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Nota di contenuto	Criticality in Neural Systems; Contents; List of Contributors; Chapter 1 Introduction; 1.1 Criticality in Neural Systems; Chapter 2 Criticality in Cortex: Neuronal Avalanches and Coherence Potentials; 2.1 The Late Arrival of Critical Dynamics to the Study of Cortex Function; 2.1.1 Studying Critical Dynamics through Local Perturbations; 2.1.2 Principles in Cortex Design that Support Critical Neuronal Cascades; 2.2 Cortical Resting Activity Organizes as Neuronal Avalanches; 2.2.1 Unbiased Concatenation of Neuronal Activity into Spatiotemporal Patterns 2.2.2 The Power Law in Avalanche Sizes with Slope of $-3/2$ 2.2.3 Neuronal Avalanches are Specific to Superficial Layers of Cortex; 2.2.4 The Linking of Avalanche Size to Critical Branching; 2.3 Neuronal Avalanches: Cascades of Cascades; 2.4 The Statistics of Neuronal Avalanches and Earthquakes; 2.5 Neuronal Avalanches and Cortical Oscillations; 2.6 Neuronal Avalanches Optimize Numerous Network Functions; 2.7 The Coherence Potential: Threshold-Dependent Spread of Synchrony with High Fidelity; 2.8 The Functional Architecture of Neuronal Avalanches and Coherence Potentials; Acknowledgement ReferencesChapter 3 Critical Brain Dynamics at Large Scale; 3.1 Introduction; 3.1.1 If Criticality is the Solution, What is the Problem?; 3.2 What is Criticality Good for?; 3.2.1 Emergence; 3.2.2 Spontaneous Brain Activity is Complex; 3.2.3 Emergent Complexity is Always Critical; 3.3 Statistical Signatures of Critical Dynamics; 3.3.1 Hunting for Power Laws in Densities Functions; 3.3.2 Beyond Fitting: Variance and Correlation Scaling of BrainNoise; 3.3.2.1 Anomalous Scaling; 3.3.2.2 Correlation Length; 3.4 Beyond Averages: Spatiotemporal Brain Dynamics at Criticality 3.4.1 fMRI as a Point Process3.4.2 A Phase Transition; 3.4.3 Variability and Criticality; 3.5 Consequences; 3.5.1 Connectivity versus Functional Collectivity; 3.5.2 Networks, Yet Another Circuit?; 3.5.3 River Beds, Floods, and Fuzzy Paths; 3.6 Summary and Outlook; References; Chapter 4 The Dynamic Brain in Action: Coordinative Structures, Criticality, and Coordination Dynamics; 4.1 Introduction; 4.2 The Organization of Matter; 4.3 Setting the Context: A Window into Biological Coordination; 4.4 Beyond Analogy; 4.5 An Elementary Coordinative Structure: Bimanual Coordination 4.6 Theoretical Modeling: Symmetry and Phase Transitions4.7 Predicted Signatures of Critical Phenomena in Biological Coordination; 4.7.1 Critical Slowing Down; 4.7.2 Enhancement of Fluctuations; 4.7.3 Critical Fluctuations; 4.8 Some Comments on Criticality, Timescales, and Related Aspects; 4.9 Symmetry Breaking and Metastability; 4.10 Nonequilibrium Phase Transitions in the Human Brain: MEG, EEG, and fMRI; 4.11 Neural Field Modeling of Multiple States and Phase Transitions in the Brain; 4.12 Transitions, Transients, Chimera, and Spatiotemporal Metastability 4.13 The Middle Way: Mesoscopic Protectorates
Sommario/riassunto	Leading authorities in the field review current knowledge of critical behavior in brain function, both experimental and theoretical. The book begins by summarizing experimental evidence for self-organized criticality in the brain. Subsequently, recent breakthroughs in modeling of neuronal circuits to establish self-organized criticality are described. Finally, the importance of critical dynamics for brain function is highlighted.