

1870
01:06:37,430 --> 01:06:35,839
so computers like this laptop computer

1871
01:06:38,870 --> 01:06:37,440
is kind of modular in this way that you

1872
01:06:40,630 --> 01:06:38,880
know there's a chip that does memory a

1873
01:06:43,430 --> 01:06:40,640
chip that's the cpu

1874
01:06:43,829 --> 01:06:43,440
uh chip that's the i o ports and so on

1875
01:06:45,270 --> 01:06:43,839
um

1876
01:06:47,910 --> 01:06:45,280
you can replace these somewhat

1877
01:06:48,470 --> 01:06:47,920
interchangeably so it's pretty modular

1878
01:06:51,109 --> 01:06:48,480
that so

1879
01:06:51,750 --> 01:06:51,119
this kind of design is a reasonable way

1880
01:06:54,309 --> 01:06:51,760
to design

1881
01:06:54,950 --> 01:06:54,319
systems many of our technologies design

1882
01:06:56,710 --> 01:06:54,960
this way

1883
01:06:59,750 --> 01:06:56,720
but typically biological systems don't

1884
01:07:03,270 --> 01:06:59,760
end up being designed this way

1885
01:07:04,150 --> 01:07:03,280
and if we look now that we know a bit

1886
01:07:06,390 --> 01:07:04,160
more about

1887
01:07:07,670 --> 01:07:06,400
how things like visual perception unfold

1888
01:07:10,069 --> 01:07:07,680

in the brain

1889
01:07:12,390 --> 01:07:10,079
they're not limited to just the visual

1890
01:07:15,670 --> 01:07:12,400
cortex

1891
01:07:17,750 --> 01:07:15,680
so the way i and many others think about

1892
01:07:19,829 --> 01:07:17,760
perception is that you know it's this

1893
01:07:22,390 --> 01:07:19,839
hierarchical set of predictions about

1894
01:07:25,670 --> 01:07:22,400
the causes of sensory inputs

1895
01:07:27,270 --> 01:07:25,680
many of these happen in visual cortex

1896
01:07:30,789 --> 01:07:27,280
but some of them happen

1897
01:07:34,630 --> 01:07:30,799
outside of visual cortex so

1898
01:07:40,470 --> 01:07:37,750
will interact with visual cortex

1899
01:07:42,309 --> 01:07:40,480
in interpreting coming to the best guess

1900
01:07:43,829 --> 01:07:42,319
of the causes of sensory inputs

1901
01:07:45,349 --> 01:07:43,839
and there's you know there's a lot of

1902
01:07:47,270 --> 01:07:45,359
experiments now there's a

1903
01:07:49,990 --> 01:07:47,280
great paper by gary lupin i think he's

1904
01:07:53,109 --> 01:07:50,000
at university of madison wisconsin

1905
01:07:57,109 --> 01:07:53,119
he sort of took this debate more into

1906
01:07:58,870 --> 01:07:57,119
the realm of of experiment and just

1907
01:08:01,910 --> 01:07:58,880
summarize a load of evidence showing

1908
01:08:05,670 --> 01:08:01,920
that words influence perception

1909
01:08:08,309 --> 01:08:05,680
in in pretty clear

1910
01:08:09,349 --> 01:08:08,319
ways so this to me is not surprising but

1911
01:08:10,549 --> 01:08:09,359
it's also there's just

1912
01:08:12,630 --> 01:08:10,559
there's lots of interesting questions

1913
01:08:14,069 --> 01:08:12,640

about how far this goes again this is

1914
01:08:16,709 --> 01:08:14,079
always the question how deep do these

1915
01:08:20,229 --> 01:08:16,719
influences go what kinds of things

1916
01:08:23,669 --> 01:08:20,239
are are amenable uh or influenceable

1917
01:08:25,349 --> 01:08:23,679
by things like language it seems like

1918
01:08:26,789 --> 01:08:25,359
there's a controversy around it when you

1919
01:08:28,789 --> 01:08:26,799
even just look at the wikipedia article

1920
01:08:29,829 --> 01:08:28,799
about the sapir warf hypothesis pinker

1921
01:08:32,709 --> 01:08:29,839
and chomsky

1922
01:08:33,829 --> 01:08:32,719
are both against it being true and i

1923
01:08:35,189 --> 01:08:33,839
haven't had a chance to look up their

1924
01:08:36,870 --> 01:08:35,199
arguments i'm curious if you could

1925
01:08:39,430 --> 01:08:36,880
explain to me as well as the audience

1926
01:08:40,390 --> 01:08:39,440
what are chomsky's and to a lesser

1927
01:08:41,749 --> 01:08:40,400
extent pinkers

1928
01:08:43,430 --> 01:08:41,759
but i'm more interested in chomsky's

1929
01:08:45,189 --> 01:08:43,440
arguments against it

1930
01:08:46,789 --> 01:08:45,199
yeah i to be honest it's not something

1931
01:08:49,910 --> 01:08:46,799
i've studied much

1932
01:08:51,829 --> 01:08:49,920
either my feeling is that

1933
01:08:54,309 --> 01:08:51,839
i mean trump says chomsky is known for

1934
01:08:56,070 --> 01:08:54,319
his ideas about universal grammar i mean

1935
01:08:57,749 --> 01:08:56,080
he's he's he's such an interesting

1936
01:08:59,749 --> 01:08:57,759
character because he in many ways put

1937
01:09:01,590 --> 01:08:59,759
the nail in the coffin of behaviorism

1938
01:09:03,910 --> 01:09:01,600

sort of saying that okay you need to

1939
01:09:05,669 --> 01:09:03,920
take mental internal mental processes

1940
01:09:08,309 --> 01:09:05,679
seriously

1941
01:09:09,430 --> 01:09:08,319
and we can't just infer them always just

1942
01:09:12,709 --> 01:09:09,440
on the basis of

1943
01:09:14,709 --> 01:09:12,719
behaviors we need to we need to

1944
01:09:15,749 --> 01:09:14,719
assume some complex internal mechanism

1945
01:09:19,590 --> 01:09:15,759
of course he was doing this

1946
01:09:21,269 --> 01:09:19,600
in the uh in the domain of language and

1947
01:09:22,950 --> 01:09:21,279
saying you can't explain linguistic

1948
01:09:24,709 --> 01:09:22,960
behavior purely from a behaviorist

1949
01:09:28,149 --> 01:09:24,719
perspective on on what

1950
01:09:29,669 --> 01:09:28,159
people say just how quickly human beings

1951
01:09:31,430 --> 01:09:29,679
learn language there's just

1952
01:09:33,349 --> 01:09:31,440
he would say that there's not enough

1953
01:09:35,510 --> 01:09:33,359
information in the stimuli that babies

1954
01:09:37,749 --> 01:09:35,520
are exposed to for them to

1955
01:09:38,950 --> 01:09:37,759
infer grammar and people still will

1956
01:09:40,070 --> 01:09:38,960
argue about that you know they'll say

1957
01:09:41,829 --> 01:09:40,080
well actually there is and

1958
01:09:43,510 --> 01:09:41,839
it just depends on because they're

1959
01:09:45,829 --> 01:09:43,520
interacting with it and so

1960
01:09:46,870 --> 01:09:45,839
i i'm not a linguist so i don't want to

1961
01:09:50,789 --> 01:09:46,880
come down on

1962
01:09:53,269 --> 01:09:50,799
one side or other there but in chomsky's

1963
01:09:55,669 --> 01:09:53,279

view became this idea of this sort of

1964
01:09:58,950 --> 01:09:55,679
language acquisition device this

1965
01:10:00,470 --> 01:09:58,960
very very circumscribed

1966
01:10:02,310 --> 01:10:00,480
system in the brain that was for

1967
01:10:04,070 --> 01:10:02,320
language and so

1968
01:10:05,350 --> 01:10:04,080
i think if you take that perspective you

1969
01:10:06,950 --> 01:10:05,360
are

1970
01:10:09,910 --> 01:10:06,960
you're going to be disinclined to the

1971
01:10:11,750 --> 01:10:09,920
sapir wolf hypothesis which is

1972
01:10:13,430 --> 01:10:11,760
really motivated by an idea that there

1973
01:10:14,149 --> 01:10:13,440
isn't this kind of modularity in the

1974
01:10:17,590 --> 01:10:14,159
brain

1975
01:10:19,430 --> 01:10:17,600
that things there is to some extent

1976
01:10:21,189 --> 01:10:19,440
there's specialization

1977
01:10:23,669 --> 01:10:21,199
but there's not a complete kind of

1978
01:10:26,229 --> 01:10:23,679
encapsulation

1979
01:10:27,750 --> 01:10:26,239
firewalling of one kind of process from

1980
01:10:29,510 --> 01:10:27,760
another

1981
01:10:31,510 --> 01:10:29,520
is there a difference but sorry going

1982
01:10:33,430 --> 01:10:31,520
from yeah it's just when you when you

1983
01:10:35,030 --> 01:10:33,440
brought up the idea of the visual

1984
01:10:37,110 --> 01:10:35,040
visual cortex being related to other

1985
01:10:38,390 --> 01:10:37,120
areas of the brain what that reminded me

1986
01:10:39,669 --> 01:10:38,400
of was the

1987
01:10:41,669 --> 01:10:39,679
i believe there was a study that they

1988
01:10:45,510 --> 01:10:41,679

conducted with regards to

1989
01:10:48,390 --> 01:10:45,520
color color detection uh being tied to

1990
01:10:49,430 --> 01:10:48,400
uh if if if in the language that that

1991
01:10:51,910 --> 01:10:49,440
individual spoke

1992
01:10:53,990 --> 01:10:51,920
there was there were there was act there

1993
01:10:57,669 --> 01:10:54,000
were actual words that would

1994
01:10:59,669 --> 01:10:57,679
define a certain color then

1995
01:11:01,830 --> 01:10:59,679
then that individual was capable of

1996
01:11:02,550 --> 01:11:01,840
identifying that specific color but if a

1997
01:11:06,950 --> 01:11:02,560
language was

1998
01:11:09,350 --> 01:11:06,960
was not um it did not have that specific

1999
01:11:10,550 --> 01:11:09,360
color um like just it hadn't been

2000
01:11:11,990 --> 01:11:10,560
developed in that language and that

2001
01:11:17,350 --> 01:11:12,000
person would not be able to to

2002
01:11:19,110 --> 01:11:17,360
detect it so i'm just wondering what

2003
01:11:20,390 --> 01:11:19,120
this is sort of a piece of evidence

2004
01:11:22,149 --> 01:11:20,400
right that yeah i mean that's sort of

2005
01:11:23,590 --> 01:11:22,159
connected yeah that's a good

2006
01:11:25,669 --> 01:11:23,600
another piece of evidence sort of in

2007
01:11:27,830 --> 01:11:25,679
favor of sapi wolf right and

2008
01:11:29,350 --> 01:11:27,840
exactly and i think the example that

2009
01:11:30,709 --> 01:11:29,360
comes to mind when you talk about that i

2010
01:11:32,550 --> 01:11:30,719
think it's russian right and i don't

2011
01:11:34,470 --> 01:11:32,560
speak russian but i believe russian has

2012
01:11:37,750 --> 01:11:34,480
more words for blue

2013
01:11:41,350 --> 01:11:37,760

and um than english maybe maybe

2014
01:11:44,310 --> 01:11:41,360
and colors you can test this

2015
01:11:45,830 --> 01:11:44,320
really nicely with color because colors

2016
01:11:47,430 --> 01:11:45,840
is beautiful example of categorical

2017
01:11:48,790 --> 01:11:47,440
perception you have a continuous

2018
01:11:51,990 --> 01:11:48,800
wavelength

2019
01:11:54,630 --> 01:11:52,000
that you know we typically experience as

2020
01:11:55,910 --> 01:11:54,640
a number of discrete colors with with

2021
01:11:57,270 --> 01:11:55,920
bits of blurry boundary what happens

2022
01:11:58,709 --> 01:11:57,280
when you look at a rainbow i mean that's

2023
01:12:01,110 --> 01:11:58,719
what that's what you see

2024
01:12:02,709 --> 01:12:01,120
even though the color is the spectrum is

2025
01:12:06,070 --> 01:12:02,719
continuously changing

2026
01:12:06,950 --> 01:12:06,080
so to assess categorical perception you

2027
01:12:08,790 --> 01:12:06,960
sort of ask

2028
01:12:10,149 --> 01:12:08,800
you present people with differences on

2029
01:12:12,070 --> 01:12:10,159
this continuous scale and ask them to

2030
01:12:15,030 --> 01:12:12,080
judge how far apart they are

2031
01:12:16,790 --> 01:12:15,040
and if their judgments changes quite a

2032
01:12:17,350 --> 01:12:16,800
lot at some times but not other times

2033
01:12:22,950 --> 01:12:17,360
then you

2034
01:12:25,110 --> 01:12:22,960
boundary there um and

2035
01:12:27,590 --> 01:12:25,120
so yeah i think i mean this is again for

2036
01:12:32,630 --> 01:12:27,600
me it's a bit second hand but

2037
01:12:34,870 --> 01:12:32,640
i'm prepared to accept that people who

2038
01:12:36,229 --> 01:12:34,880

who learn russian from birth i don't

2039
01:12:37,590 --> 01:12:36,239
know about if you learn as a second

2040
01:12:39,669 --> 01:12:37,600
language

2041
01:12:41,189 --> 01:12:39,679
may divide their experiences of blue

2042
01:12:43,189 --> 01:12:41,199
into more categories

2043
01:12:45,430 --> 01:12:43,199
than people who have a different

2044
01:12:47,750 --> 01:12:45,440
linguistic environment

2045
01:12:49,750 --> 01:12:47,760
against me it's like okay this is kind

2046
01:12:51,510 --> 01:12:49,760
of fine i don't

2047
01:12:53,189 --> 01:12:51,520
unders well for me it shouldn't be a

2048
01:12:53,510 --> 01:12:53,199
controversial perspective to adopt

2049
01:12:55,910 --> 01:12:53,520
because

2050
01:12:58,550 --> 01:12:55,920
this is how perception works in general

2051
01:13:02,229 --> 01:12:58,560
we also notice for things like

2052
01:13:05,430 --> 01:13:02,239
let's say wine tasting you

2053
01:13:07,030 --> 01:13:05,440
initially you all wines or red wines

2054
01:13:10,550 --> 01:13:07,040
basically taste the same

2055
01:13:11,990 --> 01:13:10,560
um and then as you learn you sort of

2056
01:13:13,510 --> 01:13:12,000
learn to distinguish them but then you

2057
01:13:15,189 --> 01:13:13,520
learn to apply different labels to

2058
01:13:16,950 --> 01:13:15,199
different kinds of wines and then

2059
01:13:18,950 --> 01:13:16,960
those help scaffold your ability to

2060
01:13:20,630 --> 01:13:18,960
distinguish them still further

2061
01:13:22,390 --> 01:13:20,640
what the problem is you've got a chicken

2062
01:13:23,510 --> 01:13:22,400
and egg thing here you know what comes

2063
01:13:24,870 --> 01:13:23,520

first is it that you

2064
01:13:27,270 --> 01:13:24,880
experience things differently and then

2065
01:13:27,669 --> 01:13:27,280
label them or can it be the other way

2066
01:13:29,350 --> 01:13:27,679
around

2067
01:13:30,870 --> 01:13:29,360
and with many of these things i think

2068
01:13:33,030 --> 01:13:30,880
it's probably

2069
01:13:34,790 --> 01:13:33,040
not a good idea to seek an answer to

2070
01:13:36,470 --> 01:13:34,800
that and it's a circular kind of

2071
01:13:39,270 --> 01:13:36,480
causality that bootstraps these

2072
01:13:40,709 --> 01:13:39,280
differences into existence

2073
01:13:42,550 --> 01:13:40,719
do you mind repeating that last part why

2074
01:13:43,590 --> 01:13:42,560
is it that you can't start with the

2075
01:13:45,030 --> 01:13:43,600
concept and then

2076
01:13:47,189 --> 01:13:45,040
be able to perceive that concept

2077
01:13:49,030 --> 01:13:47,199
afterwards so for example

2078
01:13:50,310 --> 01:13:49,040
i don't know the difference between cyan

2079
01:13:53,110 --> 01:13:50,320
and turquoise and

2080
01:13:53,910 --> 01:13:53,120
magenta and purple and their cognates do

2081
01:13:56,390 --> 01:13:53,920
you know

2082
01:13:58,310 --> 01:13:56,400
it just it just looks like blue and some

2083
01:14:00,149 --> 01:13:58,320
blue and i know green and red and so on

2084
01:14:00,390 --> 01:14:00,159
and i could take 10 seconds to look it

2085
01:14:01,830 --> 01:14:00,400
up

2086
01:14:03,270 --> 01:14:01,840
and then it probably solves it for the

2087
01:14:04,630 --> 01:14:03,280
rest of my life but either way i see

2088
01:14:08,470 --> 01:14:04,640

that as bluish green

2089
01:14:09,830 --> 01:14:08,480
i see that as purple am i seeing the

2090
01:14:13,189 --> 01:14:09,840
same as someone else

2091
01:14:14,950 --> 01:14:13,199
but just not noticing and is difference

2092
01:14:15,990 --> 01:14:14,960
between seeing and noticing yeah yeah

2093
01:14:17,510 --> 01:14:16,000
okay this is good i mean in that

2094
01:14:19,189 --> 01:14:17,520
particular case i don't know we'd have

2095
01:14:20,229 --> 01:14:19,199
to do experiments to know that right

2096
01:14:24,790 --> 01:14:20,239
we'd have to

2097
01:14:27,189 --> 01:14:24,800
these different colors

2098
01:14:29,110 --> 01:14:27,199
to you and present them in sort of pairs

2099
01:14:31,350 --> 01:14:29,120
so you make judgments about how similar

2100
01:14:33,189 --> 01:14:31,360
they are to each other

2101
01:14:35,430 --> 01:14:33,199
and then we have to see are you making

2102
01:14:36,950 --> 01:14:35,440
reliable distinctions

2103
01:14:40,709 --> 01:14:36,960
between these colors that you

2104
01:14:43,590 --> 01:14:40,719
linguistically describe as the same

2105
01:14:45,030 --> 01:14:43,600
compared to somebody who has different

2106
01:14:45,590 --> 01:14:45,040
words for these different colors so i

2107
01:14:48,229 --> 01:14:45,600
think

2108
01:14:50,390 --> 01:14:48,239
these things all boil down to empirical

2109
01:14:53,669 --> 01:14:50,400
empirical questions

2110
01:14:55,750 --> 01:14:53,679
now here's one test this is this might

2111
01:14:57,350 --> 01:14:55,760
not be doable but

2112
01:14:58,870 --> 01:14:57,360
imagine you look at a scene and let's

2113
01:15:00,630 --> 01:14:58,880

say it has some

2114
01:15:01,990 --> 01:15:00,640
discriminable phenomena that are

2115
01:15:02,709 --> 01:15:02,000
indistinct at first because you don't

2116
01:15:04,870 --> 01:15:02,719
have the

2117
01:15:05,910 --> 01:15:04,880
language label for it so cyan and

2118
01:15:07,830 --> 01:15:05,920
turquoise for me

2119
01:15:09,350 --> 01:15:07,840
for example and you show that to me and

2120
01:15:11,110 --> 01:15:09,360
i just oh that's bluish or this blueish

2121
01:15:13,750 --> 01:15:11,120
green

2122
01:15:14,630 --> 01:15:13,760
then a day later you teach me the

2123
01:15:17,510 --> 01:15:14,640
phenomenon of

2124
01:15:19,110 --> 01:15:17,520
cyan and turquoise and i'm able to to

2125
01:15:20,630 --> 01:15:19,120
discern

2126
01:15:23,669 --> 01:15:20,640
then you put me under hypnosis to

2127
01:15:25,590 --> 01:15:23,679
remember to remember yesterday

2128
01:15:27,270 --> 01:15:25,600
and you say was cyan on the left or the

2129
01:15:30,070 --> 01:15:27,280
right

2130
01:15:32,310 --> 01:15:30,080
in other words i'm wondering because i

2131
01:15:34,070 --> 01:15:32,320
don't notice it initially do i also not

2132
01:15:35,510 --> 01:15:34,080
see it does it not get recorded or does

2133
01:15:38,070 --> 01:15:35,520
it get recorded

2134
01:15:40,149 --> 01:15:38,080
so that i can go back later now with my

2135
01:15:43,030 --> 01:15:40,159
proper disambiguations

2136
01:15:44,870 --> 01:15:43,040
and disambiguate okay that's interesting

2137
01:15:46,709 --> 01:15:44,880
i mean i like the experiment design

2138
01:15:50,149 --> 01:15:46,719

apart from the hypnosis bit i think

2139
01:15:51,750 --> 01:15:50,159
there's choose whichever method

2140
01:15:53,669 --> 01:15:51,760
choose whichever method allows you to

2141
01:15:55,669 --> 01:15:53,679
get out of that accurate memory

2142
01:15:57,270 --> 01:15:55,679
it's hypnosis is real but it's not what

2143
01:16:00,470 --> 01:15:57,280
most people think it is it's not sort of

2144
01:16:03,110 --> 01:16:00,480
um it's not this kind of stage

2145
01:16:03,910 --> 01:16:03,120
i waver watch in front of you and you

2146
01:16:07,350 --> 01:16:03,920
can remember

2147
01:16:09,350 --> 01:16:07,360
your child anyway but i think there's

2148
01:16:10,709 --> 01:16:09,360
so i can indeed imagine this experiment

2149
01:16:13,830 --> 01:16:10,719
where

2150
01:16:15,510 --> 01:16:13,840
you make a perceptual judgment

2151
01:16:16,950 --> 01:16:15,520
i then give you some prior some

2152
01:16:19,110 --> 01:16:16,960
additional knowledge

2153
01:16:19,990 --> 01:16:19,120
you make the judgment again and then you

2154
01:16:21,750 --> 01:16:20,000
try and you just

2155
01:16:23,350 --> 01:16:21,760
try and remember what what you did the

2156
01:16:26,550 --> 01:16:23,360
first time and

2157
01:16:29,590 --> 01:16:26,560
can you be more accurate uh when you're

2158
01:16:32,870 --> 01:16:29,600
retrospectively making your judgment

2159
01:16:34,709 --> 01:16:32,880
given now some additional knowledge than

2160
01:16:36,390 --> 01:16:34,719
you were at the time i i

2161
01:16:38,630 --> 01:16:36,400
met this almost certainly stuff like

2162
01:16:39,910 --> 01:16:38,640
that has been done i i don't have it to

2163
01:16:41,270 --> 01:16:39,920

the tip of my tongue

2164
01:16:43,990 --> 01:16:41,280
but yeah that's that's that's an

2165
01:16:46,390 --> 01:16:44,000
interesting uh design that could

2166
01:16:49,510 --> 01:16:46,400
certainly

2167
01:16:51,189 --> 01:16:49,520
address the question of

2168
01:16:52,550 --> 01:16:51,199
well i don't know quite what question it

2169
01:16:53,669 --> 01:16:52,560
would it would be

2170
01:16:55,270 --> 01:16:53,679
addressing because there's problems

2171
01:16:57,270 --> 01:16:55,280
there's many things being conflated here

2172
01:16:59,830 --> 01:16:57,280
there's sort of memory

2173
01:17:00,870 --> 01:16:59,840
uh along with perception at the time

2174
01:17:01,350 --> 01:17:00,880
there's all these things it really

2175
01:17:04,070 --> 01:17:01,360
depends

2176
01:17:06,550 --> 01:17:04,080
on what the specific question is you're

2177
01:17:07,910 --> 01:17:06,560
you're trying to you're trying to ask

2178
01:17:09,110 --> 01:17:07,920
but i think it's it's pretty clear

2179
01:17:11,430 --> 01:17:09,120
there's lots of you know there are lots

2180
01:17:13,590 --> 01:17:11,440
of experiments that show indeed that

2181
01:17:16,390 --> 01:17:13,600
expectations what you expect to happen

2182
01:17:18,070 --> 01:17:16,400
can directly influence perception

2183
01:17:19,990 --> 01:17:18,080
these expectations can be set up by

2184
01:17:21,350 --> 01:17:20,000
linguistic phrases so

2185
01:17:23,830 --> 01:17:21,360
i think there's lots of good evidence

2186
01:17:27,270 --> 01:17:23,840
that what we think what we

2187
01:17:29,910 --> 01:17:27,280
um what we say the the structure of

2188
01:17:30,709 --> 01:17:29,920

our thoughts and our language can indeed

2189
01:17:33,990 --> 01:17:30,719
influence

2190
01:17:36,149 --> 01:17:34,000
how we see the world is there

2191
01:17:38,950 --> 01:17:36,159
a limitation to the bayesian model of

2192
01:17:41,830 --> 01:17:40,550
i know that it can't be a holistic it

2193
01:17:43,430 --> 01:17:41,840
can't explain everything because there's

2194
01:17:44,550 --> 01:17:43,440
no con there's no model that explains

2195
01:17:46,709 --> 01:17:44,560
everything you'd have the holy grail

2196
01:17:49,510 --> 01:17:46,719
right there and i know that you

2197
01:17:51,110 --> 01:17:49,520
are a large proponent of the bayesian

2198
01:17:52,950 --> 01:17:51,120
model of how the brain works

2199
01:17:54,790 --> 01:17:52,960
i'm curious where are its limitations

2200
01:17:56,709 --> 01:17:54,800
i'll give you one example from my life

2201
01:17:59,030 --> 01:17:56,719
i was playing a video game and someone

2202
01:18:00,550 --> 01:17:59,040
in the i was expecting the person

2203
01:18:02,950 --> 01:18:00,560
i was expecting the person in the video

2204
01:18:04,950 --> 01:18:02,960
game to say the word extinction

2205
01:18:06,709 --> 01:18:04,960
and i was i was watching it she said

2206
01:18:08,709 --> 01:18:06,719
something and i thought it was

2207
01:18:10,550 --> 01:18:08,719
she said entity instead but i was

2208
01:18:10,870 --> 01:18:10,560
expecting extinction so then i rewound

2209
01:18:13,110 --> 01:18:10,880
it

2210
01:18:14,310 --> 01:18:13,120
and she in fact did say extinction so i

2211
01:18:17,430 --> 01:18:14,320
thought that was strange

2212
01:18:19,110 --> 01:18:17,440
because i expected extinction she said

2213
01:18:20,149 --> 01:18:19,120

extinction but i heard entity now these

2214
01:18:21,990 --> 01:18:20,159
are rare

2215
01:18:23,590 --> 01:18:22,000
but when they come up i do write them

2216
01:18:26,870 --> 01:18:23,600
down another one was

2217
01:18:28,149 --> 01:18:26,880
i was looking for some object on my desk

2218
01:18:29,510 --> 01:18:28,159
let's say it was a pen i don't remember

2219
01:18:30,470 --> 01:18:29,520
what it was let's say it was a pen it

2220
01:18:31,910 --> 01:18:30,480
was right here

2221
01:18:33,669 --> 01:18:31,920
and i didn't do a cursory glance i

2222
01:18:36,790 --> 01:18:33,679
looked in it for a second

2223
01:18:38,709 --> 01:18:36,800
not half a second but a glance and i

2224
01:18:39,830 --> 01:18:38,719
didn't see it and i was expecting to see

2225
01:18:41,270 --> 01:18:39,840
it because i'm looking for it and i

2226
01:18:44,310 --> 01:18:41,280
looked back and it was right where

2227
01:18:46,070 --> 01:18:44,320
i initially looked and so there's

2228
01:18:47,910 --> 01:18:46,080
okay there's some sorry okay you

2229
01:18:49,110 --> 01:18:47,920
understand the other ones what are the

2230
01:18:51,110 --> 01:18:49,120
limits of the bayesian model

2231
01:18:52,310 --> 01:18:51,120
it might just okay let's just let's just

2232
01:18:54,630 --> 01:18:52,320
take a step back and say

2233
01:18:55,750 --> 01:18:54,640
very briefly what the bayesian model is

2234
01:18:58,790 --> 01:18:55,760
and so

2235
01:19:00,709 --> 01:18:58,800
um you know bay's base theory is just

2236
01:19:02,630 --> 01:19:00,719
this way of reasoning with probabilities

2237
01:19:05,830 --> 01:19:02,640
it's this idea of

2238
01:19:08,950 --> 01:19:05,840

inference to the best explanation

2239
01:19:12,709 --> 01:19:08,960
and so in terms of

2240
01:19:15,669 --> 01:19:12,719
neuroscience the idea is that

2241
01:19:16,550 --> 01:19:15,679
that's what the brain is basically doing

2242
01:19:19,590 --> 01:19:16,560
all the time

2243
01:19:21,510 --> 01:19:19,600
that perception is

2244
01:19:23,669 --> 01:19:21,520
a best guess about the causes of sensory

2245
01:19:27,830 --> 01:19:23,679
data it's not a direct readout it's

2246
01:19:32,229 --> 01:19:27,840
it's there is sensory data it's

2247
01:19:34,070 --> 01:19:32,239
trying to combine prior expectations

2248
01:19:35,990 --> 01:19:34,080
about the causes of sensory data with

2249
01:19:37,990 --> 01:19:36,000
the sensory data to come up with the

2250
01:19:43,110 --> 01:19:38,000
best guess and all of these things are

2251
01:19:50,070 --> 01:19:46,950
it provides a standard of

2252
01:19:52,709 --> 01:19:50,080
optimality bayes theorem in mathematics

2253
01:19:54,950 --> 01:19:52,719
and probability theory is really telling

2254
01:19:58,390 --> 01:19:54,960
you what the optimal way is

2255
01:20:01,590 --> 01:19:58,400
to combine information under conditions

2256
01:20:09,189 --> 01:20:07,350
and so in one sense it's not really

2257
01:20:11,750 --> 01:20:09,199
something that can be right or wrong

2258
01:20:14,149 --> 01:20:11,760
it's a standard of optimality how how

2259
01:20:15,990 --> 01:20:14,159
you use it to think well okay that's

2260
01:20:18,470 --> 01:20:16,000
what the brain that's the problem

2261
01:20:19,270 --> 01:20:18,480
the brain should be solving if we've got

2262
01:20:21,030 --> 01:20:19,280
the

2263
01:20:22,390 --> 01:20:21,040

cost function right if we're assuming

2264
01:20:23,110 --> 01:20:22,400
the brain is solving the problem you

2265
01:20:26,229 --> 01:20:23,120
think it is

2266
01:20:31,189 --> 01:20:26,239
it tells you the optimal way to do it

2267
01:20:33,990 --> 01:20:31,199
um that's one way to interpret it

2268
01:20:35,750 --> 01:20:34,000
another way is more literal to say no

2269
01:20:36,070 --> 01:20:35,760
this is actually what the brain is doing

2270
01:20:44,229 --> 01:20:36,080
the

2271
01:20:46,629 --> 01:20:44,239
computations needed to implement

2272
01:20:49,030 --> 01:20:46,639
this kind of probabilistic reasoning

2273
01:20:53,590 --> 01:20:49,040
that's a much stronger claim

2274
01:20:57,430 --> 01:20:56,629
i think that second claim is probably

2275
01:21:01,110 --> 01:20:57,440
right but

2276
01:21:04,390 --> 01:21:01,120
probably not universally and

2277
01:21:08,070 --> 01:21:04,400
this is always across the whole brain

2278
01:21:09,990 --> 01:21:08,080
yeah yeah i mean that oh across

2279
01:21:11,830 --> 01:21:10,000
well both i mean i think i think in any

2280
01:21:14,550 --> 01:21:11,840
given brain

2281
01:21:16,470 --> 01:21:14,560
it's probably not sensible to describe

2282
01:21:18,070 --> 01:21:16,480
all the things going on in the brain as

2283
01:21:22,070 --> 01:21:18,080
involved in

2284
01:21:25,189 --> 01:21:23,430
for the simple reason that some things

2285
01:21:28,790 --> 01:21:25,199
can be pretty hard wired and that's one

2286
01:21:32,310 --> 01:21:30,310
and one cannot but you still can

2287
01:21:33,910 --> 01:21:32,320
probably interpret it as doing

2288
01:21:35,350 --> 01:21:33,920

as if it were doing bayesian inference

2289
01:21:37,030 --> 01:21:35,360
because you can always tell

2290
01:21:38,550 --> 01:21:37,040
a story you can always say oh yeah you

2291
01:21:41,189 --> 01:21:38,560
know i can describe these

2292
01:21:42,629 --> 01:21:41,199
dynamics as they're compatible with the

2293
01:21:44,229 --> 01:21:42,639
brain doing amazing influence but it's a

2294
01:21:47,430 --> 01:21:44,239
different question from whether it's

2295
01:21:49,669 --> 01:21:47,440
actually doing it okay uh

2296
01:21:54,830 --> 01:21:49,679
and again this this is actually a pretty

2297
01:21:58,149 --> 01:21:55,990
um

2298
01:21:59,270 --> 01:21:58,159
you can find i think there are lots of

2299
01:22:03,910 --> 01:21:59,280
there are lots of cases

2300
01:22:07,750 --> 01:22:06,390
things will look like exceptions to to

2301
01:22:11,189 --> 01:22:07,760
this rule

2302
01:22:13,350 --> 01:22:11,199
um and they may

2303
01:22:16,550 --> 01:22:13,360
well be accepted i mean a tip a very a

2304
01:22:18,629 --> 01:22:16,560
very kind of basic example of this

2305
01:22:19,990 --> 01:22:18,639
is the phenomenon of adaptation and

2306
01:22:21,910 --> 01:22:20,000
perception

2307
01:22:23,430 --> 01:22:21,920
uh that for instance if i show you a

2308
01:22:28,149 --> 01:22:23,440
load of

2309
01:22:31,750 --> 01:22:28,159
let's say 45 degrees sloping up

2310
01:22:32,709 --> 01:22:31,760
left let's say and then i show you a

2311
01:22:36,149 --> 01:22:32,719
line

2312
01:22:41,750 --> 01:22:39,669
you'll perceive it as further away

2313
01:22:43,430 --> 01:22:41,760

from what i was showing you before this

2314
01:22:44,870 --> 01:22:43,440
is the opposite of the regression to the

2315
01:22:46,390 --> 01:22:44,880
mean effect that i was describing

2316
01:22:47,750 --> 01:22:46,400
earlier so that so i wasn't being

2317
01:22:49,189 --> 01:22:47,760
entirely comprehensive when we were

2318
01:22:52,709 --> 01:22:49,199
talking about that

2319
01:22:54,950 --> 01:22:52,719
um adaptation

2320
01:22:56,870 --> 01:22:54,960
goes away from the mean if you go

2321
01:22:57,430 --> 01:22:56,880
towards the mean that's like an example

2322
01:23:00,390 --> 01:22:57,440
of

2323
01:23:01,910 --> 01:23:00,400
inference because you're expecting that

2324
01:23:05,030 --> 01:23:01,920
right so what you perceive

2325
01:23:07,590 --> 01:23:05,040
towards that so examples of perceptual

2326
01:23:10,070 --> 01:23:07,600
adaptations seem to be

2327
01:23:11,110 --> 01:23:10,080
anti-bayesian if you like and so there's

2328
01:23:14,310 --> 01:23:11,120
then been a lot of

2329
01:23:17,669 --> 01:23:16,229
what that what that means i mean it's

2330
01:23:19,510 --> 01:23:17,679
just a fact that

2331
01:23:21,510 --> 01:23:19,520
that's true i mean that that's what

2332
01:23:22,870 --> 01:23:21,520
adaptation does and you can sort of

2333
01:23:24,390 --> 01:23:22,880
understand it in terms of different

2334
01:23:26,950 --> 01:23:24,400
neural populations getting

2335
01:23:28,070 --> 01:23:26,960
fatigued or worn out and so across the

2336
01:23:29,590 --> 01:23:28,080
population that's

2337
01:23:31,430 --> 01:23:29,600
that's what you see you can still tell a

2338
01:23:33,270 --> 01:23:31,440

bayesian story about it i forget what it

2339
01:23:35,030 --> 01:23:33,280
is now but um

2340
01:23:36,629 --> 01:23:35,040
but there are certainly things that it's

2341
01:23:39,830 --> 01:23:36,639
not i don't think the bayesian

2342
01:23:42,870 --> 01:23:39,840
brain hypothesis is this sort of

2343
01:23:45,669 --> 01:23:42,880
magic solution to every everything

2344
01:23:47,350 --> 01:23:45,679
we see but i think it's a very useful

2345
01:23:49,830 --> 01:23:47,360
perspective

2346
01:23:51,030 --> 01:23:49,840
at that first level about its standard

2347
01:23:54,310 --> 01:23:51,040
of optimality and i

2348
01:23:55,030 --> 01:23:54,320
also think that a lot of perception in

2349
01:23:58,709 --> 01:23:55,040
the brain

2350
01:24:02,870 --> 01:23:58,719
and action uh

2351
01:24:06,149 --> 01:24:02,880
can is i think probably is

2352
01:24:08,229 --> 01:24:06,159
the brain implementing and approximating

2353
01:24:09,510 --> 01:24:08,239
bayesian inference the other just last

2354
01:24:10,629 --> 01:24:09,520
thing i want to say about that was when

2355
01:24:11,750 --> 01:24:10,639
you you were giving your counter

2356
01:24:14,629 --> 01:24:11,760
examples of

2357
01:24:15,990 --> 01:24:14,639
where you expected to see the pen and

2358
01:24:17,270 --> 01:24:16,000
and then it was where you were looking

2359
01:24:22,310 --> 01:24:17,280
all along or

2360
01:24:26,070 --> 01:24:24,390
there's a confusion is often made here

2361
01:24:28,550 --> 01:24:26,080
because in when people use

2362
01:24:30,310 --> 01:24:28,560
base theory to talk about things they

2363
01:24:32,950 --> 01:24:30,320

will use words like expectation and

2364
01:24:36,070 --> 01:24:32,960
belief and prediction and so on

2365
01:24:37,990 --> 01:24:36,080
these are not necessarily

2366
01:24:40,070 --> 01:24:38,000
personal level things it's not something

2367
01:24:42,870 --> 01:24:40,080
you as a person need to believe

2368
01:24:43,990 --> 01:24:42,880
or expect or predict so if i talk about

2369
01:24:48,229 --> 01:24:44,000
a bayesian

2370
01:24:50,390 --> 01:24:48,239
belief um it makes as much sense to say

2371
01:24:52,070 --> 01:24:50,400
that i as a person believe

2372
01:24:54,229 --> 01:24:52,080
that neurons are strong landed on the

2373
01:24:56,149 --> 01:24:54,239
moon as it would make sense to say

2374
01:24:58,390 --> 01:24:56,159
my visual cortex believes that light

2375
01:25:00,310 --> 01:24:58,400
always comes from above

2376
01:25:02,390 --> 01:25:00,320
it's a belief is a amazing belief is a

2377
01:25:05,510 --> 01:25:02,400
probability distribution

2378
01:25:09,189 --> 01:25:05,520
so it's not really

2379
01:25:11,110 --> 01:25:09,199
it which means that

2380
01:25:12,950 --> 01:25:11,120
it could very well be that your brain is

2381
01:25:15,350 --> 01:25:12,960
doing bayesian inference even though you

2382
01:25:16,870 --> 01:25:15,360
as a person had a expectation that

2383
01:25:17,910 --> 01:25:16,880
turned out to be incompatible with what

2384
01:25:19,510 --> 01:25:17,920
you see

2385
01:25:21,270 --> 01:25:19,520
your visual cortex might be believing

2386
01:25:23,830 --> 01:25:21,280
something different let's see

2387
01:25:25,110 --> 01:25:23,840
i see can i just interject here a little

2388
01:25:27,270 --> 01:25:25,120

bit and

2389
01:25:28,950 --> 01:25:27,280
is the bayesian brain model bayesian

2390
01:25:31,350 --> 01:25:28,960
brain model in any way

2391
01:25:32,709 --> 01:25:31,360
can it be tied to mental disorders like

2392
01:25:33,990 --> 01:25:32,719
mood disorders let's say severe

2393
01:25:35,750 --> 01:25:34,000
depression

2394
01:25:37,990 --> 01:25:35,760
uh because you know when we discuss

2395
01:25:40,310 --> 01:25:38,000
ideas such as optimal

2396
01:25:41,990 --> 01:25:40,320
you know optimal conditions well someone

2397
01:25:43,990 --> 01:25:42,000
who is who's severely depressed

2398
01:25:45,510 --> 01:25:44,000
clearly they're not in an optimal

2399
01:25:48,790 --> 01:25:45,520
condition can

2400
01:25:50,550 --> 01:25:48,800
can the bayesian model sort of identify

2401
01:25:52,550 --> 01:25:50,560
what what is going wrong here and

2402
01:25:56,390 --> 01:25:52,560
perhaps alter even alter

2403
01:25:58,870 --> 01:25:56,400
that sub-optimal conscious experience

2404
01:26:01,830 --> 01:25:58,880
any studies on that well let's first be

2405
01:26:04,950 --> 01:26:01,840
careful because i don't want to

2406
01:26:07,510 --> 01:26:04,960
to imply that uh

2407
01:26:08,229 --> 01:26:07,520
sort of i mean clearly being depressed

2408
01:26:11,750 --> 01:26:08,239
for instance

2409
01:26:13,510 --> 01:26:11,760
is is not a great state to be in so it's

2410
01:26:14,629 --> 01:26:13,520
sub-optimal for the person in terms of

2411
01:26:16,229 --> 01:26:14,639
their lived experience

2412
01:26:18,310 --> 01:26:16,239
but i would worry a little bit about

2413
01:26:19,590 --> 01:26:18,320

about sort of saying that there is a

2414
01:26:21,910 --> 01:26:19,600
standard of

2415
01:26:24,149 --> 01:26:21,920
optimal performance of the brain and

2416
01:26:28,950 --> 01:26:24,159
then deviations from that are

2417
01:26:36,070 --> 01:26:32,070
optimality here simply means

2418
01:26:38,149 --> 01:26:36,080
a sort of mathematical optimality about

2419
01:26:39,590 --> 01:26:38,159
the most rational way of combining

2420
01:26:42,629 --> 01:26:39,600
sources of information that are

2421
01:26:48,070 --> 01:26:45,750
it can very well be that

2422
01:26:51,110 --> 01:26:48,080
being perfectly optimal in that way is

2423
01:26:54,470 --> 01:26:51,120
psychologically sub-optimal in fact

2424
01:26:57,110 --> 01:26:54,480
many people would argue that that

2425
01:26:58,470 --> 01:26:57,120
that we have better psychological lives

2426
01:27:01,510 --> 01:26:58,480
and perform better if we're

2427
01:27:03,270 --> 01:27:01,520
if we are uh slightly irrationally

2428
01:27:07,510 --> 01:27:03,280
optimistic about things

2429
01:27:10,229 --> 01:27:07,520
um so so these two things can come apart

2430
01:27:10,790 --> 01:27:10,239
and there's this i think there is this

2431
01:27:12,790 --> 01:27:10,800
general

2432
01:27:14,709 --> 01:27:12,800
worry i have this worry about this this

2433
01:27:17,270 --> 01:27:14,719
sort of raiification of things like

2434
01:27:18,709 --> 01:27:17,280
optimality from one language to another

2435
01:27:22,310 --> 01:27:18,719
and we suddenly start making claims

2436
01:27:23,910 --> 01:27:22,320
about people's psychological lives and

2437
01:27:25,430 --> 01:27:23,920
ethics and morals and things like that

2438
01:27:26,790 --> 01:27:25,440

there's a big gap

2439
01:27:28,629 --> 01:27:26,800
having said that you're you're

2440
01:27:31,830 --> 01:27:28,639
absolutely right that this is a good

2441
01:27:34,870 --> 01:27:31,840
framework for thinking about

2442
01:27:36,709 --> 01:27:34,880
phenomena in psychiatric condition

2443
01:27:38,629 --> 01:27:36,719
mental illness

2444
01:27:40,629 --> 01:27:38,639
other things too perhaps the best

2445
01:27:44,070 --> 01:27:40,639
example one of the oldest

2446
01:27:45,830 --> 01:27:44,080
is in schizophrenia and psychosis

2447
01:27:48,070 --> 01:27:45,840
when we go back to hallucinations what

2448
01:27:49,669 --> 01:27:48,080
is a hallucination

2449
01:27:51,430 --> 01:27:49,679
in the language we've been talking about

2450
01:27:55,270 --> 01:27:51,440
now hallucination can be

2451
01:27:58,550 --> 01:27:55,280
usefully thought of as

2452
01:28:01,110 --> 01:27:58,560
a a bayesian inference where

2453
01:28:02,950 --> 01:28:01,120
your prior belief or your visual cortex

2454
01:28:05,990 --> 01:28:02,960
is prior belief

2455
01:28:08,070 --> 01:28:06,000
is unusually strong so it's overwhelming

2456
01:28:09,430 --> 01:28:08,080
the sensory data so the conclusion the

2457
01:28:11,669 --> 01:28:09,440
brain comes to

2458
01:28:12,950 --> 01:28:11,679
is guided more by what the brain expects

2459
01:28:16,149 --> 01:28:12,960
is there than

2460
01:28:18,950 --> 01:28:16,159
what the physical signals from the world

2461
01:28:21,350 --> 01:28:18,960
are are saying um if you think that

2462
01:28:23,669 --> 01:28:21,360
every perception is this balance between

2463
01:28:25,270 --> 01:28:23,679

what we expect and what we get again we

2464
01:28:29,110 --> 01:28:25,280
had this example earlier of looking at

2465
01:28:30,870 --> 01:28:29,120
faces and clouds everybody sort of has a

2466
01:28:32,950 --> 01:28:30,880
minor hallucination

2467
01:28:35,110 --> 01:28:32,960
going on there partly because our brain

2468
01:28:36,709 --> 01:28:35,120
comes pre-loaded with expectations to

2469
01:28:38,390 --> 01:28:36,719
see faces

2470
01:28:40,790 --> 01:28:38,400
everywhere faces a very important

2471
01:28:43,990 --> 01:28:40,800
stimuli for us as human beings

2472
01:28:46,629 --> 01:28:44,000
so we see faces in clouds quite quite

2473
01:28:52,790 --> 01:28:50,550
when people are having hallucinations in

2474
01:28:54,830 --> 01:28:52,800
well perhaps in psychedelia but also in

2475
01:28:56,390 --> 01:28:54,840
psychosis you can think of that then as

2476
01:28:57,830 --> 01:28:56,400
again

2477
01:29:01,189 --> 01:28:57,840
their perceptual predictions are

2478
01:29:02,629 --> 01:29:01,199
overwhelming the sensory data

2479
01:29:04,709 --> 01:29:02,639
and i think this is this is a really

2480
01:29:07,510 --> 01:29:04,719
powerful approach it's it's

2481
01:29:09,350 --> 01:29:07,520
um paul fletcher and cambridge and chris

2482
01:29:11,510 --> 01:29:09,360
fritton london

2483
01:29:13,430 --> 01:29:11,520
pioneered this this way of thinking many

2484
01:29:16,070 --> 01:29:13,440
years ago and

2485
01:29:17,030 --> 01:29:16,080
and now people like phil call it yale

2486
01:29:18,870 --> 01:29:17,040
taking it

2487
01:29:20,870 --> 01:29:18,880
further because it makes very specific

2488
01:29:24,070 --> 01:29:20,880

predictions if

2489
01:29:27,189 --> 01:29:24,080
somebody with with psychosis

2490
01:29:29,030 --> 01:29:27,199
is if their symptoms are explained by

2491
01:29:32,070 --> 01:29:29,040
this imbalance then you could presumably

2492
01:29:35,910 --> 01:29:32,080
put them into a very

2493
01:29:38,870 --> 01:29:35,920
limited uh psychophysical situation

2494
01:29:40,310 --> 01:29:38,880
where we can test in a very if you like

2495
01:29:44,149 --> 01:29:40,320
boring way

2496
01:29:46,229 --> 01:29:44,159
uh what the balance is between their

2497
01:29:48,310 --> 01:29:46,239
their expectations and their perception

2498
01:29:49,990 --> 01:29:48,320
you know we can we can basically just

2499
01:29:51,510 --> 01:29:50,000
and there's this experiment phil call it

2500
01:29:54,709 --> 01:29:51,520
did um

2501
01:29:58,229 --> 01:29:54,719
was to just associate a

2502
01:30:01,189 --> 01:29:58,239
uh a dim flash of light with a noise

2503
01:30:02,709 --> 01:30:01,199
but then it very occasionally leave the

2504
01:30:04,870 --> 01:30:02,719
flash of light out

2505
01:30:06,709 --> 01:30:04,880
and then ask people what they perceived

2506
01:30:07,510 --> 01:30:06,719
and people with psychosis would perceive

2507
01:30:11,830 --> 01:30:07,520
the flash of light

2508
01:30:12,950 --> 01:30:11,840
when it wasn't there than people without

2509
01:30:14,070 --> 01:30:12,960
psychosis because

2510
01:30:15,669 --> 01:30:14,080
you know the interpretation being

2511
01:30:17,110 --> 01:30:15,679
they're expecting the flash of light and

2512
01:30:18,790 --> 01:30:17,120
that expectation

2513
01:30:21,669 --> 01:30:18,800

stronger in these people so it actually

2514
01:30:23,510 --> 01:30:21,679
generates the experience

2515
01:30:25,430 --> 01:30:23,520
more often and i really like this

2516
01:30:28,950 --> 01:30:25,440
because

2517
01:30:32,390 --> 01:30:28,960
it if you think about how

2518
01:30:36,070 --> 01:30:32,400
medicine works

2519
01:30:38,709 --> 01:30:36,080
you want to get away from

2520
01:30:40,550 --> 01:30:38,719
defining conditions purely based on the

2521
01:30:41,750 --> 01:30:40,560
symptoms that people report

2522
01:30:43,030 --> 01:30:41,760
and you want to get towards

2523
01:30:45,750 --> 01:30:43,040
understanding what the underlying

2524
01:30:49,030 --> 01:30:45,760
mechanisms are

2525
01:30:50,390 --> 01:30:49,040
if it used to be people would have fever

2526
01:30:52,310 --> 01:30:50,400
and that would be their disease you know

2527
01:30:53,910 --> 01:30:52,320
they have fever and maybe a yellow fever

2528
01:30:57,510 --> 01:30:53,920
or another fever

2529
01:30:59,270 --> 01:30:57,520
but that was it um and you treat it by i

2530
01:31:02,470 --> 01:30:59,280
don't know bloodletting or something

2531
01:31:03,830 --> 01:31:02,480
uh but once you understood that

2532
01:31:05,189 --> 01:31:03,840
fever is a symptom but there's a

2533
01:31:07,189 --> 01:31:05,199
mechanism that's giving your eyes to

2534
01:31:11,510 --> 01:31:07,199
that fever and that's an infection

2535
01:31:14,790 --> 01:31:11,520
you treat the infection fever goes away

2536
01:31:16,390 --> 01:31:14,800
um medicine has always progressed like

2537
01:31:18,229 --> 01:31:16,400
that from getting underneath the surface

2538
01:31:20,470 --> 01:31:18,239

level symptom description to what what

2539
01:31:23,350 --> 01:31:20,480
the underlying pathology is

2540
01:31:24,390 --> 01:31:23,360
and in psychiatry this is still early

2541
01:31:25,750 --> 01:31:24,400
days

2542
01:31:28,390 --> 01:31:25,760
if you look at the diagnostic

2543
01:31:32,629 --> 01:31:28,400
statistical manual in psychiatry

2544
01:31:34,950 --> 01:31:32,639
it's basically a big list of symptoms um

2545
01:31:35,750 --> 01:31:34,960
and depending on what cluster of

2546
01:31:38,790 --> 01:31:35,760
symptoms you have

2547
01:31:45,030 --> 01:31:40,470
but we're beginning to move beyond that

2548
01:31:46,709 --> 01:31:45,040
now this is one example okay

2549
01:31:48,550 --> 01:31:46,719
something like psychosis one of the

2550
01:31:51,830 --> 01:31:48,560
underlying abnormalities

2551
01:31:54,790 --> 01:31:51,840
or aberrant processes is

2552
01:31:57,350 --> 01:31:54,800
bayesian belief updating in the brain

2553
01:31:59,669 --> 01:31:57,360
and that explains the symptoms

2554
01:32:01,510 --> 01:31:59,679
but it also means well maybe there are

2555
01:32:04,629 --> 01:32:01,520
more targeted ways to develop

2556
01:32:06,390 --> 01:32:04,639
prognosis or therapy even

2557
01:32:08,550 --> 01:32:06,400
and so i think this is this is the whole

2558
01:32:11,590 --> 01:32:08,560
area which we which is now called by

2559
01:32:14,149 --> 01:32:11,600
computational psychiatry coming up with

2560
01:32:15,510 --> 01:32:14,159
computational models of the symptoms in

2561
01:32:18,470 --> 01:32:15,520
psychiatrics and

2562
01:32:20,310 --> 01:32:18,480
conditions so psychosis schizophrenia is

2563
01:32:22,070 --> 01:32:20,320

one

2564
01:32:23,430 --> 01:32:22,080
but then people also thinking about this

2565
01:32:26,229 --> 01:32:23,440
in terms of things like

2566
01:32:27,030 --> 01:32:26,239
depression as well and also things which

2567
01:32:29,990 --> 01:32:27,040
which i would

2568
01:32:31,510 --> 01:32:30,000
rather label as neurodiversity rather

2569
01:32:32,950 --> 01:32:31,520
than psychiatric disorders but things

2570
01:32:36,470 --> 01:32:32,960
like autism so

2571
01:32:39,510 --> 01:32:36,480
conditions um that are not

2572
01:32:41,910 --> 01:32:39,520
psychiatric problems but certainly

2573
01:32:44,070 --> 01:32:41,920
involve people having different kinds of

2574
01:32:46,790 --> 01:32:44,080
experiences

2575
01:32:48,229 --> 01:32:46,800
again what's actually underlying the

2576
01:32:50,470 --> 01:32:48,239
surface level

2577
01:32:52,070 --> 01:32:50,480
uh phenomena here i can see how

2578
01:32:53,110 --> 01:32:52,080
depression and psychosis might be

2579
01:32:56,310 --> 01:32:53,120
related to

2580
01:32:58,470 --> 01:32:56,320
a miscalibration of the bayesian priors

2581
01:32:59,990 --> 01:32:58,480
how what about other psychiatric

2582
01:33:01,590 --> 01:33:00,000
conditions like you mentioned autism

2583
01:33:03,350 --> 01:33:01,600
that one i don't see how it's a it's a

2584
01:33:04,229 --> 01:33:03,360
mistake in in how they're viewing the

2585
01:33:06,070 --> 01:33:04,239
world it

2586
01:33:07,830 --> 01:33:06,080
it seems to me to be more hardwired well

2587
01:33:09,110 --> 01:33:07,840
this is going to be clear that i i'm not

2588
01:33:10,790 --> 01:33:09,120

i don't think it should be described as

2589
01:33:11,110 --> 01:33:10,800
a psychiatric condition autism i think

2590
01:33:16,490 --> 01:33:11,120
it's

2591
01:33:18,390 --> 01:33:16,500
diet neurodiversity and um

2592
01:33:21,430 --> 01:33:18,400
[Music]

2593
01:33:22,709 --> 01:33:21,440
so it's again i think it is a

2594
01:33:25,990 --> 01:33:22,719
a very interesting example though

2595
01:33:32,229 --> 01:33:30,070
typically when people are are given the

2596
01:33:34,709 --> 01:33:32,239
diagnosis or label of autism or being

2597
01:33:37,910 --> 01:33:34,719
autism spectrum

2598
01:33:39,510 --> 01:33:37,920
it's often when some social difficulties

2599
01:33:41,110 --> 01:33:39,520
become apparent

2600
01:33:42,790 --> 01:33:41,120
and so people typically have thought of

2601
01:33:43,990 --> 01:33:42,800
it in terms of an issue with theory of

2602
01:33:47,510 --> 01:33:44,000
mind

2603
01:33:49,510 --> 01:33:47,520
that um there's a there's a difference

2604
01:33:52,149 --> 01:33:49,520
in autistic people about

2605
01:33:54,550 --> 01:33:52,159
the way in which they perceive the

2606
01:33:59,110 --> 01:33:54,560
states of other people's minds

2607
01:34:02,950 --> 01:34:02,310
that's you know that's been for for a

2608
01:34:04,790 --> 01:34:02,960
long time

2609
01:34:07,669 --> 01:34:04,800
sort of the general understanding of

2610
01:34:11,350 --> 01:34:07,679
what autism is

2611
01:34:13,189 --> 01:34:11,360
but then if you look more carefully

2612
01:34:15,590 --> 01:34:13,199
closely and people have always done this

2613
01:34:19,750 --> 01:34:15,600

because about what um

2614
01:34:21,910 --> 01:34:19,760
what people with autism report about

2615
01:34:23,110 --> 01:34:21,920
their lived experience it's not just

2616
01:34:24,950 --> 01:34:23,120
about

2617
01:34:27,270 --> 01:34:24,960
theory of mind or anything like that

2618
01:34:32,070 --> 01:34:27,280
there are some very basic perceptual

2619
01:34:33,669 --> 01:34:32,080
phenomena happening too um

2620
01:34:37,430 --> 01:34:33,679
there's often this sensation of being

2621
01:34:41,270 --> 01:34:39,270
everything seems overwhelming in the

2622
01:34:42,550 --> 01:34:41,280
sensory world loud noises are very

2623
01:34:45,990 --> 01:34:42,560
disturbing

2624
01:34:48,550 --> 01:34:46,000
um there's a sort of need to control

2625
01:34:50,629 --> 01:34:48,560
to make inputs more predictable things

2626
01:34:52,149 --> 01:34:50,639
seem more unpredictable

2627
01:34:55,669 --> 01:34:52,159
and to me this this and to others this

2628
01:34:59,669 --> 01:34:57,830
something going on that can be more

2629
01:35:01,430 --> 01:34:59,679
usefully articulated in a sort of

2630
01:35:03,910 --> 01:35:01,440
bayesian language here

2631
01:35:05,430 --> 01:35:03,920
are brains of autistic people they're

2632
01:35:07,910 --> 01:35:05,440
dealing with uncertainty in a different

2633
01:35:11,750 --> 01:35:10,629
they're not adapting to changing

2634
01:35:14,709 --> 01:35:11,760
probabilities

2635
01:35:16,310 --> 01:35:14,719
quite so well um does this sort of

2636
01:35:16,870 --> 01:35:16,320
there's there's a lot of hypotheses out

2637
01:35:19,910 --> 01:35:16,880
there

2638
01:35:22,950 --> 01:35:19,920

the basic point is that

2639
01:35:27,510 --> 01:35:22,960
we can again go much deeper

2640
01:35:29,990 --> 01:35:27,520
than how these conditions

2641
01:35:31,270 --> 01:35:30,000
superficially present themselves to

2642
01:35:32,790 --> 01:35:31,280
understand well there's something more

2643
01:35:34,629 --> 01:35:32,800
basic going on about how these brains

2644
01:35:37,189 --> 01:35:34,639
are processing sensory information

2645
01:35:39,350 --> 01:35:37,199
that then these high level phenomena are

2646
01:35:43,109 --> 01:35:39,360
built upon

2647
01:35:46,550 --> 01:35:43,119
and again back to schizophrenia actually

2648
01:35:48,070 --> 01:35:46,560
a lot of the symptoms of schizophrenia

2649
01:35:49,830 --> 01:35:48,080
become clinically relevant when they

2650
01:35:51,830 --> 01:35:49,840
when they become delusions when people

2651
01:35:55,030 --> 01:35:51,840
start having false beliefs

2652
01:35:57,910 --> 01:35:55,040
about paranoia and um being controlled

2653
01:35:59,910 --> 01:35:57,920
by the cia or something like that

2654
01:36:01,189 --> 01:35:59,920
but these false beliefs can be

2655
01:36:03,270 --> 01:36:01,199
understood as

2656
01:36:04,790 --> 01:36:03,280
higher order inferences to explain away

2657
01:36:06,310 --> 01:36:04,800
unusual perceptions

2658
01:36:08,070 --> 01:36:06,320
and so it's the perception that comes

2659
01:36:10,470 --> 01:36:08,080
first not the belief and you

2660
01:36:11,189 --> 01:36:10,480
so you understand begin to understand

2661
01:36:12,790 --> 01:36:11,199
that

2662
01:36:15,669 --> 01:36:12,800
the primary pathology in something like

2663
01:36:18,709 --> 01:36:15,679

schizophrenia is a difficult is a

2664
01:36:21,830 --> 01:36:18,719
alteration in perceptual ability

2665
01:36:23,270 --> 01:36:21,840
and that only then later on as the

2666
01:36:27,750 --> 01:36:23,280
condition progresses

2667
01:36:30,310 --> 01:36:27,760
does that uh does that become

2668
01:36:32,790 --> 01:36:30,320
manifest in beliefs in different kinds

2669
01:36:35,669 --> 01:36:32,800
of beliefs

2670
01:36:36,629 --> 01:36:35,679
speaking of well not speaking of let's

2671
01:36:38,310 --> 01:36:36,639
take a tangent

2672
01:36:39,910 --> 01:36:38,320
girdles and completeness theorem i'm

2673
01:36:42,390 --> 01:36:39,920
curious to know what you see as the

2674
01:36:44,629 --> 01:36:42,400
applicability or non-applicability of it

2675
01:36:46,229 --> 01:36:44,639
with regard to how the brain operates so

2676
01:36:46,709 --> 01:36:46,239
someone like penrose or lucas would say

2677
01:36:51,270 --> 01:36:46,719
that

2678
01:36:54,550 --> 01:36:51,280
computation

2679
01:36:57,270 --> 01:36:54,560
let's say in a touring sense because of

2680
01:36:58,070 --> 01:36:57,280
so and so i'm sure you know the argument

2681
01:37:01,109 --> 01:36:58,080
what do you

2682
01:37:02,950 --> 01:37:01,119
completeness theorem has i don't think

2683
01:37:04,390 --> 01:37:02,960
it has that much relevance to it to be

2684
01:37:07,189 --> 01:37:04,400
honest um

2685
01:37:07,590 --> 01:37:07,199
i i read i remember reading penrose's

2686
01:37:11,590 --> 01:37:07,600
book

2687
01:37:13,430 --> 01:37:11,600
the emperor's new mind uh about

2688
01:37:15,030 --> 01:37:13,440

well 30 years ago now i think shortly

2689
01:37:15,430 --> 01:37:15,040
after it came out just at the beginning

2690
01:37:18,830 --> 01:37:15,440
of

2691
01:37:20,149 --> 01:37:18,840
when i was just about to go to college

2692
01:37:21,990 --> 01:37:20,159
um

2693
01:37:23,830 --> 01:37:22,000
waiting for this enlightenment about why

2694
01:37:27,350 --> 01:37:23,840
it was gonna be relevant

2695
01:37:29,750 --> 01:37:27,360
and um and it's clearly a very

2696
01:37:30,629 --> 01:37:29,760
important piece of mathematical

2697
01:37:33,990 --> 01:37:30,639
philosophy right

2698
01:37:35,910 --> 01:37:34,000
it's telling us that that there are

2699
01:37:37,750 --> 01:37:35,920
axioms with any given formal system that

2700
01:37:41,030 --> 01:37:37,760
cannot be proven to be true within

2701
01:37:42,790 --> 01:37:41,040
that formal system um

2702
01:37:44,310 --> 01:37:42,800
and as i understand it was a sort of big

2703
01:37:46,390 --> 01:37:44,320
blow against the hilbert program of

2704
01:37:51,270 --> 01:37:46,400
trying to bring closure to the

2705
01:37:56,950 --> 01:37:54,310
and but

2706
01:37:58,709 --> 01:37:56,960
quite what that has to say about the

2707
01:38:01,189 --> 01:37:58,719
brain

2708
01:38:02,790 --> 01:38:01,199
i've never been convinced that it has

2709
01:38:07,750 --> 01:38:02,800
that much to say

2710
01:38:11,910 --> 01:38:09,109
you know i don't think the brain is a

2711
01:38:16,790 --> 01:38:15,350
and so the fact that

2712
01:38:18,470 --> 01:38:16,800
okay what do you mean when you say that

2713
01:38:19,510 --> 01:38:18,480

because clearly well again well not

2714
01:38:21,109 --> 01:38:19,520
clearly really

2715
01:38:23,270 --> 01:38:21,119
it's sort of yeah i mean it does get a

2716
01:38:25,510 --> 01:38:23,280
bit complicated because you know firstly

2717
01:38:28,310 --> 01:38:25,520
quite what it is like well what quite

2718
01:38:31,669 --> 01:38:28,320
what exactly is good at

2719
01:38:32,149 --> 01:38:31,679
saying it seems to be because of course

2720
01:38:33,669 --> 01:38:32,159
the

2721
01:38:35,430 --> 01:38:33,679
touring class of computation is

2722
01:38:36,550 --> 01:38:35,440
something where there is there is

2723
01:38:45,590 --> 01:38:36,560
closure

2724
01:38:48,950 --> 01:38:45,600
um and

2725
01:38:52,310 --> 01:38:48,960
so i guess for me goodal

2726
01:38:59,510 --> 01:38:55,910
if you apply it to the brain

2727
01:39:03,109 --> 01:38:59,520
it may tell you that

2728
01:39:08,870 --> 01:39:03,119
the brain is not a computer

2729
01:39:17,669 --> 01:39:12,310
there are things that we

2730
01:39:22,790 --> 01:39:20,709
within a formal system that where proof

2731
01:39:25,590 --> 01:39:22,800
where a proof of that doesn't

2732
01:39:29,109 --> 01:39:25,600
necessarily exist

2733
01:39:30,709 --> 01:39:29,119
um this is going way back because it's

2734
01:39:34,149 --> 01:39:30,719
been a long time so i thought of this

2735
01:39:35,669 --> 01:39:34,159
thought about this but firstly that

2736
01:39:38,550 --> 01:39:35,679
doesn't seem

2737
01:39:41,430 --> 01:39:38,560
that surprising because even if the

2738
01:39:43,590 --> 01:39:41,440

brain were

2739
01:39:45,189 --> 01:39:43,600
a computer a computer of this so we

2740
01:39:46,790 --> 01:39:45,199
don't know quite exactly what kind of

2741
01:39:50,149 --> 01:39:46,800
computer it is so we don't

2742
01:39:52,709 --> 01:39:50,159
quite know what sorts of

2743
01:39:53,750 --> 01:39:52,719
true statements should be not

2744
01:39:55,830 --> 01:39:53,760
establishable

2745
01:39:57,669 --> 01:39:55,840
by the kind of computer that the brain

2746
01:40:00,870 --> 01:39:57,679
might happen to be

2747
01:40:02,629 --> 01:40:00,880
um but i'm

2748
01:40:04,870 --> 01:40:02,639
basically i'm kind of happy with the

2749
01:40:08,070 --> 01:40:04,880
with the idea that

2750
01:40:11,590 --> 01:40:08,080
that uh the brain

2751
01:40:13,990 --> 01:40:11,600
cannot be it is not a

2752
01:40:15,830 --> 01:40:14,000
does not operate according to these

2753
01:40:18,310 --> 01:40:15,840
principles of logic

2754
01:40:21,990 --> 01:40:18,320
you know that it's not it doesn't reach

2755
01:40:25,109 --> 01:40:22,000
true conclusions about truth by

2756
01:40:26,229 --> 01:40:25,119
uh combining these logical operations in

2757
01:40:28,390 --> 01:40:26,239
in a particular way

2758
01:40:29,910 --> 01:40:28,400
that that good old syrian wrestle i mean

2759
01:40:31,270 --> 01:40:29,920
goodall's theorem is a

2760
01:40:32,950 --> 01:40:31,280
sort of reduction i think isn't it i

2761
01:40:36,629 --> 01:40:32,960
mean it's a real

2762
01:40:39,669 --> 01:40:36,639
um strong form of of logic

2763
01:40:41,189 --> 01:40:39,679

uh that's does that put you at odds with

2764
01:40:43,510 --> 01:40:41,199
some of your colleagues because as far

2765
01:40:45,030 --> 01:40:43,520
as i understand most of them

2766
01:40:46,550 --> 01:40:45,040
believe that the brain is some

2767
01:40:49,189 --> 01:40:46,560
computational device that could be wrong

2768
01:40:50,790 --> 01:40:49,199
could just have a bias set

2769
01:40:53,270 --> 01:40:50,800
no i think you're right i think that i

2770
01:40:55,830 --> 01:40:53,280
don't know if it sets at odds but but i

2771
01:40:57,030 --> 01:40:55,840
that well i mean firstly i don't think

2772
01:40:58,709 --> 01:40:57,040
it particularly

2773
01:41:00,390 --> 01:40:58,719
the whole point about goodell's theorem

2774
01:41:03,030 --> 01:41:00,400
for penrose is then made a

2775
01:41:04,550 --> 01:41:03,040
claim about consciousness yeah and that

2776
01:41:05,990 --> 01:41:04,560
was a connection that was to be honest

2777
01:41:07,669 --> 01:41:06,000
never very clear to me

2778
01:41:10,390 --> 01:41:07,679
and sort of the idea that that you know

2779
01:41:13,590 --> 01:41:10,400
we consciously experience things

2780
01:41:15,910 --> 01:41:13,600
that as being true or false

2781
01:41:17,430 --> 01:41:15,920
that we know cannot be proved proven

2782
01:41:20,629 --> 01:41:17,440
that way

2783
01:41:21,990 --> 01:41:20,639
by a system of logic through goodwill's

2784
01:41:24,629 --> 01:41:22,000
theorem so therefore consciousness is

2785
01:41:28,950 --> 01:41:27,030
a property of these kinds of formal

2786
01:41:32,870 --> 01:41:28,960
systems

2787
01:41:34,870 --> 01:41:32,880
again fine right still might be the case

2788
01:41:36,550 --> 01:41:34,880

that the brain does do some information

2789
01:41:37,430 --> 01:41:36,560
processing it still might be the case

2790
01:41:40,790 --> 01:41:37,440
that that

2791
01:41:42,629 --> 01:41:40,800
that it is just uh

2792
01:41:45,109 --> 01:41:42,639
um of a you know a constrained or

2793
01:41:46,870 --> 01:41:45,119
restricted kind

2794
01:41:48,550 --> 01:41:46,880
so you can you can i think you can have

2795
01:41:51,350 --> 01:41:48,560
that you can accept that the brain is an

2796
01:41:52,950 --> 01:41:51,360
information processing device

2797
01:41:54,790 --> 01:41:52,960
but maybe it doesn't have the kind of

2798
01:41:56,149 --> 01:41:54,800
class of universality for which good

2799
01:41:59,109 --> 01:41:56,159
else theorem becomes

2800
01:42:00,470 --> 01:41:59,119
relevant um not all computers have to be

2801
01:42:05,990 --> 01:42:00,480
universal

2802
01:42:09,669 --> 01:42:08,149
worry that people use that language too

2803
01:42:12,070 --> 01:42:09,679
loosely when they talk about

2804
01:42:15,990 --> 01:42:12,080
the brain it's a very easy thing to say

2805
01:42:21,590 --> 01:42:19,590
and that consciousness is a form of

2806
01:42:27,109 --> 01:42:21,600
information processing of some sort that

2807
01:42:31,510 --> 01:42:29,669
maybe but um you know it speaks to mind

2808
01:42:35,750 --> 01:42:31,520
uploading

2809
01:42:40,550 --> 01:42:35,760
well yeah i mean it's it's

2810
01:42:44,149 --> 01:42:43,430
it's quite a big assumption that

2811
01:42:46,310 --> 01:42:44,159
consciousness

2812
01:42:48,070 --> 01:42:46,320
is to do with information processing and

2813
01:42:49,590 --> 01:42:48,080

the brain is actually an organ of

2814
01:42:51,109 --> 01:42:49,600
information processing yes there is an

2815
01:42:53,030 --> 01:42:51,119
indirectness between

2816
01:42:54,950 --> 01:42:53,040
how scent what sensory inputs do when

2817
01:42:55,510 --> 01:42:54,960
they impact our retinas and our things

2818
01:42:59,270 --> 01:42:55,520
and

2819
01:43:02,550 --> 01:43:00,870
you can always apply information

2820
01:43:04,229 --> 01:43:02,560
processing metaphorically

2821
01:43:05,910 --> 01:43:04,239
you can describe a system from a third

2822
01:43:07,109 --> 01:43:05,920
person perspective as processing

2823
01:43:09,590 --> 01:43:07,119
information

2824
01:43:11,109 --> 01:43:09,600
it's transforming inputs into outputs we

2825
01:43:12,629 --> 01:43:11,119
can describe inputs we can describe

2826
01:43:13,990 --> 01:43:12,639
outputs

2827
01:43:16,229 --> 01:43:14,000
and there's an indirect relation so we

2828
01:43:16,790 --> 01:43:16,239
can but is that is that what the brain

2829
01:43:20,470 --> 01:43:16,800
is

2830
01:43:23,590 --> 01:43:20,480
in some way

2831
01:43:25,510 --> 01:43:23,600
is it um how is its mechanism actually

2832
01:43:27,910 --> 01:43:25,520
working or is it just a very complicated

2833
01:43:29,350 --> 01:43:27,920
bunch of levers and pulleys

2834
01:43:33,270 --> 01:43:29,360
that look as if it's processing

2835
01:43:36,830 --> 01:43:35,030
does that difference make a difference i

2836
01:43:39,750 --> 01:43:36,840
think it

2837
01:43:42,870 --> 01:43:39,760
does when

2838
01:43:43,590 --> 01:43:42,880

you draw these kinds of implications

2839
01:43:46,790 --> 01:43:43,600
from it

2840
01:43:49,350 --> 01:43:46,800
so as you just mentioned if

2841
01:43:50,790 --> 01:43:49,360
you believe that consciousness is a

2842
01:43:52,790 --> 01:43:50,800
property of a particular form of

2843
01:43:55,590 --> 01:43:52,800
information processing

2844
01:43:57,669 --> 01:43:55,600
then you might believe that it doesn't

2845
01:44:00,550 --> 01:43:57,679
matter what the substrate of that is

2846
01:44:02,790 --> 01:44:00,560
what is the physical mechanism that's

2847
01:44:04,310 --> 01:44:02,800
underpinning this information processing

2848
01:44:06,550 --> 01:44:04,320
and you're not convinced that it's

2849
01:44:09,990 --> 01:44:06,560
substrate independent

2850
01:44:11,750 --> 01:44:10,000
no i'm not convinced but i'm again i'm

2851
01:44:17,270 --> 01:44:11,760
disappointedly agnostic about it

2852
01:44:20,629 --> 01:44:18,790
the only concert the only systems we

2853
01:44:23,270 --> 01:44:20,639
know of confident

2854
01:44:25,350 --> 01:44:23,280
in that are conscious are biological

2855
01:44:27,510 --> 01:44:25,360
systems

2856
01:44:29,350 --> 01:44:27,520
um it's difficult to come up with a good

2857
01:44:31,669 --> 01:44:29,360
reason why that should be so

2858
01:44:33,510 --> 01:44:31,679
you know why why is it why should it be

2859
01:44:37,270 --> 01:44:33,520
that consciousness is restricted

2860
01:44:39,350 --> 01:44:37,280
to things made out of of neurons

2861
01:44:40,790 --> 01:44:39,360
but there's also many other levels of

2862
01:44:41,350 --> 01:44:40,800
substrate independence there are things

2863
01:44:44,790 --> 01:44:41,360

like well

2864
01:44:46,550 --> 01:44:44,800
maybe it doesn't matter quite what the

2865
01:44:48,149 --> 01:44:46,560
molecules are you know whether they're

2866
01:44:50,070 --> 01:44:48,159
carbon or silicon

2867
01:44:51,590 --> 01:44:50,080
but maybe the structure of the mechanism

2868
01:44:53,270 --> 01:44:51,600
still matters

2869
01:44:54,709 --> 01:44:53,280
so theories like integrated information

2870
01:44:56,950 --> 01:44:54,719
theory pick out this middle ground for

2871
01:44:58,470 --> 01:44:56,960
integrated information theory

2872
01:45:01,030 --> 01:44:58,480
the substrate doesn't matter in the

2873
01:45:03,430 --> 01:45:01,040
sense that

2874
01:45:04,870 --> 01:45:03,440
silicon is just as good as carbon but

2875
01:45:07,669 --> 01:45:04,880
the mechanism does matter

2876
01:45:08,390 --> 01:45:07,679
you can't have a feed-forward neural

2877
01:45:11,430 --> 01:45:08,400
network

2878
01:45:13,430 --> 01:45:11,440
without any recurrency be conscious

2879
01:45:15,910 --> 01:45:13,440
it doesn't on that theory that's ruled

2880
01:45:16,629 --> 01:45:15,920
out because it's a property of the the

2881
01:45:18,149 --> 01:45:16,639
mechanism

2882
01:45:19,750 --> 01:45:18,159
so there are many different ways in

2883
01:45:22,709 --> 01:45:19,760
which

2884
01:45:25,270 --> 01:45:22,719
things other than input output mappings

2885
01:45:27,189 --> 01:45:25,280
might turn out to be relevant

2886
01:45:29,750 --> 01:45:27,199
and the assumption that none of these

2887
01:45:33,510 --> 01:45:29,760
things matter i think is

2888
01:45:35,270 --> 01:45:33,520

is a dangerous and weak assumption um

2889
01:45:37,270 --> 01:45:35,280
and of course that's the assumption on

2890
01:45:39,669 --> 01:45:37,280
which these things like mind uploading a

2891
01:45:41,910 --> 01:45:39,679
base that the idea that

2892
01:45:43,590 --> 01:45:41,920
it really doesn't matter that if i get

2893
01:45:43,990 --> 01:45:43,600
the input output relations right if the

2894
01:45:47,510 --> 01:45:44,000
system

2895
01:45:51,750 --> 01:45:47,520
is functionally identical

2896
01:45:54,149 --> 01:45:51,760
then i'm gonna be conscious in my iphone

2897
01:45:55,030 --> 01:45:54,159
i just don't think that's a safe way to

2898
01:45:57,270 --> 01:45:55,040
think

2899
01:45:58,310 --> 01:45:57,280
speaking of tanoni i understand how psy

2900
01:46:00,470 --> 01:45:58,320
can be measured in

2901
01:46:01,350 --> 01:46:00,480
let's say toy examples in trivial

2902
01:46:03,669 --> 01:46:01,360
somewhat trivial

2903
01:46:05,030 --> 01:46:03,679
uh idealized states i think you mean phi

2904
01:46:07,750 --> 01:46:05,040
by the way science

2905
01:46:09,430 --> 01:46:07,760
very fine is his measure psi is like

2906
01:46:11,430 --> 01:46:09,440
some sort of you know hokey stuff

2907
01:46:12,950 --> 01:46:11,440
okay that's correct although there may

2908
01:46:15,510 --> 01:46:12,960
be a relationship who knows right

2909
01:46:16,629 --> 01:46:15,520
okay so let's talk about phi is there a

2910
01:46:21,830 --> 01:46:16,639
measure of phi

2911
01:46:30,470 --> 01:46:26,149
so phi in general

2912
01:46:33,510 --> 01:46:30,480
yeah um they have to have dynamics um

2913
01:46:34,310 --> 01:46:33,520

so is there a way of using neural

2914
01:46:36,950 --> 01:46:34,320
imaging to

2915
01:46:38,470 --> 01:46:36,960
determine the why of someone let's say

2916
01:46:40,149 --> 01:46:38,480
the straight answer is yes but it's not

2917
01:46:42,390 --> 01:46:40,159
the same phi

2918
01:46:43,910 --> 01:46:42,400
that julio would want to measure in his

2919
01:46:45,910 --> 01:46:43,920
theory

2920
01:46:47,750 --> 01:46:45,920
um there are approximations which i

2921
01:46:50,790 --> 01:46:47,760
think you can measure

2922
01:46:54,390 --> 01:46:50,800
so phi mathematically

2923
01:46:56,390 --> 01:46:54,400
is this measure of

2924
01:46:57,830 --> 01:46:56,400
how much information the whole of a

2925
01:47:01,830 --> 01:46:57,840
system has

2926
01:47:04,229 --> 01:47:01,840
about its evolution over time

2927
01:47:05,669 --> 01:47:04,239
than the parts do considered

2928
01:47:08,390 --> 01:47:05,679
independently it's sort of a measure of

2929
01:47:10,629 --> 01:47:08,400
emergence in this sense you can also

2930
01:47:12,310 --> 01:47:10,639
think of it a bit more loosely as a

2931
01:47:16,070 --> 01:47:12,320
measure of

2932
01:47:18,470 --> 01:47:16,080
combination of integration and

2933
01:47:19,830 --> 01:47:18,480
information system is going to have

2934
01:47:22,470 --> 01:47:19,840
higher fi

2935
01:47:26,390 --> 01:47:22,480
if it can enter more different states

2936
01:47:29,750 --> 01:47:27,990
so the information has to be for the

2937
01:47:30,629 --> 01:47:29,760
system itself and not for an external

2938
01:47:32,470 --> 01:47:30,639

observer

2939
01:47:34,830 --> 01:47:32,480
so it has to be integrated in that in

2940
01:47:37,030 --> 01:47:34,840
that way

2941
01:47:40,149 --> 01:47:37,040
um

2942
01:47:43,669 --> 01:47:40,159
now for for giulio tinoni

2943
01:47:47,669 --> 01:47:43,679
to really measure phi

2944
01:47:49,990 --> 01:47:47,679
there's a problem in that

2945
01:47:50,950 --> 01:47:50,000
to quantify the amount of information

2946
01:47:52,870 --> 01:47:50,960
the system

2947
01:47:54,070 --> 01:47:52,880
is generating by being in a particular

2948
01:47:56,070 --> 01:47:54,080
state

2949
01:47:57,910 --> 01:47:56,080
technically you need to know all the

2950
01:47:59,669 --> 01:47:57,920
possible states the system could have

2951
01:48:02,390 --> 01:47:59,679
been in even if it's never been in any

2952
01:48:06,470 --> 01:48:04,790
in practice this is nearly always

2953
01:48:07,910 --> 01:48:06,480
impossible to know

2954
01:48:09,430 --> 01:48:07,920
and it's impossible because we don't

2955
01:48:10,550 --> 01:48:09,440
have a high enough resolution or for

2956
01:48:14,070 --> 01:48:10,560
some other reason

2957
01:48:16,310 --> 01:48:14,080
if you could measure everything

2958
01:48:18,149 --> 01:48:16,320
in precise detail there are only certain

2959
01:48:19,669 --> 01:48:18,159
systems i think they're ergodic systems

2960
01:48:20,870 --> 01:48:19,679
where i forget my physics terminology

2961
01:48:23,350 --> 01:48:20,880
now but you know

2962
01:48:25,109 --> 01:48:23,360
most systems will never will not unless

2963
01:48:26,950 --> 01:48:25,119

you push them in some way

2964
01:48:29,430 --> 01:48:26,960
they may not explore all the possible

2965
01:48:31,350 --> 01:48:29,440
states they could be in

2966
01:48:35,430 --> 01:48:31,360
now only explore a subset of their state

2967
01:48:39,430 --> 01:48:37,030
and so you've got to push a system in

2968
01:48:41,430 --> 01:48:39,440
all possible ways to figure out

2969
01:48:43,830 --> 01:48:41,440
what all possible states it could be in

2970
01:48:48,229 --> 01:48:46,629
and you can't do that just by having

2971
01:48:50,310 --> 01:48:48,239
high resolution brain imaging

2972
01:48:51,990 --> 01:48:50,320
what you can do if you know let's assume

2973
01:48:53,350 --> 01:48:52,000
you've got this fancy new technology you

2974
01:48:55,830 --> 01:48:53,360
can you can

2975
01:48:56,950 --> 01:48:55,840
measure with arbitrary high arbitrarily

2976
01:48:59,750 --> 01:48:56,960
high

2977
01:49:01,669 --> 01:48:59,760
spatial and temporal resolution you can

2978
01:49:03,270 --> 01:49:01,679
measure now an approximation to find

2979
01:49:06,149 --> 01:49:03,280
there's still massive difficulties

2980
01:49:08,149 --> 01:49:06,159
computational difficulties in

2981
01:49:09,270 --> 01:49:08,159
considering how you cut all these you

2982
01:49:11,990 --> 01:49:09,280
know what the right

2983
01:49:13,990 --> 01:49:12,000
granularity of time and space is that

2984
01:49:17,350 --> 01:49:14,000
gives the maximum value of it and

2985
01:49:19,350 --> 01:49:17,360
how you cut the system up to find

2986
01:49:20,629 --> 01:49:19,360
where what what partition makes the

2987
01:49:21,510 --> 01:49:20,639
biggest difference between the whole and

2988
01:49:23,510 --> 01:49:21,520

the parts

2989
01:49:25,189 --> 01:49:23,520
they're massive problems but you can do

2990
01:49:26,870 --> 01:49:25,199
it and you know with my

2991
01:49:28,950 --> 01:49:26,880
colleagues here with adam barrett in

2992
01:49:31,750 --> 01:49:28,960
particular

2993
01:49:32,790 --> 01:49:31,760
and pedro mediano in london we've been

2994
01:49:35,830 --> 01:49:32,800
developing for

2995
01:49:37,430 --> 01:49:35,840
nearly 10 years now some approximations

2996
01:49:39,589 --> 01:49:37,440
to find

2997
01:49:40,950 --> 01:49:39,599
that capture some of the spirit of it

2998
01:49:42,310 --> 01:49:40,960
that it's a measure of combined

2999
01:49:44,629 --> 01:49:42,320
integration information

3000
01:49:46,629 --> 01:49:44,639
but which you can practically apply to

3001
01:49:49,750 --> 01:49:46,639
brain imaging data

3002
01:49:52,149 --> 01:49:49,760
so that's certainly possible but

3003
01:49:55,109 --> 01:49:52,159
it has to be recognized that they are

3004
01:49:58,550 --> 01:49:55,119
approximations

3005
01:50:05,350 --> 01:50:02,229
and they as of now they don't work

3006
01:50:07,350 --> 01:50:05,360
very well uh when we apply them to

3007
01:50:10,629 --> 01:50:07,360
actual data in the sense that they

3008
01:50:12,790 --> 01:50:10,639
they're pretty insensitive to

3009
01:50:15,030 --> 01:50:12,800
or rather that they're very noisy you

3010
01:50:16,629 --> 01:50:15,040
can change subtle

3011
01:50:18,390 --> 01:50:16,639
things in a system and then the measure

3012
01:50:20,950 --> 01:50:18,400
changes quite a lot

3013
01:50:22,310 --> 01:50:20,960

so i wouldn't have very much confidence

3014
01:50:23,910 --> 01:50:22,320
applying these measures to

3015
01:50:26,629 --> 01:50:23,920
empirical data although it's certainly

3016
01:50:28,870 --> 01:50:26,639
something we're still working on

3017
01:50:30,790 --> 01:50:28,880
i was reading a paper by peter lush a

3018
01:50:33,510 --> 01:50:30,800
few months ago

3019
01:50:34,790 --> 01:50:33,520
before i had researched you at all turns

3020
01:50:35,669 --> 01:50:34,800
out you're a co-author on it so that's

3021
01:50:37,350 --> 01:50:35,679
pretty cool

3022
01:50:38,870 --> 01:50:37,360
it was about the rubber hand illusion

3023
01:50:39,990 --> 01:50:38,880
and imaginative suggestion

3024
01:50:42,390 --> 01:50:40,000
demand characteristics and

3025
01:50:44,629 --> 01:50:42,400
phenomenological control right exactly

3026
01:50:46,149 --> 01:50:44,639
now i don't recall it precisely and i

3027
01:50:47,030 --> 01:50:46,159
wasn't sure about the relationship

3028
01:50:48,229 --> 01:50:47,040
between the three

3029
01:50:50,310 --> 01:50:48,239
as far as i understand demand

3030
01:50:52,070 --> 01:50:50,320
characteristics serve as an implicit

3031
01:50:53,830 --> 01:50:52,080
imaginative suggestion

3032
01:50:55,189 --> 01:50:53,840
and as far as i understand

3033
01:50:58,310 --> 01:50:55,199
phenomenological control

3034
01:51:00,550 --> 01:50:58,320
is the degree to which you can act on

3035
01:51:01,910 --> 01:51:00,560
that suggestion or the degree to which

3036
01:51:03,189 --> 01:51:01,920
you can act on your expectation

3037
01:51:04,709 --> 01:51:03,199
is this something like that and do you

3038
01:51:05,030 --> 01:51:04,719

mind just yeah if you know what should

3039
01:51:05,990 --> 01:51:05,040
be

3040
01:51:07,109 --> 01:51:06,000
talking about outline it for the

3041
01:51:08,310 --> 01:51:07,119
audience because i found it extremely

3042
01:51:09,830 --> 01:51:08,320
interesting

3043
01:51:11,109 --> 01:51:09,840
yeah this is a switching of years again

3044
01:51:11,750 --> 01:51:11,119
but i'm glad you're glad you brought it

3045
01:51:13,910 --> 01:51:11,760
up i mean

3046
01:51:15,350 --> 01:51:13,920
there's a lot of terminology there in in

3047
01:51:17,350 --> 01:51:15,360
in one sense they're all

3048
01:51:19,189 --> 01:51:17,360
vaguely unsuccessful attempts to avoid

3049
01:51:21,030 --> 01:51:19,199
saying hypnosis because hypnosis has all

3050
01:51:21,910 --> 01:51:21,040
this unfortunate historical baggage

3051
01:51:23,910 --> 01:51:21,920
i think there was the word

3052
01:51:24,470 --> 01:51:23,920
hypnotizability in the paper it'll be in

3053
01:51:26,709 --> 01:51:24,480
there but

3054
01:51:27,750 --> 01:51:26,719
but you have these these so let's take

3055
01:51:29,589 --> 01:51:27,760
them one by one so demand

3056
01:51:32,229 --> 01:51:29,599
characteristics is a phenomenon that

3057
01:51:34,470 --> 01:51:32,239
psychologists have known about forever

3058
01:51:35,830 --> 01:51:34,480
since the 60s at least it was formalized

3059
01:51:36,390 --> 01:51:35,840
that but i'm sure people knew about it

3060
01:51:37,830 --> 01:51:36,400
before

3061
01:51:41,109 --> 01:51:37,840
this is the idea that if you're doing a

3062
01:51:43,669 --> 01:51:41,119
psychological experiment

3063
01:51:45,990 --> 01:51:43,679

oftentimes your subjects might

3064
01:51:46,790 --> 01:51:46,000
implicitly or even explicitly know what

3065
01:51:49,830 --> 01:51:46,800
you're trying

3066
01:51:50,790 --> 01:51:49,840
to you know what the right answer is so

3067
01:51:53,830 --> 01:51:50,800
to speak

3068
01:51:55,350 --> 01:51:53,840
and either just

3069
01:51:56,629 --> 01:51:55,360
deliberately tell you what you are

3070
01:51:59,109 --> 01:51:56,639
expecting to hear because they don't

3071
01:52:01,750 --> 01:51:59,119
want to disappoint the experimenter

3072
01:52:04,790 --> 01:52:01,760
or unconsciously actually have that sort

3073
01:52:07,270 --> 01:52:04,800
of experience if you if you expect

3074
01:52:08,550 --> 01:52:07,280
if you if the context of an experiment

3075
01:52:11,109 --> 01:52:08,560
is strongly

3076
01:52:12,709 --> 01:52:11,119
leading you to have a particular kind of

3077
01:52:14,790 --> 01:52:12,719
experience in one condition rather than

3078
01:52:17,510 --> 01:52:14,800
another

3079
01:52:18,310 --> 01:52:17,520
then you may well have that experience

3080
01:52:19,910 --> 01:52:18,320
and so

3081
01:52:22,149 --> 01:52:19,920
in psychology it's always been important

3082
01:52:23,510 --> 01:52:22,159
to rule out demand characteristics if

3083
01:52:24,870 --> 01:52:23,520
you want to say that something else is

3084
01:52:26,470 --> 01:52:24,880
responsible

3085
01:52:29,030 --> 01:52:26,480
which basically means trying to say that

3086
01:52:30,950 --> 01:52:29,040
people don't have

3087
01:52:33,430 --> 01:52:30,960
different expectations for different

3088
01:52:34,950 --> 01:52:33,440

experimental conditions

3089
01:52:36,550 --> 01:52:34,960
and then if you still see a difference

3090
01:52:37,430 --> 01:52:36,560
then you can say well it's not because

3091
01:52:40,229 --> 01:52:37,440
of

3092
01:52:42,830 --> 01:52:40,239
their implicit expectations about what

3093
01:52:49,750 --> 01:52:45,990
um and

3094
01:52:51,270 --> 01:52:49,760
then we get to uh

3095
01:52:54,070 --> 01:52:51,280
suggestibility imaginative

3096
01:52:56,790 --> 01:52:54,080
suggestibility hypnotic suggestibility

3097
01:52:57,350 --> 01:52:56,800
these are this speaks to there's a

3098
01:53:00,310 --> 01:52:57,360
there's

3099
01:53:00,950 --> 01:53:00,320
quite reliable individual differences in

3100
01:53:03,350 --> 01:53:00,960
how

3101
01:53:05,109 --> 01:53:03,360
hypnotically suggestible people are and

3102
01:53:08,550 --> 01:53:05,119
by suggestible here i mean

3103
01:53:11,669 --> 01:53:08,560
something like you can be

3104
01:53:13,189 --> 01:53:11,679
asked to experience something like a fly

3105
01:53:13,830 --> 01:53:13,199
crawling up your arm or something like

3106
01:53:15,750 --> 01:53:13,840
that

3107
01:53:17,430 --> 01:53:15,760
and you might have you might actually

3108
01:53:19,270 --> 01:53:17,440
start to experience that

3109
01:53:21,189 --> 01:53:19,280
um you know your hands are being drawn

3110
01:53:23,430 --> 01:53:21,199
together there are ways

3111
01:53:24,229 --> 01:53:23,440
in which people vary in the extent to

3112
01:53:27,510 --> 01:53:24,239
which

3113
01:53:30,229 --> 01:53:27,520

a suggestion from a from a third person

3114
01:53:30,790 --> 01:53:30,239
can induce an experience that's what we

3115
01:53:32,550 --> 01:53:30,800
mean by

3116
01:53:33,990 --> 01:53:32,560
hypnotizability here so it's not the

3117
01:53:36,390 --> 01:53:34,000
kind of darren

3118
01:53:37,510 --> 01:53:36,400
brown big magic stage magic thing that's

3119
01:53:40,070 --> 01:53:37,520
fascinating too

3120
01:53:41,030 --> 01:53:40,080
it's more like just how how much can

3121
01:53:44,390 --> 01:53:41,040
your experience

3122
01:53:46,470 --> 01:53:44,400
be influenced by what i say

3123
01:53:47,430 --> 01:53:46,480
and people vary a lot in this you're in

3124
01:53:49,830 --> 01:53:47,440
there

3125
01:53:51,830 --> 01:53:49,840
that's a huge celebrity right he's

3126
01:53:54,310 --> 01:53:51,840
brilliant

3127
01:53:55,270 --> 01:53:54,320
actually i love listening to his

3128
01:53:57,350 --> 01:53:55,280
interviews

3129
01:53:58,390 --> 01:53:57,360
i think it's underrated here in at least

3130
01:54:01,430 --> 01:53:58,400
in canada in

3131
01:54:05,510 --> 01:54:01,440
america but

3132
01:54:08,790 --> 01:54:05,520
but so now you can start to see that

3133
01:54:10,470 --> 01:54:08,800
if you've got an experiment where

3134
01:54:12,070 --> 01:54:10,480
there might be demand characteristics

3135
01:54:14,390 --> 01:54:12,080
going on such that the setup of the

3136
01:54:17,589 --> 01:54:14,400
experiment

3137
01:54:19,350 --> 01:54:17,599
leads you to expect

3138
01:54:21,030 --> 01:54:19,360

some sort of experience in one condition

3139
01:54:23,109 --> 01:54:21,040
but not another

3140
01:54:24,870 --> 01:54:23,119
if you're highly hypnotizable highly

3141
01:54:26,310 --> 01:54:24,880
suggestible

3142
01:54:28,709 --> 01:54:26,320
the demand characteristics might have a

3143
01:54:31,270 --> 01:54:28,719
stronger effect i see

3144
01:54:32,149 --> 01:54:31,280
um because they basically act as a

3145
01:54:33,510 --> 01:54:32,159
suggestion

3146
01:54:34,870 --> 01:54:33,520
and if you're more susceptible to

3147
01:54:36,870 --> 01:54:34,880
suggestions they're going to have a

3148
01:54:38,870 --> 01:54:36,880
stronger effect

3149
01:54:40,470 --> 01:54:38,880
now the third piece is this term

3150
01:54:41,030 --> 01:54:40,480
phenomenological control which peter

3151
01:54:43,189 --> 01:54:41,040
luschen

3152
01:54:46,709 --> 01:54:43,199
and zoltan dienes my other colleague of

3153
01:54:49,830 --> 01:54:46,719
sussex they sort of introduced this term

3154
01:54:51,669 --> 01:54:49,840
basically to try and

3155
01:54:53,189 --> 01:54:51,679
firstly that these suggestions can

3156
01:54:55,750 --> 01:54:53,199
affect your experience hence

3157
01:54:57,589 --> 01:54:55,760
phenomenological phenomenology

3158
01:54:59,430 --> 01:54:57,599
and the idea of control is it's the

3159
01:55:01,109 --> 01:54:59,440
subjects you yourself i you know i give

3160
01:55:02,709 --> 01:55:01,119
you the suggestion but then you're

3161
01:55:04,149 --> 01:55:02,719
controlling you're generating your

3162
01:55:05,830 --> 01:55:04,159
experience i can't just even though

3163
01:55:09,270 --> 01:55:05,840

you're not aware of doing it

3164
01:55:13,589 --> 01:55:11,430
i can reduce you to experience something

3165
01:55:15,030 --> 01:55:13,599
if you're highly suggestible

3166
01:55:16,629 --> 01:55:15,040
you're generating yourself but you're

3167
01:55:18,229 --> 01:55:16,639
not aware that you're doing it it sounds

3168
01:55:19,270 --> 01:55:18,239
like the placebo it's related to the

3169
01:55:21,109 --> 01:55:19,280
placebo effect it's

3170
01:55:23,510 --> 01:55:21,119
very related right again people who

3171
01:55:25,589 --> 01:55:23,520
respond to the placebo effects

3172
01:55:27,830 --> 01:55:25,599
arguably and there's some evidence that

3173
01:55:30,629 --> 01:55:27,840
they're more highly hypnotizable

3174
01:55:32,070 --> 01:55:30,639
um they're more suggestible they're

3175
01:55:34,149 --> 01:55:32,080
changing their experience in a response

3176
01:55:37,510 --> 01:55:34,159
to a suggestion

3177
01:55:39,350 --> 01:55:37,520
so there's this very big typically

3178
01:55:40,950 --> 01:55:39,360
uncontrolled variable in a lot of

3179
01:55:44,390 --> 01:55:40,960
experiments

3180
01:55:46,310 --> 01:55:44,400
of hypnotizability traits for

3181
01:55:50,149 --> 01:55:46,320
knowledgeable control suggestibility

3182
01:55:51,270 --> 01:55:50,159
take your pick and this matters if your

3183
01:55:52,709 --> 01:55:51,280
experiment involves demand

3184
01:55:54,310 --> 01:55:52,719
characteristics because now the results

3185
01:55:56,470 --> 01:55:54,320
you're gonna get will depend on who you

3186
01:55:59,910 --> 01:55:56,480
test

3187
01:56:00,629 --> 01:55:59,920
and so we've thought this is work led by

3188
01:56:03,030 --> 01:56:00,639

peter and

3189
01:56:04,470 --> 01:56:03,040
and zoltan and warwick who i mentioned

3190
01:56:07,350 --> 01:56:04,480
earlier warwick roseboom who's worked on

3191
01:56:08,709 --> 01:56:07,360
the time perception staff too

3192
01:56:10,310 --> 01:56:08,719
thought this is what's going on in the

3193
01:56:11,990 --> 01:56:10,320
rubber hand illusion the rubber hand

3194
01:56:14,149 --> 01:56:12,000
illusion is a very famous thing i

3195
01:56:15,350 --> 01:56:14,159
i mention it i demonstrate it in my ted

3196
01:56:16,950 --> 01:56:15,360
talk

3197
01:56:18,149 --> 01:56:16,960
and i tell the old story so this is

3198
01:56:19,669 --> 01:56:18,159
something where i've had to change my

3199
01:56:23,030 --> 01:56:19,679
mind about it a little bit

3200
01:56:25,109 --> 01:56:23,040
you tell the whole story yeah the pre

3201
01:56:26,229 --> 01:56:25,119
phenomenological this is why i wrote

3202
01:56:27,669 --> 01:56:26,239
down because

3203
01:56:29,750 --> 01:56:27,679
i remember you referencing the rubber

3204
01:56:31,350 --> 01:56:29,760
hand illusion plenty and i thought okay

3205
01:56:31,910 --> 01:56:31,360
are you using this as a basis for your

3206
01:56:33,109 --> 01:56:31,920
model

3207
01:56:34,229 --> 01:56:33,119
and i know that there are some holes

3208
01:56:35,510 --> 01:56:34,239
that are poked in the rubber hand theory

3209
01:56:36,790 --> 01:56:35,520
at least by peter lush so i was like oh

3210
01:56:37,589 --> 01:56:36,800
hey yeah that sounds interesting but

3211
01:56:39,109 --> 01:56:37,599
then i found out

3212
01:56:40,470 --> 01:56:39,119
wait you co-authored that paper so you

3213
01:56:43,189 --> 01:56:40,480

should know about this it might be

3214
01:56:46,310 --> 01:56:43,199
correct in my interpretation of it

3215
01:56:48,470 --> 01:56:46,320
ah no i mean we we're in fact

3216
01:56:49,669 --> 01:56:48,480
we're we should change our minds right i

3217
01:56:50,870 --> 01:56:49,679
mean if i didn't change my mind about

3218
01:56:51,830 --> 01:56:50,880
something i wouldn't be a good scientist

3219
01:56:55,109 --> 01:56:51,840
right

3220
01:56:56,149 --> 01:56:55,119
so so yeah this is what so that talk was

3221
01:56:57,189 --> 01:56:56,159
from 2017

3222
01:57:00,470 --> 01:56:57,199
and this work in the rubber hand

3223
01:57:03,350 --> 01:57:00,480
illusion started maybe in 2018 or 2019

3224
01:57:05,109 --> 01:57:03,360
so um but actually they both fit with

3225
01:57:07,189 --> 01:57:05,119
this general story so this rubber hand

3226
01:57:09,830 --> 01:57:07,199
illusion is this idea that

3227
01:57:11,750 --> 01:57:09,840
my experience of i can i can change my

3228
01:57:15,750 --> 01:57:11,760
experience of body ownership

3229
01:57:19,750 --> 01:57:15,760
of what is my body in some fairly simple

3230
01:57:20,629 --> 01:57:19,760
lab based way if if i put a rubber hand

3231
01:57:22,390 --> 01:57:20,639
in front of you

3232
01:57:24,550 --> 01:57:22,400
and your real hand is hidden from view

3233
01:57:26,310 --> 01:57:24,560
and i stroke the rubber hand

3234
01:57:28,550 --> 01:57:26,320
simultaneously with the real hand so

3235
01:57:30,229 --> 01:57:28,560
you're seeing stroking on the hand

3236
01:57:31,669 --> 01:57:30,239
you're looking at her hands it's a

3237
01:57:32,870 --> 01:57:31,679
rubber hand but you're seeing strike and

3238
01:57:34,390 --> 01:57:32,880

you're feeling it too because i'm

3239
01:57:35,910 --> 01:57:34,400
stroking your real hand

3240
01:57:37,830 --> 01:57:35,920
then for some people you start to have

3241
01:57:39,350 --> 01:57:37,840
this weird experience that this hand is

3242
01:57:41,030 --> 01:57:39,360
somehow part of your body even though

3243
01:57:44,870 --> 01:57:41,040
you know it's not

3244
01:57:45,910 --> 01:57:44,880
um and so the simple story explanation

3245
01:57:47,589 --> 01:57:45,920
for that

3246
01:57:49,669 --> 01:57:47,599
is that it's just multi-bayesian

3247
01:57:51,830 --> 01:57:49,679
multi-sensory integration that

3248
01:57:53,270 --> 01:57:51,840
the brain sees touch and it feels touch

3249
01:57:53,750 --> 01:57:53,280
and it's putting these things together

3250
01:57:59,430 --> 01:57:53,760
and

3251
01:58:04,550 --> 01:58:02,550
but there's this other factor which is

3252
01:58:06,390 --> 01:58:04,560
that's a situation which is going to

3253
01:58:08,070 --> 01:58:06,400
very strongly induce

3254
01:58:09,430 --> 01:58:08,080
demand characteristics you're seeing

3255
01:58:10,870 --> 01:58:09,440
something looks like a hand and

3256
01:58:12,550 --> 01:58:10,880
you're being stroked and then the

3257
01:58:13,830 --> 01:58:12,560
experimenter asks you does that feel

3258
01:58:15,589 --> 01:58:13,840
like your hand

3259
01:58:17,030 --> 01:58:15,599
you can see it's going to set up that

3260
01:58:19,270 --> 01:58:17,040
expectation

3261
01:58:20,629 --> 01:58:19,280
and so what peter's work beautifully did

3262
01:58:23,990 --> 01:58:20,639
was to

3263
01:58:25,350 --> 01:58:24,000

show that in fact individual differences

3264
01:58:30,229 --> 01:58:25,360
in

3265
01:58:31,910 --> 01:58:30,239
correlate with how strong the rubber

3266
01:58:34,229 --> 01:58:31,920
hand illusion is i see

3267
01:58:36,229 --> 01:58:34,239
and he also showed that typically people

3268
01:58:36,629 --> 01:58:36,239
use as a control they stroke the rubber

3269
01:58:40,790 --> 01:58:36,639
hand

3270
01:58:43,270 --> 01:58:40,800
this is going to break this

3271
01:58:45,669 --> 01:58:43,280
multi-sensory integration because now

3272
01:58:46,950 --> 01:58:45,679
you feel touched but it's no longer

3273
01:58:48,390 --> 01:58:46,960
aligned with the touch that you're

3274
01:58:51,270 --> 01:58:48,400
seeing

3275
01:58:52,310 --> 01:58:51,280
and what happens well people experience

3276
01:58:55,510 --> 01:58:52,320
it much less

3277
01:58:57,430 --> 01:58:55,520
yeah but the point is people also expect

3278
01:58:58,950 --> 01:58:57,440
to experience it much less if you ask

3279
01:59:01,350 --> 01:58:58,960
just people what would they expect to

3280
01:59:02,790 --> 01:59:01,360
experience when it's out of time

3281
01:59:04,629 --> 01:59:02,800
they say well i wouldn't expect to

3282
01:59:06,229 --> 01:59:04,639
experience it then so

3283
01:59:08,550 --> 01:59:06,239
it's not a good control for demand

3284
01:59:11,830 --> 01:59:08,560
characteristics because

3285
01:59:16,950 --> 01:59:11,840
what you expect to experience differs

3286
01:59:20,790 --> 01:59:18,390
i thought that what you did was great

3287
01:59:22,709 --> 01:59:20,800
with the pulsing of the heart because i

3288
01:59:24,310 --> 01:59:22,719

don't imagine that someone would think

3289
01:59:26,470 --> 01:59:24,320
or would even be conscious of how their

3290
01:59:28,390 --> 01:59:26,480
heart is pulsing to be able to associate

3291
01:59:31,430 --> 01:59:28,400
the one that is in line with okay

3292
01:59:32,870 --> 01:59:31,440
does that not show that it's not purely

3293
01:59:34,629 --> 01:59:32,880
the demand characteristics or the

3294
01:59:36,070 --> 01:59:34,639
imaginative suggestion because you don't

3295
01:59:37,189 --> 01:59:36,080
know you don't have access to how your

3296
01:59:38,790 --> 01:59:37,199
heart is beating

3297
01:59:40,629 --> 01:59:38,800
you do it in some way but you're not

3298
01:59:42,390 --> 01:59:40,639
paying so i think i think unfortunately

3299
01:59:45,750 --> 01:59:42,400
not in two different ways one way is

3300
01:59:48,070 --> 01:59:45,760
that in fact

3301
01:59:49,750 --> 01:59:48,080
suggestion effects can influence basic

3302
01:59:51,350 --> 01:59:49,760
physiology as well

3303
01:59:52,709 --> 01:59:51,360
it's not just limited to what you might

3304
01:59:53,990 --> 01:59:52,719
subjectively report about your

3305
01:59:56,790 --> 01:59:54,000
experience you can induce

3306
01:59:58,310 --> 01:59:56,800
physiological responses through imaging

3307
01:59:59,990 --> 01:59:58,320
suggestions

3308
02:00:02,790 --> 02:00:00,000
so that's one thing and the other thing

3309
02:00:03,030 --> 02:00:02,800
is you know get that experiment again so

3310
02:00:24,950 --> 02:00:03,040
i

3311
02:00:27,910 --> 02:00:24,960
because

3312
02:00:29,589 --> 02:00:27,920
to peter's experiment where we measured

3313
02:00:31,510 --> 02:00:29,599

hypnotizability and then looked at the

3314
02:00:33,189 --> 02:00:31,520
rubber hand illusion

3315
02:00:36,390 --> 02:00:33,199
we did the experiment or he did the

3316
02:00:39,750 --> 02:00:36,400
experiment well a bunch of people did on

3317
02:00:41,990 --> 02:00:39,760
i forget was it 430 or 340 hundreds of

3318
02:00:45,109 --> 02:00:42,000
people

3319
02:00:46,709 --> 02:00:45,119
it's normally these experiments are done

3320
02:00:47,350 --> 02:00:46,719
on groups of like 20 or something like

3321
02:00:55,189 --> 02:00:47,360
that

3322
02:00:56,709 --> 02:00:55,199
where what we did was instead of

3323
02:00:59,109 --> 02:00:56,719
stroking the hand we gave people a

3324
02:01:00,870 --> 02:00:59,119
virtual hand and it flashed

3325
02:01:03,109 --> 02:01:00,880
either in time or out of time with their

3326
02:01:06,229 --> 02:01:03,119
heartbeat and again we found

3327
02:01:06,790 --> 02:01:06,239
that people experienced it more as their

3328
02:01:08,229 --> 02:01:06,800
own hand

3329
02:01:10,229 --> 02:01:08,239
when the flashing was in time with their

3330
02:01:13,270 --> 02:01:10,239
heartbeat so sort of what we called

3331
02:01:14,629 --> 02:01:13,280
a cardiovascular cardio

3332
02:01:18,149 --> 02:01:14,639
something version of the rubber hand

3333
02:01:21,270 --> 02:01:18,159
illusion intercepted version

3334
02:01:22,629 --> 02:01:21,280
um i don't know to what extent that's

3335
02:01:24,149 --> 02:01:22,639
driven by

3336
02:01:26,310 --> 02:01:24,159
suggestibility i just don't know because

3337
02:01:28,950 --> 02:01:26,320
we didn't measure it

3338
02:01:30,629 --> 02:01:28,960

and so we need to do it again and we

3339
02:01:34,070 --> 02:01:30,639
haven't yet

3340
02:01:35,750 --> 02:01:34,080
for us i'm also wondering and i'm just

3341
02:01:37,270 --> 02:01:35,760
thinking out loud here if if there's any

3342
02:01:40,070 --> 02:01:37,280
utility to test

3343
02:01:41,030 --> 02:01:40,080
test this experiment when the

3344
02:01:44,229 --> 02:01:41,040
participants

3345
02:01:46,300 --> 02:01:44,239
are on psychedelics um

3346
02:01:48,229 --> 02:01:46,310
in a sense that's a psychedelic question

3347
02:01:49,350 --> 02:01:48,239
[Laughter]

3348
02:01:51,350 --> 02:01:49,360
i was asked that because you know you

3349
02:01:51,750 --> 02:01:51,360
you discuss the level of complexity how

3350
02:01:55,910 --> 02:01:51,760
that's

3351
02:01:57,510 --> 02:01:55,920
were discussing how it gets

3352
02:01:59,750 --> 02:01:57,520
it's more complex when when these

3353
02:02:01,830 --> 02:01:59,760
individuals are on psychedelics versus

3354
02:02:04,629 --> 02:02:01,840
the wakeful resting state

3355
02:02:06,390 --> 02:02:04,639
yeah so so we've done some work in

3356
02:02:08,229 --> 02:02:06,400
combat in collaboration now with the

3357
02:02:09,750 --> 02:02:08,239
group at imperial college london led by

3358
02:02:11,430 --> 02:02:09,760
robin card harris on

3359
02:02:13,589 --> 02:02:11,440
on what happens in the brain during

3360
02:02:15,109 --> 02:02:13,599
psychedelics um

3361
02:02:17,990 --> 02:02:15,119
and there are lots of dif interesting

3362
02:02:22,470 --> 02:02:18,000
differences um

3363
02:02:25,669 --> 02:02:23,990

when someone's on a large dose of

3364
02:02:26,870 --> 02:02:25,679
psychedelics they can't really do

3365
02:02:28,550 --> 02:02:26,880
anything

3366
02:02:30,550 --> 02:02:28,560
yeah they can lie they can line a brain

3367
02:02:33,669 --> 02:02:30,560
scanner but you can't get them to do

3368
02:02:38,550 --> 02:02:33,679
an experiment and press buttons

3369
02:02:43,109 --> 02:02:41,270
so you know one of the things i'm

3370
02:02:44,550 --> 02:02:43,119
excited about is the potential for

3371
02:02:47,189 --> 02:02:44,560
actually research

3372
02:02:48,950 --> 02:02:47,199
in using microdosing here so if you give

3373
02:02:50,790 --> 02:02:48,960
people very small doses

3374
02:02:53,430 --> 02:02:50,800
sure they don't have the big vivid

3375
02:02:54,950 --> 02:02:53,440
hallucinations

3376
02:02:57,030 --> 02:02:54,960
any differences in the brain are going

3377
02:02:58,390 --> 02:02:57,040
to be correspondingly more subtle

3378
02:03:01,109 --> 02:02:58,400
but you have the big advantage that

3379
02:03:04,229 --> 02:03:01,119
people can still do experiments

3380
02:03:05,430 --> 02:03:04,239
so you know i'd certainly like to i

3381
02:03:08,149 --> 02:03:05,440
think that's that's a

3382
02:03:09,589 --> 02:03:08,159
very rich vein of work to follow by the

3383
02:03:11,189 --> 02:03:09,599
way just to connect those two points

3384
02:03:12,709 --> 02:03:11,199
there was there was a lovely paper i

3385
02:03:15,750 --> 02:03:12,719
think by olsen and

3386
02:03:18,950 --> 02:03:15,760
colleagues from a couple of last year

3387
02:03:20,790 --> 02:03:18,960
where they they claim to have induced a

3388
02:03:21,750 --> 02:03:20,800

psychological psychedelic experience

3389
02:03:23,510 --> 02:03:21,760
through

3390
02:03:25,270 --> 02:03:23,520
hypnotic suggestion interesting it's

3391
02:03:27,510 --> 02:03:25,280
called like tripping on nothing

3392
02:03:29,990 --> 02:03:27,520
and they should set up set up the whole

3393
02:03:30,950 --> 02:03:30,000
context have a very nice relaxing lobby

3394
02:03:32,550 --> 02:03:30,960
area and

3395
02:03:34,709 --> 02:03:32,560
people come in fully believing they're

3396
02:03:37,430 --> 02:03:34,719
going to be taking part in some

3397
02:03:38,790 --> 02:03:37,440
experiment with suicide and and then

3398
02:03:40,470 --> 02:03:38,800
they don't get any

3399
02:03:42,070 --> 02:03:40,480
but they're still led to believe that

3400
02:03:43,589 --> 02:03:42,080
they have got it and then they often

3401
02:03:45,030 --> 02:03:43,599
report

3402
02:03:46,870 --> 02:03:45,040
all these hallucinations and things

3403
02:03:48,950 --> 02:03:46,880
going on so so

3404
02:03:50,069 --> 02:03:48,960
potentially you can even induce

3405
02:03:52,550 --> 02:03:50,079
psychedelic

3406
02:03:55,189 --> 02:03:52,560
effects given strong enough expectations

3407
02:03:56,709 --> 02:03:55,199
about what's going on now of course

3408
02:04:00,069 --> 02:03:56,719
i would say there's probably still going

3409
02:04:03,270 --> 02:04:02,390
a placebo psychedelic experience and a

3410
02:04:05,109 --> 02:04:03,280
real one

3411
02:04:06,790 --> 02:04:05,119
but quite what the difference is is an

3412
02:04:08,870 --> 02:04:06,800
interesting open question

3413
02:04:10,709 --> 02:04:08,880

what insights have you found from any of

3414
02:04:12,470 --> 02:04:10,719
your psychedelic experiences if you can

3415
02:04:16,310 --> 02:04:12,480
talk about it that you feel like

3416
02:04:21,030 --> 02:04:16,320
were let's say world view shattering

3417
02:04:24,390 --> 02:04:23,109
if anything it was more reassuring

3418
02:04:27,830 --> 02:04:24,400
because

3419
02:04:29,750 --> 02:04:27,840
the thing is a lot of my

3420
02:04:31,430 --> 02:04:29,760
work over the years has been about

3421
02:04:32,790 --> 02:04:31,440
trying to understand perception of this

3422
02:04:36,790 --> 02:04:32,800
kind of construction

3423
02:04:38,310 --> 02:04:36,800
you know this perceptual best guess um

3424
02:04:39,990 --> 02:04:38,320
we've been talking about examples of

3425
02:04:41,030 --> 02:04:40,000
seeing faces and clouds and all these

3426
02:04:42,709 --> 02:04:41,040
effects that

3427
02:04:43,990 --> 02:04:42,719
fit very comfortably with this view of

3428
02:04:45,589 --> 02:04:44,000
how the brain works and how it does

3429
02:04:47,109 --> 02:04:45,599
perception

3430
02:04:48,310 --> 02:04:47,119
so you think when you're on psychedelics

3431
02:04:49,910 --> 02:04:48,320
you're temporarily shifting with the

3432
02:04:51,589 --> 02:04:49,920
bayesian priors

3433
02:04:53,109 --> 02:04:51,599
yeah i think so i think it sort of made

3434
02:04:55,109 --> 02:04:53,119
sense it sort of makes sense that way

3435
02:04:56,950 --> 02:04:55,119
firstly it gives you very very

3436
02:04:58,629 --> 02:04:56,960
immediate insight that your perceptual

3437
02:05:00,310 --> 02:04:58,639
world is a construction of some sort and

3438
02:05:04,069 --> 02:05:00,320

it starts departing from

3439
02:05:05,510 --> 02:05:04,079
what it used to be quite quite quickly

3440
02:05:08,149 --> 02:05:05,520
and it's interesting people can have

3441
02:05:10,069 --> 02:05:08,159
very different i think

3442
02:05:11,830 --> 02:05:10,079
take different lessons from experiences

3443
02:05:13,430 --> 02:05:11,840
like this

3444
02:05:15,430 --> 02:05:13,440
depending on their prior beliefs about

3445
02:05:18,830 --> 02:05:15,440
them again so if if people

3446
02:05:23,109 --> 02:05:21,990
it some people might believe that

3447
02:05:25,669 --> 02:05:23,119
psychedelics

3448
02:05:26,709 --> 02:05:25,679
are evidence for a more immaterial form

3449
02:05:28,470 --> 02:05:26,719
of consciousness because

3450
02:05:30,709 --> 02:05:28,480
you know you suddenly depart from you

3451
02:05:31,990 --> 02:05:30,719
yourself you don't experience yourself

3452
02:05:34,149 --> 02:05:32,000
so much and

3453
02:05:35,750 --> 02:05:34,159
and so you might think well this just

3454
02:05:37,990 --> 02:05:35,760
this is good evidence that that

3455
02:05:42,629 --> 02:05:38,000
consciousness is

3456
02:05:46,950 --> 02:05:42,639
is not this thing created by my brain

3457
02:05:51,510 --> 02:05:49,990
but for me and you also might

3458
02:05:52,790 --> 02:05:51,520
reinforce beliefs and things like pan

3459
02:05:54,470 --> 02:05:52,800
psychism that consciousness is

3460
02:05:55,750 --> 02:05:54,480
everywhere because the whole world seems

3461
02:05:58,390 --> 02:05:55,760
to be alive and

3462
02:05:59,750 --> 02:05:58,400
vivid with with meaning uh but the other

3463
02:06:02,470 --> 02:05:59,760

way to think of it is that

3464
02:06:04,310 --> 02:06:02,480
if you come say somebody like me with a

3465
02:06:05,510 --> 02:06:04,320
prior belief that the brain is the organ

3466
02:06:07,270 --> 02:06:05,520
of that experience

3467
02:06:08,870 --> 02:06:07,280
it's just more evidence for that because

3468
02:06:10,950 --> 02:06:08,880
you mess with the brain

3469
02:06:12,790 --> 02:06:10,960
in a very straightforward way you just

3470
02:06:15,430 --> 02:06:12,800
activate these serotonin

3471
02:06:17,430 --> 02:06:15,440
receptors and bang your experience of

3472
02:06:19,270 --> 02:06:17,440
the world myself massively changes

3473
02:06:21,350 --> 02:06:19,280
so i sort of interpret it as very strong

3474
02:06:24,470 --> 02:06:21,360
evidence for the material basis

3475
02:06:25,990 --> 02:06:24,480
of our conscious lives what do you make

3476
02:06:28,149 --> 02:06:26,000
of daniel dennett's claims

3477
02:06:29,669 --> 02:06:28,159
of well let's say daniel dennett's view

3478
02:06:31,830 --> 02:06:29,679
of consciousness have you read his

3479
02:06:33,510 --> 02:06:31,840
explaining consciousness book i always

3480
02:06:35,189 --> 02:06:33,520
find it insightful to know how

3481
02:06:36,629 --> 02:06:35,199
let's say luminaries like yourself and

3482
02:06:39,669 --> 02:06:36,639
others disagree

3483
02:06:40,229 --> 02:06:39,679
i mean well bennett is the luminary in

3484
02:06:43,350 --> 02:06:40,239
this uh

3485
02:06:46,069 --> 02:06:43,360
in this group he's i i

3486
02:06:47,910 --> 02:06:46,079
started reading his stuff again at a

3487
02:06:50,149 --> 02:06:47,920
reasonably early stage so

3488
02:06:51,750 --> 02:06:50,159

in the early 90s i was lucky to to read

3489
02:06:53,430 --> 02:06:51,760
it consciousness explained and it's it's

3490
02:06:57,030 --> 02:06:53,440
a remarkable book

3491
02:06:58,229 --> 02:06:57,040
um and you know i have been a lot

3492
02:07:01,750 --> 02:06:58,239
inspired by

3493
02:07:04,870 --> 02:07:01,760
dana over the years

3494
02:07:09,510 --> 02:07:08,790
i agree i think to a large extent but

3495
02:07:12,790 --> 02:07:09,520
maybe not

3496
02:07:16,229 --> 02:07:12,800
the whole way but

3497
02:07:19,030 --> 02:07:16,239
that might partly be because

3498
02:07:21,750 --> 02:07:19,040
i found it quite difficult to know what

3499
02:07:24,550 --> 02:07:21,760
the whole way actually means

3500
02:07:26,550 --> 02:07:24,560
for dan so meaning you're unsure of what

3501
02:07:28,149 --> 02:07:26,560
his viewpoints are

3502
02:07:30,310 --> 02:07:28,159
well i mean i i've had many

3503
02:07:34,069 --> 02:07:30,320
conversations with him and i know

3504
02:07:37,430 --> 02:07:34,079
it's it's there's there's a lot of

3505
02:07:39,270 --> 02:07:37,440
there's a lot of so i think where

3506
02:07:41,270 --> 02:07:39,280
we so one thing that i very much like

3507
02:07:44,629 --> 02:07:41,280
about his ideas is this sort of

3508
02:07:46,069 --> 02:07:44,639
idea about um multiple drafts and centre

3509
02:07:50,149 --> 02:07:46,079
of narrative gravity and

3510
02:07:51,750 --> 02:07:50,159
and um this sort of idea that

3511
02:07:53,270 --> 02:07:51,760
the self the narrative self this

3512
02:07:55,270 --> 02:07:53,280
identity that we have the thoughts

3513
02:07:57,589 --> 02:07:55,280

that we think that that it's not some

3514
02:07:59,910 --> 02:07:57,599
sort of internal essence of self

3515
02:08:01,750 --> 02:07:59,920
there's just many things going on and we

3516
02:08:06,830 --> 02:08:01,760
kind of construct our

3517
02:08:13,189 --> 02:08:09,430
um

3518
02:08:15,990 --> 02:08:13,199
he's also for me anyway bang on about

3519
02:08:17,430 --> 02:08:16,000
um some of the mistakes that people make

3520
02:08:19,669 --> 02:08:17,440
when they think about perceptual

3521
02:08:23,189 --> 02:08:19,679
experience so for instance

3522
02:08:24,790 --> 02:08:23,199
you know he's he's he's very much

3523
02:08:27,270 --> 02:08:24,800
uh actually i will tell you i'll tell

3524
02:08:30,709 --> 02:08:27,280
you one story because he was at the

3525
02:08:33,030 --> 02:08:30,719
when i gave my ted talk in 2017

3526
02:08:34,550 --> 02:08:33,040
he was in the audience and i was

3527
02:08:36,069 --> 02:08:34,560
massively terrified giving this talk

3528
02:08:40,069 --> 02:08:36,079
it's a terrifying experience oh you look

3529
02:08:43,270 --> 02:08:40,079
calm on stage yeah

3530
02:08:44,069 --> 02:08:43,280
it's a totally terrifying experience but

3531
02:08:45,669 --> 02:08:44,079
i was most

3532
02:08:48,149 --> 02:08:45,679
terrified of the fact that danny was in

3533
02:08:49,350 --> 02:08:48,159
the audience and

3534
02:08:51,350 --> 02:08:49,360
wondered what he was going to think of

3535
02:08:54,709 --> 02:08:51,360
it and

3536
02:08:58,069 --> 02:08:54,719
he was very kind and he said it was

3537
02:09:01,030 --> 02:08:58,079
almost perfect and then okay what's up

3538
02:09:02,790 --> 02:09:01,040

what's the problem he said well you said

3539
02:09:09,750 --> 02:09:02,800
and i have like a father figure he said

3540
02:09:14,470 --> 02:09:12,950
precisely the mistake

3541
02:09:15,750 --> 02:09:14,480
yeah he wasn't to know about the rubber

3542
02:09:17,350 --> 02:09:15,760
hand illusion stuff right that wasn't

3543
02:09:19,510 --> 02:09:17,360
mistaken nobody knew about that we

3544
02:09:22,470 --> 02:09:19,520
hadn't done the work

3545
02:09:23,030 --> 02:09:22,480
i'd said as part of the talk this idea

3546
02:09:26,310 --> 02:09:23,040
of

3547
02:09:28,149 --> 02:09:26,320
conscious perception as like an inner

3548
02:09:29,830 --> 02:09:28,159
movie

3549
02:09:31,830 --> 02:09:29,840
that and i can't remember the precise

3550
02:09:35,270 --> 02:09:31,840
words i use now i used to know them

3551
02:09:37,430 --> 02:09:35,280
totally by heart but um this idea that

3552
02:09:38,709 --> 02:09:37,440
i described this multi-modal fully

3553
02:09:41,270 --> 02:09:38,719
immersive

3554
02:09:43,189 --> 02:09:41,280
in a movie as a description of what

3555
02:09:45,669 --> 02:09:43,199
perceptual experience is like

3556
02:09:47,030 --> 02:09:45,679
and that's what he said no no he doesn't

3557
02:09:48,550 --> 02:09:47,040
like that because it implies there's a

3558
02:09:51,030 --> 02:09:48,560
little person in your head viewing it

3559
02:09:53,109 --> 02:09:51,040
exactly exactly it implies even though i

3560
02:09:56,390 --> 02:09:53,119
didn't mean it and i don't believe it

3561
02:09:58,310 --> 02:09:56,400
just that linguistic slip it sort of

3562
02:09:59,589 --> 02:09:58,320
it gives that impression it's easy to

3563
02:10:01,270 --> 02:09:59,599

interpret that way

3564
02:10:03,430 --> 02:10:01,280
and it might speak that i still

3565
02:10:05,750 --> 02:10:03,440
had fully hadn't grasped that

3566
02:10:06,950 --> 02:10:05,760
point if you speak of it in a movie you

3567
02:10:08,470 --> 02:10:06,960
imply

3568
02:10:09,830 --> 02:10:08,480
somebody watching the movie no there is

3569
02:10:11,109 --> 02:10:09,840
no inner movie right and that just begs

3570
02:10:13,030 --> 02:10:11,119
the question but i do recall

3571
02:10:14,790 --> 02:10:13,040
um i do recall dennis saying that it's

3572
02:10:16,229 --> 02:10:14,800
okay to have a little person inside your

3573
02:10:17,669 --> 02:10:16,239
brain watching the movie as long as that

3574
02:10:18,470 --> 02:10:17,679
little person has another one and it

3575
02:10:20,390 --> 02:10:18,480
doesn't regress

3576
02:10:22,310 --> 02:10:20,400
infinitely because each little person

3577
02:10:25,350 --> 02:10:22,320
can be different than the last

3578
02:10:27,430 --> 02:10:25,360
do you remember this argument not not

3579
02:10:29,589 --> 02:10:27,440
really i don't i just think it's easier

3580
02:10:31,750 --> 02:10:29,599
to do away with that argument at all you

3581
02:10:33,750 --> 02:10:31,760
know there's no need for it

3582
02:10:35,990 --> 02:10:33,760
it's a it's a solution for there's no

3583
02:10:37,030 --> 02:10:36,000
problem that that

3584
02:10:41,109 --> 02:10:37,040
it's a solution to a problem that

3585
02:10:46,470 --> 02:10:44,390
an inner homunculus anyway yes we do

3586
02:10:48,870 --> 02:10:46,480
have what we can call metacognitive

3587
02:10:50,470 --> 02:10:48,880
processes so i can make judgments about

3588
02:10:52,310 --> 02:10:50,480

my conscious experiences i can tell you

3589
02:10:53,830 --> 02:10:52,320
whether i'm confident or not or i can

3590
02:10:57,669 --> 02:10:53,840
tell you whether

3591
02:10:59,669 --> 02:10:57,679
um yeah i can reflect on and evaluate

3592
02:11:00,870 --> 02:10:59,679
things that happen but that doesn't mean

3593
02:11:03,270 --> 02:11:00,880
there's a

3594
02:11:04,390 --> 02:11:03,280
sort of inner observer it just means

3595
02:11:12,149 --> 02:11:04,400
there are

3596
02:11:15,189 --> 02:11:12,159
of my cognitive architecture

3597
02:11:17,350 --> 02:11:15,199
so yeah

3598
02:11:18,470 --> 02:11:17,360
so he certainly he's alway i've always

3599
02:11:24,390 --> 02:11:18,480
found him

3600
02:11:25,430 --> 02:11:24,400
very on point about picking up on errors

3601
02:11:28,870 --> 02:11:25,440
like that

3602
02:11:32,229 --> 02:11:28,880
where i've never been entirely clear is

3603
02:11:35,830 --> 02:11:34,149
the extent to which we're mistaken about

3604
02:11:37,510 --> 02:11:35,840
what it is we're trying to explain when

3605
02:11:40,310 --> 02:11:37,520
we try to explain consciousness

3606
02:11:41,430 --> 02:11:40,320
he's often criticized or understood as

3607
02:11:46,709 --> 02:11:41,440
saying that

3608
02:11:52,550 --> 02:11:48,790
i'm not sure that that's what what he

3609
02:11:55,270 --> 02:11:52,560
means i think it's entirely

3610
02:11:56,709 --> 02:11:55,280
right to say that qualia these you know

3611
02:11:59,109 --> 02:11:56,719
the redness of red the

3612
02:12:00,149 --> 02:11:59,119
painfulness of pain are not what we

3613
02:12:01,510 --> 02:12:00,159

think they are

3614
02:12:03,589 --> 02:12:01,520
but that doesn't necessarily mean they

3615
02:12:06,709 --> 02:12:03,599
don't exist

3616
02:12:08,950 --> 02:12:06,719
um but yeah i mean he's for me he's he's

3617
02:12:10,550 --> 02:12:08,960
definitely

3618
02:12:12,229 --> 02:12:10,560
one of the people i still always learn

3619
02:12:15,109 --> 02:12:12,239
from every time i

3620
02:12:18,629 --> 02:12:15,119
every time i speak to and it's been an

3621
02:12:22,629 --> 02:12:20,229
seeing talking to him and seeing how

3622
02:12:25,270 --> 02:12:22,639
he's talking more also in terms of the

3623
02:12:28,310 --> 02:12:25,280
bayesian brain these days and trying to

3624
02:12:30,069 --> 02:12:28,320
you know put his ideas

3625
02:12:31,910 --> 02:12:30,079
within that framework which i think is a

3626
02:12:33,669 --> 02:12:31,920
really interesting project

3627
02:12:36,149 --> 02:12:33,679
and do you agree with his conception of

3628
02:12:40,149 --> 02:12:36,159
uh free will the compatibilist

3629
02:12:40,709 --> 02:12:40,159
approach i i'm a compatibilist yeah i

3630
02:12:42,229 --> 02:12:40,719
mean i

3631
02:12:43,910 --> 02:12:42,239
i think i think free will is another

3632
02:12:45,350 --> 02:12:43,920
kind of perceptual experience and i

3633
02:12:47,350 --> 02:12:45,360
think this whole

3634
02:12:48,629 --> 02:12:47,360
debate about determinism is totally

3635
02:12:51,750 --> 02:12:48,639
irrelevant to do

3636
02:12:52,790 --> 02:12:51,760
understanding of free will i'm trying to

3637
02:12:54,950 --> 02:12:52,800
get right

3638
02:12:56,229 --> 02:12:54,960

dennit on the podcast he said that he's

3639
02:12:57,510 --> 02:12:56,239
busy writing a book

3640
02:12:59,270 --> 02:12:57,520
so he can't come on i'm also trying to

3641
02:13:00,830 --> 02:12:59,280
get douglas hofstetter

3642
02:13:02,709 --> 02:13:00,840
what are your views on douglas

3643
02:13:04,310 --> 02:13:02,719
hofstadter's model

3644
02:13:06,470 --> 02:13:04,320
i just don't know i don't know him

3645
02:13:10,069 --> 02:13:06,480
personally and i've read only

3646
02:13:11,830 --> 02:13:10,079
really the amazing um

3647
02:13:13,189 --> 02:13:11,840
um it's one of the best books everybody

3648
02:13:16,310 --> 02:13:13,199
everybody should read that

3649
02:13:18,629 --> 02:13:16,320
it's phenomenal um it's just playful

3650
02:13:21,589 --> 02:13:18,639
what i take from that is just this

3651
02:13:23,589 --> 02:13:21,599
incredible playfulness creativity i have

3652
02:13:25,750 --> 02:13:23,599
it right here i can keep only it's uh

3653
02:13:27,350 --> 02:13:25,760
three books beside me four books one of

3654
02:13:28,629 --> 02:13:27,360
them yeah and that's one that's one of

3655
02:13:29,990 --> 02:13:28,639
them you know that's that's

3656
02:13:32,069 --> 02:13:30,000
i don't know if you know the show the

3657
02:13:34,229 --> 02:13:32,079
desert island discs we have it on the

3658
02:13:36,470 --> 02:13:34,239
radio here in the uk

3659
02:13:40,149 --> 02:13:36,480
and the idea has been going on for like

3660
02:13:43,109 --> 02:13:40,159
decades and the idea is you

3661
02:13:44,550 --> 02:13:43,119
what are the eight songs that you would

3662
02:13:46,790 --> 02:13:44,560
take with you if you're getting banished

3663
02:13:49,910 --> 02:13:46,800

to a desert island never to return

3664
02:13:51,669 --> 02:13:49,920
you can only take eight tracks um and

3665
02:13:53,270 --> 02:13:51,679
then you're also allowed so most people

3666
02:13:54,790 --> 02:13:53,280
in england spend half their lives

3667
02:13:55,990 --> 02:13:54,800
figuring out what these eight tracks are

3668
02:13:57,669 --> 02:13:56,000
going to be just in case they get

3669
02:13:59,109 --> 02:13:57,679
invited onto the show at some point and

3670
02:14:01,350 --> 02:13:59,119
you want to be ready

3671
02:14:02,870 --> 02:14:01,360
um but you're also allowed to take a

3672
02:14:05,350 --> 02:14:02,880
book cool

3673
02:14:06,390 --> 02:14:05,360
and so for you that would be definitely

3674
02:14:07,910 --> 02:14:06,400
well i wouldn't

3675
02:14:09,270 --> 02:14:07,920
say it would be the one but it would

3676
02:14:11,510 --> 02:14:09,280
certainly be up there i haven't made a

3677
02:14:14,069 --> 02:14:11,520
container decision about the book yet

3678
02:14:14,790 --> 02:14:14,079
um but it's so i love the way it just

3679
02:14:16,870 --> 02:14:14,800
creates it

3680
02:14:19,109 --> 02:14:16,880
playfully explores our intuitions about

3681
02:14:22,390 --> 02:14:19,119
what cognition is what mind is what

3682
02:14:24,310 --> 02:14:22,400
what explanations and biology physics

3683
02:14:26,390 --> 02:14:24,320
consist in i think it's i think it's

3684
02:14:28,870 --> 02:14:26,400
just he's a genius

3685
02:14:30,950 --> 02:14:28,880
sort of insights yeah have you read his

3686
02:14:33,430 --> 02:14:30,960
analogy book

3687
02:14:33,990 --> 02:14:33,440
i haven't i haven't no it's a great one

3688
02:14:35,430 --> 02:14:34,000

but it's

3689
02:14:37,750 --> 02:14:35,440
far too long so sometimes it goes

3690
02:14:41,270 --> 02:14:37,760
through lists and lists

3691
02:14:42,709 --> 02:14:41,280
what i find to be somewhat tedious okay

3692
02:14:44,310 --> 02:14:42,719
so what are your views on his views of

3693
02:14:46,950 --> 02:14:44,320
consciousness where do you agree

3694
02:14:51,109 --> 02:14:48,550
well that's a tricky question because to

3695
02:14:53,750 --> 02:14:51,119
be honest i it's been i

3696
02:14:54,790 --> 02:14:53,760
would be hard-pressed to articulate what

3697
02:14:57,030 --> 02:14:54,800
they are i mean

3698
02:14:58,950 --> 02:14:57,040
to me it got his talks about strange

3699
02:15:03,910 --> 02:14:58,960
loops and things like that

3700
02:15:07,430 --> 02:15:05,270
yeah i don't have i don't have a

3701
02:15:09,030 --> 02:15:07,440
particular strong

3702
02:15:10,310 --> 02:15:09,040
view because i to me i've always just

3703
02:15:12,629 --> 02:15:10,320
associated him with these with these

3704
02:15:15,350 --> 02:15:12,639
things about

3705
02:15:17,030 --> 02:15:15,360
language recursion all these all these

3706
02:15:19,589 --> 02:15:17,040
playful insights so

3707
02:15:20,229 --> 02:15:19,599
i don't think he's as far as i know he's

3708
02:15:23,510 --> 02:15:20,239
not

3709
02:15:24,870 --> 02:15:23,520
coming to my radar specifically about

3710
02:15:26,550 --> 02:15:24,880
consciousness more about what's

3711
02:15:27,990 --> 02:15:26,560
self-consistent and what we think of as

3712
02:15:28,229 --> 02:15:28,000
a self and that's it when you're saying

3713
02:15:30,470 --> 02:15:28,239

that

3714
02:15:32,229 --> 02:15:30,480
the homunculus it's a it's a foolish

3715
02:15:34,069 --> 02:15:32,239
model in some ways

3716
02:15:35,350 --> 02:15:34,079
what about global workspace theory as

3717
02:15:36,069 --> 02:15:35,360
far as i understand i don't know much

3718
02:15:37,750 --> 02:15:36,079
about it i just

3719
02:15:38,950 --> 02:15:37,760
had a cursory glance at it it sounds

3720
02:15:40,229 --> 02:15:38,960
like there's a homunculus because

3721
02:15:43,270 --> 02:15:40,239
there's something that's viewing

3722
02:15:44,470 --> 02:15:43,280
or there's a well you can explain it

3723
02:15:45,830 --> 02:15:44,480
much better than i but what are you what

3724
02:15:46,550 --> 02:15:45,840
are your views on the global workspace

3725
02:15:50,390 --> 02:15:46,560
theory

3726
02:15:52,149 --> 02:15:50,400
the sort of most popular theories in

3727
02:15:53,910 --> 02:15:52,159
consciousness science

3728
02:15:55,830 --> 02:15:53,920
neuroscientific theories these days and

3729
02:15:59,350 --> 02:15:55,840
it's um

3730
02:16:01,990 --> 02:15:59,360
it's first developed by bernie bars and

3731
02:16:03,430 --> 02:16:02,000
taken on mainly by standard hey in paris

3732
02:16:06,149 --> 02:16:03,440
neuroscientist

3733
02:16:08,950 --> 02:16:06,159
and it makes a very simple sort of uh

3734
02:16:11,669 --> 02:16:08,960
proposal that

3735
02:16:14,310 --> 02:16:11,679
what we are conscious of the contents of

3736
02:16:16,390 --> 02:16:14,320
our consciousness

3737
02:16:18,229 --> 02:16:16,400
they become conscious in virtue of being

3738
02:16:21,189 --> 02:16:18,239

broadcast in this

3739
02:16:21,830 --> 02:16:21,199
workspace in the brain that gives them

3740
02:16:23,750 --> 02:16:21,840
access

3741
02:16:24,870 --> 02:16:23,760
to many different cognitive processes

3742
02:16:26,950 --> 02:16:24,880
which is why

3743
02:16:28,149 --> 02:16:26,960
i'm conscious of this glass of water

3744
02:16:30,870 --> 02:16:28,159
means

3745
02:16:31,270 --> 02:16:30,880
i can do many things now in virtue of

3746
02:16:33,110 --> 02:16:31,280
being

3747
02:16:34,709 --> 02:16:33,120
conscious of it i can drink it i can tip

3748
02:16:35,669 --> 02:16:34,719
it over the computer i can take it to

3749
02:16:39,190 --> 02:16:35,679
the kitchen

3750
02:16:45,110 --> 02:16:39,200
i can put it down again from it

3751
02:16:49,990 --> 02:16:48,070
uh whatever in my brain is representing

3752
02:16:51,429 --> 02:16:50,000
the perception of that glass has access

3753
02:16:54,389 --> 02:16:51,439
to all these different

3754
02:16:55,990 --> 02:16:54,399
flexible cognitive processes and for

3755
02:16:56,709 --> 02:16:56,000
global workspace theory it's that

3756
02:17:00,629 --> 02:16:56,719
process

3757
02:17:01,110 --> 02:17:00,639
of being available broadcasted around

3758
02:17:04,629 --> 02:17:01,120
this

3759
02:17:07,509 --> 02:17:04,639
workspace that endows that perception

3760
02:17:11,830 --> 02:17:07,519
with the property of being conscious

3761
02:17:14,469 --> 02:17:11,840
um the analogy i think is done again

3762
02:17:17,589 --> 02:17:14,479
uses the analogy fame in the brain

3763
02:17:19,429 --> 02:17:17,599

for that theme in the brain fame in the

3764
02:17:21,589 --> 02:17:19,439
brain so something becomes

3765
02:17:23,030 --> 02:17:21,599
feminist famous within the brain all

3766
02:17:23,990 --> 02:17:23,040
other parts of the brain know about it

3767
02:17:25,589 --> 02:17:24,000
suddenly my

3768
02:17:27,110 --> 02:17:25,599
my auditory cortex knows about it my

3769
02:17:28,790 --> 02:17:27,120
language senders know about it

3770
02:17:30,469 --> 02:17:28,800
my motor cordx knows about it it's

3771
02:17:31,669 --> 02:17:30,479
famous there's a cup there's a there's a

3772
02:17:33,910 --> 02:17:31,679
glass of water

3773
02:17:34,709 --> 02:17:33,920
hooray everybody can see it it's famous

3774
02:17:37,429 --> 02:17:34,719
yeah

3775
02:17:39,110 --> 02:17:37,439
and that fame in the brain underwrites

3776
02:17:43,509 --> 02:17:39,120
conscious perception

3777
02:17:45,830 --> 02:17:43,519
um so that's that's the claim

3778
02:17:46,549 --> 02:17:45,840
the nice thing about it is it explains a

3779
02:17:48,389 --> 02:17:46,559
lot of the

3780
02:17:49,910 --> 02:17:48,399
functional properties we associate with

3781
02:17:51,349 --> 02:17:49,920
consciousness because indeed there are

3782
02:17:53,270 --> 02:17:51,359
things i can do when i'm conscious of

3783
02:17:56,230 --> 02:17:53,280
something that i can't when i'm not yes

3784
02:17:57,669 --> 02:17:56,240
and this flexible action is is central

3785
02:17:59,830 --> 02:17:57,679
to that

3786
02:18:02,309 --> 02:17:59,840
it's also testable because you can put

3787
02:18:04,230 --> 02:18:02,319
people in brain scanners

3788
02:18:05,669 --> 02:18:04,240

and change you know present them with

3789
02:18:06,870 --> 02:18:05,679
stimuli and

3790
02:18:10,070 --> 02:18:06,880
vary whether they're consciously

3791
02:18:11,589 --> 02:18:10,080
perceived or not and you can look for is

3792
02:18:12,549 --> 02:18:11,599
there this ignition of this global

3793
02:18:14,629 --> 02:18:12,559
workspace in the

3794
02:18:17,429 --> 02:18:14,639
in the brain when they're conscious and

3795
02:18:21,429 --> 02:18:17,439
many experiments would say there is

3796
02:18:24,709 --> 02:18:23,509
it's not for me explaining a great deal

3797
02:18:26,469 --> 02:18:24,719
about

3798
02:18:27,990 --> 02:18:26,479
and back where we and as we sort of

3799
02:18:30,389 --> 02:18:28,000
begin to wrap up we're back where we

3800
02:18:33,110 --> 02:18:30,399
started which is with phenomenology

3801
02:18:35,910 --> 02:18:33,120
so the fact that something is famous in

3802
02:18:38,150 --> 02:18:35,920
the global workspace

3803
02:18:40,230 --> 02:18:38,160
explains a lot about what we can do

3804
02:18:42,950 --> 02:18:40,240
behaviorally and functionally

3805
02:18:43,589 --> 02:18:42,960
but it doesn't really explain to me at

3806
02:18:45,910 --> 02:18:43,599
least well

3807
02:18:47,509 --> 02:18:45,920
why is it why is this visual experience

3808
02:18:49,030 --> 02:18:47,519
the way it is

3809
02:18:50,790 --> 02:18:49,040
the phenomenology of this visual

3810
02:18:52,150 --> 02:18:50,800
experience has a character

3811
02:18:54,389 --> 02:18:52,160
just being famous in the global

3812
02:18:56,070 --> 02:18:54,399
workspace doesn't really explain that

3813
02:18:57,669 --> 02:18:56,080

it also is not going to address the hard

3814
02:18:58,150 --> 02:18:57,679
problem of consciousness yeah that's

3815
02:18:59,990 --> 02:18:58,160
what i'm

3816
02:19:02,309 --> 02:19:00,000
thinking no one would no one claim that

3817
02:19:04,469 --> 02:19:02,319
it is but there's this often inverse

3818
02:19:07,669 --> 02:19:04,479
relationship it has a benefit of being

3819
02:19:09,030 --> 02:19:07,679
eminently testable um

3820
02:19:11,190 --> 02:19:09,040
and although you know you can finesse

3821
02:19:12,629 --> 02:19:11,200
and say well the global work space is

3822
02:19:14,790 --> 02:19:12,639
wherever you find it in the brain and

3823
02:19:17,830 --> 02:19:14,800
there are problems because

3824
02:19:19,349 --> 02:19:17,840
how do i separate the signature of a

3825
02:19:22,389 --> 02:19:19,359
workspace being active

3826
02:19:24,070 --> 02:19:22,399
from simply my

3827
02:19:26,070 --> 02:19:24,080
consciously reporting something has

3828
02:19:27,349 --> 02:19:26,080
happened um

3829
02:19:30,070 --> 02:19:27,359
maybe the difference i'm seeing in the

3830
02:19:31,910 --> 02:19:30,080
brain is just the difference in

3831
02:19:33,270 --> 02:19:31,920
my verbal report rather than the

3832
02:19:34,070 --> 02:19:33,280
mechanisms that give rise to the

3833
02:19:35,830 --> 02:19:34,080
experience

3834
02:19:37,190 --> 02:19:35,840
so there are some tough questions there

3835
02:19:40,070 --> 02:19:37,200
too but it's

3836
02:19:40,389 --> 02:19:40,080
it's uh it's an appealing theory i you

3837
02:19:43,509 --> 02:19:40,399
know

3838
02:19:44,950 --> 02:19:43,519

i don't focus on it because for me i

3839
02:19:46,950 --> 02:19:44,960
want to focus on what kinds of

3840
02:19:48,150 --> 02:19:46,960
mechanisms explain phenomenology and for

3841
02:19:50,950 --> 02:19:48,160
me the bayesian perspective

3842
02:19:52,070 --> 02:19:50,960
is much is much more interesting farraz

3843
02:19:53,590 --> 02:19:52,080
why don't you ask a

3844
02:19:55,270 --> 02:19:53,600
question to wrap up and then i'll ask my

3845
02:19:57,030 --> 02:19:55,280
last question as well

3846
02:19:58,870 --> 02:19:57,040
first of all it has been a fascinating

3847
02:20:01,349 --> 02:19:58,880
talk thank you so much

3848
02:20:02,870 --> 02:20:01,359
for this conversation been great yes i

3849
02:20:07,270 --> 02:20:02,880
thought it was going to be half an hour

3850
02:20:09,270 --> 02:20:07,280
it was certainly not half an hour yeah

3851
02:20:10,630 --> 02:20:09,280
i'm sure our audience our perception of

3852
02:20:13,910 --> 02:20:10,640
time has changed

3853
02:20:15,190 --> 02:20:13,920
yes just just to wrap things up maybe

3854
02:20:18,389 --> 02:20:15,200
very briefly if you could

3855
02:20:19,510 --> 02:20:18,399
just let us know maybe do you consider

3856
02:20:23,349 --> 02:20:19,520
yourself as someone who

3857
02:20:26,110 --> 02:20:23,359
looks at the world through a pragmatic

3858
02:20:27,429 --> 02:20:26,120
lens as opposed to let's say maybe an

3859
02:20:29,190 --> 02:20:27,439
objectivist

3860
02:20:30,790 --> 02:20:29,200
lens because you know i always look at

3861
02:20:31,670 --> 02:20:30,800
the world i think there are there are

3862
02:20:33,510 --> 02:20:31,680
different

3863
02:20:35,990 --> 02:20:33,520

frameworks from which we can we can

3864
02:20:38,150 --> 02:20:36,000
choose to to look at the world and

3865
02:20:39,030 --> 02:20:38,160
to me the pragmatic approach seems to be

3866
02:20:54,630 --> 02:20:39,040
a

3867
02:20:59,110 --> 02:20:54,640
here

3868
02:21:00,630 --> 02:20:59,120
suppose both would be interesting

3869
02:21:02,070 --> 02:21:00,640
as a scientist it makes sense that that

3870
02:21:02,550 --> 02:21:02,080
you want you might want to take a more

3871
02:21:04,070 --> 02:21:02,560
objective

3872
02:21:05,990 --> 02:21:04,080
approach but maybe other person could be

3873
02:21:07,750 --> 02:21:06,000
uninteresting well i think there's

3874
02:21:08,870 --> 02:21:07,760
always a blend right i mean even

3875
02:21:11,590 --> 02:21:08,880
as a scientist there's a sort of

3876
02:21:12,389 --> 02:21:11,600
objectivity is is an ideal right you

3877
02:21:15,270 --> 02:21:12,399
don't

3878
02:21:16,630 --> 02:21:15,280
get there and much philosophy of science

3879
02:21:18,630 --> 02:21:16,640
emphasizes that

3880
02:21:20,790 --> 02:21:18,640
how in practice pragmatic it is you've

3881
02:21:23,190 --> 02:21:20,800
got to do experiments

3882
02:21:24,550 --> 02:21:23,200
you come up with testable hypotheses and

3883
02:21:27,670 --> 02:21:24,560
you don't

3884
02:21:28,630 --> 02:21:27,680
have a kind of complete it's not

3885
02:21:30,550 --> 02:21:28,640
hypothesis

3886
02:21:32,309 --> 02:21:30,560
test ruled out either it's it's sort of

3887
02:21:35,429 --> 02:21:32,319
what ideas are more

3888
02:21:37,429 --> 02:21:35,439

uh lackintosh talks about experimental

3889
02:21:41,429 --> 02:21:37,439
fecundity what framework give rise to

3890
02:21:43,270 --> 02:21:41,439
experimental predictions um

3891
02:21:45,110 --> 02:21:43,280
and so yeah i think scientifically i'm

3892
02:21:48,469 --> 02:21:45,120
quite pragmatic as well

3893
02:21:52,830 --> 02:21:48,479
i want to focus on areas

3894
02:21:54,389 --> 02:21:52,840
of the problem where progress is

3895
02:21:56,150 --> 02:21:54,399
conceivable

3896
02:21:58,230 --> 02:21:56,160
which is why you know i don't focus on

3897
02:22:00,150 --> 02:21:58,240
coming up with a trying to think up

3898
02:22:01,910 --> 02:22:00,160
some eureka solution to the heart

3899
02:22:04,630 --> 02:22:01,920
problem of consciousness

3900
02:22:07,270 --> 02:22:04,640
i don't i prefer to see if i can get

3901
02:22:10,389 --> 02:22:07,280
there by doing stuff that can be done

3902
02:22:12,230 --> 02:22:10,399
um and yeah i guess that's

3903
02:22:13,429 --> 02:22:12,240
against the answers to say yeah this

3904
02:22:14,550 --> 02:22:13,439
question part of your reasoning is that

3905
02:22:15,670 --> 02:22:14,560
part of the reason why you dislike the

3906
02:22:17,429 --> 02:22:15,680
heart problem just because of its

3907
02:22:19,830 --> 02:22:17,439
ostensible interactability

3908
02:22:20,710 --> 02:22:19,840
i i don't dislike it at all um you know

3909
02:22:24,469 --> 02:22:20,720
i think

3910
02:22:28,790 --> 02:22:24,479
very very

3911
02:22:31,429 --> 02:22:28,800
important way uh an intuition

3912
02:22:31,990 --> 02:22:31,439
about consciousness and a metaphysical

3913
02:22:35,670 --> 02:22:32,000

challenge

3914
02:22:36,070 --> 02:22:35,680
for explanations um it's just that i

3915
02:22:39,349 --> 02:22:36,080
don't

3916
02:22:41,030 --> 02:22:39,359
think addressing it head-on is the most

3917
02:22:44,389 --> 02:22:41,040
pragmatic productive

3918
02:22:46,550 --> 02:22:44,399
path for consciousness science to follow

3919
02:22:47,429 --> 02:22:46,560
okay so um i have quite a few questions

3920
02:22:48,950 --> 02:22:47,439
i'm going to list them and then you

3921
02:22:51,429 --> 02:22:48,960
could just choose one

3922
02:22:52,389 --> 02:22:51,439
whichever one feels like it'll give you

3923
02:22:56,550 --> 02:22:52,399
the most bang

3924
02:22:56,870 --> 02:22:56,560
curious you mentioned grainger causality

3925
02:22:58,150 --> 02:22:56,880
and i

3926
02:22:59,990 --> 02:22:58,160
and you said that it wasn't used often

3927
02:23:02,389 --> 02:23:00,000
in neuroscience and i want us to know

3928
02:23:03,349 --> 02:23:02,399
why is that the case then okay another

3929
02:23:04,870 --> 02:23:03,359
question was

3930
02:23:06,630 --> 02:23:04,880
the relationship between consciousness

3931
02:23:08,389 --> 02:23:06,640
and intelligence not

3932
02:23:09,830 --> 02:23:08,399
the way that intelligence is used when

3933
02:23:12,230 --> 02:23:09,840
people say artificial intelligence but

3934
02:23:13,750 --> 02:23:12,240
more like iq the neuroscientific iq

3935
02:23:15,910 --> 02:23:13,760
and i was curious if there's been any

3936
02:23:18,150 --> 02:23:15,920
tests where you give someone anesthesia

3937
02:23:19,990 --> 02:23:18,160
how much anesthesia is required is

3938
02:23:23,030 --> 02:23:20,000

proportional to the iq of the person

3939
02:23:24,870 --> 02:23:23,040
so that is one way of testing is someone

3940
02:23:26,950 --> 02:23:24,880
who has a higher intelligence

3941
02:23:28,389 --> 02:23:26,960
more conscious in some sense okay so i

3942
02:23:29,429 --> 02:23:28,399
was going to ask you okay the one i want

3943
02:23:34,230 --> 02:23:29,439
i wanted to know about

3944
02:23:39,590 --> 02:23:37,670
there's a slide in your

3945
02:23:41,110 --> 02:23:39,600
presentation i believe it was about the

3946
02:23:42,550 --> 02:23:41,120
free energy principle and how it relates

3947
02:23:43,750 --> 02:23:42,560
to hold on you just pick the one you

3948
02:23:44,790 --> 02:23:43,760
want me to ask okay

3949
02:23:46,230 --> 02:23:44,800
let's get back to artificial

3950
02:23:47,110 --> 02:23:46,240
intelligence because you have a phd in

3951
02:23:50,710 --> 02:23:47,120
it

3952
02:23:54,950 --> 02:23:50,720
the famous ones like gan

3953
02:23:56,710 --> 02:23:54,960
convolutional now yoshibok said that

3954
02:23:58,389 --> 02:23:56,720
one of the ways that the gan that the

3955
02:23:59,670 --> 02:23:58,399
generative adversarial network relates

3956
02:24:03,429 --> 02:23:59,680
to the brain is in dreams

3957
02:24:04,870 --> 02:24:03,439
he thinks that dreams are like your

3958
02:24:06,950 --> 02:24:04,880
brain testing you at your weakest point

3959
02:24:09,030 --> 02:24:06,960
almost like the adversary

3960
02:24:10,550 --> 02:24:09,040
test okay so you get the idea now i'm

3961
02:24:11,910 --> 02:24:10,560
curious

3962
02:24:14,469 --> 02:24:11,920
there's gans there's convolutional

3963
02:24:17,830 --> 02:24:14,479

recurrent lstms there's transformer

3964
02:24:20,790 --> 02:24:17,840
and boltzmann let's see

3965
02:24:22,550 --> 02:24:20,800
that's right are these different

3966
02:24:23,910 --> 02:24:22,560
architectures do you see them as related

3967
02:24:26,710 --> 02:24:23,920
to different modules in the brain

3968
02:24:27,670 --> 02:24:26,720
much like yosha said hey well the gan

3969
02:24:30,309 --> 02:24:27,680
might be response

3970
02:24:31,349 --> 02:24:30,319
somewhat related to dreams is it like

3971
02:24:33,270 --> 02:24:31,359
the convolutional

3972
02:24:34,469 --> 02:24:33,280
is how we it's our visual perception and

3973
02:24:37,270 --> 02:24:34,479
it's pretty much that

3974
02:24:39,590 --> 02:24:37,280
transformer is your ability to generate

3975
02:24:40,870 --> 02:24:39,600
dialogue

3976
02:24:43,110 --> 02:24:40,880
okay can we pick a different question

3977
02:24:44,070 --> 02:24:43,120
okay i'm not kidding i'm kidding let's

3978
02:24:46,550 --> 02:24:44,080
go with that

3979
02:24:48,070 --> 02:24:46,560
we'll have that one um we'll take it a

3980
02:24:49,030 --> 02:24:48,080
little while why is that a difficult

3981
02:24:51,030 --> 02:24:49,040
question to answer

3982
02:24:53,670 --> 02:24:51,040
it's it's kind of difficult i mean so

3983
02:24:55,990 --> 02:24:53,680
yeah my phd in ai was quite some

3984
02:24:57,429 --> 02:24:56,000
time ago but but we're actually still

3985
02:24:59,270 --> 02:24:57,439
working on in fact working on it more

3986
02:25:01,270 --> 02:24:59,280
and more these days again with some

3987
02:25:02,389 --> 02:25:01,280
super smart colleagues and grad students

3988
02:25:03,990 --> 02:25:02,399

um

3989
02:25:06,870 --> 02:25:04,000
and i think for the reason you just

3990
02:25:13,349 --> 02:25:10,309
you we have this i think

3991
02:25:16,070 --> 02:25:13,359
so it's easy to say

3992
02:25:17,750 --> 02:25:16,080
that the brain is making predictions

3993
02:25:18,870 --> 02:25:17,760
about the causes of sensory data and

3994
02:25:20,150 --> 02:25:18,880
that's what we perceive and

3995
02:25:22,710 --> 02:25:20,160
it's doing some sort of baiting

3996
02:25:25,830 --> 02:25:22,720
inference so but exactly how it's doing

3997
02:25:32,790 --> 02:25:29,510
and exactly how you can collect

3998
02:25:34,469 --> 02:25:32,800
evidence to test these ideas of exactly

3999
02:25:36,070 --> 02:25:34,479
what's going on

4000
02:25:38,309 --> 02:25:36,080
depends on having much more

4001
02:25:43,510 --> 02:25:38,319
sophisticated computational model

4002
02:25:48,710 --> 02:25:44,950
which is why i'm very interested in

4003
02:25:51,830 --> 02:25:48,720
these different classes of network

4004
02:25:52,150 --> 02:25:51,840
what can they explain about perception

4005
02:25:55,190 --> 02:25:52,160
and

4006
02:25:55,670 --> 02:25:55,200
behavior how well do they map onto what

4007
02:25:58,790 --> 02:25:55,680
we know

4008
02:26:00,790 --> 02:25:58,800
what we can measure in the brain

4009
02:26:03,590 --> 02:26:00,800
um and actually the other way around can

4010
02:26:05,910 --> 02:26:03,600
we actually develop

4011
02:26:07,349 --> 02:26:05,920
better machine learning architectures

4012
02:26:08,150 --> 02:26:07,359
through understanding more about how the

4013
02:26:10,230 --> 02:26:08,160

brain

4014
02:26:11,590 --> 02:26:10,240
does these sorts of things and there's

4015
02:26:13,830 --> 02:26:11,600
good example one of the things we're

4016
02:26:16,389 --> 02:26:13,840
working on there is for instance

4017
02:26:18,950 --> 02:26:16,399
most convolutional neural networks which

4018
02:26:21,830 --> 02:26:18,960
are extremely good at classification

4019
02:26:23,750 --> 02:26:21,840
require bucket loads of data one of the

4020
02:26:25,990 --> 02:26:23,760
reasons they started to work

4021
02:26:27,030 --> 02:26:26,000
is that they can be trained on the

4022
02:26:29,030 --> 02:26:27,040
internet

4023
02:26:30,630 --> 02:26:29,040
there's huge amounts of data and compute

4024
02:26:32,389 --> 02:26:30,640
computation power

4025
02:26:33,990 --> 02:26:32,399
um and lots of interesting little tweaks

4026
02:26:35,590 --> 02:26:34,000
but you know the principles of deep

4027
02:26:41,270 --> 02:26:35,600
networks were there

4028
02:26:47,110 --> 02:26:44,950
but we learn things

4029
02:26:48,950 --> 02:26:47,120
quite quickly we don't need exposure to

4030
02:26:50,389 --> 02:26:48,960
everything in order to learn

4031
02:26:53,590 --> 02:26:50,399
new concepts and things like that so

4032
02:26:57,670 --> 02:26:55,590
one of the things that humans and

4033
02:27:00,150 --> 02:26:57,680
animals do when they learn is they

4034
02:27:01,349 --> 02:27:00,160
select what data to learn from you pay

4035
02:27:05,030 --> 02:27:01,359
attention to different things

4036
02:27:08,950 --> 02:27:07,270
and so this opens a possibility can we

4037
02:27:10,950 --> 02:27:08,960
define can we design more efficient

4038
02:27:13,910 --> 02:27:10,960

machine learning algorithms

4039
02:27:16,389 --> 02:27:13,920
that gain efficiency through selecting

4040
02:27:19,670 --> 02:27:16,399
the data they learn from

4041
02:27:21,349 --> 02:27:19,680
um and then how do they know what data

4042
02:27:22,870 --> 02:27:21,359
to look for well that's a problem we can

4043
02:27:25,590 --> 02:27:22,880
investigate in terms of what humans do

4044
02:27:27,510 --> 02:27:25,600
is that related to the frame problem

4045
02:27:29,110 --> 02:27:27,520
no not particularly it's it's more i

4046
02:27:32,389 --> 02:27:29,120
mean that's really a problem about how

4047
02:27:34,469 --> 02:27:32,399
things come to have meaning um

4048
02:27:36,550 --> 02:27:34,479
or a single grounding frame well yeah i

4049
02:27:38,630 --> 02:27:36,560
guess that's sort of related

4050
02:27:40,230 --> 02:27:38,640
um in the sense that this is really a

4051
02:27:42,550 --> 02:27:40,240
much more much more

4052
02:27:44,790 --> 02:27:42,560
kind of yeah they're related in the

4053
02:27:46,230 --> 02:27:44,800
sense that that

4054
02:27:48,070 --> 02:27:46,240
basically how much do you need to know

4055
02:27:50,389 --> 02:27:48,080
about context and

4056
02:27:51,190 --> 02:27:50,399
things to to learn stuff but just very

4057
02:27:52,630 --> 02:27:51,200
pragmatically

4058
02:27:54,630 --> 02:27:52,640
what's the size of data set that you

4059
02:27:56,230 --> 02:27:54,640
need in order to achieve

4060
02:27:58,070 --> 02:27:56,240
certain performance and generalization

4061
02:27:59,349 --> 02:27:58,080
capacity in a network

4062
02:28:01,110 --> 02:27:59,359
so that's one way but the other way i

4063
02:28:02,309 --> 02:28:01,120

think is is more interesting from a

4064
02:28:04,230 --> 02:28:02,319
perspective what we've been talking

4065
02:28:06,550 --> 02:28:04,240
about which is

4066
02:28:10,070 --> 02:28:06,560
do any of these classes of of

4067
02:28:13,270 --> 02:28:12,120
do they serve as useful

4068
02:28:14,950 --> 02:28:13,280
[Music]

4069
02:28:16,550 --> 02:28:14,960
ways to understand what the brain is

4070
02:28:19,110 --> 02:28:16,560
actually doing how it might be

4071
02:28:19,750 --> 02:28:19,120
actually implementing or approximating

4072
02:28:22,870 --> 02:28:19,760
something like

4073
02:28:26,150 --> 02:28:22,880
bayesian inference and we'll

4074
02:28:28,630 --> 02:28:26,160
finish just with a sort of a simple

4075
02:28:29,190 --> 02:28:28,640
line of thinking here which is the still

4076
02:28:31,270 --> 02:28:29,200
currently

4077
02:28:33,110 --> 02:28:31,280
off-the-shelf networks that people are

4078
02:28:35,750 --> 02:28:33,120
still excited about

4079
02:28:37,429 --> 02:28:35,760
basically feed forward networks these

4080
02:28:41,510 --> 02:28:37,439
deep convolutional neural networks like

4081
02:28:45,270 --> 02:28:43,030
there are many layers and they're

4082
02:28:47,030 --> 02:28:45,280
trained on a lot of data

4083
02:28:49,990 --> 02:28:47,040
um but they process it in this kind of

4084
02:28:52,790 --> 02:28:51,349
seems the brain doesn't work like that

4085
02:28:54,150 --> 02:28:52,800
at all in fact the whole frameworks that

4086
02:28:54,630 --> 02:28:54,160
i've been we've been discussing are more

4087
02:28:56,870 --> 02:28:54,640
about

4088
02:28:58,630 --> 02:28:56,880

top-down predictions being reigned in by

4089
02:28:59,590 --> 02:28:58,640
sensory data they put a lot of emphasis

4090
02:29:02,870 --> 02:28:59,600
on the current

4091
02:29:07,030 --> 02:29:02,880
top down in inside out connectivity

4092
02:29:08,790 --> 02:29:07,040
um and so to model that kind of activity

4093
02:29:10,950 --> 02:29:08,800
a feed forward deep convolutional neural

4094
02:29:12,790 --> 02:29:10,960
net is not sufficient

4095
02:29:14,550 --> 02:29:12,800
so we need to have we need to look at

4096
02:29:15,910 --> 02:29:14,560
architectures that have

4097
02:29:17,030 --> 02:29:15,920
top-down connectivity that have

4098
02:29:18,950 --> 02:29:17,040
generative models and there are

4099
02:29:20,950 --> 02:29:18,960
architectures actually

4100
02:29:22,630 --> 02:29:20,960
there are architectures there are and

4101
02:29:23,510 --> 02:29:22,640
they you know there are generative

4102
02:29:24,550 --> 02:29:23,520
networks now

4103
02:29:26,070 --> 02:29:24,560
i mean there's a long history of

4104
02:29:27,590 --> 02:29:26,080
generative networks they go back to

4105
02:29:28,550 --> 02:29:27,600
variational auto encoders and things

4106
02:29:30,469 --> 02:29:28,560
like that

4107
02:29:31,750 --> 02:29:30,479
um helmholtz machines helmholtz being

4108
02:29:34,230 --> 02:29:31,760
the same guy that

4109
02:29:36,389 --> 02:29:34,240
is historically associated with

4110
02:29:39,510 --> 02:29:36,399
predictive perception and the bayesian

4111
02:29:40,309 --> 02:29:39,520
brain um but they became a little bit

4112
02:29:43,990 --> 02:29:40,319
less

4113
02:29:46,070 --> 02:29:44,000

became so powerful

4114
02:29:48,950 --> 02:29:46,080
so quickly but now there's a lot of

4115
02:29:51,910 --> 02:29:48,960
movement back towards the power of

4116
02:29:52,309 --> 02:29:51,920
of unsupervised learning of generative

4117
02:29:54,469 --> 02:29:52,319
uh

4118
02:29:56,309 --> 02:29:54,479
models in networks generative

4119
02:29:57,270 --> 02:29:56,319
adversarial networks have one example of

4120
02:29:59,349 --> 02:29:57,280
that

4121
02:30:01,030 --> 02:29:59,359
um where you know one network will try

4122
02:30:02,830 --> 02:30:01,040
and produce examples

4123
02:30:04,230 --> 02:30:02,840
uh to fool another network's

4124
02:30:08,309 --> 02:30:04,240
classification

4125
02:30:09,670 --> 02:30:08,319
um you said that joshua

4126
02:30:11,590 --> 02:30:09,680
talks about that as a good model for

4127
02:30:12,870 --> 02:30:11,600
dreams indeed it might be there are many

4128
02:30:14,550 --> 02:30:12,880
other ways to think about what dreams

4129
02:30:17,270 --> 02:30:14,560
might be doing is just sort of pruning

4130
02:30:19,830 --> 02:30:17,280
the complexity of a generative model

4131
02:30:20,710 --> 02:30:19,840
you let it free run and then you kind of

4132
02:30:23,190 --> 02:30:20,720
prune its

4133
02:30:24,550 --> 02:30:23,200
parameter space down a bit and and so

4134
02:30:25,830 --> 02:30:24,560
there are lots of i think lots of

4135
02:30:27,990 --> 02:30:25,840
interesting things

4136
02:30:29,910 --> 02:30:28,000
to be explained about perception

4137
02:30:33,270 --> 02:30:29,920
cognition and consciousness

4138
02:30:34,389 --> 02:30:33,280

through coming up with uh the right kind

4139
02:30:37,910 --> 02:30:34,399
of

4140
02:30:39,510 --> 02:30:37,920
computational model

4141
02:30:41,110 --> 02:30:39,520
and things that involve explicitly

4142
02:30:42,790 --> 02:30:41,120
generative components that for me that's

4143
02:30:44,630 --> 02:30:42,800
where the action is at the moment

4144
02:30:45,830 --> 02:30:44,640
professor thank you so much i'm

4145
02:30:46,389 --> 02:30:45,840
definitely going to be following your

4146
02:30:47,670 --> 02:30:46,399
work and

4147
02:30:49,910 --> 02:30:47,680
many of the people who are listening are

4148
02:30:51,270 --> 02:30:49,920
going to follow your work from now

4149
02:30:53,349 --> 02:30:51,280
where can people find out more about you

4150
02:30:55,670 --> 02:30:53,359
what are you working on next

4151
02:30:56,550 --> 02:30:55,680
well thank you thirsty thank you curt

4152
02:30:59,429 --> 02:30:56,560
for us that was a

4153
02:31:01,510 --> 02:30:59,439
very stimulating conversation um we

4154
02:31:03,270 --> 02:31:01,520
could go on for longer but i'm about to

4155
02:31:05,429 --> 02:31:03,280
die so i don't think

4156
02:31:06,550 --> 02:31:05,439
we can um but thank you for a wonderful

4157
02:31:08,550 --> 02:31:06,560
conversation um

4158
02:31:10,070 --> 02:31:08,560
thank you if people are not already

4159
02:31:13,030 --> 02:31:10,080
completely sick of

4160
02:31:13,990 --> 02:31:13,040
stuff that i have to say then um you can

4161
02:31:18,510 --> 02:31:14,000
find out more

4162
02:31:22,389 --> 02:31:20,070
www.anilseth.com

4163
02:31:24,230 --> 02:31:22,399

i'll leave a link in the description and

4164
02:31:25,270 --> 02:31:24,240
i think as you mentioned at the the top

4165
02:31:28,309 --> 02:31:25,280
there's

4166
02:31:31,349 --> 02:31:28,319
all this is the ted talk

4167
02:31:34,469 --> 02:31:31,359
which is out there and uh i

4168
02:31:37,590 --> 02:31:34,479
am putting the finishing touches to uh

4169
02:31:39,110 --> 02:31:37,600
a book um aimed at the informed general

4170
02:31:41,030 --> 02:31:39,120
audience so hopefully the kind of

4171
02:31:42,389 --> 02:31:41,040
people that would be watching this

4172
02:31:45,190 --> 02:31:42,399
listening to this

4173
02:31:46,469 --> 02:31:45,200
um the book is called being you a new

4174
02:31:50,630 --> 02:31:46,479
science of consciousness

4175
02:31:53,190 --> 02:31:50,640
and it all being well will be out

4176
02:31:54,550 --> 02:31:53,200
uh sometime between may and september

4177
02:31:56,950 --> 02:31:54,560
next year we haven't got a precise

4178
02:31:58,950 --> 02:31:56,960
publication date but it's

4179
02:32:00,870 --> 02:31:58,960
the plan is to publish it in the middle

4180
02:32:02,950 --> 02:32:00,880
of 2021 so

4181
02:32:04,630 --> 02:32:02,960
in less than a year and you can sign up

4182
02:32:06,389 --> 02:32:04,640
on my website for updates

4183
02:32:07,910 --> 02:32:06,399
about that book if that's something

4184
02:32:10,309 --> 02:32:07,920
you're interested in

4185
02:32:11,750 --> 02:32:10,319
okay everyone go to his website sign up

4186
02:32:12,950 --> 02:32:11,760
get notified when he comes out with this

4187
02:32:15,750 --> 02:32:12,960
book

4188
02:32:17,270 --> 02:32:15,760

follow him on do you have twitter i do

4189
02:32:18,150 --> 02:32:17,280
oh yeah yeah that's so you can follow me

4190
02:32:19,990 --> 02:32:18,160
on twitter uh

4191
02:32:21,910 --> 02:32:20,000
you'll put the link in but it's just

4192
02:32:23,110 --> 02:32:21,920
okay seth but yeah you can follow me on

4193
02:32:25,030 --> 02:32:23,120
twitter too

4194
02:32:26,469 --> 02:32:25,040
thank you again by the way how is it

4195
02:32:28,950 --> 02:32:26,479
that you stay so fit do you have a

4196
02:32:32,630 --> 02:32:28,960
regimen do you meditate do you

4197
02:32:35,590 --> 02:32:32,640
fast um oh i don't know why

4198
02:32:36,710 --> 02:32:35,600
why you think i'm i'm i'm that oh well

4199
02:32:39,110 --> 02:32:36,720
no i mean actually this

4200
02:32:40,630 --> 02:32:39,120
you look healthy one of the could be

4201
02:32:41,110 --> 02:32:40,640
wrong for me one of the weird things

4202
02:32:44,550 --> 02:32:41,120
about

4203
02:32:46,790 --> 02:32:44,560
the the pandemic this year um

4204
02:32:48,309 --> 02:32:46,800
is i've not been well not women but none

4205
02:32:51,110 --> 02:32:48,319
of us have been traveling

4206
02:32:51,429 --> 02:32:51,120
but actually i've been lucky enough not

4207
02:32:56,710 --> 02:32:51,439
to

4208
02:32:57,590 --> 02:32:56,720
and slightly paradoxically i feel fitter

4209
02:32:59,429 --> 02:32:57,600
than i

4210
02:33:01,990 --> 02:32:59,439
have normally done because i've been

4211
02:33:03,910 --> 02:33:02,000
able to keep a better routine

4212
02:33:05,830 --> 02:33:03,920
just interesting don't have jet lag all

4213
02:33:08,469 --> 02:33:05,840

the time and i can

4214
02:33:10,710 --> 02:33:08,479
build going for a run two or three times

4215
02:33:12,710 --> 02:33:10,720
a week properly into the routine so

4216
02:33:14,710 --> 02:33:12,720
actually doing uh you know looking after

4217
02:33:17,429 --> 02:33:14,720
myself has become a little bit easier

4218
02:33:19,190 --> 02:33:17,439
in some ways during this during this

4219
02:33:22,230 --> 02:33:19,200
period i find that academics

4220
02:33:23,910 --> 02:33:22,240
and people who are more interested in

4221
02:33:25,510 --> 02:33:23,920
intellectual domains tend to do well

4222
02:33:26,309 --> 02:33:25,520
during this lockdown because they like

4223
02:33:29,510 --> 02:33:26,319
to sit and

4224
02:33:31,270 --> 02:33:29,520
write and not be disturbed oh yeah

4225
02:33:33,590 --> 02:33:31,280
well if only it was like that i mean the

4226
02:33:34,389 --> 02:33:33,600
the flip side of that is i mean this has

4227
02:33:36,309 --> 02:33:34,399
been a lovely

4228
02:33:38,070 --> 02:33:36,319
conversation on zoom but the number of

4229
02:33:40,070 --> 02:33:38,080
hours that i spent on zoom time zones

4230
02:33:41,830 --> 02:33:40,080
also seem to mean less because i can now

4231
02:33:43,349 --> 02:33:41,840
just get wrapped into a meeting in

4232
02:33:45,429 --> 02:33:43,359
california and the

4233
02:33:46,630 --> 02:33:45,439
great night and australia the next

4234
02:33:51,990 --> 02:33:46,640
morning so

4235
02:33:53,190 --> 02:33:52,000
7 pm it's just coming up just uh yes

4236
02:33:55,590 --> 02:33:53,200
and lastly you went like this when you

4237
02:33:57,349 --> 02:33:55,600
said that you don't have covid

4238
02:33:59,349 --> 02:33:57,359

do you feel strange as someone who at

4239
02:34:01,590 --> 02:33:59,359
least i i would imagine you think of

4240
02:34:04,469 --> 02:34:01,600
yourself as a rational person

4241
02:34:05,190 --> 02:34:04,479
and this obviously doesn't do anything

4242
02:34:08,230 --> 02:34:05,200
but

4243
02:34:10,070 --> 02:34:08,240
you don't do this

4244
02:34:15,190 --> 02:34:10,080
something bad may happen so how does

4245
02:34:18,309 --> 02:34:17,349
a really yourself question to finish you

4246
02:34:20,710 --> 02:34:18,319
know

4247
02:34:21,830 --> 02:34:20,720
yeah i mean it's it's it's still true we

4248
02:34:23,510 --> 02:34:21,840
we still have these

4249
02:34:25,830 --> 02:34:23,520
i mean partly it's a social signal right

4250
02:34:28,230 --> 02:34:25,840
i just i just wanted to do that

4251
02:34:28,870 --> 02:34:28,240
to indicate to them to avoid having to

4252
02:34:30,870 --> 02:34:28,880
say that

4253
02:34:32,950 --> 02:34:30,880
fortunately so far i have been able to

4254
02:34:36,230 --> 02:34:32,960
avoid it's just it's kind of just a

4255
02:34:38,870 --> 02:34:36,240
gestural shortcut but still you know

4256
02:34:42,070 --> 02:34:38,880
academic understanding does not trump

4257
02:34:44,389 --> 02:34:42,080
our lived experience all the time

4258
02:34:45,750 --> 02:34:44,399
i still see colors as really existing in

4259
02:34:48,309 --> 02:34:45,760
the world

4260
02:34:51,910 --> 02:34:48,319
even though i know they are

4261
02:34:57,910 --> 02:34:54,950
so the way we the way

4262
02:34:59,590 --> 02:34:57,920
the study of consciousness changes me as

4263
02:35:03,670 --> 02:34:59,600

a person is that everything changes but

4264
02:35:07,349 --> 02:35:05,270
it's great it's a great talk thank you

4265
02:35:09,270 --> 02:35:07,359
so much thank you i look forward to your

4266
02:35:10,309 --> 02:35:09,280
to reading your book professor yes i'm

4267
02:35:13,270 --> 02:35:10,319
gonna do it hopefully

4268
02:35:14,630 --> 02:35:13,280
on vacation if it's next summer after a