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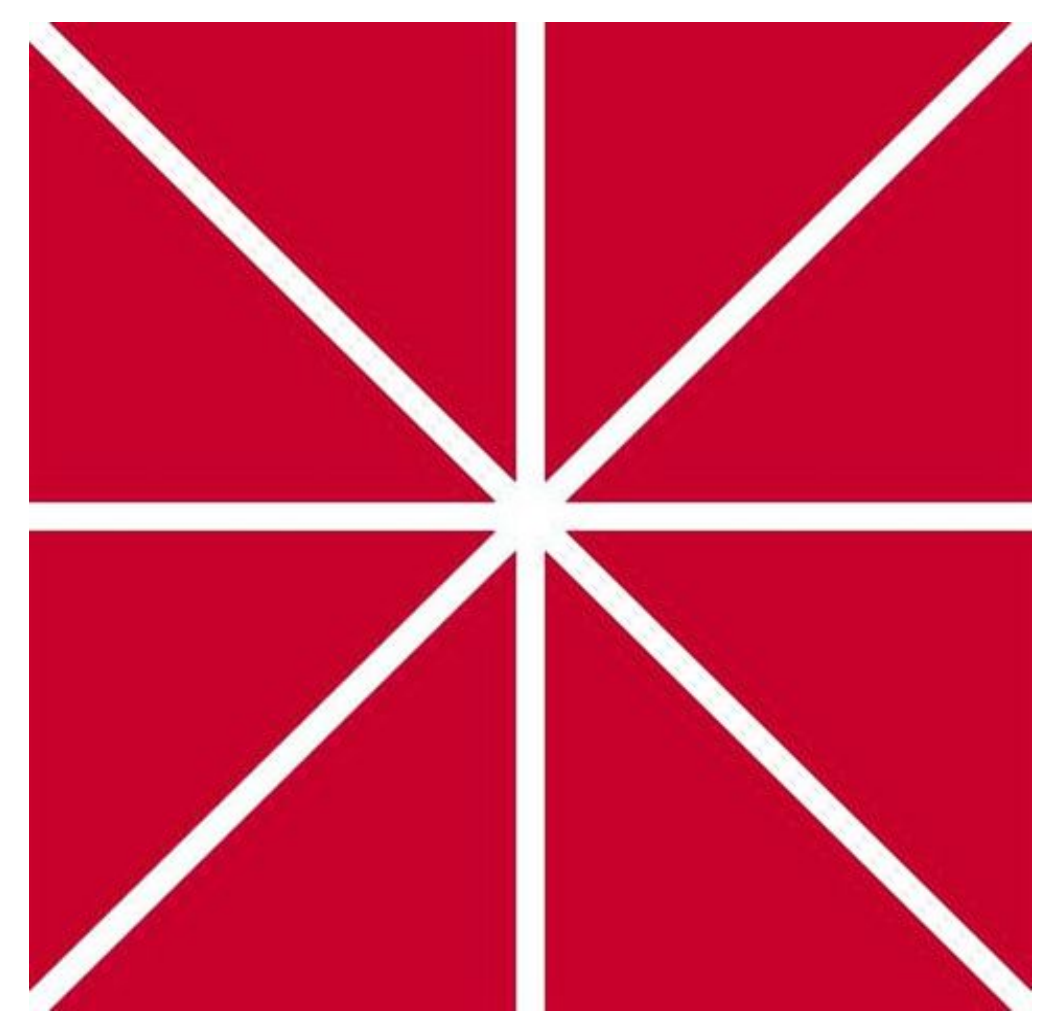
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Measuring neural time series data in a sensory deprivation tank

Jackson Gregory, Tian Lan, Uri Maoz, and Amir Raz



Introduction

- We are interested in studying the neurological and physiological effects of the float pod, also known as REST therapy.
- Float pods rely on the concept of depriving most senses (sound, light, temperature, and proprioception) in a pool filled with buoyant salt water at body temperature.
- We plan to look at the different levels of relaxation and the brain frequencies are associated with relaxation
- Research done in this field has shown that the float pod induced a state of relaxation and heightened introspection in participants with high levels of anxiety (Feinstein et al., 2018).
- Research has also shown that the float pod may be a promising technique for reducing suffering in individuals with anxiety and depression (Feinstein et al., 2018).

Methods

- 6 channel electroencephalography (EEG) was recorded (Fp1, Fp2, AF3, AF4, AF7, AF8)
- Sampling rate was set at 1000Hz. The ground was set at FPz and reference was set at AFz.
- A customized 6-channel LiveAmp mobile EEG amplifier from Brain Products GmbH was used to collect EEG signal from the frontal lobe.



Fig. 1: Sensory deprivation tank



Fig. 2: EEG headband

Preliminary Attempts

- There was a strong electrocardiography (ECG) presence due to the salty environment and the moisture in the pod.
- The cap design was changed to a cap made out of wetsuit material and an elastic band to secure it to the head.
- There was also an attempt to secure the cap without a headband by using adhesives to attach the cap to the forehead.
- The reference electrode was moved to the nose tip, which did eliminate some of the ECG artifacts, but not at a level where EEG signal was considered as reliable.

Successful Attempts

- A swim cap is placed over the head band, creating a good seal around the EEG head band which resulted in an elimination of the ECG artifact.

Results

- After adjusting pre-float procedure and applying artifact removal algorithm, stable EEG with high signal-to-noise ratio (SNR) was able to be recorded for 45 minutes without the presence of ECG artifacts.

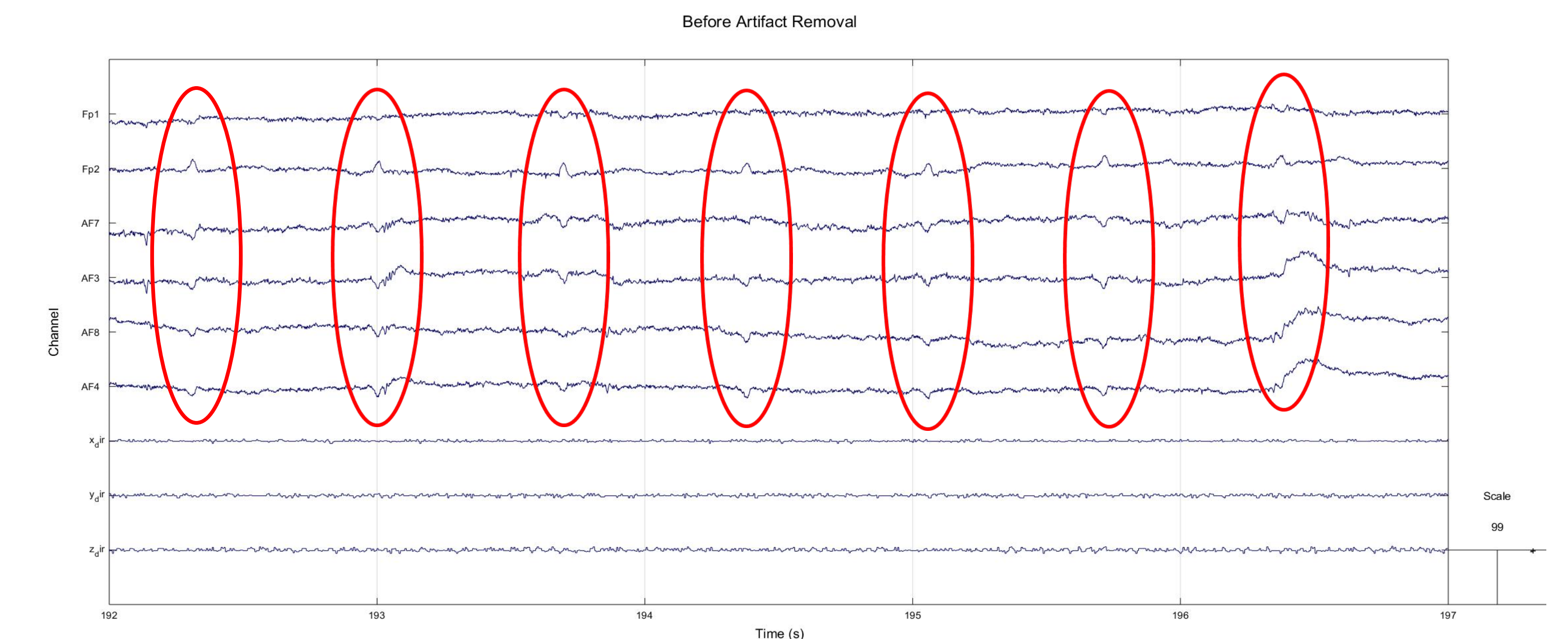


Fig.3: 5-second EEG recordings with ECG artifacts (red circled)

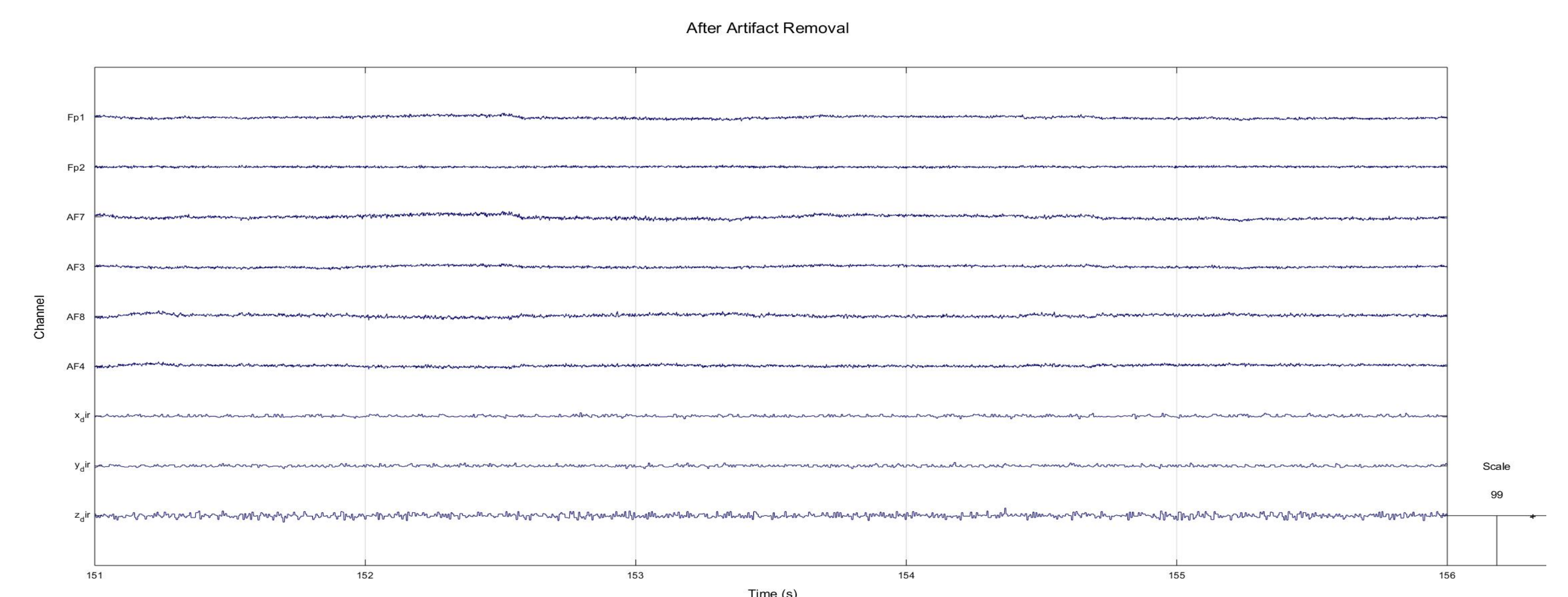


Fig.4: 5-second EEG recordings without ECG artifacts

Discussion

- We intend to improve the SNR of the EEG signal.
- We intend to integrate EEG readings with other physiological measurements, like motion sensors.
- Future attempts will be made to make the cap more comfortable.
- In the future, several experimental paradigms will be introduced inside the float pod .

References

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- Feinstein, J. S., Khalsa, S. S., Yeh, H., Zoubi, O. A., Arevian, A. C., Wohlrab, C., . . . Paulus, M. P. (2018). The elicitation of relaxation and interoceptive awareness using floatation therapy in individuals with high anxiety sensitivity. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 3, 555- 562.