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# Neural Resonance Theory: Entrainment to Missing Pulse Rhythms

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**Abstract:** Many rhythm perception experiments employ simple isochronous rhythms, in which synchronous neural or behavioral responses are observed. However, responses at the stimulus frequency do not allow one to distinguish whether synchrony occurs as a response to common input, or as the result of an emergent population oscillation that entrains at a particular frequency. This study aimed to investigate whether the sensorimotor system, as measured by 32-channel cortical EEG, would entrain to a complex rhythm at the pulse frequency even when the complex rhythm contained no spectral power at that frequency. Dynamical analysis predicts neural oscillation will emerge at such a “missing” pulse frequency. We report evidence of response in the EEG to missing 2 Hz pulse rhythms. These data support the theory that rhythmic synchrony occurs as the result of an emergent population oscillation that entrains at this particular frequency. We also discuss generators of the missing pulse response.