A Bayesian model is a statistical model made of the pair prior x likelihood = posterior x marginal.

Bayesian models of brain function such as active inference and predictive coding offer a general theoretical framework with which to explain several aspects of normal and disordered brain function. Of particular interest to the present study is the potential for such models to explain the pathology of auditory phantom perception, i.e. tinnitus. To test this framework empirically, Hullfish et al., performed an fMRI experiment on a large clinical sample (n = 75) of the human chronic tinnitus population. The experiment features a within-subject design based on two experimental conditions: subjects were presented with sound stimuli matched to their tinnitus frequency (TF) as well as similar stimuli presented at a control frequency (CF). The responses elicited by these stimuli, as measured using both activity and functional connectivity, were then analyzed both within and between conditions. Given the Bayesian-brain framework, we hypothesize that TF stimuli will elicit greater activity and/or functional connectivity in areas related to the cognitive and emotional aspects of tinnitus, i.e. tinnitus-related distress. We conversely hypothesize that CF stimuli will elicit greater activity/connectivity in areas related to auditory perception and attention. We discuss our results in the context of this framework and suggest future directions for empirical testing [1)].

1)
Hullfish J, Abenes I, Kovacs S, Sunaert S, De Ridder D, Vanneste S. Functional brain changes in auditory phantom perception evoked by different stimulus frequencies. Neurosci Lett. 2018 Jul 31. pii: S0304-3940(18)30522-6. doi: 10.1016/j.neulet.2018.07.043. [Epub ahead of print] PubMed PMID: 30075284.