



An Introduction to Constraints-led Approach

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Pedagogical Principles for Coaching?

- Student-centred
- Exploratory Learning
- Individualised movement literacy
- Facilitative role for the teacher
- Variability in practice



Need for Learning Design?

- Theoretical advances in Motor Control & Learning to inform how we can **design learning** for our children
- Empirical findings to support the **theory to inform the practice**
- To provide insights on Learning Design



Learners as Complex Neurobiological Systems

- Features of System Nonlinearity (Chow et al., 2011)
 - Non-proportionality
 - Multi-stability
 - Parametric Control
 - Functional role of Noise
- Learners as **self-organizing neurobiological systems?**

Chow, J. Y., Davids, K., Hristovski, R., Araújo, D., & Passos, P. (2011). Nonlinear Pedagogy: Learning design for self-organizing neurobiological systems. *New Ideas in Psychology*, 29(2), 189-200.



What is Nonlinear Pedagogy?

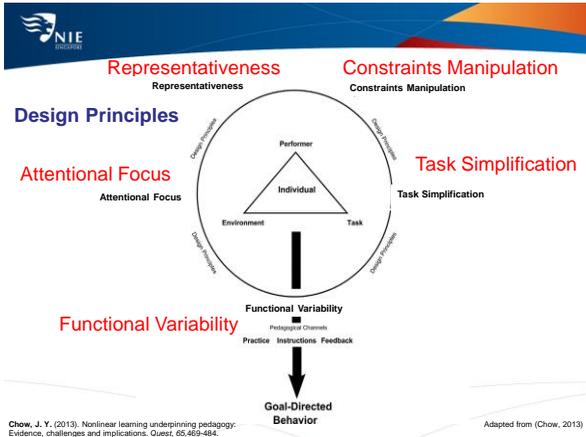
- Traditionally, pedagogical approaches in physical education (PE) & are viewed as **technique dominated** involving the use of **prescriptive instructions** and **repetitive drills**.
- Paradoxically may limit learning opportunities for movement skills development (Bunker & Thorpe, 1982).
- In contrast, Nonlinear Pedagogy encourages children to **explore individualised movement solutions** and develop cognitive and decision-making **skills for game play** (Chow et al., 2007).



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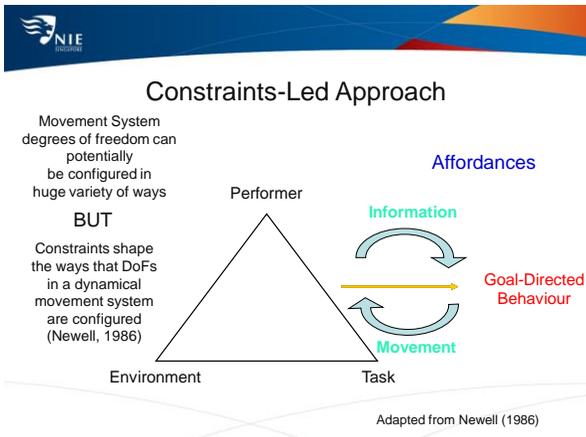
- **Nonlinear behaviors** emerge at various levels (e.g., individual, game, and physical education context).
- Therefore, physical educators should adopt a pedagogy that takes into account the **nonlinear interactions** that occur in teaching and learning interventions. (Chow et al., 2007; Davids, Button, & Bennett, 2008).

Chow, J. Y., Davids, K., Button, C., Shuttleworth, R., Renshaw, I., & Araújo, D. (2007). The role of nonlinear pedagogy in physical education. *Review of Educational Research*, 77, 251-278.



Role of Constraints

- Ecological dynamics views **influential factors within practice environment as constraints** on acquiring movement coordination (Newell et al., 2001)
- What is the role of constraints?
- Constraints- boundaries or features that **shape the emergence of behaviour** by a learner seeking a functional movement (Newell, 1986)
- Coordination emerges due to the **interacting constraints**



Performer Constraints

A person's own unique **physical and mental characteristics**

Structural constraints

- related to body's structure
- Examples: height, weight, muscle mass, leg length

Functional constraints

- related to behavioural function
- Examples: motivation, memory, processing-demands?

Environmental Constraints

- Exist outside the body, as a property of the world around us.
 - Relatively time independent
 - Physical and Socio-cultural
- Examples:

Amount of Light Humidity Gravity Surface (Floor/Wall)	Gender typing Audience Ethnic culture Economic conditions
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Task Constraints

- Related to **goals, rules and equipment** used on a specific task. Relevant for teachers.

Three categories:

- Goals**, relating to the product or the outcome of the task
- Rules**
- Equipment**, implements or machines

Use to specify or constrain response of learners



Task Constraints

- Coordination as “selection under constraint” (Thelen, 1995)
- What are the theoretical implications?
- Implications for learner
 - Discovery vs. Directed learning
- Implications for practitioner
 - All explicit instructions all the time?
 - A model optimal pattern?
 - Active learners



Goals and Rules

- Tasks have goals that relate to the outcome.
- Most of the time how the **goal** is satisfied doesn't matter.
- Rules can specify that a specific pattern of coordination has to be produced (closed skill, gymnastics)...
.. or simply provide an opportunity in which the task must be completed
- Common indirect teaching strategy to modify **rules** to force particular solutions



Thank You



This research is funded by the Education Research Funding Programme (OER 21/14 CJY), National Institute of Education (NIE), Nanyang Technological University, Singapore. The views expressed in this presentation are the author's and do not necessarily represent the views of NIE.