



**MEREL
KINDT**

**FEAR
EXTINCTION**

1
00:00:05,630 --> 00:00:02,690
I was thinking how can we mislead our

2
00:00:07,970 --> 00:00:05,640
brain and weaken the fear memory itself

3
00:00:10,250 --> 00:00:07,980
emotional memory that underlies anxiety

4
00:00:12,470 --> 00:00:10,260
disorders is not a sort of single memory

5
00:00:15,230 --> 00:00:12,480
Trace but it is a network this changed

6
00:00:17,269 --> 00:00:15,240
our whole idea of memory

7
00:00:18,769 --> 00:00:17,279
this episode we talk about a

8
00:00:21,529 --> 00:00:18,779
groundbreaking intervention for

9
00:00:24,410 --> 00:00:21,539
treatment resistant PTSD panic disorders

10
00:00:26,330 --> 00:00:24,420
and fear in general merrell-kindit is a

11
00:00:28,370 --> 00:00:26,340
professor of Clinical Psychology and a

12
00:00:29,990 --> 00:00:28,380
pioneer of research in fear Extinction

13
00:00:31,790 --> 00:00:30,000

when I heard about this research I was

14

00:00:33,590 --> 00:00:31,800

flabbergasted that it wasn't getting

15

00:00:35,330 --> 00:00:33,600

anywhere near the press that I thought

16

00:00:37,069 --> 00:00:35,340

it should this by the way is an

17

00:00:39,110 --> 00:00:37,079

unreleased episode from approximately

18

00:00:40,670 --> 00:00:39,120

two years ago near the beginning of the

19

00:00:43,310 --> 00:00:40,680

theories of everything podcast with

20

00:00:45,470 --> 00:00:43,320

Merrell kindett forgive my nasincy as a

21

00:00:47,569 --> 00:00:45,480

podcaster as I've changed substantially

22

00:00:49,850 --> 00:00:47,579

and hopefully substantively in various

23

00:00:52,250 --> 00:00:49,860

ways since then most of them hopefully

24

00:00:54,590 --> 00:00:52,260

again positive enjoy

25

00:00:56,450 --> 00:00:54,600

we're here with Merrell Kent of the

26

00:00:58,549 --> 00:00:56,460

University of Amsterdam and she is a

27

00:00:59,869 --> 00:00:58,559

professor in fear Extinction if I'm not

28

00:01:02,330 --> 00:00:59,879

mistaken or at least that's what she

29

00:01:03,830 --> 00:01:02,340

studies so Professor can you give us an

30

00:01:05,570 --> 00:01:03,840

overview of your fear Extinction

31

00:01:08,390 --> 00:01:05,580

research

32

00:01:11,330 --> 00:01:08,400

yeah this is uh this is a long story so

33

00:01:14,390 --> 00:01:11,340

I don't know uh yeah how much time you

34

00:01:15,710 --> 00:01:14,400

have but uh I think I have to give you a

35

00:01:18,170 --> 00:01:15,720

bit of a background information

36

00:01:21,770 --> 00:01:18,180

otherwise it's really difficult to to

37

00:01:24,530 --> 00:01:21,780

understand uh the research program and

38

00:01:26,929 --> 00:01:24,540

and why we changed actually uh our

39

00:01:29,510 --> 00:01:26,939

approach from the traditional

40

00:01:33,890 --> 00:01:29,520

um approach that is taken to to tackle

41

00:01:35,690 --> 00:01:33,900

uh irrational fears for fair uh and

42

00:01:37,249 --> 00:01:35,700

anxiety disorders and also post

43

00:01:40,249 --> 00:01:37,259

traumatic stress disorder cognitive

44

00:01:42,770 --> 00:01:40,259

behavioral therapy is the most effective

45

00:01:45,230 --> 00:01:42,780

treatment and even though it is

46

00:01:47,210 --> 00:01:45,240

effective there are also many patients

47

00:01:51,770 --> 00:01:47,220

that do not profit from the treatment

48

00:01:53,810 --> 00:01:51,780

but the yeah the

49

00:01:56,510 --> 00:01:53,820

what is really a problem is the high

50

00:01:58,730 --> 00:01:56,520

relapse rate so even after successful

51
00:02:02,090 --> 00:01:58,740
treatment there are many patients that

52
00:02:03,410 --> 00:02:02,100
yeah show a relapse

53
00:02:06,530 --> 00:02:03,420
and

54
00:02:08,830 --> 00:02:06,540
um yeah this this idea of relapse after

55
00:02:11,410 --> 00:02:08,840
cognitive behavioral treatment can be

56
00:02:14,630 --> 00:02:11,420
understood by

57
00:02:18,350 --> 00:02:14,640
behavioral Neuroscience research

58
00:02:21,410 --> 00:02:18,360
so I will briefly explain that so to

59
00:02:23,930 --> 00:02:21,420
understand the mechanisms of change and

60
00:02:27,290 --> 00:02:23,940
also cognitive behavior therapy we use

61
00:02:29,630 --> 00:02:27,300
the fear conditioning Paradigm this is

62
00:02:33,170 --> 00:02:29,640
laboratory research that can be done in

63
00:02:35,330 --> 00:02:33,180

rodents but also in humans so please

64

00:02:37,550 --> 00:02:35,340

interrupt me if you don't understand me

65

00:02:39,350 --> 00:02:37,560

so cognitive behavioral therapy as far

66

00:02:41,330 --> 00:02:39,360

as I know is something like you're

67

00:02:43,970 --> 00:02:41,340

afraid of a stimulus let's let's say

68

00:02:45,770 --> 00:02:43,980

it's rats or mice then you have

69

00:02:47,690 --> 00:02:45,780

Progressive exposure over the course of

70

00:02:49,190 --> 00:02:47,700

weeks maybe even months so that is how

71

00:02:50,869 --> 00:02:49,200

far can you go to a rat can you go nine

72

00:02:52,070 --> 00:02:50,879

meters and then they're like that's

73

00:02:54,830 --> 00:02:52,080

that's the most they're like we how

74

00:02:56,690 --> 00:02:54,840

about 8.5 like ah okay great great job

75

00:02:58,369 --> 00:02:56,700

great job next day it's like can you do

76

00:03:00,530 --> 00:02:58,379

eight meters instead of 8.5 they're like

77

00:03:03,290 --> 00:03:00,540

okay and then and then some and that

78

00:03:06,050 --> 00:03:03,300

takes weeks and weeks and weeks

79

00:03:07,610 --> 00:03:06,060

and what you're saying is there are a

80

00:03:09,110 --> 00:03:07,620

couple downsides to this cognitive the

81

00:03:11,630 --> 00:03:09,120

traditional cognitive behavioral therapy

82

00:03:14,630 --> 00:03:11,640

one is that the long amount of time it

83

00:03:16,190 --> 00:03:14,640

takes and then two is that even when

84

00:03:18,110 --> 00:03:16,200

you're supposedly cured something

85

00:03:20,270 --> 00:03:18,120

traumatic can happen again that can

86

00:03:21,890 --> 00:03:20,280

trigger you back to being at Baseline

87

00:03:24,949 --> 00:03:21,900

Baseline fear level where you were

88

00:03:27,290 --> 00:03:24,959

before okay so uh this was very well

89

00:03:29,809 --> 00:03:27,300

explained and the so the idea is that we

90

00:03:32,930 --> 00:03:29,819

know from so we have an experimental

91

00:03:34,550 --> 00:03:32,940

um uh model to understand

92

00:03:37,070 --> 00:03:34,560

um exposure treatment or cognitive

93

00:03:39,890 --> 00:03:37,080

behavior treatment and and this is so we

94

00:03:42,530 --> 00:03:39,900

can learn for instance uh rats

95

00:03:44,089 --> 00:03:42,540

um by presenting a neutral stimulus a

96

00:03:46,369 --> 00:03:44,099

tone which is followed by painful

97

00:03:49,430 --> 00:03:46,379

stimulus or shock and then after a

98

00:03:51,289 --> 00:03:49,440

couple of learning trials they so they

99

00:03:54,410 --> 00:03:51,299

if we only present them the new

100

00:03:57,710 --> 00:03:54,420

originally neutral troll they react with

101
00:03:59,390 --> 00:03:57,720
a freezing response so that means that a

102
00:04:01,729 --> 00:03:59,400
what we call a fear memory has been

103
00:04:04,210 --> 00:04:01,739
formed which is an association between

104
00:04:07,430 --> 00:04:04,220
the originally neutral stimulus the tone

105
00:04:09,710 --> 00:04:07,440
and the shock and that when they are

106
00:04:12,110 --> 00:04:09,720
only presented to the tone they respond

107
00:04:14,270 --> 00:04:12,120
as if they are also presented they

108
00:04:16,449 --> 00:04:14,280
expect also to be presented to a shock

109
00:04:19,610 --> 00:04:16,459
even though they are not

110
00:04:21,890 --> 00:04:19,620
exposed to a shock anymore

111
00:04:25,550 --> 00:04:21,900
and then you can also extinguish the

112
00:04:28,850 --> 00:04:25,560
fear by repeatedly exposing them to the

113
00:04:31,129 --> 00:04:28,860

tone without a shock and then after many

114

00:04:34,129 --> 00:04:31,139

many tries you see a gradual decline of

115

00:04:37,129 --> 00:04:34,139

fear but then if you just wait a couple

116

00:04:41,030 --> 00:04:37,139

of weeks or you change the context then

117

00:04:43,790 --> 00:04:41,040

it's very easy to trigger the fear

118

00:04:46,370 --> 00:04:43,800

response again so you see very easily a

119

00:04:49,670 --> 00:04:46,380

return of fear and we know from the

120

00:04:51,409 --> 00:04:49,680

animal uh research that this can be

121

00:04:55,629 --> 00:04:51,419

explained that Extinction learning even

122

00:04:59,150 --> 00:04:55,639

though is a very effective procedure to

123

00:05:01,490 --> 00:04:59,160

reduce the Learned Fear response it does

124

00:05:03,950 --> 00:05:01,500

not erase the original fear memory so

125

00:05:06,650 --> 00:05:03,960

the fear Memory Remains intact and the

126
00:05:08,930 --> 00:05:06,660
new sort of Extinction memory is formed

127
00:05:11,030 --> 00:05:08,940
that competes for Behavioral control

128
00:05:13,030 --> 00:05:11,040
with the original fear memory but the

129
00:05:16,850 --> 00:05:13,040
original fear memory is extremely strong

130
00:05:19,010 --> 00:05:16,860
and very often winds from the extinction

131
00:05:23,510 --> 00:05:19,020
memory and that this explains actually

132
00:05:26,689 --> 00:05:23,520
the return of fear so until the

133
00:05:29,029 --> 00:05:26,699
um yeah around the world two thousand or

134
00:05:32,150 --> 00:05:29,039
so it was a sort of accepted few that we

135
00:05:33,890 --> 00:05:32,160
can never change the fear memory and the

136
00:05:36,650 --> 00:05:33,900
best thing that we can do is actually

137
00:05:40,550 --> 00:05:36,660
forming a new Extinction memory and all

138
00:05:42,469 --> 00:05:40,560

the new approaches that tries to improve

139

00:05:43,390 --> 00:05:42,479

the cognitive behavior treatment was

140

00:05:47,210 --> 00:05:43,400

actually

141

00:05:50,450 --> 00:05:47,220

aimed to strengthen or enhance the

142

00:05:51,950 --> 00:05:50,460

extinction memory so after my PhD at the

143

00:05:54,170 --> 00:05:51,960

University of Amsterdam I moved to

144

00:05:56,210 --> 00:05:54,180

Maastricht University and that also my

145

00:05:58,129 --> 00:05:56,220

clinical training so I saw many patients

146

00:06:00,890 --> 00:05:58,139

with fear and phobias and post-traumatic

147

00:06:02,150 --> 00:06:00,900

stress disorder I was well known with

148

00:06:05,629 --> 00:06:02,160

the literature also with the

149

00:06:07,370 --> 00:06:05,639

Neuroscience literature and I was sort

150

00:06:10,370 --> 00:06:07,380

of for a year thinking well how can we

151

00:06:13,249 --> 00:06:10,380

somehow mislead our brain and sort of

152

00:06:16,909 --> 00:06:13,259

weaken the fear memory itself would that

153

00:06:20,689 --> 00:06:16,919

be possible and then I discovered early

154

00:06:22,490 --> 00:06:20,699

I think in 2002 or three three indeed

155

00:06:24,409 --> 00:06:22,500

because that was the year that the paper

156

00:06:28,730 --> 00:06:24,419

of Grenada appeared

157

00:06:31,850 --> 00:06:28,740

the paper by Cream Nader showing that it

158

00:06:34,010 --> 00:06:31,860

might be possible to change the

159

00:06:36,350 --> 00:06:34,020

underlying or to weaken the underlying

160

00:06:40,070 --> 00:06:36,360

fear memory

161

00:06:43,850 --> 00:06:40,080

and so what they did in in rodents they

162

00:06:45,770 --> 00:06:43,860

first learned this um fear are

163

00:06:48,529 --> 00:06:45,780

presenting the rodents with a tone and a

164

00:06:50,629 --> 00:06:48,539

shock and then testing them a couple of

165

00:06:53,450 --> 00:06:50,639

days later you see an expression of the

166

00:06:56,029 --> 00:06:53,460

fear memory by freezing a response if

167

00:06:57,890 --> 00:06:56,039

they are only presented to the tone and

168

00:07:01,129 --> 00:06:57,900

what they did is instead of an

169

00:07:03,590 --> 00:07:01,139

Extinction procedure they reactivated

170

00:07:06,650 --> 00:07:03,600

the fear memory

171

00:07:09,890 --> 00:07:06,660

by presenting them to a single tone and

172

00:07:12,010 --> 00:07:09,900

then injected the animals with a protein

173

00:07:15,469 --> 00:07:12,020

synthesis inhibitor

174

00:07:18,469 --> 00:07:15,479

anisomycin a very toxic drug

175

00:07:20,990 --> 00:07:18,479

which you cannot use in humans but they

176

00:07:23,749 --> 00:07:21,000

did so in in the rodents

177

00:07:25,850 --> 00:07:23,759

and then if they tested the animals a

178

00:07:27,409 --> 00:07:25,860

couple of hours later there was still a

179

00:07:30,290 --> 00:07:27,419

very strong expression of the fair

180

00:07:33,290 --> 00:07:30,300

memory but then 24 hours later

181

00:07:35,330 --> 00:07:33,300

the fear was almost gone as if there was

182

00:07:36,290 --> 00:07:35,340

no longer an expression of the fear

183

00:07:39,770 --> 00:07:36,300

memory

184

00:07:42,110 --> 00:07:39,780

yeah this was really sort of this change

185

00:07:44,870 --> 00:07:42,120

terrible idea of memory because until

186

00:07:46,430 --> 00:07:44,880

then we thought that after memory is

187

00:07:50,270 --> 00:07:46,440

consolidated

188

00:07:53,510 --> 00:07:50,280

so maybe can dive a little bit into the

189

00:07:56,330 --> 00:07:53,520

basics of Neuroscience on on memory so

190

00:07:58,909 --> 00:07:56,340

if if organisms learn something and you

191

00:08:00,830 --> 00:07:58,919

test them for instance within an hour we

192

00:08:02,870 --> 00:08:00,840

speak of short-term memory so if they

193

00:08:04,189 --> 00:08:02,880

have learned a memorized but they well

194

00:08:06,529 --> 00:08:04,199

if there's memory of what they learn

195

00:08:08,930 --> 00:08:06,539

there's a short-term memory and in order

196

00:08:12,469 --> 00:08:08,940

to transfer the short-term memory into a

197

00:08:13,550 --> 00:08:12,479

long-term memory uh protein synthesis is

198

00:08:16,010 --> 00:08:13,560

necessary

199

00:08:19,249 --> 00:08:16,020

and if you block the protein synthesis

200

00:08:21,830 --> 00:08:19,259

there is it is not possible to form a

201
00:08:24,950 --> 00:08:21,840
long-term memory so then if you test the

202
00:08:27,290 --> 00:08:24,960
animals for instance 24 hours later you

203
00:08:30,650 --> 00:08:27,300
don't see any expression anymore

204
00:08:34,690 --> 00:08:30,660
but the sort of accepted few or dominant

205
00:08:38,510 --> 00:08:34,700
few in um memory literature was that

206
00:08:41,110 --> 00:08:38,520
after memory has been Consolidated we

207
00:08:43,850 --> 00:08:41,120
cannot change the original memory trade

208
00:08:46,310 --> 00:08:43,860
Trace so the only way to change our

209
00:08:49,310 --> 00:08:46,320
memory is by forming new memory traces

210
00:08:53,269 --> 00:08:49,320
that interfere with the original memory

211
00:08:56,290 --> 00:08:53,279
Trace so this seminal study by crem

212
00:09:00,829 --> 00:08:56,300
Nader showed that it may be possible

213
00:09:03,470 --> 00:09:00,839

even after memory consolidation to

214

00:09:07,009 --> 00:09:03,480

change the original memory trace and

215

00:09:09,670 --> 00:09:07,019

that if you reactivate memory that the

216

00:09:13,250 --> 00:09:09,680

receiving of the memory requires again

217

00:09:13,990 --> 00:09:13,260

protein synthesis and this means that if

218

00:09:16,850 --> 00:09:14,000

you

219

00:09:18,650 --> 00:09:16,860

interfere with these processes with the

220

00:09:21,650 --> 00:09:18,660

protein synthesis

221

00:09:23,509 --> 00:09:21,660

required for the rewriting of the

222

00:09:27,290 --> 00:09:23,519

previously formed memory

223

00:09:29,750 --> 00:09:27,300

then we may be able to change

224

00:09:31,670 --> 00:09:29,760

fear memory itself

225

00:09:34,190 --> 00:09:31,680

right and just to interrupt if I'm

226

00:09:35,990 --> 00:09:34,200

understanding correctly you make a mouse

227

00:09:37,730 --> 00:09:36,000

or rat or whatever it is extremely

228

00:09:39,949 --> 00:09:37,740

afraid of some stimulus let's call it a

229

00:09:42,110 --> 00:09:39,959

tone in this case then you can make it

230

00:09:44,210 --> 00:09:42,120

afraid Again by repeating the stimulus

231

00:09:45,769 --> 00:09:44,220

and afterwards you inject it with a

232

00:09:47,090 --> 00:09:45,779

neurotoxic I believe it's just toxic in

233

00:09:49,070 --> 00:09:47,100

general but I don't know neurotoxic

234

00:09:51,050 --> 00:09:49,080

chemical at least that prevents this

235

00:09:52,790 --> 00:09:51,060

protein from synthesizing or inhibits

236

00:09:55,430 --> 00:09:52,800

this protein in some way the one that

237

00:09:57,290 --> 00:09:55,440

would entrench this memory and then it

238

00:09:59,030 --> 00:09:57,300

would eliminate the fear response

239

00:10:02,750 --> 00:09:59,040

because that memory is no longer being

240

00:10:04,970 --> 00:10:02,760

fortified is that correct yeah almost so

241

00:10:07,009 --> 00:10:04,980

what happens is if you and I come come

242

00:10:09,949 --> 00:10:07,019

later to that because it really depends

243

00:10:13,490 --> 00:10:09,959

on very specific circumstances whether

244

00:10:15,590 --> 00:10:13,500

the memory Trace is stabilized so if you

245

00:10:18,290 --> 00:10:15,600

retrieve a memory it's not always the

246

00:10:21,410 --> 00:10:18,300

case that the memory Trace is becomes in

247

00:10:25,370 --> 00:10:21,420

a sort of label or destabilized face but

248

00:10:27,430 --> 00:10:25,380

if so then after destabilization it

249

00:10:29,150 --> 00:10:27,440

requires protein synthesis to be

250

00:10:32,509 --> 00:10:29,160

re-stabilized again

251
00:10:34,730 --> 00:10:32,519
and normally that is what happens so

252
00:10:38,930 --> 00:10:34,740
memory reconsolidation is a way of

253
00:10:40,310 --> 00:10:38,940
updating the memory so if the memory

254
00:10:45,829 --> 00:10:40,320
should

255
00:10:48,470 --> 00:10:45,839
environment does not change but if the

256
00:10:50,449 --> 00:10:48,480
environment changes the memory should be

257
00:10:52,190 --> 00:10:50,459
changed a bit because while the whole

258
00:10:54,050 --> 00:10:52,200
idea of memory is that it is a sort of

259
00:10:57,050 --> 00:10:54,060
well it makes us very adaptive because

260
00:11:00,889 --> 00:10:57,060
it helps us to to better respond to the

261
00:11:02,569 --> 00:11:00,899
environment so if the environment does

262
00:11:04,790 --> 00:11:02,579
not change the memory or should also not

263
00:11:06,769 --> 00:11:04,800

change if it changes then the memory can

264

00:11:08,769 --> 00:11:06,779

either be changed by forming new memory

265

00:11:12,290 --> 00:11:08,779

traces or by

266

00:11:13,670 --> 00:11:12,300

updating the original memory Trace so

267

00:11:15,530 --> 00:11:13,680

would you please elaborate a little bit

268

00:11:18,110 --> 00:11:15,540

on how you arrived at the idea that

269

00:11:20,210 --> 00:11:18,120

taking these better occurs after the

270

00:11:23,150 --> 00:11:20,220

exposure stimulus is what's efficacious

271

00:11:25,550 --> 00:11:23,160

as opposed to before so after reading

272

00:11:28,310 --> 00:11:25,560

this seminal study by crem Nader that

273

00:11:30,050 --> 00:11:28,320

appeared in 2000 so at the turn of the

274

00:11:33,110 --> 00:11:30,060

century I became really thrilled because

275

00:11:35,690 --> 00:11:33,120

I thought if we can translate this

276

00:11:38,509 --> 00:11:35,700

finding to the human field this might

277

00:11:40,430 --> 00:11:38,519

sort of implicate that we really can

278

00:11:42,889 --> 00:11:40,440

sort of treat people with irrational

279

00:11:44,750 --> 00:11:42,899

fears and anxiety disorders and maybe

280

00:11:48,170 --> 00:11:44,760

also responsible success disorder which

281

00:11:50,690 --> 00:11:48,180

are much more effective intervention and

282

00:11:53,630 --> 00:11:50,700

this could be a solution for the higher

283

00:11:55,970 --> 00:11:53,640

relapse rate but the anisomycin protein

284

00:11:59,449 --> 00:11:55,980

synthesis can clearly not be used in

285

00:12:01,310 --> 00:11:59,459

humans this is very toxic and also what

286

00:12:03,949 --> 00:12:01,320

we can do is

287

00:12:06,769 --> 00:12:03,959

uh inject the drug directly into the

288

00:12:08,569 --> 00:12:06,779

brain into the amygdala the the the the

289

00:12:10,030 --> 00:12:08,579

fear center of the brain and that is

290

00:12:15,290 --> 00:12:10,040

what for instance

291

00:12:18,350 --> 00:12:15,300

also many other uh animal researches but

292

00:12:20,870 --> 00:12:18,360

uh in 2004 and also

293

00:12:25,430 --> 00:12:20,880

um a little bit before that year there

294

00:12:28,490 --> 00:12:25,440

were a couple of studies testing uh the

295

00:12:30,889 --> 00:12:28,500

same ID but then with propranolol the

296

00:12:33,410 --> 00:12:30,899

noradrenotic beta blocker so we only

297

00:12:35,930 --> 00:12:33,420

give 40 milligrams and only once it's

298

00:12:39,710 --> 00:12:35,940

not very clearly not very toxic for

299

00:12:42,530 --> 00:12:39,720

humans in our first study we gave

300

00:12:45,230 --> 00:12:42,540

Propranolol actually before the memory

301
00:12:47,690 --> 00:12:45,240
reactivation and not to dampen the fear

302
00:12:50,329 --> 00:12:47,700
response but we reasoned that if you

303
00:12:52,370 --> 00:12:50,339
reactivate a fair memory then the

304
00:12:54,050 --> 00:12:52,380
processes of memory destabilization and

305
00:12:56,329 --> 00:12:54,060
re-stabilization probably start

306
00:12:58,970 --> 00:12:56,339
immediately following the memory

307
00:13:02,389 --> 00:12:58,980
retrieval and it takes between one and

308
00:13:04,310 --> 00:13:02,399
two hours before propranolol has passed

309
00:13:05,990 --> 00:13:04,320
the blood brain barrier and reaches a

310
00:13:09,889 --> 00:13:06,000
peak level so we thought if we give it

311
00:13:12,050 --> 00:13:09,899
afterwards we may miss the window

312
00:13:14,269 --> 00:13:12,060
but then of course if you give it before

313
00:13:16,069 --> 00:13:14,279

memory reactivation you never know

314

00:13:18,650 --> 00:13:16,079

whether it somehow interferes with the

315

00:13:20,690 --> 00:13:18,660

retrieval so that was why in later

316

00:13:22,970 --> 00:13:20,700

studies so it worked very well and then

317

00:13:25,670 --> 00:13:22,980

in later studies we always now give it

318

00:13:27,050 --> 00:13:25,680

after the memory reactivation but we

319

00:13:30,050 --> 00:13:27,060

don't use it

320

00:13:33,110 --> 00:13:30,060

to dampen the fear response but nor

321

00:13:35,750 --> 00:13:33,120

adrenaline as a neurotransmitter is

322

00:13:37,610 --> 00:13:35,760

indirectly involved in the protein

323

00:13:39,769 --> 00:13:37,620

synthesis necessary for memory

324

00:13:41,569 --> 00:13:39,779

consolidation and also for memory

325

00:13:44,030 --> 00:13:41,579

reconsolidation

326

00:13:46,550 --> 00:13:44,040

so this is the reason why we can also

327

00:13:47,930 --> 00:13:46,560

work with Propranolol instead of working

328

00:13:50,030 --> 00:13:47,940

with protein

329

00:13:52,190 --> 00:13:50,040

synthesis blockers

330

00:13:54,470 --> 00:13:52,200

would you say then that the difference

331

00:13:56,930 --> 00:13:54,480

between your approach and cognitive

332

00:13:58,790 --> 00:13:56,940

behavioral therapy is the focus on the

333

00:14:01,670 --> 00:13:58,800

recollection of memory and the

334

00:14:04,670 --> 00:14:01,680

destruction of the initial fear memory

335

00:14:07,190 --> 00:14:04,680

as opposed to trying to build barrier

336

00:14:10,250 --> 00:14:07,200

memories that would inhibit that

337

00:14:12,610 --> 00:14:10,260

original fear response yeah indeed the

338

00:14:15,590 --> 00:14:12,620

difference is that instead of

339

00:14:17,990 --> 00:14:15,600

building new memories or trying to

340

00:14:20,750 --> 00:14:18,000

control and be emotional memory and

341

00:14:24,410 --> 00:14:20,760

emotional responses we try to

342

00:14:26,629 --> 00:14:24,420

to yeah mitigate the uh the root of the

343

00:14:29,329 --> 00:14:26,639

disorder so to weaken the fear memory

344

00:14:32,690 --> 00:14:29,339

itself procedurally it's also very

345

00:14:34,430 --> 00:14:32,700

different because exposure treatment

346

00:14:37,009 --> 00:14:34,440

yeah the idea is that it actually

347

00:14:40,310 --> 00:14:37,019

targets more the cognitive processes so

348

00:14:42,430 --> 00:14:40,320

the expectancies it's a it's a longer

349

00:14:44,590 --> 00:14:42,440

process so by re

350

00:14:46,790 --> 00:14:44,600

beatingly people

351

00:14:50,750 --> 00:14:46,800

exposing to the feared queue they

352

00:14:55,069 --> 00:14:50,760

gradually learn that uh what they fear

353

00:14:58,069 --> 00:14:55,079

is is irrational whereas we expose our

354

00:15:00,710 --> 00:14:58,079

um participants only very briefly

355

00:15:04,310 --> 00:15:00,720

between two and five minutes to the

356

00:15:07,490 --> 00:15:04,320

third queue so we don't

357

00:15:09,590 --> 00:15:07,500

targets the cognitive system and what is

358

00:15:13,310 --> 00:15:09,600

interesting what we see is first we see

359

00:15:18,350 --> 00:15:13,320

a behavior change so we so we reduce the

360

00:15:21,530 --> 00:15:18,360

defensive reflex or in phobics we change

361

00:15:23,329 --> 00:15:21,540

the avoidance behavior and when I say

362

00:15:25,430 --> 00:15:23,339

first you see the change are you talking

363

00:15:26,509 --> 00:15:25,440

about after you give the beta blocker

364

00:15:27,650 --> 00:15:26,519

and then you wait 20 minutes they're

365

00:15:30,230 --> 00:15:27,660

talking about that and then for the next

366

00:15:33,590 --> 00:15:30,240

day we actually we found and we

367

00:15:36,590 --> 00:15:33,600

published that paper in 2018 and when

368

00:15:39,350 --> 00:15:36,600

you test them 12 hours later on the same

369

00:15:41,329 --> 00:15:39,360

day you still see them same fear

370

00:15:42,110 --> 00:15:41,339

expression but only after a night of

371

00:15:45,650 --> 00:15:42,120

sleep

372

00:15:48,530 --> 00:15:45,660

uh we see the sudden very abrupt

373

00:15:50,569 --> 00:15:48,540

reduction of fear so instead of the

374

00:15:55,850 --> 00:15:50,579

gradual decline of the fear response

375

00:15:58,069 --> 00:15:55,860

it's delayed So after 24 hours but very

376

00:16:00,650 --> 00:15:58,079

um abrupt and that

377

00:16:04,189 --> 00:16:00,660

especially when when

378

00:16:06,769 --> 00:16:04,199

I treat uh patients and and it is a

379

00:16:10,189 --> 00:16:06,779

successful treatment it's every time

380

00:16:13,129 --> 00:16:10,199

feels like magic because

381

00:16:14,750 --> 00:16:13,139

yeah normally you see a sort of you are

382

00:16:18,110 --> 00:16:14,760

there when you see sort of gradual

383

00:16:20,930 --> 00:16:18,120

change in behavior and now first you see

384

00:16:23,689 --> 00:16:20,940

during the exposure that people are

385

00:16:27,290 --> 00:16:23,699

really as an intense fear response are

386

00:16:30,230 --> 00:16:27,300

sometimes crying and and panicking and

387

00:16:32,629 --> 00:16:30,240

then if they come back 24 hours later

388

00:16:34,810 --> 00:16:32,639

they are able to it's not that they

389

00:16:38,329 --> 00:16:34,820

entirely relaxed

390

00:16:40,310 --> 00:16:38,339

uh but yeah there's such a huge

391

00:16:43,810 --> 00:16:40,320

difference so that

392

00:16:46,610 --> 00:16:43,820

really feels like uh it cannot be true

393

00:16:48,650 --> 00:16:46,620

I'm curious you had mentioned the

394

00:16:51,889 --> 00:16:48,660

relationship between protein synthesis

395

00:16:54,350 --> 00:16:51,899

and fear it is known that for protein

396

00:16:57,530 --> 00:16:54,360

synthesis that this is deeply tied with

397

00:17:00,050 --> 00:16:57,540

our genetics the sort of manuscript for

398

00:17:02,990 --> 00:17:00,060

the creation of all of our proteins do

399

00:17:06,650 --> 00:17:03,000

you think it is for this reason that

400

00:17:09,110 --> 00:17:06,660

one finds that in epigenetics that there

401
00:17:11,150 --> 00:17:09,120
are inherited fears does that have a

402
00:17:14,210 --> 00:17:11,160
connection to your research

403
00:17:16,610 --> 00:17:14,220
yeah no I I'm what do you mean with

404
00:17:18,710 --> 00:17:16,620
inherited fears because I'm a bit I mean

405
00:17:20,929 --> 00:17:18,720
that was also one of the questions that

406
00:17:23,150 --> 00:17:20,939
the fear of snakes I mean the fears that

407
00:17:26,689 --> 00:17:23,160
we treat is of is are the irrational

408
00:17:29,150 --> 00:17:26,699
fears so not I mean

409
00:17:31,130 --> 00:17:29,160
of course I mean snakes can be dangerous

410
00:17:33,530 --> 00:17:31,140
but there's no reason to be really

411
00:17:36,830 --> 00:17:33,540
phobic in a sense that you

412
00:17:38,930 --> 00:17:36,840
that people avoid several places because

413
00:17:41,510 --> 00:17:38,940

there could be a snake whereas there is

414

00:17:43,970 --> 00:17:41,520

no snake or so that is the kind of fear

415

00:17:47,930 --> 00:17:43,980

that we treat

416

00:17:50,930 --> 00:17:47,940

um there was an article uh published on

417

00:17:52,730 --> 00:17:50,940

it was an epigenetic study where they l

418

00:17:56,049 --> 00:17:52,740

believe they

419

00:17:59,270 --> 00:17:56,059

induced a fear of response

420

00:18:03,710 --> 00:17:59,280

to rodents at the sound of a bell

421

00:18:05,810 --> 00:18:03,720

and they made a very visceral pain for

422

00:18:10,010 --> 00:18:05,820

the rodents at the sound of that Bell

423

00:18:12,590 --> 00:18:10,020

they then allowed the rodents to uh have

424

00:18:14,770 --> 00:18:12,600

their next generation of Offspring and

425

00:18:17,289 --> 00:18:14,780

then gave them the sound of that Bell

426

00:18:20,390 --> 00:18:17,299

apparently the rodents were afraid

427

00:18:22,850 --> 00:18:20,400

although never hearing the Bell before

428

00:18:25,130 --> 00:18:22,860

or feeling tortured at this hearing of

429

00:18:25,850 --> 00:18:25,140

the Bell were afraid at the sound of the

430

00:18:29,750 --> 00:18:25,860

Bell

431

00:18:32,810 --> 00:18:29,760

for what is even more amazing is that

432

00:18:36,470 --> 00:18:32,820

the generation after the grandchildren

433

00:18:40,010 --> 00:18:36,480

they then gave the sound of the bell and

434

00:18:43,669 --> 00:18:40,020

had these rodents afraid so I'm curious

435

00:18:46,730 --> 00:18:43,679

if this link of fear this is inheritance

436

00:18:50,810 --> 00:18:46,740

of fear has something to do with uh

437

00:18:53,270 --> 00:18:50,820

epigenetic mechanisms on DNA considering

438

00:18:55,130 --> 00:18:53,280

that you were speaking of protein the

439

00:18:59,950 --> 00:18:55,140

relation between protein and synthesis

440

00:19:05,210 --> 00:19:02,870

I'm very curious to to read do you

441

00:19:08,450 --> 00:19:05,220

remember the authors of the paper

442

00:19:10,909 --> 00:19:08,460

I can find it and send it yeah please I

443

00:19:14,029 --> 00:19:10,919

don't know but somehow as if there is um

444

00:19:19,010 --> 00:19:14,039

indeed a memory of the fear that is

445

00:19:24,470 --> 00:19:22,610

by the way does this only work on fear

446

00:19:25,970 --> 00:19:24,480

memories like post-traumatic stress

447

00:19:27,289 --> 00:19:25,980

disorder or can it work on people who

448

00:19:28,549 --> 00:19:27,299

have innate fears like we were

449

00:19:30,049 --> 00:19:28,559

mentioning before some people are afraid

450

00:19:33,890 --> 00:19:30,059

of snakes innately some people are

451
00:19:35,630 --> 00:19:33,900
afraid of blood that's more discussed no

452
00:19:37,610 --> 00:19:35,640
yeah well we tested that because in a

453
00:19:40,669 --> 00:19:37,620
few conditioning procedure so what we do

454
00:19:41,330 --> 00:19:40,679
is uh we work with pictures and

455
00:19:45,350 --> 00:19:41,340
um

456
00:19:48,590 --> 00:19:45,360
an electric uh stimulus administered to

457
00:19:50,990 --> 00:19:48,600
the wrist so painful stimulus so we also

458
00:19:54,770 --> 00:19:51,000
use the fair conditioning model in the

459
00:19:58,250 --> 00:19:54,780
laboratory and and an innate fear is not

460
00:20:00,110 --> 00:19:58,260
the fear but we go to the to the Learned

461
00:20:02,510 --> 00:20:00,120
stimulus or the picture followed by the

462
00:20:03,890 --> 00:20:02,520
shock but actually the response to the

463
00:20:06,110 --> 00:20:03,900

shock itself

464

00:20:10,250 --> 00:20:06,120

and that didn't change so it's not that

465

00:20:13,130 --> 00:20:10,260

we in that sense dampen the that is what

466

00:20:16,310 --> 00:20:13,140

what you could expect if you dampen your

467

00:20:18,470 --> 00:20:16,320

whole fear system that people or or

468

00:20:21,650 --> 00:20:18,480

animals don't respond anymore to

469

00:20:26,210 --> 00:20:21,660

intrinsically uh threatening stimuli

470

00:20:27,890 --> 00:20:26,220

like pain or or a threatening animal and

471

00:20:32,029 --> 00:20:27,900

that's that this is not what happens

472

00:20:33,950 --> 00:20:32,039

it's really to the Learned fears

473

00:20:35,690 --> 00:20:33,960

and you mentioned that what's required

474

00:20:37,610 --> 00:20:35,700

is a night's rest

475

00:20:40,370 --> 00:20:37,620

in order for your for your treatment to

476
00:20:41,690 --> 00:20:40,380
be effective have you measured the

477
00:20:44,390 --> 00:20:41,700
quality of someone's sleep to the

478
00:20:46,310 --> 00:20:44,400
extinction of the fear this is what we

479
00:20:48,770 --> 00:20:46,320
are currently testing but unfortunately

480
00:20:51,289 --> 00:20:48,780
the the study we had to stop with the

481
00:20:54,169 --> 00:20:51,299
data collection due to covid-19 so

482
00:20:57,110 --> 00:20:54,179
hopefully we can proceed with our study

483
00:21:00,350 --> 00:20:57,120
after the summer but so this is so what

484
00:21:03,529 --> 00:21:00,360
we did is we controlled for the 40 hours

485
00:21:05,750 --> 00:21:03,539
so because from the animal literature we

486
00:21:07,730 --> 00:21:05,760
learned that is that reconsolidation is

487
00:21:09,470 --> 00:21:07,740
time dependent

488
00:21:11,450 --> 00:21:09,480

um so we started first with a pilot

489

00:21:14,330 --> 00:21:11,460

study and then we discovered that yeah

490

00:21:16,789 --> 00:21:14,340

when you wait five or six hours it was

491

00:21:18,529 --> 00:21:16,799

still such a strong fear expression and

492

00:21:20,990 --> 00:21:18,539

we always you know our previous studies

493

00:21:25,850 --> 00:21:21,000

we always tested the next day

494

00:21:29,930 --> 00:21:25,860

for the effect and and it takes also

495

00:21:32,690 --> 00:21:29,940

um well propranol has um five hour half

496

00:21:34,730 --> 00:21:32,700

time failure so after 12 hours it's

497

00:21:36,649 --> 00:21:34,740

almost completely out of the body and

498

00:21:39,169 --> 00:21:36,659

especially the next day it's completely

499

00:21:41,270 --> 00:21:39,179

gone so then you are also sure that what

500

00:21:42,950 --> 00:21:41,280

you measure can no longer be a

501
00:21:44,270 --> 00:21:42,960
propranolol effect

502
00:21:45,770 --> 00:21:44,280
and

503
00:21:48,110 --> 00:21:45,780
um

504
00:21:51,169 --> 00:21:48,120
so we piloted first and tested five

505
00:21:53,870 --> 00:21:51,179
hours and then a certain moment I asked

506
00:21:55,970 --> 00:21:53,880
my poster maybe you could test also 12

507
00:21:57,770 --> 00:21:55,980
hours later on the same day and we still

508
00:22:00,110 --> 00:21:57,780
found such a strong fear response and

509
00:22:02,330 --> 00:22:00,120
then we decided to study where we either

510
00:22:04,730 --> 00:22:02,340
did a treatment in the morning tested

511
00:22:06,890 --> 00:22:04,740
them 12 hours later on the same day and

512
00:22:10,250 --> 00:22:06,900
then again the next day or we treated

513
00:22:12,049 --> 00:22:10,260

them in the evening just also waited 12

514

00:22:13,610 --> 00:22:12,059

hours but it was a night of sleep in

515

00:22:16,070 --> 00:22:13,620

between and then the next day and we

516

00:22:19,130 --> 00:22:16,080

really saw that it was not a time but a

517

00:22:21,230 --> 00:22:19,140

night of sleep but we did not register

518

00:22:23,510 --> 00:22:21,240

the Sleep Quality we don't know which

519

00:22:27,289 --> 00:22:23,520

phase of the sleep is important so these

520

00:22:30,350 --> 00:22:27,299

are yeah very interesting next steps we

521

00:22:34,029 --> 00:22:30,360

also tested uh the time we know during

522

00:22:35,570 --> 00:22:34,039

which we can actually give propranolol so

523

00:22:39,830 --> 00:22:35,580

uh

524

00:22:42,529 --> 00:22:39,840

after memory activation and it still

525

00:22:44,810 --> 00:22:42,539

works but two hours after memory

526

00:22:46,510 --> 00:22:44,820

retrieved then it's really too late so

527

00:22:49,430 --> 00:22:46,520

that also shows that there's a really

528

00:22:51,909 --> 00:22:49,440

specific time window that you can Target

529

00:22:55,130 --> 00:22:51,919

these processes and otherwise you are

530

00:22:57,850 --> 00:22:55,140

too late can fear Extinction work on

531

00:23:01,010 --> 00:22:57,860

relatively minor issues so for example

532

00:23:02,990 --> 00:23:01,020

if someone were to approach if someone

533

00:23:06,830 --> 00:23:03,000

were nervous speaking in front of others

534

00:23:10,010 --> 00:23:06,840

could they use this treatment to get rid

535

00:23:12,649 --> 00:23:10,020

of those minor fears social fears are in

536

00:23:16,070 --> 00:23:12,659

that sense not so easy because people we

537

00:23:19,070 --> 00:23:16,080

we did a study uh in people who have a

538

00:23:21,289 --> 00:23:19,080

fear of public speaking and that the

539

00:23:23,270 --> 00:23:21,299

treatment was not effective and the

540

00:23:26,330 --> 00:23:23,280

problem in research is done that you for

541

00:23:28,190 --> 00:23:26,340

instance work with a standard protocol

542

00:23:31,070 --> 00:23:28,200

that is already quite difficult for

543

00:23:33,549 --> 00:23:31,080

people who suffer from social fears

544

00:23:36,289 --> 00:23:33,559

because these fears are generally very

545

00:23:38,510 --> 00:23:36,299

idiosyncratic but especially with social

546

00:23:40,850 --> 00:23:38,520

Affairs people very often they their

547

00:23:43,669 --> 00:23:40,860

fears actually but other people think

548

00:23:46,730 --> 00:23:43,679

for instance and it is really hard to to

549

00:23:49,669 --> 00:23:46,740

expose people to that and our issue is

550

00:23:52,610 --> 00:23:49,679

that the threat

551
00:23:55,669 --> 00:23:52,620
or the anticipated catastrophe does not

552
00:23:58,669 --> 00:23:55,679
necessarily happen in a specific time

553
00:24:01,370 --> 00:23:58,679
window so if what people fear can happen

554
00:24:04,730 --> 00:24:01,380
for instance a year later then a

555
00:24:06,830 --> 00:24:04,740
treatment cannot be applied because it

556
00:24:08,570 --> 00:24:06,840
really should be in the moment that you

557
00:24:10,909 --> 00:24:08,580
trigger the memory and then something

558
00:24:12,049 --> 00:24:10,919
they can learn something from from their

559
00:24:14,750 --> 00:24:12,059
environment

560
00:24:16,909 --> 00:24:14,760
with respect to their fear and there are

561
00:24:19,970 --> 00:24:16,919
also many fears I mean when people are

562
00:24:22,430 --> 00:24:19,980
afraid of of dying very often that that

563
00:24:24,890 --> 00:24:22,440

this is not something that that the

564

00:24:27,350 --> 00:24:24,900

thing will happen in the near future but

565

00:24:29,270 --> 00:24:27,360

maybe in a year or so

566

00:24:31,909 --> 00:24:29,280

so for that kind of fear the treatment

567

00:24:34,549 --> 00:24:31,919

is not suitable

568

00:24:37,909 --> 00:24:34,559

are there other it seems to me that this

569

00:24:40,070 --> 00:24:37,919

is almost like a surgical knife yeah

570

00:24:42,770 --> 00:24:40,080

cognitively speaking that you are

571

00:24:45,230 --> 00:24:42,780

removing sectors of fear and of memory

572

00:24:48,049 --> 00:24:45,240

and the more clean-cut and defined those

573

00:24:51,169 --> 00:24:48,059

fears are the better they can be removed

574

00:24:53,750 --> 00:24:51,179

are there other complicating factors in

575

00:24:55,070 --> 00:24:53,760

this mental surgery

576

00:25:01,190 --> 00:24:55,080

yeah

577

00:25:03,830 --> 00:25:01,200

in a paper kind of sort of as a matter

578

00:25:05,890 --> 00:25:03,840

for a neurosurgery or so and it's in

579

00:25:09,590 --> 00:25:05,900

that sounds very different from uh

580

00:25:11,990 --> 00:25:09,600

Psychotherapy uh yeah it is even one of

581

00:25:13,310 --> 00:25:12,000

your I think last questions

582

00:25:16,610 --> 00:25:13,320

um

583

00:25:19,190 --> 00:25:16,620

because after so we first showed this uh

584

00:25:21,649 --> 00:25:19,200

this this effect in the laboratory in in

585

00:25:25,310 --> 00:25:21,659

dozens of studies which is a sort of

586

00:25:27,890 --> 00:25:25,320

proof of principle then we tested it in

587

00:25:30,470 --> 00:25:27,900

uh people with fear of spiders

588

00:25:32,750 --> 00:25:30,480

and and then of course I received many

589

00:25:34,909 --> 00:25:32,760

questions for people who are suffering

590

00:25:37,010 --> 00:25:34,919

from uh crippling fear so if it's so

591

00:25:39,470 --> 00:25:37,020

easy I can also do it myself expose

592

00:25:41,870 --> 00:25:39,480

myself to the queue take the pill and

593

00:25:44,750 --> 00:25:41,880

then the fear is gone but yeah

594

00:25:47,269 --> 00:25:44,760

unfortunately it's it's not easy because

595

00:25:49,190 --> 00:25:47,279

there are many boundary conditions and

596

00:25:52,909 --> 00:25:49,200

it has to do with

597

00:25:55,310 --> 00:25:52,919

the idea that if you are exposed to the

598

00:25:59,210 --> 00:25:55,320

feared queue it's not necessarily so

599

00:26:01,430 --> 00:25:59,220

that the memory is uh

600

00:26:04,250 --> 00:26:01,440

uh destabilized

601
00:26:07,370 --> 00:26:04,260
and if the exposure for instance is to

602
00:26:09,470 --> 00:26:07,380
so either it is not there's nothing new

603
00:26:12,590 --> 00:26:09,480
to be learned then it's a sort of

604
00:26:16,570 --> 00:26:12,600
passive retrieval it could also be that

605
00:26:20,149 --> 00:26:16,580
a situation is too new or too different

606
00:26:23,870 --> 00:26:20,159
from from their original fear and then

607
00:26:25,490 --> 00:26:23,880
this is a sort of can yeah

608
00:26:28,730 --> 00:26:25,500
um

609
00:26:31,029 --> 00:26:28,740
sort of initiation of the formation of a

610
00:26:34,070 --> 00:26:31,039
new memory or of an Extinction memory

611
00:26:35,990 --> 00:26:34,080
and whether you target the process of

612
00:26:38,269 --> 00:26:36,000
memory reconciliation is really in

613
00:26:40,610 --> 00:26:38,279

between a sort of passive retrieval

614

00:26:43,490 --> 00:26:40,620

process and the formation of a new

615

00:26:46,850 --> 00:26:43,500

memory and the problem is that we do not

616

00:26:48,529 --> 00:26:46,860

have a sort of index that we can use to

617

00:26:51,409 --> 00:26:48,539

know what is happening in the brain

618

00:26:53,690 --> 00:26:51,419

during the memory reactivation

619

00:26:57,049 --> 00:26:53,700

so we only have the behavior

620

00:26:58,330 --> 00:26:57,059

the readout of memory but the fair

621

00:27:00,190 --> 00:26:58,340

reaction is not

622

00:27:02,090 --> 00:27:00,200

[Music]

623

00:27:04,490 --> 00:27:02,100

informative

624

00:27:06,470 --> 00:27:04,500

on what happens actually in the brain on

625

00:27:08,510 --> 00:27:06,480

whether it's only a passive retrieval

626

00:27:13,070 --> 00:27:08,520

process or whether the memory

627

00:27:15,350 --> 00:27:13,080

reconsolidation is triggers so this is

628

00:27:18,110 --> 00:27:15,360

a huge Challenge and our current

629

00:27:19,730 --> 00:27:18,120

research is trying to tackle this this

630

00:27:23,330 --> 00:27:19,740

problem especially

631

00:27:25,310 --> 00:27:23,340

in translating to clinical practice so

632

00:27:26,510 --> 00:27:25,320

what we do now and so I'm now sitting

633

00:27:31,310 --> 00:27:26,520

here in

634

00:27:34,130 --> 00:27:31,320

in my clinic we opened a clinic uh a

635

00:27:34,990 --> 00:27:34,140

year ago where we treat many people with

636

00:27:38,029 --> 00:27:35,000

um

637

00:27:40,070 --> 00:27:38,039

suffering from fears and phobias so what

638

00:27:43,310 --> 00:27:40,080

we do now is

639

00:27:45,830 --> 00:27:43,320

partly intuitively so to decide when do

640

00:27:47,870 --> 00:27:45,840

we stop so you expose people ahead to

641

00:27:52,630 --> 00:27:47,880

the to the field queue it could be a dog

642

00:27:56,990 --> 00:27:52,640

a kitten a spider uh Heights whatever

643

00:27:59,930 --> 00:27:57,000

okay how how long should you exposure be

644

00:28:02,269 --> 00:27:59,940

such that we trigger the so we

645

00:28:04,549 --> 00:28:02,279

destabilize the memory but that is not

646

00:28:06,710 --> 00:28:04,559

too long certainly that it becomes

647

00:28:08,029 --> 00:28:06,720

already an exposure treatment and that

648

00:28:10,190 --> 00:28:08,039

is yeah

649

00:28:12,409 --> 00:28:10,200

really a challenge

650

00:28:14,269 --> 00:28:12,419

something I was thinking about it there

651
00:28:16,789 --> 00:28:14,279
are people with childhood traumas and

652
00:28:19,010 --> 00:28:16,799
various other anxieties and I was

653
00:28:21,529 --> 00:28:19,020
wondering well instead of exposing them

654
00:28:23,630 --> 00:28:21,539
to whatever stimulus would cause them to

655
00:28:25,789 --> 00:28:23,640
feel the extreme fear given that

656
00:28:28,450 --> 00:28:25,799
sometimes that's impractical especially

657
00:28:30,950 --> 00:28:28,460
now during covet can they with

658
00:28:35,710 --> 00:28:30,960
tremendous effort concerted mental

659
00:28:38,990 --> 00:28:35,720
effort just think about that stimulus to

660
00:28:40,250 --> 00:28:39,000
hallucinate in a sense Their Fear and

661
00:28:41,810 --> 00:28:40,260
and instead of bringing their fear

662
00:28:42,830 --> 00:28:41,820
response up to 10 out of 10 which is

663
00:28:44,870 --> 00:28:42,840

what you try to do in your practice

664

00:28:46,970 --> 00:28:44,880

bring it up to four out of ten because

665

00:28:49,070 --> 00:28:46,980

obviously it's not the same as having

666

00:28:51,350 --> 00:28:49,080

let's say a mask murderer

667

00:28:53,450 --> 00:28:51,360

in front of you and you imagining a mask

668

00:28:54,649 --> 00:28:53,460

murderer or a person in a mess let's say

669

00:28:56,870 --> 00:28:54,659

they're they're afraid of the scream

670

00:28:58,730 --> 00:28:56,880

mask from that 90s movie so they imagine

671

00:29:00,769 --> 00:28:58,740

the scream mask okay they imagined it

672

00:29:03,409 --> 00:29:00,779

and they're triggering themselves up to

673

00:29:04,789 --> 00:29:03,419

four out of ten then they take the beta

674

00:29:06,649 --> 00:29:04,799

blocker now

675

00:29:08,390 --> 00:29:06,659

imagine they do that

676

00:29:10,730 --> 00:29:08,400

well first of all would that work at all

677

00:29:12,110 --> 00:29:10,740

and second of all if if let's say it

678

00:29:14,390 --> 00:29:12,120

doesn't work do you imagine it would

679

00:29:16,870 --> 00:29:14,400

work if they did that a few times your

680

00:29:18,769 --> 00:29:16,880

treatment is like one Extinction event

681

00:29:20,690 --> 00:29:18,779

eradicate that memory from one treatment

682

00:29:22,310 --> 00:29:20,700

but do you imagine this four out of ten

683

00:29:24,130 --> 00:29:22,320

progressively over the course of two

684

00:29:26,870 --> 00:29:24,140

weeks let's say could bring it down to

685

00:29:29,690 --> 00:29:26,880

almost remove that memory at least the

686

00:29:31,549 --> 00:29:29,700

fear associated with it yeah uh now

687

00:29:33,889 --> 00:29:31,559

first of all we of course it is not

688

00:29:35,090 --> 00:29:33,899

necessarily so that even if it works

689

00:29:37,789 --> 00:29:35,100

that it is

690

00:29:39,470 --> 00:29:37,799

I mean memory emotional memory that

691

00:29:40,669 --> 00:29:39,480

underlies anxiety disorders and

692

00:29:43,250 --> 00:29:40,679

especially post-traumatic stress

693

00:29:46,430 --> 00:29:43,260

disorder is not a sort of single memory

694

00:29:48,889 --> 00:29:46,440

Trace but it is a network so you could

695

00:29:50,269 --> 00:29:48,899

imagine that for PTSD that you even if

696

00:29:52,490 --> 00:29:50,279

it works that you weak in the network

697

00:29:55,490 --> 00:29:52,500

but that you need more treatment

698

00:29:58,750 --> 00:29:55,500

sessions to really dismantle the

699

00:30:03,070 --> 00:29:58,760

underlying uh emotional memory

700

00:30:05,389 --> 00:30:03,080

we have have uh applied the

701
00:30:07,130 --> 00:30:05,399
reconciliation intervention already to

702
00:30:08,930 --> 00:30:07,140
to people suffering from post-traumatic

703
00:30:13,130 --> 00:30:08,940
stress disorder and this is in general

704
00:30:14,630 --> 00:30:13,140
the way also yeah if if you do if you

705
00:30:17,149 --> 00:30:14,640
use the standard cognitive behavior

706
00:30:19,850 --> 00:30:17,159
treatment you always work with uh

707
00:30:21,470 --> 00:30:19,860
imaginary exposure and the idea is that

708
00:30:24,230 --> 00:30:21,480
the trauma memory is actually the

709
00:30:26,950 --> 00:30:24,240
trigger like in dog phobia the dog draw

710
00:30:29,330 --> 00:30:26,960
my memory triggers an overwhelming

711
00:30:32,510 --> 00:30:29,340
emotional responses and people are

712
00:30:34,490 --> 00:30:32,520
afraid of being overwhelmed by their

713
00:30:36,470 --> 00:30:34,500

emotion responses and they feel like

714

00:30:39,110 --> 00:30:36,480

they cannot handle it they will become

715

00:30:42,470 --> 00:30:39,120

crazy losing control whatever

716

00:30:43,870 --> 00:30:42,480

so the reason to go back to the trauma

717

00:30:46,010 --> 00:30:43,880

is actually

718

00:30:47,990 --> 00:30:46,020

usually when people have intrusive

719

00:30:49,789 --> 00:30:48,000

memories they try to avoid it because

720

00:30:51,409 --> 00:30:49,799

they don't want to expose themselves to

721

00:30:53,510 --> 00:30:51,419

the trauma memory because it triggers

722

00:30:56,210 --> 00:30:53,520

very intense

723

00:30:58,370 --> 00:30:56,220

um difficult emotions and what you do in

724

00:31:00,470 --> 00:30:58,380

treatment then is you try to do that of

725

00:31:03,649 --> 00:31:00,480

course supporting the patient

726

00:31:06,830 --> 00:31:03,659

and and uh if you do

727

00:31:09,409 --> 00:31:06,840

rights then it triggers indeed the in

728

00:31:11,149 --> 00:31:09,419

yeah very strong emotional reactions and

729

00:31:13,190 --> 00:31:11,159

then they can experience that they do

730

00:31:15,529 --> 00:31:13,200

not die or that they are not

731

00:31:17,930 --> 00:31:15,539

going crazy over there first so this is

732

00:31:20,630 --> 00:31:17,940

then the sort of prediction error or new

733

00:31:22,450 --> 00:31:20,640

experience that may

734

00:31:27,529 --> 00:31:22,460

um

735

00:31:29,750 --> 00:31:27,539

then the Propranolol could work there is

736

00:31:32,510 --> 00:31:29,760

a in one of the I don't know whether you

737

00:31:34,850 --> 00:31:32,520

have seen the uh documentary by Lana

738

00:31:37,690 --> 00:31:34,860

Wilson a cure for fear so one of the

739

00:31:40,490 --> 00:31:37,700

four parts is the night in Kabul

740

00:31:42,529 --> 00:31:40,500

uh and this was a

741

00:31:45,769 --> 00:31:42,539

trauma treatment

742

00:31:47,750 --> 00:31:45,779

and there we used to

743

00:31:50,389 --> 00:31:47,760

um strengthen the memory reactivation

744

00:31:53,690 --> 00:31:50,399

also a um

745

00:31:56,810 --> 00:31:53,700

a virtual reality environment to make it

746

00:31:59,630 --> 00:31:56,820

a bit stronger too so to present him

747

00:32:03,370 --> 00:31:59,640

with some cues that could sort of yeah

748

00:32:05,870 --> 00:32:03,380

enhance the reactivation of the specific

749

00:32:07,789 --> 00:32:05,880

trauma memory but this is not always

750

00:32:09,590 --> 00:32:07,799

necessary sometimes people are very good

751

00:32:10,370 --> 00:32:09,600

in in

752

00:32:19,430 --> 00:32:10,380

um

753

00:32:21,110 --> 00:32:19,440

think psychedelics could have any any

754

00:32:23,210 --> 00:32:21,120

role in all this do you think it can

755

00:32:25,970 --> 00:32:23,220

perhaps enhance the effect let's say if

756

00:32:27,490 --> 00:32:25,980

the memory is not is is that is that the

757

00:32:29,810 --> 00:32:27,500

level of let's say four out of ten

758

00:32:31,490 --> 00:32:29,820

perhaps with a psychedelic experience

759

00:32:33,830 --> 00:32:31,500

this can

760

00:32:35,990 --> 00:32:33,840

get enhanced and and that way maybe we

761

00:32:38,090 --> 00:32:36,000

can do something about it reactivating

762

00:32:38,930 --> 00:32:38,100

that memory or is it too too much of a

763

00:32:41,389 --> 00:32:38,940

novel

764

00:32:43,370 --> 00:32:41,399

experience for someone who maybe hasn't

765

00:32:45,470 --> 00:32:43,380

done psychedelics before what are your

766

00:32:48,710 --> 00:32:45,480

speculations yeah well there are some

767

00:32:50,389 --> 00:32:48,720

some promising studies using MDMA for

768

00:32:52,789 --> 00:32:50,399

instance so I think the idea what is

769

00:32:55,430 --> 00:32:52,799

important of course is that that

770

00:32:57,409 --> 00:32:55,440

the research has a sort of at least

771

00:33:00,590 --> 00:32:57,419

plausible hypothesis on the working

772

00:33:03,169 --> 00:33:00,600

mechanism that's in my view important

773

00:33:05,269 --> 00:33:03,179

and whereas you very often see in in

774

00:33:08,330 --> 00:33:05,279

this field is that sort of drugs are

775

00:33:10,490 --> 00:33:08,340

just tested and so see

776

00:33:12,789 --> 00:33:10,500

just sure what it has an effect or not

777

00:33:16,610 --> 00:33:12,799

about it's not the way I like to work

778

00:33:18,769 --> 00:33:16,620

but there are I mean psychedelics could

779

00:33:19,490 --> 00:33:18,779

work by

780

00:33:21,529 --> 00:33:19,500

um

781

00:33:22,730 --> 00:33:21,539

they could help to destabilize the

782

00:33:24,950 --> 00:33:22,740

memory

783

00:33:28,190 --> 00:33:24,960

and yeah

784

00:33:31,009 --> 00:33:28,200

so and and then it is easier to yeah to

785

00:33:32,389 --> 00:33:31,019

to either and then maybe not I I don't

786

00:33:34,130 --> 00:33:32,399

think that you should then work maybe

787

00:33:35,690 --> 00:33:34,140

with Propranolol because then it could

788

00:33:37,730 --> 00:33:35,700

be also an interaction between the two

789

00:33:40,669 --> 00:33:37,740

at least you should make sure that it is

790

00:33:43,610 --> 00:33:40,679

not problematic uh but there are also

791

00:33:45,529 --> 00:33:43,620

behavior of course imagery scripting is

792

00:33:47,630 --> 00:33:45,539

a good way to to change the trauma

793

00:33:52,789 --> 00:33:47,640

memory and you could do that in

794

00:33:57,649 --> 00:33:56,090

right it will be really interesting to

795

00:33:59,450 --> 00:33:57,659

to do something in conjunction so

796

00:34:01,430 --> 00:33:59,460

perhaps we can maybe talk a little bit

797

00:34:02,750 --> 00:34:01,440

about that down the road that would be

798

00:34:05,450 --> 00:34:02,760

great yeah but but then the difference

799

00:34:07,549 --> 00:34:05,460

is because sometimes I mean cognitive

800

00:34:09,649 --> 00:34:07,559

behavior treatment is just

801

00:34:10,669 --> 00:34:09,659

combined with

802

00:34:13,070 --> 00:34:10,679

um

803

00:34:15,710 --> 00:34:13,080

with drugs but then it's only I mean

804

00:34:18,349 --> 00:34:15,720

drugs that also dampen the emotional

805

00:34:21,589 --> 00:34:18,359

response whereas the

806

00:34:24,829 --> 00:34:21,599

intriguing aspect here is that we use a

807

00:34:26,810 --> 00:34:24,839

drug uh not to dampen the emotion

808

00:34:29,149 --> 00:34:26,820

response but to really interfere with

809

00:34:32,030 --> 00:34:29,159

the yeah learning and memory processes

810

00:34:34,149 --> 00:34:32,040

which is a very different way of using a

811

00:34:37,970 --> 00:34:34,159

drug

812

00:34:41,990 --> 00:34:37,980

how far do these unlearning processes go

813

00:34:44,329 --> 00:34:42,000

is it possible to remove disgust or

814

00:34:47,389 --> 00:34:44,339

happiness for example or let's say a

815

00:34:50,930 --> 00:34:47,399

fond memory of something the opposite of

816

00:34:54,230 --> 00:34:50,940

fear are these future paths for This

817

00:34:56,750 --> 00:34:54,240

research or is it limited only within

818

00:35:00,290 --> 00:34:56,760

the scope of the phobic

819

00:35:02,870 --> 00:35:00,300

yeah certainly not limited to fears and

820

00:35:06,650 --> 00:35:02,880

phobias because it has

821

00:35:07,550 --> 00:35:06,660

also we tested for uh in the area of

822

00:35:09,829 --> 00:35:07,560

addiction

823

00:35:13,490 --> 00:35:09,839

first learn animals to become addicted

824

00:35:15,470 --> 00:35:13,500

to cocaine or other other drugs so

825

00:35:16,849 --> 00:35:15,480

addiction is also an associative memory

826
00:35:19,849 --> 00:35:16,859
like fears

827
00:35:22,370 --> 00:35:19,859
so there's a queue and an

828
00:35:24,170 --> 00:35:22,380
um yeah approach Behavior because the

829
00:35:29,390 --> 00:35:24,180
animal is addicted

830
00:35:31,730 --> 00:35:29,400
to it and um so in fears we

831
00:35:34,310 --> 00:35:31,740
aim to change the authorities behavior

832
00:35:36,650 --> 00:35:34,320
and in addiction you yeah then you

833
00:35:39,170 --> 00:35:36,660
should try to to change the approach

834
00:35:41,750 --> 00:35:39,180
Behavior so the other way

835
00:35:44,329 --> 00:35:41,760
and that is possible it is I think but

836
00:35:48,950 --> 00:35:44,339
it has not been I mean

837
00:35:52,930 --> 00:35:48,960
we are now in a pilot phase uh testing

838
00:35:55,910 --> 00:35:52,940

um people who are addicted to cigarettes

839

00:35:57,230 --> 00:35:55,920

uh but yeah

840

00:35:58,970 --> 00:35:57,240

so let's say someone's addicted to

841

00:36:00,290 --> 00:35:58,980

cigarettes or cocaine if they see the

842

00:36:01,609 --> 00:36:00,300

stimulus the cigarettes or the cocaine

843

00:36:03,109 --> 00:36:01,619

it triggers them they wanted smoke or

844

00:36:05,089 --> 00:36:03,119

they want to have cocaine again anyway

845

00:36:07,550 --> 00:36:05,099

if we're making an analog to the fear

846

00:36:09,770 --> 00:36:07,560

response the fear response situation is

847

00:36:12,410 --> 00:36:09,780

you provoke them intensely and then give

848

00:36:13,970 --> 00:36:12,420

them the beta blocker now in the

849

00:36:15,589 --> 00:36:13,980

addiction response do get them to smoke

850

00:36:16,970 --> 00:36:15,599

the cigarettes intensely or the cocaine

851
00:36:19,130 --> 00:36:16,980
intensely and then well obviously that's

852
00:36:20,510 --> 00:36:19,140
illegal and then give them the beta

853
00:36:22,310 --> 00:36:20,520
blocker if you just make them feel like

854
00:36:23,990 --> 00:36:22,320
oh I need to be I want to have this so

855
00:36:24,829 --> 00:36:24,000
much then remove it take the beta

856
00:36:27,829 --> 00:36:24,839
blocker

857
00:36:31,609 --> 00:36:27,839
as this last uh and that makes it very

858
00:36:34,550 --> 00:36:31,619
hard so the uh because so we first years

859
00:36:37,970 --> 00:36:34,560
ago we already tested this with students

860
00:36:40,190 --> 00:36:37,980
that wanted to quit smoking and then we

861
00:36:42,050 --> 00:36:40,200
so we asked them to bring their favorite

862
00:36:44,150 --> 00:36:42,060
cigarettes to the lab

863
00:36:46,130 --> 00:36:44,160

and they thought well I'm smoking my

864

00:36:48,589 --> 00:36:46,140

last cigarette and then they had to give

865

00:36:50,089 --> 00:36:48,599

cigarette to the experimenter and we

866

00:36:53,150 --> 00:36:50,099

were a bit afraid that

867

00:36:55,130 --> 00:36:53,160

that the participants would sort of clap

868

00:36:57,530 --> 00:36:55,140

the experimenter in his face or whatever

869

00:36:59,510 --> 00:36:57,540

but that didn't happen but the treatment

870

00:37:02,690 --> 00:36:59,520

also didn't work and we realized

871

00:37:04,849 --> 00:37:02,700

afterwards yeah because then it is a

872

00:37:07,550 --> 00:37:04,859

sort of passive process in terms of the

873

00:37:08,870 --> 00:37:07,560

memory because someone else decides for

874

00:37:11,150 --> 00:37:08,880

you even though

875

00:37:13,130 --> 00:37:11,160

the participants were motivated to quit

876

00:37:22,550 --> 00:37:13,140

the

877

00:37:25,910 --> 00:37:22,560

we think indeed what you said somehow we

878

00:37:28,310 --> 00:37:25,920

have to trigger the urge to smoke and

879

00:37:30,890 --> 00:37:28,320

then they have to decide themselves so

880

00:37:32,589 --> 00:37:30,900

they really should be engaged in it okay

881

00:37:38,150 --> 00:37:32,599

now

882

00:37:42,829 --> 00:37:40,069

see this is why it's Nobel prize winning

883

00:37:44,990 --> 00:37:42,839

because if this works this can work for

884

00:37:46,970 --> 00:37:45,000

addiction is a huge huge topic this can

885

00:37:49,069 --> 00:37:46,980

work for porn addiction or drug

886

00:37:50,450 --> 00:37:49,079

addiction or any form of addiction I

887

00:37:52,670 --> 00:37:50,460

don't know the limitations but I'm just

888

00:37:55,310 --> 00:37:52,680

surviving yeah well I mean the

889

00:37:57,349 --> 00:37:55,320

translation is so difficult so uh and

890

00:38:00,170 --> 00:37:57,359

there are so I mean it really depends on

891

00:38:01,910 --> 00:38:00,180

so many subtle uh factors whether it

892

00:38:04,130 --> 00:38:01,920

works or not that is I mean as a

893

00:38:06,290 --> 00:38:04,140

scientist that just really I mean I love

894

00:38:10,190 --> 00:38:06,300

that because it's it will never be

895

00:38:12,470 --> 00:38:10,200

boring uh but I'm I'm working at two

896

00:38:14,210 --> 00:38:12,480

sides so I'm a neuroscientist but I'm

897

00:38:17,089 --> 00:38:14,220

also working in clinical science so I

898

00:38:19,849 --> 00:38:17,099

also see the yeah how difficult it is to

899

00:38:22,430 --> 00:38:19,859

bridge these two fields and yeah we are

900

00:38:24,829 --> 00:38:22,440

working on it with a team of PhD

901
00:38:27,890 --> 00:38:24,839
students and postdocs

902
00:38:29,810 --> 00:38:27,900
uh there are also uh I mean there are

903
00:38:32,930 --> 00:38:29,820
several labs in the worlds that

904
00:38:36,470 --> 00:38:32,940
basically work with animal models we can

905
00:38:38,510 --> 00:38:36,480
learn a lot from them because they can

906
00:38:40,069 --> 00:38:38,520
do things that we can't do I mean they

907
00:38:43,069 --> 00:38:40,079
really

908
00:38:45,650 --> 00:38:43,079
and study the microbiology in the brain

909
00:38:48,109 --> 00:38:45,660
and we can study that in humans but uh

910
00:38:52,250 --> 00:38:48,119
yeah the the

911
00:38:54,770 --> 00:38:52,260
it it looks easier I think than it is

912
00:38:56,569 --> 00:38:54,780
and this really has to do so so because

913
00:38:58,970 --> 00:38:56,579

these memories these emotional memories

914

00:39:00,770 --> 00:38:58,980

are so strong also for addiction and

915

00:39:02,329 --> 00:39:00,780

they're

916

00:39:04,670 --> 00:39:02,339

um

917

00:39:08,569 --> 00:39:06,530

I mean if an emotional memory in general

918

00:39:10,310 --> 00:39:08,579

is already strong and then they are

919

00:39:12,170 --> 00:39:10,320

engraved almost in the physical

920

00:39:14,270 --> 00:39:12,180

architecture of the brain especially

921

00:39:16,130 --> 00:39:14,280

because people are addicted for years

922

00:39:18,770 --> 00:39:16,140

they have experienced their Addiction in

923

00:39:22,430 --> 00:39:18,780

many different contexts so it's not easy

924

00:39:24,770 --> 00:39:22,440

to destabilize the memory but yeah

925

00:39:26,930 --> 00:39:24,780

now that we are on there well then we

926
00:39:29,089 --> 00:39:26,940
should be able to change it

927
00:39:31,250 --> 00:39:29,099
now that we are on the cusp of removing

928
00:39:33,589 --> 00:39:31,260
fears I think it might be important to

929
00:39:36,829 --> 00:39:33,599
ask is there an important reason why

930
00:39:40,069 --> 00:39:36,839
people feel fear is what would be the

931
00:39:41,390 --> 00:39:40,079
ramifications of a society that has gone

932
00:39:43,490 --> 00:39:41,400
through with this research and

933
00:39:45,770 --> 00:39:43,500
eliminated not only fear but as you have

934
00:39:47,630 --> 00:39:45,780
mentioned addiction discussed uh even

935
00:39:50,170 --> 00:39:47,640
pleasure towards certain things that are

936
00:39:53,810 --> 00:39:50,180
otherwise unsavory what would the rare

937
00:39:56,950 --> 00:39:53,820
notifications be I think that one that

938
00:40:01,190 --> 00:39:56,960

fear is one of the most uh important

939

00:40:03,349 --> 00:40:01,200

emotions across species

940

00:40:06,609 --> 00:40:03,359

um because it's yeah it definitely

941

00:40:09,050 --> 00:40:06,619

helped us to survive so not only the

942

00:40:13,550 --> 00:40:09,060

it's crucial for the survival of the

943

00:40:20,870 --> 00:40:14,450

um

944

00:40:24,890 --> 00:40:23,030

I was going to ask as a follow-up to

945

00:40:27,950 --> 00:40:24,900

that how far down the phylogenetic tree

946

00:40:30,410 --> 00:40:27,960

does Fear go you know how conserved is

947

00:40:33,290 --> 00:40:30,420

this emotion yeah well it depends a bit

948

00:40:35,690 --> 00:40:33,300

on the definition of fear but if if we

949

00:40:38,210 --> 00:40:35,700

consider defensive reflexes as a sign of

950

00:40:41,870 --> 00:40:38,220

fear then all animals

951
00:40:45,470 --> 00:40:41,880
I think exhibits a signs of fear but I

952
00:40:49,190 --> 00:40:45,480
would say a society without fear well

953
00:40:50,329 --> 00:40:49,200
would not be a society anymore

954
00:40:52,790 --> 00:40:50,339
um

955
00:40:55,790 --> 00:40:52,800
it's also for instance and and the fear

956
00:40:59,990 --> 00:40:55,800
of losing your Offspring it's very

957
00:41:04,670 --> 00:41:00,000
fundamental for our intense

958
00:41:11,530 --> 00:41:08,030
but without fear I mean people should I

959
00:41:16,790 --> 00:41:11,540
I mean I think social behavior is also

960
00:41:21,470 --> 00:41:19,790
sorry if I may if I just briefly go back

961
00:41:23,450 --> 00:41:21,480
to the idea of psychedelics because that

962
00:41:26,390 --> 00:41:23,460
that area really fascinates Me overall

963
00:41:28,910 --> 00:41:26,400

and is there a particular reason uh you

964

00:41:31,130 --> 00:41:28,920

brought up MDMA specifically as opposed

965

00:41:34,430 --> 00:41:31,140

to let's say the other ones such as you

966

00:41:37,550 --> 00:41:34,440

know LSD mushrooms is are there any do

967

00:41:39,890 --> 00:41:37,560

you identify anything specifically speak

968

00:41:40,970 --> 00:41:39,900

to MDMA that is not present in the

969

00:41:43,730 --> 00:41:40,980

others or

970

00:41:45,050 --> 00:41:43,740

well at least I know I'm I I'm not so

971

00:41:46,609 --> 00:41:45,060

familiar with all the streets I know

972

00:41:49,790 --> 00:41:46,619

that there are a couple of studies that

973

00:41:52,970 --> 00:41:49,800

used MDMA successfully in PTSD and and

974

00:41:55,609 --> 00:41:52,980

it's it's it targets The nmda receptors

975

00:41:57,710 --> 00:41:55,619

and nmda receptors are involved in the

976

00:42:00,069 --> 00:41:57,720

memory destabilization so that was

977

00:42:04,130 --> 00:42:00,079

actually the reason that I mentioned

978

00:42:06,290 --> 00:42:04,140

MDMA as far as I can understand the MDMA

979

00:42:08,810 --> 00:42:06,300

would be more for the cognitive

980

00:42:11,089 --> 00:42:08,820

behavioral therapy route where you just

981

00:42:13,250 --> 00:42:11,099

get them to relive their memory and then

982

00:42:14,810 --> 00:42:13,260

now with the MDMA they can't feel the

983

00:42:17,270 --> 00:42:14,820

fear as much in fact they might attach

984

00:42:18,710 --> 00:42:17,280

positive emotions to it whereas with

985

00:42:20,390 --> 00:42:18,720

your treatment it's like please don't

986

00:42:22,310 --> 00:42:20,400

attach any positive emotions Feel the

987

00:42:23,690 --> 00:42:22,320

fear so that's why with LSD that's

988

00:42:25,609 --> 00:42:23,700

completely different LSD it's not like

989

00:42:26,810 --> 00:42:25,619

you're only experiencing Euphoria you

990

00:42:28,430 --> 00:42:26,820

can have the most intense anxiety

991

00:42:29,930 --> 00:42:28,440

attacks of your entire life do you

992

00:42:30,890 --> 00:42:29,940

imagine the treatment with LSD would be

993

00:42:33,290 --> 00:42:30,900

I would imagine it'd be much different

994

00:42:34,970 --> 00:42:33,300

than MDMA I would imagine that LSD or

995

00:42:37,010 --> 00:42:34,980

mushrooms would be more in line with

996

00:42:38,270 --> 00:42:37,020

your treatment rather than MDMA which is

997

00:42:40,190 --> 00:42:38,280

a cognitive behavioral therapy

998

00:42:42,589 --> 00:42:40,200

accelerators MDMA your treatment

999

00:42:43,730 --> 00:42:42,599

accelerator might be the LSD that's what

1000

00:42:45,710 --> 00:42:43,740

I surmise but I want to know what you

1001
00:42:49,190 --> 00:42:45,720
think

1002
00:42:50,569 --> 00:42:49,200
yeah I agree because

1003
00:42:52,490 --> 00:42:50,579
uh yeah

1004
00:42:54,890 --> 00:42:52,500
MDMA

1005
00:42:58,430 --> 00:42:54,900
triggers and I think an oxytociner

1006
00:43:00,950 --> 00:42:58,440
release if I yeah

1007
00:43:06,470 --> 00:43:03,890
so it could be sort of somehow inhibits

1008
00:43:09,470 --> 00:43:06,480
the um it could work in two directions

1009
00:43:11,690 --> 00:43:09,480
because it could also help if you feel

1010
00:43:14,150 --> 00:43:11,700
safe and attached for instance to your

1011
00:43:16,730 --> 00:43:14,160
therapist it could also help to dive

1012
00:43:19,670 --> 00:43:16,740
into your also in

1013
00:43:22,329 --> 00:43:19,680

into the trauma memory and into the more

1014

00:43:26,150 --> 00:43:22,339

difficult emotions so in that sense

1015

00:43:28,910 --> 00:43:26,160

MDMA would also work

1016

00:43:30,650 --> 00:43:28,920

because if you are too if the emotions

1017

00:43:32,470 --> 00:43:30,660

are too strong it could also add a

1018

00:43:36,650 --> 00:43:32,480

certain important sort of yeah

1019

00:43:39,530 --> 00:43:36,660

inhibits of really going into into it

1020

00:43:41,390 --> 00:43:39,540

and feeling it the documentary you

1021

00:43:43,010 --> 00:43:41,400

mentioned is called cure of fear is that

1022

00:43:44,990 --> 00:43:43,020

correct yeah

1023

00:43:47,569 --> 00:43:45,000

okay I recommend everyone watch this

1024

00:43:49,130 --> 00:43:47,579

this I watched it I found it endlessly

1025

00:43:50,630 --> 00:43:49,140

fascinating is what turned me on to your

1026

00:43:52,130 --> 00:43:50,640

research to begin with

1027

00:43:54,530 --> 00:43:52,140

is there something else you do

1028

00:43:56,210 --> 00:43:54,540

afterwards after the post for your

1029

00:43:57,770 --> 00:43:56,220

stimulus other than just giving them the

1030

00:43:59,569 --> 00:43:57,780

beta blocker do you talk them down do

1031

00:44:01,309 --> 00:43:59,579

you say everything will be okay or is it

1032

00:44:03,170 --> 00:44:01,319

as simple as expose yourself to the fear

1033

00:44:04,370 --> 00:44:03,180

10 out of 10 take the beta blocker five

1034

00:44:06,589 --> 00:44:04,380

minutes after that or pretty much

1035

00:44:08,270 --> 00:44:06,599

immediately after that and go along with

1036

00:44:12,290 --> 00:44:08,280

your day have a nice rest is there

1037

00:44:14,510 --> 00:44:12,300

something else that's missing no so so

1038

00:44:16,849 --> 00:44:14,520

I mean the the exposure it's it's it's

1039

00:44:18,950 --> 00:44:16,859

not so easy I mean that is really

1040

00:44:20,809 --> 00:44:18,960

difficult people are generally not able

1041

00:44:22,550 --> 00:44:20,819

to do it themselves because they really

1042

00:44:25,790 --> 00:44:22,560

need support

1043

00:44:29,210 --> 00:44:25,800

to actually do it because the fear

1044

00:44:31,910 --> 00:44:29,220

response itself triggers an an avoidance

1045

00:44:34,010 --> 00:44:31,920

response so they want to to escape the

1046

00:44:37,010 --> 00:44:34,020

situation of course but if they have

1047

00:44:39,109 --> 00:44:37,020

done so no then they go to a room uh

1048

00:44:39,950 --> 00:44:39,119

what we do is

1049

00:44:43,970 --> 00:44:39,960

um

1050

00:44:46,730 --> 00:44:43,980

only I mean I briefly reinforce them for

1051

00:44:50,450 --> 00:44:46,740

what they did so far and then they wait

1052

00:44:52,609 --> 00:44:50,460

for two hours they relax uh because we

1053

00:44:55,190 --> 00:44:52,619

want to make sure that they

1054

00:44:56,809 --> 00:44:55,200

don't have another stressful experience

1055

00:44:59,569 --> 00:44:56,819

that could trigger another nor

1056

00:45:02,270 --> 00:44:59,579

adrenaline response it could interfere

1057

00:45:04,609 --> 00:45:02,280

with the effect of the beta blocker and

1058

00:45:06,589 --> 00:45:04,619

then after two hours they go home have a

1059

00:45:09,410 --> 00:45:06,599

night of sleep and then they come back

1060

00:45:11,870 --> 00:45:09,420

for a test

1061

00:45:13,910 --> 00:45:11,880

so you're there in part to make sure

1062

00:45:15,710 --> 00:45:13,920

that they don't have another traumatic

1063

00:45:17,089 --> 00:45:15,720

experience that worsens it completely

1064

00:45:19,490 --> 00:45:17,099

because I would imagine that this could

1065

00:45:21,290 --> 00:45:19,500

drive someone insane if they're exposed

1066

00:45:23,930 --> 00:45:21,300

to 10 out of 10 of fear on something

1067

00:45:27,410 --> 00:45:23,940

that they're already extremely afraid of

1068

00:45:29,990 --> 00:45:27,420

yeah so uh so we we try to make sure

1069

00:45:31,250 --> 00:45:30,000

that they are not re-exposed to uh to

1070

00:45:32,930 --> 00:45:31,260

the field queue and sometimes it's

1071

00:45:34,609 --> 00:45:32,940

difficult for instance we also treat

1072

00:45:36,230 --> 00:45:34,619

people with fear of dogs and then when

1073

00:45:39,109 --> 00:45:36,240

they go outside it could be that they

1074

00:45:41,329 --> 00:45:39,119

will meet a dog again and yeah because

1075

00:45:44,270 --> 00:45:41,339

then because we know that I mean that

1076
00:45:46,250 --> 00:45:44,280
could trigger again the fear memory and

1077
00:45:47,870 --> 00:45:46,260
we don't know but it makes sense that it

1078
00:45:50,089 --> 00:45:47,880
then interferes with the treatment

1079
00:45:52,490 --> 00:45:50,099
effect so we always make sure if that is

1080
00:45:55,010 --> 00:45:52,500
the case that someone will pick them up

1081
00:45:57,050 --> 00:45:55,020
in the car that they don't meet a dog

1082
00:45:57,890 --> 00:45:57,060
until a night of sleep and then the next

1083
00:46:00,829 --> 00:45:57,900
day

1084
00:46:03,890 --> 00:46:00,839
so we also once treated a woman with a

1085
00:46:06,109 --> 00:46:03,900
fear of silverfish and they were at her

1086
00:46:09,890 --> 00:46:06,119
house so she was not allowed to sleep in

1087
00:46:11,930 --> 00:46:09,900
her own house she she booked a hotel and

1088
00:46:15,230 --> 00:46:11,940

then came back for the test and then

1089

00:46:18,589 --> 00:46:15,240

after this first night she could go home

1090

00:46:22,130 --> 00:46:18,599

again to to expose herself to the

1091

00:46:24,650 --> 00:46:22,140

silverfish when she was removed from the

1092

00:46:26,510 --> 00:46:24,660

fear now in this case of the silverfish

1093

00:46:27,650 --> 00:46:26,520

was there a traumatic event that

1094

00:46:29,270 --> 00:46:27,660

happened that made her afraid of the

1095

00:46:31,190 --> 00:46:29,280

silverfish to begin with excuse me for

1096

00:46:33,589 --> 00:46:31,200

seeming imbecile grass and I I have a

1097

00:46:35,870 --> 00:46:33,599

fear and it's a flying insect I despise

1098

00:46:37,910 --> 00:46:35,880

flying insects like I like dragonflies

1099

00:46:40,490 --> 00:46:37,920

it's the only kind but mosquitoes and

1100

00:46:41,750 --> 00:46:40,500

bees and black flies I I can't even go

1101
00:46:44,030 --> 00:46:41,760
into the Wilderness because of it

1102
00:46:45,530 --> 00:46:44,040
practically speaking

1103
00:46:48,770 --> 00:46:45,540
I don't have access to I'm not in

1104
00:46:51,230 --> 00:46:48,780
Amsterdam what can I do here in Toronto

1105
00:46:52,670 --> 00:46:51,240
alone in my condo and other people who

1106
00:46:54,530 --> 00:46:52,680
have fears similar to mines maybe not

1107
00:46:56,510 --> 00:46:54,540
flying insects but what can they do No

1108
00:46:58,550 --> 00:46:56,520
One's Gonna sue you what would you what

1109
00:47:00,530 --> 00:46:58,560
would you do

1110
00:47:02,930 --> 00:47:00,540
yeah what I would do is expose you then

1111
00:47:04,670 --> 00:47:02,940
I would first ask you which if if there

1112
00:47:07,250 --> 00:47:04,680
is an insect that you

1113
00:47:07,910 --> 00:47:07,260

um fear most and then order

1114

00:47:09,069 --> 00:47:07,920

um

1115

00:47:12,130 --> 00:47:09,079

yeah

1116

00:47:14,270 --> 00:47:12,140

a couple of them or sometimes doesn't

1117

00:47:18,230 --> 00:47:14,280

and then

1118

00:47:19,550 --> 00:47:18,240

um so very often Fierce so first of all

1119

00:47:21,230 --> 00:47:19,560

your first question was actually is it

1120

00:47:24,290 --> 00:47:21,240

necessary to have a traumatic experience

1121

00:47:25,730 --> 00:47:24,300

with the cue that you fear no the idea

1122

00:47:28,250 --> 00:47:25,740

is so at least it is our

1123

00:47:30,470 --> 00:47:28,260

conceptualization of fear and anxiety

1124

00:47:32,630 --> 00:47:30,480

disorders that there isn't we call fear

1125

00:47:34,670 --> 00:47:32,640

memory or associate memory that analyzed

1126

00:47:37,130 --> 00:47:34,680

the fear response and the fear memory is

1127

00:47:39,770 --> 00:47:37,140

formed either through direct traumatic

1128

00:47:41,690 --> 00:47:39,780

experiences but also very often in an

1129

00:47:43,010 --> 00:47:41,700

indirect way just by modeling because

1130

00:47:46,130 --> 00:47:43,020

you have seen other people that are

1131

00:47:48,410 --> 00:47:46,140

afraid of dogs or insects or by

1132

00:47:50,690 --> 00:47:48,420

information or sometimes people really

1133

00:47:52,609 --> 00:47:50,700

don't know how they developed it but it

1134

00:47:56,450 --> 00:47:52,619

is just there then

1135

00:47:58,609 --> 00:47:56,460

if you have a fear some people have some

1136

00:48:01,130 --> 00:47:58,619

sort of traumatic experience because if

1137

00:48:02,750 --> 00:48:01,140

you have a fear of a specific animal and

1138

00:48:07,309 --> 00:48:02,760

that you are exposed to the animal that

1139

00:48:11,329 --> 00:48:08,870

um

1140

00:48:12,430 --> 00:48:11,339

for your treatment then yeah I would say

1141

00:48:14,569 --> 00:48:12,440

well

1142

00:48:18,410 --> 00:48:14,579

we should

1143

00:48:20,270 --> 00:48:18,420

try to I mean I first I should do a sort

1144

00:48:23,510 --> 00:48:20,280

of interview to know exactly what kind

1145

00:48:25,910 --> 00:48:23,520

of situation would be terrifying for you

1146

00:48:29,569 --> 00:48:25,920

like being in a small room for instance

1147

00:48:32,210 --> 00:48:29,579

with insects or that that they that you

1148

00:48:34,370 --> 00:48:32,220

that they are on your skin or on your

1149

00:48:36,410 --> 00:48:34,380

feet or whatever so at first I'm not

1150

00:48:38,510 --> 00:48:36,420

claustrophobic but yes if I was in a

1151

00:48:41,030 --> 00:48:38,520

room that's trapped with a thousand

1152

00:48:43,430 --> 00:48:41,040

mosquitoes I dislike the buzzing around

1153

00:48:44,630 --> 00:48:43,440

my ears so I imagine maybe I can't order

1154

00:48:45,890 --> 00:48:44,640

mosquitoes I don't even know how you can

1155

00:48:47,390 --> 00:48:45,900

do that maybe I could just find a

1156

00:48:49,130 --> 00:48:47,400

YouTube video of mosquitoes around a

1157

00:48:51,410 --> 00:48:49,140

microphone put that on try to imagine

1158

00:48:53,089 --> 00:48:51,420

myself in a room full of mosquitoes

1159

00:48:54,290 --> 00:48:53,099

make my fear response four out of ten

1160

00:48:55,910 --> 00:48:54,300

because that's probably the best I could

1161

00:48:57,170 --> 00:48:55,920

do then take the beta blocker do you

1162

00:49:00,109 --> 00:48:57,180

imagine something like that would work

1163

00:49:02,569 --> 00:49:00,119

no I don't think so it's not enough I

1164

00:49:04,849 --> 00:49:02,579

think just hearing it and and not being

1165

00:49:07,130 --> 00:49:04,859

exposed to the real threat

1166

00:49:10,130 --> 00:49:07,140

yeah and it is probably to do something

1167

00:49:12,290 --> 00:49:10,140

because most of the fears in

1168

00:49:15,470 --> 00:49:12,300

have to do with not being able to

1169

00:49:18,230 --> 00:49:15,480

predict for instance the the cue that

1170

00:49:21,230 --> 00:49:18,240

you fear and with not being able to

1171

00:49:23,510 --> 00:49:21,240

control it so with uncontrollability and

1172

00:49:26,870 --> 00:49:23,520

with unpredictability and that's why

1173

00:49:29,990 --> 00:49:26,880

these insects moving fast and somehow

1174

00:49:32,030 --> 00:49:30,000

yeah you feel probably like I I want to

1175

00:49:34,730 --> 00:49:32,040

control them I want to control the the

1176
00:49:36,470 --> 00:49:34,740
noise or that they come to me and you

1177
00:49:41,690 --> 00:49:36,480
can't so this is really then what you

1178
00:49:47,089 --> 00:49:41,700
need in the treatment to feel that uh

1179
00:49:48,530 --> 00:49:47,099
in order to Target your fear memory

1180
00:49:52,130 --> 00:49:48,540
so what compelled you to make this

1181
00:49:54,530 --> 00:49:52,140
documentary the peer to fear documentary

1182
00:49:57,050 --> 00:49:54,540
yeah first of all uh the documentary

1183
00:49:59,510 --> 00:49:57,060
there are more documentaries so first

1184
00:50:03,170 --> 00:49:59,520
the memory hackers and there's a

1185
00:50:04,849 --> 00:50:03,180
treatment uh uh was a nofa documentary

1186
00:50:07,609 --> 00:50:04,859
and then this

1187
00:50:10,130 --> 00:50:07,619
um the science of fear by Roberto

1188
00:50:12,349 --> 00:50:10,140

fredekia that is uh

1189

00:50:16,309 --> 00:50:12,359

be afraid to the science of fear that

1190

00:50:18,230 --> 00:50:16,319

was broadcasted in Canada actually

1191

00:50:20,510 --> 00:50:18,240

CBS

1192

00:50:22,210 --> 00:50:20,520

um they approached me so not a vice

1193

00:50:26,450 --> 00:50:22,220

versa

1194

00:50:28,490 --> 00:50:26,460

and the same old for Lana Wilson uh but

1195

00:50:29,930 --> 00:50:28,500

yeah

1196

00:50:31,250 --> 00:50:29,940

I think

1197

00:50:37,069 --> 00:50:31,260

um

1198

00:50:39,530 --> 00:50:37,079

to first to educate people that uh that

1199

00:50:42,290 --> 00:50:39,540

that there are millions of people that

1200

00:50:46,069 --> 00:50:42,300

suffer from crippling fears and phobias

1201

00:50:48,410 --> 00:50:46,079

so to to to teach people that they are

1202

00:50:51,230 --> 00:50:48,420

not weak or crazy that they have these

1203

00:50:53,690 --> 00:50:51,240

fears that that is very important but

1204

00:50:55,970 --> 00:50:53,700

also to educate them about or the

1205

00:50:59,530 --> 00:50:55,980

mysteries of emotional memory which is I

1206

00:51:04,430 --> 00:50:59,540

think for everyone a very relevant and

1207

00:51:08,990 --> 00:51:06,950

great um I'd like to ask a couple of

1208

00:51:10,910 --> 00:51:09,000

technical questions if I may um

1209

00:51:13,430 --> 00:51:10,920

regarding your research and you're

1210

00:51:17,030 --> 00:51:13,440

Illuminating 2009 paper and you briefly

1211

00:51:18,829 --> 00:51:17,040

discussed two theories uh namely uh you

1212

00:51:20,750 --> 00:51:18,839

know the there was the storage Theory as

1213

00:51:22,970 --> 00:51:20,760

well as the retrieval Theory one of

1214

00:51:26,089 --> 00:51:22,980

which you survives may have caused a

1215

00:51:28,490 --> 00:51:26,099

fair memory Extinction however at the

1216

00:51:31,910 --> 00:51:28,500

time it was not clear which one was the

1217

00:51:33,650 --> 00:51:31,920

cause would you please a little bit

1218

00:51:35,870 --> 00:51:33,660

elaborate on these theories and

1219

00:51:38,750 --> 00:51:35,880

furthermore tell us whether 11 years

1220

00:51:40,549 --> 00:51:38,760

later now in 2020 do we have a better

1221

00:51:42,710 --> 00:51:40,559

understanding of the mechanism behind

1222

00:51:45,170 --> 00:51:42,720

memory Extinction from a let's say

1223

00:51:49,190 --> 00:51:45,180

theoretical perspective or is it still

1224

00:51:52,970 --> 00:51:49,200

largely a mystery overall no well

1225

00:51:55,549 --> 00:51:52,980

if you only study human

1226

00:51:57,650 --> 00:51:55,559

almost at least for your heart and

1227

00:51:59,390 --> 00:51:57,660

almost impossible to to disentangle

1228

00:52:02,390 --> 00:51:59,400

between a retrieval

1229

00:52:04,490 --> 00:52:02,400

problem or storage problem whether you

1230

00:52:06,290 --> 00:52:04,500

really change the underlying memory

1231

00:52:08,089 --> 00:52:06,300

trace or whether you it's difficult it's

1232

00:52:10,190 --> 00:52:08,099

more difficult to retrieve it but maybe

1233

00:52:12,910 --> 00:52:10,200

it is still there but you can just

1234

00:52:16,370 --> 00:52:12,920

retrieve it and

1235

00:52:20,329 --> 00:52:16,380

clinically I mean if the retrieval

1236

00:52:21,770 --> 00:52:20,339

uh difficulty is is so huge that you can

1237

00:52:24,349 --> 00:52:21,780

never retrieve it anymore then it

1238

00:52:25,730 --> 00:52:24,359

doesn't make any difference but

1239

00:52:27,890 --> 00:52:25,740

theoretically it's of course very

1240

00:52:30,710 --> 00:52:27,900

interesting from the animal literature

1241

00:52:32,210 --> 00:52:30,720

well now that we are more and more able

1242

00:52:35,329 --> 00:52:32,220

to

1243

00:52:36,349 --> 00:52:35,339

find actually the memory engram in the

1244

00:52:39,410 --> 00:52:36,359

brain

1245

00:52:42,410 --> 00:52:39,420

by optogenetics and so on and that means

1246

00:52:44,049 --> 00:52:42,420

that you can turn on and off the fear

1247

00:52:46,790 --> 00:52:44,059

memory

1248

00:52:49,849 --> 00:52:46,800

they also showed that the

1249

00:52:52,790 --> 00:52:49,859

reconsolidation intervention really

1250

00:52:55,370 --> 00:52:52,800

changed the memory engram and this

1251
00:52:57,710 --> 00:52:55,380
suggests at least that it affects the

1252
00:52:58,549 --> 00:52:57,720
storage of the fear memory and that is

1253
00:53:01,569 --> 00:52:58,559
not

1254
00:53:04,609 --> 00:53:01,579
just a retrieval issue

1255
00:53:05,990 --> 00:53:04,619
okay so from the animal side then it's

1256
00:53:07,670 --> 00:53:06,000
it's more geared toward the storage

1257
00:53:11,089 --> 00:53:07,680
aspect yeah

1258
00:53:15,170 --> 00:53:11,099
purely based on human research I read it

1259
00:53:17,809 --> 00:53:15,180
to this actually yeah impossible to uh

1260
00:53:19,849 --> 00:53:17,819
this entangle the two uh conceptual

1261
00:53:22,309 --> 00:53:19,859
Frameworks yeah right yes there are

1262
00:53:25,069 --> 00:53:22,319
limitations unfortunately and um going

1263
00:53:26,870 --> 00:53:25,079

back to the imagery rescripting uh

1264

00:53:29,510 --> 00:53:26,880

phenomenon that you had you I think you

1265

00:53:31,609 --> 00:53:29,520

delved deep into it into a recent 2019

1266

00:53:33,650 --> 00:53:31,619

paper where you discuss you know the

1267

00:53:36,530 --> 00:53:33,660

role of imagery scripting in emotional

1268

00:53:38,329 --> 00:53:36,540

memory now maybe if we can just briefly

1269

00:53:41,630 --> 00:53:38,339

talk about this a little more just to

1270

00:53:43,549 --> 00:53:41,640

see whether you know we could utilize

1271

00:53:47,390 --> 00:53:43,559

imagery scripting in conjunction with

1272

00:53:50,030 --> 00:53:47,400

with let's say Propranolol uh to extend

1273

00:53:52,490 --> 00:53:50,040

the impact of modifying fear in various

1274

00:53:54,470 --> 00:53:52,500

settings for example online therapies

1275

00:53:56,089 --> 00:53:54,480

like is that a possibility you think I

1276
00:53:58,849 --> 00:53:56,099
mean we I know we briefly talked about

1277
00:54:00,829 --> 00:53:58,859
how the fear has to you we have to be in

1278
00:54:02,930 --> 00:54:00,839
a controlled environment where this has

1279
00:54:05,329 --> 00:54:02,940
to be properly conducted but with the

1280
00:54:07,490 --> 00:54:05,339
introduction of imagery restricting do

1281
00:54:09,890 --> 00:54:07,500
you think we can do anything in that

1282
00:54:16,460 --> 00:54:09,900
regard or or no we still have certain

1283
00:54:22,010 --> 00:54:19,130
[Music]

1284
00:54:22,970 --> 00:54:22,020
I think that for instance in for if when

1285
00:54:27,170 --> 00:54:22,980
we

1286
00:54:29,650 --> 00:54:27,180
um use the procedure in specific fears

1287
00:54:31,930 --> 00:54:29,660
and phobias but we actually asked the

1288
00:54:35,150 --> 00:54:31,940

participant to

1289

00:54:38,030 --> 00:54:35,160

approach for instance the spider or the

1290

00:54:40,609 --> 00:54:38,040

dog and and then I mean

1291

00:54:43,010 --> 00:54:40,619

usually they would sort of uh run away

1292

00:54:45,470 --> 00:54:43,020

because I think if I approach it then

1293

00:54:47,930 --> 00:54:45,480

something very bad happens and then they

1294

00:54:49,910 --> 00:54:47,940

experience that it doesn't happen

1295

00:54:51,950 --> 00:54:49,920

so this is sort of new something new

1296

00:54:54,049 --> 00:54:51,960

it's a new experience and that's the

1297

00:54:57,190 --> 00:54:54,059

idea is that this is necessary to open

1298

00:55:00,290 --> 00:54:57,200

up the memory Trace

1299

00:55:03,109 --> 00:55:00,300

uh and for trauma memory it could be

1300

00:55:05,690 --> 00:55:03,119

that especially sometimes you we see uh

1301
00:55:08,150 --> 00:55:05,700
traumatized people and they went over

1302
00:55:10,609 --> 00:55:08,160
and over the trauma memory and the

1303
00:55:12,470 --> 00:55:10,619
trauma story and then it's really hard

1304
00:55:16,069 --> 00:55:12,480
just by going back

1305
00:55:17,510 --> 00:55:16,079
to to open up the memory trace and do

1306
00:55:20,890 --> 00:55:17,520
and then when we do a little bit of

1307
00:55:25,490 --> 00:55:20,900
restricting it could help to destabilize

1308
00:55:29,990 --> 00:55:27,950
right so so in a sense it is possible

1309
00:55:32,329 --> 00:55:30,000
then to do something in conjunction

1310
00:55:34,309 --> 00:55:32,339
with because I know in that study you

1311
00:55:38,270 --> 00:55:34,319
did not introduce beta blockers right it

1312
00:55:41,030 --> 00:55:38,280
was purely yeah well or so then so we we

1313
00:55:42,829 --> 00:55:41,040

did it we over edit this already so a

1314

00:55:47,569 --> 00:55:42,839

couple of times then it's only one

1315

00:55:51,349 --> 00:55:47,579

session but I also supervised several uh

1316

00:55:54,530 --> 00:55:51,359

um so a recent uh huge trial and also in

1317

00:55:56,630 --> 00:55:54,540

the in the past trial uh where we only

1318

00:55:58,670 --> 00:55:56,640

did imagery scripting but then it's more

1319

00:56:01,490 --> 00:55:58,680

like a traditional cognitive behavior

1320

00:56:04,430 --> 00:56:01,500

treatment and you do sort of weekly uh

1321

00:56:07,549 --> 00:56:04,440

sessions many sessions in a row

1322

00:56:12,530 --> 00:56:07,559

right right right yeah okay my question

1323

00:56:15,530 --> 00:56:12,540

on disgust is is it possible to

1324

00:56:18,589 --> 00:56:15,540

have a technique for disgust that would

1325

00:56:21,829 --> 00:56:18,599

eliminate it and mirror would it be the

1326
00:56:26,089 --> 00:56:21,839
same process except as as fear removal

1327
00:56:28,250 --> 00:56:26,099
but instead with the disgusting stimulus

1328
00:56:30,530 --> 00:56:28,260
so for example uh if someone is

1329
00:56:33,290 --> 00:56:30,540
completely grossed out by by blood or by

1330
00:56:36,349 --> 00:56:33,300
public toilets uh how would they

1331
00:56:39,710 --> 00:56:36,359
overcome this this discuss would they do

1332
00:56:44,390 --> 00:56:41,630
yeah

1333
00:56:50,930 --> 00:56:46,970
I don't know I don't think sometimes we

1334
00:56:53,990 --> 00:56:50,940
see people with a fear of spiders but

1335
00:56:57,530 --> 00:56:54,000
sometimes they also find the spiders

1336
00:57:02,390 --> 00:56:58,549
um

1337
00:57:05,329 --> 00:57:02,400
we have the ID but we never really

1338
00:57:07,790 --> 00:57:05,339

tested it that that's the treatment then

1339

00:57:11,089 --> 00:57:07,800

reduces the fear response but that the

1340

00:57:12,349 --> 00:57:11,099

disgusts remains intact I can imagine

1341

00:57:15,349 --> 00:57:12,359

though

1342

00:57:17,390 --> 00:57:15,359

that if they disgust is that sometimes

1343

00:57:20,809 --> 00:57:17,400

if for instance disgust is so strong

1344

00:57:24,530 --> 00:57:20,819

that people are yeah are afraid of the

1345

00:57:26,809 --> 00:57:24,540

disgusts I mean not two to a degree some

1346

00:57:29,870 --> 00:57:26,819

people have a sort of

1347

00:57:31,849 --> 00:57:29,880

cheese aversion or so or milk aversion

1348

00:57:35,030 --> 00:57:31,859

so they have sort of discussed for some

1349

00:57:36,950 --> 00:57:35,040

smells or and so on and I think by I

1350

00:57:39,109 --> 00:57:36,960

don't think that we can treat that but

1351

00:57:41,809 --> 00:57:39,119

then if people really

1352

00:57:44,870 --> 00:57:41,819

fear that if they are exposed

1353

00:57:46,849 --> 00:57:44,880

to something that would trigger such a

1354

00:57:49,970 --> 00:57:46,859

strong discussed feeling that they will

1355

00:57:53,150 --> 00:57:49,980

faint or whatever we could

1356

00:57:55,849 --> 00:57:53,160

treat that so then the discus is more

1357

00:57:59,510 --> 00:57:55,859

like what a spider or a dog is for

1358

00:58:02,569 --> 00:57:59,520

people with a animal phobia

1359

00:58:04,430 --> 00:58:02,579

I see thank you now before we wrap up I

1360

00:58:06,170 --> 00:58:04,440

have an analogy that I made that I think

1361

00:58:07,609 --> 00:58:06,180

is completely naive and I want you to

1362

00:58:09,170 --> 00:58:07,619

correct it because I couldn't figure out

1363

00:58:10,549 --> 00:58:09,180

a better way of conceptualizing your

1364

00:58:12,470 --> 00:58:10,559

research as to why beta blockers

1365

00:58:13,849 --> 00:58:12,480

afterwards Works rather than before so

1366

00:58:16,609 --> 00:58:13,859

the way that I see it is when you get

1367

00:58:18,049 --> 00:58:16,619

exposed to a fearful stimuli it's as if

1368

00:58:19,970 --> 00:58:18,059

imagine you have a cabinet behind you

1369

00:58:21,650 --> 00:58:19,980

and this is an oversimplification and

1370

00:58:23,750 --> 00:58:21,660

each one of the drawers in the cabinet

1371

00:58:26,210 --> 00:58:23,760

is a memory it's as if what you've done

1372

00:58:27,290 --> 00:58:26,220

in the fear example is you've opened up

1373

00:58:29,510 --> 00:58:27,300

that drawer

1374

00:58:30,890 --> 00:58:29,520

however if you take the beta blockers

1375

00:58:32,390 --> 00:58:30,900

before because I believe memory

1376

00:58:34,010 --> 00:58:32,400

consolidation is highly dependent on

1377

00:58:35,089 --> 00:58:34,020

beta receptors in your brain that if you

1378

00:58:36,770 --> 00:58:35,099

take beta blockers that actually

1379

00:58:38,270 --> 00:58:36,780

interferes with you formulating memories

1380

00:58:39,770 --> 00:58:38,280

so if you were to take the beta blocker

1381

00:58:41,510 --> 00:58:39,780

before it would be as if maybe you open

1382

00:58:43,250 --> 00:58:41,520

up that drawer but the rewrite

1383

00:58:45,349 --> 00:58:43,260

capabilities are not there because the

1384

00:58:47,930 --> 00:58:45,359

beta receptors for some reason need to

1385

00:58:49,670 --> 00:58:47,940

be active for the rewrite abilities to

1386

00:58:51,770 --> 00:58:49,680

be available then you take the beta

1387

00:58:53,870 --> 00:58:51,780

blockers afterwards because it's not as

1388

00:58:55,670 --> 00:58:53,880

if the memory gets rewrote I know this

1389

00:58:58,010 --> 00:58:55,680

is so convoluted it's not as if the

1390

00:58:59,569 --> 00:58:58,020

memory gets Rewritten right then it gets

1391

00:59:01,789 --> 00:58:59,579

Rewritten about two hours later or one

1392

00:59:03,829 --> 00:59:01,799

hour later so it's like fear stimuli

1393

00:59:05,329 --> 00:59:03,839

open up that drawer don't rewrite in it

1394

00:59:06,950 --> 00:59:05,339

wait one hour then the brain is going to

1395

00:59:09,170 --> 00:59:06,960

rewrite it but the brain at one hour

1396

00:59:10,849 --> 00:59:09,180

from now looks to the body how are you

1397

00:59:12,349 --> 00:59:10,859

feeling are you afraid and then it will

1398

00:59:13,789 --> 00:59:12,359

rewrite based on that so that's why if

1399

00:59:15,530 --> 00:59:13,799

you take a beta blocker afterwards and

1400

00:59:17,990 --> 00:59:15,540

you're calm it's like okay we're about

1401
00:59:20,329 --> 00:59:18,000
to rewrite but now I see your com let's

1402
00:59:22,130 --> 00:59:20,339
rewrite it and say calmness let's put

1403
00:59:24,770 --> 00:59:22,140
the hashtag com on it what's wrong with

1404
00:59:26,870 --> 00:59:24,780
that yeah you said a lot first of all I

1405
00:59:30,829 --> 00:59:26,880
think that the the actual rewriting

1406
00:59:36,890 --> 00:59:34,010
um and that's probably the there's more

1407
00:59:39,170 --> 00:59:36,900
work on that probably the face where

1408
00:59:41,510 --> 00:59:39,180
when there's no new incoming information

1409
00:59:43,549 --> 00:59:41,520
it's sort of that for the brain that is

1410
00:59:45,170 --> 00:59:43,559
probably the sort of best face to decide

1411
00:59:47,930 --> 00:59:45,180
if this is the information that should

1412
00:59:49,609 --> 00:59:47,940
be kept and this can be forgotten so

1413
00:59:51,530 --> 00:59:49,619

that makes sense to do that when there

1414

00:59:54,470 --> 00:59:51,540

is no new incoming information that is

1415

00:59:57,589 --> 00:59:54,480

during the night but there are of course

1416

01:00:01,010 --> 00:59:57,599

several important steps in this whole

1417

01:00:02,809 --> 01:00:01,020

process of resetting so the the what we

1418

01:00:05,210 --> 01:00:02,819

have shown is that you should give the

1419

01:00:06,890 --> 01:00:05,220

beta blocker up to one hour after memory

1420

01:00:10,789 --> 01:00:06,900

retrieve and not two hours is probably

1421

01:00:13,190 --> 01:00:10,799

because in this in this brief window

1422

01:00:14,510 --> 01:00:13,200

time window the beta generic receptors

1423

01:00:15,589 --> 01:00:14,520

are involved but there are of course

1424

01:00:18,170 --> 01:00:15,599

many other

1425

01:00:21,230 --> 01:00:18,180

steps in this whole Cascade of memory

1426

01:00:24,710 --> 01:00:21,240

resaving but the actually writing

1427

01:00:28,730 --> 01:00:25,490

um

1428

01:00:32,030 --> 01:00:28,740

I think in the in the lab when we did a

1429

01:00:34,670 --> 01:00:32,040

fair conditioning and we do not measure

1430

01:00:37,069 --> 01:00:34,680

freezing what they do in rodents but we

1431

01:00:38,690 --> 01:00:37,079

measure the start or reflect this is I

1432

01:00:39,950 --> 01:00:38,700

blink reflex

1433

01:00:42,530 --> 01:00:39,960

so

1434

01:00:46,010 --> 01:00:42,540

um this is uh yeah you cannot control

1435

01:00:48,829 --> 01:00:46,020

this reflex it's a defensive reflex

1436

01:00:50,870 --> 01:00:48,839

um initiated in the Amica lab and that

1437

01:00:52,250 --> 01:00:50,880

is typically potentiated when people

1438

01:00:53,630 --> 01:00:52,260

anticipate

1439

01:00:56,089 --> 01:00:53,640

something

1440

01:00:58,849 --> 01:00:56,099

threatening so when they are in a

1441

01:01:01,010 --> 01:00:58,859

fearful State you see an enhanced

1442

01:01:05,210 --> 01:01:01,020

startle

1443

01:01:06,010 --> 01:01:05,220

about reflex startup position

1444

01:01:07,690 --> 01:01:06,020

um

1445

01:01:10,970 --> 01:01:07,700

[Music]

1446

01:01:13,789 --> 01:01:10,980

this uh defense of fear Behavior was not

1447

01:01:16,309 --> 01:01:13,799

suppressed when we gave Propranolol

1448

01:01:18,109 --> 01:01:16,319

before memory retrieval

1449

01:01:19,490 --> 01:01:18,119

so

1450

01:01:27,589 --> 01:01:19,500

and

1451

01:01:30,650 --> 01:01:27,599

apparently targeted the the beta genetic

1452

01:01:34,130 --> 01:01:30,660

receptors in in the phase where it shoot

1453

01:01:36,890 --> 01:01:34,140

if you do it if you give propranolol

1454

01:01:39,470 --> 01:01:36,900

um to people that suffer from that that

1455

01:01:40,370 --> 01:01:39,480

suffer from a phobia

1456

01:01:43,789 --> 01:01:40,380

um

1457

01:01:45,650 --> 01:01:43,799

the fear response itself is part of the

1458

01:01:48,109 --> 01:01:45,660

in the subjective fear is part of the

1459

01:01:50,930 --> 01:01:48,119

emotional memory so if you suppress that

1460

01:01:54,410 --> 01:01:50,940

I also think that it doesn't work

1461

01:01:57,349 --> 01:01:54,420

because this information feedbacks and

1462

01:01:59,630 --> 01:01:57,359

is part of the reactivation of the of

1463

01:02:02,150 --> 01:01:59,640

the fear memory so for that reason I

1464

01:02:05,270 --> 01:02:02,160

also would not give it before and would

1465

01:02:08,270 --> 01:02:05,280

not suppress the fair response in people

1466

01:02:10,069 --> 01:02:08,280

with fears and phobias

1467

01:02:11,390 --> 01:02:10,079

you said that you can also give beta

1468

01:02:12,950 --> 01:02:11,400

blockers to people in the morning but

1469

01:02:14,569 --> 01:02:12,960

beta blockers have a half-life of about

1470

01:02:15,950 --> 01:02:14,579

five hours so that means 12 hours from

1471

01:02:18,589 --> 01:02:15,960

now that's almost gone from your system

1472

01:02:20,089 --> 01:02:18,599

why is it that then the memory rewriting

1473

01:02:21,829 --> 01:02:20,099

that happens at night time when you

1474

01:02:23,390 --> 01:02:21,839

sleep is affected by the beta blockers

1475

01:02:26,089 --> 01:02:23,400

earlier why does the beta blocker have

1476

01:02:27,589 --> 01:02:26,099

an effect if it's gone by the time that

1477

01:02:29,660 --> 01:02:27,599

you're rewriting your memories when

1478

01:02:30,650 --> 01:02:29,670

you're sleeping

1479

01:02:31,490 --> 01:02:30,660

[Music]

1480

01:02:33,650 --> 01:02:31,500

um

1481

01:02:34,370 --> 01:02:33,660

yeah because

1482

01:02:36,589 --> 01:02:34,380

um

1483

01:02:39,230 --> 01:02:36,599

the effect of the beta blockers is it's

1484

01:02:42,530 --> 01:02:39,240

not that it's sort of

1485

01:02:44,270 --> 01:02:42,540

I mean beta blockers we also have been

1486

01:02:46,490 --> 01:02:44,280

um it blocks a beta genetic receptors

1487

01:02:49,309 --> 01:02:46,500

there in the brain but also in the heart

1488

01:02:50,569 --> 01:02:49,319

so if you take a beta blocker in a

1489

01:02:53,809 --> 01:02:50,579

situation where you're normally

1490

01:02:56,270 --> 01:02:53,819

stressful you you feel that because

1491

01:02:58,069 --> 01:02:56,280

peripherally you don't have the bodily

1492

01:03:01,309 --> 01:02:58,079

responses that you normally would have

1493

01:03:05,210 --> 01:03:03,170

um but

1494

01:03:07,730 --> 01:03:05,220

um by the way we tested also another

1495

01:03:09,829 --> 01:03:07,740

beta blocker nadalol which has the same

1496

01:03:11,390 --> 01:03:09,839

bodily effect but does not pass the

1497

01:03:13,430 --> 01:03:11,400

blood brain barrier and there doesn't

1498

01:03:15,710 --> 01:03:13,440

work so it's really the central effect

1499

01:03:17,450 --> 01:03:15,720

in the brain that explains the fear

1500

01:03:19,130 --> 01:03:17,460

reduction

1501

01:03:22,870 --> 01:03:19,140

um

1502

01:03:25,849 --> 01:03:22,880

so the beta blocker does not work by

1503

01:03:28,849 --> 01:03:25,859

suppressing the peripheral the bodily

1504

01:03:31,329 --> 01:03:28,859

fear response it works because in a

1505

01:03:33,589 --> 01:03:31,339

specific time window it's it's

1506

01:03:36,589 --> 01:03:33,599

blocks the beta a genetic receptors

1507

01:03:39,349 --> 01:03:36,599

receptors and therefore the adrenaline

1508

01:03:41,870 --> 01:03:39,359

as a as a neurotransmitter in a brain

1509

01:03:46,069 --> 01:03:41,880

cannot signal

1510

01:03:49,010 --> 01:03:46,079

um other cells that are necessary to uh

1511

01:03:51,530 --> 01:03:49,020

synthesize the proteins which are

1512

01:03:54,170 --> 01:03:51,540

normally used for the reshaping of the

1513

01:04:00,410 --> 01:03:58,069

okay I see so Horizon and even DOTA

1514

01:04:02,510 --> 01:04:00,420

protein synthesis may take place later

1515

01:04:04,849 --> 01:04:02,520

it does not mean that all these

1516

01:04:06,530 --> 01:04:04,859

neurobiological processes take place at

1517

01:04:09,049 --> 01:04:06,540

the same time they have

1518

01:04:10,970 --> 01:04:09,059

in that sense probably their own time

1519

01:04:13,910 --> 01:04:10,980

window

1520

01:04:15,770 --> 01:04:13,920

I see so I'm pretty much wrapped with my

1521

01:04:17,809 --> 01:04:15,780

questions as far as repeater do you have

1522

01:04:20,450 --> 01:04:17,819

any follow-ups

1523

01:04:22,069 --> 01:04:20,460

um just maybe if you could as my final

1524

01:04:23,630 --> 01:04:22,079

question if you could briefly maybe talk

1525

01:04:25,430 --> 01:04:23,640

about the future challenges and

1526

01:04:27,890 --> 01:04:25,440

limitations in determining the exact

1527

01:04:29,930 --> 01:04:27,900

role and impact of propranol if you want

1528

01:04:31,549 --> 01:04:29,940

to summarize that

1529

01:04:33,289 --> 01:04:31,559

um in terms with regards to fear

1530

01:04:37,069 --> 01:04:33,299

Extinction that would be great but other

1531

01:04:43,849 --> 01:04:40,970

yeah we um we we are

1532

01:04:46,010 --> 01:04:43,859

currently working on so what is

1533

01:04:47,210 --> 01:04:46,020

important is that there is no I think I

1534

01:04:50,210 --> 01:04:47,220

haven't

1535

01:04:55,569 --> 01:04:50,220

said that so what makes it so difficult

1536

01:05:00,650 --> 01:04:58,490

exposure or in the laboratory memory

1537

01:05:02,930 --> 01:05:00,660

reactivation procedure that always

1538

01:05:04,609 --> 01:05:02,940

triggers the process of memory

1539

01:05:06,170 --> 01:05:04,619

reconsolidation

1540

01:05:09,530 --> 01:05:06,180

so whether

1541

01:05:12,829 --> 01:05:09,540

a brief exposure destabilizes the memory

1542

01:05:15,829 --> 01:05:12,839

depends both on the learning history so

1543

01:05:17,470 --> 01:05:15,839

on the memory representation itself and

1544

01:05:19,370 --> 01:05:17,480

on the

1545

01:05:21,770 --> 01:05:19,380

retrieval

1546

01:05:23,690 --> 01:05:21,780

or on the exposure so this is the

1547

01:05:26,450 --> 01:05:23,700

interaction between these two and that

1548

01:05:30,069 --> 01:05:26,460

this makes it quite a challenge it means

1549

01:05:31,970 --> 01:05:30,079

that for instance a stronger memory

1550

01:05:35,210 --> 01:05:31,980

requires

1551
01:05:36,770 --> 01:05:35,220
sometimes a longer exposure than a

1552
01:05:41,270 --> 01:05:36,780
weaker memory

1553
01:05:44,390 --> 01:05:42,349
um

1554
01:05:46,250 --> 01:05:44,400
but yeah I mean the memory is a

1555
01:05:48,170 --> 01:05:46,260
theoretical construct so we can only

1556
01:05:50,569 --> 01:05:48,180
observe the behavior and we cannot say

1557
01:05:52,430 --> 01:05:50,579
on basis of the behavior this is a

1558
01:05:55,490 --> 01:05:52,440
strong memory and this is a weak memory

1559
01:05:58,630 --> 01:05:55,500
and this is for this strong memory you

1560
01:06:01,849 --> 01:05:58,640
need a one minute exposure and for this

1561
01:06:04,130 --> 01:06:01,859
memory is three minutes so so

1562
01:06:05,930 --> 01:06:04,140
so we are actually because of this

1563
01:06:08,510 --> 01:06:05,940

interaction and in the lab we can really

1564

01:06:10,549 --> 01:06:08,520

control that and we did so so we changed

1565

01:06:12,049 --> 01:06:10,559

we can really play around with the

1566

01:06:14,990 --> 01:06:12,059

learning history in the lab with the

1567

01:06:18,230 --> 01:06:15,000

fair conditioning and then and then see

1568

01:06:21,530 --> 01:06:18,240

okay we can control if if we then expose

1569

01:06:24,109 --> 01:06:21,540

them to one or two trials it's it's it

1570

01:06:25,490 --> 01:06:24,119

works and then to a bit more then it

1571

01:06:28,430 --> 01:06:25,500

doesn't work anymore and we understand

1572

01:06:30,770 --> 01:06:28,440

why in clinical practice when we work

1573

01:06:32,450 --> 01:06:30,780

with people with a phobia we have we do

1574

01:06:33,670 --> 01:06:32,460

nothing about the learning history this

1575

01:06:36,589 --> 01:06:33,680

very often there are many many

1576

01:06:39,470 --> 01:06:36,599

experiences or it can be very implicit

1577

01:06:41,589 --> 01:06:39,480

learning or indirect we don't know so we

1578

01:06:44,210 --> 01:06:41,599

have to guess what is actually necessary

1579

01:06:47,390 --> 01:06:44,220

to destabilize the memory and this is

1580

01:06:47,990 --> 01:06:47,400

what we yeah we try to

1581

01:06:50,510 --> 01:06:48,000

um

1582

01:06:52,190 --> 01:06:50,520

to do in in our current research to

1583

01:06:55,430 --> 01:06:52,200

understand it better so that we can

1584

01:06:58,670 --> 01:06:55,440

better control when what's a boundary

1585

01:07:01,010 --> 01:06:58,680

and necessary conditions are when we

1586

01:07:03,230 --> 01:07:01,020

translate our findings to

1587

01:07:05,630 --> 01:07:03,240

um to clinical practice

1588

01:07:08,089 --> 01:07:05,640

doctor speaking of your current research

1589

01:07:11,329 --> 01:07:08,099

where can our audience find out more

1590

01:07:13,190 --> 01:07:11,339

about you and are there ways that they

1591

01:07:16,309 --> 01:07:13,200

can support you and your work

1592

01:07:17,329 --> 01:07:16,319

and that I believe will be our final

1593

01:07:20,930 --> 01:07:17,339

question

1594

01:07:22,849 --> 01:07:20,940

yeah well I can also send my Links of

1595

01:07:25,849 --> 01:07:22,859

course to the UVA University of

1596

01:07:26,070 --> 01:07:25,859

Amsterdam uh and also the link to the

1597

01:07:28,370 --> 01:07:26,080

clinic

1598

01:07:30,829 --> 01:07:28,380

[Music]

1599

01:07:34,370 --> 01:07:30,839

thank you very much

1600

01:07:36,529 --> 01:07:34,380

thank you so much appreciate it

1601
01:07:38,210 --> 01:07:36,539
the podcast is now concluded thank you

1602
01:07:40,130 --> 01:07:38,220
for watching if you haven't subscribed

1603
01:07:42,109 --> 01:07:40,140
or clicked on that like button now would

1604
01:07:44,930 --> 01:07:42,119
be a great time to do so as each

1605
01:07:46,970 --> 01:07:44,940
subscribe and like helps YouTube push

1606
01:07:48,770 --> 01:07:46,980
this content to more people also I

1607
01:07:51,170 --> 01:07:48,780
recently found out that external links

1608
01:07:53,630 --> 01:07:51,180
count plenty toward the algorithm which

1609
01:07:54,890 --> 01:07:53,640
means that when you share on Twitter on

1610
01:07:57,109 --> 01:07:54,900
Facebook on Reddit

1611
01:07:58,910 --> 01:07:57,119
Etc it shows YouTube that people are

1612
01:08:01,010 --> 01:07:58,920
talking about this outside of YouTube

1613
01:08:02,870 --> 01:08:01,020

which in turn greatly AIDS the

1614

01:08:04,490 --> 01:08:02,880

Distribution on YouTube as well if you'd

1615

01:08:06,849 --> 01:08:04,500

like to support more conversations like

1616

01:08:08,930 --> 01:08:06,859

this then do consider visiting

1617

01:08:11,150 --> 01:08:08,940

theoriesofeverything.org again it's

1618

01:08:13,549 --> 01:08:11,160

support from the sponsors and you that

1619

01:08:15,230 --> 01:08:13,559

allow me to work on toe full time you

1620

01:08:17,329 --> 01:08:15,240

get early access to ad-free audio

1621

01:08:19,430 --> 01:08:17,339

episodes there as well every dollar

1622

01:08:21,470 --> 01:08:19,440

helps far more than you may think either