

1
00:00:17,320 --> 00:00:23,149
this morning I talked about some of the

2
00:00:20,390 --> 00:00:26,028
dogmas of science and what happens when

3
00:00:23,149 --> 00:00:27,829
you turn them into questions and this

4
00:00:26,028 --> 00:00:33,189
afternoon I'm going to start with the

5
00:00:27,829 --> 00:00:33,189
dogma that the laws of nature are fixed

6
00:00:33,549 --> 00:00:41,449
this Dogma has a long history and it

7
00:00:37,340 --> 00:00:43,220
really goes back to ancient Greece the

8
00:00:41,450 --> 00:00:46,660
ancient Greek philosophers were

9
00:00:43,219 --> 00:00:50,769
concerned with the nature of reality and

10
00:00:46,659 --> 00:00:52,789
they thought reality was eternal

11
00:00:50,770 --> 00:00:55,250
probably they arrived at that idea

12
00:00:52,789 --> 00:00:57,469
through mystical experience many mystics

13
00:00:55,250 --> 00:00:59,840
have the experienced as a timeless realm

14
00:00:57,469 --> 00:01:02,750
which is more real than the world we

15
00:00:59,840 --> 00:01:05,618
live in and in ancient Greece they tried

16
00:01:02,750 --> 00:01:07,819
to turn this into a philosophical Theory

17
00:01:05,618 --> 00:01:11,469
different philosophers had different

18
00:01:07,819 --> 00:01:14,118
answers to the nature of eternal reality

19
00:01:11,469 --> 00:01:17,629
Pythagoras and his school thought the

20
00:01:14,118 --> 00:01:19,998
eternal reality was mathematical it was

21
00:01:17,629 --> 00:01:22,908
outside space and time there was a world

22
00:01:19,998 --> 00:01:24,468
of numbers ratios and proportions that

23
00:01:22,909 --> 00:01:26,920
were the basis of everything that

24
00:01:24,468 --> 00:01:32,390
happens in the world

25
00:01:26,920 --> 00:01:35,030
Plato generalized this idea to the idea

26
00:01:32,390 --> 00:01:38,090
of an eternal realm of forms or ideas

27
00:01:35,030 --> 00:01:40,009
beyond space and time everything in this

28
00:01:38,090 --> 00:01:46,310
world is a reflection of these eternal

29

00:01:40,009 --> 00:01:49,188
archetypes the materialists are Epicurus

30
00:01:46,310 --> 00:01:51,319
and Democritus said that eternal reality

31
00:01:49,188 --> 00:01:57,498
was matter made up of lots of little

32
00:01:51,319 --> 00:02:00,289
bits the atoms in the 17th century the

33
00:01:57,498 --> 00:02:02,568
both animism and Platonism were revived

34
00:02:00,289 --> 00:02:07,968
and built into the foundation of modern

35
00:02:02,569 --> 00:02:10,909
science the idea was that God created

36
00:02:07,968 --> 00:02:14,030
the world machine and in it he placed in

37
00:02:10,909 --> 00:02:16,909
numerable atoms which were eternal and

38
00:02:14,030 --> 00:02:20,770
were permanently present and would

39
00:02:16,909 --> 00:02:24,500
remain the same forever God also gave

40
00:02:20,770 --> 00:02:27,019
the laws to nature and the laws of

41
00:02:24,500 --> 00:02:27,419
nature were eternal ideas and the mind

42
00:02:27,019 --> 00:02:29,879
of

43
00:02:27,419 --> 00:02:33,958

odd mathematical ideas in the eternal

44

00:02:29,879 --> 00:02:35,729

mathematical mind of God the reason that

45

00:02:33,959 --> 00:02:39,319

science achieved such an enormous

46

00:02:35,729 --> 00:02:41,879

prestige in the 17th and 18th centuries

47

00:02:39,318 --> 00:02:45,419

was because people thought that through

48

00:02:41,879 --> 00:02:48,109

science men were directly finding out

49

00:02:45,419 --> 00:02:51,179

the inner mind of God

50

00:02:48,110 --> 00:02:54,330

science was superior to religion because

51

00:02:51,180 --> 00:02:57,750

it gave an absolute insight into the

52

00:02:54,330 --> 00:02:59,640

ultimate truths of nature people didn't

53

00:02:57,750 --> 00:03:02,969

think that Newton's law of gravitation

54

00:02:59,639 --> 00:03:05,129

was a man-made hypothesis that just

55

00:03:02,969 --> 00:03:07,080

temporarily fitted the facts they

56

00:03:05,129 --> 00:03:09,150

thought Newton had actually seen into

57

00:03:07,080 --> 00:03:11,489

the mind of God and that science was

58
00:03:09,150 --> 00:03:13,200
revealing an absolute truth deeper and

59
00:03:11,489 --> 00:03:15,989
more important than that of religion

60
00:03:13,199 --> 00:03:20,189
which was always based on conflicts and

61
00:03:15,989 --> 00:03:24,000
interpretations of dogma so this gave

62
00:03:20,189 --> 00:03:27,180
the idea of eternal laws of nature in

63
00:03:24,000 --> 00:03:29,639
the 19th century most scientists thought

64
00:03:27,180 --> 00:03:31,829
the whole universe was eternal they got

65
00:03:29,639 --> 00:03:34,048
rid of the idea of a Creator God by

66
00:03:31,829 --> 00:03:36,269
saying matter and energy have always

67
00:03:34,049 --> 00:03:41,189
been there and the laws that govern it

68
00:03:36,269 --> 00:03:44,219
have always been there but in 1966 there

69
00:03:41,189 --> 00:03:46,639
was a huge revolution in cosmology with

70
00:03:44,219 --> 00:03:49,769
the acceptance of the Big Bang Theory

71
00:03:46,639 --> 00:03:52,229
the universe was that now believed to

72
00:03:49,769 --> 00:03:55,789
believe it begin about fourteen billion

73
00:03:52,229 --> 00:03:58,560
years ago very small and very hot and

74
00:03:55,789 --> 00:04:03,239
it's been growing and expanding ever

75
00:03:58,560 --> 00:04:06,329
since so this raises the question of the

76
00:04:03,239 --> 00:04:09,329
laws of nature if we live in a radically

77
00:04:06,329 --> 00:04:13,430
evolutionary universe what about the

78
00:04:09,329 --> 00:04:16,470
laws of nature could they also evolve

79
00:04:13,430 --> 00:04:20,910
well this is not a possible question if

80
00:04:16,470 --> 00:04:23,729
you assume the laws are fixed but as

81
00:04:20,910 --> 00:04:27,120
soon as you begin to think about it you

82
00:04:23,728 --> 00:04:29,219
can question the very idea of law the

83
00:04:27,120 --> 00:04:31,740
idea of law of nature is obviously a

84
00:04:29,220 --> 00:04:35,430
metaphor it's an anthropocentric

85
00:04:31,740 --> 00:04:39,780
metaphor only humans have laws in fact

86

00:04:35,430 --> 00:04:43,389
only civilized societies tribes have

87
00:04:39,779 --> 00:04:46,179
so in the 17th century the metaphor was

88
00:04:43,389 --> 00:04:49,329
explicit God was like the cosmic Emperor

89
00:04:46,180 --> 00:04:49,959
and he was also like the cosmic police

90
00:04:49,329 --> 00:04:52,389
force

91
00:04:49,959 --> 00:04:55,468
because he was omnipotent and made sure

92
00:04:52,389 --> 00:04:57,879
that everything abate the laws of nature

93
00:04:55,468 --> 00:05:00,038
for many scientists today who are

94
00:04:57,879 --> 00:05:02,199
atheists they can no longer believe in

95
00:05:00,038 --> 00:05:05,800
God as the source of the laws of nature

96
00:05:02,199 --> 00:05:10,330
or the cosmic police force but these

97
00:05:05,800 --> 00:05:12,460
metaphors have persisted of course the

98
00:05:10,329 --> 00:05:15,310
source of these metaphors is human laws

99
00:05:12,459 --> 00:05:16,899
and human laws do evolve the laws of

100
00:05:15,310 --> 00:05:20,468

Germany today are different from the

101

00:05:16,899 --> 00:05:24,250

laws a hundred years ago but I think a

102

00:05:20,468 --> 00:05:27,370

much better metaphor is habit I think

103

00:05:24,250 --> 00:05:29,348

the universe has habits not laws and I

104

00:05:27,370 --> 00:05:31,598

think the regularities of nature depend

105

00:05:29,348 --> 00:05:37,418

on what's happened before does a kind of

106

00:05:31,598 --> 00:05:40,000

memory in nature this is not just my own

107

00:05:37,418 --> 00:05:42,549

idea it was put forward in the 19th

108

00:05:40,000 --> 00:05:44,918

century by several different

109

00:05:42,550 --> 00:05:46,629

philosophers and most clearly at the

110

00:05:44,918 --> 00:05:49,899

beginning of the 20th century by the

111

00:05:46,629 --> 00:05:54,550

American philosopher CS Lewis it was

112

00:05:49,899 --> 00:05:56,888

also suggested by William James and as

113

00:05:54,550 --> 00:06:03,939

an idea I think it's a much better idea

114

00:05:56,889 --> 00:06:07,028

than the idea of fixed laws my own

115
00:06:03,939 --> 00:06:09,848
hypothesis of morphic resonance is a way

116
00:06:07,028 --> 00:06:12,759
of explaining the habits of nature and I

117
00:06:09,848 --> 00:06:14,949
shall come back to that in a minute but

118
00:06:12,759 --> 00:06:17,830
the advantage of evolving habits of

119
00:06:14,949 --> 00:06:20,919
nature is that we don't have to say they

120
00:06:17,829 --> 00:06:21,538
were all fixed at the beginning at the

121
00:06:20,918 --> 00:06:24,250
moment

122
00:06:21,538 --> 00:06:26,829
scientists have tied themselves into

123
00:06:24,250 --> 00:06:30,579
knots because of the assumption the laws

124
00:06:26,829 --> 00:06:32,490
are fixed at the beginning many of you

125
00:06:30,579 --> 00:06:37,240
will have heard of the cosmological

126
00:06:32,490 --> 00:06:39,778
anthropic principle this argument has

127
00:06:37,240 --> 00:06:43,079
been going on for about thirty years and

128
00:06:39,778 --> 00:06:46,180
some scientists have pointed out that

129
00:06:43,079 --> 00:06:47,588
the laws and constants of nature could

130
00:06:46,180 --> 00:06:49,930
have been different from what they are

131
00:06:47,588 --> 00:06:52,540
and if they'd been even slightly

132
00:06:49,930 --> 00:06:55,990
different life would not have evolved

133
00:06:52,540 --> 00:06:58,510
and we wouldn't be here to discuss it so

134
00:06:55,990 --> 00:07:00,670
the fact that we exist and that we're

135
00:06:58,509 --> 00:07:03,539
talking about the nature of nature is

136
00:07:00,670 --> 00:07:07,240
itself telling us something about nature

137
00:07:03,540 --> 00:07:09,879
because we could only exist if it's just

138
00:07:07,240 --> 00:07:11,800
right for us and of all the possible

139
00:07:09,879 --> 00:07:15,909
laws and all the possible values of the

140
00:07:11,800 --> 00:07:18,060
constants they're just right for us so

141
00:07:15,910 --> 00:07:20,370
the argument starts from that assumption

142
00:07:18,060 --> 00:07:22,780
then there are two schools of thought

143

00:07:20,370 --> 00:07:24,759
everything was exactly right at the

144
00:07:22,779 --> 00:07:27,969
moment of the Big Bang so that we can

145
00:07:24,759 --> 00:07:30,699
evolve so there are two possibilities on

146
00:07:27,970 --> 00:07:33,010
this argument one is there's a creator

147
00:07:30,699 --> 00:07:35,949
god who's like a mathematician and

148
00:07:33,009 --> 00:07:37,539
engineer who fine-tunes the laws and

149
00:07:35,949 --> 00:07:39,459
constants of nature right at the

150
00:07:37,540 --> 00:07:43,689
beginning say it's exactly right for us

151
00:07:39,459 --> 00:07:46,049
to evolve that's a kind of neo deism the

152
00:07:43,689 --> 00:07:48,790
doctrine that God is a kind of creator a

153
00:07:46,050 --> 00:07:50,980
mathematical engineering creator who

154
00:07:48,790 --> 00:07:54,220
starts everything off presses the start

155
00:07:50,980 --> 00:07:58,450
button and then retires and everything

156
00:07:54,220 --> 00:08:00,820
goes on automatically after that and the

157
00:07:58,449 --> 00:08:02,589

alternative to that is the idea that

158

00:08:00,819 --> 00:08:05,680
there are billions trillions

159

00:08:02,589 --> 00:08:08,679
quadrillions of actual universes all

160

00:08:05,680 --> 00:08:10,930
with different laws and constants and we

161

00:08:08,680 --> 00:08:13,360
know about this one because this is the

162

00:08:10,930 --> 00:08:15,160
only one we can exist in so there's

163

00:08:13,360 --> 00:08:17,050
nothing special about this one except

164

00:08:15,160 --> 00:08:21,160
the fact we're in it all the others

165

00:08:17,050 --> 00:08:24,009
actually exist now believe it or not

166

00:08:21,160 --> 00:08:26,350
most cosmologists at least in the

167

00:08:24,009 --> 00:08:29,170
english-speaking world are now believers

168

00:08:26,350 --> 00:08:31,390
in the multiverse theory that billions

169

00:08:29,170 --> 00:08:35,440
of universes for which there's not one

170

00:08:31,389 --> 00:08:38,019
shred of evidence I was discussing this

171

00:08:35,440 --> 00:08:40,479
with Britain's astronomer royal Lord

172
00:08:38,019 --> 00:08:44,399
Rees who happens to be an old friend of

173
00:08:40,479 --> 00:08:47,350
mine and I said to him Martin I said

174
00:08:44,399 --> 00:08:49,899
surely this is the ultimate violation of

175
00:08:47,350 --> 00:08:51,519
Occam's razor Occam's razor is the

176
00:08:49,899 --> 00:08:53,980
principle you shouldn't proliferate

177
00:08:51,519 --> 00:08:56,049
entities unnecessarily and I said and

178
00:08:53,980 --> 00:08:59,050
you've proliferated quadrillions of

179
00:08:56,049 --> 00:09:03,159
universes and I said isn't this an

180
00:08:59,049 --> 00:09:04,899
extremely extravagant hypothesis and he

181
00:09:03,159 --> 00:09:05,919
said well I agree it's a bit of a

182
00:09:04,899 --> 00:09:09,399
problem

183
00:09:05,919 --> 00:09:14,679
Occam's razor he said but this way we

184
00:09:09,399 --> 00:09:16,629
can get rid of God so I said you mean

185
00:09:14,679 --> 00:09:18,939
you prefer to have quadrillions of

186
00:09:16,629 --> 00:09:21,299
unobserved universes to God you had yes

187
00:09:18,940 --> 00:09:25,870
it's much better it's more scientific

188
00:09:21,299 --> 00:09:28,389
but of course as theologians have

189
00:09:25,870 --> 00:09:30,009
pointed out a God an infinite God could

190
00:09:28,389 --> 00:09:32,049
be the God of an infinite number of

191
00:09:30,009 --> 00:09:32,769
universes so they haven't even got rid

192
00:09:32,049 --> 00:09:37,000
of God

193
00:09:32,769 --> 00:09:39,700
they've just proliferated universes the

194
00:09:37,000 --> 00:09:42,278
whole of this discussion just melts away

195
00:09:39,700 --> 00:09:44,410
if we assume that nature is based on

196
00:09:42,278 --> 00:09:47,019
habits that evolve things fit together

197
00:09:44,409 --> 00:09:49,958
because only successful habits can

198
00:09:47,019 --> 00:09:51,839
survive other ones die out only things

199
00:09:49,958 --> 00:09:54,189
that fit in with what's already there

200

00:09:51,839 --> 00:09:59,350
concern survive and can become new

201
00:09:54,190 --> 00:10:02,579
habits so this extraordinary scholastic

202
00:09:59,350 --> 00:10:07,089
argument about billions of universes vs.

203
00:10:02,578 --> 00:10:10,028
Deus tick creator is totally unnecessary

204
00:10:07,089 --> 00:10:12,430
if we adopt a truly evolutionary

205
00:10:10,028 --> 00:10:15,659
cosmology and think of the regularities

206
00:10:12,429 --> 00:10:15,659
as more like habits

207
00:10:19,029 --> 00:10:24,889
I'll come back to the nature of morphic

208
00:10:22,789 --> 00:10:26,779
fields through which I suppose these

209
00:10:24,889 --> 00:10:28,789
habits are expressed

210
00:10:26,779 --> 00:10:32,379
but first I'll just talk about this

211
00:10:28,789 --> 00:10:35,269
using plain language in terms of habits

212
00:10:32,379 --> 00:10:38,689
the theory of morphic resonance says

213
00:10:35,269 --> 00:10:41,720
that similar patterns of activity are

214
00:10:38,690 --> 00:10:44,510

influenced by similar past patterns that

215

00:10:41,720 --> 00:10:46,639

happened before doesn't influence a kind

216

00:10:44,509 --> 00:10:49,429

of resonant influence of similarity

217

00:10:46,639 --> 00:10:52,909

across time and space from the past to

218

00:10:49,429 --> 00:10:55,389

the present what this means is that each

219

00:10:52,909 --> 00:10:58,969

kind of thing has a collective memory

220

00:10:55,389 --> 00:11:01,220

each baby giraffe as it develops as an

221

00:10:58,970 --> 00:11:03,680

embryo and grows into a bugger off is

222

00:11:01,220 --> 00:11:06,440

shaped by the memory of the form of

223

00:11:03,679 --> 00:11:09,620

previous giraffes as it starts behaving

224

00:11:06,440 --> 00:11:13,580

it Tunes into the habits of previous

225

00:11:09,620 --> 00:11:16,460

giraffes it has giraffe instincts so

226

00:11:13,580 --> 00:11:19,040

each species has a collective memory

227

00:11:16,460 --> 00:11:21,440

each individual draws upon that

228

00:11:19,039 --> 00:11:24,589

collective memory and contributes to it

229

00:11:21,440 --> 00:11:26,450
in the human realm the side area is

230

00:11:24,590 --> 00:11:28,580
familiar from Jung's idea of the

231

00:11:26,450 --> 00:11:30,710
collective unconscious but I'm

232

00:11:28,580 --> 00:11:35,120
suggesting this is a basic principle of

233

00:11:30,710 --> 00:11:38,290
all nature it applies not only to living

234

00:11:35,120 --> 00:11:41,539
organisms but also to crystals and

235

00:11:38,289 --> 00:11:44,990
proteins I'm suggesting that when you

236

00:11:41,539 --> 00:11:47,839
first make a new chemical compound when

237

00:11:44,990 --> 00:11:50,090
you first crystallized it there won't be

238

00:11:47,840 --> 00:11:52,129
a pre-existing habit you have to wait

239

00:11:50,090 --> 00:11:55,220
for a new form to come into being in

240

00:11:52,129 --> 00:11:57,049
nature the second time you crystallize

241

00:11:55,220 --> 00:11:59,120
it anywhere in the world it should

242

00:11:57,049 --> 00:12:01,969
happen a bit easier because of the first

243

00:11:59,120 --> 00:12:03,470
crystals the third time easier still

244

00:12:01,970 --> 00:12:05,779
because of the first and the second

245

00:12:03,470 --> 00:12:07,460
crystals as time goes on it should get

246

00:12:05,779 --> 00:12:12,199
easier to crystallize all around the

247

00:12:07,460 --> 00:12:14,570
world is this true well it's well known

248

00:12:12,200 --> 00:12:16,430
to chemists that new compounds are very

249

00:12:14,570 --> 00:12:18,830
difficult to crystallize to start with

250

00:12:16,429 --> 00:12:22,579
and as time goes on they get easier to

251

00:12:18,830 --> 00:12:24,980
crystallize all over the world and this

252

00:12:22,580 --> 00:12:27,740
is simply taken for granted in chemistry

253

00:12:24,980 --> 00:12:29,420
it's a common observation but chemists

254

00:12:27,740 --> 00:12:31,289
don't explain it in terms of morphic

255

00:12:29,419 --> 00:12:33,448
resonance they assume it happens because

256

00:12:31,289 --> 00:12:36,120
fragments of crystals were carried from

257

00:12:33,448 --> 00:12:38,129
laboratory to laboratory usually they

258
00:12:36,120 --> 00:12:40,709
assume they're blown there is invisible

259
00:12:38,129 --> 00:12:42,448
dust particles in the air but I'm

260
00:12:40,708 --> 00:12:44,489
suggesting the same would happen even if

261
00:12:42,448 --> 00:12:48,539
you filter out these dust particles from

262
00:12:44,490 --> 00:12:50,399
the air this theory also predicts that

263
00:12:48,539 --> 00:12:52,588
the habit of the crystal will get

264
00:12:50,399 --> 00:12:54,929
stronger as time goes on it will become

265
00:12:52,589 --> 00:12:59,040
more stable and it would be harder to

266
00:12:54,929 --> 00:13:01,528
disrupt the kept the crystals harder to

267
00:12:59,039 --> 00:13:03,360
break them down the way you break

268
00:13:01,528 --> 00:13:06,269
crystals done is by heating them up

269
00:13:03,360 --> 00:13:08,329
until they reach the melting point and

270
00:13:06,269 --> 00:13:11,250
then the crystal structure disappears

271
00:13:08,328 --> 00:13:13,888

this theory predicts that new compounds

272

00:13:11,250 --> 00:13:16,370

should have lower melting points as time

273

00:13:13,889 --> 00:13:19,709

goes on the melting point should rise

274

00:13:16,370 --> 00:13:21,720

with new compounds old compounds have

275

00:13:19,708 --> 00:13:23,939

probably already reached a stable state

276

00:13:21,720 --> 00:13:26,910

but you see this happening with new ones

277

00:13:23,940 --> 00:13:29,910

that's the prediction do the melting

278

00:13:26,909 --> 00:13:32,278

points of new compounds increase well

279

00:13:29,909 --> 00:13:35,429

strangely enough they do seem to and

280

00:13:32,278 --> 00:13:38,578

I've documented these the data in my

281

00:13:35,429 --> 00:13:43,919

books a new science of life and the

282

00:13:38,578 --> 00:13:46,318

presence of the past the the data show

283

00:13:43,919 --> 00:13:48,269

that the melting points of many

284

00:13:46,318 --> 00:13:50,939

compounds that have been crystallized in

285

00:13:48,269 --> 00:13:53,539

the 20th century for the first time have

286
00:13:50,940 --> 00:13:56,670
gone up by 10 degrees 15 degrees Celsius

287
00:13:53,539 --> 00:13:58,769
sometimes 20 degrees Celsius I'm talking

288
00:13:56,669 --> 00:14:05,088
big effects here not fractions of a

289
00:13:58,769 --> 00:14:08,370
degree this theory also applies to

290
00:14:05,089 --> 00:14:11,240
animal behavior it predicts that if you

291
00:14:08,370 --> 00:14:12,539
train rats to learn a new trick in

292
00:14:11,240 --> 00:14:15,028
Frankfurt

293
00:14:12,539 --> 00:14:16,500
then rats all over the world should be

294
00:14:15,028 --> 00:14:18,480
able to learn the same trick quicker

295
00:14:16,500 --> 00:14:21,929
just because the rats have learned it

296
00:14:18,480 --> 00:14:25,589
here by morphic resonance it's part of

297
00:14:21,929 --> 00:14:28,849
the collective memory of these rats now

298
00:14:25,589 --> 00:14:32,790
is this true well there's already

299
00:14:28,850 --> 00:14:34,680
evidence that animals do learn things

300
00:14:32,789 --> 00:14:37,889
quicker if others have already learned

301
00:14:34,679 --> 00:14:41,399
it one of the longest experiments in the

302
00:14:37,889 --> 00:14:44,100
history of rat psychology was carried

303
00:14:41,399 --> 00:14:47,370
out starting in the 1920s at

304
00:14:44,100 --> 00:14:49,199
bothered by William McDougall mcdougal

305
00:14:47,370 --> 00:14:52,019
was trying to find out if animals could

306
00:14:49,198 --> 00:14:53,929
inherit what that if children could

307
00:14:52,019 --> 00:14:57,000
inherit what their parents had learned

308
00:14:53,929 --> 00:14:59,370
he trained rats to escape from the water

309
00:14:57,000 --> 00:15:01,129
maze and measured how many errors it

310
00:14:59,370 --> 00:15:03,870
took before they learned how to do it

311
00:15:01,129 --> 00:15:05,939
then he trained their children they

312
00:15:03,870 --> 00:15:09,028
learn quicker their grandchildren

313
00:15:05,940 --> 00:15:11,430
learned even quicker and this was of

314

00:15:09,028 --> 00:15:13,318
course very controversial at the time

315
00:15:11,429 --> 00:15:15,318
because it suggested there was an

316
00:15:13,318 --> 00:15:18,689
inheritance of acquired characteristics

317
00:15:15,318 --> 00:15:19,860
which was a taboo in Western science in

318
00:15:18,690 --> 00:15:22,560
the 20th century

319
00:15:19,860 --> 00:15:24,959
it's now been rehabilitated it's now

320
00:15:22,559 --> 00:15:27,979
mainstream it's called epigenetic

321
00:15:24,958 --> 00:15:31,828
inheritance since about the year 2000

322
00:15:27,980 --> 00:15:34,528
but the critics said to mcdougal his

323
00:15:31,828 --> 00:15:38,299
experiments must be wrong he must have

324
00:15:34,528 --> 00:15:40,528
been selecting the quicker learning rats

325
00:15:38,299 --> 00:15:41,939
unconsciously he selected them because

326
00:15:40,528 --> 00:15:43,980
they thought he wanted to hurry the

327
00:15:41,940 --> 00:15:46,920
experiment up so he picked the parents

328
00:15:43,980 --> 00:15:49,528

as the ones who'd learned quickest he

329

00:15:46,919 --> 00:15:52,110

hadn't done that but he agreed to test

330

00:15:49,528 --> 00:15:54,620

this and he then did a new experiment to

331

00:15:52,110 --> 00:15:57,600

confront his critics in every generation

332

00:15:54,620 --> 00:16:00,948

he selected as parent parents of the

333

00:15:57,600 --> 00:16:03,240

next generation the most stupid rats so

334

00:16:00,948 --> 00:16:06,269

every generation they should have made

335

00:16:03,240 --> 00:16:10,639

more and more errors instead of less and

336

00:16:06,269 --> 00:16:10,639

less what he found

337

00:16:18,389 --> 00:16:26,909

oh there we are and what he found was

338

00:16:24,000 --> 00:16:29,190

that the total number of errors to start

339

00:16:26,909 --> 00:16:32,309

with was more than 230 before they

340

00:16:29,190 --> 00:16:36,110

learned and after 22 generations it was

341

00:16:32,309 --> 00:16:38,699

down to about 35 so it was a huge change

342

00:16:36,110 --> 00:16:41,129

this was such a big effect that his

343
00:16:38,700 --> 00:16:43,610
critics had to repeat this work it was

344
00:16:41,129 --> 00:16:52,200
repeated in Scotland and in Australia

345
00:16:43,610 --> 00:16:54,720
the Scottish and the Australian rats the

346
00:16:52,200 --> 00:16:56,519
Scottish and the Australian rats started

347
00:16:54,720 --> 00:16:59,278
more or less where the American ones had

348
00:16:56,519 --> 00:17:02,039
left off but the interesting results

349
00:16:59,278 --> 00:17:05,609
were from Australia because they found

350
00:17:02,039 --> 00:17:07,859
that they tested a control line of rats

351
00:17:05,609 --> 00:17:11,068
whose parents had never been exposed to

352
00:17:07,859 --> 00:17:14,338
this maze they got better - they found a

353
00:17:11,068 --> 00:17:16,259
progressive increase and the all of them

354
00:17:14,338 --> 00:17:19,019
got better so it wasn't anything to do

355
00:17:16,259 --> 00:17:20,039
with genes or modification of genes they

356
00:17:19,019 --> 00:17:22,168
were all getting better

357
00:17:20,039 --> 00:17:28,318
that's just what you would expect on the

358
00:17:22,169 --> 00:17:30,540
basis of morphic resonance now the same

359
00:17:28,318 --> 00:17:32,940
should apply to people it should be

360
00:17:30,539 --> 00:17:37,678
getting easier to program computers to

361
00:17:32,940 --> 00:17:40,110
learn wind surfing to play video games

362
00:17:37,679 --> 00:17:42,809
just because so many people have already

363
00:17:40,109 --> 00:17:45,479
done this and actually most of these

364
00:17:42,808 --> 00:17:47,220
things do seem to be getting easier but

365
00:17:45,480 --> 00:17:50,240
of course there are many variables that

366
00:17:47,220 --> 00:17:52,679
affect us including media education

367
00:17:50,240 --> 00:17:55,529
instructional videos on the internet and

368
00:17:52,679 --> 00:17:58,320
so on the only way you can get clear

369
00:17:55,529 --> 00:18:01,619
data is if you compare people's

370
00:17:58,319 --> 00:18:05,069
performance on the same test over years

371

00:18:01,619 --> 00:18:07,979
and fortunately this data does exist

372
00:18:05,069 --> 00:18:12,298
from data on average scores on

373
00:18:07,980 --> 00:18:14,339
intelligence tests in the 1980's I

374
00:18:12,298 --> 00:18:17,700
predicted that average scores on

375
00:18:14,339 --> 00:18:20,009
intelligence tests on IQ tests should be

376
00:18:17,700 --> 00:18:22,500
going up not because people are getting

377
00:18:20,009 --> 00:18:24,210
more intelligent but because the tests

378
00:18:22,500 --> 00:18:27,329
are getting easier to do because so many

379
00:18:24,210 --> 00:18:29,370
people have already done them and it

380
00:18:27,329 --> 00:18:31,769
turned out that this is exactly what's

381
00:18:29,369 --> 00:18:34,528
happening all over the world

382
00:18:31,769 --> 00:18:36,599
the scores on intelligence tests the

383
00:18:34,528 --> 00:18:40,919
average scores are going up they've gone

384
00:18:36,599 --> 00:18:43,369
up by about 30% since 1918 when for

385
00:18:40,919 --> 00:18:45,899

intelligence tests were first developed

386

00:18:43,369 --> 00:18:48,148

this was discovered by a New Zealand

387

00:18:45,898 --> 00:18:52,979

scientist called James Flynn and it's

388

00:18:48,148 --> 00:18:55,379

now called the Flynn effect that shows

389

00:18:52,980 --> 00:18:59,339

the increase in average American

390

00:18:55,380 --> 00:19:01,140

intelligence since 1918 there's no other

391

00:18:59,339 --> 00:19:06,240

evidence that Americans have got more

392

00:19:01,140 --> 00:19:09,570

intelligent and everyone agrees about

393

00:19:06,240 --> 00:19:12,200

that but there's a lot of discussion as

394

00:19:09,569 --> 00:19:15,740

to how to explain the Flynn effect

395

00:19:12,200 --> 00:19:18,120

there's seven or eight rival our

396

00:19:15,740 --> 00:19:20,399

explanations and none of them explain it

397

00:19:18,119 --> 00:19:22,500

but I think this is exactly what we

398

00:19:20,398 --> 00:19:33,089

would predict on the basis of morphic

399

00:19:22,500 --> 00:19:34,589

resonance so there are many people have

400
00:19:33,089 --> 00:19:37,439
done other tests for morphic resonance

401
00:19:34,589 --> 00:19:39,869
these are summarized in the new edition

402
00:19:37,440 --> 00:19:42,330
of my book a new science of life which

403
00:19:39,869 --> 00:19:46,889
in German is - hopefully sure universal

404
00:19:42,329 --> 00:19:49,849
and I won't go into those now but there

405
00:19:46,890 --> 00:19:52,770
is more evidence for this it's still not

406
00:19:49,849 --> 00:19:54,658
obviously it's still a hypothesis it's

407
00:19:52,769 --> 00:19:56,879
still not completely proved and it's

408
00:19:54,659 --> 00:19:59,940
still very controversial but the

409
00:19:56,880 --> 00:20:01,980
evidence suggests that this may well be

410
00:19:59,940 --> 00:20:05,970
right at least that's the way I

411
00:20:01,980 --> 00:20:08,069
understand the evidence and many more

412
00:20:05,970 --> 00:20:15,440
tests are possible and some are going on

413
00:20:08,069 --> 00:20:19,048
now so I think that morphic resonance is

414
00:20:15,440 --> 00:20:25,230
a basic principle of nature it applies

415
00:20:19,048 --> 00:20:27,778
to anything that's self-organizing the

416
00:20:25,230 --> 00:20:30,210
most precise morphic resonance occurs

417
00:20:27,778 --> 00:20:32,849
when systems are very similar to each

418
00:20:30,210 --> 00:20:36,360
other and if we're thinking about human

419
00:20:32,849 --> 00:20:38,639
beings then when you ask the question

420
00:20:36,359 --> 00:20:39,269
what human beings are most similar to

421
00:20:38,640 --> 00:20:43,230
each other

422
00:20:39,269 --> 00:20:45,529
the answer is identical twins this

423
00:20:43,230 --> 00:20:47,269
theory predicts that identical twin

424
00:20:45,529 --> 00:20:48,859
would have a very strong morphic

425
00:20:47,269 --> 00:20:52,309
resonance with each other precisely

426
00:20:48,859 --> 00:20:54,439
because they are so similar the theory

427
00:20:52,309 --> 00:20:57,109
also predicts that if you separate

428

00:20:54,440 --> 00:20:58,640
identical twins soon after birth they

429
00:20:57,109 --> 00:21:00,500
would still resonate with each other

430
00:20:58,640 --> 00:21:01,720
even if they brought a brought up in

431
00:21:00,500 --> 00:21:05,000
completely different environments

432
00:21:01,720 --> 00:21:06,829
because they're so similar the theory

433
00:21:05,000 --> 00:21:09,500
predicts that identical twins separated

434
00:21:06,829 --> 00:21:13,730
soon after birth would continue to be

435
00:21:09,500 --> 00:21:15,200
very similar for many years as you know

436
00:21:13,730 --> 00:21:18,230
there have been many studies on

437
00:21:15,200 --> 00:21:20,390
identical twins because there's been a

438
00:21:18,230 --> 00:21:22,789
long debate in in science about the

439
00:21:20,390 --> 00:21:27,490
relative influence of genes and the

440
00:21:22,789 --> 00:21:27,490
environment or nature and nurture

441
00:21:28,569 --> 00:21:34,639
Studies on identical twins have shown

442
00:21:31,309 --> 00:21:36,700

remarkable similarities and this is

443

00:21:34,640 --> 00:21:38,780
usually interpreted to mean

444

00:21:36,700 --> 00:21:42,470
therefore it's all genetically

445

00:21:38,779 --> 00:21:45,079
programmed in fact the whole edifice of

446

00:21:42,470 --> 00:21:48,589
genetic determinism which is so

447

00:21:45,079 --> 00:21:52,149
important today in people's thinking is

448

00:21:48,589 --> 00:21:54,409
based on these identical twin studies

449

00:21:52,150 --> 00:21:56,780
it's not that people have considered

450

00:21:54,410 --> 00:21:58,910
morphic resonance and ruled it out they

451

00:21:56,779 --> 00:22:01,250
haven't even considered it and I think

452

00:21:58,910 --> 00:22:04,090
this evidence actually effects morphic

453

00:22:01,250 --> 00:22:09,559
resonance much better than the genetic

454

00:22:04,089 --> 00:22:13,429
explanation if we pursue this line of

455

00:22:09,559 --> 00:22:16,429
thought about similarity and we ask the

456

00:22:13,430 --> 00:22:21,380
question who in the past is most similar

457
00:22:16,430 --> 00:22:24,560
to me or to you the answer is yourself

458
00:22:21,380 --> 00:22:26,810
or myself we're more similar to

459
00:22:24,559 --> 00:22:27,460
ourselves in the past than to anybody

460
00:22:26,809 --> 00:22:29,569
else

461
00:22:27,460 --> 00:22:31,789
therefore we should have the most

462
00:22:29,569 --> 00:22:35,000
specific morphic resonance with

463
00:22:31,789 --> 00:22:36,680
ourselves more than with anyone else

464
00:22:35,000 --> 00:22:40,460
because we're not as similar to anyone

465
00:22:36,680 --> 00:22:42,380
else that would mean that much of the

466
00:22:40,460 --> 00:22:45,500
influence working on us from the past

467
00:22:42,380 --> 00:22:48,860
both in form and behavior and memory

468
00:22:45,500 --> 00:22:51,200
would come through morphic resonance our

469
00:22:48,859 --> 00:22:53,359
bodies remain more or less the same

470
00:22:51,200 --> 00:22:55,880
shape over many years people can still

471
00:22:53,359 --> 00:22:58,219
recognize us when we meet them after 10

472
00:22:55,880 --> 00:22:58,820
or 20 years but almost all the molecules

473
00:22:58,220 --> 00:23:00,528
in

474
00:22:58,819 --> 00:23:02,839
our bodies have changed and many of the

475
00:23:00,528 --> 00:23:04,940
cells have changed yet the form remains

476
00:23:02,839 --> 00:23:07,428
and I think this is because of self

477
00:23:04,940 --> 00:23:10,149
resonance we resonate with ourselves and

478
00:23:07,429 --> 00:23:14,080
this maintains a continuity of form I

479
00:23:10,148 --> 00:23:16,609
think this is also the basis of memory I

480
00:23:14,079 --> 00:23:18,589
think when you remember what you did

481
00:23:16,609 --> 00:23:21,048
yesterday or last year or when you were

482
00:23:18,589 --> 00:23:24,048
a child I don't think those memories are

483
00:23:21,048 --> 00:23:26,000
stored inside your brain I think that

484
00:23:24,048 --> 00:23:28,609
it's because you're similar to yourself

485

00:23:26,000 --> 00:23:30,829
you're resonating with yourself in the

486
00:23:28,609 --> 00:23:34,250
past and the memories as it were leap

487
00:23:30,829 --> 00:23:36,528
across space from you in the past across

488
00:23:34,250 --> 00:23:38,599
space and time from you in the past to

489
00:23:36,528 --> 00:23:43,099
you present in the present by a kind of

490
00:23:38,599 --> 00:23:45,798
resonance now this brings me to another

491
00:23:43,099 --> 00:23:48,378
of the dogmas of materialism memories

492
00:23:45,798 --> 00:23:50,418
are stored in the brain this is simply

493
00:23:48,378 --> 00:23:52,699
taken for granted by scientists and

494
00:23:50,419 --> 00:23:54,379
indeed by most people because they

495
00:23:52,700 --> 00:23:55,970
usually take the view well they must be

496
00:23:54,378 --> 00:23:59,990
in the brain where else could they be

497
00:23:55,970 --> 00:24:01,730
um but people within science have tried

498
00:23:59,990 --> 00:24:03,710
to find memories in the brain for more

499
00:24:01,730 --> 00:24:07,509

than a hundred years and they've had an

500

00:24:03,710 --> 00:24:11,179

extremely disappointing time in the

501

00:24:07,509 --> 00:24:14,028

1940s and 50s an American scientist Karl

502

00:24:11,179 --> 00:24:16,730

Lashley trained rats to learn a whole

503

00:24:14,028 --> 00:24:18,679

variety of tricks and then he cut out

504

00:24:16,730 --> 00:24:20,649

bits of their brain to see if he could

505

00:24:18,679 --> 00:24:24,139

find out where the memories were stored

506

00:24:20,648 --> 00:24:25,878

to his surprise he found that it didn't

507

00:24:24,138 --> 00:24:27,888

really matter which bits of the brain

508

00:24:25,878 --> 00:24:29,750

you cut out you could cut out large

509

00:24:27,888 --> 00:24:32,359

areas of the brain the right the left

510

00:24:29,750 --> 00:24:34,669

the front the back and they still

511

00:24:32,359 --> 00:24:36,619

remembered of course if you cut out the

512

00:24:34,669 --> 00:24:39,649

whole brain they couldn't behave anymore

513

00:24:36,619 --> 00:24:43,278

so he showed the brain as necessary for

514
00:24:39,648 --> 00:24:47,148
behavior and but not for specific

515
00:24:43,278 --> 00:24:50,089
memories and similar research with

516
00:24:47,148 --> 00:24:52,398
octopuses led to the same conclusion and

517
00:24:50,089 --> 00:24:54,709
the researchers who did that said that

518
00:24:52,398 --> 00:24:58,058
memory seems to be both everywhere and

519
00:24:54,710 --> 00:25:02,419
nowhere in particular within the brain

520
00:24:58,058 --> 00:25:03,980
car program neuroscientist reacted to

521
00:25:02,419 --> 00:25:07,399
these findings by suggesting that

522
00:25:03,980 --> 00:25:09,620
memories are stored holographically over

523
00:25:07,398 --> 00:25:10,649
large regions of the brain they're all

524
00:25:09,619 --> 00:25:12,149
there everywhere

525
00:25:10,650 --> 00:25:15,840
so if you cut out one bit they can

526
00:25:12,150 --> 00:25:17,519
survive somewhere else people have gone

527
00:25:15,839 --> 00:25:19,559
on trying to find memories in the brain

528
00:25:17,519 --> 00:25:24,059
and over and over again their

529
00:25:19,559 --> 00:25:25,879
experiments have drawn a blank some

530
00:25:24,059 --> 00:25:28,649
well-known research by Wilder Penfield

531
00:25:25,880 --> 00:25:31,170
involved stimulating parts of people's

532
00:25:28,650 --> 00:25:33,600
brains during operations for epilepsy

533
00:25:31,170 --> 00:25:36,210
and he found he could sometimes evoke

534
00:25:33,599 --> 00:25:37,889
memories but that doesn't prove the

535
00:25:36,210 --> 00:25:40,980
memories are stored in that bit of brain

536
00:25:37,890 --> 00:25:43,950
and in fact Penfield himself came to the

537
00:25:40,980 --> 00:25:45,360
conclusion that they weren't it just

538
00:25:43,950 --> 00:25:49,069
shows that bit of the brain may be

539
00:25:45,359 --> 00:25:49,069
involved in retrieving the memories

540
00:25:49,130 --> 00:25:53,280
philosophers have also pointed out that

541
00:25:51,240 --> 00:25:56,880
memory storage in the brain is very

542

00:25:53,279 --> 00:25:58,649
problematic these standards areas that

543
00:25:56,880 --> 00:26:00,510
memories are stored in the brain and

544
00:25:58,650 --> 00:26:02,280
when you need the memory a retrieval

545
00:26:00,509 --> 00:26:04,890
system then retrieves the memory from

546
00:26:02,279 --> 00:26:07,170
the store but as several philosophers

547
00:26:04,890 --> 00:26:09,750
have pointed out for the retrieval

548
00:26:07,170 --> 00:26:11,910
system to know which memory to retrieve

549
00:26:09,750 --> 00:26:13,740
from the store it has to have a memory

550
00:26:11,910 --> 00:26:16,560
itself to know what it's looking for

551
00:26:13,740 --> 00:26:18,569
and that must itself have another

552
00:26:16,559 --> 00:26:21,019
retrieval system and so you have an

553
00:26:18,569 --> 00:26:23,970
infinite regress

554
00:26:21,019 --> 00:26:26,220
but neither philosophical arguments nor

555
00:26:23,970 --> 00:26:28,440
the failure to find memory traces have

556
00:26:26,220 --> 00:26:30,480

made the slightest difference to the

557

00:26:28,440 --> 00:26:32,430

conventional assumption in neuroscience

558

00:26:30,480 --> 00:26:34,860

that memories are in the brain because

559

00:26:32,430 --> 00:26:36,930

people assume there's no alternative it

560

00:26:34,859 --> 00:26:40,019

must be the case even if we can't find

561

00:26:36,930 --> 00:26:41,910

them they must be there I think the

562

00:26:40,019 --> 00:26:45,569

failure to find them has a very simple

563

00:26:41,910 --> 00:26:47,220

explanation they're not there and it's

564

00:26:45,569 --> 00:26:48,779

rather like me coming along to your

565

00:26:47,220 --> 00:26:50,220

house and trying to find out what

566

00:26:48,779 --> 00:26:52,950

programs you watched on television

567

00:26:50,220 --> 00:26:55,470

yesterday by analyzing the wires and

568

00:26:52,950 --> 00:26:57,779

transistors of your TV set I wouldn't

569

00:26:55,470 --> 00:27:00,509

find any trace of those programs because

570

00:26:57,779 --> 00:27:03,269

that's not how it works and I think our

571
00:27:00,509 --> 00:27:06,299
brain is more like a TV receiver tuning

572
00:27:03,269 --> 00:27:11,579
into our memories not a video recorder

573
00:27:06,299 --> 00:27:16,519
storing them so this leads to a quite

574
00:27:11,579 --> 00:27:19,289
different interpretation of memory and

575
00:27:16,519 --> 00:27:22,190
one that I think makes much better sense

576
00:27:19,289 --> 00:27:22,190
of the facts

577
00:27:25,099 --> 00:27:31,980
I'm now going to come on to the details

578
00:27:28,919 --> 00:27:36,299
of my own hypothesis as to how morphic

579
00:27:31,980 --> 00:27:39,298
resonance works all of what I've said so

580
00:27:36,298 --> 00:27:41,668
far could work on a general theory of

581
00:27:39,298 --> 00:27:43,500
resonance without much detail I mean you

582
00:27:41,669 --> 00:27:45,809
could get as far as I've said with all

583
00:27:43,500 --> 00:27:49,079
those tests without any more detailed

584
00:27:45,808 --> 00:27:51,839
theory but I myself started out as a

585
00:27:49,079 --> 00:27:55,649
developmental biologist interested in

586
00:27:51,839 --> 00:27:58,109
how plants develop and these

587
00:27:55,650 --> 00:28:01,169
considerations are very relevant to

588
00:27:58,109 --> 00:28:03,329
developmental biology and this again is

589
00:28:01,169 --> 00:28:05,429
one of the unsolved problems of biology

590
00:28:03,329 --> 00:28:09,960
no one really understands how organisms

591
00:28:05,429 --> 00:28:12,150
develop from a fertilized egg many

592
00:28:09,960 --> 00:28:16,259
people naively assume that the genes

593
00:28:12,150 --> 00:28:19,440
explain this people talk of a genetic

594
00:28:16,259 --> 00:28:22,259
program or genetic instructions but

595
00:28:19,440 --> 00:28:24,690
actually genes don't explain the shape

596
00:28:22,259 --> 00:28:27,779
of your face or the shape of your arms

597
00:28:24,690 --> 00:28:29,940
and your legs or your kidney watching

598
00:28:27,779 --> 00:28:32,460
this thing is destructive the sequence

599

00:28:29,940 --> 00:28:34,169
of amino acids in proteins that's what

600
00:28:32,460 --> 00:28:36,990
they do they code for the sequence of

601
00:28:34,169 --> 00:28:39,120
amino acids in proteins and some genes

602
00:28:36,990 --> 00:28:42,240
are involved in the control of protein

603
00:28:39,119 --> 00:28:45,029
synthesis they're not instructions for

604
00:28:42,240 --> 00:28:47,159
your form behavior or instincts that's

605
00:28:45,029 --> 00:28:50,069
just a fantasy people have tried to cram

606
00:28:47,159 --> 00:28:52,159
all heredity into the genes because they

607
00:28:50,069 --> 00:28:55,139
think there's nowhere else it could be

608
00:28:52,159 --> 00:28:57,179
but if we inherit those things through

609
00:28:55,140 --> 00:29:00,330
morphic resonance then there's no need

610
00:28:57,179 --> 00:29:03,690
for them all to be in the genes genes

611
00:29:00,329 --> 00:29:07,079
are grossly overrated and the entire

612
00:29:03,690 --> 00:29:09,990
genome sequencing project the the

613
00:29:07,079 --> 00:29:12,298

genetic modification project at large

614

00:29:09,990 --> 00:29:14,538

chunks of modern biology biotechnology

615

00:29:12,298 --> 00:29:17,668

are based on this enormous

616

00:29:14,538 --> 00:29:19,619

overestimation of genes hundreds of

617

00:29:17,669 --> 00:29:22,350

billions of dollars have been wasted in

618

00:29:19,619 --> 00:29:24,329

research that has found out something

619

00:29:22,349 --> 00:29:26,339

but has certainly not revealed the

620

00:29:24,329 --> 00:29:30,119

secret of life as people originally

621

00:29:26,339 --> 00:29:33,269

promised I think that these are

622

00:29:30,119 --> 00:29:35,549

expressed through what I call morphic

623

00:29:33,269 --> 00:29:38,700

fields fields concerned with che

624

00:29:35,549 --> 00:29:48,119

or form and this is part of a holistic

625

00:29:38,700 --> 00:29:50,850

philosophy of nature and everything in

626

00:29:48,119 --> 00:29:52,799

nature is made up of levels of

627

00:29:50,849 --> 00:29:54,569

organization and at each level the whole

628
00:29:52,799 --> 00:29:57,269
is more than the sum of the parts

629
00:29:54,569 --> 00:30:01,379
these small circles could be subatomic

630
00:29:57,269 --> 00:30:04,109
particles within atoms and then these

631
00:30:01,380 --> 00:30:07,140
atoms could be in molecules the

632
00:30:04,109 --> 00:30:09,269
molecules could be in a crystal at each

633
00:30:07,140 --> 00:30:11,009
level there's an organizational

634
00:30:09,269 --> 00:30:11,809
wholeness that's more than the sum of

635
00:30:11,009 --> 00:30:14,730
the parts

636
00:30:11,809 --> 00:30:18,059
all these could be organelles inside

637
00:30:14,730 --> 00:30:22,110
cells in tissues in organs in organisms

638
00:30:18,059 --> 00:30:24,690
in societies of organisms all holistic

639
00:30:22,109 --> 00:30:27,229
models of nature have this idea of

640
00:30:24,690 --> 00:30:30,779
nested hierarchies or whole our keys of

641
00:30:27,230 --> 00:30:33,269
organization my suggestion is that the

642
00:30:30,779 --> 00:30:35,399
wholeness at each level that's more than

643
00:30:33,269 --> 00:30:38,700
the sum of the parts is a morphic field

644
00:30:35,400 --> 00:30:40,740
a form shaping field a field of form or

645
00:30:38,700 --> 00:30:43,590
pattern from the Greek word morphē

646
00:30:40,740 --> 00:30:45,690
meaning form and that these fields have

647
00:30:43,589 --> 00:30:47,669
a memory built into them through morphic

648
00:30:45,690 --> 00:30:50,190
resonance so at every level the

649
00:30:47,670 --> 00:30:51,630
wholeness has a kind of memory which is

650
00:30:50,190 --> 00:30:55,610
comes through morphic resonance

651
00:30:51,630 --> 00:30:55,610
expressed through these fields

652
00:30:59,970 --> 00:31:04,740
just to remind you of the primary source

653
00:31:02,519 --> 00:31:07,950
of this field concept which is magnetic

654
00:31:04,740 --> 00:31:10,500
fields the third the term field was

655
00:31:07,950 --> 00:31:13,140
introduced into science in the 1840s by

656

00:31:10,500 --> 00:31:16,009
Michael Faraday who was studying

657
00:31:13,140 --> 00:31:19,050
magnetic fields and electric fields and

658
00:31:16,009 --> 00:31:22,859
a field is scientifically defined as a

659
00:31:19,049 --> 00:31:25,639
region of influence the magnetic field

660
00:31:22,859 --> 00:31:28,229
around the magnet is inside the magnet -

661
00:31:25,640 --> 00:31:30,750
but you don't see it normally but if you

662
00:31:28,230 --> 00:31:32,910
sprinkle iron filings then you see the

663
00:31:30,750 --> 00:31:41,329
shape the structure of the field as in

664
00:31:32,910 --> 00:31:43,650
this familiar picture here in the 1920s

665
00:31:41,329 --> 00:31:46,470
when people were thinking about

666
00:31:43,650 --> 00:31:49,890
developmental biology they came up with

667
00:31:46,470 --> 00:31:53,579
the idea of Morpho genetic fields fields

668
00:31:49,890 --> 00:31:56,670
that shape form the Greek words morphé

669
00:31:53,579 --> 00:31:59,579
and Genesis mean form and coming into

670
00:31:56,670 --> 00:32:02,100

being morphogenesis is the coming into

671

00:31:59,579 --> 00:32:04,559

being a form more for genetic fields of

672

00:32:02,099 --> 00:32:08,009

fields that shape the form of developing

673

00:32:04,559 --> 00:32:10,139

organisms as Mark I said this morning

674

00:32:08,009 --> 00:32:13,319

this idea was first put forward by

675

00:32:10,140 --> 00:32:16,890

Alexander Govich in Russia and Paul vais

676

00:32:13,319 --> 00:32:19,109

in Vienna and this field concept has

677

00:32:16,890 --> 00:32:22,050

become quite well established within

678

00:32:19,109 --> 00:32:24,179

biology these are biological or more for

679

00:32:22,049 --> 00:32:28,200

genetic fields that shape developing

680

00:32:24,180 --> 00:32:30,750

organisms the fields themselves are

681

00:32:28,200 --> 00:32:32,279

organized in nested hierarchies there's

682

00:32:30,750 --> 00:32:35,190

a field for the whole body for the

683

00:32:32,279 --> 00:32:43,289

organs for the tissues for the cells and

684

00:32:35,190 --> 00:32:45,600

so on what are these fields their term

685
00:32:43,289 --> 00:32:47,970
is still widely used within biology and

686
00:32:45,599 --> 00:32:50,519
when I was doing research on

687
00:32:47,970 --> 00:32:52,559
developmental biology of plants I got

688
00:32:50,519 --> 00:32:56,490
interested in this concept because I was

689
00:32:52,559 --> 00:32:58,559
sure we needed something like that let

690
00:32:56,490 --> 00:33:02,519
me just explain a little bit more why we

691
00:32:58,559 --> 00:33:05,490
need this concept the chemistry of the

692
00:33:02,519 --> 00:33:07,920
genes and the proteins and bone and

693
00:33:05,490 --> 00:33:11,490
connective tissue is simply not enough

694
00:33:07,920 --> 00:33:14,160
to explain form chemically your arms and

695
00:33:11,490 --> 00:33:16,559
your legs are identical they contain

696
00:33:14,160 --> 00:33:19,590
identical genes and yet they have

697
00:33:16,559 --> 00:33:23,250
different forms so something else must

698
00:33:19,589 --> 00:33:25,619
be shaping the form it's rather like a

699
00:33:23,250 --> 00:33:30,210
building if you're trying to understand

700
00:33:25,619 --> 00:33:33,299
the house then of course it contains

701
00:33:30,210 --> 00:33:37,170
building materials bricks cement timber

702
00:33:33,299 --> 00:33:39,089
and so on but that doesn't completely

703
00:33:37,170 --> 00:33:41,279
explain the form of the house because

704
00:33:39,089 --> 00:33:43,829
there's the architects plan as well

705
00:33:41,279 --> 00:33:45,960
if you demolish the house you can

706
00:33:43,829 --> 00:33:48,569
analyze the materials in the house but

707
00:33:45,960 --> 00:33:51,779
the plan disappears this is a bit like

708
00:33:48,569 --> 00:33:54,059
biochemistry and molecular biology which

709
00:33:51,779 --> 00:33:55,740
starts by killing organisms and grinding

710
00:33:54,059 --> 00:33:57,779
them up and then extracting the

711
00:33:55,740 --> 00:34:00,029
molecules when they do that the whole of

712
00:33:57,779 --> 00:34:01,920
the form disappears and it doesn't weigh

713

00:34:00,029 --> 00:34:03,539
anything it's not something you can

714
00:34:01,920 --> 00:34:06,840
crystallize in a test tube

715
00:34:03,539 --> 00:34:08,639
it's simply ignored and therefore can

716
00:34:06,839 --> 00:34:10,679
never be explained just by looking at

717
00:34:08,639 --> 00:34:12,359
the building materials anymore than the

718
00:34:10,679 --> 00:34:14,639
building materials could explain the

719
00:34:12,360 --> 00:34:16,470
form of a house now of course if you

720
00:34:14,639 --> 00:34:18,329
have defective building materials you'll

721
00:34:16,469 --> 00:34:20,250
get a defective house so they have some

722
00:34:18,329 --> 00:34:23,340
influence but they don't explain the

723
00:34:20,250 --> 00:34:26,159
form the more for genetic fields are

724
00:34:23,340 --> 00:34:28,200
there to explain the form and in some

725
00:34:26,159 --> 00:34:30,329
way they're rather like Aristotle's idea

726
00:34:28,199 --> 00:34:32,279
of the soul which is the form of the

727
00:34:30,329 --> 00:34:34,949

body which attracts the developing

728

00:34:32,280 --> 00:34:38,960

organism towards it but it's a more

729

00:34:34,949 --> 00:34:38,960

modern conception of a similar idea

730

00:34:39,260 --> 00:34:46,169

these fields are not in the nucleus and

731

00:34:43,550 --> 00:34:46,860

single cells have more for genetic

732

00:34:46,168 --> 00:34:49,859

fields

733

00:34:46,860 --> 00:34:52,650

these are radiolaria --nz single-celled

734

00:34:49,860 --> 00:34:55,349

organisms that have skeletons mineral

735

00:34:52,650 --> 00:34:57,860

skeletons these live in the sea each

736

00:34:55,349 --> 00:35:00,589

species has a completely different form

737

00:34:57,860 --> 00:35:02,789

each species has one nucleus and

738

00:35:00,590 --> 00:35:04,680

switching on and off genes couldn't

739

00:35:02,789 --> 00:35:06,659

possibly explain these forms there has

740

00:35:04,679 --> 00:35:10,139

to be a structure within the cell that

741

00:35:06,659 --> 00:35:12,509

somehow shapes them these are famous

742
00:35:10,139 --> 00:35:15,119
pictures of a dredge alarians by ernst

743
00:35:12,510 --> 00:35:17,520
haeckel the great german evolutionary

744
00:35:15,119 --> 00:35:21,750
biologist showing this extraordinary

745
00:35:17,519 --> 00:35:23,489
range of forms these are pollen grains

746
00:35:21,750 --> 00:35:25,289
of different species these again a

747
00:35:23,489 --> 00:35:30,349
single cells which have

748
00:35:25,289 --> 00:35:31,739
characteristic forms and this is

749
00:35:30,349 --> 00:35:34,559
acetabular ria

750
00:35:31,739 --> 00:35:37,679
it's a single-celled alga each of these

751
00:35:34,559 --> 00:35:40,500
is a single plant they're about five

752
00:35:37,679 --> 00:35:42,989
centimeters long and they have a cap and

753
00:35:40,500 --> 00:35:45,090
a stalk and then in the base they have a

754
00:35:42,989 --> 00:35:46,739
little root and the nucleus is in the

755
00:35:45,090 --> 00:35:48,570
root is just one nucleus it's a

756
00:35:46,739 --> 00:35:51,629
single-celled organism even though it's

757
00:35:48,570 --> 00:35:55,140
five centimeters long and again all that

758
00:35:51,630 --> 00:35:58,470
shape comes about from just one nucleus

759
00:35:55,139 --> 00:36:00,629
making the right proteins but it you

760
00:35:58,469 --> 00:36:02,789
can't explain this form by the nucleus

761
00:36:00,630 --> 00:36:04,710
being a kind of brain of the organism it

762
00:36:02,789 --> 00:36:06,420
isn't it's just the source of the right

763
00:36:04,710 --> 00:36:12,780
information for making the right

764
00:36:06,420 --> 00:36:14,970
proteins this is a bat embryo reminding

765
00:36:12,780 --> 00:36:16,860
us that in complex organisms there are

766
00:36:14,969 --> 00:36:19,469
many levels of organization there are

767
00:36:16,860 --> 00:36:21,329
the bones the organs the ribs the eyes

768
00:36:19,469 --> 00:36:23,250
and so forth each of these have their

769
00:36:21,329 --> 00:36:29,789
own more for genetic fields within the

770

00:36:23,250 --> 00:36:33,360
overall field of the whole organism one

771
00:36:29,789 --> 00:36:35,340
of the reasons why people put forward

772
00:36:33,360 --> 00:36:39,690
the idea of more for genetic fields in

773
00:36:35,340 --> 00:36:41,309
the first place was because organisms

774
00:36:39,690 --> 00:36:45,659
have extraordinary abilities to

775
00:36:41,309 --> 00:36:49,769
regenerate fields have a holistic

776
00:36:45,659 --> 00:36:52,859
property unlike machines which means

777
00:36:49,769 --> 00:36:56,219
they can remain whole even if you break

778
00:36:52,860 --> 00:36:59,700
systems down if you cut a magnet in half

779
00:36:56,219 --> 00:37:02,819
you don't get to half magnets you get to

780
00:36:59,699 --> 00:37:06,509
small but complete magnets all field

781
00:37:02,820 --> 00:37:09,300
phenomena are intrinsically holistic now

782
00:37:06,510 --> 00:37:11,850
it's not true of machines if you cut a

783
00:37:09,300 --> 00:37:16,440
computer in half all you get is a broken

784
00:37:11,849 --> 00:37:18,869

computer but with living organisms if

785

00:37:16,440 --> 00:37:20,639

you cut them into small parts the parts

786

00:37:18,869 --> 00:37:23,789

can often regenerate into a whole

787

00:37:20,639 --> 00:37:26,460

organism if you cut a willow tree into

788

00:37:23,789 --> 00:37:32,730

small cuttings each cutting can give you

789

00:37:26,460 --> 00:37:36,240

a whole new tree these are dragonfly

790

00:37:32,730 --> 00:37:38,730

eggs on the left is a normal dragonfly

791

00:37:36,239 --> 00:37:41,759

egg with the embryo inside the egg

792

00:37:38,730 --> 00:37:44,579

case on the right it was tied in the

793

00:37:41,760 --> 00:37:46,859

middle and the top half was killed the

794

00:37:44,579 --> 00:37:49,440

lower half now gives rise to a small but

795

00:37:46,858 --> 00:37:51,119

complete organism not the back end of an

796

00:37:49,440 --> 00:37:53,789

organism but a small but complete

797

00:37:51,119 --> 00:37:56,700

organism this is rather like cutting a

798

00:37:53,789 --> 00:37:58,829

magnet in half and having to each half

799
00:37:56,699 --> 00:38:04,319
with its North and South Pole that still

800
00:37:58,829 --> 00:38:06,480
has a complete field and these show the

801
00:38:04,320 --> 00:38:09,960
regeneration of the planaria the

802
00:38:06,480 --> 00:38:12,480
flatworm which cut in various ways that

803
00:38:09,960 --> 00:38:18,630
gives parts each of which can regenerate

804
00:38:12,480 --> 00:38:21,179
a complete worm and this is acetabular

805
00:38:18,630 --> 00:38:24,900
area which I showed you a little while

806
00:38:21,179 --> 00:38:25,710
ago surprisingly if you cut out a bit of

807
00:38:24,900 --> 00:38:28,440
the stalk

808
00:38:25,710 --> 00:38:31,470
leaving behind the nucleus which is in

809
00:38:28,440 --> 00:38:34,980
the root bit this stalk can regenerate

810
00:38:31,469 --> 00:38:37,439
and give a new cap to the acetabular

811
00:38:34,980 --> 00:38:39,179
area in the absence of any nucleus

812
00:38:37,440 --> 00:38:42,179
showing it's not the nucleus that's

813
00:38:39,179 --> 00:38:43,799
controlling this process after a few

814
00:38:42,179 --> 00:38:45,960
weeks it dies because it needs the

815
00:38:43,800 --> 00:38:48,420
nucleus to make new proteins to replace

816
00:38:45,960 --> 00:38:54,630
proteins but the nucleus is not a brain

817
00:38:48,420 --> 00:38:57,510
controlling this process and this shows

818
00:38:54,630 --> 00:39:02,039
a very remarkable regeneration in the

819
00:38:57,510 --> 00:39:05,369
eye of a newt or salamander the lens was

820
00:39:02,039 --> 00:39:07,349
surgically removed and what happens now

821
00:39:05,369 --> 00:39:10,350
is that a new lens grows from the edge

822
00:39:07,349 --> 00:39:12,239
of the iris in normal development the

823
00:39:10,349 --> 00:39:15,150
lens grows from a folding in of the skin

824
00:39:12,239 --> 00:39:18,259
on the outside but here it forms in a

825
00:39:15,150 --> 00:39:23,280
completely new way to regenerate a

826
00:39:18,260 --> 00:39:25,650
functioning eye so regeneration suggests

827

00:39:23,280 --> 00:39:27,600
that things are not producing produced

828
00:39:25,650 --> 00:39:30,240
just mechanistically there's a holistic

829
00:39:27,599 --> 00:39:32,009
field which underlies this process and

830
00:39:30,239 --> 00:39:33,868
this is one of the reasons that the idea

831
00:39:32,010 --> 00:39:37,650
of morphic genetic fields is widely

832
00:39:33,869 --> 00:39:39,450
adopted within biology but then the

833
00:39:37,650 --> 00:39:42,750
question is what are these fields and

834
00:39:39,449 --> 00:39:44,759
how do they work most biologists admit

835
00:39:42,750 --> 00:39:47,280
we need some kind of field but what they

836
00:39:44,760 --> 00:39:49,380
say is well eventually we'll just

837
00:39:47,280 --> 00:39:50,940
explain them in terms of conventional

838
00:39:49,380 --> 00:39:53,789
and chemistry we don't know how they

839
00:39:50,940 --> 00:39:55,650
work but let's assume it turns out that

840
00:39:53,789 --> 00:40:03,779
there nothing really new there's some

841
00:39:55,650 --> 00:40:06,630

conventional explanation other people

842

00:40:03,780 --> 00:40:09,210

usually ex mathematicians who've turned

843

00:40:06,630 --> 00:40:11,610

to biology say well if they exist they

844

00:40:09,210 --> 00:40:13,559

must have an equation and all we need to

845

00:40:11,610 --> 00:40:15,150

do is find out the field equation then

846

00:40:13,559 --> 00:40:16,889

we'll have explained it because they're

847

00:40:15,150 --> 00:40:18,690

basically platanus --ts and they think

848

00:40:16,889 --> 00:40:23,670

the ultimate explanation is going to be

849

00:40:18,690 --> 00:40:26,159

mathematical but I take a third view I

850

00:40:23,670 --> 00:40:27,960

don't think that they're just existing

851

00:40:26,159 --> 00:40:31,019

fields I think they're a new kind of

852

00:40:27,960 --> 00:40:32,730

field and I don't think mathematical

853

00:40:31,019 --> 00:40:34,530

models would explain them we can make

854

00:40:32,730 --> 00:40:37,110

mathematical models of them but those

855

00:40:34,530 --> 00:40:39,330

are man-made models that illuminate some

856
00:40:37,110 --> 00:40:42,900
aspect of the field but the maths is not

857
00:40:39,329 --> 00:40:47,460
more real than the field the field is

858
00:40:42,900 --> 00:40:49,559
more real than the mathematical model so

859
00:40:47,460 --> 00:40:52,260
anyway my own theory is that these

860
00:40:49,559 --> 00:40:54,719
fields are a new kind of field they do

861
00:40:52,260 --> 00:40:56,730
shape and organize the organisms and

862
00:40:54,719 --> 00:41:00,929
they have a kind of memory within them

863
00:40:56,730 --> 00:41:02,699
in my books - chef Ayesha Universum a

864
00:41:00,929 --> 00:41:05,190
new science of life and the presence of

865
00:41:02,699 --> 00:41:08,789
the past which in German is des cadet

866
00:41:05,190 --> 00:41:10,500
NIST in a tour I talk about the way in

867
00:41:08,789 --> 00:41:12,509
which these fields work their

868
00:41:10,500 --> 00:41:14,969
probability structures like quantum

869
00:41:12,510 --> 00:41:18,110
fields they influence indeterminate

870
00:41:14,969 --> 00:41:20,549
events by restricting their into their

871
00:41:18,110 --> 00:41:23,280
indeterminacy to impose patterns upon

872
00:41:20,550 --> 00:41:26,550
them and I go into various details as to

873
00:41:23,280 --> 00:41:30,180
how I think they might work but this

874
00:41:26,550 --> 00:41:37,080
just gives you a flavor of the kind of

875
00:41:30,179 --> 00:41:40,230
things they might be what I'm going to

876
00:41:37,079 --> 00:41:43,559
do now is talk about the morphic fields

877
00:41:40,230 --> 00:41:45,389
of social groups because fields apply

878
00:41:43,559 --> 00:41:48,000
not only to whole organisms and to

879
00:41:45,389 --> 00:41:49,710
organs within them but they apply to the

880
00:41:48,000 --> 00:41:53,190
way that groups of organisms are

881
00:41:49,710 --> 00:41:58,349
organized here we see a flock of

882
00:41:53,190 --> 00:42:01,440
starlings and as they fly around these

883
00:41:58,349 --> 00:42:01,969
birds can change direction very rapidly

884

00:42:01,440 --> 00:42:04,280
with

885
00:42:01,969 --> 00:42:05,419
bumping into each other it's a very

886
00:42:04,280 --> 00:42:07,910
remarkable sight

887
00:42:05,420 --> 00:42:12,500
and we see something similar with

888
00:42:07,909 --> 00:42:15,829
schools of fish they are swimming in

889
00:42:12,500 --> 00:42:18,019
this direction and they can move very

890
00:42:15,829 --> 00:42:21,500
rapidly they can change direction very

891
00:42:18,019 --> 00:42:23,750
fast without bumping into each other the

892
00:42:21,500 --> 00:42:28,429
best computer models of these fields of

893
00:42:23,750 --> 00:42:30,289
these flocks and swarms are field models

894
00:42:28,429 --> 00:42:31,969
and I think what we have is a field of

895
00:42:30,289 --> 00:42:33,739
the whole group the members of the group

896
00:42:31,969 --> 00:42:38,480
are linked through a field which shapes

897
00:42:33,739 --> 00:42:41,139
the way the individuals behave I think

898
00:42:38,480 --> 00:42:45,260

social organization in ants and termites

899

00:42:41,139 --> 00:42:47,420

and bees and wasps and in many other

900

00:42:45,260 --> 00:42:52,000

animal groups in all animal groups is

901

00:42:47,420 --> 00:42:52,000

organized by morphic fields of the group

902

00:42:52,150 --> 00:42:57,829

normally when they Group together as

903

00:42:55,010 --> 00:42:59,540

in this case the field coordinates their

904

00:42:57,829 --> 00:43:03,650

immediate behavior in relation to each

905

00:42:59,539 --> 00:43:05,869

other but even if they move apart

906

00:43:03,650 --> 00:43:09,980

I think they remain connected through

907

00:43:05,869 --> 00:43:13,280

these morphic fields for example packs

908

00:43:09,980 --> 00:43:16,699

of wolves are bonded through their time

909

00:43:13,280 --> 00:43:18,560

together as a pack but when the adult

910

00:43:16,699 --> 00:43:20,868

wolves go out hunting they leave the

911

00:43:18,559 --> 00:43:22,909

baby wolves the Cubs in a den usually

912

00:43:20,869 --> 00:43:25,010

with a babysitter and then they roam

913
00:43:22,909 --> 00:43:27,259
over hundreds of kilometres hunting I

914
00:43:25,010 --> 00:43:29,930
think the field that links them is not

915
00:43:27,260 --> 00:43:33,670
broken it stretches it stretches a bit

916
00:43:29,929 --> 00:43:36,829
like an invisible elastic band rotate

917
00:43:33,670 --> 00:43:39,769
connecting the separated members of the

918
00:43:36,829 --> 00:43:42,679
group another way of thinking about this

919
00:43:39,769 --> 00:43:44,960
is in terms of quantum nonlocality in

920
00:43:42,679 --> 00:43:47,269
quantum physics if particles have been

921
00:43:44,960 --> 00:43:49,608
part of the same system when they move

922
00:43:47,269 --> 00:43:52,119
apart they can remain connected or

923
00:43:49,608 --> 00:43:54,909
entangled said that a change in one

924
00:43:52,119 --> 00:43:57,380
instantaneously affects the other

925
00:43:54,909 --> 00:43:59,989
Einstein thought quantum theory must be

926
00:43:57,380 --> 00:44:02,358
wrong because if it was true it would

927
00:43:59,989 --> 00:44:06,019
allow for what he called spooky action

928
00:44:02,358 --> 00:44:08,210
at a distance experiments show Einstein

929
00:44:06,019 --> 00:44:10,730
was wrong quantum theory is right there

930
00:44:08,210 --> 00:44:13,220
is spooky action at a distance however

931
00:44:10,730 --> 00:44:14,820
you interpret it and I think this

932
00:44:13,219 --> 00:44:17,489
provides the best analogy

933
00:44:14,820 --> 00:44:20,100
for connections between members of

934
00:44:17,489 --> 00:44:22,579
social groups I'm not saying it's

935
00:44:20,099 --> 00:44:26,190
homologous I'm saying it's analogous

936
00:44:22,579 --> 00:44:28,079
interestingly this connection in quantum

937
00:44:26,190 --> 00:44:30,300
nonlocality does not fall off with

938
00:44:28,079 --> 00:44:33,179
distance nor does the connection between

939
00:44:30,300 --> 00:44:35,310
members of social groups if you feel

940
00:44:33,179 --> 00:44:38,489
very fond of your parents or your

941

00:44:35,309 --> 00:44:40,469
children it you still feel fond of them

942
00:44:38,489 --> 00:44:42,539
and still feel attached to them even if

943
00:44:40,469 --> 00:44:45,179
their hundreds of kilometres away you

944
00:44:42,539 --> 00:44:49,440
don't get less fond of them as they get

945
00:44:45,179 --> 00:44:51,389
further away and in fact we have an

946
00:44:49,440 --> 00:44:53,429
English proverb that suggests exactly

947
00:44:51,389 --> 00:45:02,339
the opposite absence makes the heart

948
00:44:53,429 --> 00:45:04,169
grow fonder and so the connection

949
00:45:02,340 --> 00:45:06,450
between members of social groups at a

950
00:45:04,170 --> 00:45:07,400
distance is I think the basis of

951
00:45:06,449 --> 00:45:09,739
telepathy

952
00:45:07,400 --> 00:45:12,450
telepathy is a form of communication

953
00:45:09,739 --> 00:45:14,399
among members of social groups which can

954
00:45:12,449 --> 00:45:17,099
occur when they're beyond the range of

955
00:45:14,400 --> 00:45:18,930

the normal senses I think it also occurs

956

00:45:17,099 --> 00:45:21,420

when they're close together but it's

957

00:45:18,929 --> 00:45:24,259

harder to separate it from body language

958

00:45:21,420 --> 00:45:27,269

and normal means of communication I

959

00:45:24,260 --> 00:45:29,910

think this is a normal not paranormal

960

00:45:27,269 --> 00:45:32,699

means of communication between members

961

00:45:29,909 --> 00:45:35,750

of animal groups because I think it's a

962

00:45:32,699 --> 00:45:38,699

basic feature of animal behavior I

963

00:45:35,750 --> 00:45:41,730

started my investigations with animals

964

00:45:38,699 --> 00:45:43,889

and I started them with the animals we

965

00:45:41,730 --> 00:45:47,099

know best dogs and cats and other

966

00:45:43,889 --> 00:45:48,779

animals and the starting point because

967

00:45:47,099 --> 00:45:50,880

there'd been no previous scientific

968

00:45:48,780 --> 00:45:53,610

research on telepathy and animals of

969

00:45:50,880 --> 00:45:55,680

this kind my starting point was to ask

970
00:45:53,610 --> 00:45:56,550
people about their experience with dogs

971
00:45:55,679 --> 00:45:59,369
and cats

972
00:45:56,550 --> 00:46:06,150
I asked animal trainers police dog

973
00:45:59,369 --> 00:46:09,239
handlers vets pet owners blind people

974
00:46:06,150 --> 00:46:10,860
with Guide Dogs and so on about their

975
00:46:09,239 --> 00:46:14,719
experiences and I now have a database

976
00:46:10,860 --> 00:46:17,400
with more than 5,000 of these stories

977
00:46:14,719 --> 00:46:18,269
some people say you shouldn't listen to

978
00:46:17,400 --> 00:46:21,510
people's stories

979
00:46:18,269 --> 00:46:23,820
they're just anecdotes I heard that so

980
00:46:21,510 --> 00:46:27,660
often I looked up the word anecdote in

981
00:46:23,820 --> 00:46:31,109
the dictionary and I it literally means

982
00:46:27,659 --> 00:46:33,088
unpublished and in Greek is not ecto das

983
00:46:31,108 --> 00:46:35,250
is published an anecdote is an

984
00:46:33,088 --> 00:46:37,288
unpublished story as soon as it's

985
00:46:35,250 --> 00:46:39,838
published by definition it stops being

986
00:46:37,289 --> 00:46:42,630
an anecdote it's promoted to the rank of

987
00:46:39,838 --> 00:46:46,980
a case history and medicine is based on

988
00:46:42,630 --> 00:46:49,740
them and so for me the plural of

989
00:46:46,980 --> 00:46:51,719
anecdote is data and if you have

990
00:46:49,739 --> 00:46:54,118
hundreds of stories from people all over

991
00:46:51,719 --> 00:46:56,939
the world describing the same kind of

992
00:46:54,119 --> 00:46:59,519
phenomenon with their animals at least I

993
00:46:56,940 --> 00:47:01,380
think this means something's going on

994
00:46:59,519 --> 00:47:03,329
at least something's making people

995
00:47:01,380 --> 00:47:05,309
believe this their belief may be a false

996
00:47:03,329 --> 00:47:07,970
belief but at least many people are

997
00:47:05,309 --> 00:47:10,559
independently reporting similar thing

998

00:47:07,969 --> 00:47:12,838
most of my colleagues take the line that

999
00:47:10,559 --> 00:47:14,910
if thousands of ordinary people say

1000
00:47:12,838 --> 00:47:18,298
something's happening it must be untrue

1001
00:47:14,909 --> 00:47:19,920
I take the opposite opinion I think if

1002
00:47:18,298 --> 00:47:21,929
thousands of ordinary people say

1003
00:47:19,920 --> 00:47:25,470
something's happening it's probably true

1004
00:47:21,929 --> 00:47:27,629
and it's worth investigating the

1005
00:47:25,469 --> 00:47:29,308
phenomenon I've investigated most is the

1006
00:47:27,630 --> 00:47:31,740
ability of dogs to know when their

1007
00:47:29,309 --> 00:47:33,660
owners are coming home many people have

1008
00:47:31,739 --> 00:47:36,919
found the dog waits at a door or window

1009
00:47:33,659 --> 00:47:39,858
when the person is on the way home and

1010
00:47:36,920 --> 00:47:43,289
sometimes 10 minutes or more before they

1011
00:47:39,858 --> 00:47:44,940
return dr. von normal told me this

1012
00:47:43,289 --> 00:47:47,490

morning at breakfast he had a dog that

1013

00:47:44,940 --> 00:47:48,990

did this and his wife knew when he was

1014

00:47:47,489 --> 00:47:51,629

going to come home because it was

1015

00:47:48,989 --> 00:47:54,358

waiting ten minutes beforehand it's a

1016

00:47:51,630 --> 00:47:56,220

very common phenomenon and let's just

1017

00:47:54,358 --> 00:47:58,500

see how many people in this room have

1018

00:47:56,219 --> 00:47:59,788

got now or have had dogs or cats or

1019

00:47:58,500 --> 00:48:04,889

other animals that know when they're

1020

00:47:59,789 --> 00:48:06,900

coming home yes thank you that's quite

1021

00:48:04,889 --> 00:48:09,989

quite a lot of people you see this is

1022

00:48:06,900 --> 00:48:12,389

not a rare phenomenon I've done

1023

00:48:09,989 --> 00:48:14,098

experiments to test what's going on the

1024

00:48:12,389 --> 00:48:16,710

skeptics say it's just routine

1025

00:48:14,099 --> 00:48:18,510

it's just hearing cars and that sort of

1026

00:48:16,710 --> 00:48:20,490

thing we've done experiments where we

1027
00:48:18,510 --> 00:48:23,339
film the dog the whole time the person

1028
00:48:20,489 --> 00:48:25,889
is out we know the exact time on the

1029
00:48:23,338 --> 00:48:28,469
film we have people come at random times

1030
00:48:25,889 --> 00:48:31,259
that they don't know in advance we have

1031
00:48:28,469 --> 00:48:33,868
them come by taxi or by other unfamiliar

1032
00:48:31,260 --> 00:48:37,260
vehicle and the dogs still know over and

1033
00:48:33,869 --> 00:48:40,320
over again this research is summarized

1034
00:48:37,260 --> 00:48:42,120
in my book which in English is called

1035
00:48:40,320 --> 00:48:44,580
dogs that know when their owners are

1036
00:48:42,119 --> 00:48:48,929
coming home in in German its desi

1037
00:48:44,579 --> 00:48:50,699
beaters in deer terror and so there's

1038
00:48:48,929 --> 00:48:51,269
now a lot of evidence that animals can

1039
00:48:50,699 --> 00:48:53,549
do this

1040
00:48:51,269 --> 00:48:55,829
telepathy and animals is quite common in

1041
00:48:53,550 --> 00:48:59,070
fact animals are much better at it than

1042
00:48:55,829 --> 00:49:01,069
most people but of course in the human

1043
00:48:59,070 --> 00:49:03,690
realm the same principles apply

1044
00:49:01,070 --> 00:49:05,670
telepathy occurs between people who are

1045
00:49:03,690 --> 00:49:07,470
socially or emotionally bonded it

1046
00:49:05,670 --> 00:49:09,780
doesn't usually happen with strangers

1047
00:49:07,469 --> 00:49:13,619
it happens with mothers and babies

1048
00:49:09,780 --> 00:49:16,650
mothers and children lovers husbands and

1049
00:49:13,619 --> 00:49:18,900
wives best friends therapists and

1050
00:49:16,650 --> 00:49:21,690
clients where there's a transference and

1051
00:49:18,900 --> 00:49:24,389
countertransference and people who and

1052
00:49:21,690 --> 00:49:28,590
close colleagues it doesn't happen with

1053
00:49:24,389 --> 00:49:35,960
insurance salesmen and other sort of

1054
00:49:28,590 --> 00:49:38,250
strangers so this phenomenon is widely

1055

00:49:35,960 --> 00:49:39,720
experienced most people in the

1056
00:49:38,250 --> 00:49:42,469
population have had these experiences

1057
00:49:39,719 --> 00:49:45,719
and yet this is regarded as illusory

1058
00:49:42,469 --> 00:49:48,209
this is the dogma psychic phenomena are

1059
00:49:45,719 --> 00:49:48,659
illusory dogma 9 that I referred to this

1060
00:49:48,210 --> 00:49:51,539
morning

1061
00:49:48,659 --> 00:49:54,149
I think telepathy is actually quite

1062
00:49:51,539 --> 00:49:56,639
common and I've studied it in the places

1063
00:49:54,150 --> 00:49:58,500
where it's most biological a lot of

1064
00:49:56,639 --> 00:50:01,289
parapsychology has been based on

1065
00:49:58,500 --> 00:50:04,079
extremely artificial situations people

1066
00:50:01,289 --> 00:50:07,949
guessing cards that random strangers are

1067
00:50:04,079 --> 00:50:11,179
looking at or sitting in rooms with

1068
00:50:07,949 --> 00:50:13,649
earphones on and dim red light trying to

1069
00:50:11,179 --> 00:50:16,819

think what somebody else is looking at

1070

00:50:13,650 --> 00:50:19,349

in another room usually with strangers

1071

00:50:16,820 --> 00:50:21,059

these experiments work much better with

1072

00:50:19,349 --> 00:50:23,009

people who are closely linked and indeed

1073

00:50:21,059 --> 00:50:26,940

parapsychology researchers have found

1074

00:50:23,010 --> 00:50:28,770

that out too I've looked at think things

1075

00:50:26,940 --> 00:50:31,800

that are much more common and everyday

1076

00:50:28,769 --> 00:50:33,710

many mothers for example claim that they

1077

00:50:31,800 --> 00:50:36,480

can tell when their baby needs them when

1078

00:50:33,710 --> 00:50:38,070

nursing mothers are breastfeeding many

1079

00:50:36,480 --> 00:50:40,320

of them find that after they go back to

1080

00:50:38,070 --> 00:50:42,390

work or they start leaving their baby a

1081

00:50:40,320 --> 00:50:44,519

few months after the birth and they're

1082

00:50:42,389 --> 00:50:46,799

still breastfeeding they sometimes feel

1083

00:50:44,519 --> 00:50:49,170

their milk let down when they're at work

1084
00:50:46,800 --> 00:50:50,670
there's no sound of a baby nothing's

1085
00:50:49,170 --> 00:50:51,980
happening suddenly their breasts start

1086
00:50:50,670 --> 00:50:54,440
producing milk there

1087
00:50:51,980 --> 00:50:59,539
start tingling this is the milk letdown

1088
00:50:54,440 --> 00:51:01,340
reflex mediated by oxytocin and most

1089
00:50:59,539 --> 00:51:03,800
mothers when that happens assume that

1090
00:51:01,340 --> 00:51:05,420
their baby needs them and they ring home

1091
00:51:03,800 --> 00:51:07,760
on their mobile phone and they're

1092
00:51:05,420 --> 00:51:09,800
usually right I've done a detailed study

1093
00:51:07,760 --> 00:51:11,780
on nursing mothers and their babies and

1094
00:51:09,800 --> 00:51:13,340
I found that the odds against chance of

1095
00:51:11,780 --> 00:51:15,680
this happening are about a billion to

1096
00:51:13,340 --> 00:51:17,539
one it's a highly significant effect and

1097
00:51:15,679 --> 00:51:21,259
it's not just explained by synchronized

1098
00:51:17,539 --> 00:51:24,170
rhythms this is a very basic biological

1099
00:51:21,260 --> 00:51:26,720
form of telepathy and I'm sure natural

1100
00:51:24,170 --> 00:51:28,579
selection would have favored it mothers

1101
00:51:26,719 --> 00:51:30,589
who could tell when their child or their

1102
00:51:28,579 --> 00:51:32,480
baby needed them when they were far away

1103
00:51:30,590 --> 00:51:35,119
from it beyond the range of hearing and

1104
00:51:32,480 --> 00:51:36,889
crying would have babies that would

1105
00:51:35,119 --> 00:51:38,960
survive better than mothers that didn't

1106
00:51:36,889 --> 00:51:41,000
know and I think that'd be a very good

1107
00:51:38,960 --> 00:51:42,530
reason natural selection would favour

1108
00:51:41,000 --> 00:51:47,539
the developments of these abilities

1109
00:51:42,530 --> 00:51:49,700
especially in women but the Communists

1110
00:51:47,539 --> 00:51:51,590
kind of telepathy by far with in the

1111
00:51:49,699 --> 00:51:53,659
modern world occurs in connection with

1112

00:51:51,590 --> 00:51:57,470
modern technology namely

1113
00:51:53,659 --> 00:51:59,239
telephone telepathy many people have had

1114
00:51:57,469 --> 00:52:01,969
the experience of thinking of someone

1115
00:51:59,239 --> 00:52:05,419
who then rings and they say that's funny

1116
00:52:01,969 --> 00:52:08,719
I was just thinking about you I've done

1117
00:52:05,420 --> 00:52:14,349
surveys on this phenomenon in various

1118
00:52:08,719 --> 00:52:17,089
countries and they've shown that about

1119
00:52:14,349 --> 00:52:18,409
95 percent of women say they've had this

1120
00:52:17,090 --> 00:52:21,980
experience compared with about

1121
00:52:18,409 --> 00:52:23,659
seventy-two percent of men now many more

1122
00:52:21,980 --> 00:52:25,519
women than men have had this telephone

1123
00:52:23,659 --> 00:52:28,460
telepathy but even the majority of men

1124
00:52:25,519 --> 00:52:31,429
have had it I've done these surveys in

1125
00:52:28,460 --> 00:52:34,670
Germany Britain North America and South

1126
00:52:31,429 --> 00:52:37,579

America in Argentina women everywhere

1127

00:52:34,670 --> 00:52:39,550

come on to around 95% there are more

1128

00:52:37,579 --> 00:52:41,599

national differences between men

1129

00:52:39,550 --> 00:52:47,420

Argentinian men are the most sensitive

1130

00:52:41,599 --> 00:52:51,858

and British men the least and these are

1131

00:52:47,420 --> 00:52:54,470

other kinds of telepathy and these are

1132

00:52:51,858 --> 00:52:55,099

other kinds of telepathy again women

1133

00:52:54,469 --> 00:52:57,730

more than men

1134

00:52:55,099 --> 00:53:00,349

but much less than telephone telepathy

1135

00:52:57,730 --> 00:53:04,260

so this is the commonest kind in the

1136

00:53:00,349 --> 00:53:06,690

modern world now

1137

00:53:04,260 --> 00:53:10,440

skeptics for a long time have dismissed

1138

00:53:06,690 --> 00:53:12,750

this phenomenon by saying well it's just

1139

00:53:10,440 --> 00:53:14,490

coincidence you think of people all the

1140

00:53:12,750 --> 00:53:15,869

time if one of them rings you imagine

1141
00:53:14,489 --> 00:53:18,899
it's telepathy and you forget the

1142
00:53:15,869 --> 00:53:19,680
millions of times you're wrong now for a

1143
00:53:18,900 --> 00:53:21,510
hundred years

1144
00:53:19,679 --> 00:53:23,569
they've got away with that as a

1145
00:53:21,510 --> 00:53:26,820
hypothesis without a shred of evidence

1146
00:53:23,570 --> 00:53:30,450
but I set up experiments to test this in

1147
00:53:26,820 --> 00:53:32,519
my experiments the subject picks for

1148
00:53:30,449 --> 00:53:35,699
people they know well friends or family

1149
00:53:32,519 --> 00:53:38,759
members they sit at home on a landline

1150
00:53:35,699 --> 00:53:40,348
telephone they're filmed to make sure

1151
00:53:38,760 --> 00:53:42,839
they're not getting emails or other

1152
00:53:40,349 --> 00:53:46,829
phone calls we pick one of the four

1153
00:53:42,838 --> 00:53:48,539
callers at random by throwing a dice we

1154
00:53:46,829 --> 00:53:51,690
ring them up and ask them to call the

1155
00:53:48,539 --> 00:53:53,789
subject the phone rings they know it's

1156
00:53:51,690 --> 00:53:55,710
one of these four people before they

1157
00:53:53,789 --> 00:53:58,469
pick it up they have to say who it is I

1158
00:53:55,710 --> 00:54:01,650
think it's Mary they pick it up hello

1159
00:53:58,469 --> 00:54:06,149
Mary by chance you'd be right one time

1160
00:54:01,650 --> 00:54:09,059
in for 25% in these experiments the

1161
00:54:06,150 --> 00:54:12,420
actual hit rate here's the chance rate

1162
00:54:09,059 --> 00:54:15,509
of 25 percent the actual hit rate was 45

1163
00:54:12,420 --> 00:54:17,430
percent and the p-value for this this

1164
00:54:15,510 --> 00:54:19,650
was done with hundreds of trials the

1165
00:54:17,429 --> 00:54:22,379
probability value is 1 times 10 to the

1166
00:54:19,650 --> 00:54:24,960
minus 12 for those of you who are into

1167
00:54:22,380 --> 00:54:27,088
statistics I should point out this makes

1168
00:54:24,960 --> 00:54:34,019
it more likely than the existence of the

1169

00:54:27,088 --> 00:54:35,519
Higgs boson and we also did these tests

1170
00:54:34,019 --> 00:54:38,280
we're two of the four callers were

1171
00:54:35,519 --> 00:54:40,230
familiar people and the other two were

1172
00:54:38,280 --> 00:54:42,480
unfamiliar people that they'd never met

1173
00:54:40,230 --> 00:54:45,690
and this showed very clearly as it works

1174
00:54:42,480 --> 00:54:48,500
with familiar but hardly at all with

1175
00:54:45,690 --> 00:54:48,500
unfamiliar people

1176
00:54:52,369 --> 00:54:56,690
and this just summarizes some of the

1177
00:54:54,409 --> 00:54:58,548
results it's a new way of testing for

1178
00:54:56,690 --> 00:55:01,039
telepathy highly significant positive

1179
00:54:58,548 --> 00:55:02,690
results no effective distance we did

1180
00:55:01,039 --> 00:55:05,390
these experiments between Britain and

1181
00:55:02,690 --> 00:55:07,849
Australia we recruited young Australians

1182
00:55:05,389 --> 00:55:09,798
and New Zealanders in Britain and we

1183
00:55:07,849 --> 00:55:12,710

tested with two callers they'd recently

1184

00:55:09,798 --> 00:55:15,318

met in Britain and two people back home

1185

00:55:12,710 --> 00:55:17,630

their mothers people they were close to

1186

00:55:15,318 --> 00:55:20,358

and it worked actually better with the

1187

00:55:17,630 --> 00:55:22,099

people in Australia because they were

1188

00:55:20,358 --> 00:55:25,190

closer to them emotionally even though

1189

00:55:22,099 --> 00:55:26,630

they were further physically it's been

1190

00:55:25,190 --> 00:55:28,608

replicated at the University of

1191

00:55:26,630 --> 00:55:32,059

Amsterdam and at the University of

1192

00:55:28,608 --> 00:55:34,038

Freiburg in Germany it's a very good for

1193

00:55:32,059 --> 00:55:37,309

student projects and it agrees with

1194

00:55:34,039 --> 00:55:40,460

common experience I've done similar

1195

00:55:37,309 --> 00:55:43,759

experience with emails SMS messages and

1196

00:55:40,460 --> 00:55:46,759

I'm about to launch a new application on

1197

00:55:43,759 --> 00:55:49,460

Facebook so people can do this through

1198
00:55:46,759 --> 00:55:51,858
social media I also have an automated

1199
00:55:49,460 --> 00:55:54,139
telepathy test working on mobile phones

1200
00:55:51,858 --> 00:55:56,598
not yet in Germany it works in Britain

1201
00:55:54,139 --> 00:55:58,460
and America where people can just do

1202
00:55:56,599 --> 00:56:01,099
this experiment at any time with their

1203
00:55:58,460 --> 00:56:03,048
friends so this research can now break

1204
00:56:01,099 --> 00:56:06,019
out of the laboratory and become part of

1205
00:56:03,048 --> 00:56:07,818
ordinary life and in fact in this

1206
00:56:06,018 --> 00:56:10,038
research on telepathy I've concentrated

1207
00:56:07,818 --> 00:56:12,139
on what I call the mysteries of everyday

1208
00:56:10,039 --> 00:56:15,289
life because these things are happening

1209
00:56:12,139 --> 00:56:18,170
all the time and yet the dogmatic

1210
00:56:15,289 --> 00:56:20,960
assumptions of materialism have managed

1211
00:56:18,170 --> 00:56:22,818
to deny so much of our own experience

1212
00:56:20,960 --> 00:56:24,889
first of all they've denied that our

1213
00:56:22,818 --> 00:56:27,170
images are out there where they seem to

1214
00:56:24,889 --> 00:56:29,210
be secondly they've made people say oh

1215
00:56:27,170 --> 00:56:31,639
our pets aren't really psychic that's

1216
00:56:29,210 --> 00:56:34,548
just coincidence they deny the sense of

1217
00:56:31,639 --> 00:56:38,179
being stared at they deny telepathy they

1218
00:56:34,548 --> 00:56:40,429
deny the importance of belief on our

1219
00:56:38,179 --> 00:56:42,139
behavior and indeed in medicine although

1220
00:56:40,429 --> 00:56:46,338
that's now accepted through the placebo

1221
00:56:42,139 --> 00:56:48,199
effect but if we sweep away these dogmas

1222
00:56:46,338 --> 00:56:49,969
and look at things in an open-minded way

1223
00:56:48,199 --> 00:56:52,808
the scientific evidence actually

1224
00:56:49,969 --> 00:56:55,519
supports the reality of these

1225
00:56:52,809 --> 00:56:58,339
experiences which most of us have have

1226

00:56:55,518 --> 00:57:00,528
had personally and I think when we admit

1227
00:56:58,338 --> 00:57:02,778
the reality of these things we learn

1228
00:57:00,528 --> 00:57:05,329
something important we are connected

1229
00:57:02,778 --> 00:57:05,989
with each other at a distance our minds

1230
00:57:05,329 --> 00:57:08,480
do

1231
00:57:05,989 --> 00:57:11,389
stand beyond our brains our intentions

1232
00:57:08,480 --> 00:57:13,280
affect other people a dog isn't affected

1233
00:57:11,389 --> 00:57:15,500
by your intention to come home it's a

1234
00:57:13,280 --> 00:57:17,930
measurable effect people are affected by

1235
00:57:15,500 --> 00:57:19,610
your intention to telephone them that's

1236
00:57:17,929 --> 00:57:22,730
why they think about you just before the

1237
00:57:19,610 --> 00:57:25,070
call comes that our intentions can

1238
00:57:22,730 --> 00:57:27,019
affect people at a distance all these

1239
00:57:25,070 --> 00:57:30,289
are things that almost everybody knows

1240
00:57:27,019 --> 00:57:32,630

already and sometimes people say to me

1241

00:57:30,289 --> 00:57:34,820

unsophisticated people sometimes say to

1242

00:57:32,630 --> 00:57:36,710

me why do you waste your time trying to

1243

00:57:34,820 --> 00:57:42,019

prove things that everyone already knows

1244

00:57:36,710 --> 00:57:43,610

and and it's true that most people do

1245

00:57:42,019 --> 00:57:45,500

already know these things but the

1246

00:57:43,610 --> 00:57:47,360

intellectual educated part of them is

1247

00:57:45,500 --> 00:57:47,989

forced to deny it because if you don't

1248

00:57:47,360 --> 00:57:49,849

deny it

1249

00:57:47,989 --> 00:57:53,149

people think you're stupid or uneducated

1250

00:57:49,849 --> 00:57:55,849

or superstitious I think the real

1251

00:57:53,150 --> 00:57:58,010

superstition is this dogmatic belief in

1252

00:57:55,849 --> 00:58:01,130

materialism it's hung over from a

1253

00:57:58,010 --> 00:58:03,080

previous age it's not appropriate to the

1254

00:58:01,130 --> 00:58:06,170

facts as we know them and I think

1255
00:58:03,079 --> 00:58:08,809
science liberated from these dogmas can

1256
00:58:06,170 --> 00:58:10,820
become more scientific not less so I

1257
00:58:08,809 --> 00:58:14,980
think you'll become more interesting and

1258
00:58:10,820 --> 00:58:14,980
more fun thank you

1259
00:58:22,480 --> 00:58:24,539
you