



CoCo Seminar Series Fall 2024

The Unpredictable Game: What Complex Systems Science Tells Us About Soccer

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Friday September 27, 2024 12:00-1:00pm EDT
Hybrid (EB-R15 & Zoom; meeting link available on
<http://coco.binghamton.edu/>)

Why do inexperienced coaches sometimes achieve stunning victories while seasoned teams suffer shocking defeats? Why do strategies dismissed by sports science sometimes yield unexpected success? These mysteries led Pep Guardiola to declare, *"Soccer is a great lie. Experience is a great lie because each situation is new. What worked for you yesterday might not work today."* What got you here won't get you there tomorrow in sports, making constant adaptation a fundamental principle. In this presentation, we will explore how key properties of complex systems, such as dynamic interactions, self-organization, and emergent behaviors, provide deeper insights into sports games, such as soccer. We address the challenges posed by the Data Rich and Information Poor Syndrome (DRIPS) and the Anti-information phenomenon, where an abundance of data fails to translate into actionable insights. We emphasize the importance of asking transformative questions in sports, illustrating with examples. For tactical analysis, we propose an event-based modeling approach, a more efficient technique than (i) passing network modeling, and (ii) Expected Goals (xG), a metric designed to measure the probability of a shot resulting in a goal. Regarding talent identification, we highlight the need for new KPIs based on Grit (Consistency and Perseverance), Tolerance (Resistance and Resilience), Antifragility, Ego-Dissolution and Flow, and Guided Complexity. By connecting the worlds of science and sport, we explore fresh perspectives on tactical planning, player development, and innovation, ultimately enhancing our understanding of the game.

Nelson Fernández is a Professor and Head of the Complex Systems Lab at the University of Pamplona, Colombia, and currently a Visiting Scholar at CoCo. He obtained his Master's degree in Molecular Biology and Biotechnology at the University of Pamplona, and his PhD degree in Computer Science at the University of the Andes. His research interests include complex systems, data science, collective learning, adaptive computation, and ecoinformatics.

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