

## **Dynamic Predictive Templates in Perception**

### **Abstract**

False alarms occur when participants report perceiving a stimulus that was, in fact, never presented. False alarms share this feature with hallucinations—vivid and transient experiences of objects, such as images or sounds, that occur without an external cause. Consequently, false alarms have become one of the most influential paradigms for studying perceptual symptoms in psychosis. However, to serve as a proxy for hallucinations, false alarms must meet two additional criteria:

First, false alarms should not only represent the erroneous report of a signal but also reflect perceptual experiences characterized by specific content. Second, false alarms should occur on a timescale compatible with the temporal dynamics of hallucinations, which often unfold over seconds to minutes, particularly in the early stages of psychotic illness.

In this work, we combine Hidden Markov Models with a classification image approach to show that false alarms are more likely to occur in an internal mode of perception—a minute-long brain state during which the content of perception is strongly biased toward previous experiences. This confirms that false alarms are perceptual phenomena characterized by specific contents and driven by dynamic predictive templates. These templates are governed by transitions between external and internal modes of perception that alternate on a timescale compatible with the onset and offset of hallucinatory experiences.