



The UFO Rabbit Hole

A RATIONAL APPROACH
TO ANCIENT ALIENS
[PT 1]

Episode 8

1
00:00:01,350 --> 00:00:22,710

[Music]

2
00:00:22,720 --> 00:00:31,589

so

3
00:00:36,709 --> 00:00:33,510

welcome back to the ufo rabbit hole

4
00:00:39,030 --> 00:00:36,719

podcast i'm your host kelly chase

5
00:00:41,590 --> 00:00:39,040

today we begin a new leg of our journey

6
00:00:43,750 --> 00:00:41,600

down the rabbit hole so i want to take a

7
00:00:45,670 --> 00:00:43,760

quick minute to recap where we've been

8
00:00:47,029 --> 00:00:45,680

and to begin to map out the way forward

9
00:00:48,709 --> 00:00:47,039

from here

10
00:00:51,350 --> 00:00:48,719

so far we've established that the

11
00:00:53,350 --> 00:00:51,360

pentagon has admitted that ufos are real

12
00:00:55,270 --> 00:00:53,360

that they're operating with impunity in

13
00:00:56,389 --> 00:00:55,280

our airspace and that we don't know what

14

00:00:57,750 --> 00:00:56,399

they are

15

00:00:59,910 --> 00:00:57,760

we've talked through some of the most

16

00:01:01,510 --> 00:00:59,920

common explanations for what the ufo

17

00:01:03,670 --> 00:01:01,520

phenomenon might be

18

00:01:05,950 --> 00:01:03,680

considering everything from secret human

19

00:01:09,030 --> 00:01:05,960

technology to future humans and from

20

00:01:11,030 --> 00:01:09,040

extraterrestrials to ultraterrestrials

21

00:01:13,030 --> 00:01:11,040

we've also been introduced to some

22

00:01:14,710 --> 00:01:13,040

although certainly not all of the main

23

00:01:15,749 --> 00:01:14,720

players in the current disclosure

24

00:01:18,550 --> 00:01:15,759

movement

25

00:01:19,830 --> 00:01:18,560

including former director of atip luis

26

00:01:21,830 --> 00:01:19,840

elizondo

27

00:01:24,630 --> 00:01:21,840

former deputy assistant secretary of

28

00:01:27,429 --> 00:01:24,640

defense for intelligence chris mellon

29

00:01:29,910 --> 00:01:27,439

investigative journalist ross colt hart

30

00:01:32,310 --> 00:01:29,920

and former blink 182 frontman and

31

00:01:35,190 --> 00:01:32,320

founder of the now defunct to the stars

32

00:01:37,350 --> 00:01:35,200

academy of arts and sciences tom delong

33

00:01:39,190 --> 00:01:37,360

and many more

34

00:01:41,590 --> 00:01:39,200

and although we've covered a lot of

35

00:01:43,990 --> 00:01:41,600

ground when it comes to understanding

36

00:01:46,630 --> 00:01:44,000

the full scope of the ufo phenomenon and

37

00:01:49,270 --> 00:01:46,640

its implications for humankind we've

38

00:01:50,389 --> 00:01:49,280

barely scratched the surface

39

00:01:52,310 --> 00:01:50,399

and yet

40

00:01:55,270 --> 00:01:52,320

already it's clear that the branches of

41

00:01:57,270 --> 00:01:55,280

ufology stretch out in every direction

42

00:02:00,069 --> 00:01:57,280

its tendrils are deeply tangled and

43

00:02:02,630 --> 00:02:00,079

entwined with questions of human history

44

00:02:05,270 --> 00:02:02,640

consciousness spirituality quantum

45

00:02:07,350 --> 00:02:05,280

mechanics and even the paranormal

46

00:02:09,270 --> 00:02:07,360

basically anywhere that we would look to

47

00:02:11,510 --> 00:02:09,280

ask the deeper questions about the

48

00:02:14,710 --> 00:02:11,520

nature of our reality and our purpose

49

00:02:16,869 --> 00:02:14,720

within it we find ufology lurking

50

00:02:18,150 --> 00:02:16,879

taunting us with seemingly unanswerable

51

00:02:21,190 --> 00:02:18,160

questions

52

00:02:23,589 --> 00:02:21,200

and so over these next several episodes

53

00:02:25,510 --> 00:02:23,599

we'll begin to get a high-level overview

54

00:02:26,710 --> 00:02:25,520

of the many different facets of this

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00:02:28,229 --> 00:02:26,720

phenomenon

56

00:02:30,790 --> 00:02:28,239

we'll talk about bleeding-edge

57

00:02:33,030 --> 00:02:30,800

scientific discoveries we'll dive deeper

58

00:02:35,509 --> 00:02:33,040

into the history of ufos and what the

59

00:02:37,430 --> 00:02:35,519

united states government might be hiding

60

00:02:40,309 --> 00:02:37,440

we'll explore the deep ties of the

61

00:02:42,070 --> 00:02:40,319

phenomenon to the paranormal and discuss

62

00:02:44,390 --> 00:02:42,080

multiple models of the mind and

63

00:02:46,470 --> 00:02:44,400

consciousness and even look at the

64

00:02:48,830 --> 00:02:46,480

mysteries surrounding the origin of the

65

00:02:51,910 --> 00:02:48,840

human species and what makes us so

66

00:02:53,990 --> 00:02:51,920

unique today though i want to talk

67

00:02:55,990 --> 00:02:54,000

specifically about some of the mysteries

68

00:02:57,509 --> 00:02:56,000

that exist around the dawn of human

69

00:02:59,670 --> 00:02:57,519

civilization

70

00:03:02,390 --> 00:02:59,680

where it happened when it happened and

71

00:03:04,710 --> 00:03:02,400

why it happened and what role the ufo

72

00:03:06,630 --> 00:03:04,720

phenomenon may have played in shaping

73

00:03:08,710 --> 00:03:06,640

who we are today

74

00:03:11,030 --> 00:03:08,720

as we've discussed previously it's

75

00:03:13,750 --> 00:03:11,040

basically impossible to point to any

76

00:03:15,830 --> 00:03:13,760

specific incident or time period and say

77

00:03:18,949 --> 00:03:15,840

that that is the definitive beginning of

78

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

the ufo phenomenon the reality is that

79

00:03:23,190 --> 00:03:20,959

although it has manifested itself in

80

00:03:25,589 --> 00:03:23,200

different ways throughout history there

81

00:03:27,670 --> 00:03:25,599

is a clear pattern of strange objects

82

00:03:29,990 --> 00:03:27,680

and beings coming from the sky being

83

00:03:31,030 --> 00:03:30,000

reported by people and cultures around

84

00:03:33,190 --> 00:03:31,040

the world

85

00:03:34,630 --> 00:03:33,200

dating back to our very earliest written

86

00:03:36,710 --> 00:03:34,640

records

87

00:03:38,710 --> 00:03:36,720

there are lots of explanations for what

88

00:03:41,110 --> 00:03:38,720

these reports might represent from

89
00:03:42,710 --> 00:03:41,120
misunderstood weather phenomena to myths

90
00:03:44,309 --> 00:03:42,720
and allegories that were never meant to

91
00:03:46,789 --> 00:03:44,319
be taken as fact

92
00:03:48,869 --> 00:03:46,799
and because it's very difficult for us

93
00:03:51,509 --> 00:03:48,879
to know exactly what happened hundreds

94
00:03:53,670 --> 00:03:51,519
if not thousands of years ago it can be

95
00:03:55,830 --> 00:03:53,680
very tempting to just write all of those

96
00:03:59,270 --> 00:03:55,840
stories off as figments from a more

97
00:04:01,509 --> 00:03:59,280
primitive less scientific time period

98
00:04:03,270 --> 00:04:01,519
however with the pentagon's admission

99
00:04:05,350 --> 00:04:03,280
that ufos are real

100
00:04:07,429 --> 00:04:05,360
i think there's a really strong argument

101
00:04:08,710 --> 00:04:07,439
to be made that we no longer have that

102
00:04:10,869 --> 00:04:08,720
luxury

103
00:04:12,550 --> 00:04:10,879
members of our military and witnesses

104
00:04:14,710 --> 00:04:12,560
all around the world have reported

105
00:04:17,110 --> 00:04:14,720
seeing strange things in the sky that

106
00:04:18,229 --> 00:04:17,120
don't abide by the laws of physics as we

107
00:04:19,830 --> 00:04:18,239
know them

108
00:04:21,909 --> 00:04:19,840
why would we assume that this is the

109
00:04:23,030 --> 00:04:21,919
only time in human history that this has

110
00:04:25,670 --> 00:04:23,040
happened

111
00:04:28,310 --> 00:04:25,680
in fact when we examine the hypotheses

112
00:04:30,310 --> 00:04:28,320
offered to explain the ufo phenomenon

113
00:04:32,710 --> 00:04:30,320

most of them function in such a way as

114

00:04:34,230 --> 00:04:32,720

to strongly imply that this isn't a new

115

00:04:36,550 --> 00:04:34,240

phenomenon

116

00:04:39,110 --> 00:04:36,560

for example if what we're dealing with

117

00:04:40,950 --> 00:04:39,120

is future humans then there's no reason

118

00:04:42,550 --> 00:04:40,960

to believe that they'd only come back to

119

00:04:44,230 --> 00:04:42,560

this time period

120

00:04:46,150 --> 00:04:44,240

if they're going back to observe or

121

00:04:47,030 --> 00:04:46,160

interact with earlier versions of humans

122

00:04:48,390 --> 00:04:47,040

at all

123

00:04:50,710 --> 00:04:48,400

we can assume that this has been

124

00:04:52,030 --> 00:04:50,720

happening throughout human history

125

00:04:54,550 --> 00:04:52,040

if what we're dealing with is

126

00:04:56,550 --> 00:04:54,560

ultra-terrestrial then whatever this is

127

00:04:59,110 --> 00:04:56,560

has been here for a long time

128

00:05:00,310 --> 00:04:59,120

potentially much longer than humans

129

00:05:02,310 --> 00:05:00,320

and if what we're dealing with is

130

00:05:04,790 --> 00:05:02,320

interdimensional well then there's

131

00:05:07,029 --> 00:05:04,800

almost no limit to who or what is coming

132

00:05:08,950 --> 00:05:07,039

through the veil and limiting humanity's

133

00:05:11,110 --> 00:05:08,960

exposure to these beings to just a few

134

00:05:13,189 --> 00:05:11,120

decades is nonsensical if

135

00:05:15,350 --> 00:05:13,199

interdimensional travel is possible at

136

00:05:18,550 --> 00:05:15,360

all it's almost certainly happening on a

137

00:05:21,189 --> 00:05:18,560

scale that we can scarcely comprehend

138

00:05:23,270 --> 00:05:21,199

so of the most common hypotheses that

139

00:05:24,790 --> 00:05:23,280

really only leaves the extraterrestrial

140

00:05:26,469 --> 00:05:24,800

hypothesis

141

00:05:28,950 --> 00:05:26,479

could beings from another planet have

142

00:05:31,350 --> 00:05:28,960

first arrived here about 80ish years ago

143

00:05:32,629 --> 00:05:31,360

and have been messing with us ever since

144

00:05:33,830 --> 00:05:32,639

potentially

145

00:05:35,990 --> 00:05:33,840

if we're limiting the scope of the

146

00:05:37,670 --> 00:05:36,000

phenomenon to the last century then it's

147

00:05:39,110 --> 00:05:37,680

certainly the hypothesis that makes the

148

00:05:41,430 --> 00:05:39,120

most sense

149

00:05:43,590 --> 00:05:41,440

however if extraterrestrial visitation

150

00:05:45,830 --> 00:05:43,600

is happening now it certainly doesn't

151

00:05:47,029 --> 00:05:45,840

preclude extraterrestrial visitation in

152

00:05:48,950 --> 00:05:47,039

the past

153

00:05:51,270 --> 00:05:48,960

if earth and humans are interesting to

154

00:05:53,909 --> 00:05:51,280

alien intelligences now it's likely that

155

00:05:55,749 --> 00:05:53,919

they would have been in the past as well

156

00:05:57,990 --> 00:05:55,759

though admittedly the advent of the

157

00:06:00,309 --> 00:05:58,000

nuclear bomb could conceivably have been

158

00:06:01,909 --> 00:06:00,319

the thing that put us on their radar

159

00:06:04,390 --> 00:06:01,919

it's hard to know

160

00:06:07,029 --> 00:06:04,400

the point being given what we know of

161

00:06:09,110 --> 00:06:07,039

the phenomenon so far it makes a lot of

162

00:06:10,230 --> 00:06:09,120

sense to look to the past for potential

163

00:06:12,390 --> 00:06:10,240

clues

164

00:06:15,590 --> 00:06:12,400

and you know what that means friends

165

00:06:17,430 --> 00:06:15,600

it's time for us to do in ancient aliens

166

00:06:19,430 --> 00:06:17,440

for those who aren't familiar ancient

167

00:06:21,189 --> 00:06:19,440

aliens is a show on the history channel

168

00:06:23,909 --> 00:06:21,199

that is based on the premise that in our

169

00:06:26,070 --> 00:06:23,919

distant past extraterrestrials came to

170

00:06:27,990 --> 00:06:26,080

earth and interacted with and sometimes

171

00:06:30,070 --> 00:06:28,000

helped humans

172

00:06:32,070 --> 00:06:30,080

this theory is called ancient astronaut

173

00:06:34,070 --> 00:06:32,080

theory and its proponents see evidence

174

00:06:35,990 --> 00:06:34,080

to support their claims in everything

175

00:06:38,710 --> 00:06:36,000

from petroglyphs depicting strange

176
00:06:40,469 --> 00:06:38,720
beings to ancient megalithic structures

177
00:06:42,230 --> 00:06:40,479
that they contend humans could not have

178
00:06:43,909 --> 00:06:42,240
built on their own

179
00:06:46,230 --> 00:06:43,919
they see the stories in ancient

180
00:06:48,950 --> 00:06:46,240
scriptures as evidence of our ancestors

181
00:06:51,029 --> 00:06:48,960
trying to describe events and technology

182
00:06:52,469 --> 00:06:51,039
that they had no words or framework to

183
00:06:54,550 --> 00:06:52,479
understand

184
00:06:56,950 --> 00:06:54,560
basically anything interesting

185
00:06:58,629 --> 00:06:56,960
mysterious or anomalous in our past has

186
00:07:00,150 --> 00:06:58,639
one explanation

187
00:07:02,230 --> 00:07:00,160
aliens did it

188
00:07:03,350 --> 00:07:02,240

or at least that's the main takeaway of

189

00:07:05,909 --> 00:07:03,360

the show

190

00:07:08,469 --> 00:07:05,919

ancient aliens by its very infotainment

191

00:07:10,550 --> 00:07:08,479

nature is not big on nuance and is

192

00:07:12,790 --> 00:07:10,560

notorious for stringing together wild

193

00:07:15,110 --> 00:07:12,800

theories and making bold proclamations

194

00:07:17,830 --> 00:07:15,120

based on evidence that is dubious at

195

00:07:19,990 --> 00:07:17,840

best it makes for a fun watch if you're

196

00:07:21,990 --> 00:07:20,000

not too concerned with the truthiness of

197

00:07:23,589 --> 00:07:22,000

the facts being presented

198

00:07:25,990 --> 00:07:23,599

but for those who are looking for a

199

00:07:27,670 --> 00:07:26,000

scientific rational approach to some of

200

00:07:29,430 --> 00:07:27,680

these bigger questions

201
00:07:31,430 --> 00:07:29,440
this isn't it

202
00:07:34,150 --> 00:07:31,440
now i want to come right out and say

203
00:07:36,309 --> 00:07:34,160
that i am an ancient aliens apologist

204
00:07:38,230 --> 00:07:36,319
there are many in the ufo community who

205
00:07:40,070 --> 00:07:38,240
don't share my views and i understand

206
00:07:42,469 --> 00:07:40,080
why

207
00:07:45,270 --> 00:07:42,479
for many people ancient aliens is their

208
00:07:47,990 --> 00:07:45,280
main and perhaps their only exposure to

209
00:07:49,430 --> 00:07:48,000
ideas surrounding the ufo phenomenon

210
00:07:51,830 --> 00:07:49,440
i was certainly one of those people

211
00:07:53,270 --> 00:07:51,840
before i started down this rabbit hole

212
00:07:55,189 --> 00:07:53,280
and if that's the main place you're

213
00:07:57,510 --> 00:07:55,199

getting your information it can be hard

214

00:08:00,869 --> 00:07:57,520

to take any of it seriously it just

215

00:08:03,749 --> 00:08:00,879

comes across as totally wackadoo

216

00:08:05,430 --> 00:08:03,759

but i still go to bat for ancient aliens

217

00:08:07,270 --> 00:08:05,440

in my early days of investigating this

218

00:08:09,430 --> 00:08:07,280

phenomenon the deal that i made with

219

00:08:11,909 --> 00:08:09,440

myself was that i would look at every

220

00:08:14,150 --> 00:08:11,919

piece of evidence and every theory i

221

00:08:16,790 --> 00:08:14,160

would turn over every rock and i would

222

00:08:19,270 --> 00:08:16,800

allow myself to really and truly

223

00:08:21,189 --> 00:08:19,280

consider ideas that i deemed to be too

224

00:08:23,350 --> 00:08:21,199

absurd in the past

225

00:08:26,070 --> 00:08:23,360

i didn't need to accept it i didn't need

226

00:08:28,390 --> 00:08:26,080

to believe it i just needed to explore

227

00:08:31,110 --> 00:08:28,400

it with an open mind doing my best to

228

00:08:34,070 --> 00:08:31,120

set aside my previous biases and weigh

229

00:08:36,230 --> 00:08:34,080

each piece of evidence on its merits

230

00:08:37,990 --> 00:08:36,240

and being new to the world of ufos and

231

00:08:39,829 --> 00:08:38,000

not knowing where to start ancient

232

00:08:40,790 --> 00:08:39,839

aliens was a pretty natural place to

233

00:08:42,790 --> 00:08:40,800

begin

234

00:08:44,710 --> 00:08:42,800

and so i started watching

235

00:08:47,110 --> 00:08:44,720

and in the midst of the logical leaps

236

00:08:49,430 --> 00:08:47,120

and the hilarious non-sequiturs there

237

00:08:51,829 --> 00:08:49,440

were also some truly astounding and

238

00:08:54,550 --> 00:08:51,839

challenging ideas

239

00:08:58,070 --> 00:08:54,560

there were revelations that frankly

240

00:09:00,630 --> 00:08:58,080

floored me prompting me to dig deeper

241

00:09:02,949 --> 00:09:00,640

the ideas that really struck me the ones

242

00:09:05,590 --> 00:09:02,959

that kept me awake puzzling over if this

243

00:09:08,230 --> 00:09:05,600

could possibly be true and contemplating

244

00:09:10,870 --> 00:09:08,240

the stunning implications if it were

245

00:09:13,509 --> 00:09:10,880

weren't the flashy ideas it was a wild

246

00:09:15,509 --> 00:09:13,519

speculation about nuclear wars or alien

247

00:09:18,150 --> 00:09:15,519

overlords or high technology in the

248

00:09:21,430 --> 00:09:18,160

distant past it was the smaller and more

249

00:09:23,509 --> 00:09:21,440

grounded details the physical proof the

250

00:09:24,550 --> 00:09:23,519

anomalies that could be ignored but not

251
00:09:26,790 --> 00:09:24,560
denied

252
00:09:29,110 --> 00:09:26,800
the tantalizing hints that the story of

253
00:09:30,070 --> 00:09:29,120
humanity might not be what we think it

254
00:09:31,670 --> 00:09:30,080
is

255
00:09:33,030 --> 00:09:31,680
and i'm grateful to ancient aliens for

256
00:09:35,590 --> 00:09:33,040
that

257
00:09:37,110 --> 00:09:35,600
however it's also important to recognize

258
00:09:39,030 --> 00:09:37,120
that although the ancient astronaut

259
00:09:41,590 --> 00:09:39,040
theory is the idea that most people are

260
00:09:43,430 --> 00:09:41,600
familiar with there are actually a few

261
00:09:45,829 --> 00:09:43,440
other potential explanations for the

262
00:09:47,590 --> 00:09:45,839
mysterious sites and anomalous artifacts

263
00:09:49,750 --> 00:09:47,600

from our distant past

264

00:09:52,070 --> 00:09:49,760

and most of them boil down to the idea

265

00:09:54,070 --> 00:09:52,080

that human civilization may be much

266

00:09:56,150 --> 00:09:54,080

older than we thought

267

00:09:57,670 --> 00:09:56,160

we'll get back to that idea in part two

268

00:09:59,829 --> 00:09:57,680

and talk through some of the evidence

269

00:10:02,470 --> 00:09:59,839

for that potentially being the case

270

00:10:04,630 --> 00:10:02,480

but for now let's stick a pin in it

271

00:10:06,790 --> 00:10:04,640

all that's important at this stage is to

272

00:10:08,389 --> 00:10:06,800

recognize that there are a wide range of

273

00:10:10,310 --> 00:10:08,399

possibilities when we look at the

274

00:10:13,030 --> 00:10:10,320

mysteries of our past

275

00:10:15,190 --> 00:10:13,040

and many of them are just as startling

276
00:10:16,550 --> 00:10:15,200
and just as profound as ancient alien

277
00:10:18,550 --> 00:10:16,560
visitors

278
00:10:21,030 --> 00:10:18,560
but before we start looking at any

279
00:10:23,030 --> 00:10:21,040
particular evidence or explanation

280
00:10:25,190 --> 00:10:23,040
we first need to ask the biggest and

281
00:10:27,750 --> 00:10:25,200
most important question

282
00:10:30,230 --> 00:10:27,760
what do we know for sure about ancient

283
00:10:31,350 --> 00:10:30,240
human civilization

284
00:10:33,110 --> 00:10:31,360
after all

285
00:10:35,030 --> 00:10:33,120
whether we're talking about alien

286
00:10:37,030 --> 00:10:35,040
intelligences interacting with and

287
00:10:39,190 --> 00:10:37,040
influencing human development

288
00:10:40,710 --> 00:10:39,200

or human civilization being older than

289

00:10:43,030 --> 00:10:40,720

we think it is

290

00:10:45,030 --> 00:10:43,040

there should be evidence right

291

00:10:46,630 --> 00:10:45,040

and with the technological advances of

292

00:10:48,710 --> 00:10:46,640

the past several decades

293

00:10:50,949 --> 00:10:48,720

archaeologists and researchers are

294

00:10:52,870 --> 00:10:50,959

equipped with more powerful and precise

295

00:10:55,269 --> 00:10:52,880

tools than ever before

296

00:10:56,630 --> 00:10:55,279

so surely there must be some things that

297

00:10:58,630 --> 00:10:56,640

we know for sure

298

00:11:00,470 --> 00:10:58,640

which means that hypothetically there

299

00:11:03,110 --> 00:11:00,480

are things we should be able to rule out

300

00:11:05,509 --> 00:11:03,120

right the answer to that question was

301

00:11:07,910 --> 00:11:05,519

meant to be just the intro of this

302

00:11:09,910 --> 00:11:07,920

episode but has ballooned into an

303

00:11:11,990 --> 00:11:09,920

episode of its own and i think it's

304

00:11:13,910 --> 00:11:12,000

important that we spend some time here

305

00:11:16,230 --> 00:11:13,920

because before we can have an

306

00:11:17,990 --> 00:11:16,240

intelligent and informed conversation

307

00:11:20,150 --> 00:11:18,000

about what may or may not have happened

308

00:11:22,230 --> 00:11:20,160

in humanity's ancient past

309

00:11:24,949 --> 00:11:22,240

we first need to have the conversation

310

00:11:26,069 --> 00:11:24,959

about what we already know and how we

311

00:11:28,870 --> 00:11:26,079

know it

312

00:11:30,790 --> 00:11:28,880

and also as you've probably guessed

313

00:11:32,550 --> 00:11:30,800

i'm going to advocate for the idea that

314

00:11:35,190 --> 00:11:32,560

there is significant evidence that the

315

00:11:37,430 --> 00:11:35,200

established narrative about how when and

316

00:11:38,630 --> 00:11:37,440

why human civilization developed is

317

00:11:40,870 --> 00:11:38,640

incorrect

318

00:11:44,069 --> 00:11:40,880

which is not something that i do lightly

319

00:11:46,310 --> 00:11:44,079

i am not an archaeologist or a scientist

320

00:11:48,550 --> 00:11:46,320

i'm a content creator who reads too many

321

00:11:51,110 --> 00:11:48,560

books and no matter how many books i

322

00:11:53,509 --> 00:11:51,120

read any decent archaeologist has

323

00:11:55,509 --> 00:11:53,519

forgotten more about this subject than i

324

00:11:57,590 --> 00:11:55,519

am likely to ever know

325

00:11:59,910 --> 00:11:57,600

so i think it's important to first lay

326

00:12:02,389 --> 00:11:59,920

out the case for why i believe this line

327

00:12:04,470 --> 00:12:02,399

of questioning is warranted and why i

328

00:12:07,269 --> 00:12:04,480

feel comfortable making the admittedly

329

00:12:09,190 --> 00:12:07,279

audacious claim that the experts may be

330

00:12:11,430 --> 00:12:09,200

wrong on this one

331

00:12:13,430 --> 00:12:11,440

but before we get into all that

332

00:12:15,509 --> 00:12:13,440

i want to take a minute to talk about a

333

00:12:18,150 --> 00:12:15,519

very important concept that we'll

334

00:12:19,750 --> 00:12:18,160

inevitably be revisiting again and again

335

00:12:21,110 --> 00:12:19,760

as we continue our journey down the

336

00:12:24,470 --> 00:12:21,120

rabbit hole

337

00:12:26,389 --> 00:12:24,480

and that concept is epistemology

338

00:12:28,150 --> 00:12:26,399

so for those of you that didn't waste

339

00:12:29,790 --> 00:12:28,160

your parents money on three quarters of

340

00:12:32,389 --> 00:12:29,800

a philosophy degree

341

00:12:35,590 --> 00:12:32,399

epistemology is the study or theory of

342

00:12:36,790 --> 00:12:35,600

the origin nature methods and limits of

343

00:12:38,790 --> 00:12:36,800

knowledge

344

00:12:40,870 --> 00:12:38,800

as we continue to explore all these

345

00:12:43,110 --> 00:12:40,880

strange ideas and theories we'll

346

00:12:45,590 --> 00:12:43,120

inevitably find ourselves coming back to

347

00:12:48,389 --> 00:12:45,600

the same basic questions

348

00:12:50,550 --> 00:12:48,399

what do we know to be true and how do we

349

00:12:53,190 --> 00:12:50,560

know for sure that what we accept is

350

00:12:54,870 --> 00:12:53,200

true is actually true

351
00:12:56,629 --> 00:12:54,880
basically it's exactly what we're

352
00:12:58,389 --> 00:12:56,639
talking about with regards to early

353
00:13:00,790 --> 00:12:58,399
human civilization

354
00:13:02,230 --> 00:13:00,800
what do we know and how do we know that

355
00:13:04,069 --> 00:13:02,240
we know it

356
00:13:06,949 --> 00:13:04,079
these may sound like really obvious

357
00:13:09,190 --> 00:13:06,959
questions with equally obvious answers

358
00:13:11,110 --> 00:13:09,200
but the question of what we can know and

359
00:13:13,670 --> 00:13:11,120
how we can know that we know it has

360
00:13:16,710 --> 00:13:13,680
stumped philosophers perhaps more than

361
00:13:18,389 --> 00:13:16,720
any other for thousands of years

362
00:13:20,949 --> 00:13:18,399
consider for a moment the difference

363
00:13:24,230 --> 00:13:20,959

between believing that something is true

364

00:13:26,470 --> 00:13:24,240

and knowing that something is true

365

00:13:28,949 --> 00:13:26,480

we know instinctively that those two

366

00:13:31,110 --> 00:13:28,959

things are very different but it can be

367

00:13:32,389 --> 00:13:31,120

hard to put your finger on how they are

368

00:13:34,150 --> 00:13:32,399

different

369

00:13:36,230 --> 00:13:34,160

a person can believe that something is

370

00:13:38,230 --> 00:13:36,240

true that is actually false

371

00:13:40,230 --> 00:13:38,240

this happens all the time often when

372

00:13:42,150 --> 00:13:40,240

someone is working with incomplete or

373

00:13:44,310 --> 00:13:42,160

incorrect information

374

00:13:46,230 --> 00:13:44,320

people can jump to conclusions or put

375

00:13:47,430 --> 00:13:46,240

blind trust in a source that isn't

376

00:13:48,870 --> 00:13:47,440

accurate

377

00:13:51,110 --> 00:13:48,880

sometimes it's just a matter of a

378

00:13:53,430 --> 00:13:51,120

mistake or a miscommunication

379

00:13:55,670 --> 00:13:53,440

but generally we agree that just because

380

00:13:58,150 --> 00:13:55,680

someone believes something doesn't

381

00:14:00,230 --> 00:13:58,160

necessarily mean that it's true and we

382

00:14:02,389 --> 00:14:00,240

also recognize that we can become

383

00:14:04,230 --> 00:14:02,399

attached to our beliefs in a way that

384

00:14:06,470 --> 00:14:04,240

makes us more likely to dismiss or

385

00:14:08,310 --> 00:14:06,480

overlook data that doesn't fit within

386

00:14:09,110 --> 00:14:08,320

that framework

387

00:14:10,870 --> 00:14:09,120

but

388

00:14:12,949 --> 00:14:10,880

knowing something is fundamentally

389

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

different from believing it

390

00:14:16,629 --> 00:14:14,399

you can know your best friend's phone

391

00:14:17,829 --> 00:14:16,639

number you can know that two plus two

392

00:14:20,629 --> 00:14:17,839

equals four

393

00:14:22,310 --> 00:14:20,639

you can know a poem word for word

394

00:14:25,030 --> 00:14:22,320

you can know your name

395

00:14:27,030 --> 00:14:25,040

an inherent in this idea of knowing

396

00:14:29,829 --> 00:14:27,040

something is the assumption that this

397

00:14:31,590 --> 00:14:29,839

knowledge is both objectively true and

398

00:14:33,110 --> 00:14:31,600

verifiable

399

00:14:34,790 --> 00:14:33,120

simple right

400

00:14:37,829 --> 00:14:34,800

not quite

401
00:14:39,990 --> 00:14:37,839
we don't know anything in a vacuum

402
00:14:42,230 --> 00:14:40,000
every piece of knowledge that we have is

403
00:14:44,389 --> 00:14:42,240
built upon a foundation of other data

404
00:14:47,350 --> 00:14:44,399
and assumptions that support and confirm

405
00:14:49,269 --> 00:14:47,360
it even if you never think about it

406
00:14:50,550 --> 00:14:49,279
you don't just know that two plus two

407
00:14:53,189 --> 00:14:50,560
equals four

408
00:14:55,189 --> 00:14:53,199
you know what two of something is you

409
00:14:57,509 --> 00:14:55,199
can picture it in your mind

410
00:14:59,509 --> 00:14:57,519
you know what a whole number is you know

411
00:15:01,030 --> 00:14:59,519
what the plus sign and the equal sign

412
00:15:03,670 --> 00:15:01,040
mean and you can perform those

413
00:15:07,269 --> 00:15:03,680

mathematical functions in your head

414

00:15:10,550 --> 00:15:07,279

but the number two like all numbers is

415

00:15:12,389 --> 00:15:10,560

itself an unprovable abstraction

416

00:15:13,990 --> 00:15:12,399

using number theory and the shared

417

00:15:15,509 --> 00:15:14,000

understanding that we have of what

418

00:15:18,230 --> 00:15:15,519

numbers are

419

00:15:20,470 --> 00:15:18,240

we've created logic which itself is the

420

00:15:22,790 --> 00:15:20,480

fundamental underpinning of science and

421

00:15:25,189 --> 00:15:22,800

language and basically all of the cool

422

00:15:27,750 --> 00:15:25,199

stuff that humans know how to do

423

00:15:28,710 --> 00:15:27,760

but while we can use numbers to do all

424

00:15:32,470 --> 00:15:28,720

of that

425

00:15:35,910 --> 00:15:32,480

we can't use numbers to prove themselves

426

00:15:38,550 --> 00:15:35,920

you could say that 2 equals 2 but saying

427

00:15:40,629 --> 00:15:38,560

that 2 equals itself is not a meaningful

428

00:15:43,590 --> 00:15:40,639

statement in this context just like if

429

00:15:45,910 --> 00:15:43,600

you said blue is blue

430

00:15:47,430 --> 00:15:45,920

neither is saying that three minus one

431

00:15:49,269 --> 00:15:47,440

equals two

432

00:15:50,870 --> 00:15:49,279

we can prove that that equation is

433

00:15:53,590 --> 00:15:50,880

consistent with the framework of

434

00:15:55,910 --> 00:15:53,600

mathematics but we can't prove that it's

435

00:15:57,509 --> 00:15:55,920

real outside of the framework of

436

00:15:59,590 --> 00:15:57,519

mathematics

437

00:16:01,590 --> 00:15:59,600

now i don't want to get too bogged down

438

00:16:03,990 --> 00:16:01,600

here because this line of questioning

439

00:16:05,910 --> 00:16:04,000

inevitably leads to the question of

440

00:16:06,870 --> 00:16:05,920

whether we can actually know anything at

441

00:16:09,189 --> 00:16:06,880

all

442

00:16:11,990 --> 00:16:09,199

if you drill down far enough into any

443

00:16:15,350 --> 00:16:12,000

single thing that we know to be true you

444

00:16:17,350 --> 00:16:15,360

inevitably hit conceptual bedrock or the

445

00:16:20,310 --> 00:16:17,360

place where your verifiable knowledge

446

00:16:22,470 --> 00:16:20,320

ends and the unverifiable abstract

447

00:16:24,629 --> 00:16:22,480

concepts and assumptions from which they

448

00:16:27,189 --> 00:16:24,639

grow begin

449

00:16:29,590 --> 00:16:27,199

logician mathematician and philosopher

450

00:16:33,030 --> 00:16:29,600

kurt gerdel first expressed this idea

451
00:16:35,030 --> 00:16:33,040
with his incompleteness theorems in 1931

452
00:16:37,189 --> 00:16:35,040
but you don't have to be a mathematician

453
00:16:39,189 --> 00:16:37,199
or philosopher to understand the

454
00:16:41,350 --> 00:16:39,199
limitations of our knowledge

455
00:16:42,629 --> 00:16:41,360
if you've ever spent any time around a

456
00:16:44,710 --> 00:16:42,639
young child

457
00:16:47,749 --> 00:16:44,720
you likely already know that each one of

458
00:16:50,710 --> 00:16:47,759
us is only about five wise away from a

459
00:16:52,629 --> 00:16:50,720
complete existential unraveling

460
00:16:54,230 --> 00:16:52,639
why is the grass green

461
00:16:56,310 --> 00:16:54,240
because it has a bright pigment called

462
00:16:57,430 --> 00:16:56,320
chlorophyll that makes it green

463
00:16:59,269 --> 00:16:57,440

why

464

00:17:01,910 --> 00:16:59,279

because plants need it to make food in a

465

00:17:02,870 --> 00:17:01,920

process called photosynthesis

466

00:17:04,470 --> 00:17:02,880

why

467

00:17:06,470 --> 00:17:04,480

because that's how it evolved over

468

00:17:07,750 --> 00:17:06,480

billions of years

469

00:17:09,909 --> 00:17:07,760

why

470

00:17:11,590 --> 00:17:09,919

god maybe or maybe it's just the random

471

00:17:13,510 --> 00:17:11,600

unfolding of events over billions of

472

00:17:15,110 --> 00:17:13,520

years i honestly don't know kid and i

473

00:17:16,789 --> 00:17:15,120

don't have time to be contemplating the

474

00:17:18,549 --> 00:17:16,799

absurdity of existence right now put

475

00:17:20,710 --> 00:17:18,559

your shoes on

476

00:17:22,789 --> 00:17:20,720

now for our purposes

477

00:17:24,630 --> 00:17:22,799

it doesn't serve us to get lost in naval

478

00:17:27,669 --> 00:17:24,640

gazing questions about whether or not

479

00:17:29,510 --> 00:17:27,679

knowledge is even possible

480

00:17:31,909 --> 00:17:29,520

we conduct our lives under the

481

00:17:34,549 --> 00:17:31,919

assumption that we can know things and

482

00:17:35,750 --> 00:17:34,559

our observable reality seems to suggest

483

00:17:37,750 --> 00:17:35,760

that we can

484

00:17:39,510 --> 00:17:37,760

because our knowledge allows us to do

485

00:17:41,830 --> 00:17:39,520

things that we otherwise wouldn't be

486

00:17:43,830 --> 00:17:41,840

able to do like calculate the exact

487

00:17:45,350 --> 00:17:43,840

angle of entry for a spaceship returning

488

00:17:46,950 --> 00:17:45,360

to earth so that it doesn't burn up in

489

00:17:49,190 --> 00:17:46,960

the atmosphere

490

00:17:50,710 --> 00:17:49,200

so if our experience suggests that

491

00:17:52,950 --> 00:17:50,720

knowledge is possible

492

00:17:54,870 --> 00:17:52,960

why am i even bringing this up

493

00:17:56,789 --> 00:17:54,880

i bring it up because i think that it's

494

00:17:59,350 --> 00:17:56,799

important to bring a certain level of

495

00:18:01,990 --> 00:17:59,360

humility to any conversation about what

496

00:18:04,630 --> 00:18:02,000

we can know and what we can't know

497

00:18:06,789 --> 00:18:04,640

we have very good and very reliable

498

00:18:09,190 --> 00:18:06,799

frameworks that allow us to understand

499

00:18:11,510 --> 00:18:09,200

complex ideas and relationships and

500

00:18:13,270 --> 00:18:11,520

methodologies that allow us to verify

501
00:18:14,630 --> 00:18:13,280
our conclusions against the conclusions

502
00:18:16,390 --> 00:18:14,640
of others

503
00:18:18,470 --> 00:18:16,400
but it's important to remember that

504
00:18:20,789 --> 00:18:18,480
these things are tools and not

505
00:18:23,830 --> 00:18:20,799
necessarily a representation of an

506
00:18:25,669 --> 00:18:23,840
objective universal reality

507
00:18:26,789 --> 00:18:25,679
this is a mistake that we make a lot as

508
00:18:29,510 --> 00:18:26,799
humans

509
00:18:31,590 --> 00:18:29,520
neil degrasse tyson has famously said

510
00:18:33,909 --> 00:18:31,600
the good thing about science is that

511
00:18:34,870 --> 00:18:33,919
it's true whether or not you believe in

512
00:18:37,110 --> 00:18:34,880
it

513
00:18:38,470 --> 00:18:37,120

and given the cultural context of the

514

00:18:40,549 --> 00:18:38,480

last few years

515

00:18:42,470 --> 00:18:40,559

many champions of science have grabbed

516

00:18:44,789 --> 00:18:42,480

on to this statement and have used it as

517

00:18:46,230 --> 00:18:44,799

both a rallying cry and as a weapon

518

00:18:47,750 --> 00:18:46,240

against those who don't share their

519

00:18:50,310 --> 00:18:47,760

views

520

00:18:52,630 --> 00:18:50,320

but if you break it down that statement

521

00:18:54,830 --> 00:18:52,640

isn't just blatantly false

522

00:18:58,070 --> 00:18:54,840

but fundamentally

523

00:19:00,230 --> 00:18:58,080

unscientific science isn't true

524

00:19:01,270 --> 00:19:00,240

science isn't a collection of verified

525

00:19:03,990 --> 00:19:01,280

facts

526

00:19:05,990 --> 00:19:04,000

science is a methodology and like any

527

00:19:09,110 --> 00:19:06,000

methodology it's as fallible as the

528

00:19:10,870 --> 00:19:09,120

people who are utilizing it

529

00:19:12,470 --> 00:19:10,880

returning to an example that we've used

530

00:19:14,150 --> 00:19:12,480

a few times now

531

00:19:17,750 --> 00:19:14,160

let's consider second century

532

00:19:20,070 --> 00:19:17,760

mathematician and astronomer ptolemy

533

00:19:23,270 --> 00:19:20,080

his model of the solar system improved

534

00:19:25,270 --> 00:19:23,280

upon past models so significantly that

535

00:19:27,830 --> 00:19:25,280

it was used to accurately predict the

536

00:19:30,630 --> 00:19:27,840

movements of celestial bodies in the sky

537

00:19:32,950 --> 00:19:30,640

for over 1400 years

538

00:19:34,549 --> 00:19:32,960

but it was also completely wrong and

539

00:19:36,789 --> 00:19:34,559

based on the assumption that the earth

540

00:19:39,190 --> 00:19:36,799

was at the center of everything

541

00:19:41,510 --> 00:19:39,200

to be clear i'm not saying that we

542

00:19:44,549 --> 00:19:41,520

shouldn't trust scientific conclusions

543

00:19:46,390 --> 00:19:44,559

the scientific method is by far the best

544

00:19:48,549 --> 00:19:46,400

way to test our assumptions about our

545

00:19:50,230 --> 00:19:48,559

reality in a way that is as free from

546

00:19:53,110 --> 00:19:50,240

bias as possible

547

00:19:55,029 --> 00:19:53,120

it's imperfect yes but we used it to put

548

00:19:56,710 --> 00:19:55,039

a man on the moon so it's still pretty

549

00:19:58,870 --> 00:19:56,720

damn amazing

550

00:20:01,510 --> 00:19:58,880

but what i am saying is that we need to

551
00:20:02,710 --> 00:20:01,520
be careful not to turn science into a

552
00:20:05,350 --> 00:20:02,720
religion

553
00:20:07,909 --> 00:20:05,360
there are no sacred cows in science

554
00:20:10,070 --> 00:20:07,919
there is no scientific fact that can't

555
00:20:12,710 --> 00:20:10,080
be undone with the introduction of a new

556
00:20:14,710 --> 00:20:12,720
data point that changes everything

557
00:20:15,909 --> 00:20:14,720
but that's a hard thing for humans to

558
00:20:17,750 --> 00:20:15,919
remember

559
00:20:19,590 --> 00:20:17,760
we live our lives with the assumption

560
00:20:22,310 --> 00:20:19,600
that we can observe and have knowledge

561
00:20:25,190 --> 00:20:22,320
of objective reality which just makes

562
00:20:27,590 --> 00:20:25,200
practical sense it keeps us safe it

563
00:20:30,390 --> 00:20:27,600

creates order where there was none it's

564

00:20:33,350 --> 00:20:30,400

the basis of civilization itself

565

00:20:35,430 --> 00:20:33,360

so it can make us super uncomfortable to

566

00:20:38,230 --> 00:20:35,440

recognize that our sense of objective

567

00:20:39,510 --> 00:20:38,240

reality is so contingent and potentially

568

00:20:41,270 --> 00:20:39,520

tenuous

569

00:20:42,870 --> 00:20:41,280

we don't like to think about the fact

570

00:20:45,350 --> 00:20:42,880

that everything that we regard to be

571

00:20:47,669 --> 00:20:45,360

true is essentially just a hypothesis

572

00:20:49,909 --> 00:20:47,679

that is waiting to be disproven

573

00:20:50,950 --> 00:20:49,919

we don't like i don't know we like

574

00:20:53,830 --> 00:20:50,960

answers

575

00:20:55,750 --> 00:20:53,840

are clear

576

00:20:57,669 --> 00:20:55,760

we like to believe that our species has

577

00:20:59,510 --> 00:20:57,679

cracked everything from the structure of

578

00:21:01,029 --> 00:20:59,520

atoms to the limits of the universe and

579

00:21:03,750 --> 00:21:01,039

that there's really nothing left for us

580

00:21:05,830 --> 00:21:03,760

to know and when we have questions about

581

00:21:08,630 --> 00:21:05,840

our reality we increasingly look to

582

00:21:11,830 --> 00:21:08,640

scientists to be the arbiters of truth

583

00:21:14,310 --> 00:21:11,840

but scientists don't have answers they

584

00:21:17,029 --> 00:21:14,320

have science which is a methodology that

585

00:21:19,029 --> 00:21:17,039

allows us to approach the truth but is

586

00:21:21,270 --> 00:21:19,039

not the truth itself

587

00:21:22,230 --> 00:21:21,280

and it's not just that their answers can

588

00:21:28,710 --> 00:21:22,240

change

589

00:21:30,630 --> 00:21:28,720

and a pattern that we see repeated again

590

00:21:32,549 --> 00:21:30,640

and again throughout history

591

00:21:35,029 --> 00:21:32,559

almost without exception

592

00:21:36,789 --> 00:21:35,039

is that when we get new data that upends

593

00:21:39,110 --> 00:21:36,799

our models and invalidates our

594

00:21:40,710 --> 00:21:39,120

fundamental understanding of the nature

595

00:21:42,950 --> 00:21:40,720

of our reality

596

00:21:45,909 --> 00:21:42,960

that data is initially rejected as

597

00:21:48,070 --> 00:21:45,919

impossible ridiculed as pseudoscience

598

00:21:50,230 --> 00:21:48,080

and marginalized along with all those

599

00:21:51,750 --> 00:21:50,240

who dare to entertain such heretical

600

00:21:54,230 --> 00:21:51,760

viewpoints

601
00:21:55,909 --> 00:21:54,240
and seemingly no one is totally immune

602
00:21:59,190 --> 00:21:55,919
from this bias against data that

603
00:22:00,789 --> 00:21:59,200
threatens our worldview einstein himself

604
00:22:02,950 --> 00:22:00,799
said that the greatest blunder of his

605
00:22:04,630 --> 00:22:02,960
career was not believing what the math

606
00:22:06,950 --> 00:22:04,640
was telling him about the nature of the

607
00:22:09,510 --> 00:22:06,960
universe that it wasn't static and

608
00:22:13,110 --> 00:22:09,520
unchanging but was actually expanding at

609
00:22:15,510 --> 00:22:13,120
an accelerating pace einstein invented

610
00:22:18,230 --> 00:22:15,520
the cosmological constant to normalize

611
00:22:20,149 --> 00:22:18,240
his equations and it wasn't until edwin

612
00:22:22,390 --> 00:22:20,159
hubble proved that the light from

613
00:22:24,549 --> 00:22:22,400

distant galaxies was redshifted away

614

00:22:26,870 --> 00:22:24,559

from the earth that he realized that

615

00:22:29,270 --> 00:22:26,880

he'd been wrong all along

616

00:22:30,870 --> 00:22:29,280

and i would argue that as profound as

617

00:22:33,590 --> 00:22:30,880

einstein's discoveries about the

618

00:22:36,470 --> 00:22:33,600

universe were the idea that we are not

619

00:22:39,029 --> 00:22:36,480

alone and perhaps never have been

620

00:22:40,950 --> 00:22:39,039

represents the single greatest paradigm

621

00:22:43,190 --> 00:22:40,960

shift in human history

622

00:22:45,430 --> 00:22:43,200

the implications are as challenging as

623

00:22:47,190 --> 00:22:45,440

they are wide reaching and we should

624

00:22:50,070 --> 00:22:47,200

expect that it will make people

625

00:22:52,070 --> 00:22:50,080

uncomfortable it will make people angry

626

00:22:54,630 --> 00:22:52,080

it will make people defensive

627

00:22:57,190 --> 00:22:54,640

because to be clear what we're talking

628

00:22:59,669 --> 00:22:57,200

about is nothing less than rewriting

629

00:23:02,070 --> 00:22:59,679

human history as we know it

630

00:23:04,870 --> 00:23:02,080

but sometimes that's exactly what

631

00:23:06,870 --> 00:23:04,880

science requires of us

632

00:23:09,110 --> 00:23:06,880

all right i think we've spent enough

633

00:23:10,870 --> 00:23:09,120

time in the philosophical weeds

634

00:23:12,390 --> 00:23:10,880

let's get to talking about the matter at

635

00:23:14,549 --> 00:23:12,400

hand which is

636

00:23:16,549 --> 00:23:14,559

what do we know for sure about early

637

00:23:18,630 --> 00:23:16,559

human civilization

638

00:23:20,070 --> 00:23:18,640

as we'll see this isn't the easiest

639

00:23:22,470 --> 00:23:20,080

question to answer

640

00:23:24,350 --> 00:23:22,480

at least in part because archaeology

641

00:23:26,070 --> 00:23:24,360

itself presents some unique

642

00:23:27,830 --> 00:23:26,080

epistemological challenges and

643

00:23:29,510 --> 00:23:27,840

complications

644

00:23:31,350 --> 00:23:29,520

let's start with dating

645

00:23:33,750 --> 00:23:31,360

if you want to understand what happened

646

00:23:36,390 --> 00:23:33,760

in the distant past you need to be able

647

00:23:38,549 --> 00:23:36,400

to construct some kind of a narrative

648

00:23:40,549 --> 00:23:38,559

and to construct an accurate narrative

649

00:23:42,870 --> 00:23:40,559

you need to know not just when things

650

00:23:46,710 --> 00:23:42,880

happened but the order in which they

651
00:23:49,430 --> 00:23:46,720
happened relative to other things

652
00:23:50,870 --> 00:23:49,440
so how do researchers figure out how old

653
00:23:52,470 --> 00:23:50,880
something is

654
00:23:53,909 --> 00:23:52,480
there are several different methods

655
00:23:56,470 --> 00:23:53,919
depending on what it is that you're

656
00:24:01,430 --> 00:23:56,480
trying to date and they fall into two

657
00:24:03,350 --> 00:24:01,440
main categories relative and absolute

658
00:24:05,190 --> 00:24:03,360
relative dating techniques involve

659
00:24:07,510 --> 00:24:05,200
establishing a basic time frame for

660
00:24:09,990 --> 00:24:07,520
something by comparing it to other old

661
00:24:11,110 --> 00:24:10,000
things and are therefore far less

662
00:24:12,789 --> 00:24:11,120
precise

663
00:24:15,110 --> 00:24:12,799

it's actually more accurate to think of

664

00:24:16,470 --> 00:24:15,120

these methods as ordering rather than

665

00:24:21,990 --> 00:24:16,480

dating

666

00:24:24,310 --> 00:24:22,000

techniques were the main way that

667

00:24:26,390 --> 00:24:24,320

researchers attempted to assign dates to

668

00:24:28,549 --> 00:24:26,400

things and although they aren't as

669

00:24:30,789 --> 00:24:28,559

precise many of these techniques are

670

00:24:33,029 --> 00:24:30,799

still used today

671

00:24:35,350 --> 00:24:33,039

one such method of relative dating is

672

00:24:37,669 --> 00:24:35,360

biostratigraphy

673

00:24:39,269 --> 00:24:37,679

as rock and sediment build up over time

674

00:24:41,830 --> 00:24:39,279

they form layers

675

00:24:43,909 --> 00:24:41,840

this means that in most cases you can

676

00:24:46,470 --> 00:24:43,919

assume that if you find a fossil or an

677

00:24:47,990 --> 00:24:46,480

artifact at a certain layer it's older

678

00:24:48,789 --> 00:24:48,000

than anything that would be found above

679

00:24:54,470 --> 00:24:48,799

it

680

00:24:56,630 --> 00:24:54,480

called funnel association

681

00:24:58,390 --> 00:24:56,640

sometimes researchers can compare things

682

00:25:00,870 --> 00:24:58,400

to other fossils that were found in the

683

00:25:02,870 --> 00:25:00,880

same layer if you know how old those

684

00:25:04,870 --> 00:25:02,880

fossils are then you can establish that

685

00:25:06,310 --> 00:25:04,880

what you're dating was around at the

686

00:25:08,070 --> 00:25:06,320

same time

687

00:25:09,590 --> 00:25:08,080

you can potentially get more precise

688

00:25:12,149 --> 00:25:09,600

dating information by looking

689

00:25:13,750 --> 00:25:12,159

specifically at microscopic animal life

690

00:25:16,149 --> 00:25:13,760

in the fossil record

691

00:25:19,190 --> 00:25:16,159

microfauna tend to evolve much faster

692

00:25:21,029 --> 00:25:19,200

than larger organisms so each species

693

00:25:23,350 --> 00:25:21,039

exists for a much shorter time in the

694

00:25:25,669 --> 00:25:23,360

fossil record allowing researchers to

695

00:25:27,269 --> 00:25:25,679

zero in more precisely on a particular

696

00:25:29,269 --> 00:25:27,279

time frame

697

00:25:31,110 --> 00:25:29,279

another method of relative dating is

698

00:25:33,190 --> 00:25:31,120

paleomagnetism

699

00:25:34,870 --> 00:25:33,200

about every one hundred thousand to six

700

00:25:36,870 --> 00:25:34,880

hundred thousand years the earth's

701

00:25:38,870 --> 00:25:36,880

magnetic poles flip

702

00:25:41,190 --> 00:25:38,880

these changes can be detected by looking

703

00:25:43,669 --> 00:25:41,200

at the orientation of magnetic crystals

704

00:25:45,750 --> 00:25:43,679

in certain kinds of rock

705

00:25:47,669 --> 00:25:45,760

now obviously a hundred thousand to six

706

00:25:49,909 --> 00:25:47,679

hundred thousand years is a pretty long

707

00:25:52,710 --> 00:25:49,919

time frame making this method not very

708

00:25:54,630 --> 00:25:52,720

precise however it is often used as a

709

00:25:57,350 --> 00:25:54,640

check against other methods of dating to

710

00:25:59,669 --> 00:25:57,360

help confirm their conclusions

711

00:26:01,350 --> 00:25:59,679

researchers can also use a method called

712

00:26:03,110 --> 00:26:01,360

tefrochronology

713

00:26:05,830 --> 00:26:03,120

whenever there is a major volcanic

714

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

eruption large amounts of dust rock and

715

00:26:09,830 --> 00:26:07,760

other materials are shot up into the

716

00:26:11,830 --> 00:26:09,840

atmosphere where they eventually rain

717

00:26:13,590 --> 00:26:11,840

down on the land below

718

00:26:16,710 --> 00:26:13,600

this layer of sediment will have a

719

00:26:19,110 --> 00:26:16,720

unique geomagnetic fingerprint so if you

720

00:26:21,110 --> 00:26:19,120

know the date of a particular eruption

721

00:26:23,350 --> 00:26:21,120

you can date things relative to that

722

00:26:25,830 --> 00:26:23,360

layer with everything above it occurring

723

00:26:28,470 --> 00:26:25,840

after the eruption and everything below

724

00:26:30,230 --> 00:26:28,480

it occurring before

725

00:26:32,870 --> 00:26:30,240

as you can see from these methods they

726

00:26:34,789 --> 00:26:32,880

aren't particularly precise however

727

00:26:36,710 --> 00:26:34,799

scientists have also developed several

728

00:26:38,789 --> 00:26:36,720

other methods that allow them to get a

729

00:26:40,149 --> 00:26:38,799

much more accurate sense of the age of

730

00:26:42,630 --> 00:26:40,159

something

731

00:26:44,950 --> 00:26:42,640

the first and by far the most common is

732

00:26:47,990 --> 00:26:44,960

radiocarbon dating which involves

733

00:26:50,149 --> 00:26:48,000

measuring the quantities of carbon-14

734

00:26:52,070 --> 00:26:50,159

carbon-14 forms high up in the

735

00:26:54,950 --> 00:26:52,080

atmosphere and then is breathed in by

736

00:26:57,430 --> 00:26:54,960

plants and breathed out by animals as a

737

00:26:59,830 --> 00:26:57,440

result you can find carbon 14 in

738

00:27:03,190 --> 00:26:59,840

basically anything that's alive

739

00:27:05,510 --> 00:27:03,200

carbon 14 is a radioactive isotope a

740

00:27:07,430 --> 00:27:05,520

radioactive isotope is basically a

741

00:27:09,269 --> 00:27:07,440

version of an atom that has a different

742

00:27:12,070 --> 00:27:09,279

number of neutrons

743

00:27:15,510 --> 00:27:12,080

carbon usually has 6 neutrons but carbon

744

00:27:17,750 --> 00:27:15,520

14 has 8 which makes it both heavier and

745

00:27:22,710 --> 00:27:17,760

less stable

746

00:27:25,190 --> 00:27:22,720

breaks down over time with one of its

747

00:27:26,310 --> 00:27:25,200

neutrons splitting into a proton and an

748

00:27:33,190 --> 00:27:26,320

electron

749

00:27:36,789 --> 00:27:33,200

and one more proton

750

00:27:38,950 --> 00:27:36,799

carbon 14 decays into nitrogen

751
00:27:41,990 --> 00:27:38,960
this process begins as soon as something

752
00:27:44,630 --> 00:27:42,000
dies and stops taking in carbon 14 but

753
00:27:45,590 --> 00:27:44,640
the process of radioactive decay is very

754
00:27:47,669 --> 00:27:45,600
slow

755
00:27:49,669 --> 00:27:47,679
it's half-life or the amount of time it

756
00:27:52,750 --> 00:27:49,679
takes for half of a given quantity of

757
00:27:54,870 --> 00:27:52,760
carbon-14 to decay is

758
00:27:56,630 --> 00:27:54,880
5730 years

759
00:27:58,950 --> 00:27:56,640
scientists are then able to use the

760
00:28:01,669 --> 00:27:58,960
amount of carbon-14 left in organic

761
00:28:04,230 --> 00:28:01,679
materials like bones or plant fibers or

762
00:28:06,470 --> 00:28:04,240
ashes from a campfire to figure out how

763
00:28:08,389 --> 00:28:06,480

old something is

764

00:28:10,070 --> 00:28:08,399

however there are limitations to

765

00:28:12,230 --> 00:28:10,080

radiocarbon dating

766

00:28:14,950 --> 00:28:12,240

the first is that after a period of

767

00:28:17,590 --> 00:28:14,960

about 50 000 years organic materials

768

00:28:20,630 --> 00:28:17,600

have lost more than 99 of their carbon

769

00:28:23,029 --> 00:28:20,640

14 which means that we can only use it

770

00:28:24,310 --> 00:28:23,039

to date things from about the last 40

771

00:28:26,549 --> 00:28:24,320

thousand years

772

00:28:29,350 --> 00:28:26,559

the other limitation is that it only

773

00:28:31,590 --> 00:28:29,360

works on organic matter so you can't use

774

00:28:33,269 --> 00:28:31,600

it on things like rock metal or other

775

00:28:35,909 --> 00:28:33,279

minerals

776

00:28:38,310 --> 00:28:35,919

to date rock researchers usually turn to

777

00:28:39,669 --> 00:28:38,320

either single crystal fusion or uranium

778

00:28:41,510 --> 00:28:39,679

series dating

779

00:28:43,990 --> 00:28:41,520

without getting too in the weeds like

780

00:28:46,230 --> 00:28:44,000

radiocarbon dating both of these dating

781

00:28:48,950 --> 00:28:46,240

techniques involve using the decay rates

782

00:28:50,630 --> 00:28:48,960

of various isotopes to determine how old

783

00:28:53,190 --> 00:28:50,640

something is

784

00:28:55,029 --> 00:28:53,200

conveniently while uranium series dating

785

00:28:57,029 --> 00:28:55,039

only works for things that are forty

786

00:28:59,830 --> 00:28:57,039

thousand to five hundred thousand years

787

00:29:02,070 --> 00:28:59,840

old single crystal fusion works best on

788

00:29:04,310 --> 00:29:02,080

things that are 500 000 years old or

789

00:29:06,230 --> 00:29:04,320

older and it actually gets more accurate

790

00:29:08,549 --> 00:29:06,240

over time

791

00:29:10,070 --> 00:29:08,559

for materials like teeth and coral that

792

00:29:12,710 --> 00:29:10,080

are especially good at trapping

793

00:29:14,710 --> 00:29:12,720

electrons from the sun in cosmic rays

794

00:29:17,350 --> 00:29:14,720

researchers can use a technique called

795

00:29:19,110 --> 00:29:17,360

trapped charge dating this can be a

796

00:29:21,350 --> 00:29:19,120

complicated process that involves

797

00:29:23,190 --> 00:29:21,360

looking at multiple variables including

798

00:29:25,909 --> 00:29:23,200

the amount of radiation that the object

799

00:29:28,549 --> 00:29:25,919

was exposed to each year to calculate

800

00:29:31,110 --> 00:29:28,559

the rate at which electrons were trapped

801
00:29:32,870 --> 00:29:31,120
and to make things more complicated it's

802
00:29:35,510 --> 00:29:32,880
only accurate for things that are less

803
00:29:38,149 --> 00:29:35,520
than 100 000 years old

804
00:29:40,470 --> 00:29:38,159
besides teeth and coral certain silicate

805
00:29:42,070 --> 00:29:40,480
rocks like quartz are also very good at

806
00:29:43,909 --> 00:29:42,080
trapping electrons

807
00:29:46,149 --> 00:29:43,919
for researchers who are specifically

808
00:29:49,470 --> 00:29:46,159
working with prehistoric tools made of

809
00:29:51,110 --> 00:29:49,480
flint which is a hardened form of quartz

810
00:29:53,669 --> 00:29:51,120
thermoluminescence can help them

811
00:29:56,470 --> 00:29:53,679
determine the age of the tool itself

812
00:29:58,549 --> 00:29:56,480
not just the materials it was made from

813
00:30:00,470 --> 00:29:58,559

the last stage in the process of making

814

00:30:02,630 --> 00:30:00,480

these tools was usually to drop them

815

00:30:04,710 --> 00:30:02,640

into a fire which frees all of the

816

00:30:07,190 --> 00:30:04,720

electrons essentially resetting the

817

00:30:09,669 --> 00:30:07,200

clock for that object this allows

818

00:30:11,350 --> 00:30:09,679

researchers to determine how long ago it

819

00:30:12,710 --> 00:30:11,360

was made

820

00:30:15,510 --> 00:30:12,720

for things that have been buried for a

821

00:30:17,669 --> 00:30:15,520

long time researchers can use optically

822

00:30:19,510 --> 00:30:17,679

stimulated luminescence in a process

823

00:30:22,070 --> 00:30:19,520

that allows them to determine

824

00:30:23,909 --> 00:30:22,080

not when something was made but how long

825

00:30:25,909 --> 00:30:23,919

it's been since it was last exposed to

826

00:30:27,909 --> 00:30:25,919

sunlight

827

00:30:30,070 --> 00:30:27,919

there are a few other methods of dating

828

00:30:31,909 --> 00:30:30,080

but i think you'll get the idea

829

00:30:33,669 --> 00:30:31,919

you don't need to know every method of

830

00:30:35,750 --> 00:30:33,679

dating or how it works

831

00:30:37,510 --> 00:30:35,760

what's more important is to understand

832

00:30:39,350 --> 00:30:37,520

the challenges that researchers

833

00:30:41,269 --> 00:30:39,360

encounter when they're trying to date an

834

00:30:43,430 --> 00:30:41,279

archaeological find

835

00:30:45,590 --> 00:30:43,440

each method has its strengths and its

836

00:30:48,710 --> 00:30:45,600

limitations and because of these

837

00:30:50,710 --> 00:30:48,720

limitations researchers generally strive

838

00:30:52,789 --> 00:30:50,720

to date things as many different ways as

839

00:30:54,070 --> 00:30:52,799

possible to help them zero in on the

840

00:30:55,830 --> 00:30:54,080

correct date

841

00:30:58,230 --> 00:30:55,840

the result is that there is a lot of

842

00:31:00,149 --> 00:30:58,240

variability in how accurate dating of

843

00:31:02,389 --> 00:31:00,159

these objects can be

844

00:31:04,310 --> 00:31:02,399

if something is dated using at least two

845

00:31:06,470 --> 00:31:04,320

different methods and is verified by

846

00:31:08,710 --> 00:31:06,480

multiple independent labs who all point

847

00:31:10,549 --> 00:31:08,720

to the same time frame you can have a

848

00:31:12,389 --> 00:31:10,559

pretty high degree of confidence that

849

00:31:14,310 --> 00:31:12,399

that date is legit

850

00:31:16,310 --> 00:31:14,320

if something is only dated using one

851
00:31:21,029 --> 00:31:16,320
method or if it isn't independently

852
00:31:22,870 --> 00:31:21,039
verified that date may be less reliable

853
00:31:25,269 --> 00:31:22,880
and then there is the case of the things

854
00:31:27,909 --> 00:31:25,279
that you can't date accurately with any

855
00:31:29,750 --> 00:31:27,919
of the above methods and maddeningly

856
00:31:31,990 --> 00:31:29,760
this applies to a category of

857
00:31:34,630 --> 00:31:32,000
archaeological treasures that we'd most

858
00:31:36,870 --> 00:31:34,640
like to date which is basically any

859
00:31:38,950 --> 00:31:36,880
structure made out of stone

860
00:31:41,029 --> 00:31:38,960
thousands of years ago cultures around

861
00:31:43,750 --> 00:31:41,039
the world erected massive stone

862
00:31:45,750 --> 00:31:43,760
monuments temples and other structures

863
00:31:47,990 --> 00:31:45,760

out of enormous blocks of stones

864

00:31:49,750 --> 00:31:48,000

referred to as megaliths

865

00:31:52,470 --> 00:31:49,760

many of these megalithic structures

866

00:31:54,310 --> 00:31:52,480

remain largely intact today even as the

867

00:31:56,870 --> 00:31:54,320

civilizations and cultures that built

868

00:31:58,950 --> 00:31:56,880

them have been lost to the sands of time

869

00:32:01,590 --> 00:31:58,960

their stunning architecture stirs our

870

00:32:04,310 --> 00:32:01,600

sense of wonder their confounding size

871

00:32:06,470 --> 00:32:04,320

pricks at the corners of our imagination

872

00:32:08,950 --> 00:32:06,480

their mysteries call to us and there's

873

00:32:11,590 --> 00:32:08,960

this uncanny sense that if only we could

874

00:32:13,509 --> 00:32:11,600

unravel their secrets we might gain some

875

00:32:16,149 --> 00:32:13,519

special insight or knowledge that

876

00:32:19,750 --> 00:32:16,159

somehow has been lost

877

00:32:21,430 --> 00:32:19,760

they're also extremely difficult to date

878

00:32:22,870 --> 00:32:21,440

we can tell when the stone was formed

879

00:32:24,710 --> 00:32:22,880

geologically

880

00:32:26,470 --> 00:32:24,720

we can make some assumptions about what

881

00:32:28,310 --> 00:32:26,480

kind of tools would have been needed to

882

00:32:30,870 --> 00:32:28,320

build these structures that can help us

883

00:32:33,269 --> 00:32:30,880

to pin it to a particular time period

884

00:32:35,509 --> 00:32:33,279

we can compare it stylistically to other

885

00:32:37,509 --> 00:32:35,519

art architecture and writing that we are

886

00:32:40,149 --> 00:32:37,519

able to date and draw some conclusions

887

00:32:41,990 --> 00:32:40,159

that way and we can often date organic

888

00:32:43,430 --> 00:32:42,000

and other materials found in and around

889

00:32:45,350 --> 00:32:43,440

the site

890

00:32:48,149 --> 00:32:45,360

but all of these are indirect and

891

00:32:49,669 --> 00:32:48,159

imprecise ways at arriving at a date and

892

00:32:51,590 --> 00:32:49,679

if you're working with the wrong set of

893

00:32:53,909 --> 00:32:51,600

assumptions to begin with

894

00:32:56,950 --> 00:32:53,919

you could misdate something entirely

895

00:32:58,950 --> 00:32:56,960

it's a messy business for instance you

896

00:33:01,350 --> 00:32:58,960

could find a crypt with bones in it and

897

00:33:03,269 --> 00:33:01,360

date the bones to a certain time period

898

00:33:04,789 --> 00:33:03,279

and then assume that the construction of

899

00:33:06,549 --> 00:33:04,799

that crypt was more or less

900

00:33:07,909 --> 00:33:06,559

contemporaneous to the people who were

901
00:33:09,750 --> 00:33:07,919
buried there

902
00:33:11,990 --> 00:33:09,760
but what if it had been in use for

903
00:33:14,070 --> 00:33:12,000
thousands of years before that what if

904
00:33:16,789 --> 00:33:14,080
it had changed hands a few times due to

905
00:33:19,110 --> 00:33:16,799
war or even just the passage of time

906
00:33:21,269 --> 00:33:19,120
the most educated guess in the world is

907
00:33:23,029 --> 00:33:21,279
still just a guess without anything to

908
00:33:25,029 --> 00:33:23,039
confirm it

909
00:33:27,350 --> 00:33:25,039
another challenge in dating megalithic

910
00:33:30,230 --> 00:33:27,360
structures or really any structure built

911
00:33:32,710 --> 00:33:30,240
in antiquity is that cultures around the

912
00:33:34,630 --> 00:33:32,720
world have shown a tendency to rebuild

913
00:33:35,830 --> 00:33:34,640

on top of an existing structure or

914

00:33:37,750 --> 00:33:35,840

foundation

915

00:33:39,350 --> 00:33:37,760

you see this especially in places that

916

00:33:40,789 --> 00:33:39,360

have a religious or spiritual

917

00:33:42,870 --> 00:33:40,799

significance

918

00:33:44,470 --> 00:33:42,880

there's perhaps no place on earth where

919

00:33:46,710 --> 00:33:44,480

we see this occurring more than in

920

00:33:48,789 --> 00:33:46,720

jerusalem where three different

921

00:33:51,029 --> 00:33:48,799

monotheistic religions judaism

922

00:33:53,430 --> 00:33:51,039

christianity and islam have some of

923

00:33:55,750 --> 00:33:53,440

their most sacred sites

924

00:33:58,630 --> 00:33:55,760

and in some cases these sites are

925

00:34:00,789 --> 00:33:58,640

literally right on top of each other

926

00:34:03,430 --> 00:34:00,799

the islamic holy site the dome of the

927

00:34:05,990 --> 00:34:03,440

rock sits on temple mount in jerusalem

928

00:34:07,509 --> 00:34:06,000

over a spot that is believed to be both

929

00:34:09,990 --> 00:34:07,519

the place where the god of the old

930

00:34:10,869 --> 00:34:10,000

testament asked abraham to sacrifice his

931

00:34:12,550 --> 00:34:10,879

son

932

00:34:14,149 --> 00:34:12,560

and the spot from which muhammad

933

00:34:15,990 --> 00:34:14,159

ascended into heaven

934

00:34:18,550 --> 00:34:16,000

the dome of the rock is built on the

935

00:34:21,990 --> 00:34:18,560

former site of the second jewish temple

936

00:34:23,669 --> 00:34:22,000

which was first built in 516 bc

937

00:34:25,669 --> 00:34:23,679

which in turn was said to have been

938

00:34:27,909 --> 00:34:25,679

built on the foundation of solomon's

939

00:34:30,470 --> 00:34:27,919

temple which was said to be completed

940

00:34:32,550 --> 00:34:30,480

around 957 bc

941

00:34:34,950 --> 00:34:32,560

the western wall is believed to be a

942

00:34:38,069 --> 00:34:34,960

remnant of the second temple

943

00:34:40,629 --> 00:34:38,079

so in this one spot you see layers upon

944

00:34:43,669 --> 00:34:40,639

layers upon layers of history

945

00:34:45,669 --> 00:34:43,679

and this creates complications

946

00:34:47,430 --> 00:34:45,679

obviously we can't really go digging

947

00:34:49,030 --> 00:34:47,440

around these sites to try to learn more

948

00:34:50,869 --> 00:34:49,040

about what's under them

949

00:34:52,950 --> 00:34:50,879

beyond their profound significance to

950

00:34:55,030 --> 00:34:52,960

billions of people around the world

951
00:34:57,030 --> 00:34:55,040
their archaeological treasures in their

952
00:34:58,950 --> 00:34:57,040
own right doing anything that could

953
00:35:00,390 --> 00:34:58,960
potentially damage these structures is

954
00:35:02,230 --> 00:35:00,400
unthinkable

955
00:35:05,030 --> 00:35:02,240
and because we aren't able to study what

956
00:35:06,870 --> 00:35:05,040
lies underneath these sites the evidence

957
00:35:09,270 --> 00:35:06,880
for any older structures that may have

958
00:35:11,349 --> 00:35:09,280
come before is lost to us their

959
00:35:13,910 --> 00:35:11,359
mysteries and meanings swept away by the

960
00:35:15,510 --> 00:35:13,920
sands of time

961
00:35:17,510 --> 00:35:15,520
another thing that makes megalithic

962
00:35:18,310 --> 00:35:17,520
structures particularly difficult to

963
00:35:20,550 --> 00:35:18,320

date

964

00:35:22,150 --> 00:35:20,560

is that they are built to last for a

965

00:35:24,150 --> 00:35:22,160

really long time

966

00:35:25,829 --> 00:35:24,160

far longer than anything else built by

967

00:35:27,910 --> 00:35:25,839

humans

968

00:35:30,150 --> 00:35:27,920

to help put that into perspective you

969

00:35:32,630 --> 00:35:30,160

can think about it this way if every

970

00:35:35,829 --> 00:35:32,640

single last human alive disappeared from

971

00:35:37,990 --> 00:35:35,839

the planet tomorrow within just 1 000

972

00:35:40,230 --> 00:35:38,000

years almost all traces of our

973

00:35:43,349 --> 00:35:40,240

civilization will have been eroded

974

00:35:45,910 --> 00:35:43,359

buried or otherwise swallowed by nature

975

00:35:48,069 --> 00:35:45,920

even manhattan will once again be a lush

976

00:35:50,230 --> 00:35:48,079

green island much like it was when it

977

00:35:52,230 --> 00:35:50,240

was first explored by henry hudson in

978

00:35:54,150 --> 00:35:52,240

1609

979

00:35:56,230 --> 00:35:54,160

some signs of humanity will still remain

980

00:35:57,990 --> 00:35:56,240

though the washington monument will

981

00:36:00,230 --> 00:35:58,000

still be standing though it would likely

982

00:36:02,790 --> 00:36:00,240

be underwater and the walls of notre

983

00:36:05,109 --> 00:36:02,800

dame in paris may still be recognizable

984

00:36:07,430 --> 00:36:05,119

stonehenge will still stand

985

00:36:10,470 --> 00:36:07,440

but if you zoom out to 10 000 years

986

00:36:12,390 --> 00:36:10,480

after humans what would remain then

987

00:36:13,990 --> 00:36:12,400

the great wall of china will have eroded

988

00:36:15,430 --> 00:36:14,000

tremendously though it will still be

989

00:36:17,510 --> 00:36:15,440

recognizable

990

00:36:19,349 --> 00:36:17,520

the pyramids and the sphinx will likely

991

00:36:20,630 --> 00:36:19,359

be gone unless they were buried by the

992

00:36:22,630 --> 00:36:20,640

sahara

993

00:36:24,870 --> 00:36:22,640

only our largest stone structures would

994

00:36:29,030 --> 00:36:24,880

remain like the remnants of the Hoover

995

00:36:31,430 --> 00:36:29,040

dam the faces on Mount Rushmore however

996

00:36:33,430 --> 00:36:31,440

could survive in a recognizable form for

997

00:36:35,190 --> 00:36:33,440

millennia

998

00:36:37,109 --> 00:36:35,200

this is because granite one of the

999

00:36:39,670 --> 00:36:37,119

hardest kinds of rock and a popular

1000

00:36:42,230 --> 00:36:39,680

megalithic building material erodes at

1001
00:36:43,190 --> 00:36:42,240
only about one inch every ten thousand

1002
00:36:44,790 --> 00:36:43,200
years

1003
00:36:46,790 --> 00:36:44,800
so when we're talking about large

1004
00:36:49,109 --> 00:36:46,800
structures built with granite or

1005
00:36:50,870 --> 00:36:49,119
similarly durable blocks of stone

1006
00:36:53,910 --> 00:36:50,880
we're talking about something that has

1007
00:36:56,390 --> 00:36:53,920
the ability to exist and endure outside

1008
00:36:58,230 --> 00:36:56,400
of the normal human time scale

1009
00:37:01,109 --> 00:36:58,240
in the time it would take for new york

1010
00:37:03,829 --> 00:37:01,119
city to become a forest again a megalith

1011
00:37:05,670 --> 00:37:03,839
will have undergone a bit of weathering

1012
00:37:07,910 --> 00:37:05,680
when we're talking about structures that

1013
00:37:09,910 --> 00:37:07,920

have the ability to endure for thousands

1014

00:37:12,150 --> 00:37:09,920

of years if not tens of thousands of

1015

00:37:14,150 --> 00:37:12,160

years and without any direct way to

1016

00:37:16,069 --> 00:37:14,160

confirm when they were built

1017

00:37:17,829 --> 00:37:16,079

it's entirely possible that our

1018

00:37:19,829 --> 00:37:17,839

understanding of how old they are is

1019

00:37:23,109 --> 00:37:19,839

entirely wrong

1020

00:37:25,190 --> 00:37:23,119

and if as some archaeologists suggest

1021

00:37:27,430 --> 00:37:25,200

some of these megalithic structures are

1022

00:37:29,109 --> 00:37:27,440

older than we previously thought

1023

00:37:30,710 --> 00:37:29,119

what might that mean for the story of

1024

00:37:32,790 --> 00:37:30,720

humanity

1025

00:37:35,430 --> 00:37:32,800

and what might we discover about

1026
00:37:40,240 --> 00:37:35,440
ourselves as we begin to reimagine the

1027
00:39:03,030 --> 00:38:55,020
[Music]

1028
00:39:05,190 --> 00:39:03,040
and beyond challenges with dating the

1029
00:39:06,790 --> 00:39:05,200
most interesting and mysterious remnants

1030
00:39:08,870 --> 00:39:06,800
of our ancient past

1031
00:39:11,349 --> 00:39:08,880
archaeology itself presents some

1032
00:39:13,829 --> 00:39:11,359
additional epistemological challenges as

1033
00:39:16,230 --> 00:39:13,839
a result of the unique way the data is

1034
00:39:18,630 --> 00:39:16,240
collected in this field of science

1035
00:39:21,670 --> 00:39:18,640
for example unlike most other branches

1036
00:39:23,589 --> 00:39:21,680
of science archaeology often involves

1037
00:39:25,670 --> 00:39:23,599
rare discoveries that can't be

1038
00:39:27,829 --> 00:39:25,680

replicated at will

1039

00:39:30,230 --> 00:39:27,839

one of the most important aspects of

1040

00:39:32,550 --> 00:39:30,240

validating scientific conclusions is the

1041

00:39:33,510 --> 00:39:32,560

ability to replicate results

1042

00:39:35,589 --> 00:39:33,520

however

1043

00:39:37,829 --> 00:39:35,599

archaeological discoveries tend to be

1044

00:39:39,990 --> 00:39:37,839

rare and they only get more rare the

1045

00:39:42,150 --> 00:39:40,000

farther back in time you go

1046

00:39:44,470 --> 00:39:42,160

sometimes there's very little to compare

1047

00:39:46,950 --> 00:39:44,480

a site to which makes it even more

1048

00:39:49,109 --> 00:39:46,960

challenging to draw conclusions

1049

00:39:52,630 --> 00:39:49,119

another issue is that the act of

1050

00:39:54,630 --> 00:39:52,640

discovery can destroy most if not all of

1051

00:39:57,030 --> 00:39:54,640

the key evidence

1052

00:39:59,349 --> 00:39:57,040

for example if you have to dig to

1053

00:40:01,510 --> 00:39:59,359

uncover a site as you're digging it up

1054

00:40:03,349 --> 00:40:01,520

you're effectively destroying all of the

1055

00:40:04,710 --> 00:40:03,359

evidence of the site's stratigraphic

1056

00:40:06,710 --> 00:40:04,720

positioning

1057

00:40:08,790 --> 00:40:06,720

archaeologists are trained in how to

1058

00:40:10,790 --> 00:40:08,800

conduct this sort of excavation and

1059

00:40:13,270 --> 00:40:10,800

carefully document each stage to

1060

00:40:15,030 --> 00:40:13,280

preserve as much information about the

1061

00:40:16,950 --> 00:40:15,040

original condition of the site as

1062

00:40:19,750 --> 00:40:16,960

possible

1063

00:40:22,150 --> 00:40:19,760

however this also means that knowledge

1064

00:40:24,630 --> 00:40:22,160

of key elements is entirely dependent

1065

00:40:26,870 --> 00:40:24,640

upon the observers who were present

1066

00:40:29,430 --> 00:40:26,880

no matter how careful someone is it

1067

00:40:31,670 --> 00:40:29,440

would be impossible for anyone to record

1068

00:40:34,390 --> 00:40:31,680

absolutely everything about a site as it

1069

00:40:36,870 --> 00:40:34,400

existed in its original condition

1070

00:40:39,190 --> 00:40:36,880

any small detail that is overlooked

1071

00:40:41,109 --> 00:40:39,200

could potentially have huge implications

1072

00:40:42,950 --> 00:40:41,119

for the conclusions that are later drawn

1073

00:40:45,270 --> 00:40:42,960

about a particular site

1074

00:40:48,470 --> 00:40:45,280

but once it's been excavated that

1075

00:40:50,790 --> 00:40:48,480

evidence is destroyed forever

1076
00:40:52,470 --> 00:40:50,800
and this is only further complicated by

1077
00:40:55,510 --> 00:40:52,480
the fact that interpreting an

1078
00:40:58,230 --> 00:40:55,520
archaeological site is never simple

1079
00:41:00,710 --> 00:40:58,240
on any given day you could take any two

1080
00:41:03,030 --> 00:41:00,720
top archaeologists plot them down on the

1081
00:41:05,430 --> 00:41:03,040
same site and ask them their conclusions

1082
00:41:07,750 --> 00:41:05,440
and get two different answers

1083
00:41:09,910 --> 00:41:07,760
coming to a consensus is often difficult

1084
00:41:11,990 --> 00:41:09,920
and made more so by the fact that the

1085
00:41:13,829 --> 00:41:12,000
only data available is that which was

1086
00:41:15,589 --> 00:41:13,839
collected by those who were on the site

1087
00:41:18,069 --> 00:41:15,599
at the time of the dig

1088
00:41:20,790 --> 00:41:18,079

and to further muddy the waters

1089

00:41:22,790 --> 00:41:20,800

there are incentives for people to lie

1090

00:41:24,950 --> 00:41:22,800

we'd like to think that we can always

1091

00:41:27,190 --> 00:41:24,960

depend upon a scientist to be objective

1092

00:41:28,950 --> 00:41:27,200

and truthful in their conclusions but

1093

00:41:30,790 --> 00:41:28,960

the reality is that scientists are

1094

00:41:32,630 --> 00:41:30,800

subject to the same conscious and

1095

00:41:35,349 --> 00:41:32,640

unconscious biases and the same

1096

00:41:37,190 --> 00:41:35,359

temptations as the rest of us

1097

00:41:38,950 --> 00:41:37,200

while there are a few archaeologists who

1098

00:41:41,750 --> 00:41:38,960

manage to make multiple important

1099

00:41:43,589 --> 00:41:41,760

discoveries in their careers the reality

1100

00:41:45,670 --> 00:41:43,599

is that many brilliant and talented

1101

00:41:48,390 --> 00:41:45,680

archaeologists toil for their entire

1102

00:41:49,990 --> 00:41:48,400

careers without ever personally finding

1103

00:41:51,750 --> 00:41:50,000

anything of import

1104

00:41:52,710 --> 00:41:51,760

beyond just earning the respect of their

1105

00:41:54,790 --> 00:41:52,720

peers

1106

00:41:56,950 --> 00:41:54,800

making an important discovery means more

1107

00:41:59,190 --> 00:41:56,960

money for research and excavations

1108

00:42:01,109 --> 00:41:59,200

better positions at better universities

1109

00:42:02,630 --> 00:42:01,119

and even potentially book and media

1110

00:42:05,109 --> 00:42:02,640

opportunities

1111

00:42:07,030 --> 00:42:05,119

it's not hard to understand why someone

1112

00:42:09,510 --> 00:42:07,040

might leave out information that might

1113

00:42:11,270 --> 00:42:09,520

contradict the importance of their find

1114

00:42:12,870 --> 00:42:11,280

or might embellish slightly to make

1115

00:42:14,710 --> 00:42:12,880

something seem more important than it

1116

00:42:16,870 --> 00:42:14,720

was

1117

00:42:18,309 --> 00:42:16,880

and i'd argue that there's the opposite

1118

00:42:21,030 --> 00:42:18,319

pressure as well

1119

00:42:23,349 --> 00:42:21,040

to gloss over or to overlook anomalous

1120

00:42:25,510 --> 00:42:23,359

details that contradict earlier findings

1121

00:42:28,069 --> 00:42:25,520

and conclusions in the field

1122

00:42:30,230 --> 00:42:28,079

as with anything else archaeology has a

1123

00:42:32,470 --> 00:42:30,240

deeply enmeshed established narrative

1124

00:42:34,150 --> 00:42:32,480

regarding the history of humanity

1125

00:42:37,109 --> 00:42:34,160

and those who choose to challenge the

1126

00:42:39,550 --> 00:42:37,119

status quo are often met with hostility

1127

00:42:41,990 --> 00:42:39,560

and derision they can be labeled as

1128

00:42:44,309 --> 00:42:42,000

pseudoscientists if not outright con

1129

00:42:46,390 --> 00:42:44,319

artists and for people who are slapped

1130

00:42:47,829 --> 00:42:46,400

with that label the fallout can be

1131

00:42:49,190 --> 00:42:47,839

personally and professionally

1132

00:42:51,109 --> 00:42:49,200

devastating

1133

00:42:55,349 --> 00:42:51,119

the research money and cushy positions

1134

00:42:59,270 --> 00:42:56,829

which brings us to another

1135

00:43:01,750 --> 00:42:59,280

epistemological challenge that impacts

1136

00:43:03,349 --> 00:43:01,760

not just archaeology but the practice of

1137

00:43:05,589 --> 00:43:03,359

science as a whole

1138

00:43:07,430 --> 00:43:05,599

which is that there are flaws in the

1139

00:43:09,670 --> 00:43:07,440

peer review system that can make it

1140

00:43:12,150 --> 00:43:09,680

difficult for particularly challenging

1141

00:43:14,150 --> 00:43:12,160

or unpopular ideas to get the same

1142

00:43:15,829 --> 00:43:14,160

consideration as ideas that are more

1143

00:43:17,190 --> 00:43:15,839

closely aligned with the established

1144

00:43:19,750 --> 00:43:17,200

narrative

1145

00:43:21,910 --> 00:43:19,760

if you're unfamiliar peer review is the

1146

00:43:23,910 --> 00:43:21,920

system used to assess the quality of a

1147

00:43:25,750 --> 00:43:23,920

manuscript before it's published in a

1148

00:43:27,910 --> 00:43:25,760

scientific journal

1149

00:43:30,069 --> 00:43:27,920

independent researchers in the relevant

1150

00:43:33,030 --> 00:43:30,079

research area assess submitted

1151
00:43:35,750 --> 00:43:33,040
manuscripts for originality validity and

1152
00:43:37,589 --> 00:43:35,760
significance to help editors determine

1153
00:43:39,430 --> 00:43:37,599
whether a manuscript should be published

1154
00:43:41,670 --> 00:43:39,440
in their journal

1155
00:43:43,910 --> 00:43:41,680
basically it's a way for other experts

1156
00:43:46,069 --> 00:43:43,920
in the field to look at how the research

1157
00:43:48,150 --> 00:43:46,079
being presented was conducted and to

1158
00:43:50,470 --> 00:43:48,160
assess the conclusions that were drawn

1159
00:43:51,430 --> 00:43:50,480
and to give an opinion on how legit it

1160
00:43:55,750 --> 00:43:51,440
is

1161
00:43:57,910 --> 00:43:55,760
need to have a group of their peers look

1162
00:43:59,109 --> 00:43:57,920
over their work and say this looks right

1163
00:44:01,190 --> 00:43:59,119

to me

1164

00:44:03,510 --> 00:44:01,200

and peer review isn't just used to

1165

00:44:05,750 --> 00:44:03,520

determine which articles are published

1166

00:44:08,069 --> 00:44:05,760

but to determine who receives scientific

1167

00:44:10,870 --> 00:44:08,079

grants which projects are funded and

1168

00:44:12,710 --> 00:44:10,880

which scientists are hired and promoted

1169

00:44:14,550 --> 00:44:12,720

and that makes sense right

1170

00:44:16,390 --> 00:44:14,560

we need some sort of system of checks

1171

00:44:17,990 --> 00:44:16,400

and balances in science

1172

00:44:19,990 --> 00:44:18,000

we need a way to sort out the

1173

00:44:22,550 --> 00:44:20,000

experiments that were poorly constructed

1174

00:44:25,589 --> 00:44:22,560

and the conclusions that weren't sound

1175

00:44:27,750 --> 00:44:25,599

we need a way of coming to a consensus

1176

00:44:30,230 --> 00:44:27,760

and don't get me wrong for all of its

1177

00:44:32,710 --> 00:44:30,240

flaws the peer review system is the best

1178

00:44:34,950 --> 00:44:32,720

answer we have for that by far

1179

00:44:37,109 --> 00:44:34,960

it's like democracy it's a messy

1180

00:44:38,630 --> 00:44:37,119

imperfect system but we have yet to come

1181

00:44:40,710 --> 00:44:38,640

up with anything better

1182

00:44:42,630 --> 00:44:40,720

so please don't hear what i'm about to

1183

00:44:44,470 --> 00:44:42,640

say as an attack on the peer review

1184

00:44:45,589 --> 00:44:44,480

system or a suggestion that it should be

1185

00:44:47,349 --> 00:44:45,599

abandoned

1186

00:44:50,150 --> 00:44:47,359

but i do think that it's important to

1187

00:44:52,550 --> 00:44:50,160

understand what its weaknesses are and

1188

00:44:55,030 --> 00:44:52,560

how they can become particularly evident

1189

00:44:57,750 --> 00:44:55,040

in the case of scientific findings that

1190

00:44:58,710 --> 00:44:57,760

radically alter our existing beliefs

1191

00:45:00,950 --> 00:44:58,720

so

1192

00:45:03,670 --> 00:45:00,960

what are those limitations

1193

00:45:06,870 --> 00:45:03,680

the first is that reviewers are usually

1194

00:45:09,270 --> 00:45:06,880

untrained unpaid and overworked

1195

00:45:10,630 --> 00:45:09,280

now granted untrained means something

1196

00:45:12,550 --> 00:45:10,640

very different when you're talking about

1197

00:45:13,510 --> 00:45:12,560

a scientist with one or more terminal

1198

00:45:15,109 --> 00:45:13,520

degrees

1199

00:45:17,510 --> 00:45:15,119

the people who are conducting peer

1200

00:45:19,910 --> 00:45:17,520

review are highly trained in both their

1201
00:45:20,870 --> 00:45:19,920
field and in scientific methodologies as

1202
00:45:23,349 --> 00:45:20,880
a whole

1203
00:45:26,550 --> 00:45:23,359
however they aren't generally trained on

1204
00:45:28,550 --> 00:45:26,560
the peer review process itself

1205
00:45:31,190 --> 00:45:28,560
and as we'll see there are certain

1206
00:45:33,270 --> 00:45:31,200
mistakes and biases that can impact what

1207
00:45:35,750 --> 00:45:33,280
studies get published and which ones

1208
00:45:37,349 --> 00:45:35,760
don't which in turn impacts which

1209
00:45:40,470 --> 00:45:37,359
scientific findings are given

1210
00:45:42,550 --> 00:45:40,480
credibility and which ones are dismissed

1211
00:45:44,309 --> 00:45:42,560
so a little training on how to check

1212
00:45:46,870 --> 00:45:44,319
yourself for those biases throughout the

1213
00:45:48,630 --> 00:45:46,880

process seems warranted but it's not

1214

00:45:50,230 --> 00:45:48,640

something that most peer reviewers ever

1215

00:45:53,270 --> 00:45:50,240

receive

1216

00:45:55,589 --> 00:45:53,280

and with 2.5 million peer-reviewed

1217

00:45:57,190 --> 00:45:55,599

articles being published annually

1218

00:45:58,470 --> 00:45:57,200

a number which does not take into

1219

00:45:59,670 --> 00:45:58,480

account all of the papers that are

1220

00:46:01,589 --> 00:45:59,680

rejected

1221

00:46:02,950 --> 00:46:01,599

it's difficult to find enough people to

1222

00:46:04,550 --> 00:46:02,960

do the work

1223

00:46:06,710 --> 00:46:04,560

add in the fact that they are generally

1224

00:46:08,550 --> 00:46:06,720

unpaid for their labor and the result is

1225

00:46:10,470 --> 00:46:08,560

a pool of peer reviewers who are

1226
00:46:12,230 --> 00:46:10,480
well-meaning but almost certainly

1227
00:46:13,910 --> 00:46:12,240
overworked

1228
00:46:16,230 --> 00:46:13,920
the second issue with the peer review

1229
00:46:19,109 --> 00:46:16,240
system is that there's evidence that

1230
00:46:21,990 --> 00:46:19,119
reviewers aren't always consistent

1231
00:46:23,910 --> 00:46:22,000
in one study two researchers selected 12

1232
00:46:26,550 --> 00:46:23,920
articles that were already accepted by

1233
00:46:28,230 --> 00:46:26,560
well-respected scientific journals and

1234
00:46:30,950 --> 00:46:28,240
switched the names of the authors and

1235
00:46:33,109 --> 00:46:30,960
academic institutions to fake ones

1236
00:46:35,109 --> 00:46:33,119
they then resubmitted the exact same

1237
00:46:37,589 --> 00:46:35,119
articles to the same journals that had

1238
00:46:39,349 --> 00:46:37,599

already accepted them in the previous 18

1239

00:46:41,990 --> 00:46:39,359
to 32 months

1240

00:46:43,589 --> 00:46:42,000
surprisingly only three of the papers

1241

00:46:45,430 --> 00:46:43,599
were identified by the editors and

1242

00:46:47,270 --> 00:46:45,440
reviewers of these journals as being an

1243

00:46:49,670 --> 00:46:47,280
article they'd already published

1244

00:46:53,190 --> 00:46:49,680
and of the nine that continued on all

1245

00:46:55,750 --> 00:46:53,200
but one was turned down with 89 of the

1246

00:46:58,069 --> 00:46:55,760
reviewers recommending rejection

1247

00:47:00,069 --> 00:46:58,079
obviously this lack of consistency

1248

00:47:01,670 --> 00:47:00,079
suggests that there are factors beyond

1249

00:47:03,990 --> 00:47:01,680
just the black and white scientific

1250

00:47:06,470 --> 00:47:04,000
merits of an article that contributes to

1251
00:47:07,670 --> 00:47:06,480
whether or not it's actually published

1252
00:47:09,270 --> 00:47:07,680
and finally

1253
00:47:11,270 --> 00:47:09,280
there is evidence that the most

1254
00:47:13,750 --> 00:47:11,280
innovative and impactful scientific

1255
00:47:16,309 --> 00:47:13,760
ideas are more likely to be rejected

1256
00:47:19,109 --> 00:47:16,319
through the process of peer review

1257
00:47:21,349 --> 00:47:19,119
a 2015 study tracked the popularity of

1258
00:47:23,589 --> 00:47:21,359
rejected and accepted manuscripts at

1259
00:47:24,390 --> 00:47:23,599
three top medical journals and found

1260
00:47:25,990 --> 00:47:24,400
that

1261
00:47:28,069 --> 00:47:26,000
while the editors and reviewers

1262
00:47:30,069 --> 00:47:28,079
generally made good decisions regarding

1263
00:47:31,510 --> 00:47:30,079

which manuscripts to publish and which

1264

00:47:33,829 --> 00:47:31,520

to reject

1265

00:47:35,589 --> 00:47:33,839

some of the most highly cited articles

1266

00:47:37,750 --> 00:47:35,599

were the ones that were most likely to

1267

00:47:41,910 --> 00:47:37,760

be rejected

1268

00:47:44,230 --> 00:47:41,920

they started with 1008 manuscripts 808

1269

00:47:45,270 --> 00:47:44,240

of which were eventually published

1270

00:47:48,069 --> 00:47:45,280

however

1271

00:47:51,430 --> 00:47:48,079

among those that were rejected were all

1272

00:47:53,589 --> 00:47:51,440

of the 14 most cited articles

1273

00:47:55,990 --> 00:47:53,599

this suggests that while the peer review

1274

00:47:57,829 --> 00:47:56,000

system is great for raising the overall

1275

00:48:00,309 --> 00:47:57,839

average quality of articles that are

1276

00:48:02,150 --> 00:48:00,319

published it isn't very good at

1277

00:48:04,790 --> 00:48:02,160

recognizing and promoting the most

1278

00:48:07,430 --> 00:48:04,800

important and impactful research

1279

00:48:09,589 --> 00:48:07,440

which makes sense if you want to smooth

1280

00:48:11,990 --> 00:48:09,599

out the mean of any data you first need

1281

00:48:14,309 --> 00:48:12,000

to eliminate any outliers

1282

00:48:16,470 --> 00:48:14,319

but sometimes the outlier is the data

1283

00:48:18,950 --> 00:48:16,480

point that changes everything

1284

00:48:21,430 --> 00:48:18,960

what then

1285

00:48:23,829 --> 00:48:21,440

so the takeaway here is this the peer

1286

00:48:26,069 --> 00:48:23,839

review system is a necessary and well

1287

00:48:28,470 --> 00:48:26,079

proven process for maintaining an

1288

00:48:30,470 --> 00:48:28,480

overall level of quality and scientific

1289

00:48:33,270 --> 00:48:30,480

rigor with regard to the scientific

1290

00:48:35,430 --> 00:48:33,280

articles that are published

1291

00:48:37,750 --> 00:48:35,440

however the system is not without its

1292

00:48:40,790 --> 00:48:37,760

flaws and has a general bias toward the

1293

00:48:43,829 --> 00:48:40,800

status quo and against more innovative

1294

00:48:44,710 --> 00:48:43,839

or radical ideas

1295

00:48:47,109 --> 00:48:44,720

so

1296

00:48:49,589 --> 00:48:47,119

putting it all together what does all of

1297

00:48:51,430 --> 00:48:49,599

this mean for us

1298

00:48:53,589 --> 00:48:51,440

what it doesn't mean and i want to be

1299

00:48:55,670 --> 00:48:53,599

very clear about this is that we should

1300

00:48:57,670 --> 00:48:55,680

just throw everything out the window or

1301
00:48:59,750 --> 00:48:57,680
assume that we are as good as or better

1302
00:49:00,950 --> 00:48:59,760
than archaeologists at interpreting data

1303
00:49:03,349 --> 00:49:00,960
in their field

1304
00:49:05,510 --> 00:49:03,359
we absolutely are not

1305
00:49:06,549 --> 00:49:05,520
right now we're feeling smug and full of

1306
00:49:08,549 --> 00:49:06,559
facts

1307
00:49:10,870 --> 00:49:08,559
we know about the challenges of dating

1308
00:49:12,790 --> 00:49:10,880
archaeological sites we know that most

1309
00:49:15,270 --> 00:49:12,800
archaeologists only ever get to assess

1310
00:49:17,270 --> 00:49:15,280
second or third hand data we understand

1311
00:49:20,069 --> 00:49:17,280
the biases inherent to the peer review

1312
00:49:21,990 --> 00:49:20,079
process we're feeling very smart and who

1313
00:49:23,910 --> 00:49:22,000

doesn't love feeling smart

1314

00:49:25,589 --> 00:49:23,920

but everything that we've talked about

1315

00:49:28,710 --> 00:49:25,599

in the last few minutes wouldn't even

1316

00:49:31,030 --> 00:49:28,720

fill one chapter of a 101 textbook

1317

00:49:33,190 --> 00:49:31,040

it's not even a drop in a bucket it's a

1318

00:49:34,710 --> 00:49:33,200

drop in an ocean compared to the

1319

00:49:36,470 --> 00:49:34,720

knowledge of people who have spent

1320

00:49:39,270 --> 00:49:36,480

decades of their lives

1321

00:49:41,270 --> 00:49:39,280

dedicated to studying these things

1322

00:49:43,190 --> 00:49:41,280

when you find ourselves in this place

1323

00:49:45,589 --> 00:49:43,200

the dunning-kruger effect is a good

1324

00:49:47,750 --> 00:49:45,599

touchstone to keep us grounded if you're

1325

00:49:50,069 --> 00:49:47,760

unfamiliar the dunning-kruger effect is

1326
00:49:52,630 --> 00:49:50,079
an extremely common form of cognitive

1327
00:49:54,150 --> 00:49:52,640
bias where people who have very limited

1328
00:49:56,309 --> 00:49:54,160
knowledge of something greatly

1329
00:49:57,349 --> 00:49:56,319
overestimate how much they know about a

1330
00:49:59,349 --> 00:49:57,359
thing

1331
00:50:00,790 --> 00:49:59,359
it's basically a case of not knowing

1332
00:50:02,309 --> 00:50:00,800
what you don't know

1333
00:50:03,990 --> 00:50:02,319
if you only know a little bit about

1334
00:50:05,990 --> 00:50:04,000
something you can easily make the

1335
00:50:08,230 --> 00:50:06,000
mistake of assuming that what you know

1336
00:50:10,470 --> 00:50:08,240
is basically all there is to know

1337
00:50:12,390 --> 00:50:10,480
and interestingly once people start to

1338
00:50:14,150 --> 00:50:12,400

learn more about a subject and become

1339

00:50:16,870 --> 00:50:14,160

more aware of its true scope and

1340

00:50:18,950 --> 00:50:16,880

complexity they very quickly go from

1341

00:50:22,230 --> 00:50:18,960

overestimating their knowledge to

1342

00:50:24,390 --> 00:50:22,240

realizing that they know next to nothing

1343

00:50:26,069 --> 00:50:24,400

so basically if you haven't studied

1344

00:50:27,990 --> 00:50:26,079

something deeply enough to have been

1345

00:50:30,069 --> 00:50:28,000

truly humbled by it

1346

00:50:32,950 --> 00:50:30,079

you probably know much much less about

1347

00:50:35,030 --> 00:50:32,960

that thing than you'd like to think

1348

00:50:36,710 --> 00:50:35,040

i also want to be clear that although i

1349

00:50:38,230 --> 00:50:36,720

do think that there is more than enough

1350

00:50:40,069 --> 00:50:38,240

evidence for us to question the

1351
00:50:42,309 --> 00:50:40,079
established narrative about the age and

1352
00:50:44,630 --> 00:50:42,319
origins of human civilization

1353
00:50:46,630 --> 00:50:44,640
and that the mechanisms and institutions

1354
00:50:49,589 --> 00:50:46,640
of academia have been suppressing this

1355
00:50:51,430 --> 00:50:49,599
knowledge i absolutely do not believe

1356
00:50:54,630 --> 00:50:51,440
that there is a conspiracy within

1357
00:50:56,710 --> 00:50:54,640
academia to cover any of this up because

1358
00:50:58,150 --> 00:50:56,720
i don't think that there needs to be

1359
00:51:00,950 --> 00:50:58,160
when i look at all of these things

1360
00:51:04,069 --> 00:51:00,960
together i don't see a plot i don't see

1361
00:51:06,829 --> 00:51:04,079
sinister machinations what i see is our

1362
00:51:09,910 --> 00:51:06,839
humanity in all its nobility and

1363
00:51:11,670 --> 00:51:09,920

absurdity we want to belong so we shift

1364

00:51:12,710 --> 00:51:11,680

and mold our beliefs to align with the

1365

00:51:14,630 --> 00:51:12,720

whole

1366

00:51:16,790 --> 00:51:14,640

our need to know who we are is so

1367

00:51:19,349 --> 00:51:16,800

profound that we tell ourselves that we

1368

00:51:20,549 --> 00:51:19,359

already do just to ease the existential

1369

00:51:22,549 --> 00:51:20,559

friction

1370

00:51:24,390 --> 00:51:22,559

we mistake the limits of our knowledge

1371

00:51:27,670 --> 00:51:24,400

for the limits of what is

1372

00:51:30,069 --> 00:51:27,680

we strive we falter we're wrong

1373

00:51:32,390 --> 00:51:30,079

we rise and we try again it's just who

1374

00:51:34,710 --> 00:51:32,400

we are

1375

00:51:36,230 --> 00:51:34,720

and finally i want to take a minute to

1376

00:51:37,990 --> 00:51:36,240

talk about a word that gets thrown

1377

00:51:39,750 --> 00:51:38,000

around a lot when we're talking about

1378

00:51:41,430 --> 00:51:39,760

scientific ideas that threaten the

1379

00:51:44,150 --> 00:51:41,440

established narrative

1380

00:51:45,910 --> 00:51:44,160

and that word is pseudoscience

1381

00:51:47,990 --> 00:51:45,920

and for any scientist who hopes to

1382

00:51:50,309 --> 00:51:48,000

maintain the credibility necessary to

1383

00:51:52,549 --> 00:51:50,319

have a career much less get money to

1384

00:51:53,990 --> 00:51:52,559

fund their research it's the ultimate

1385

00:51:56,390 --> 00:51:54,000

kiss of death

1386

00:51:58,710 --> 00:51:56,400

but what is pseudoscience

1387

00:52:00,950 --> 00:51:58,720

pseudoscience is a collection of beliefs

1388

00:52:02,710 --> 00:52:00,960

or practices regarded as being based on

1389

00:52:05,270 --> 00:52:02,720

the scientific method

1390

00:52:07,270 --> 00:52:05,280

so if a person is using the scientific

1391

00:52:08,470 --> 00:52:07,280

method to define a question make

1392

00:52:10,470 --> 00:52:08,480

predictions

1393

00:52:11,750 --> 00:52:10,480

gather and analyze data and then draw

1394

00:52:13,190 --> 00:52:11,760

conclusions

1395

00:52:15,510 --> 00:52:13,200

that's science

1396

00:52:18,870 --> 00:52:15,520

if a person is not using the scientific

1397

00:52:20,230 --> 00:52:18,880

method that's not science and if someone

1398

00:52:22,470 --> 00:52:20,240

is doing research and drawing

1399

00:52:24,630 --> 00:52:22,480

conclusions in a way that they think is

1400

00:52:26,390 --> 00:52:24,640

in alignment with the scientific method

1401
00:52:28,870 --> 00:52:26,400
but it actually isn't

1402
00:52:30,710 --> 00:52:28,880
that's pseudoscience

1403
00:52:32,950 --> 00:52:30,720
pretty straightforward right

1404
00:52:33,829 --> 00:52:32,960
and i come back to this idea again and

1405
00:52:36,150 --> 00:52:33,839
again

1406
00:52:38,470 --> 00:52:36,160
because it's in this distinction that we

1407
00:52:41,030 --> 00:52:38,480
can begin to get a solid foothold to

1408
00:52:42,710 --> 00:52:41,040
help us evaluate whether or not ideas

1409
00:52:45,670 --> 00:52:42,720
that have been relegated to the realm of

1410
00:52:47,910 --> 00:52:45,680
pseudoscience have actual merit and best

1411
00:52:50,390 --> 00:52:47,920
of all we don't need to be experts in

1412
00:52:52,470 --> 00:52:50,400
anything to do so

1413
00:52:55,109 --> 00:52:52,480

it's as simple as this

1414

00:52:58,069 --> 00:52:55,119

is this idea being called pseudoscience

1415

00:53:01,030 --> 00:52:58,079

because the approach is unscientific

1416

00:53:03,190 --> 00:53:01,040

or because the conclusions don't conform

1417

00:53:05,750 --> 00:53:03,200

to the established narrative

1418

00:53:07,510 --> 00:53:05,760

if it's unscientific that should be easy

1419

00:53:09,670 --> 00:53:07,520

to demonstrate because either the

1420

00:53:11,430 --> 00:53:09,680

scientific method wasn't used or it

1421

00:53:13,670 --> 00:53:11,440

wasn't used correctly

1422

00:53:15,510 --> 00:53:13,680

maybe a variable wasn't accounted for

1423

00:53:17,510 --> 00:53:15,520

maybe there was a flaw in the way that

1424

00:53:20,230 --> 00:53:17,520

the data was collected there are lots of

1425

00:53:22,390 --> 00:53:20,240

possibilities and any true expert in a

1426
00:53:24,630 --> 00:53:22,400
field that is leveling an accusation of

1427
00:53:26,230 --> 00:53:24,640
pseudoscience against a colleague should

1428
00:53:28,790 --> 00:53:26,240
be able to clearly articulate their

1429
00:53:30,790 --> 00:53:28,800
basis for saying so

1430
00:53:32,309 --> 00:53:30,800
but what's been kind of astonishing to

1431
00:53:35,589 --> 00:53:32,319
me as i've pursued this line of

1432
00:53:37,510 --> 00:53:35,599
questioning is how often accusations of

1433
00:53:40,230 --> 00:53:37,520
pseudoscience mention none of those

1434
00:53:42,150 --> 00:53:40,240
things and focus instead on the fact

1435
00:53:44,790 --> 00:53:42,160
that the conclusions being drawn by this

1436
00:53:47,030 --> 00:53:44,800
person are impossible

1437
00:53:49,270 --> 00:53:47,040
but how many impossible things has

1438
00:53:51,430 --> 00:53:49,280

science proven to be possible

1439

00:53:53,510 --> 00:53:51,440

impossible is a meaningless term for a

1440

00:53:55,829 --> 00:53:53,520

species as young as our own

1441

00:53:57,430 --> 00:53:55,839

what could we possibly know about what's

1442

00:54:02,870 --> 00:53:57,440

impossible

1443

00:54:05,109 --> 00:54:02,880

doesn't conform to the conclusions drawn

1444

00:54:07,030 --> 00:54:05,119

based on the existing data set

1445

00:54:09,430 --> 00:54:07,040

that doesn't mean it's wrong

1446

00:54:11,750 --> 00:54:09,440

it just means that it doesn't fit

1447

00:54:14,069 --> 00:54:11,760

and in science we don't shape our data

1448

00:54:16,950 --> 00:54:14,079

to conform to the conclusions we shape

1449

00:54:19,349 --> 00:54:16,960

our conclusions based on the data

1450

00:54:21,670 --> 00:54:19,359

the fact that a data point doesn't fit

1451

00:54:23,430 --> 00:54:21,680

isn't grounds to throw it out it's a

1452

00:54:25,270 --> 00:54:23,440

hint that there may be a piece of the

1453

00:54:27,190 --> 00:54:25,280

puzzle that we're missing

1454

00:54:29,510 --> 00:54:27,200

and so while we may not be

1455

00:54:31,670 --> 00:54:29,520

archaeologists or scientists

1456

00:54:33,910 --> 00:54:31,680

i would argue that we are at least able

1457

00:54:36,309 --> 00:54:33,920

to determine whether a set of ideas that

1458

00:54:39,510 --> 00:54:36,319

is labeled as pseudoscience has been

1459

00:54:41,670 --> 00:54:39,520

labeled so fairly that doesn't mean then

1460

00:54:43,670 --> 00:54:41,680

that it's necessarily true

1461

00:54:45,430 --> 00:54:43,680

only that we should wait to reject it

1462

00:54:47,270 --> 00:54:45,440

until we're able to do so on its

1463

00:54:49,589 --> 00:54:47,280

scientific merits

1464

00:54:51,190 --> 00:54:49,599

and that at least gives us a place to

1465

00:54:54,150 --> 00:54:51,200

start

1466

00:54:57,109 --> 00:54:54,160

so as we conclude this introduction that

1467

00:54:59,190 --> 00:54:57,119

became an entire episode i feel like we

1468

00:55:01,910 --> 00:54:59,200

have a solid foundation to go forward

1469

00:55:03,589 --> 00:55:01,920

from here and begin to explore some of

1470

00:55:05,430 --> 00:55:03,599

the mysteries surrounding the dawn of

1471

00:55:07,270 --> 00:55:05,440

human civilization

1472

00:55:09,829 --> 00:55:07,280

we recognize the necessity of

1473

00:55:12,470 --> 00:55:09,839

reevaluating the story of humanity

1474

00:55:14,470 --> 00:55:12,480

through the lens of the ufo phenomenon

1475

00:55:16,630 --> 00:55:14,480

we understand some of the challenges

1476

00:55:18,950 --> 00:55:16,640

that exist in creating a reliable and

1477

00:55:20,870 --> 00:55:18,960

consistent narrative around the events

1478

00:55:22,630 --> 00:55:20,880

of the distant past

1479

00:55:24,710 --> 00:55:22,640

we know that although the peer review

1480

00:55:26,870 --> 00:55:24,720

system helps us to ensure a high level

1481

00:55:29,270 --> 00:55:26,880

of scientific rigor and excellence is

1482

00:55:31,430 --> 00:55:29,280

maintained in the work that is published

1483

00:55:33,030 --> 00:55:31,440

it also has a tendency to reject the

1484

00:55:34,710 --> 00:55:33,040

work that is most important and

1485

00:55:37,270 --> 00:55:34,720

impactful

1486

00:55:39,510 --> 00:55:37,280

and finally we have a simple framework

1487

00:55:41,510 --> 00:55:39,520

to help us assess whether radical and

1488

00:55:44,150 --> 00:55:41,520

innovative ideas are being dismissed as

1489

00:55:46,950 --> 00:55:44,160

pseudoscience based on their merits or

1490

00:55:48,470 --> 00:55:46,960

if other biases may be at work

1491

00:55:49,270 --> 00:55:48,480

and that's where we'll pick it up next

1492

00:55:54,390 --> 00:55:49,280

time

1493

00:55:56,950 --> 00:55:54,400

looking for answers and begin to explore

1494

00:55:59,349 --> 00:55:56,960

some of the most astonishing evidence

1495

00:56:02,230 --> 00:55:59,359

that suggests that the history of human

1496

00:56:04,470 --> 00:56:02,240

civilization on this planet maybe far

1497

00:56:05,589 --> 00:56:04,480

older and more dazzling than we ever

1498

00:56:14,210 --> 00:56:05,599

imagined