The same technique is used for new data in order to define 2s-window free of artifacts. Analysis of 2s-windows free of artifacts based on AC channels data, we chose the 2s windows only from time when the bell was ringing, i.e. during first 6s of Go trials and 10s of NoGo trials. We determine windows free of artifacts in a similar way as it's done before, that is, movement artifacts is defined by amplitude size, i.e. if it is > 0.0005V.

In average, there are different numbers of trials with such 2s-windows for different days. Trials with shock are marked by yellow in the table 1.

Using data selected following Table 1, power spectral density (PSD) functions were determined for each channel using standard FFT-based method. Once the PSD were determined, we calculated the power in the frequency band 20-80Hz (and 3-43Hz) by summing up the amplitudes and determined the RMS using the formula:

$$\mathrm{RMS}_{\{i\}} = \sqrt{\sum_{k=20Hz}^{80Hz} \mathrm{PSD}_{\{i\}}(k)}\,,$$

where *i* is a channel among 20 channels that were considered in the analysis (see fig. 1). Finally, amplitude modulation (AM) patterns were created for each trial by using RMS values of each channel. These will be the AM patterns in the 20-dimensional space.

After these preprocessing steps we trained a MLP for each day separately. Using standard Levenberg Marquart learning, with about 120 training iterations. At the end of the training, all training examples were classified correctly. The testing results are after the tables.

Table 1.

141028		141029		141030		141031	
Go	NoGo	Go	NoGo	Go	NoGo	Go	NoGo
1	3	1	3	1	3	1	3
2	4	2	4	2	4	2	4
5	8	5	8	5	8	5	8
6	9	6	9	6	9	6	9
7	10	7	10	7	10	7	10
11	12	11	12	11	12	11	12
14	13	14	13	14	13	14	13
15	17	15	17	15	17	15	17
16	18	16	18	16	18	16	18
20	19	20	19	20	19	20	19
22	21	22	21	22	21	22	21
23	24	23	24	23	24	23	24
25	27	25	27	25	27	25	27
26	28	26	28	26	28	26	28
29	32	29	32	29	32	29	32
30	33	30	33	30	33	30	33
31	34	31	34	31	34	31	34
35	36	35	36	35	36	35	36
38	37	38	37	38	37	38	37
39	41	39	41	39	41	39	41
40	42	40	42	40	42	40	42
44	43	44	43	44	43	44	43
46	45	46	45	46	45	46	45
47	48	47	48	47	48	47	48
49	51	49	51	49	51	49	51
50	52	50	52	50	52	50	52
53	56	53	56	53	56	53	56
54	57	54	57	54	57	54	57
55	58	55	58	55	58	55	58
59	60	59	60	59	60	59	60
62	61	62	61	62	61	62	61
63	65	63	65	63	65	63	65
64	66	64	66	64	66	64	66
68	67	68	67	68	67	68	67
70	69	70	69	70	69	70	69
71	72	71	72	71	72	71	72
73	75	73	75	73	75	73	75
74	76	74	76	74	76	74	76
77	80	77	80	77	80	77	80
78	81	78	81	78	81	78	81
79	82	79	82	79	82	79	82
83	84	83	84	83	84	83	84
86	85	86	85	86	85	86	85
87	89	87	89	87	89	87	89
88	90	88	90	88	90	88	90
92	91	92	91	92	91	92	91
94	93	94	93	94	93	94	93
95	96	95	96	95	96	95	96

141101		141102		141103	
Go	NoGo	Go	NoGo	Go	NoGo
1	3	1	3	1	3
2	4	2	4	2	4
5	8	5	8	5	8
6	9	6	9	6	9
7	10	7	10	7	10
11	12	11	12	11	12
14	13	14	13	14	13
15	17	15	17	15	17
16	18	16	18	16	18
20	19	20	19	20	19
22	21	22	21	22	21
23	24	23	24	23	24
25	27	25	27	25	27
26	28	26	28	26	28
29	32	29	32	29	32
30	33	30	33	30	33
31	34	31	34	31	34
35	36	35	36	35	36
38	37	38	37	38	37
39	41	39	41	39	41
40	42	40	42	40	42
44	43	44	43	44	43
46	45	46	45	46	45
47	48	47	48	47	48
49	51	49	51	49	51
50	52	50	52	50	52
53	56	53	56	53	56
54	57	54	57	54	57
55	58	55	58	55	58
59	60	59	60	59	60
62	61	62	61	62	61
63	65	63	65	63	65
64	66	64	66	64	66
68	67	68	67	68	67
70	69	70	69	70	69
71	72	71	72	71	72
73	75	73	75	73	75
74	76	74	76	74	76
77	80	77	80	77	80
78	81	78	81	78	81
79	82	79	82	79	82
83	84	83	84	83	84
86	85	86	85	86	85
87	89	87	89	87	89
88	90	88	90	88	90
92	91	92	91	92	91
94	93	94	93	94	93
95	96	95	96	95	96

Table 2: Trials without shock for each day

141028		141029		141030		141031	
Go	NoGo	Go	NoGo	Go	NoGo	Go	NoGo
0/48	44/48	14/48	41/48	9/48	44/48	8/48	43/48
0%	91.6%	29%	85%	18.7%	91.6%	16%	90%

141101		141102		141103	
Go	NoGo	Go	NoGo	Go	NoGo
21/48	45/48	33/48	41/48	23/48	41/48
43%	94%	69%	85%	48%	85%

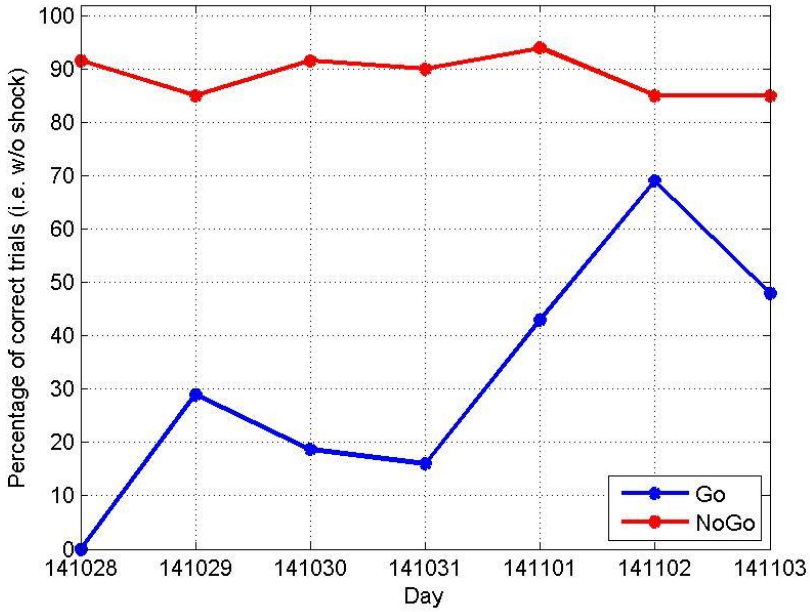

Fig. 2: Percentage of trials without shock.

After such preprocessing, we obtained a data blocks as follows:

Day 141028: 20x48 Go, 20x48 NoGo; training: 21 Go and NoGo,

Day 141029: 20x48 Go, 20x48 NoGo; training: 14 Go and NoGo

Day 141030: 20x48 Go, 20x48 NoGo; training: 27 Go and NoGo

Day 141031: 20x48 Go, 20x48 NoGo; training: 27 Go and NoGo

Day 141101: 20x48 Go, 20x48 NoGo; training: 27 Go and NoGo

Day 141102: 20x48 Go, 20x48 NoGo; training: 27 Go and NoGo

Day 141103: 20x48 Go, 20x48 NoGo; training: 27 Go and NoGo

The rest of the data was used for testing. Thus, in our classification analysis we got:

1. AC [20-80] HZ, "2-second windows"

Results of the testing are summarized in A_1, …, A_7 confusion matrices:

- Day 141028

$$A_1 = \begin{bmatrix} 25.3 & 1.7 \\ .9 & 26.1 \end{bmatrix}$$

Correct classification of patterns with Go trials is 93.7%, and with NoGo trials is 96.6%.

- Day 141029

$$A_2 = \begin{bmatrix} 31.2 & 2.8 \\ 6.9 & 25.1 \end{bmatrix}$$

Correct classification of patterns with Go trials is 91%, and with NoGo trials is 78%.

- Day 141030

$$A_3 = \begin{bmatrix} 20.8 & 0.2 \\ 2.1 & 17.9 \end{bmatrix}$$

Correct classification of patterns with Go trials is 99%, and with NoGo trials is 89%.

- Day 141031

$$A_4 = \begin{bmatrix} 16.1 & 4.9 \\ 1.3 & 18.7 \end{bmatrix}$$

Correct classification of patterns with Go trials is 76%, and with NoGo trials is 93%.

- Day 141101

$$A_5 = \begin{bmatrix} 19.9 & 1.1 \\ .8 & 19.2 \end{bmatrix}$$

Correct classification of patterns with Go trials is 94%, and with NoGo trials is 96%.

- Day 141102

$$A_6 = \begin{bmatrix} 20.8 & .2 \\ 1 & 19 \end{bmatrix}$$

Correct classification of patterns with Go trials is 99%, and with NoGo trials is 95%.

- Day 141103

$$A_7 = \begin{bmatrix} 18.6 & 2.4 \\ 0 & 20 \end{bmatrix}$$

Correct classification of patterns with Go trials is 88%, and with NoGo trials is 100%.