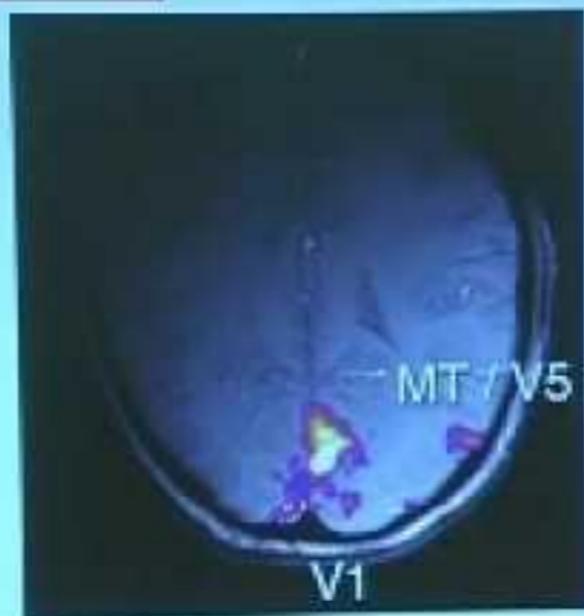# Activation with Moving Visual Stimuli

1
00:00:08,419 --> 00:00:06,680
great I'm going to be here today and I'm

2
00:00:13,039 --> 00:00:08,429
going to talk about some brain imaging

3
00:00:16,010 --> 00:00:13,049
of the brain signals from subjects that

4
00:00:18,320 --> 00:00:16,020
we've studied with correlated brain

5
00:00:20,359 --> 00:00:18,330
signals now first of all I wanted to

6
00:00:23,480 --> 00:00:20,369
acknowledge all my collaborators and

7
00:00:26,150 --> 00:00:23,490
co-investigators Liana Standish from

8
00:00:29,720 --> 00:00:26,160
bastyr university Laila Kozak Jeanne

9
00:00:31,910 --> 00:00:29,730
actor Berg Karen cook James Lake Clark

10
00:00:34,340 --> 00:00:31,920
Johnson and we wanted to thank Dean

11
00:00:36,799 --> 00:00:34,350
Radin for help with our EEG alpha

12
00:00:42,170 --> 00:00:36,809
analysis to which I'll show a little bit

13
00:00:44,030 --> 00:00:42,180

later on so the question is is there

14
00:00:46,430 --> 00:00:44,040
evidence for correlations between

15
00:00:49,220 --> 00:00:46,440
distance intentionality and brain

16
00:00:52,549 --> 00:00:49,230
function in recipients of distance

17
00:00:59,180 --> 00:00:52,559
intentionality who are tested using fMRI

18
00:01:00,740 --> 00:00:59,190
and EEG now for a background history has

19
00:01:03,860 --> 00:01:00,750
shown evidence for connection between

20
00:01:07,250 --> 00:01:03,870
human beings we all like connections

21
00:01:09,410 --> 00:01:07,260
between those we love and those that we

22
00:01:11,679 --> 00:01:09,420
work with and so how are we connected

23
00:01:15,080 --> 00:01:11,689
there could be spiritual connections

24
00:01:17,749 --> 00:01:15,090
emotional connections sensory

25
00:01:20,719 --> 00:01:17,759
connections now all of you you have a

26
00:01:23,300 --> 00:01:20,729
sensory connection with me right now so

27
00:01:25,760 --> 00:01:23,310
you can you can see me and I can see you

28
00:01:28,700 --> 00:01:25,770
I have a sensory connection and then

29
00:01:32,870 --> 00:01:28,710
there's energy connections so all of

30
00:01:36,920 --> 00:01:32,880
these have influence on how my theory is

31
00:01:40,010 --> 00:01:36,930
on how the brain works okay so a little

32
00:01:43,069 --> 00:01:40,020
bit of background in my regular work I

33
00:01:46,789 --> 00:01:43,079
do brain imaging of different diseases

34
00:01:48,740 --> 00:01:46,799
and and different research projects so

35
00:01:50,810 --> 00:01:48,750
one of my biggest projects is to study

36
00:01:53,120 --> 00:01:50,820
children with learning disabilities and

37
00:01:55,550 --> 00:01:53,130
so I do a lot of brain imaging of

38
00:01:59,090 --> 00:01:55,560

language in children with learning

39
00:02:00,800 --> 00:01:59,100
disabilities but so functional magnetic

40
00:02:03,620 --> 00:02:00,810
resonance imaging is a technique for

41
00:02:06,440 --> 00:02:03,630
measuring brain activation using blood

42
00:02:10,369 --> 00:02:06,450
oxygen level dependence which is called

43
00:02:13,040 --> 00:02:10,379
bold but now fMRI is completely

44
00:02:15,410 --> 00:02:13,050
dependent on the water in the brain

45
00:02:17,870 --> 00:02:15,420
so we've heard some talk before about

46
00:02:20,390 --> 00:02:17,880
the importance of water and that's

47
00:02:23,440 --> 00:02:20,400
exactly what we're measuring in the

48
00:02:27,350 --> 00:02:23,450
brain is the water signal which may be

49
00:02:32,000 --> 00:02:27,360
influenced by the oxygen but the real

50
00:02:34,460 --> 00:02:32,010
signal is coming from the water so how

51
00:02:37,250 --> 00:02:34,470
is it statistically tested is there a

52
00:02:40,280 --> 00:02:37,260
possibility of false positives and I'll

53
00:02:44,780 --> 00:02:40,290
go through some of the statistical tests

54
00:02:49,670 --> 00:02:44,790
that we use to test for the significance

55
00:02:53,090 --> 00:02:49,680
of brain activation that we get so

56
00:02:56,150 --> 00:02:53,100
there's been a blossoming of MRI in the

57
00:02:58,340 --> 00:02:56,160
in its ability to brain scan and I

58
00:03:02,000 --> 00:02:58,350
borrowed some slides from Mark Cohen

59
00:03:03,860 --> 00:03:02,010
from UCLA and so and I'm going to give

60
00:03:07,070 --> 00:03:03,870
you a little background on brain imaging

61
00:03:08,990 --> 00:03:07,080
but there's a blossoming of advances in

62
00:03:11,150 --> 00:03:09,000
brain imaging techniques that's happened

63
00:03:13,610 --> 00:03:11,160

and just like the past five to ten years

64
00:03:15,530 --> 00:03:13,620
that's allowed us to measure new things

65
00:03:22,430 --> 00:03:15,540
in the brain that we haven't been able

66
00:03:26,570 --> 00:03:22,440
to do before okay so brain activation is

67
00:03:28,940 --> 00:03:26,580
what happens when you think so so if all

68
00:03:31,040 --> 00:03:28,950
of you put up your right hand and you if

69
00:03:33,680 --> 00:03:31,050
all of you go like this with your right

70
00:03:37,280 --> 00:03:33,690
hand and as you're doing this you are

71
00:03:40,340 --> 00:03:37,290
activating your motor cortex on your

72
00:03:43,880 --> 00:03:40,350
left side so it crosses over so your

73
00:03:47,180 --> 00:03:43,890
right hand activates part on your left

74
00:03:49,760 --> 00:03:47,190
brain it crosses over and so you're

75
00:03:52,160 --> 00:03:49,770
activating parts of your motor cortex

76
00:03:55,729 --> 00:03:52,170
right up here of your left side of your

77
00:03:58,370 --> 00:03:55,739
brain and this causes a change in CBF

78
00:04:01,729 --> 00:03:58,380
stands for cerebral blood flow it

79
00:04:04,880 --> 00:04:01,739
changes the cerebral blood volume oxygen

80
00:04:08,870 --> 00:04:04,890
and venous oxygen and glucose

81
00:04:10,759 --> 00:04:08,880
utilization so all of these things

82
00:04:15,140 --> 00:04:10,769
happen is your change your brain

83
00:04:18,229 --> 00:04:15,150
activation now it also changes the

84
00:04:19,930 --> 00:04:18,239
electrical activity in your brain which

85
00:04:24,060 --> 00:04:19,940
you can measure with

86
00:04:28,290 --> 00:04:24,070
electroencephalography techniques

87
00:04:31,020 --> 00:04:28,300
and so the the technique with functional

88
00:04:34,130 --> 00:04:31,030

MRI is dependent on the fact that we

89
00:04:37,140 --> 00:04:34,140
have an influence of the blood oxygen on

90
00:04:39,240 --> 00:04:37,150
the tissue a signal that we get even

91
00:04:41,880 --> 00:04:39,250
though it's some distant it could be

92
00:04:44,820 --> 00:04:41,890
some distant from the from the blood

93
00:04:47,520 --> 00:04:44,830
vessel so here's the blood vessel in the

94
00:04:50,400 --> 00:04:47,530
brain and we can pick up signal over

95
00:04:52,530 --> 00:04:50,410
here because of the influence of the

96
00:04:57,650 --> 00:04:52,540
oxygen on the water in the tissue over

97
00:05:00,120 --> 00:04:57,660
here okay so one of the first

98
00:05:03,990 --> 00:05:00,130
experiments done with functional MRI was

99
00:05:06,450 --> 00:05:04,000
with photic stimulation and so you can

100
00:05:09,210 --> 00:05:06,460
measure the brain signal say every three

101
00:05:11,700 --> 00:05:09,220
seconds and you keep going beep beep

102
00:05:15,690 --> 00:05:11,710
beep and you go on and then you go off

103
00:05:18,510 --> 00:05:15,700
and you go on I sell off and on and as

104
00:05:21,470 --> 00:05:18,520
you change the stimulus you get a change

105
00:05:25,410 --> 00:05:21,480
in the brain activation as seen by the

106
00:05:27,770 --> 00:05:25,420
mr signal intensity and so we can see

107
00:05:31,110 --> 00:05:27,780
this change and then we can do

108
00:05:33,720 --> 00:05:31,120
statistics to test is this significantly

109
00:05:37,590 --> 00:05:33,730
different than this for all the

110
00:05:41,070 --> 00:05:37,600
different parts of the brain so in

111
00:05:43,440 --> 00:05:41,080
photic stimulation we in this case there

112
00:05:45,990 --> 00:05:43,450
are stimulating for 60 seconds at a time

113
00:05:48,960 --> 00:05:46,000

and then they switch tasks for another

114
00:05:50,940 --> 00:05:48,970
60 seconds and then they switch now

115
00:05:54,180 --> 00:05:50,950
typically we go through about five

116
00:05:56,790 --> 00:05:54,190
cycles of on-off period to get enough

117
00:06:02,370 --> 00:05:56,800
statistics to make a statement about

118
00:06:04,740 --> 00:06:02,380
brain activation so this is an example

119
00:06:08,370 --> 00:06:04,750
of activation with a moving visual

120
00:06:11,400 --> 00:06:08,380
stimulus and so here's here it is in the

121
00:06:14,610 --> 00:06:11,410
back of the brain in the mt region of

122
00:06:20,460 --> 00:06:14,620
the brain v5 these are areas of visual

123
00:06:22,680 --> 00:06:20,470
processing in the brain ok and then to

124
00:06:25,800 --> 00:06:22,690
process the signal we do allow some

125
00:06:28,380 --> 00:06:25,810
problem convolution of the impulse

126
00:06:30,930 --> 00:06:28,390
function in order to process this

127
00:06:33,270 --> 00:06:30,940
because there is a delay so after you

128
00:06:36,510 --> 00:06:33,280
get a stimulus there is a delay of about

129
00:06:37,010 --> 00:06:36,520
five seconds between the onset of the

130
00:06:43,339 --> 00:06:37,020
stimuli

131
00:06:46,279 --> 00:06:43,349
and the change in the bold signal ok so

132
00:06:49,249 --> 00:06:46,289
the temporal resolution is limiting in

133
00:06:52,369 --> 00:06:49,259
fMRI that's one of the limitations and

134
00:06:55,309 --> 00:06:52,379
that's why we like both f MRI and EEG

135
00:06:59,360 --> 00:06:55,319
because the temporal resolution is very

136
00:07:04,309 --> 00:06:59,370
slow in fMRI but the spatial resolution

137
00:07:06,409 --> 00:07:04,319
is very good so we like to do both f MRI

138
00:07:09,439 --> 00:07:06,419

and EEG because we get the best of both

139
00:07:15,740 --> 00:07:09,449
worlds the spatial resolution with fMRI

140
00:07:20,510 --> 00:07:15,750
and the temporal resolution with EEG ok

141
00:07:23,149 --> 00:07:20,520
now we use software developed by a group

142
00:07:27,140 --> 00:07:23,159
and Oxford called FSL so we have

143
00:07:31,240 --> 00:07:27,150
software developed to do the statistics

144
00:07:34,490 --> 00:07:31,250
of the brain signal and we can measure

145
00:07:38,629 --> 00:07:34,500
single-subject statistics and we can do

146
00:07:41,749 --> 00:07:38,639
group statistics let me go ok and it's

147
00:07:44,330 --> 00:07:41,759
called the GLM estimation so we have

148
00:07:47,420 --> 00:07:44,340
this model that we apply to the brain

149
00:07:50,089 --> 00:07:47,430
signal which we use to figure out how

150
00:07:52,760 --> 00:07:50,099
close the model fits with the actual

151
00:07:55,100 --> 00:07:52,770
signal we get from the brain and we use

152
00:07:57,260 --> 00:07:55,110
that model to test every voxel in the

153
00:08:03,140 --> 00:07:57,270
brain to see if there's a significant

154
00:08:07,850 --> 00:08:03,150
activation and we do some

155
00:08:10,909 --> 00:08:07,860
autocorrelation and we and we're able to

156
00:08:13,700 --> 00:08:10,919
get brain activation map in the brain

157
00:08:15,260 --> 00:08:13,710
I'll show you some in a minute but now

158
00:08:16,760 --> 00:08:15,270
we've published a paper in the journal

159
00:08:20,659 --> 00:08:16,770
of alternative and complementary

160
00:08:23,260 --> 00:08:20,669
medicine Genie actor Berg is the first

161
00:08:25,999 --> 00:08:23,270
author on this paper she's from Hawaii

162
00:08:28,969 --> 00:08:26,009
and so is Karen they're both from a why

163
00:08:33,769 --> 00:08:28,979

I'm from Seattle and my job was to

164
00:08:36,800 --> 00:08:33,779
analyze the signal so they sent me the

165
00:08:42,380 --> 00:08:36,810
images that came from the scanner and my

166
00:08:44,860 --> 00:08:42,390
job was to analyze the brain images so

167
00:08:47,840 --> 00:08:44,870
the subjects consisted of 22

168
00:08:48,960 --> 00:08:47,850
participants 11 pairs of healer and

169
00:08:52,949 --> 00:08:48,970
recipients

170
00:08:54,929 --> 00:08:52,959
now in the Big Island of Hawaii they

171
00:08:57,540 --> 00:08:54,939
have these Hawaiian healers that are

172
00:09:00,119 --> 00:08:57,550
gifted these are the gifted Hawaiian

173
00:09:02,040 --> 00:09:00,129
healers and they know how to send their

174
00:09:06,119 --> 00:09:02,050
energy and they know how to influence

175
00:09:09,990 --> 00:09:06,129
their energy for good to heal so Jeannie

176
00:09:13,710 --> 00:09:10,000
is the one who selected these healers to

177
00:09:19,439 --> 00:09:13,720
do this commute this experiment with the

178
00:09:21,290 --> 00:09:19,449
fMRI so in the experimental conditions

179
00:09:24,509 --> 00:09:21,300
the healer was in a control room

180
00:09:27,720 --> 00:09:24,519
physically an optically isolated from

181
00:09:29,699 --> 00:09:27,730
the receiver in the scanner so the

182
00:09:31,769 --> 00:09:29,709
scanner is deep in this tunnel if you

183
00:09:34,650 --> 00:09:31,779
have ever how many of you had an MRI if

184
00:09:36,389 --> 00:09:34,660
you had an MRI it's kind of daunting

185
00:09:40,290 --> 00:09:36,399
because you have to go in this deep

186
00:09:42,660 --> 00:09:40,300
tunnel it's really noisy and you say how

187
00:09:45,269 --> 00:09:42,670
how could you do a brain activation like

188
00:09:49,170 --> 00:09:45,279

this with all this noise how could this

189
00:09:52,400 --> 00:09:49,180
ever work well it does work because you

190
00:09:55,199 --> 00:09:52,410
can you have the on and off stimulus

191
00:09:57,960 --> 00:09:55,209
while the noise is going on so the noise