



future



1
00:00:05,180 --> 00:00:03,139
okay well thank you very much it's

2
00:00:08,480 --> 00:00:05,190
really great to be here today I'd like

3
00:00:11,230 --> 00:00:08,490
to explore what quantum mechanics might

4
00:00:14,600 --> 00:00:11,240
suggest about consciousness and the

5
00:00:17,120 --> 00:00:14,610
underlying processes of matter and how

6
00:00:18,680 --> 00:00:17,130
the two might be connected which in

7
00:00:25,429 --> 00:00:18,690
likelihood has important implications

8
00:00:27,490 --> 00:00:25,439
for sight we've had a little discussion

9
00:00:32,319 --> 00:00:27,500
that I think they're very grateful for

10
00:00:35,270 --> 00:00:32,329
for the different interpretations and I

11
00:00:36,950 --> 00:00:35,280
want to start with what I think is a

12
00:00:39,049 --> 00:00:36,960
very curious and interesting feature

13
00:00:42,760 --> 00:00:39,059

about quantum mechanics which in turns

14

00:00:44,889 --> 00:00:42,770

remains very mysterious and paradoxical

15

00:00:47,270 --> 00:00:44,899

currently these are some of the primary

16

00:00:49,340 --> 00:00:47,280

interpretations I won't say too much

17

00:00:53,779 --> 00:00:49,350

about it because uh other speakers have

18

00:00:56,540 --> 00:00:53,789

said quite quite a bit they all seem to

19

00:00:58,990 --> 00:00:56,550

explain the same data and they all seem

20

00:01:02,540 --> 00:00:59,000

to radically be radically different

21

00:01:05,719 --> 00:01:02,550

interpretations of our reality and so it

22

00:01:06,830 --> 00:01:05,729

may be difficult to make it's it's a

23

00:01:10,870 --> 00:01:06,840

very curious situation it may be

24

00:01:13,789 --> 00:01:10,880

difficult to make progress going forward

25

00:01:16,249 --> 00:01:13,799

now here is the well-known Schrodinger

26

00:01:18,859 --> 00:01:16,259

equation it so happens that the Greek

27

00:01:22,030 --> 00:01:18,869

symbol for the quantum wave function is

28

00:01:24,530 --> 00:01:22,040

usually denoted by the Greek letter side

29

00:01:26,510 --> 00:01:24,540

which I think you know who knows maybe

30

00:01:28,310 --> 00:01:26,520

sort of a hint to us nevertheless

31

00:01:31,280 --> 00:01:28,320

there's something very interesting and

32

00:01:34,460 --> 00:01:31,290

puzzling about the wavefunction that I

33

00:01:36,950 --> 00:01:34,470

think merits some attention and that is

34

00:01:38,770 --> 00:01:36,960

that the quantum wave function appears

35

00:01:42,140 --> 00:01:38,780

to exist in a very very large

36

00:01:44,359 --> 00:01:42,150

dimensional space and that is the case

37

00:01:48,410 --> 00:01:44,369

for all the different interpretations of

38

00:01:51,380 --> 00:01:48,420

quantum mechanics now here's a Sean

39

00:01:53,569 --> 00:01:51,390

Carroll a well-known advocate of

40

00:01:55,940 --> 00:01:53,579

Everett's many-worlds interpretation he

41

00:01:58,670 --> 00:01:55,950

justifies that particular interpretation

42

00:02:01,760 --> 00:01:58,680

through the very high dimensionality of

43

00:02:03,160 --> 00:02:01,770

the quantum wave function but my point

44

00:02:05,569 --> 00:02:03,170

here is that all interpretations

45

00:02:08,059 --> 00:02:05,579

Copenhagen many worlds hidden variables

46

00:02:09,090 --> 00:02:08,069

must deal with this very high

47

00:02:12,300 --> 00:02:09,100

dimensionality

48

00:02:14,700 --> 00:02:12,310

the quantum wave function now usually

49

00:02:16,710 --> 00:02:14,710

when we talk about quantum mechanics end

50

00:02:19,020 --> 00:02:16,720

up in the space that it operates in

51
00:02:20,850 --> 00:02:19,030
often it's the term that is used this

52
00:02:22,950 --> 00:02:20,860
configuration of space so I thought it

53
00:02:25,770 --> 00:02:22,960
might be good just to sort of like say a

54
00:02:27,720 --> 00:02:25,780
few words about that the term for the

55
00:02:29,570 --> 00:02:27,730
mathematical space used to describe the

56
00:02:32,100 --> 00:02:29,580
space of the quantum wave function is

57
00:02:34,950 --> 00:02:32,110
configuration space which happens to be

58
00:02:38,610 --> 00:02:34,960
three times in dimensions where n is the

59
00:02:40,950 --> 00:02:38,620
number of particles in the system so for

60
00:02:43,350 --> 00:02:40,960
example in one part ordinary three space

61
00:02:46,670 --> 00:02:43,360
has a configuration space of of three

62
00:02:48,210 --> 00:02:46,680
dimensions two particles in

63
00:02:50,400 --> 00:02:48,220

three-dimensional space can be

64

00:02:54,120 --> 00:02:50,410

alternately represented as one particle

65

00:02:57,030 --> 00:02:54,130

in six dimensions now I would have loved

66

00:02:58,110 --> 00:02:57,040

to have used graphics to display that

67

00:03:03,570 --> 00:02:58,120

but it's kind of tough when you get

68

00:03:05,100 --> 00:03:03,580

beyond three dimensions now you might

69

00:03:07,950 --> 00:03:05,110

wonder well what's this really useful

70

00:03:09,810 --> 00:03:07,960

for it turns out that although

71

00:03:12,840 --> 00:03:09,820

configuration has been space has been

72

00:03:16,500 --> 00:03:12,850

used for a lot for classical physics it

73

00:03:19,260 --> 00:03:16,510

seems to be necessary or essential to

74

00:03:21,000 --> 00:03:19,270

describe of quantum mechanics and that's

75

00:03:24,180 --> 00:03:21,010

because basically of quantum

76
00:03:26,220 --> 00:03:24,190
entanglement a quantum system is can be

77
00:03:28,770 --> 00:03:26,230
can be understood be sort of a complex

78
00:03:32,070 --> 00:03:28,780
whole that cannot be understood solely

79
00:03:34,380 --> 00:03:32,080
on the analysis of individual parts the

80
00:03:36,630 --> 00:03:34,390
quantum wave function itself can be

81
00:03:38,640 --> 00:03:36,640
understood as operating in because of

82
00:03:41,340 --> 00:03:38,650
that has to operating in three times in

83
00:03:44,970 --> 00:03:41,350
dimensions three because of the possible

84
00:03:47,130 --> 00:03:44,980
spatial dimensions so one of the key

85
00:03:48,780 --> 00:03:47,140
questions of my talk is what are the

86
00:03:50,840 --> 00:03:48,790
implications of this high dimensional

87
00:03:56,010 --> 00:03:50,850
space

88
00:03:58,410 --> 00:03:56,020

now David Bohm I think the physicist was

89

00:04:00,450 --> 00:03:58,420

one of the first to really embrace and

90

00:04:02,310 --> 00:04:00,460

use the fact of the way functioning

91

00:04:05,340 --> 00:04:02,320

existing in this high dimensional space

92

00:04:08,280 --> 00:04:05,350

in Bohm's early work which is known

93

00:04:11,660 --> 00:04:08,290

usually as hidden variables or de Broglie-Bohm

94

00:04:16,020 --> 00:04:11,670

de Broglie-Bohm framework his guidance

95

00:04:18,510 --> 00:04:16,030

equation depends on the position of all

96

00:04:19,640 --> 00:04:18,520

the particles in the system but for Bohm

97

00:04:22,069 --> 00:04:19,650

the system is

98

00:04:23,990 --> 00:04:22,079

the universe so his guidance equation

99

00:04:29,749 --> 00:04:24,000

depends on the configuration of the

100

00:04:32,150 --> 00:04:29,759

universe now this might seem like a kind

101
00:04:34,400 --> 00:04:32,160
of a radical step although perhaps not

102
00:04:37,040 --> 00:04:34,410
necessarily as radical as the other

103
00:04:39,650 --> 00:04:37,050
alternatives that are on the table

104
00:04:42,260 --> 00:04:39,660
the challenge for bohmian mekin

105
00:04:43,879 --> 00:04:42,270
McKenna's is is they're often known that

106
00:04:45,890 --> 00:04:43,889
is the philosophers and physicists who

107
00:04:48,590 --> 00:04:45,900
follow bones hidden variables framework

108
00:04:50,960 --> 00:04:48,600
is how to interpret how to think about

109
00:04:56,240 --> 00:04:50,970
this incredibly high number of

110
00:04:57,080 --> 00:04:56,250
dimensions that this requires so bones

111
00:04:59,600 --> 00:04:57,090
approach

112
00:05:01,159 --> 00:04:59,610
unlike other alternatives provides us

113
00:05:04,430 --> 00:05:01,169

with a way of thinking about subatomic

114

00:05:05,840 --> 00:05:04,440

particles that is in some sense more

115

00:05:08,960 --> 00:05:05,850

congruent with our classical

116

00:05:10,790 --> 00:05:08,970

understanding by pushing the paradoxes

117

00:05:13,189 --> 00:05:10,800

of quantum mechanics into a deeper

118

00:05:20,529 --> 00:05:13,199

underlying strata of reality that is

119

00:05:23,390 --> 00:05:20,539

inherently non-local and holistic so

120

00:05:25,430 --> 00:05:23,400

among the bohmian economists and i'm

121

00:05:29,990 --> 00:05:25,440

mechanists and the i'm an economist so

122

00:05:33,230 --> 00:05:30,000

sometimes I get mixed up the that is my

123

00:05:35,629 --> 00:05:33,240

day job as any comes um let's see where

124

00:05:38,469 --> 00:05:35,639

was I there's an interesting debate

125

00:05:40,700 --> 00:05:38,479

that's been broken out broken out among

126

00:05:42,800 --> 00:05:40,710

people who are sort of following Bohm

127

00:05:45,770 --> 00:05:42,810

and that is what is what do we make of

128

00:05:50,899 --> 00:05:45,780

this high dimensional reality David

129

00:05:52,189 --> 00:05:50,909

Albert argues that a realistic view of

130

00:05:54,469 --> 00:05:52,199

quantum mechanics requires an

131

00:05:56,779 --> 00:05:54,479

understanding of the world playing out

132

00:05:59,149 --> 00:05:56,789

in a mind-numbing ly high dimensional

133

00:06:01,010 --> 00:05:59,159

space and then he proceeds to argue or

134

00:06:01,850 --> 00:06:01,020

try to think through what does it mean

135

00:06:04,490 --> 00:06:01,860

that we're in this three dimensional

136

00:06:06,680 --> 00:06:04,500

space how do we get from infinite

137

00:06:10,339 --> 00:06:06,690

dimension or close to infant Mitchell to

138

00:06:12,140 --> 00:06:10,349

three dimensional reality others such as

139

00:06:15,140 --> 00:06:12,150

the philosopher Tim maudlin argues that

140

00:06:16,629 --> 00:06:15,150

that's too radical a step configuration

141

00:06:19,129 --> 00:06:16,639

space is best understood as a

142

00:06:20,960 --> 00:06:19,139

mathematical tool for defining the

143

00:06:22,159 --> 00:06:20,970

wavefunction which in turn describes the

144

00:06:24,529 --> 00:06:22,169

behavior of particles in

145

00:06:26,719 --> 00:06:24,539

three-dimensional space okay then there

146

00:06:28,730 --> 00:06:26,729

are others are goldstein and some of the

147

00:06:30,860 --> 00:06:28,740

other very influential people in this

148

00:06:32,540 --> 00:06:30,870

literature that argued that the quantum

149

00:06:34,700 --> 00:06:32,550

mechanical function can be understood

150

00:06:36,170 --> 00:06:34,710

as functioning in 3-space while the

151

00:06:38,150 --> 00:06:36,180

higher dimensional properties of the

152

00:06:40,130 --> 00:06:38,160

configuration space of the wavefunction

153

00:06:45,410 --> 00:06:40,140

might best be interpreted to be

154

00:06:47,870 --> 00:06:45,420

something like laws of nature okay so so

155

00:06:51,920 --> 00:06:47,880

so there we have some of the debate now

156

00:06:53,710 --> 00:06:51,930

I like North's argument she argues that

157

00:06:56,870 --> 00:06:53,720

the dynamics of the wavefunction

158

00:06:59,840 --> 00:06:56,880

requires a high dimensional space that

159

00:07:02,150 --> 00:06:59,850

is while the quantum wave function

160

00:07:04,370 --> 00:07:02,160

operates on particles that are observed

161

00:07:07,430 --> 00:07:04,380

in free space quantum states since

162

00:07:09,590 --> 00:07:07,440

they're entangled cannot be adequately

163

00:07:12,350 --> 00:07:09,600

captured with a wave function in three

164

00:07:14,390 --> 00:07:12,360

dimensions North argues that our

165

00:07:17,300 --> 00:07:14,400

three-dimensional space in all the

166

00:07:20,180 --> 00:07:17,310

objects contained within are real but

167

00:07:22,180 --> 00:07:20,190

not fundamental she argues that the wave

168

00:07:24,380 --> 00:07:22,190

function exists in a high dimensional

169

00:07:33,140 --> 00:07:24,390

fundamental space which is the

170

00:07:35,240 --> 00:07:33,150

foundation of objects in our world so so

171

00:07:36,950 --> 00:07:35,250

on one side of the debate we have the

172

00:07:39,350 --> 00:07:36,960

view that there is a real high

173

00:07:41,990 --> 00:07:39,360

dimensional space that is foundational

174

00:07:43,700 --> 00:07:42,000

in some sense the other side argues that

175

00:07:45,830 --> 00:07:43,710

this is nothing more than a mathematical

176

00:07:49,310 --> 00:07:45,840

space that describes the behavior of our

177

00:07:51,590 --> 00:07:49,320

particles in three space so one sort of

178

00:07:54,260 --> 00:07:51,600

question for me that arises is apart

179

00:07:56,750 --> 00:07:54,270

from the entanglements within the

180

00:08:00,190 --> 00:07:56,760

quantum mechanical system why should we

181

00:08:03,080 --> 00:08:00,200

require such a high dimensional space

182

00:08:05,570 --> 00:08:03,090

now as you're probably well aware a

183

00:08:09,050 --> 00:08:05,580

David Bohm actually took his work beyond

184

00:08:10,610 --> 00:08:09,060

just his hidden variables approach he

185

00:08:13,190 --> 00:08:10,620

didn't stuck with his guidance equation

186

00:08:15,410 --> 00:08:13,200

in configuration space he posited that

187

00:08:17,270 --> 00:08:15,420

particles such as electrons were

188

00:08:20,090 --> 00:08:17,280

projections of a higher dimensional

189

00:08:27,260 --> 00:08:20,100

reality which he termed the implicit

190

00:08:29,630 --> 00:08:27,270

order so the implicit order the idea

191

00:08:33,130 --> 00:08:29,640

that there's this underlying strata of

192

00:08:35,930 --> 00:08:33,140

reality that is fundamentally holistic

193

00:08:38,230 --> 00:08:35,940

suggested a possible link with something

194

00:08:40,850 --> 00:08:38,240

else that is fundamentally holistic

195

00:08:43,400 --> 00:08:40,860

consciousness so Bohn proposed an

196

00:08:45,139 --> 00:08:43,410

implicit order as a foundation for both

197

00:08:48,269 --> 00:08:45,149

consciousness and

198

00:08:49,110 --> 00:08:48,279

however is you might sort of guess most

199

00:08:51,930 --> 00:08:49,120

physicists

200

00:08:57,510 --> 00:08:51,940

even the ones I was citing earlier have

201
00:09:00,329 --> 00:08:57,520
a reluctant to take this step now before

202
00:09:01,740 --> 00:09:00,339
we sort of like dismiss bombs ideas

203
00:09:04,769 --> 00:09:01,750
about consciousness so forth

204
00:09:07,530 --> 00:09:04,779
let's take stock of a few things first

205
00:09:08,699 --> 00:09:07,540
of all consciousness does remain

206
00:09:12,690 --> 00:09:08,709
unexplained

207
00:09:14,790 --> 00:09:12,700
in fact it's a pretty hard problem no

208
00:09:18,000 --> 00:09:14,800
theories of consciousness are grounded

209
00:09:19,949 --> 00:09:18,010
in the laws of physics nothing in the

210
00:09:22,650 --> 00:09:19,959
laws of physics is that we have on the

211
00:09:26,690 --> 00:09:22,660
books suggest how consciousness might

212
00:09:29,280 --> 00:09:26,700
emerge from non conscious particles so

213
00:09:31,440 --> 00:09:29,290

another stumbling block for physicists

214

00:09:33,350 --> 00:09:31,450

to try to sort of consider consciousness

215

00:09:35,850 --> 00:09:33,360

is of course it's very the very

216

00:09:39,410 --> 00:09:35,860

difficulty in and the great difficulty

217

00:09:43,980 --> 00:09:39,420

in defining it or analyzing it however

218

00:09:46,350 --> 00:09:43,990

it is nevertheless real in fact because

219

00:09:51,530 --> 00:09:46,360

we experience it directly it is arguably

220

00:09:54,030 --> 00:09:51,540

more real than a lot of the a lot of our

221

00:09:56,310 --> 00:09:54,040

particles or theories about particles

222

00:10:02,400 --> 00:09:56,320

that are based on assumptions beliefs

223

00:10:05,269 --> 00:10:02,410

and and and so forth so so I want to say

224

00:10:08,100 --> 00:10:05,279

a few more words about this this idea of

225

00:10:10,920 --> 00:10:08,110

consciousness versus matter a few weeks

226

00:10:13,769 --> 00:10:10,930

ago the philosopher Galen Strawson wrote

227

00:10:17,220 --> 00:10:13,779

an essay in the New York Times where he

228

00:10:20,160 --> 00:10:17,230

was basically trying to sort of argue

229

00:10:23,430 --> 00:10:20,170

that consciousness we we experience

230

00:10:25,790 --> 00:10:23,440

directly directly not so much matter so

231

00:10:29,040 --> 00:10:25,800

what's what's this thing about matter

232

00:10:31,110 --> 00:10:29,050

what he really sort of sort of went into

233

00:10:33,110 --> 00:10:31,120

is is a Bertrand Russell's argument

234

00:10:36,210 --> 00:10:33,120

which I want to say a few words about

235

00:10:37,860 --> 00:10:36,220

Bertrand Russell famous philosopher you

236

00:10:40,410 --> 00:10:37,870

all know that he wasn't really a big fan

237

00:10:43,680 --> 00:10:40,420

of probably not a big fan of paranormal

238

00:10:45,960 --> 00:10:43,690

parapsychology but turns out he does

239

00:10:47,579 --> 00:10:45,970

have a very influential theory that

240

00:10:50,190 --> 00:10:47,589

suggests consciousness in some sense

241

00:10:51,660 --> 00:10:50,200

fundamental Russell argued that our

242

00:10:54,360 --> 00:10:51,670

objective knowledge of the world is

243

00:10:56,780 --> 00:10:54,370

based on abstract mathematical

244

00:10:59,930 --> 00:10:56,790

relationships and structures but it

245

00:11:02,480 --> 00:10:59,940

but is silent on what is the intrinsic

246

00:11:05,840 --> 00:11:02,490

aspect of reality whatever the essential

247

00:11:08,510 --> 00:11:05,850

seed stuff is now we might consider that

248

00:11:10,310 --> 00:11:08,520

the intrinsic aspect of reality is his

249

00:11:14,420 --> 00:11:10,320

and his argument is closely related to

250

00:11:16,010 --> 00:11:14,430

our direct experiment experience he

251

00:11:18,170 --> 00:11:16,020

added that our experience of the

252

00:11:22,040 --> 00:11:18,180

physical world suggests consciousness

253

00:11:24,200 --> 00:11:22,050

and matter or actually Oh be alike more

254

00:11:27,290 --> 00:11:24,210

alike than not alike therefore

255

00:11:28,850 --> 00:11:27,300

consciousness matter may be interlinked

256

00:11:32,090 --> 00:11:28,860

linked to a greater degree than is

257

00:11:33,500 --> 00:11:32,100

usually realized often philosophers have

258

00:11:35,960 --> 00:11:33,510

used this argument is a kind of

259

00:11:38,810 --> 00:11:35,970

jumping-off point for some version of

260

00:11:43,010 --> 00:11:38,820

Pan psychism however Russell advocated

261

00:11:44,920 --> 00:11:43,020

neural neutral monism so Russell and

262

00:11:48,260 --> 00:11:44,930

Bohm appeared to be on the same page

263

00:11:51,170 --> 00:11:48,270

coming from different directions Russell

264

00:11:53,300 --> 00:11:51,180

with a phenomenological approach coupled

265

00:11:55,910 --> 00:11:53,310

with some additional philosophical

266

00:11:57,590 --> 00:11:55,920

reasoning and bone with an

267

00:11:59,930 --> 00:11:57,600

interpretation of quantum mechanics with

268

00:12:03,260 --> 00:11:59,940

stresses inherently holistic processes

269

00:12:05,450 --> 00:12:03,270

so perhaps the answer to the question

270

00:12:07,430 --> 00:12:05,460

that we raised earlier why do we need a

271

00:12:10,640 --> 00:12:07,440

higher dimensional space perhaps is to

272

00:12:13,250 --> 00:12:10,650

provide a ground or a foundation for

273

00:12:15,200 --> 00:12:13,260

both matter and consciousness thus

274

00:12:19,400 --> 00:12:15,210

perhaps consciousness itself requires

275

00:12:21,860 --> 00:12:19,410

this high dimensional space now to

276

00:12:24,080 --> 00:12:21,870

explore this a little bit more fully I

277

00:12:27,260 --> 00:12:24,090

think I'd like to take a little detour

278

00:12:29,420 --> 00:12:27,270

and consider Toni knees integrated

279

00:12:32,780 --> 00:12:29,430

information theory

280

00:12:34,640 --> 00:12:32,790

iit attempts to develop a mathematical

281

00:12:36,350 --> 00:12:34,650

framework I'm sure many of you are

282

00:12:38,360 --> 00:12:36,360

probably a little bit familiar with this

283

00:12:40,430 --> 00:12:38,370

it's not a great deal develop a

284

00:12:42,020 --> 00:12:40,440

mathematical framework for measuring the

285

00:12:45,410 --> 00:12:42,030

degree of consciousness that a system

286

00:12:48,680 --> 00:12:45,420

has now to be clear - Nene embraces a

287

00:12:51,110 --> 00:12:48,690

type of pan psychism not the kind of

288

00:12:53,120 --> 00:12:51,120

neutral monism that i've been exploring

289

00:12:54,710 --> 00:12:53,130

here but i hope to explain how his

290

00:12:57,590 --> 00:12:54,720

framework nevertheless may give us some

291

00:13:00,680 --> 00:12:57,600

insights to Anini notes that our

292

00:13:03,380 --> 00:13:00,690

conscious experience includes a wide

293

00:13:07,100 --> 00:13:03,390

range of different qualia color of the

294

00:13:10,340 --> 00:13:07,110

carpet texture of the air sound of my

295

00:13:10,850 --> 00:13:10,350

voice all included in an integrated

296

00:13:14,720 --> 00:13:10,860

whole

297

00:13:17,270 --> 00:13:14,730

underlying under underlying this unity

298

00:13:23,800 --> 00:13:17,280

as a multitude of causal interactions

299

00:13:26,420 --> 00:13:23,810

among relevant parts of the brain so IIT

300

00:13:29,330 --> 00:13:26,430

claims that consciousness exists in any

301
00:13:31,790 --> 00:13:29,340
system of integrated information such as

302
00:13:37,340 --> 00:13:31,800
complex neural systems biological

303
00:13:39,530 --> 00:13:37,350
systems however also perhaps perhaps the

304
00:13:40,700 --> 00:13:39,540
internet as well okay I can't get this

305
00:13:43,580 --> 00:13:40,710
word never mind

306
00:13:46,400 --> 00:13:43,590
so so because it's an integrated system

307
00:13:48,710 --> 00:13:46,410
as well integrated information so it's a

308
00:13:49,400 --> 00:13:48,720
kind of so it does embrace a kind of pen

309
00:13:54,650 --> 00:13:49,410
psychism

310
00:13:59,120 --> 00:13:54,660
okay so ITT IIT also suggests say a

311
00:14:01,000 --> 00:13:59,130
higher dimensional qualia space within

312
00:14:04,130 --> 00:14:01,010
this framework of integrated information

313
00:14:05,540 --> 00:14:04,140

in experience we might have is comprised

314

00:14:09,220 --> 00:14:05,550

as a collection of cuale

315

00:14:12,020 --> 00:14:09,230

any and the dimension of this space

316

00:14:15,260 --> 00:14:12,030

depends on the possible combination of

317

00:14:17,540 --> 00:14:15,270

the network elements so obviously the

318

00:14:19,220 --> 00:14:17,550

the more complex the system then the the

319

00:14:21,320 --> 00:14:19,230

greater the dimensional space is

320

00:14:23,690 --> 00:14:21,330

required so even a relatively simple

321

00:14:28,990 --> 00:14:23,700

organism such as a worm could have a

322

00:14:37,940 --> 00:14:36,140

so in experience in this sort of

323

00:14:41,150 --> 00:14:37,950

relatively high dimensional quality of

324

00:14:43,370 --> 00:14:41,160

space would be in antonin into Nonis

325

00:14:46,550 --> 00:14:43,380

Antonis papers he describes it as a very

326
00:14:48,860 --> 00:14:46,560
very complex geometrical form comprised

327
00:14:51,740 --> 00:14:48,870
of various informational relationships

328
00:14:55,010 --> 00:14:51,750
within the system however to avoid

329
00:14:56,720 --> 00:14:55,020
confusion I want to just add something

330
00:14:59,090 --> 00:14:56,730
the dimensional space we're discussing

331
00:15:00,680 --> 00:14:59,100
earlier in quantum mechanics you know

332
00:15:03,230 --> 00:15:00,690
three times n times the number of

333
00:15:05,540 --> 00:15:03,240
particles in the universe is much much

334
00:15:08,300 --> 00:15:05,550
higher than we're describing I'm here

335
00:15:10,340 --> 00:15:08,310
based on the the possible combinations

336
00:15:11,690 --> 00:15:10,350
although that is very very high - so I

337
00:15:14,660 --> 00:15:11,700
just sort of want to make note I don't

338
00:15:16,430 --> 00:15:14,670

want to cream confusion my point is is

339

00:15:19,160 --> 00:15:16,440

that as we try to analyze our subjective

340

00:15:21,100 --> 00:15:19,170

experience in a formal information

341

00:15:23,820 --> 00:15:21,110

experiment

342

00:15:25,620 --> 00:15:23,830

because of its holistic nature

343

00:15:27,180 --> 00:15:25,630

we we need to sort of go in the

344

00:15:29,280 --> 00:15:27,190

direction of higher dimension much

345

00:15:32,880 --> 00:15:29,290

higher dimensional space than three than

346

00:15:36,500 --> 00:15:32,890

three space now here's a question though

347

00:15:39,720 --> 00:15:36,510

now in a lot of ways IET is his has been

348

00:15:42,030 --> 00:15:39,730

he's gotten a lot of attention it's

349

00:15:44,280 --> 00:15:42,040

gotten very um it's gotten very very

350

00:15:46,410 --> 00:15:44,290

influential seems to be a reasonable

351
00:15:49,620 --> 00:15:46,420
framework for exploring consciousness in

352
00:15:52,080 --> 00:15:49,630
terms of network of information provides

353
00:15:55,290 --> 00:15:52,090
plausible candidates for necessary

354
00:15:57,990 --> 00:15:55,300
conditions but is it sufficient I mean

355
00:15:59,820 --> 00:15:58,000
after all if my it predicts that my

356
00:16:02,700 --> 00:15:59,830
cellphone is conscious it predicts that

357
00:16:04,680 --> 00:16:02,710
the Internet is conscious so it seems

358
00:16:07,380 --> 00:16:04,690
like maybe some piece might be missing

359
00:16:09,210 --> 00:16:07,390
you know that's that's that's of course

360
00:16:14,870 --> 00:16:09,220
something that the philosopher is

361
00:16:18,240 --> 00:16:14,880
debating it i think you know wonder about

362
00:16:20,000 --> 00:16:18,250
so IIT suggests that conscious

363
00:16:22,680 --> 00:16:20,010

experience can be described as

364

00:16:24,510 --> 00:16:22,690

relationships of information but as I

365

00:16:27,150 --> 00:16:24,520

suggest we may not be able to

366

00:16:30,630 --> 00:16:27,160

substantiate that with actual experience

367

00:16:33,000 --> 00:16:30,640

and this problem seems to me to parallel

368

00:16:34,650 --> 00:16:33,010

Russell's argument that our objective

369

00:16:37,530 --> 00:16:34,660

knowledge of matter depicts

370

00:16:41,700 --> 00:16:37,540

relationships of causality but not in

371

00:16:44,580 --> 00:16:41,710

trend in intrinsic experience so perhaps I

372

00:16:46,590 --> 00:16:44,590

T requires some kind of grounding in a

373

00:16:48,840 --> 00:16:46,600

much higher dimensional space that could

374

00:16:50,820 --> 00:16:48,850

sort of fit into the dimensional space

375

00:16:53,850 --> 00:16:50,830

that we've been describing somehow

376
00:16:56,690 --> 00:16:53,860
perhaps something something like neutral

377
00:17:03,600 --> 00:16:56,700
monism along the lines that Bowman

378
00:17:04,199 --> 00:17:03,610
Russell suggested so so could such a

379
00:17:06,570 --> 00:17:04,209
step

380
00:17:08,100 --> 00:17:06,580
complete Tony nice framework I'm not

381
00:17:09,720 --> 00:17:08,110
really trying to make that argument I

382
00:17:11,490 --> 00:17:09,730
don't think I've really done justice to

383
00:17:14,520 --> 00:17:11,500
his very sophisticated framework I'm

384
00:17:15,930 --> 00:17:14,530
only trying to sort of glean some

385
00:17:18,300 --> 00:17:15,940
insights into how thinking about

386
00:17:20,340 --> 00:17:18,310
consciousness in a formal informational

387
00:17:22,770 --> 00:17:20,350
framework seems acquires through a lot

388
00:17:25,140 --> 00:17:22,780

to think about relatively high

389

00:17:27,120 --> 00:17:25,150

dimensions which in turn may require

390

00:17:30,510 --> 00:17:27,130

something like the infinite dimensional

391

00:17:34,490 --> 00:17:30,520

space of quantum mechanics and how it

392

00:17:41,660 --> 00:17:40,160

so this sort of like leads to what I

393

00:17:44,750 --> 00:17:41,670

think is a very interesting question

394

00:17:47,990 --> 00:17:44,760

does our experience inhabit a much

395

00:17:53,000 --> 00:17:48,000

higher dimensional space does our

396

00:17:55,370 --> 00:17:53,010

subjective experience inhabit a reality

397

00:17:59,390 --> 00:17:55,380

considerably higher dimension than the

398

00:18:02,090 --> 00:17:59,400

three-dimensional space that that we in

399

00:18:04,340 --> 00:18:02,100

some sense are used to perhaps we've

400

00:18:08,810 --> 00:18:04,350

sort of filtered out some aspects of

401
00:18:11,950 --> 00:18:08,820
reality well I don't have time to sort

402
00:18:15,200 --> 00:18:11,960
of like explore the possible SCI

403
00:18:17,030 --> 00:18:15,210
implications for SCI but just you know

404
00:18:19,880 --> 00:18:17,040
briefly I'll just note that BOMs

405
00:18:22,400 --> 00:18:19,890
implicit order is essentially a high

406
00:18:25,250 --> 00:18:22,410
dimensional space as a playground of

407
00:18:28,640 --> 00:18:25,260
non-local holistic proto conscious

408
00:18:31,160 --> 00:18:28,650
reality of pure potential and I believe

409
00:18:33,620 --> 00:18:31,170
this is an excellent framework for

410
00:18:34,880 --> 00:18:33,630
understanding the the micro side side

411
00:18:37,690 --> 00:18:34,890
data obtained under laboratory

412
00:18:40,880 --> 00:18:37,700
conditions and it could be a very rich

413
00:18:43,070 --> 00:18:40,890

framework for perhaps some of the micro

414

00:18:45,380 --> 00:18:43,080

site as well but I'm not really prepared

415

00:18:47,030 --> 00:18:45,390

to speculate too much but I think it

416

00:18:52,130 --> 00:18:47,040

really does give us a very sort of

417

00:18:55,790 --> 00:18:52,140

something to think about so just want to

418

00:18:59,540 --> 00:18:55,800

wrap up just some key points the

419

00:19:01,490 --> 00:18:59,550

standard quantum wave weighted wave

420

00:19:03,170 --> 00:19:01,500

function functions in a high dimensional

421

00:19:05,860 --> 00:19:03,180

space and of course this doesn't really

422

00:19:08,390 --> 00:19:05,870

depend on you know the interpretation

423

00:19:10,970 --> 00:19:08,400

Bohm argued that this high dimensional

424

00:19:13,160 --> 00:19:10,980

space is an underlying strata of reality

425

00:19:16,100 --> 00:19:13,170

that is non-local and inherently

426

00:19:19,790 --> 00:19:16,110

holistic and in later work posited as a

427

00:19:22,250 --> 00:19:19,800

foundation for mind and matter and as I

428

00:19:24,710 --> 00:19:22,260

as I just mentioned I think that this

429

00:19:26,990 --> 00:19:24,720

interpretation of quantum mechanics and

430

00:19:29,600 --> 00:19:27,000

consciousness is consistent with many

431

00:19:31,130 --> 00:19:29,610

categories of aside data so thank you

432

00:19:36,620 --> 00:19:31,140

very much

433

00:19:41,239 --> 00:19:36,630

[Applause]

434

00:19:46,739 --> 00:19:44,310

okay we have quite a bit of time for

435

00:19:57,359 --> 00:19:46,749

questions here so people would like to

436

00:20:01,739 --> 00:19:57,369

come line up hi

437

00:20:03,629 --> 00:20:01,749

so I always thought that right so I

438

00:20:04,859 --> 00:20:03,639

always thought that I guess I'm sort of

439

00:20:06,989 --> 00:20:04,869

a radical empiricist

440

00:20:11,599 --> 00:20:06,999

so I wonder what you'll think about this

441

00:20:14,070 --> 00:20:11,609

I feel like all all we can be sure of

442

00:20:15,570 --> 00:20:14,080

empirically is consciousness because

443

00:20:17,310 --> 00:20:15,580

that's all we basically that's our first

444

00:20:20,909 --> 00:20:17,320

everything else is imprints right so

445

00:20:23,729 --> 00:20:20,919

matters in prints right so isn't it

446

00:20:26,039 --> 00:20:23,739

easier instead of taking a neutral a

447

00:20:28,409 --> 00:20:26,049

modus position and in terms of trying to

448

00:20:31,979 --> 00:20:28,419

find parallels with QM to just take an

449

00:20:33,779 --> 00:20:31,989

idealist position and say so that the

450

00:20:36,629 --> 00:20:33,789

about high dimensional space is more

451
00:20:38,190 --> 00:20:36,639
like the foundational consciousness and

452
00:20:40,709 --> 00:20:38,200
that matter is more like the actualized

453
00:20:43,229 --> 00:20:40,719
you know evolution of the particles yeah

454
00:20:45,779 --> 00:20:43,239
that's an excellent question one of the

455
00:20:48,989 --> 00:20:45,789
sort of like problems with maybe neutral

456
00:20:51,839 --> 00:20:48,999
monism is that if we sort of posit a

457
00:20:53,459 --> 00:20:51,849
proto conscious you know strata well

458
00:20:55,229 --> 00:20:53,469
does that what does that really mean is

459
00:20:56,549 --> 00:20:55,239
it conscious or is it unconscious or

460
00:21:00,060 --> 00:20:56,559
there's something in between but how can

461
00:21:02,820 --> 00:21:00,070
it be in between you know so I I'm

462
00:21:04,320 --> 00:21:02,830
inclined to in William James who you

463
00:21:07,619 --> 00:21:04,330

know as a big fan of radical empiricism

464

00:21:10,440 --> 00:21:07,629

was also a fan of neutral monism but he

465

00:21:12,539 --> 00:21:10,450

his version was pure awareness so he

466

00:21:14,369 --> 00:21:12,549

actually and this isn't necessarily

467

00:21:16,440 --> 00:21:14,379

where I'm not sure this is where

468

00:21:18,180 --> 00:21:16,450

everyone but it but I kind of like that

469

00:21:21,239 --> 00:21:18,190

I kind of like William James version of

470

00:21:25,739 --> 00:21:21,249

pure awareness it was sort of like sort

471

00:21:27,779 --> 00:21:25,749

of like an unfiltered kind of awareness

472

00:21:31,769 --> 00:21:27,789

that gets conditioned into our

473

00:21:33,749 --> 00:21:31,779

biological kinds of you know or or let's

474

00:21:35,759 --> 00:21:33,759

say an unconditional awareness that gets

475

00:21:38,969 --> 00:21:35,769

conditioned through through our biology

476

00:21:40,889 --> 00:21:38,979

culture and so forth so I don't have a

477

00:21:43,019 --> 00:21:40,899

strong statement but it's a good

478

00:21:45,240 --> 00:21:43,029

question that I'm not that I still sort

479

00:21:47,400 --> 00:21:45,250

of like now a lot of people

480

00:21:49,380 --> 00:21:47,410

shy away from idealism because I think

481

00:21:51,990 --> 00:21:49,390

they're just a little bit you know the

482

00:21:53,670 --> 00:21:52,000

idea that is that the MOT that what we

483

00:21:56,130 --> 00:21:53,680

sort of experience for our mind seems to

484

00:21:57,780 --> 00:21:56,140

have a sort of unstable much much more

485

00:22:00,150 --> 00:21:57,790

unstable characteristic than what we

486

00:22:02,100 --> 00:22:00,160

observe when we look at matter so I

487

00:22:04,980 --> 00:22:02,110

think that so I think there's there's

488

00:22:06,630 --> 00:22:04,990

tendency to say well okay if we're not

489

00:22:11,310 --> 00:22:06,640

looking at if we're not aware does that

490

00:22:17,190 --> 00:22:11,320

you know make it go away or or and so I

491

00:22:19,290 --> 00:22:17,200

think some people may yeah are a little

492

00:22:22,470 --> 00:22:19,300

bit reluctant with with with idealism

493

00:22:24,810 --> 00:22:22,480

but I think that it may be that ideal I

494

00:22:27,300 --> 00:22:24,820

think that neutral monism does have at

495

00:22:29,340 --> 00:22:27,310

least in my view I I do a I do like the

496

00:22:31,740 --> 00:22:29,350

idea of a some kind of like maybe pure

497

00:22:38,550 --> 00:22:31,750

awareness that we as William James put

498

00:22:42,030 --> 00:22:38,560

on the table since nobody else has come

499

00:22:45,450 --> 00:22:42,040

up to get in line I'd like to offer a

500

00:22:47,940 --> 00:22:45,460

couple of comments first by way of a

501

00:22:51,420 --> 00:22:47,950

clarification the infinite dimensional

502

00:22:53,490 --> 00:22:51,430

hilbert space of quantum formalism has

503

00:22:55,680 --> 00:22:53,500

nothing to do with the three x n

504

00:22:58,410 --> 00:22:55,690

dimensional configuration space that's