Entrainment of neural oscillations as a modifiable substrate of attention

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Abstract:

Brain operation is profoundly rhythmic. Oscillations of neural excitability shape sensory, motor, and cognitive processes. Intrinsic oscillations also entrain to external rhythms, allowing the brain to optimize the processing of predictable events such as speech. Moreover, selective attention to a particular rhythm in a complex environment entails entrainment of neural oscillations to its temporal structure. Entrainment appears to form one of the core mechanisms of selective attention, which is likely to be relevant to certain psychiatric disorders. Deficient entrainment has been found in schizophrenia and dyslexia and mounting evidence also suggests that it may be abnormal in attention-deficit/hyperactivity disorder (ADHD). Understanding the underpinnings, ontogeny, and specific functions of entrainment will allow the design of experiments aimed at determining entrainment integrity in psychiatric disorders. Thus, knowledge of how entrainment is impaired in neuropsychiatric disorders will set the stage for more targeted novel interventions.