# INTERNATIONAL JOURNAL OF NEURAL SYSTEMS

ON

# Autonomous Transitions in Healthy and Epileptic Neural Systems

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Epilepsy is a debilitating disease of the central nervous system that can manifest itself through sudden, most often unexpected transitions to paroxysmal states of the brain called epileptic seizures. This dynamic nature of the epileptic disorders has motivated a broad, open interdisciplinary group of researchers, the Society of Autonomous Neurodynamic (SAND), to address the challenge of understanding the phenomena. Why do seizures come at irregular intervals? Why do they often terminate suddenly? The majority of suspected precipitating factors, lesions or genetic mutations for example, are constantly present and still the dynamic pattern can change with no obvious trigger. Many models of epilepsy concentrate on one or another parameter change that may induce the transition to the epileptic state. The autonomous system approach rather takes the holistic view of self-contained emergent behaviour that reacts to, but is not deterministically driven by the interactions with the external world. In a sense broader than the clinical context, emerging techniques in complexity sciences and neural modelling provide the tools to explore dynamics in such systems, but have yet to explain how daily computational tasks are accomplished in a continuous and autonomous fashion. How do healthy embodied brains remain independent from the dynamics of the world while also being responsive? These questions regarding system autonomy are often independently explored in physics, mathematics, philosophy and other fields.

In this special issue of the **International Journal of Neural Systems,** the goal is to publish original contributions in this emerging field of autonomous neural systems. Relevant topics are in the areas of multiple self-sustained states and dynamic transitions between these states, the effect of noisy input and parameter random drift, stability and intermittency, detection, prediction, spatial propagation and control of state transitions. Neural systems within human and animal models, as well as theoretical concepts and computer stimulation studies are well within the scope of this issue. All accepted papers have to be presented at the annual meeting of SAND, August 20-22, at Université Laval, Québec, Canada. Authors of the papers not invited to submit papers for possible publication in the special issue of IJNS can still present their papers at the conference. Further details and registration information about the meeting can be found on www.utoronto.ca/sand/.

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