

‘Central to successful control is the ability to suppress actions that are no longer relevant or required.’

Subject 104

NF Task: Users look at the car and imagine driving it forward to train alpha inhibition, aiming to enhance information suppression to reduce falling risk in the physical world.

Epoching information

- Event '7' (alpha power drop, car moves backward) is set as time = 0 ms, with epochs from [-300 1000] ms.
- Event '6' (alpha power increase, car moves forward) is plotted as a black line to show its latency relative to '7' (fig 1).
- Corrects the baseline by subtracting the -290 to 0 ms mean

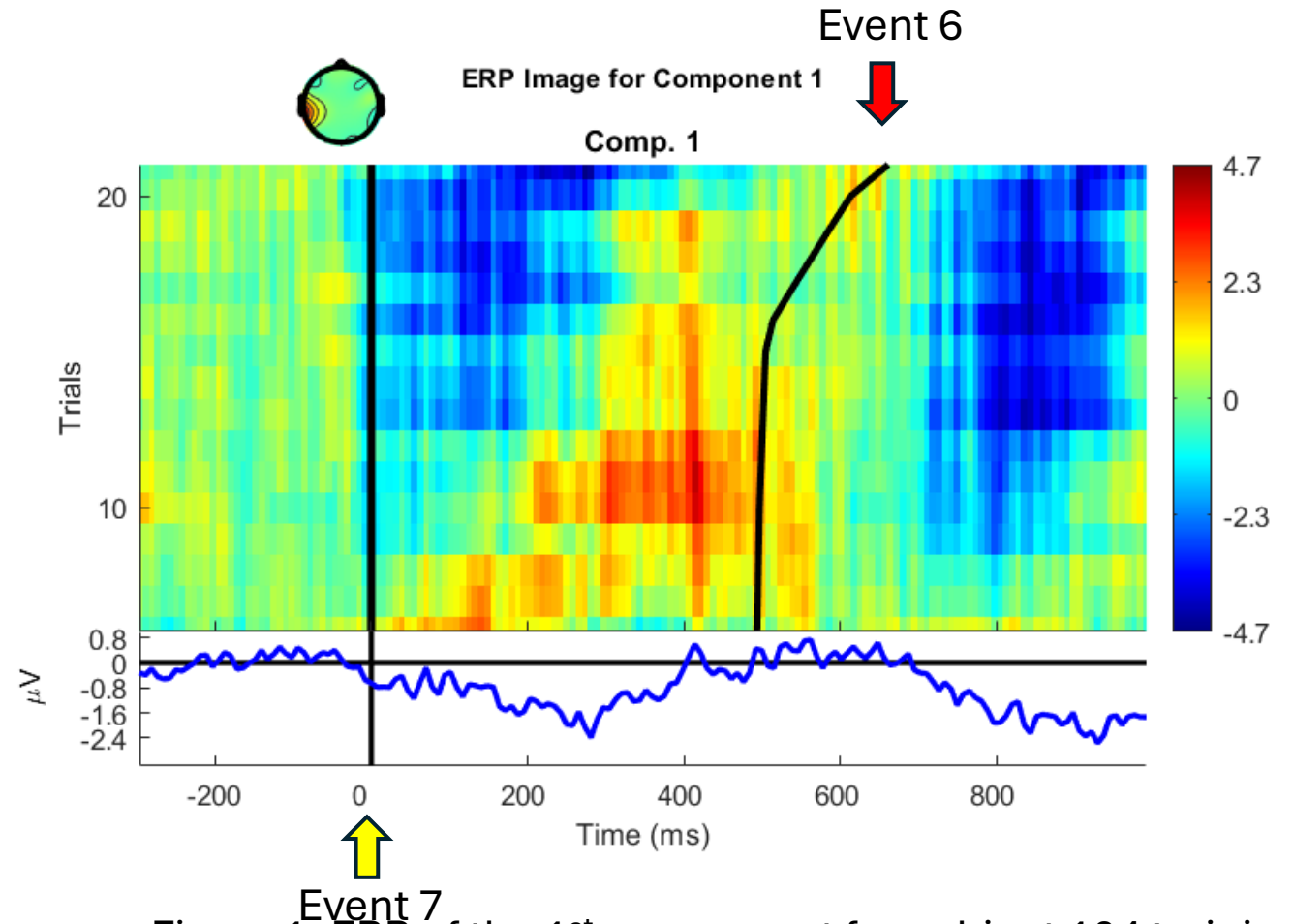
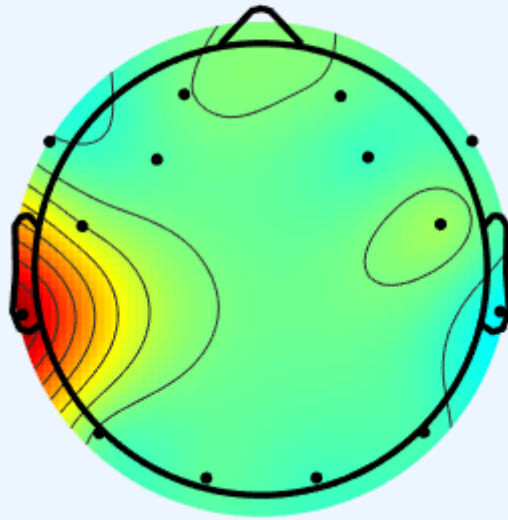


Figure 1. ERP of the 1st component for subject 104 training session 1. Event '7' is the stimulus onset when time = 0ms. Event '6' marks the car's forward movement with a black line, sorted by latency

1

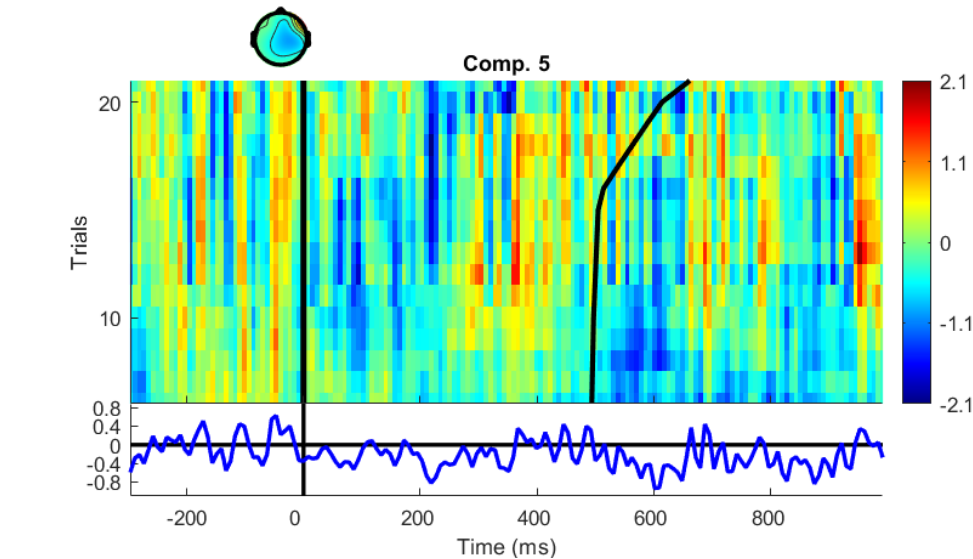
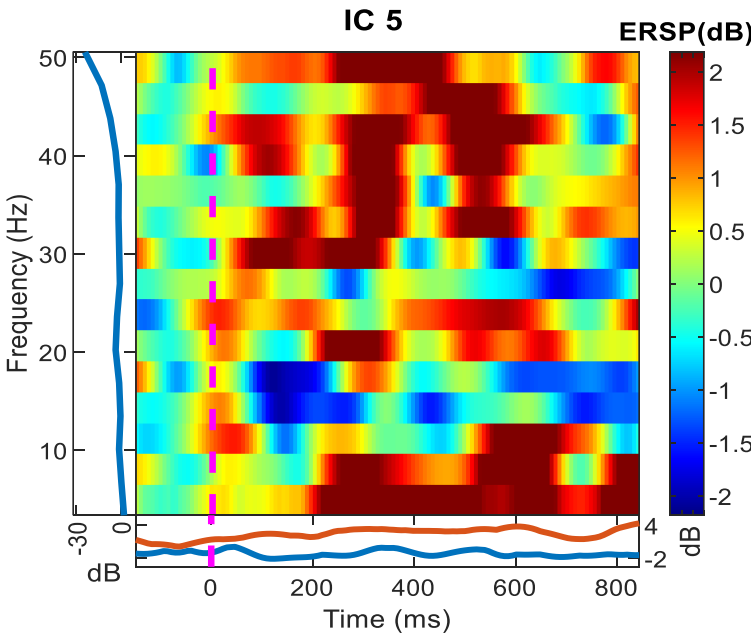
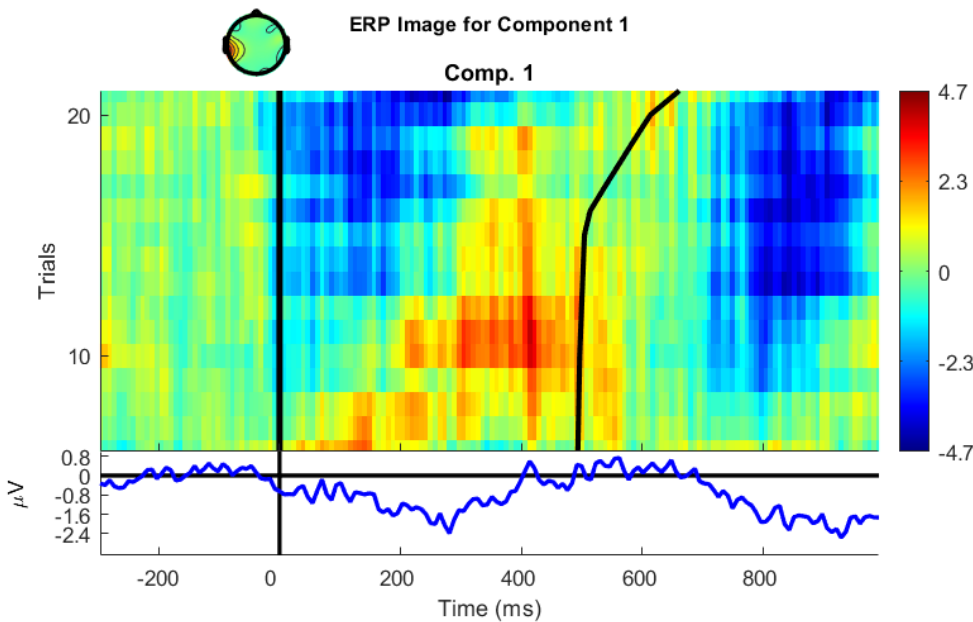
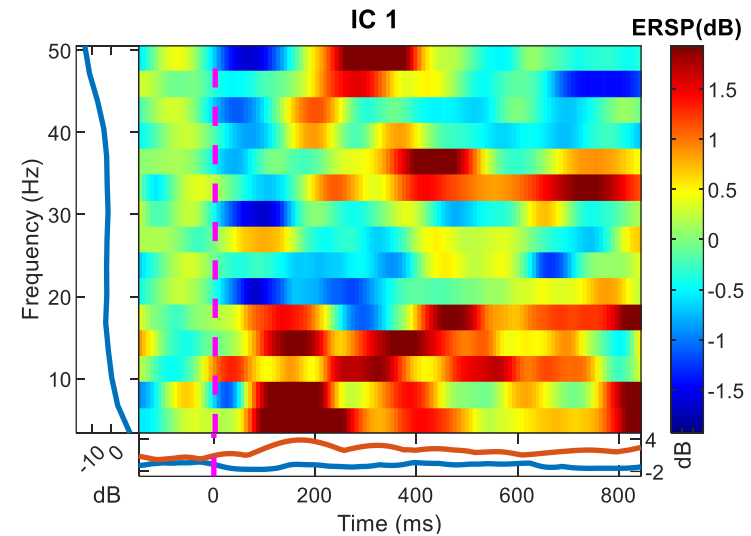


104_1

Temporal T7		
Time(ms)	Alpha	
[-100, 50]	desync	
[500, 650]	sync	

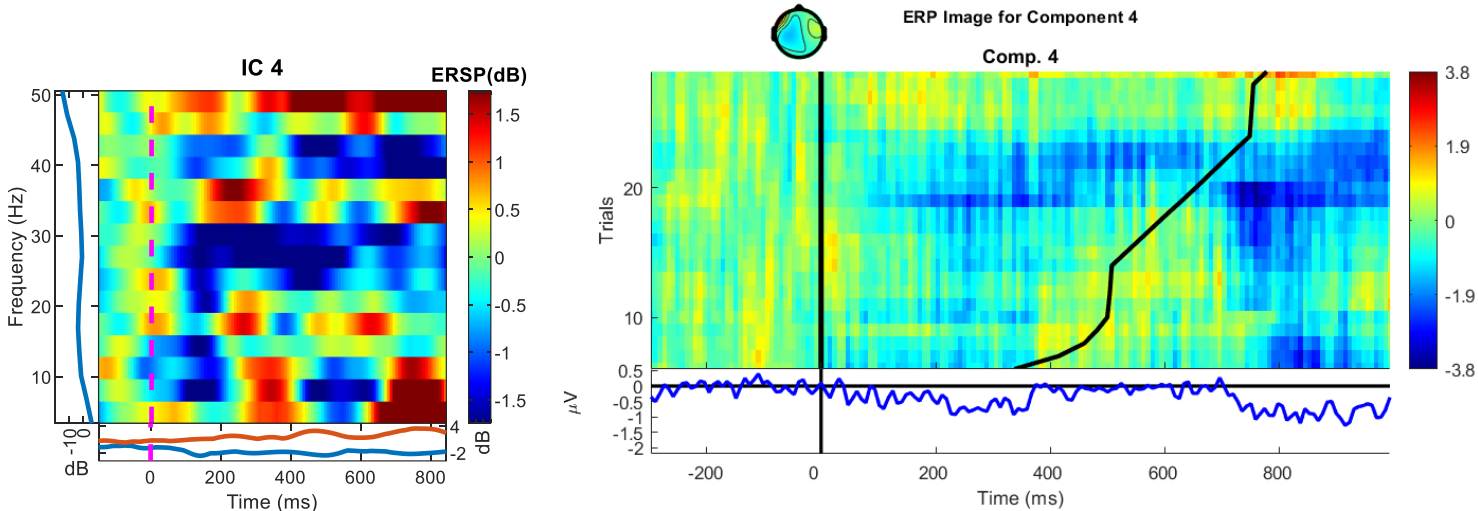
Frontal F8		
Time(ms)	Alpha	
[-50, 200]	desync	
[500, 650]	sync	

Early stage



104_2

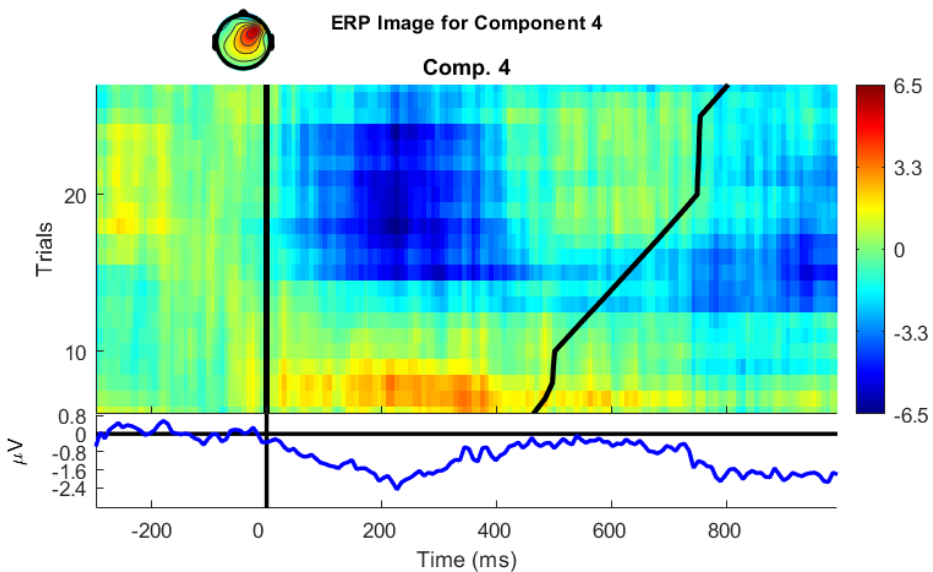
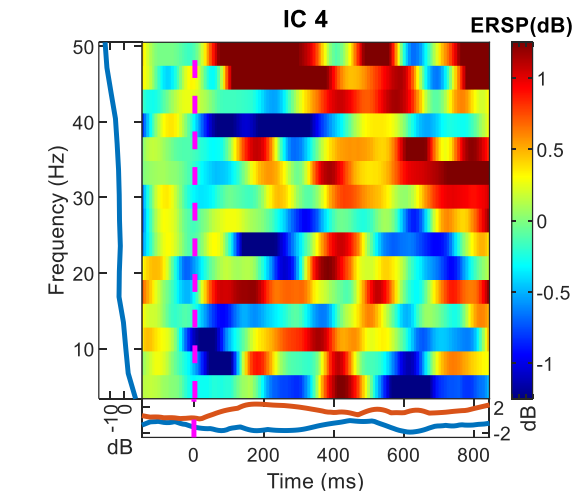
Frontal F7		
Time(ms)	Alpha	
[-50, 200]	desync	
[300, 500]	sync	



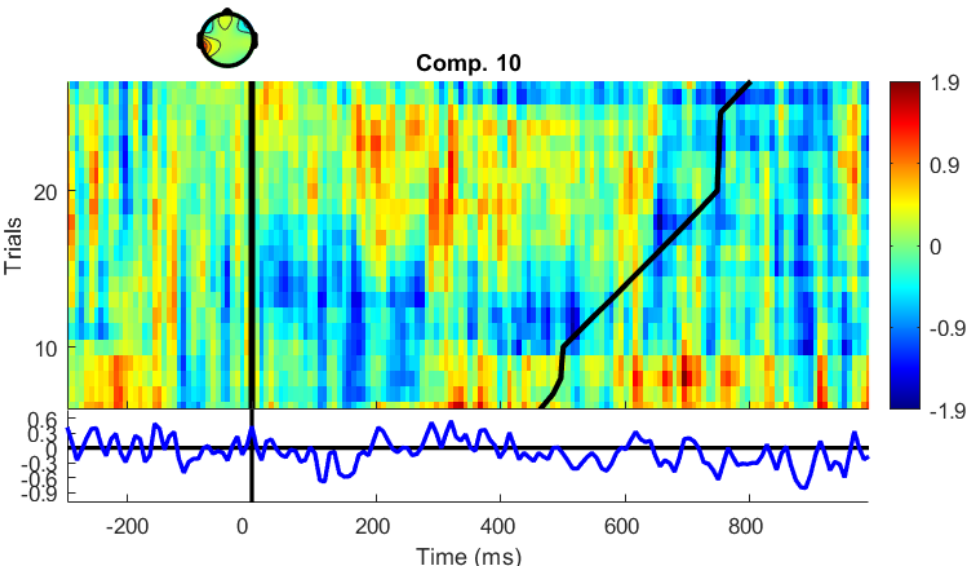
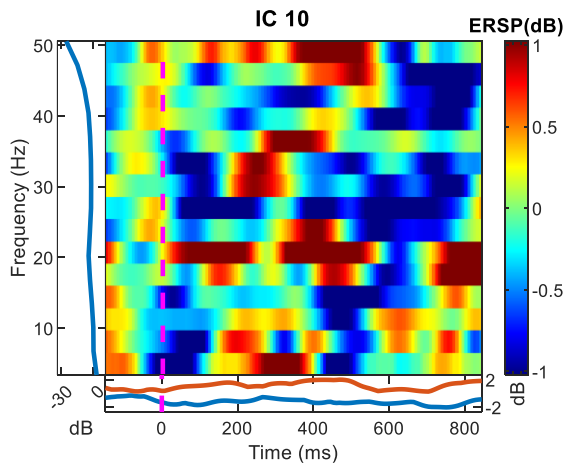
Early stage

104_3

Frontal F7		
Time(ms)	Alpha	
[-50, 150]	desync	
[350, 600]	sync	



Temporal T7		
Time(ms)	Alpha	
[-50, 150]	desync	
[300, 400]	sync	

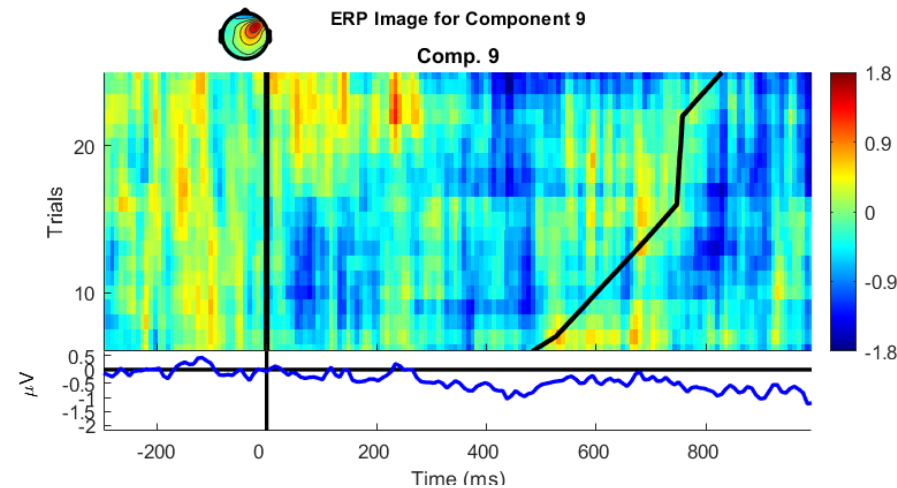
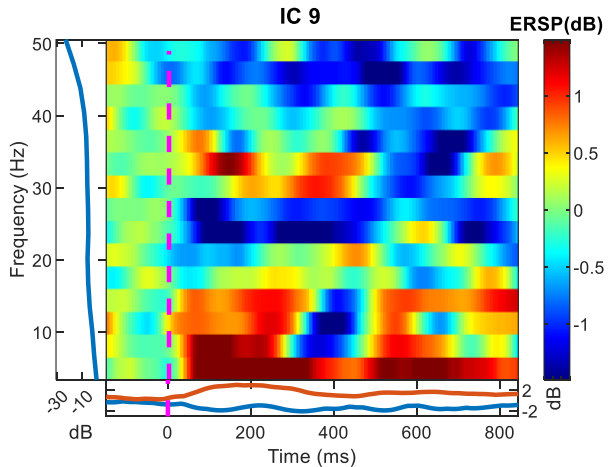
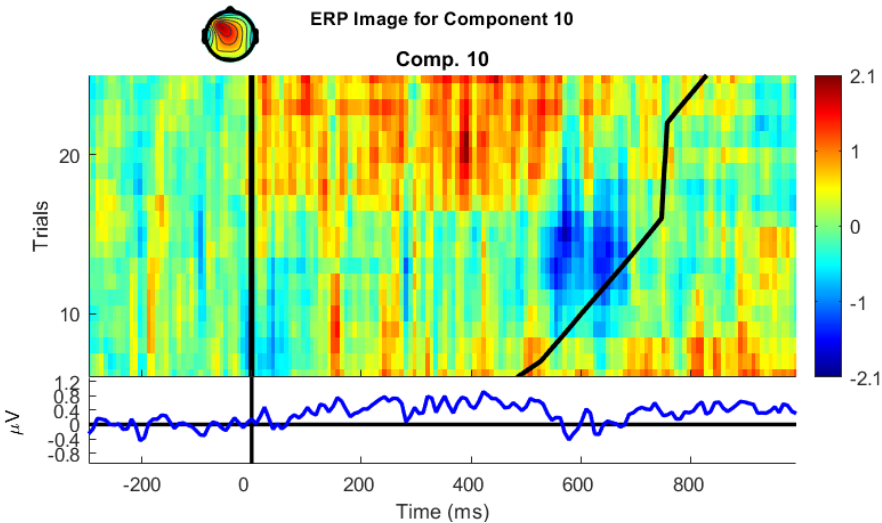
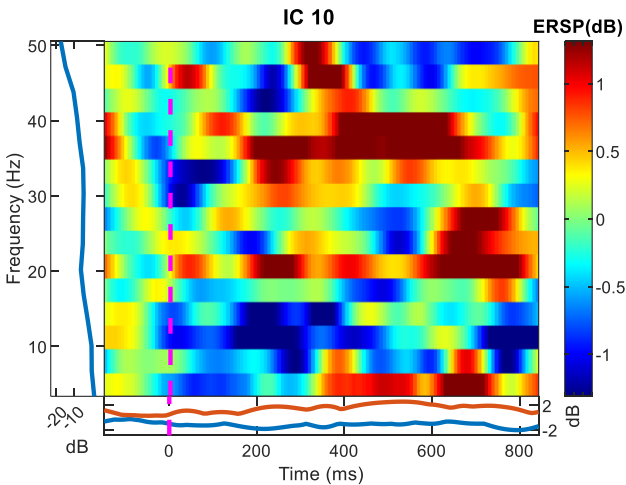


104_7

Frontal F3		
Time(ms)	Alpha	
[-50, 250]	desync	
[400, 700]	sync	

Opposite synchronisation on the right hemisphere

Frontal F4 (excluded)		
Time(ms)	Alpha	
[-50, 250]	sync	
[400, 700]	desync	

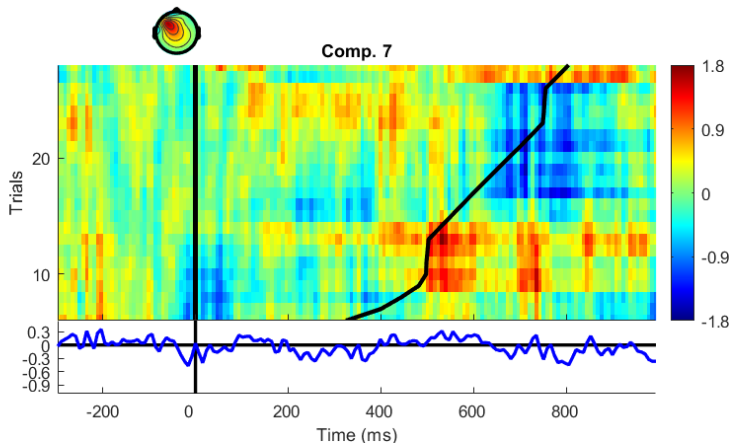
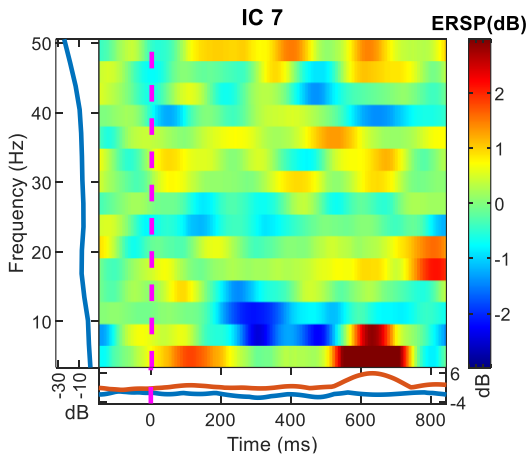
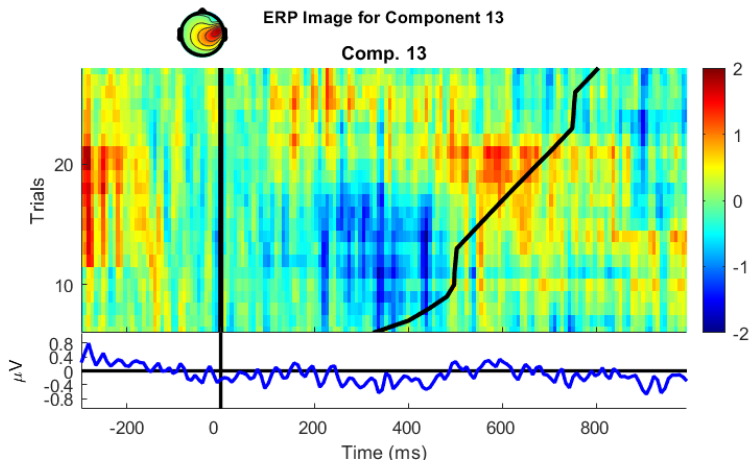
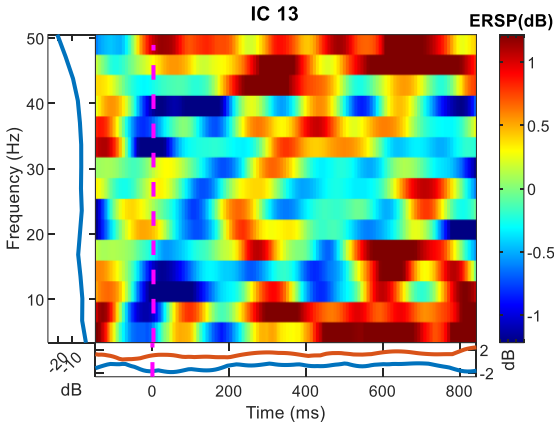


Early stage

104_8

Frontal F4		
Time(ms)	Alpha	
[-50, 100]	desync	
[350, 400]	sync	

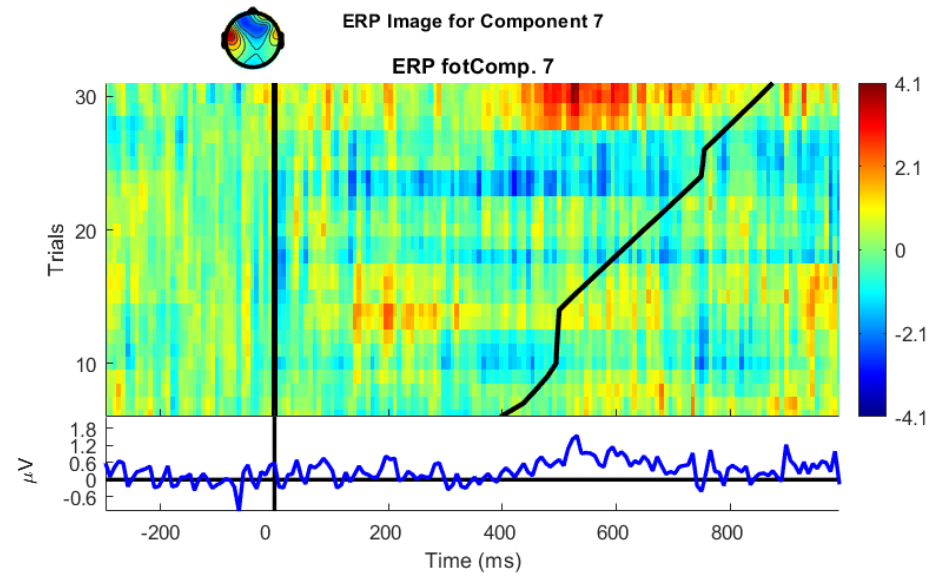
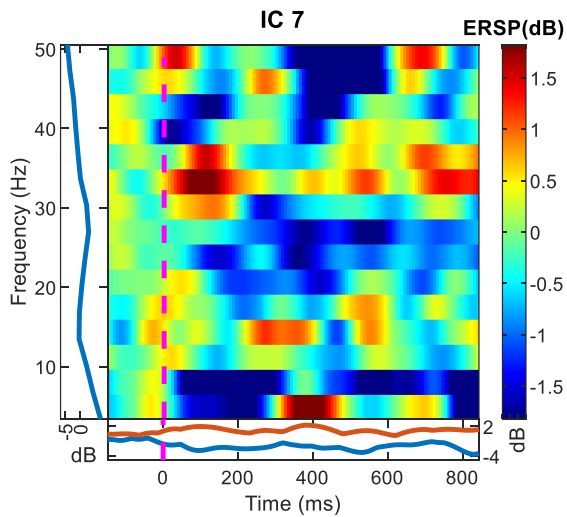
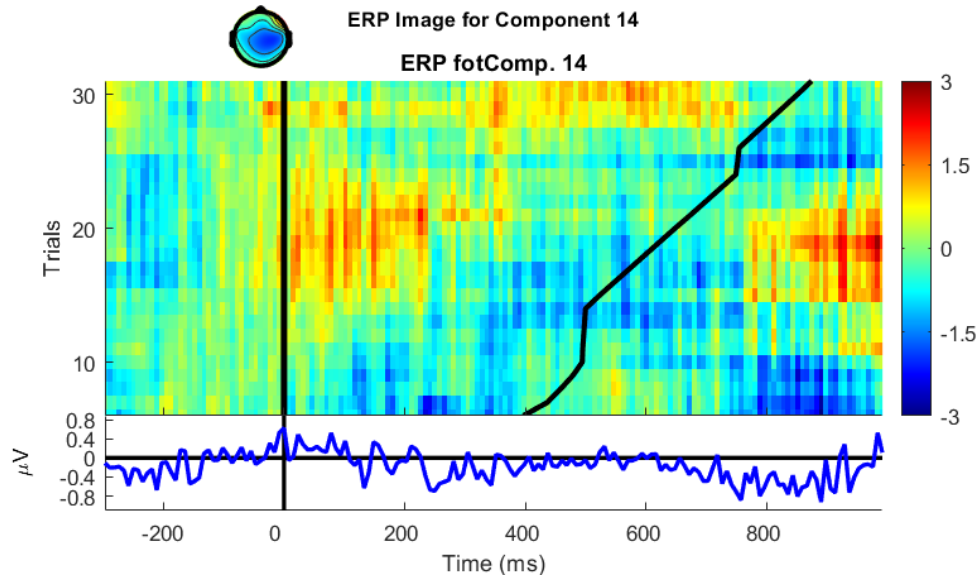
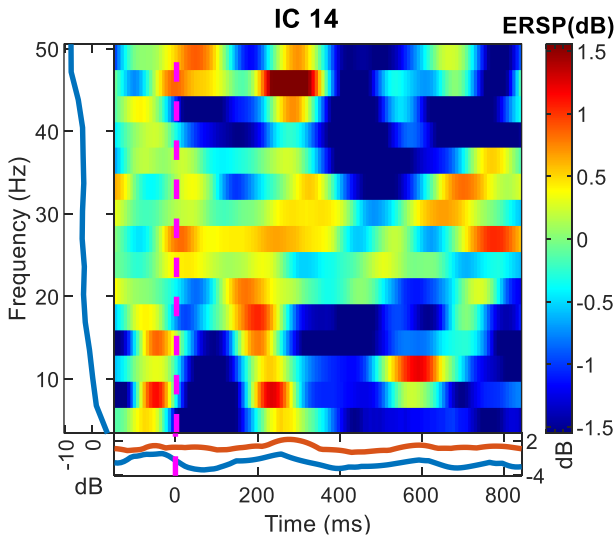
Frontal F3		
Time(ms)	Alpha	
[-50, 100]	desync	
[350, 400]	sync	



104_9

Frontal AF4		
Time(ms)	Alpha	
[-50, 200]	desync	
[300, 400]	sync	

Frontal FC5		
Time(ms)	Alpha	
[-50, 200]	desync	
[350, 420]	sync	

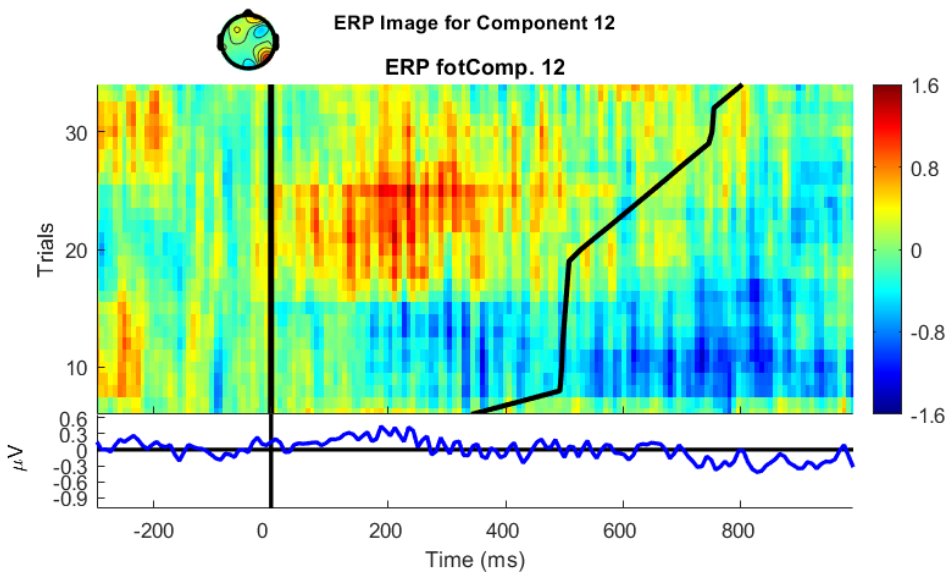
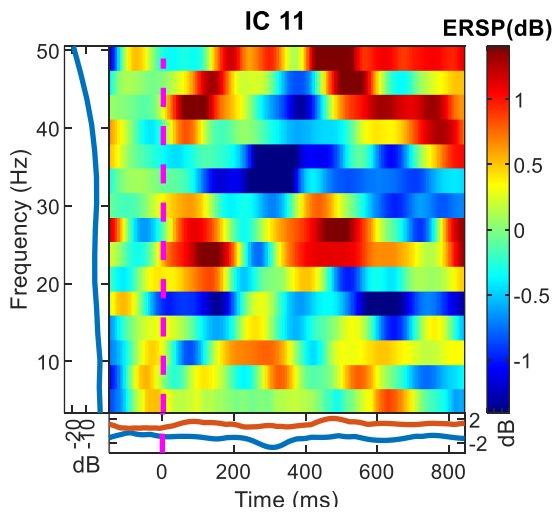
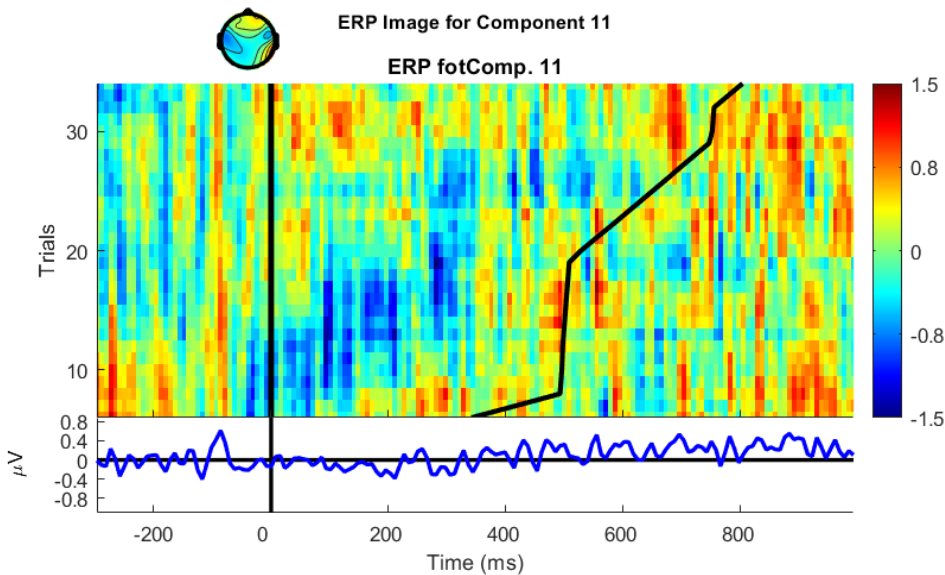
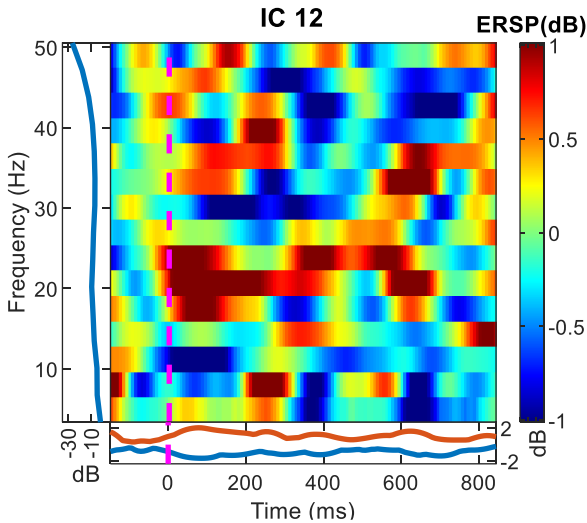


Middle stage

104_10

Temporal T8		
Time(ms)	Alpha	
[-50, 200]	desync	
[250, 300]	sync	

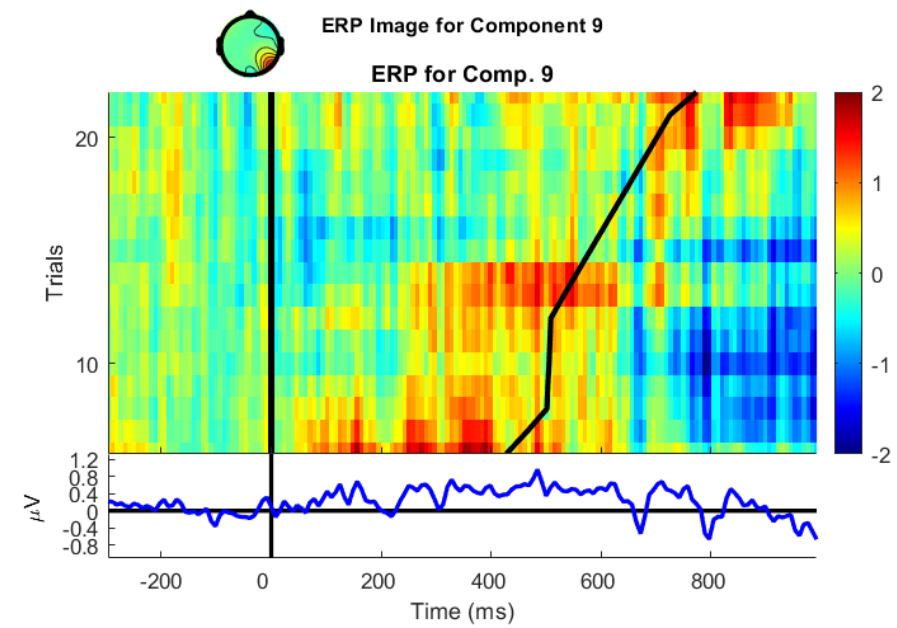
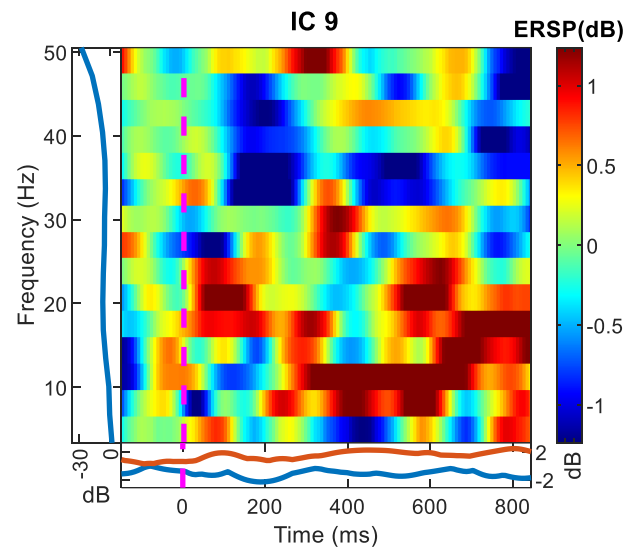
Parietal P8		
Time(ms)	Alpha	
[-50, 200]	desync	
[300, 420]	sync	



Middle stage

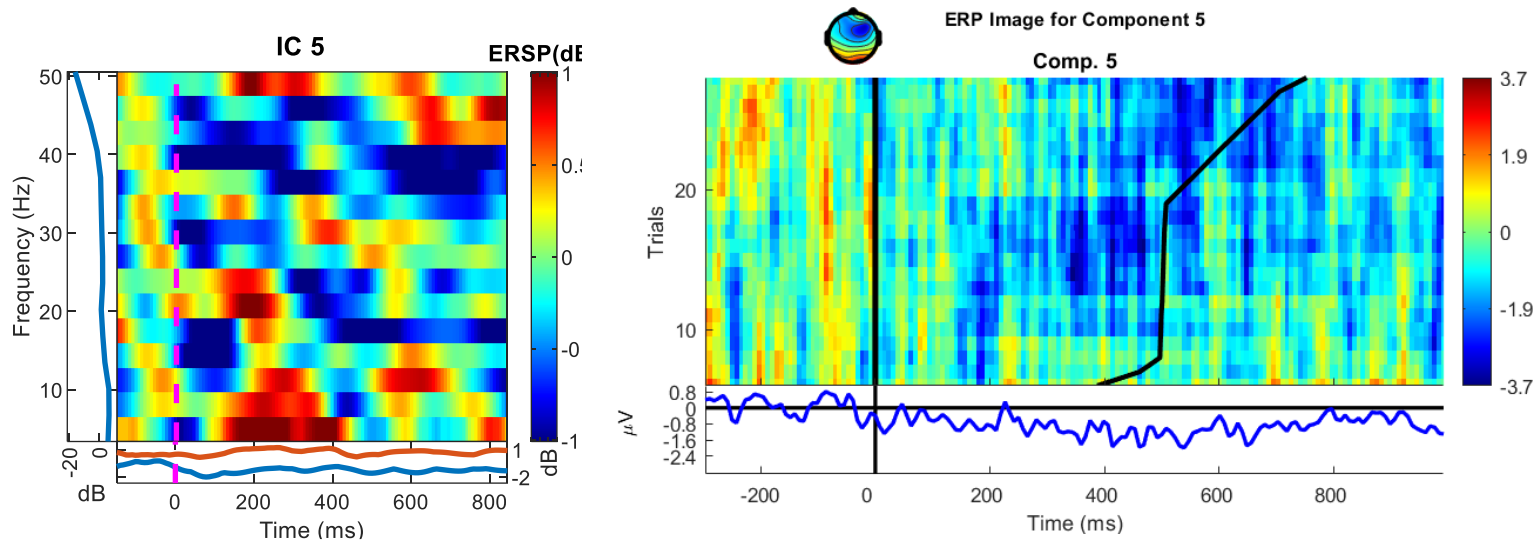
104_12

Parietal P8		
Time(ms)	Alpha	
[0, 200]	desync	
[350, 600]	sync	



104_13

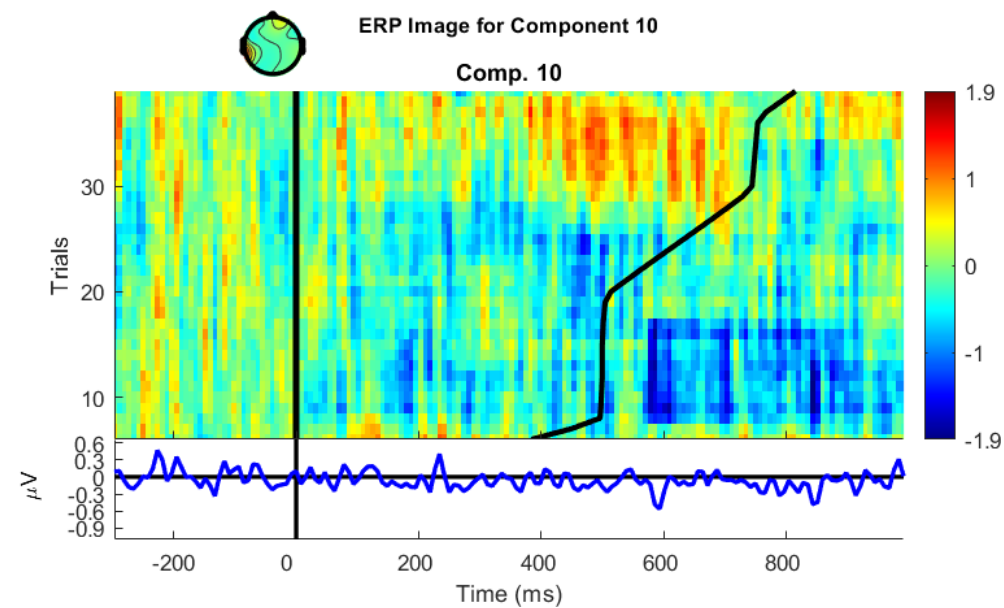
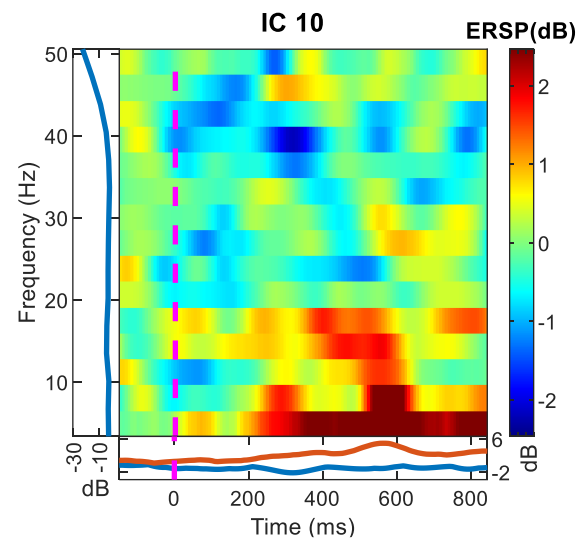
Occipital O2		
Time(ms)	Alpha	
[0, 150]	desync	
[300, 400]	sync	



Middle stage

104_14

Temporal T7		
Time(ms)	Alpha	
[0, 200]	desync	
[390, 600]	sync	



Middle stage

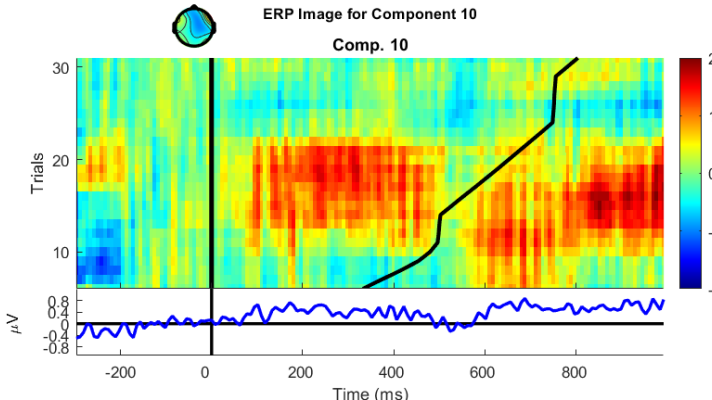
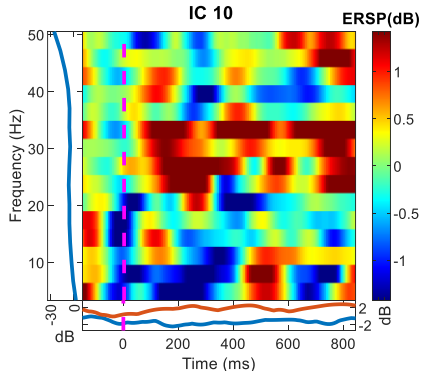
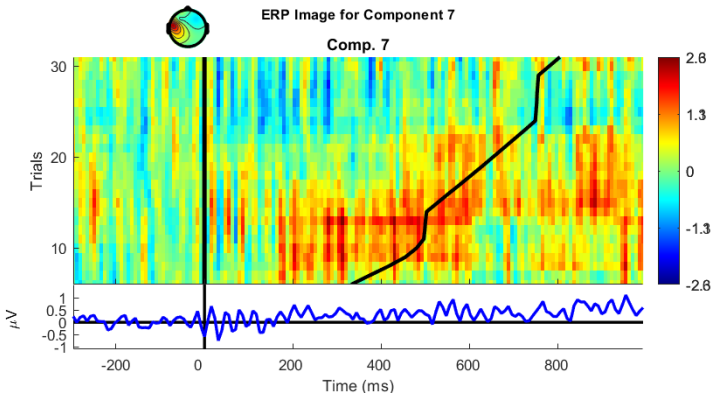
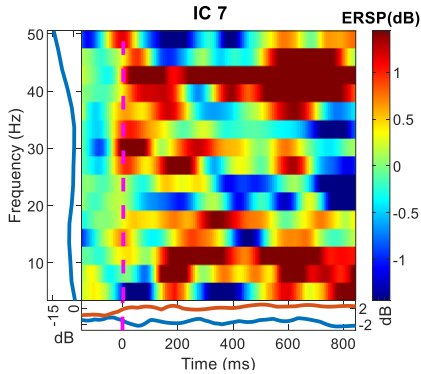
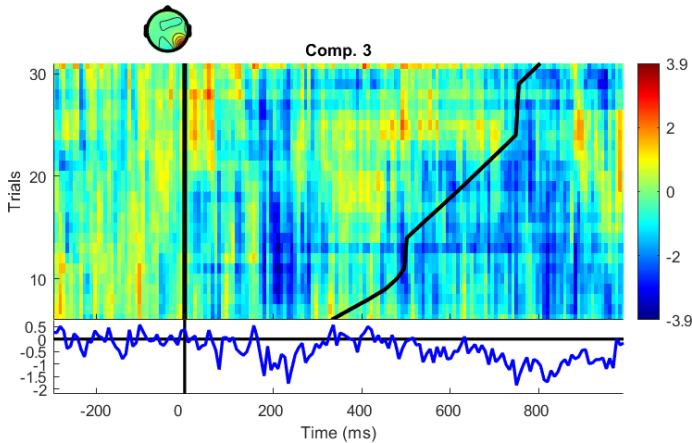
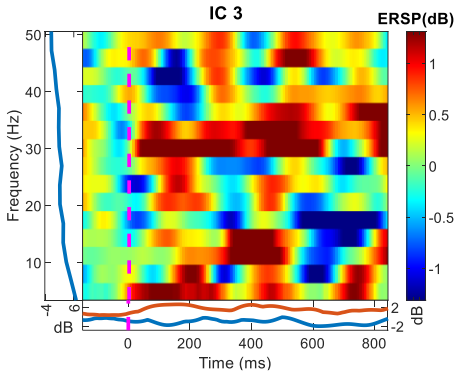
104_15

Parietal P8		
Time(ms)	Alpha	
[0, 100]	desync	
[380, 470]	sync	

Frontal FC5		
Time(ms)	Alpha	
[-50, 150]	desync	
[200, 500]	sync	

Frontal F8		
Time(ms)	Alpha	
[-50, 50]	desync	
[400, 600]	sync	

Middle stage



104_16

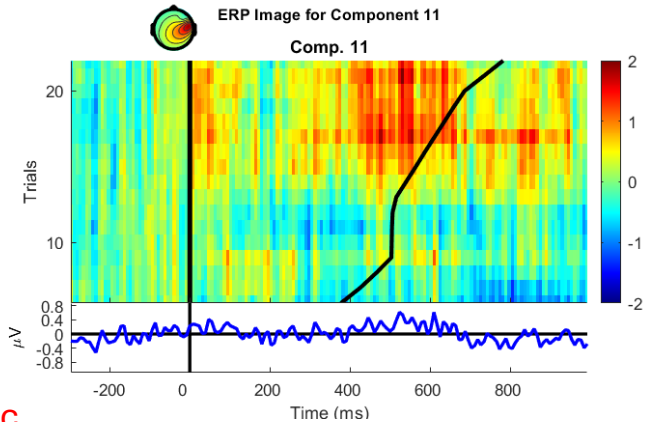
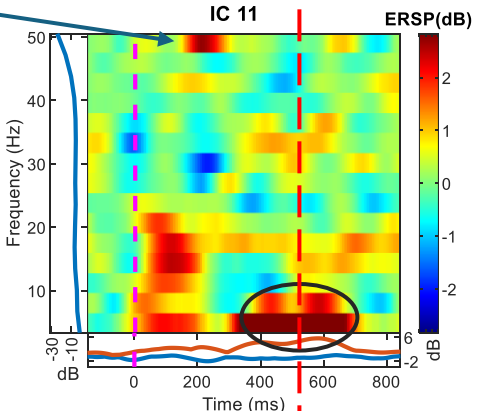
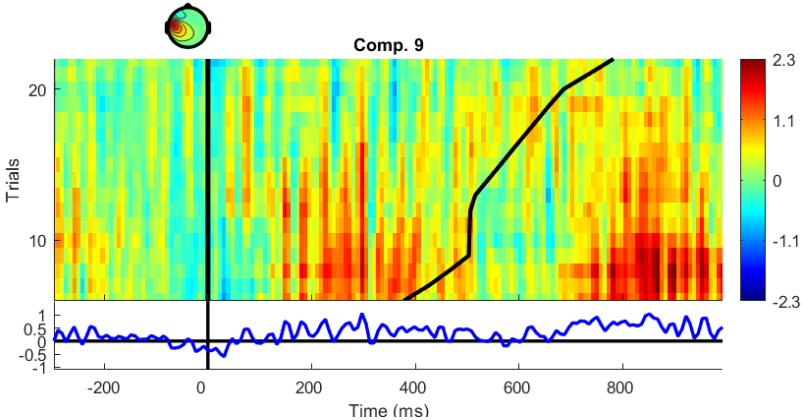
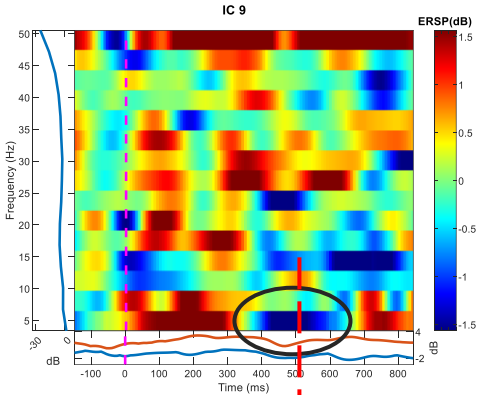
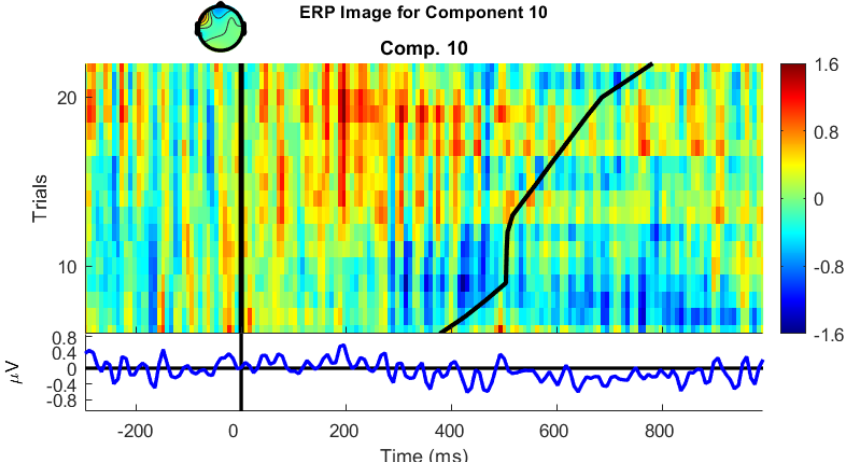
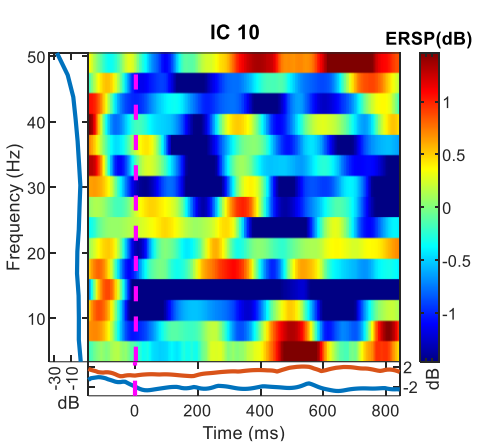
Frontal F7		
Time(ms)	Alpha	
[0, 250]	desync	
[400, 550]	sync	

Frontal FC5 (excluded)		
Time(ms)	Alpha	
[0, 100]	sync	
[400, 600]	desync	

FC5 and FC6 here shows lateralisation

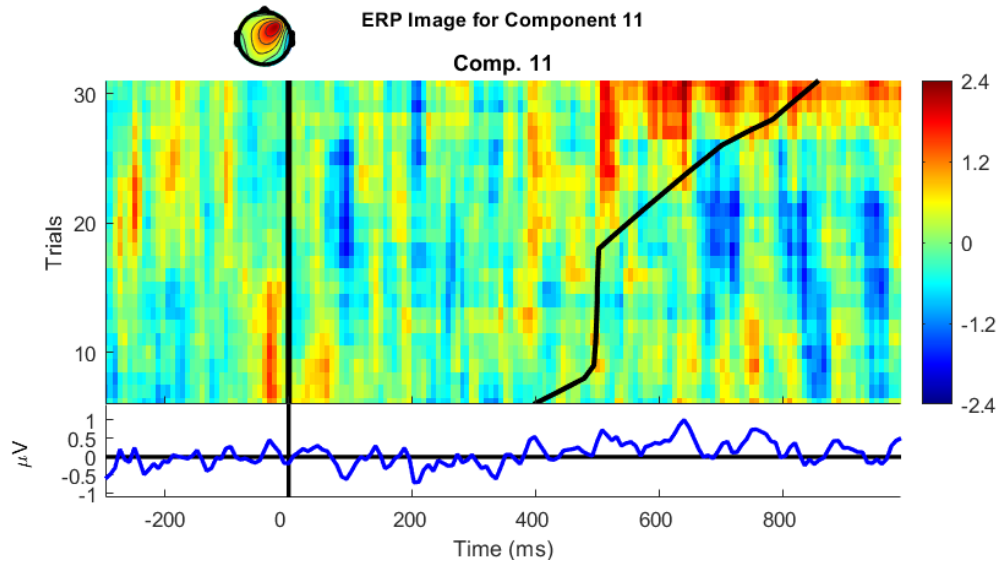
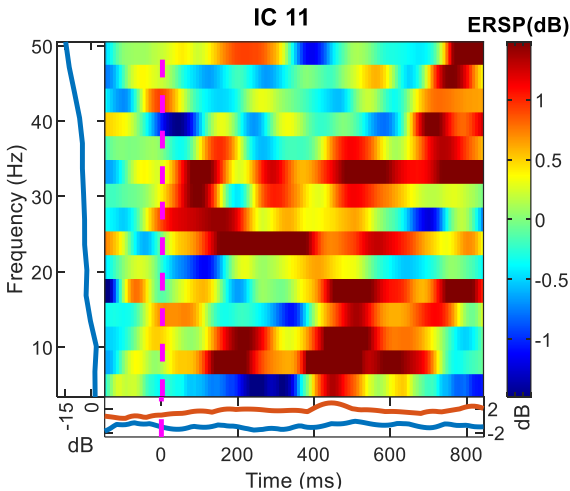
Frontal FC6 (excluded)		
Time(ms)	Alpha	
[0, 100]	sync	
[400, 600]	sync	

Middle stage

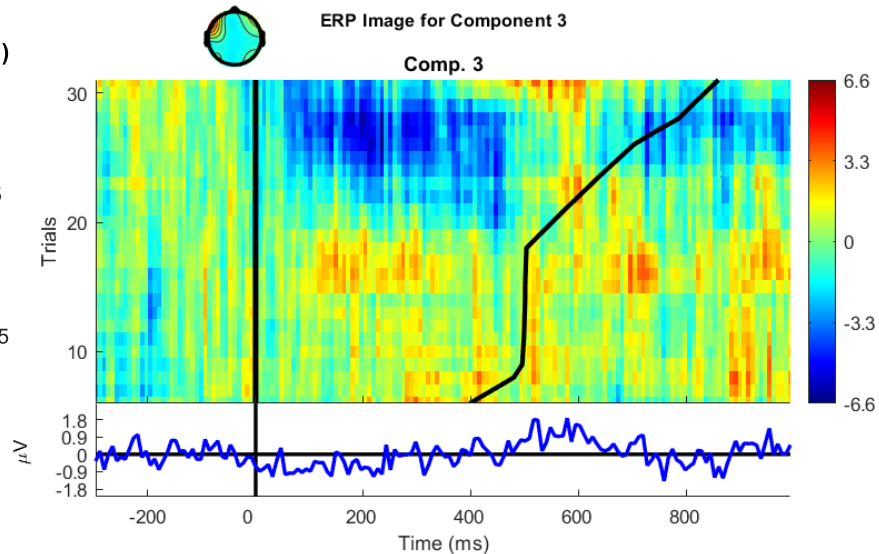
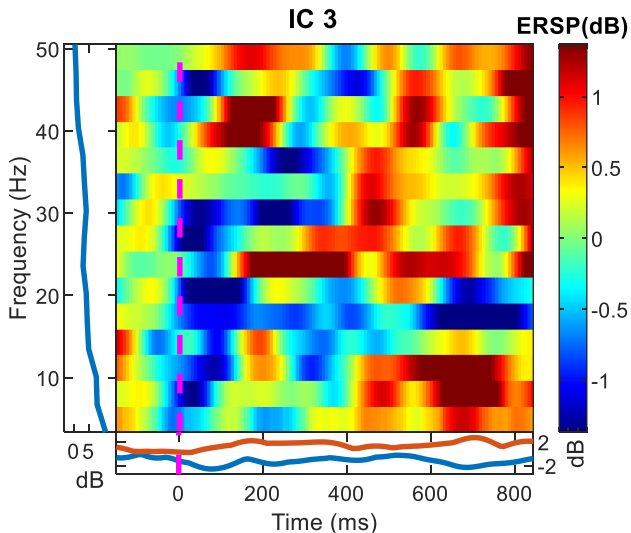


One channel's desync vs. the other's sync

Frontal F4		
Time(ms)	Alpha	
[-50,100]	desync	
[400, 600]	sync	

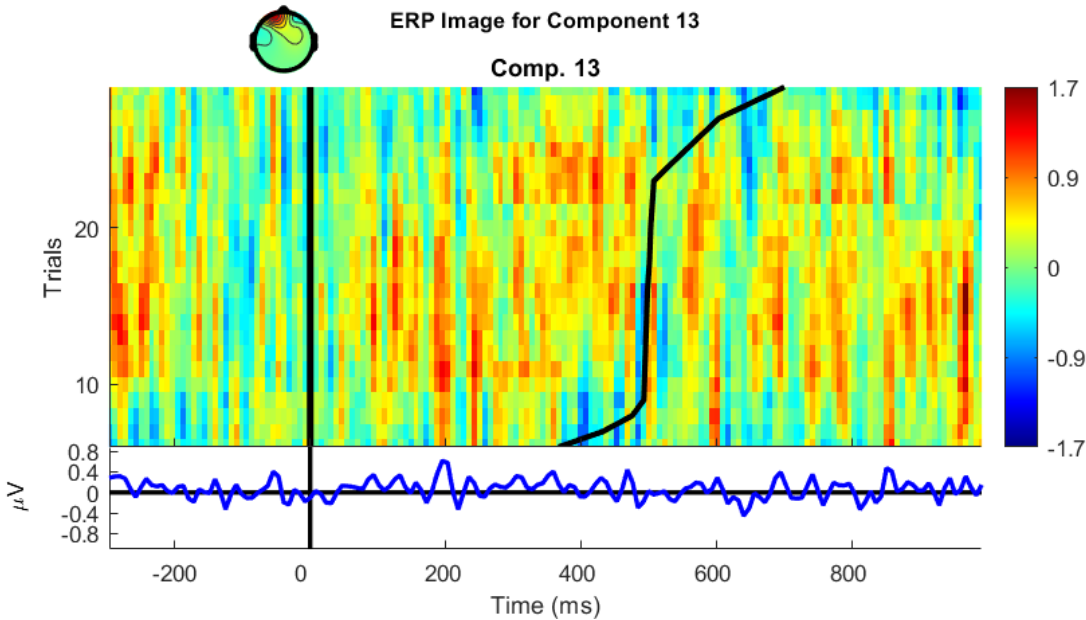
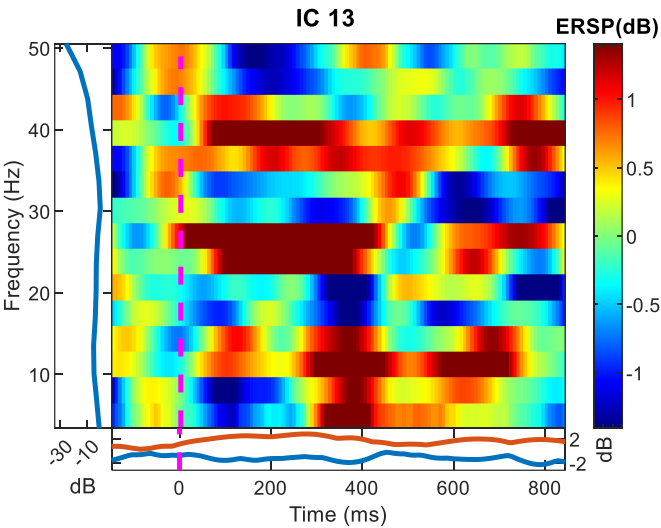


Frontal F7		
Time(ms)	Alpha	
[-50,150]	desync	
[400,750]	sync	



104_19

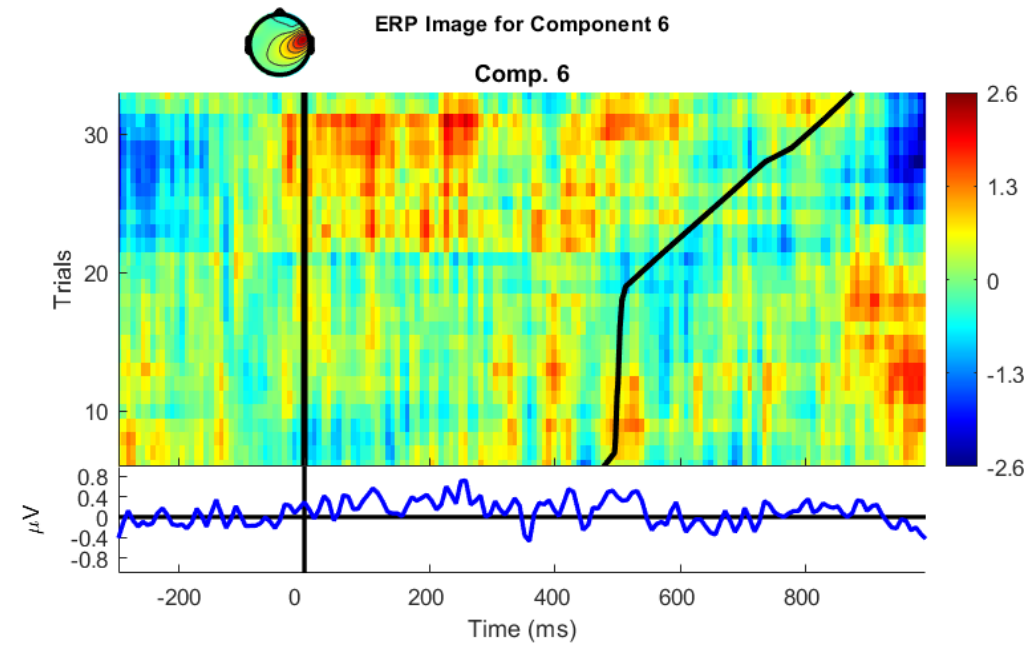
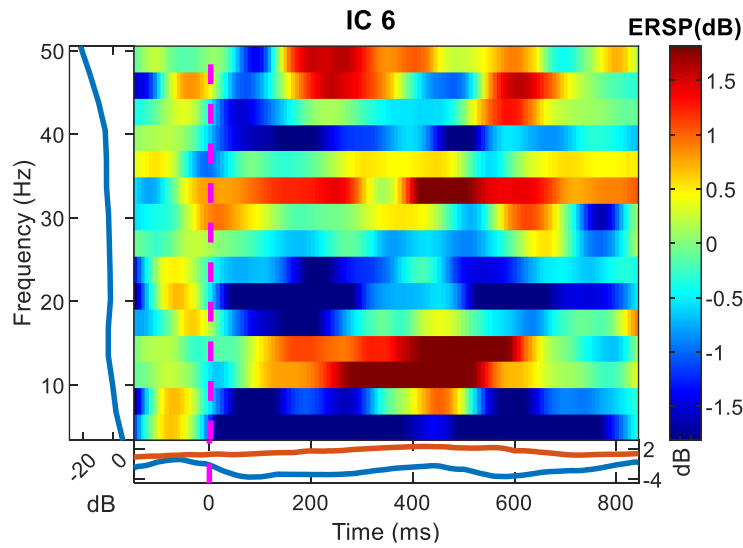
Frontal AF3		
Time(ms)	Alpha	
[-50, 200]	desync	
[300, 500]	sync	



Later stage

104_20

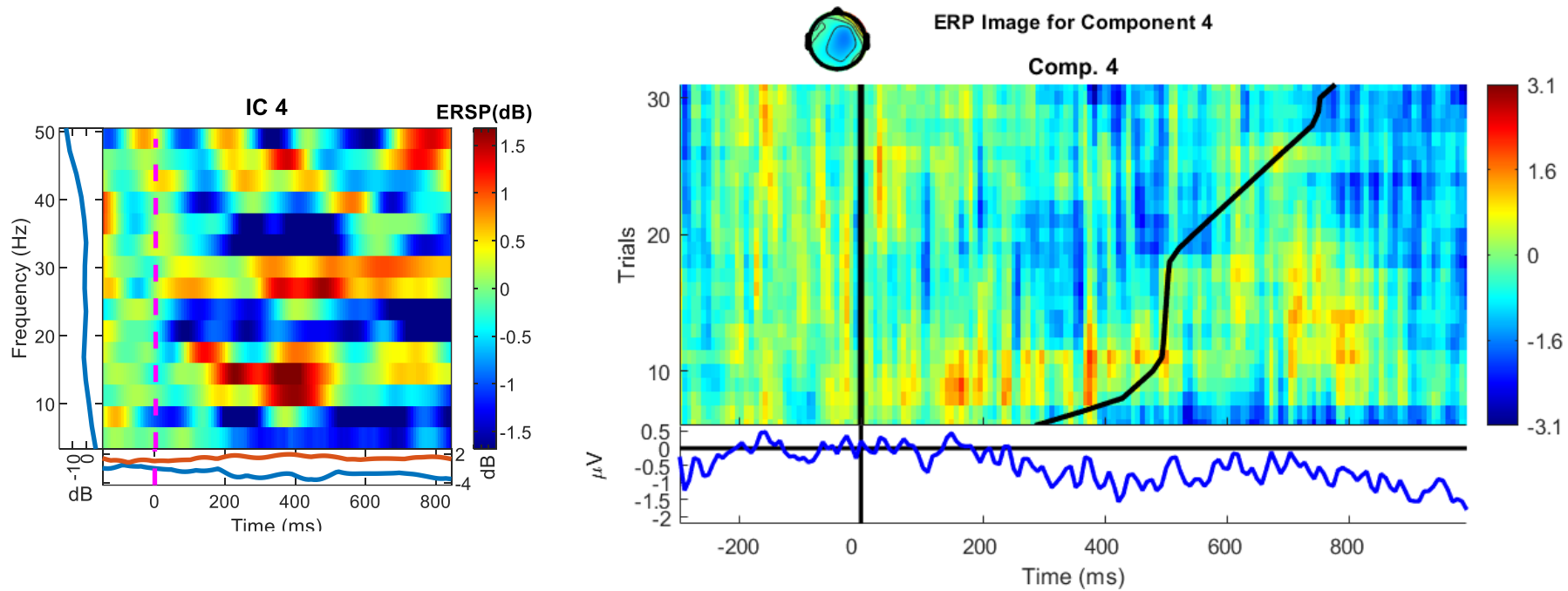
Frontal FC6		
Time(ms)	Alpha	
[-50, 200]	desync	
[300, 500]	sync	



Later stage

104_21

Frontal F8		
Time(ms)	Alpha	
[-50, 200]	desync	
[350, 500]	sync	

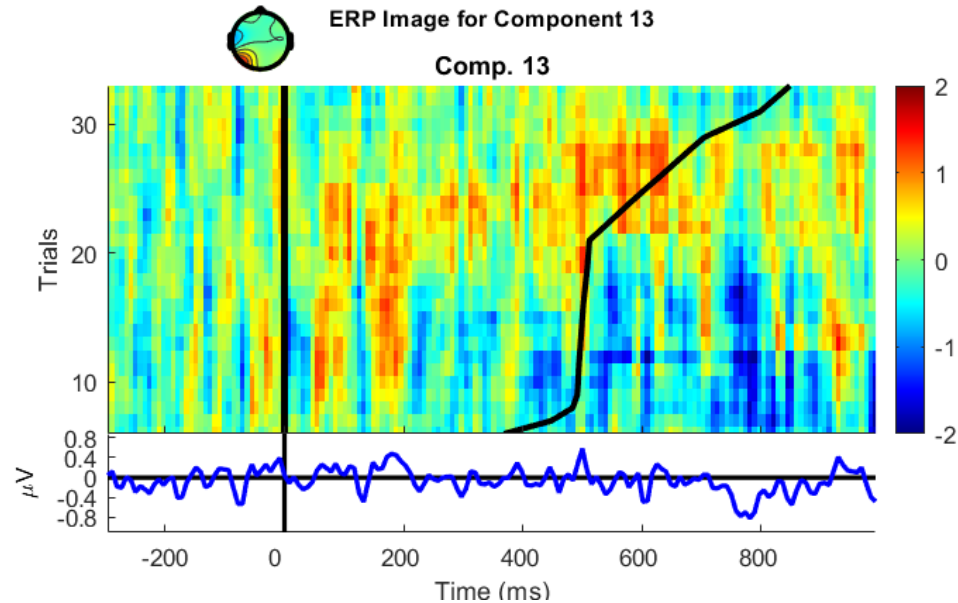
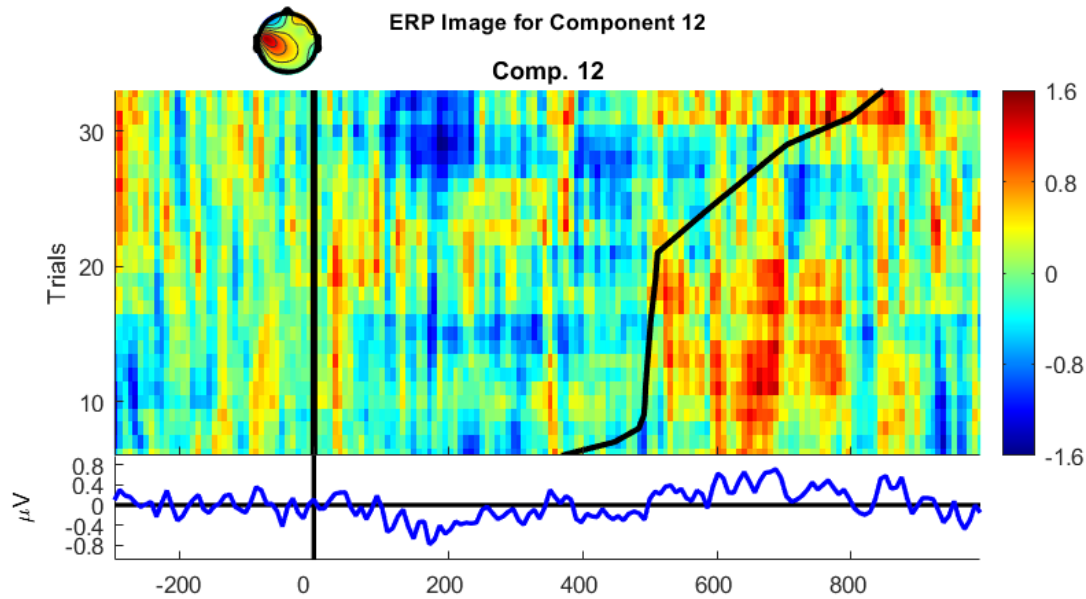
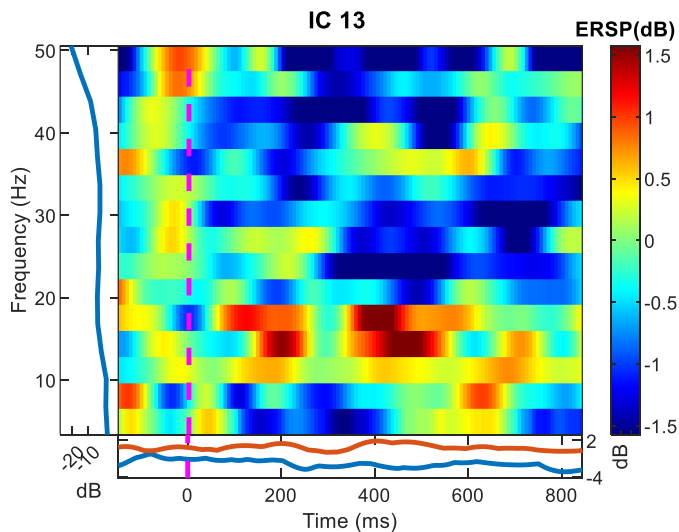
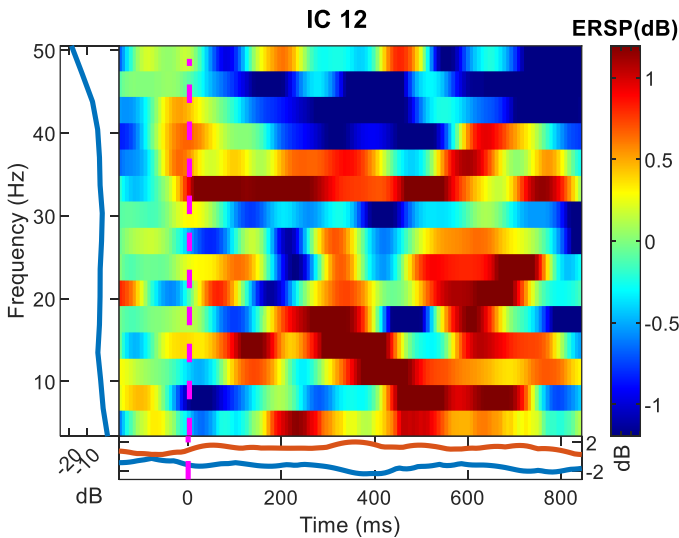


Later stage

104_22

Frontal FC5		
Time(ms)	Alpha	
[-50, 100]	desync	
[350, 600]	sync	

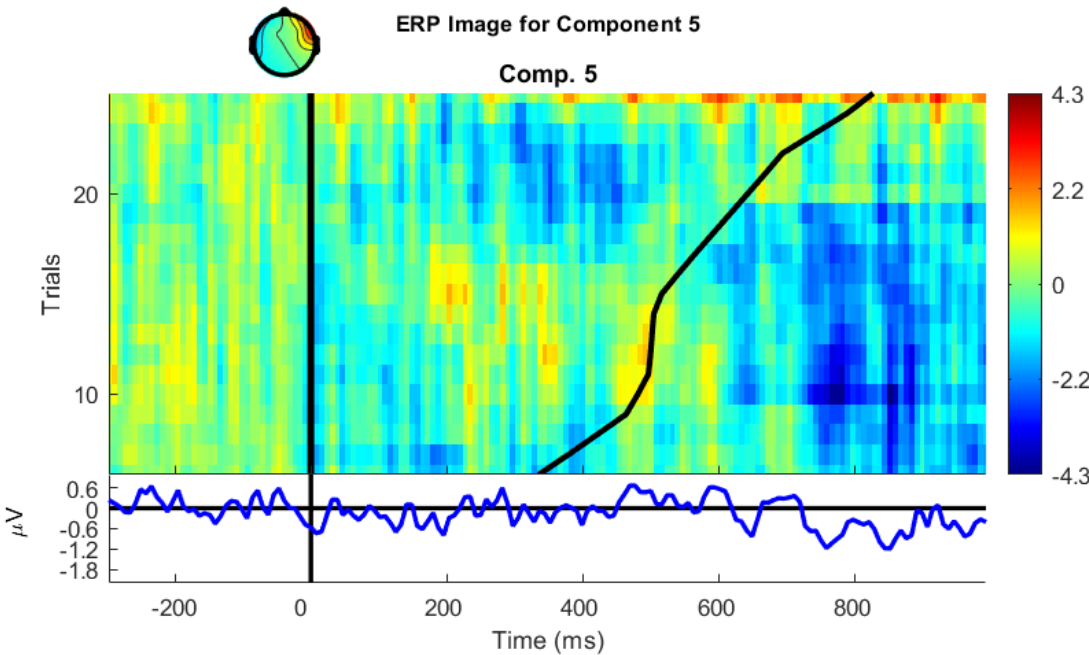
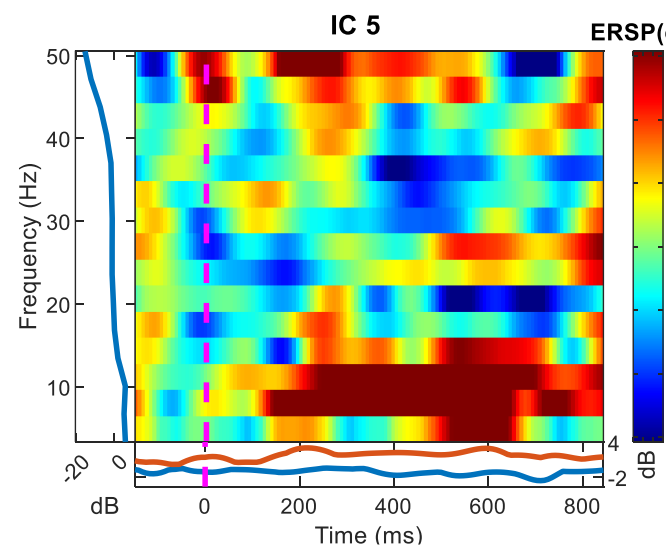
Parietal P7		
Time(ms)	Alpha	
[-50, 100]	desync	
[350, 600]	sync	



Later stage

104_23

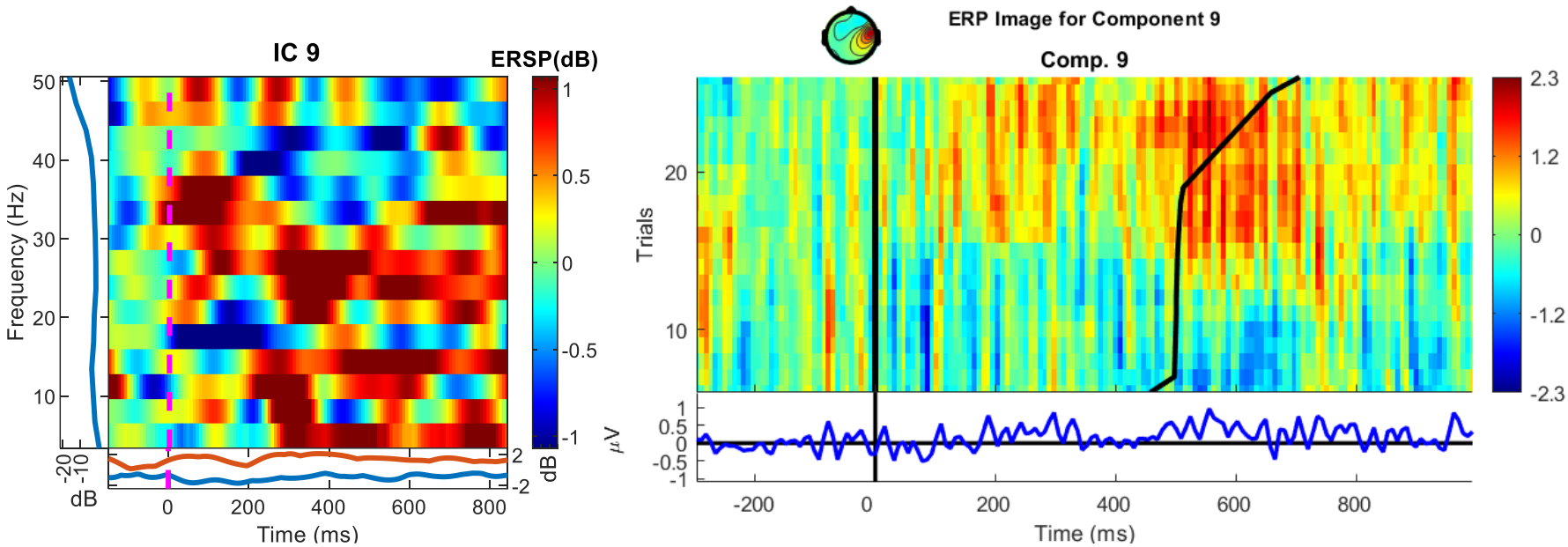
Frontal F8		
Time(ms)	Alpha	
[-50, 100]	desync	
[300, 600]	sync	



Later stage

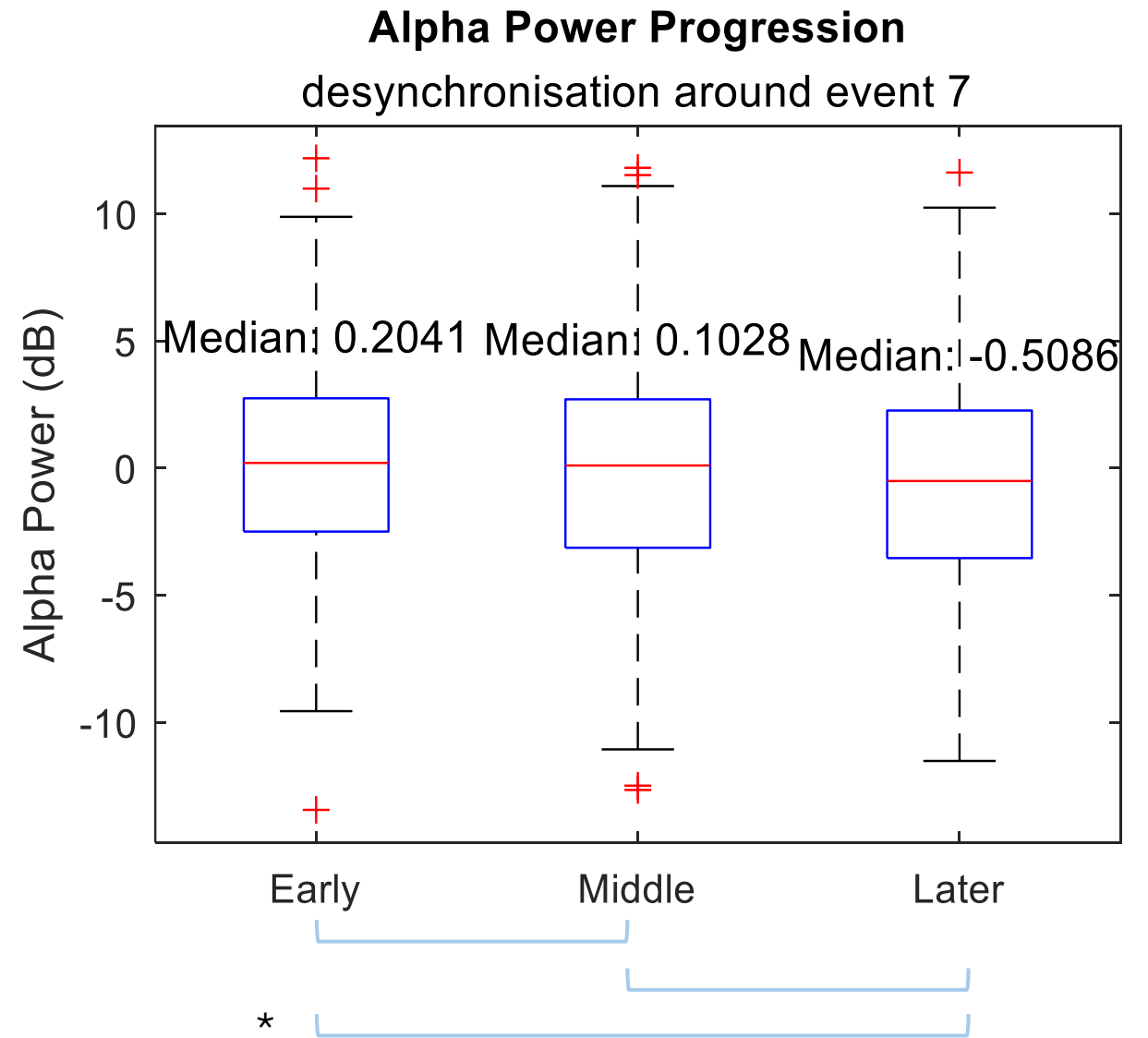
104_24

Frontal FC6		
Time(ms)	Alpha	
[-50, 100]	desync	
[500, 600]	sync	



Later stage

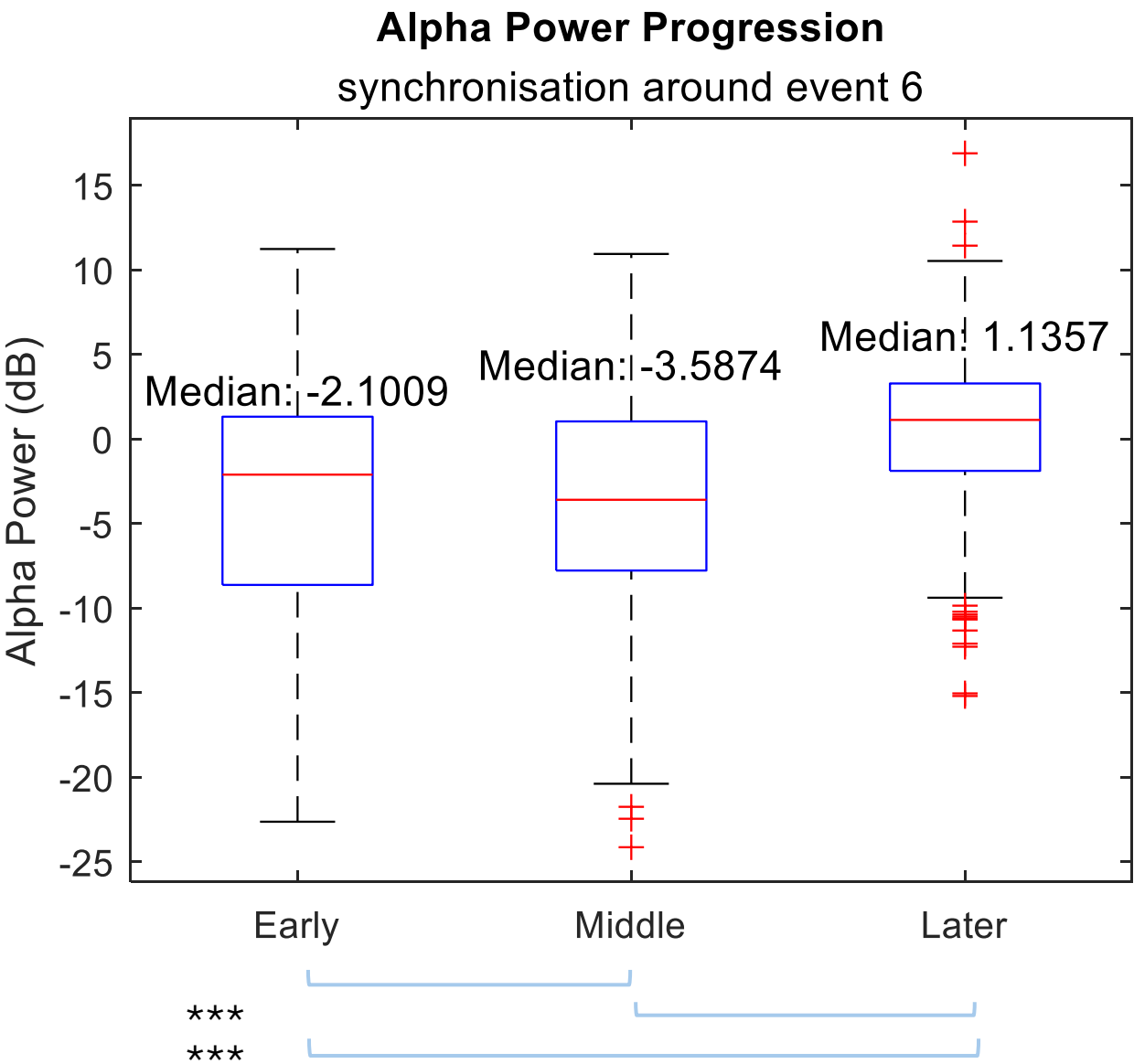
p-value (Early vs Middle): 0.29069
p-value (Middle vs Later): 0.19142
p-value (Early vs Later): 0.020216



15-20 dB? Artifact rejection or cleaning was not thorough even with ICA

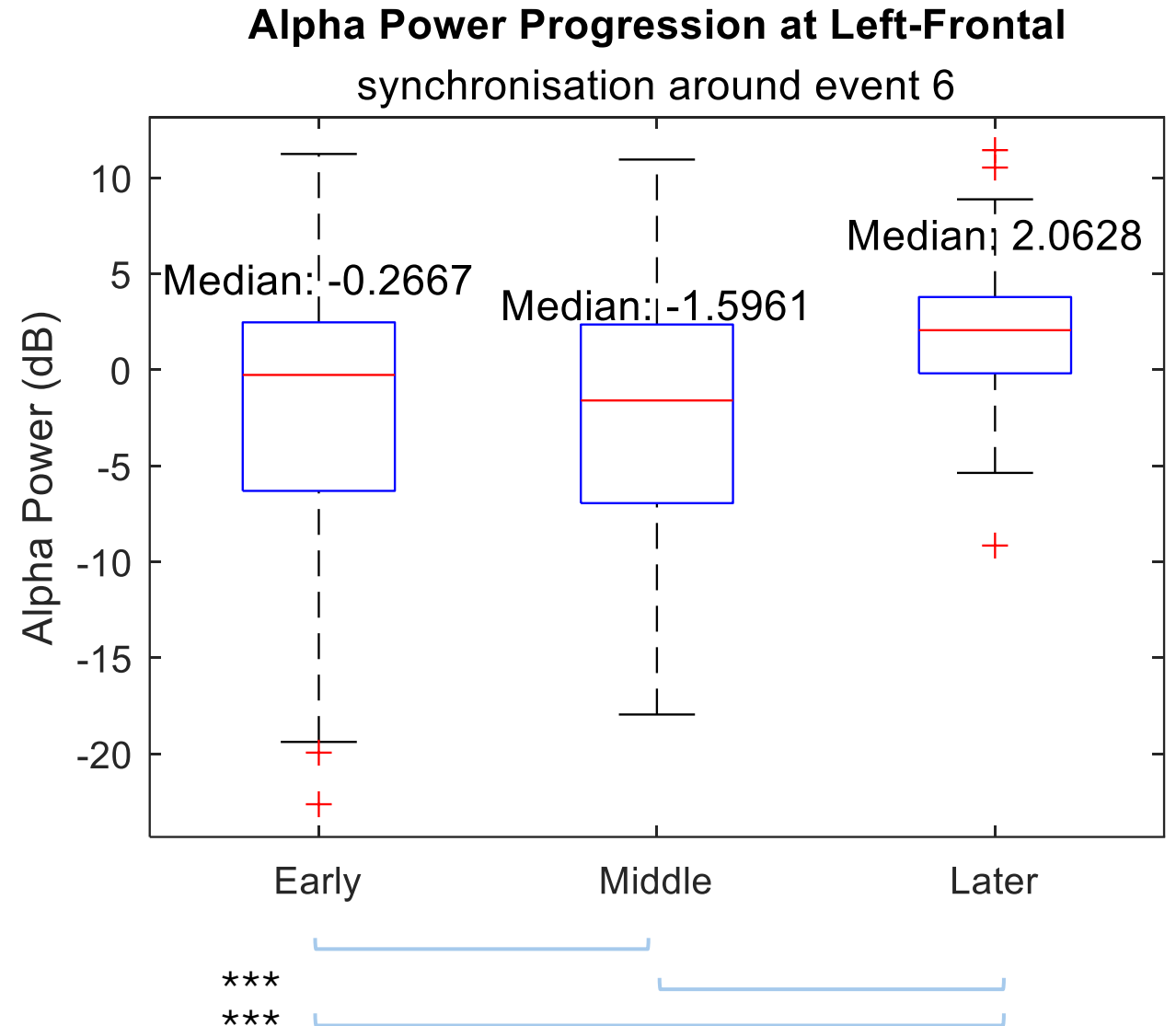
p-value (Early vs Middle): 0.58906
p-value (Middle vs Later): 2.3569e-31
p-value (Early vs Later): 8.1987e-21

In the early and middle stages of training, participants might be more actively engaged or effortful in learning the neurofeedback task, leading to greater alpha desynchronization.



Left-Frontal

10 components have been processed in total.
p-value (Early vs Middle): 0.28112
p-value (Middle vs Later): 1.6416e-10
p-value (Early vs Later): 1.5395e-07



High dB power explanation

- **Lower Baseline Power Inflates dB Values**
- When the baseline alpha power is low due to desynchronization, the denominator in the dB formula ($Power_{baseline}$) is small. This amplifies the relative change in power, leading to larger dB values, even if the absolute change in power is modest.
- In your example:
 - Baseline = $1 \mu V^2$ (desynchronized)
 - Event 6 = $32 \mu V^2$
 - $dB = 10 * \log_{10}(32/1) \approx 15 \text{ dB}$

===== All Regions Summary =====

Region: Left-Frontal

Components processed: 10

p-value (Early vs Middle): 0.33406 (decrease)

p-value (Middle vs Later): 1.6835795e-10 (increase)

p-value (Early vs Later): 2.1735558e-08 (increase)

Region: Right-Frontal

Components processed: 9

p-value (Early vs Middle): 4.1055e-05 (increase)

p-value (Middle vs Later): 0.0019137898 (increase)

p-value (Early vs Later): 8.7602815e-12 (increase)

Region: Left-Temporal

Components processed: NA

p-value (Early vs Middle): NA

p-value (Middle vs Later): NA

p-value (Early vs Later): NA

Region: Right-Temporal

Components processed: NA

p-value (Early vs Middle): NA

p-value (Middle vs Later): NA

p-value (Early vs Later): NA

Region: Left-Occipital

Components processed: 0

p-value (Early vs Middle): NA

p-value (Middle vs Later): NA

p-value (Early vs Later): NA

Region: Right-Occipital

Components processed: NA

p-value (Early vs Middle): NA

p-value (Middle vs Later): NA

p-value (Early vs Later): NA

Region: Left-Parietal

Components processed: NA

p-value (Early vs Middle): NA

p-value (Middle vs Later): NA

p-value (Early vs Later): NA

Region: Right-Parietal

Components processed: NA

p-value (Early vs Middle): NA

p-value (Middle vs Later): NA

p-value (Early vs Later): NA
