

Considerations for Utilizing the mindBEAGLE's Hybrid BCI-Based Paradigms in Bilingual Patients with Decompressive Hemicraniectomy and Hydrocephalus: A Case Study

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Introduction: Brain-computer interfaces (BCIs) like the mindBEAGLE offer promising avenues for assessing cognition and facilitating communication in patients with disorders of consciousness (DoC).[1] However, applying this technology to bilingual patients with complex neurological conditions, such as those who have undergone decompressive hemicraniectomy (DHC) and have hydrocephalus, presents unique challenges. This case study investigates considerations and potential adaptations when using mindBEAGLE in this patient population.

Materials and Methods: This case study examines a 64-year-old bilingual female patient who underwent decompressive hemicraniectomy (DHC) following a ruptured arteriovenous malformation. The mindBEAGLE system was utilized to assess cognition and communication potential, with task instructions tailored to the patient's native language and cultural background.[2] Consideration was given to the effects of altered brain geometry and biomechanics due to DHC and hydrocephalus on EEG signal quality and reliability.[3-5] Data analysis is ongoing using g.tec's g.BSanalyze software. EEG recordings will be analyzed

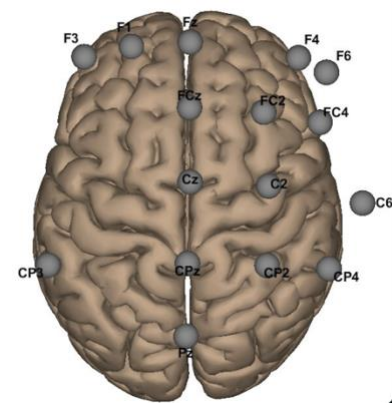


Figure 1 3D Brain Montage of EEG Electrodes

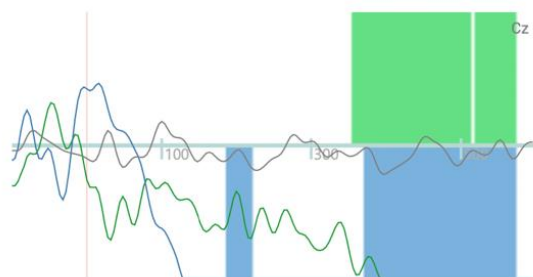


Figure 2 VT7 Assessment Output: Average Evoked Related Potential (ERP) of Channel Cz

considering the disrupted skull integrity and potential changes in signal propagation. The presentation will include these results with an evaluation of biosignal quality, the significance of evoked potentials, and the electrode configurations required for successful paradigm completion.

Conclusion: This case study provides valuable insights into the challenges of applying BCI technology in patients with complex neurological conditions. Our findings highlight the obstacles

encountered and accommodations used to address the unique needs of this patient's altered brain biomechanics and bilingual background.

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