



Rethinking Soccer: What an Ecological Dynamics Framework could offer skill, learning and development – Session 4

# Session Intentions

- What does an Ecological Dynamics Framework offer performance programmes?
- Team 'Cognition' and Synergy Formations
- Meaningful Practice Activities in Elite Programmes



# Ecological Dynamics in High Performance Contexts

- Provides us a set of tools to think about how complex skilled performance occurs
- Involves the adoption of a *Complex Adaptive Systems (CAS)* perspective
- Takes us beyond explanations from within the organism (Organismic Asymmetry)



# Reconceptualising Game Models and Strategies: Sports Teams as Complex Adaptive Systems

Local System Property

Global System Property

Collective  
Organisation

# Reconceptualising Game Models and Strategies

- Traditional iteration of a Game Model is to view from a *top-down* perspective.
- Ecological Dynamics allows us to explore Game Models from a *bottom-up* perspective which may be more functional for complex adaptive systems.

Top-Down Organisational processes



Bottom-Up Organisational processes



# Reconceptualising Game Models and Strategies: The Formation of Knowledge

*Knowledge of:* the ability to complete an action by detecting the surrounding informational constraints in order to regulate behaviour.

*Knowledge about:* refers to the perception of language or other symbols that facilitate access to absent information sources.

Key differences between these knowledges – differences between verbal judgements about affordances than actually acting on them.



# Reconceptualising Game Models and Strategies: A Landscape of Affordances

Affordances are collective environmental resources that exist prior to the individuals that come to perceive and use them.

Collective affordances can be perceived by a group of individuals trained to become perceptually attuned to them. The perception of collective affordances acts as a selection pressure for overcoming opponents.



# Reconceptualising Game Models and Strategies: A Landscape of Affordances

Passos et al 2008 – precise moment of a pass decided according to the position of a tackler and to the tacklers possibilities of tackling the ball carrier.

Team coordination depends on being *collectively attuned* to shared affordances .

“From the results of the present study, it can be concluded that interpersonal distance is a potential control parameter that leads an attacker–defender dyad to a phase transition. However, interpersonal distance does not act alone. The results demonstrate that attacker–defender system phase transitions in rugby union can be explained by the coupling of two potential, nested control parameters – interpersonal distance and relative velocity – with the former influencing the pattern-forming dynamics of dyadic system behaviour over time.”





# Reconceptualising Game Models and Strategies: Towards Synergies

Synergy formation is key for functioning  
of complex adaptive systems.

Interactions emerge bi-directionally: from  
global-to-local, and local-to-global.

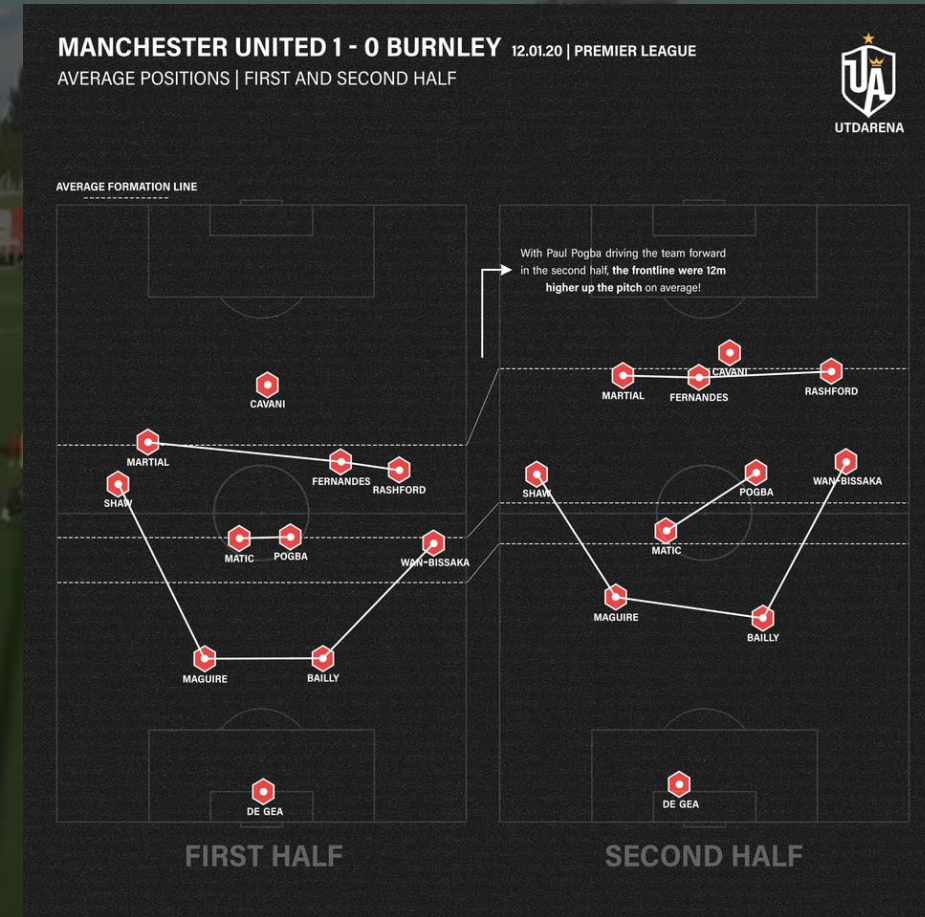
Guided by interaction with surrounding  
energy flows



# Reconceptualising Game Models and Strategies: Towards Synergies

Drawing on *degrees of freedom* from Bernstein – we can explore how independently controllable movement system degrees of freedom could be coupled to form synergies that regulate each other without modular control.

Reduction in system dimensionality allows system re-organization to a specific task. (E.g Silva et al 2013)



# Reconceptualising Game Models and Strategies: Exploiting System Degeneracy

A focal part of any CAS is to be able to exploit constraints in order for the same system output to emerge through the use of structurally different configurations.

Local interactions with a field of affordances can allow for local-global patterns to emerge in order to exploit competing system demands.



# Reconceptualising Game Models and Strategies: Implications for Practice

- Manipulating task constraints in practice
- Augmented informational constraints
- Facilitate co-design opportunities



# Perusing fine margins: Process training methods

“In line with ideas of Broadbent et al. (2015), we concluded that the current evidence that P-C training methods leads to effective transfer to performance is limited and requires more work. A key proposal here is that any P-C training programme claimed to have a positive impact on performance must be *representative* of performance environments, resulting in *fidelity* of response actions (Travassos et al., 2013). Current P-C training is hamstrung by the decision of sport psychologists to underpin interventions with traditional cognitive and experimental psychological process-oriented perspectives. This theoretical rationale leads to a biased modularized focus on the organism and a glaring neglect of environmental constraints on behavior (Araújo and Davids, 2011).”

(Renshaw et al., 2019)

