Perceptual bistability occurs when the same physical stimulus gives rise to two possible interpretations. Upon prolonged viewing of such ambiguous stimuli, only one interpretation is being perceived at any given moment, and perception switches between the two interpretations in a haphazard manner. I will present mathematical models that describe perceptual bistability, introduce the features of the models that allow to reproduce experimentally observed behavior, and discuss how the modeling results contribute to the understanding of the brain architecture and dynamics.