

EEG Mindfulness Index Report

=== Mindfulness Index (MI) Analysis Summary ===

File: UnicornRecorder_12_05_2025_12_41_310

Analysis Date: 2025-05-22 11:27:53

EDA file used: data/eda_data\opensignals_0007808C0700_2025-04-30_16-32-15_V.txt

- Window Size: 3 seconds
- Window Overlap: 50.0%
- Frequency Bands: Theta (4, 7.99), Alpha (8, 12.99), Beta (13, 30)
- MI Weights: {'theta_fz': 0.25, 'alpha_po': 0.25, 'faa': 0.2, 'beta_frontal': -0.15, 'eda_norm': -0.25}
- State Thresholds: Focused ≥ 0.5 , Neutral ≥ 0.37 , Unfocused < 0.37

Rationale for Data and Parameters

Mindfulness Index (MI) is computed as a weighted sum of neurophysiological features, followed by normalization:

$$\text{MI_raw} = (w1 * \text{Theta_Fz}) + (w2 * \text{Alpha_PO}) + (w3 * \text{FAA}) - (w4 * \text{Beta_Frontal}) - (w5 * \text{EDA_norm})$$
$$\text{MI} = 1 / (1 + \exp(-\text{MI_raw} + 1)) \text{ \# Normalized to 0-1 range}$$

- Theta_Fz (frontal theta): Higher values reflect focused attention and meditation.
- Alpha_PO (posterior alpha): Higher values reflect relaxed alertness.
- FAA (frontal alpha asymmetry): Reflects emotional valence and approach/withdrawal.
- Beta_Frontal: Higher values reflect active thinking and less mindfulness (negative weight).
- EDA_norm: Higher EDA (arousal) is negatively correlated with mindfulness (negative weight).

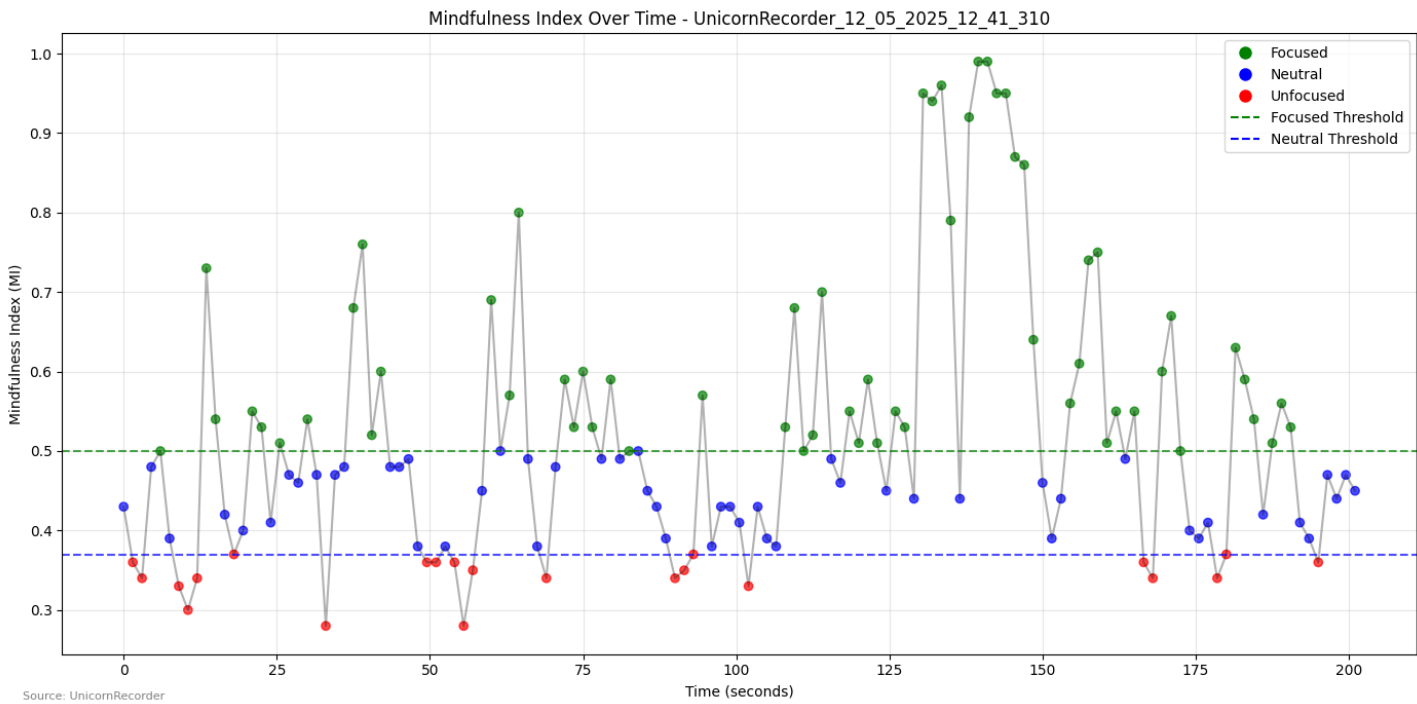
EDA data is normalized (z-score or min-max) and aligned to EEG windows. If EDA is missing or invalid, it is set to zero for that window.

Behavioral state thresholds:

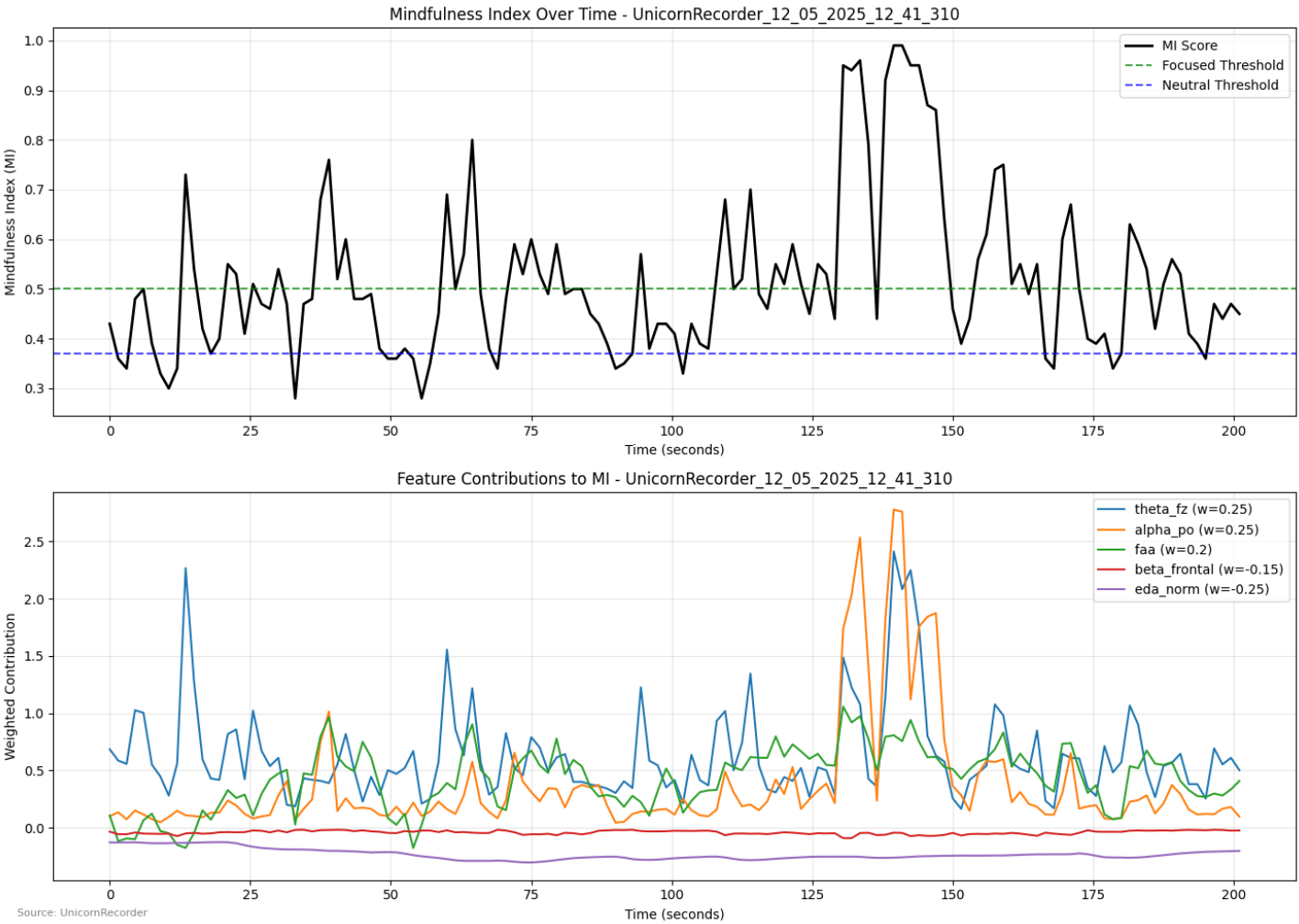
- Focused: $MI \geq 0.5$
- Neutral: $0.37 \leq MI < 0.5$
- Unfocused: $MI < 0.37$

These thresholds are empirically chosen to reflect meaningful distinctions in mindfulness levels.

UnicornRecorder_12_05_2025_12_41_310_20250522_112752_mi_timeseries.png

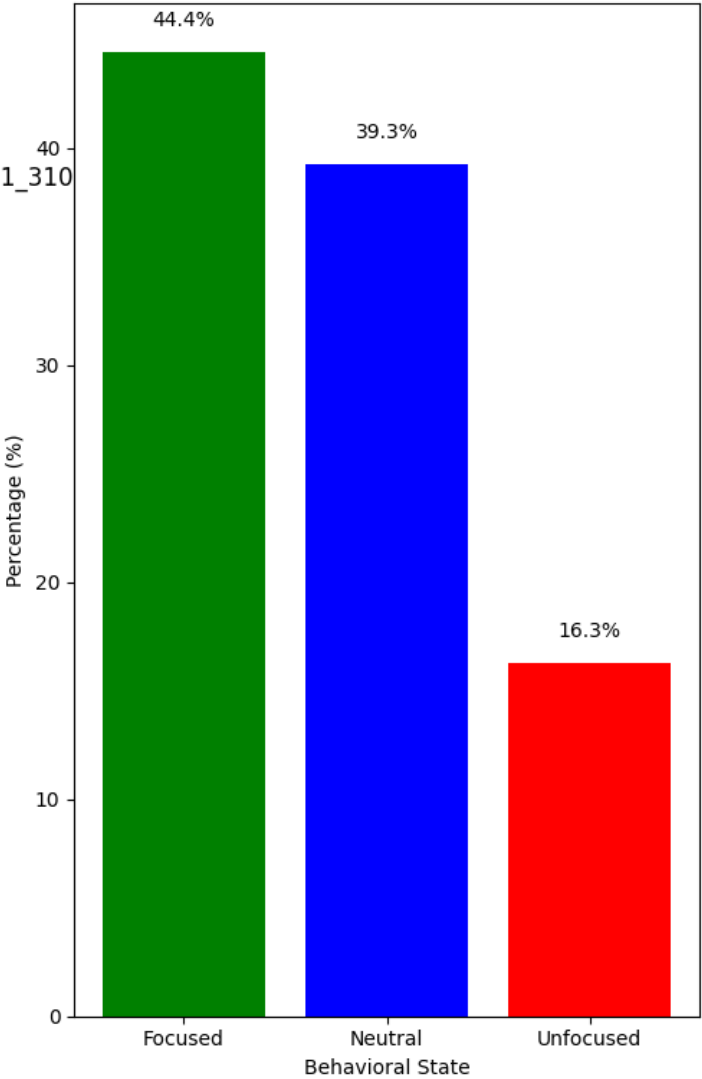
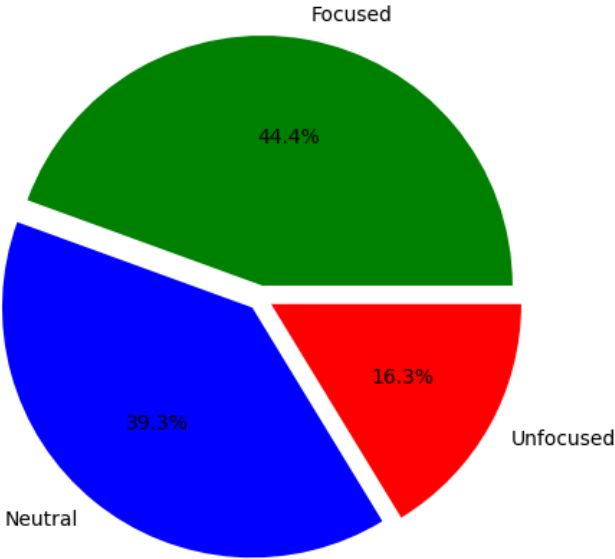


UnicornRecorder_12_05_2025_12_41_310_20250522_112752_feature_contributions.png



Percentage of Time in Each State - UnicornRecorder_12_05_2025_ :

in of Behavioral States - UnicornRecorder_12_05_2025_12_41_310



Source: UnicornRecorder

UnicornRecorder_12_05_2025_12_41_310_20250522_112752_mindfulness_data.csv

timestamp	mi_score	behavioral_state	theta_fz	alpha_po	faa	beta_frontal	eda_norm
0.0	0.43	Neutral	2.74	0.4	0.53	0.23	0.51
1.5	0.36	Unfocused	2.35	0.54	-0.59	0.38	0.51
3.0	0.34	Unfocused	2.23	0.3	-0.47	0.38	0.51
4.5	0.48	Neutral	4.11	0.6	-0.5	0.28	0.51
6.0	0.5	Focused	4.02	0.47	0.33	0.34	0.52
7.5	0.39	Neutral	2.2	0.3	0.62	0.34	0.54
9.0	0.33	Unfocused	1.79	0.19	-0.14	0.36	0.54
10.5	0.3	Unfocused	1.12	0.38	-0.24	0.34	0.54
12.0	0.34	Unfocused	2.24	0.59	-0.75	0.49	0.53
13.5	0.73	Focused	9.07	0.43	-0.88	0.33	0.53
15.0	0.54	Focused	5.09	0.41	-0.23	0.3	0.52
16.5	0.42	Neutral	2.39	0.37	0.76	0.35	0.51
18.0	0.37	Unfocused	1.72	0.53	0.35	0.32	0.51
19.5	0.4	Neutral	1.67	0.53	0.99	0.26	0.5
21.0	0.55	Focused	3.27	0.95	1.65	0.25	0.51
22.5	0.53	Focused	3.43	0.78	1.3	0.26	0.54
24.0	0.41	Neutral	1.7	0.48	1.45	0.25	0.61
25.5	0.51	Focused	4.09	0.32	0.54	0.16	0.66
27.0	0.47	Neutral	2.69	0.4	1.47	0.18	0.71
28.5	0.46	Neutral	2.15	0.45	2.1	0.26	0.73
30.0	0.54	Focused	2.44	1.12	2.37	0.16	0.75
31.5	0.47	Neutral	0.8	1.63	2.53	0.26	0.76
33.0	0.28	Unfocused	0.75	0.29	0.14	0.13	0.76
34.5	0.47	Neutral	1.73	0.66	2.37	0.12	0.76
36.0	0.48	Neutral	1.67	0.99	2.31	0.21	0.77
37.5	0.68	Focused	1.64	3.0	3.98	0.14	0.79
39.0	0.76	Focused	1.56	4.06	4.83	0.13	0.81
40.5	0.52	Focused	2.21	0.58	3.1	0.12	0.81
42.0	0.6	Focused	3.27	1.03	2.68	0.13	0.82
43.5	0.48	Neutral	2.0	0.68	2.46	0.2	0.83
45.0	0.48	Neutral	0.91	0.7	3.75	0.15	0.84

46.5	0.49	Neutral	1.78	0.66	3.07	0.21	0.86
48.0	0.38	Neutral	1.14	0.45	1.78	0.23	0.85
49.5	0.36	Unfocused	2.01	0.41	0.42	0.3	0.85
51.0	0.36	Unfocused	1.88	0.74	0.13	0.31	0.86
52.5	0.38	Neutral	2.09	0.4	0.61	0.19	0.9
54.0	0.36	Unfocused	2.68	0.88	-0.88	0.23	0.96
55.5	0.28	Unfocused	0.84	0.41	0.13	0.16	1.0
57.0	0.35	Unfocused	1.0	0.56	1.32	0.16	1.03
58.5	0.45	Neutral	2.3	0.92	1.52	0.25	1.06
60.0	0.69	Focused	6.22	0.65	1.95	0.15	1.1
61.5	0.5	Neutral	3.44	0.48	1.68	0.27	1.13
63.0	0.57	Focused	2.53	1.12	3.58	0.25	1.16
64.5	0.8	Focused	4.87	2.31	4.52	0.29	1.16
66.0	0.49	Neutral	2.29	0.86	2.53	0.31	1.16
67.5	0.38	Neutral	1.16	0.55	2.14	0.3	1.16
69.0	0.34	Unfocused	1.42	0.33	0.93	0.12	1.15
70.5	0.48	Neutral	3.3	0.96	0.77	0.16	1.16
72.0	0.59	Focused	2.09	2.62	2.56	0.26	1.19
73.5	0.53	Focused	1.83	1.62	3.03	0.42	1.21
75.0	0.6	Focused	3.16	1.25	3.37	0.38	1.21
76.5	0.53	Focused	2.81	0.92	2.72	0.38	1.19
78.0	0.49	Neutral	1.98	1.38	2.4	0.35	1.16
79.5	0.59	Focused	2.45	1.36	3.89	0.44	1.13
81.0	0.49	Neutral	2.57	0.71	2.34	0.29	1.09
82.5	0.5	Focused	1.6	1.35	2.96	0.32	1.06
84.0	0.5	Neutral	1.61	1.49	2.68	0.39	1.04
85.5	0.45	Neutral	1.51	1.41	1.8	0.31	1.03
87.0	0.43	Neutral	1.46	1.5	1.37	0.17	1.02
88.5	0.39	Neutral	1.37	0.78	1.43	0.15	1.01
90.0	0.34	Unfocused	1.22	0.18	1.33	0.13	1.01
91.5	0.35	Unfocused	1.62	0.21	0.91	0.14	1.04
93.0	0.37	Unfocused	1.39	0.48	1.39	0.12	1.09
94.5	0.57	Focused	4.9	0.57	1.12	0.19	1.12

96.0	0.38	Neutral	2.34	0.56	0.53	0.21	1.12
97.5	0.43	Neutral	2.18	0.63	1.61	0.21	1.11
99.0	0.43	Neutral	1.41	0.66	2.59	0.2	1.09
100.5	0.41	Neutral	1.67	0.46	1.92	0.17	1.06
102.0	0.33	Unfocused	0.85	1.0	0.66	0.18	1.05
103.5	0.43	Neutral	2.55	0.61	1.17	0.19	1.03
105.0	0.39	Neutral	1.66	0.44	1.55	0.17	1.02
106.5	0.38	Neutral	1.48	0.4	1.63	0.17	1.01
108.0	0.53	Focused	3.73	0.63	1.65	0.23	1.01
109.5	0.68	Focused	4.08	1.96	2.85	0.44	1.04
111.0	0.5	Focused	2.01	1.24	2.64	0.34	1.09
112.5	0.52	Focused	2.96	0.75	2.51	0.33	1.12
114.0	0.7	Focused	5.38	0.81	3.09	0.35	1.13
115.5	0.49	Neutral	2.18	0.61	3.06	0.34	1.12
117.0	0.46	Neutral	1.34	0.92	3.05	0.37	1.11
118.5	0.55	Focused	1.24	1.69	3.99	0.31	1.08
120.0	0.51	Focused	1.77	1.18	3.1	0.26	1.06
121.5	0.59	Focused	1.64	2.12	3.64	0.29	1.05
123.0	0.51	Focused	2.09	0.66	3.34	0.33	1.03
124.5	0.45	Neutral	1.08	0.99	3.01	0.37	1.02
126.0	0.55	Focused	2.11	1.29	3.23	0.32	1.01
127.5	0.53	Focused	2.01	1.54	2.74	0.33	1.01
129.0	0.44	Neutral	1.16	0.86	2.71	0.32	1.01
130.5	0.95	Focused	5.94	6.95	5.29	0.6	1.01
132.0	0.94	Focused	4.9	8.13	4.6	0.6	1.01
133.5	0.96	Focused	4.32	10.14	4.87	0.31	1.01
135.0	0.79	Focused	1.71	5.61	3.88	0.29	1.04
136.5	0.44	Neutral	1.43	0.95	2.5	0.43	1.05
138.0	0.92	Focused	4.56	7.26	3.97	0.41	1.05
139.5	0.99	Focused	9.65	11.11	4.04	0.29	1.04
141.0	0.99	Focused	8.33	11.04	3.78	0.3	1.03
142.5	0.95	Focused	9.0	4.48	4.71	0.49	1.02
144.0	0.95	Focused	7.0	7.03	3.76	0.43	1.0

145.5	0.87	Focused	3.21	7.37	3.08	0.47	0.99
147.0	0.86	Focused	2.52	7.5	3.09	0.47	0.98
148.5	0.64	Focused	2.31	3.05	2.65	0.41	0.98
150.0	0.46	Neutral	1.02	1.46	2.56	0.3	0.97
151.5	0.39	Neutral	0.66	1.14	2.13	0.45	0.97
153.0	0.44	Neutral	1.67	0.59	2.55	0.37	0.97
154.5	0.56	Focused	1.91	1.87	2.88	0.35	0.97
156.0	0.61	Focused	2.17	2.33	3.02	0.37	0.97
157.5	0.74	Focused	4.31	2.3	3.43	0.34	0.98
159.0	0.75	Focused	3.92	2.39	4.16	0.35	0.97
160.5	0.51	Focused	2.27	0.89	2.66	0.3	0.96
162.0	0.55	Focused	2.06	1.25	3.24	0.34	0.95
163.5	0.49	Neutral	1.94	0.84	2.76	0.41	0.94
165.0	0.55	Focused	3.4	0.73	2.38	0.47	0.93
166.5	0.36	Unfocused	0.95	0.46	1.83	0.28	0.93
168.0	0.34	Unfocused	0.68	0.46	1.58	0.34	0.93
169.5	0.6	Focused	2.59	1.21	3.67	0.38	0.93
171.0	0.67	Focused	2.44	2.61	3.69	0.41	0.92
172.5	0.5	Focused	2.42	0.67	2.53	0.3	0.89
174.0	0.4	Neutral	1.4	0.74	1.52	0.15	0.92
175.5	0.39	Neutral	1.11	0.79	1.86	0.23	0.98
177.0	0.41	Neutral	2.86	0.32	0.58	0.24	1.03
178.5	0.34	Unfocused	1.94	0.31	0.37	0.23	1.04
180.0	0.37	Unfocused	2.29	0.34	0.44	0.24	1.04
181.5	0.63	Focused	4.27	0.91	2.69	0.17	1.05
183.0	0.59	Focused	3.59	0.96	2.6	0.16	1.04
184.5	0.54	Focused	1.94	1.13	3.37	0.17	1.02
186.0	0.42	Neutral	1.07	0.5	2.8	0.16	0.99
187.5	0.51	Focused	2.16	0.85	2.74	0.15	0.96
189.0	0.56	Focused	2.27	1.49	2.87	0.17	0.93
190.5	0.53	Focused	2.58	1.18	2.04	0.14	0.9
192.0	0.41	Neutral	1.52	0.64	1.65	0.12	0.88
193.5	0.39	Neutral	1.53	0.46	1.39	0.14	0.86

195.0	0.36	Unfocused	1.02	0.48	1.34	0.15	0.84
196.5	0.47	Neutral	2.78	0.47	1.49	0.12	0.83
198.0	0.44	Neutral	2.21	0.67	1.41	0.13	0.83
199.5	0.47	Neutral	2.44	0.72	1.68	0.17	0.82
201.0	0.45	Neutral	2.01	0.39	2.05	0.16	0.81

UnicornRecorder_12_05_2025_12_41_310_20250522_112752_mi_only.csv

timestamp	mi_score	behavioral_state
0.0	0.43	Neutral
1.5	0.36	Unfocused
3.0	0.34	Unfocused
4.5	0.48	Neutral
6.0	0.5	Focused
7.5	0.39	Neutral
9.0	0.33	Unfocused
10.5	0.3	Unfocused
12.0	0.34	Unfocused
13.5	0.73	Focused
15.0	0.54	Focused
16.5	0.42	Neutral
18.0	0.37	Unfocused
19.5	0.4	Neutral
21.0	0.55	Focused
22.5	0.53	Focused
24.0	0.41	Neutral
25.5	0.51	Focused
27.0	0.47	Neutral
28.5	0.46	Neutral
30.0	0.54	Focused
31.5	0.47	Neutral
33.0	0.28	Unfocused
34.5	0.47	Neutral
36.0	0.48	Neutral
37.5	0.68	Focused
39.0	0.76	Focused
40.5	0.52	Focused
42.0	0.6	Focused
43.5	0.48	Neutral
45.0	0.48	Neutral

46.5	0.49	Neutral
48.0	0.38	Neutral
49.5	0.36	Unfocused
51.0	0.36	Unfocused
52.5	0.38	Neutral
54.0	0.36	Unfocused
55.5	0.28	Unfocused
57.0	0.35	Unfocused
58.5	0.45	Neutral
60.0	0.69	Focused
61.5	0.5	Neutral
63.0	0.57	Focused
64.5	0.8	Focused
66.0	0.49	Neutral
67.5	0.38	Neutral
69.0	0.34	Unfocused
70.5	0.48	Neutral
72.0	0.59	Focused
73.5	0.53	Focused
75.0	0.6	Focused
76.5	0.53	Focused
78.0	0.49	Neutral
79.5	0.59	Focused
81.0	0.49	Neutral
82.5	0.5	Focused
84.0	0.5	Neutral
85.5	0.45	Neutral
87.0	0.43	Neutral
88.5	0.39	Neutral
90.0	0.34	Unfocused
91.5	0.35	Unfocused
93.0	0.37	Unfocused
94.5	0.57	Focused

96.0	0.38	Neutral
97.5	0.43	Neutral
99.0	0.43	Neutral
100.5	0.41	Neutral
102.0	0.33	Unfocused
103.5	0.43	Neutral
105.0	0.39	Neutral
106.5	0.38	Neutral
108.0	0.53	Focused
109.5	0.68	Focused
111.0	0.5	Focused
112.5	0.52	Focused
114.0	0.7	Focused
115.5	0.49	Neutral
117.0	0.46	Neutral
118.5	0.55	Focused
120.0	0.51	Focused
121.5	0.59	Focused
123.0	0.51	Focused
124.5	0.45	Neutral
126.0	0.55	Focused
127.5	0.53	Focused
129.0	0.44	Neutral
130.5	0.95	Focused
132.0	0.94	Focused
133.5	0.96	Focused
135.0	0.79	Focused
136.5	0.44	Neutral
138.0	0.92	Focused
139.5	0.99	Focused
141.0	0.99	Focused
142.5	0.95	Focused
144.0	0.95	Focused

145.5	0.87	Focused
147.0	0.86	Focused
148.5	0.64	Focused
150.0	0.46	Neutral
151.5	0.39	Neutral
153.0	0.44	Neutral
154.5	0.56	Focused
156.0	0.61	Focused
157.5	0.74	Focused
159.0	0.75	Focused
160.5	0.51	Focused
162.0	0.55	Focused
163.5	0.49	Neutral
165.0	0.55	Focused
166.5	0.36	Unfocused
168.0	0.34	Unfocused
169.5	0.6	Focused
171.0	0.67	Focused
172.5	0.5	Focused
174.0	0.4	Neutral
175.5	0.39	Neutral
177.0	0.41	Neutral
178.5	0.34	Unfocused
180.0	0.37	Unfocused
181.5	0.63	Focused
183.0	0.59	Focused
184.5	0.54	Focused
186.0	0.42	Neutral
187.5	0.51	Focused
189.0	0.56	Focused
190.5	0.53	Focused
192.0	0.41	Neutral
193.5	0.39	Neutral

195.0	0.36	Unfocused
196.5	0.47	Neutral
198.0	0.44	Neutral
199.5	0.47	Neutral
201.0	0.45	Neutral