A Theoretical Framework for Integrating Virtual Reality Systems in an Enrichment Programme of a Professional Football Youth Academy Practice Programme

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&

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Q: What's concerning me right now?
A: Adult pressure for early specialised training in children

February 2015: Chinese President Xi Jinping announced a 'football reform plan' to lift China from 82nd place in FIFA's world rankings. This required the country's *babies* being encouraged to develop their talent as footballers (see http://www.bbc.co.uk/sport/0/football/31658273).

2018: UK Government introduces testing of 4 yr olds starting at school

CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

The Power of Play: A Pediatric Role in Enhancing Development in Young Children

Michael Yogman, MD, FAAP,[a] Andrew Garner, MD, PhD, FAAP,[b] Jeffrey Hutchinson, MD, FAAP,[c] Kathy Hirsh-Pasek, PhD,[d] Roberta Michnick Golinkoff, PhD,[e] COMMITTEE ON PSYCHOSOCIAL ASPECTS OF CHILD AND FAMILY HEALTH, COUNCIL ON COMMUNICATIONS AND MEDIA

To cite: Yogman M, Garner A, Hutchinson J, et al; AAP COMMITTEE ON PSYCHOSOCIAL ASPECTS OF CHILD AND FAMILY HEALTH, AAP COUNCIL ON COMMUNICATIONS AND MEDIA. The Power of Play: A Pediatric Role in Enhancing Development in Young Children. *Pediatrics*. 2018;142(3):e20182058

Deeper problem of over-emphasising specialised training?....10, 000 reasons (all hours)

Baker, Côté, Hambrick and colleagues

Coutinho et al. (2016).....specialised training during the early stages of development associated with several negative consequences.....

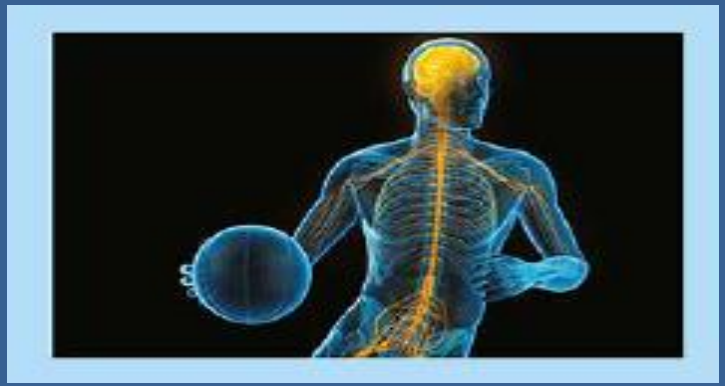
Evidence that:

(i) intensive, repetitive training during early periods of development **increase s risk of specific types of over-use injuries, decrease d sport enjoyment , increase d drop out rates and stifle s psychosocial development.**

(ii) early specialisation may **increase risk of boredom and stress and anxiety** in young children

Specialised training of 'processes' to enhance excellence and expertise in sport?

- **Brain Training** (Moreau, MacNamara & Hambrick, in press)
- **Development of ultra-fast cognition** (Riley et al., 2012)
- **Computerised cognitive training** (Walton et al., 2018)
- **Training with 'commercial cognitive devices'** (Harris, Wilson & Vine, 2018)
- **Enhancing 'meta-cognition'** (Price et al., 2018)
- **Sports vision training** (Appelbaum & Erickson, 2016)
- **Use of Virtual Reality (VR) systems** (Neumann et al., 2018)



Major Questions over Transfer of training to target sport...

frontiers in Psychology

SYSTEMATIC REVIEW
published: 11 May 2018
doi: 10.3389/fpsyg.2018.00709

Check for updates

A Systematic Review of Commercial Cognitive Training Devices: Implications for Use in Sport

*David J. Harris, Mark R. Wilson and Samuel J. Vine**

Sport and Health Sciences, University of Exeter, Exeter, United Kingdom

"Commercial CT (CCT) devices.....**extent to which this training transfers to performance.... is....unclear.....** limited support for **far transfer** benefits from CCT devices to sporting tasks, mainly because studies **did not target the sporting environment**."

The problem with this type of enrichment activity in sport? ....A clue in the title.....

frontiers in Psychology

PERSPECTIVE
published: 03 July 2018
doi: 10.3389/fpsyg.2018.01121

Check for updates

The Potential Role for Cognitive Training in Sport: More Research Needed

*Courtney C. Walton[1,2], Richard J. Keegan[3], Mike Martin[4] and Harry Hallock[2,5,6]**

[1] School of Psychology, University of Queensland, Brisbane, QLD, Australia, [2] Brain and Mind Centre, The University of Sydney, Sydney, NSW, Australia, [3] University of Canberra Research Institute for Sport and Exercise, Faculty of Health, University of Canberra, Canberra, ACT, Australia, [4] New South Wales Institute of Sport, Sydney, NSW, Australia, [5] Berlin School of Mind and Brain, Humboldt-Universität zu Berlin, Berlin, Germany, [6] Department of Neurology, Charité – Universitätsmedizin Berlin, Berlin, Germany

Can specialised training improve cognitive performance in sport (e.g., decision-making, attention, problem-solving, planning)?
....."evidence that training with commercial brain-training software can enhance cognition outside the laboratory is limited and inconsistent" (Simons et al., 2016, p.173).

Simons, D. J., Boot, W. R., Charness, N., Gathercole, S. E., Chabris, C. F., Hambrick, D. Z., & Stine-Morrow, E. A. L. (2016). Do "Brain-Training" Programs Work? *Psychological Science in the Public Interest : A Journal of the American Psychological Society*, *17*(3), 103–186. http://doi.org/10.1177/1529100616661983

Can playing digital video games help you learn *how* to play football?

QUEST
https://doi.org/10.1080/00336297.2017.1386574

Routledge
Taylor & Francis Group

Check for updates

Learning to Play Soccer: Lessons on Meta-cognition from Video Game Design

Amy Price[a], Dave Collins[b], John Stoszkowski[b], and Shane Pill[c]

[a]School of Education, Theology & Leadership, St. Mary's University, Twickenham, United Kingdom; [b]Institute of Coaching and Performance, University of Central Lancashire, Preston, United Kingdom; [c]School of Education, Flinders University, Adelaide, South Australia, Australia

ABSTRACT

Over the past decade, there has been ongoing debate relating to the use of suitable pedagogical approaches for designing learning environments to develop skillful games players. There has, however, been little consideration of the "digital age of learning" and the global success of the digital video game industry. Using the educational work of James Gee, this article attempts to rationalize how a "digital video games approach" differs from other learner-centered pedagogies currently employed for teaching and coaching games. Examination of the literature suggests that the learning gains from Teaching Games for Understanding and the Constraints Led Approach ignore the meta-cognitive dimension of learning *how* to play games—surely an important consideration for long-term development. Accordingly, by drawing on experiences from digital video game design, we examine how games practitioners might utilize such an approach for meta-cognition in coaching or teaching practice to stimulate player learning.

KEYWORDS

Games; pedagogy; skill

Sala, Tatlidil & Gobet (2017) **"....no evidence of a causal relationship between playing video games and enhanced cognitive ability**" (p. 111).

Sala, G., Tatlidil, K. S., & Gobet, F. (2017). Video game training does not enhance cognitive ability: A comprehensive meta-analytic investigation. *Psychological Bulletin, 144*(2),111-139. http://dx.doi.org/10.1037/bul0000139

Modified Perceptual Training (on and off field)....neglects the importance of actions?

Journal of Science and Medicine in Sport xxx (2018) xxx–xxx

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journal homepage: www.elsevier.com/locate/jsams

Review

Modified perceptual training in sport: A new classification framework

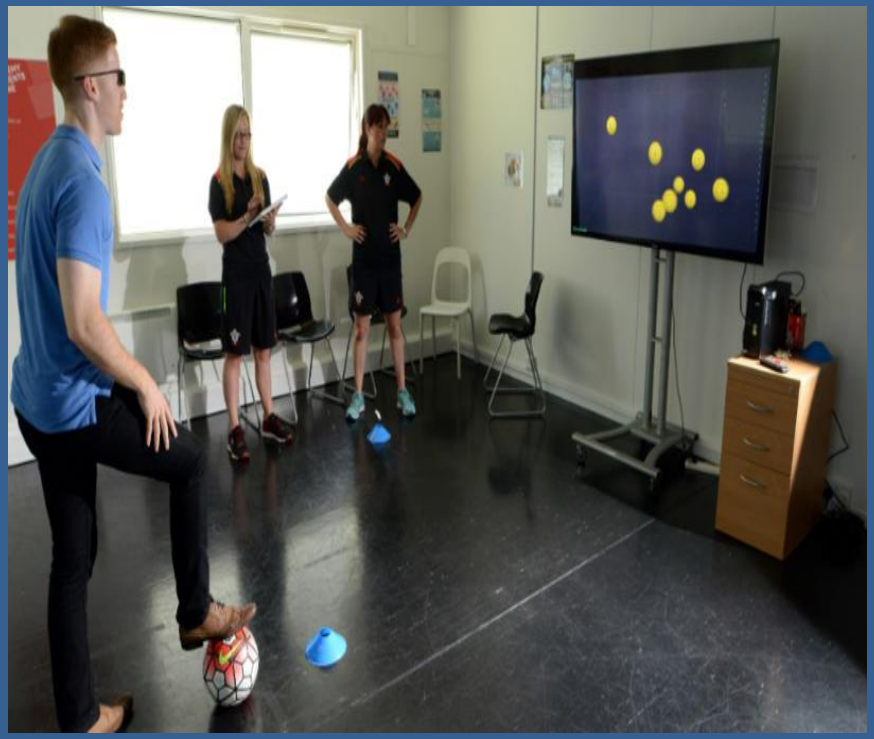
Stephen Mark Hadlow[a,b,*], Derek Panchuk[a], David Lindsay Mann[c], Marc Ronald Portus[a], Bruce Abernethy[b]

[a] Movement Science, Australian Institute of Sport, Australia
[b] School of Human Movement and Nutrition Sciences, University of Queensland, Australia
[c] Department of Human Movement Sciences, Faculty of Behaviour and Movement Sciences, Vrije Universiteit, Amsterdam, Netherlands

"MPT [sometimes]... coupled with non-specific manual gestures or manipulations (e.g. finger pointing or using the hands to adjust the training equipment), though this is generally rare."

Conclusion: Current evidence supports trainability but not transfer....(Near, rather than Far Transfer)

What do I mean by Near and Far Transfer to sport performance?



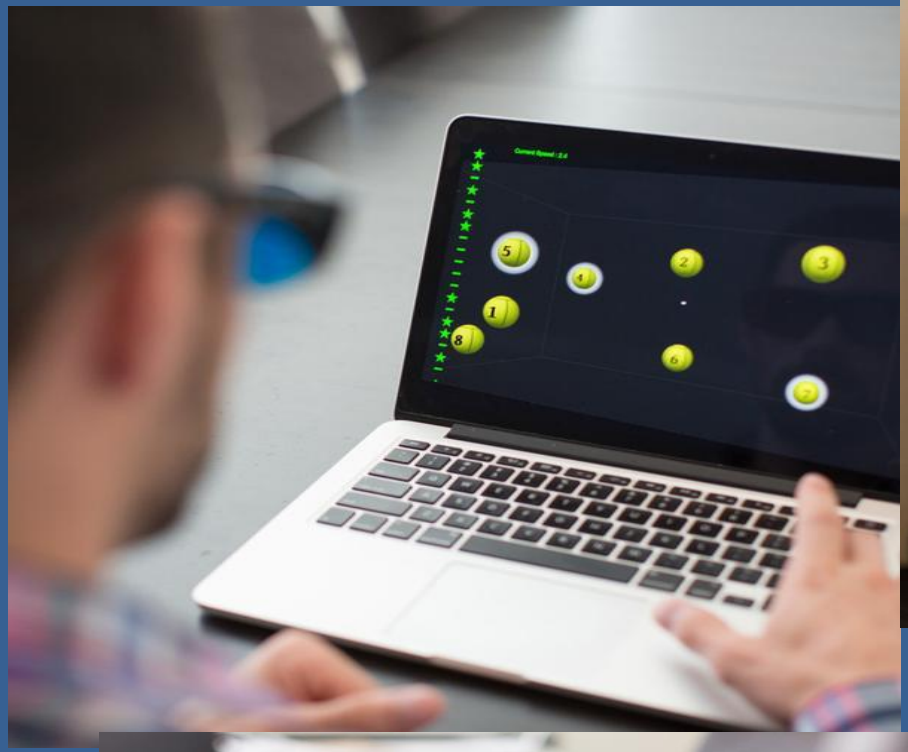
How Southampton train their players' brains
Southampton are using a device called the Neurotracker to train their players' brains
https://www.fourfourtwo.com/performance/training/how-southampton-train-their-players-brains#7WsGypQK1Sde8gqw.99

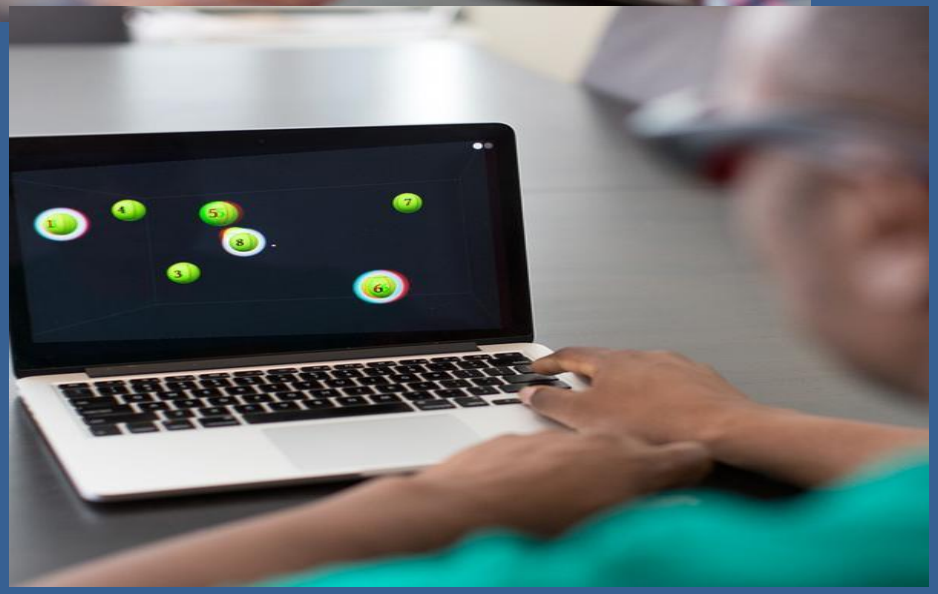
The problem of Transfer.....

Moreau et al. (in press):

".....after more than a decade of intensive research on brain training, it is clear that *far* transfer is elusive. Several meta-analyses have demonstrated that the benefits of brain training are limited to the trained task, or to very similar tasks (*near* transfer)."

Practising on an enrichment task makes you better at *that task* and not necessarily at the target sport....





Research on cognitive and perceptual and brain training.....dominated by cognitive psychology models of human behaviour: The importance of Actions?

Pro-Batter:
Cricket Australia's Centre of Excellence, Brisbane, Australia, 2010

Re-design of ball projection machines to include images of advanced information from bowlers to contextualise batting actions.....(Pinder et al., 2011)

Article

CLINICAL REHABILITATION

Clinical Rehabilitation
2017, Vol. 31(11) 1516–1528

DOI: 10.1177/0269215517705181
journals.sagepub.com/home/cre
SAGE

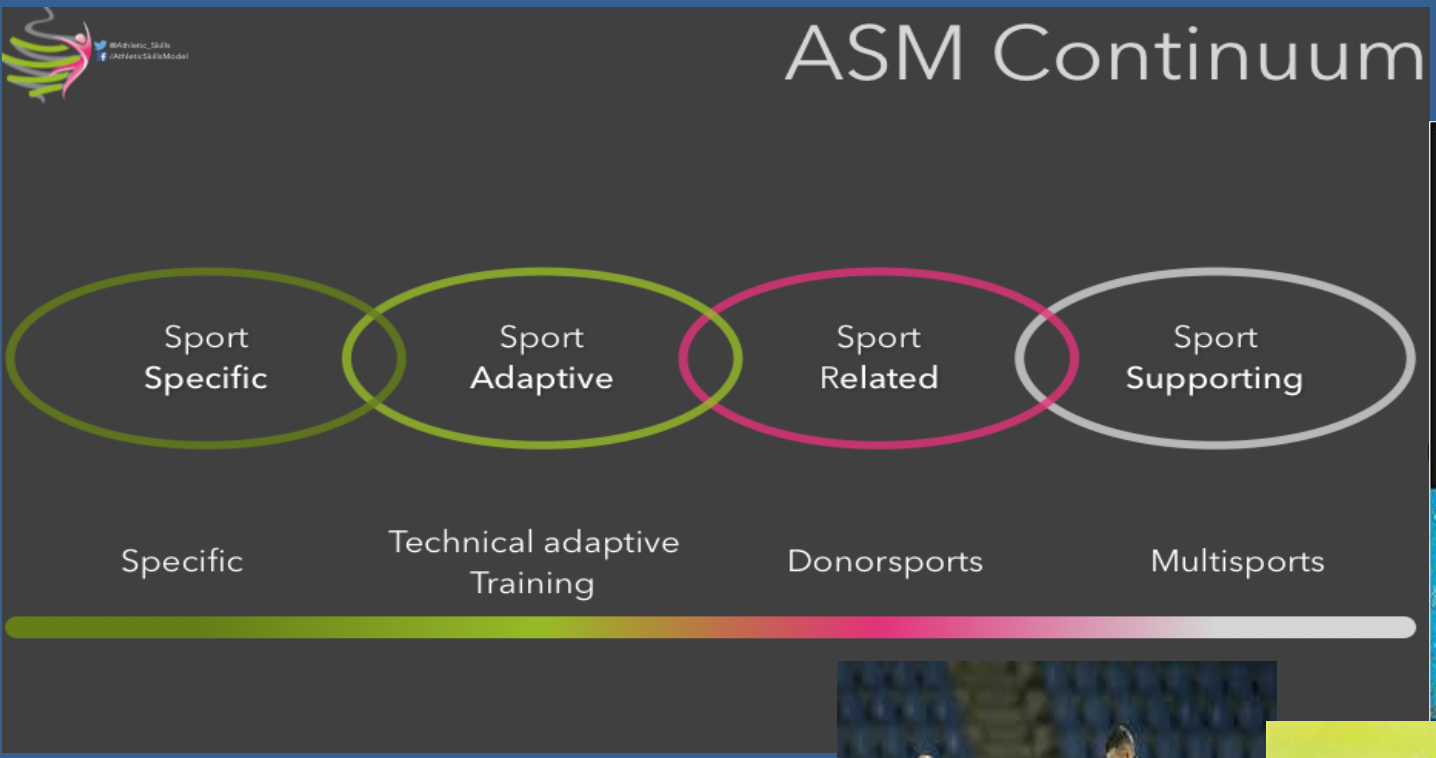
Embedding an enriched environment in an acute stroke unit increases activity in people with stroke: a controlled before–after pilot study

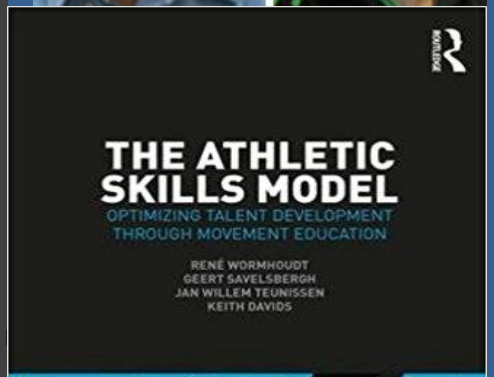
Ingrid CM Rosbergen[1,2], Rohan S Grimley[3], Kathryn S Hayward[1,4,5,6], Katrina C Walker[2], Donna Rowley[7], Alana M Campbell[2], Suzanne McGufficke[2], Samantha T Robertson[2], Janelle Trinder[7], Heidi Janssen[6,8] and Sandra G Brauer[1]

Results: The enriched environment group ($n = 30$, mean age 76.7 ± 12.1) spent a significantly higher proportion of their day engaged in 'any' activity (71% vs. 58%, $P = 0.005$) compared to the usual care group ($n = 30$, mean age 76.0 ± 12.8). They were more active in physical (33% vs. 22%, $P < 0.001$), social (40% vs. 29%, $P = 0.007$) and cognitive domains (59% vs. 45%, $P = 0.002$) and changes were sustained six months post implementation. The enriched group experienced significantly fewer adverse events (0.4 ± 0.7 vs. 1.3 ± 1.6, $P = 0.001$), with no differences found in serious adverse events (0.5 ± 1.6 vs. 1.0 ± 2.0, $P = 0.309$).

How to enrich athlete performance?
The Athletic Skills Model: Figure 5.4

Wormhoudt, Savelsbergh, Teunissen & Davids (2018)



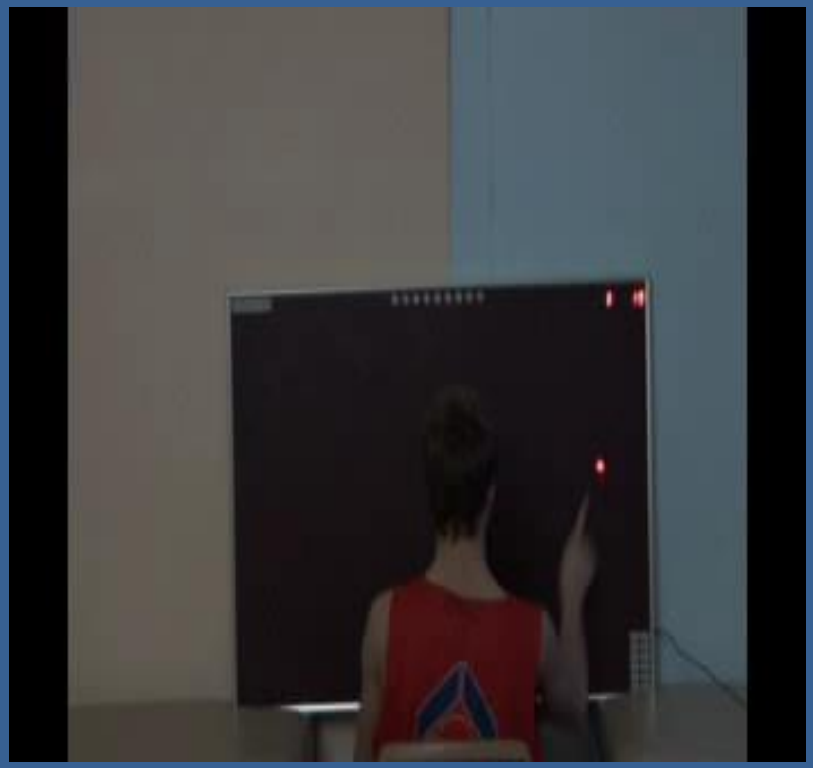


The ASM continuum: Importance of **Specificity and Generality** of Practice and Transfer of Training.

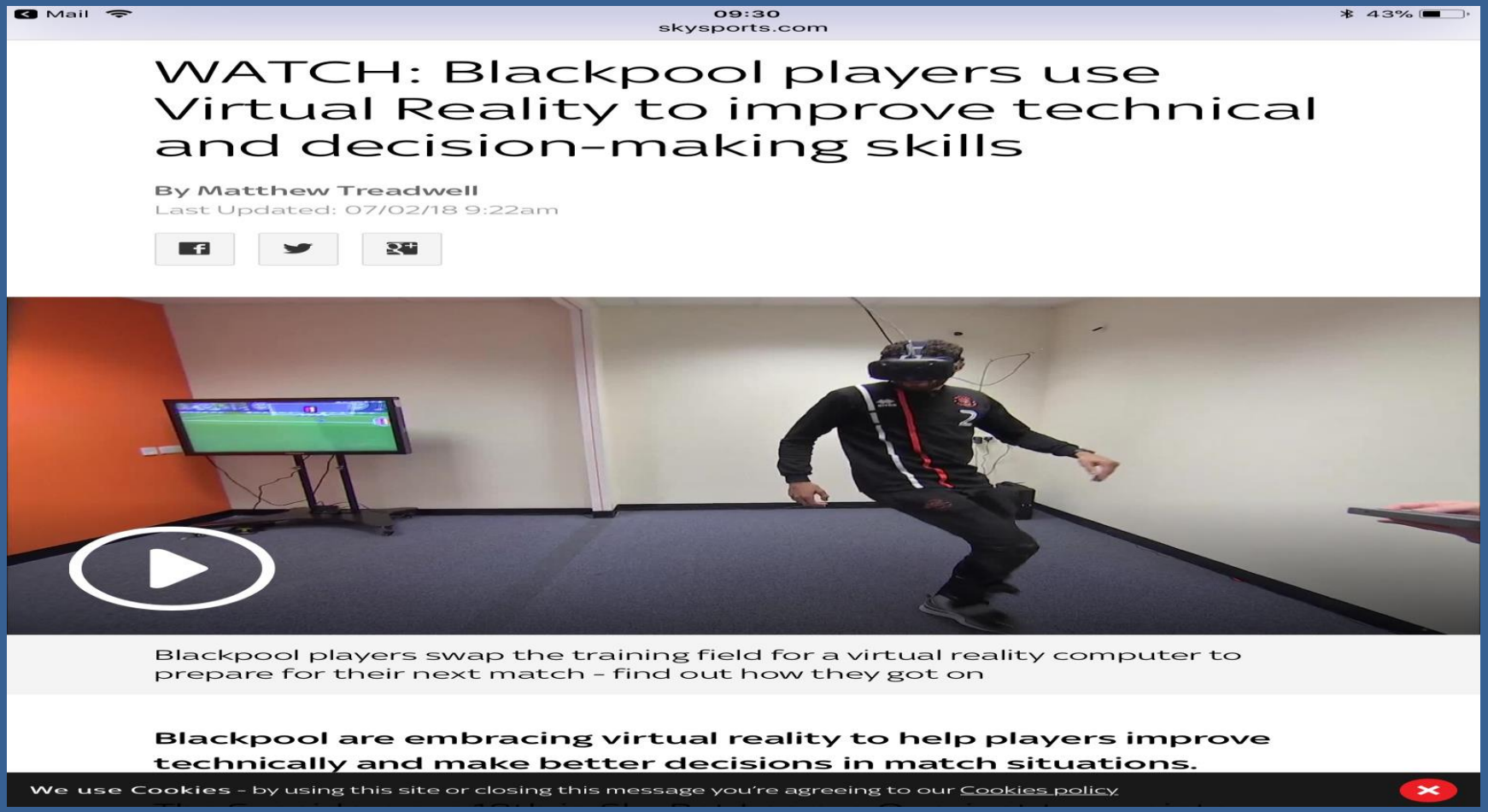
Athlete enrichment programmes in high performance sport should be effective and efficient....

The challenge of contextualising performance in practice.....

<u>Ecological Dynamics</u>: practice tasks (re)designed for athletes to regulate actions using cognition and perception



An ecological dynamics rationale for using VR technology in football training to enrich athlete performance....



http://www.skysports.com/football/news/11095/11239804/wa…virtual-reality-to-improve-technical-and-decision-making-skills 07 Feb, 2018

Neumann, D.L., Moffitt, R.L., Thomas, P.R., Loveday, K., Watling, D.P., Lombard, C.L ., Antonova, S. & Tremeer, M. (2018). A systematic review of the application of interactive virtual reality to sport. Virtual Reality 22(3), 183-198. DOI 10.1007/s10055-017-0320-5

"The research findings to date indicate that VR can be a promising adjunct to existing real-world training and participation in sport."

"**Future research would benefit from a theoretical framework of VR application to sport (see Fig. 1).**"

Sports Technology, 2013
Vol. 6, No. 4, 161–169, http://dx.doi.org/10.1080/19346182.2013.855224

Routledge
Taylor & Francis Group

REVIEW

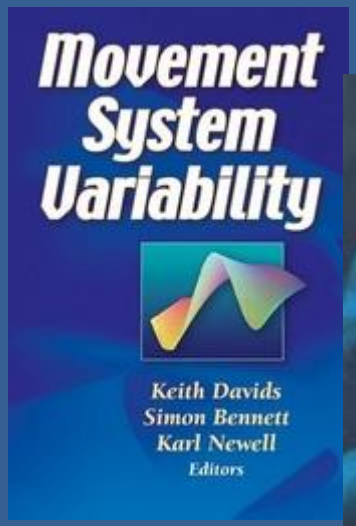
Understanding perception and action in sport: how can virtual reality technology help?

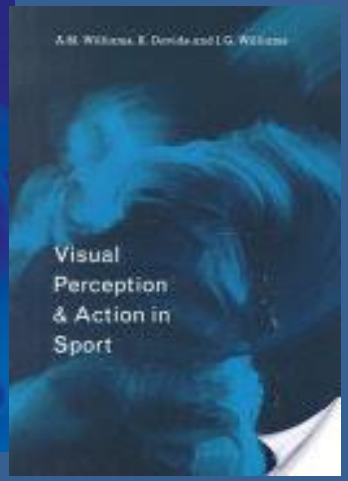
CATHY CRAIG

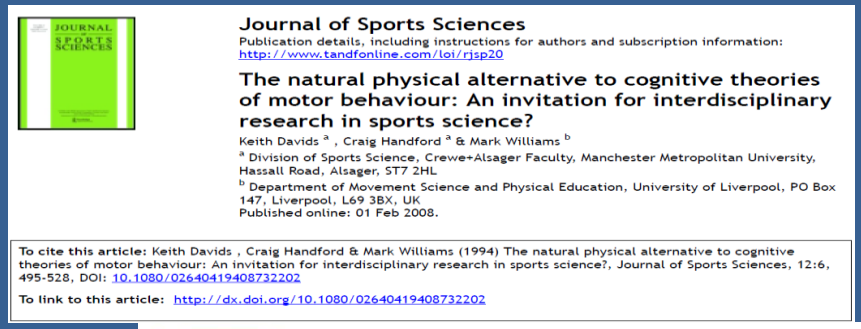
School of Psychology, Queen's University Belfast, Belfast, Northern Ireland

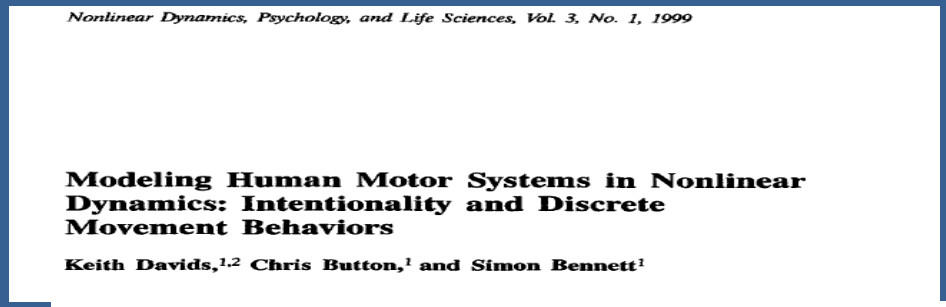
(*Received 7 April 2013; accepted 10 October 2013*)

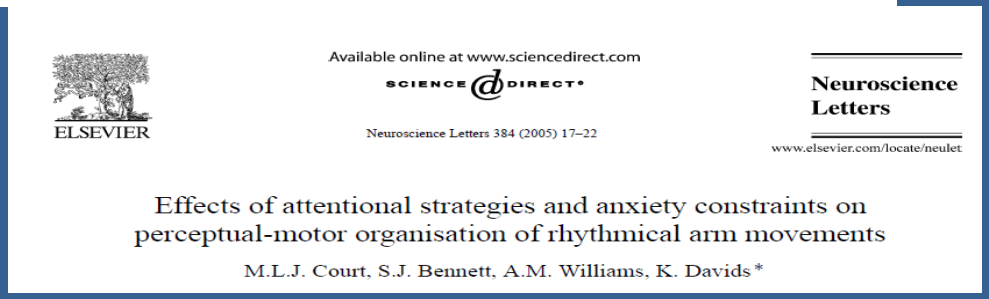
Ecological Dynamics: Athletes and sports teams are complex adaptive systems.....

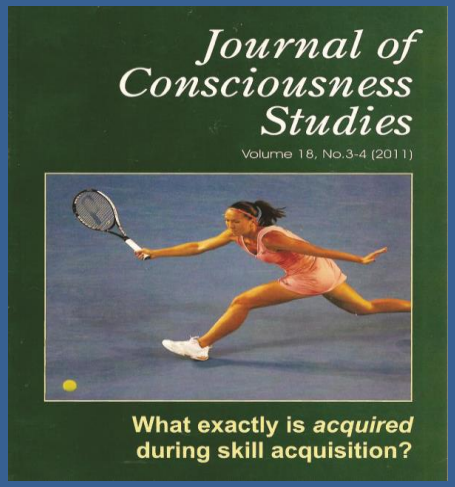






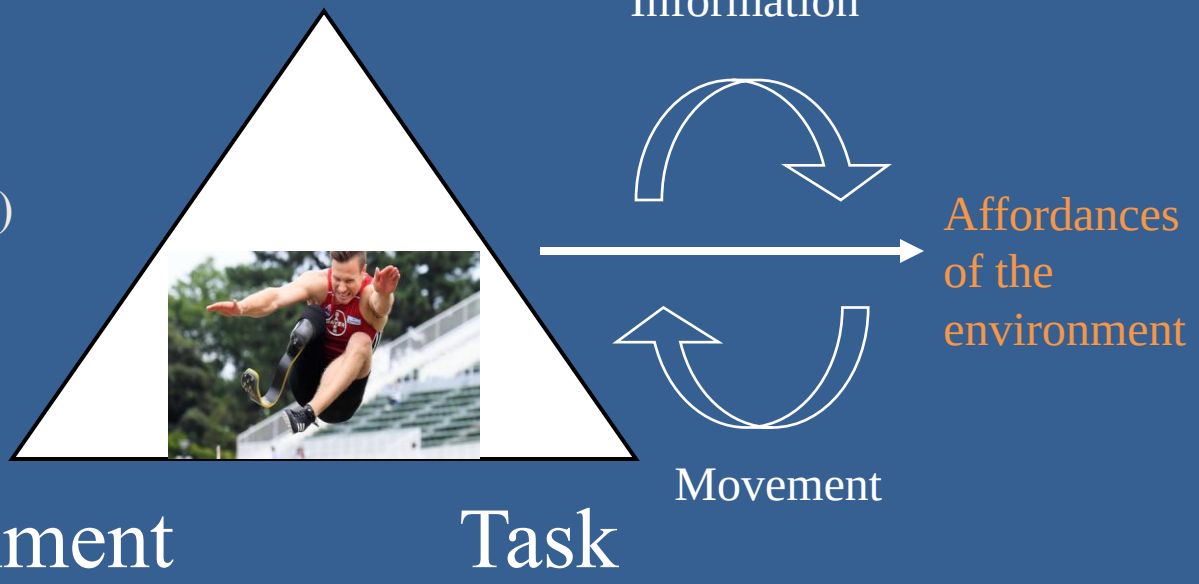






Skill Adaptation to interacting constraints

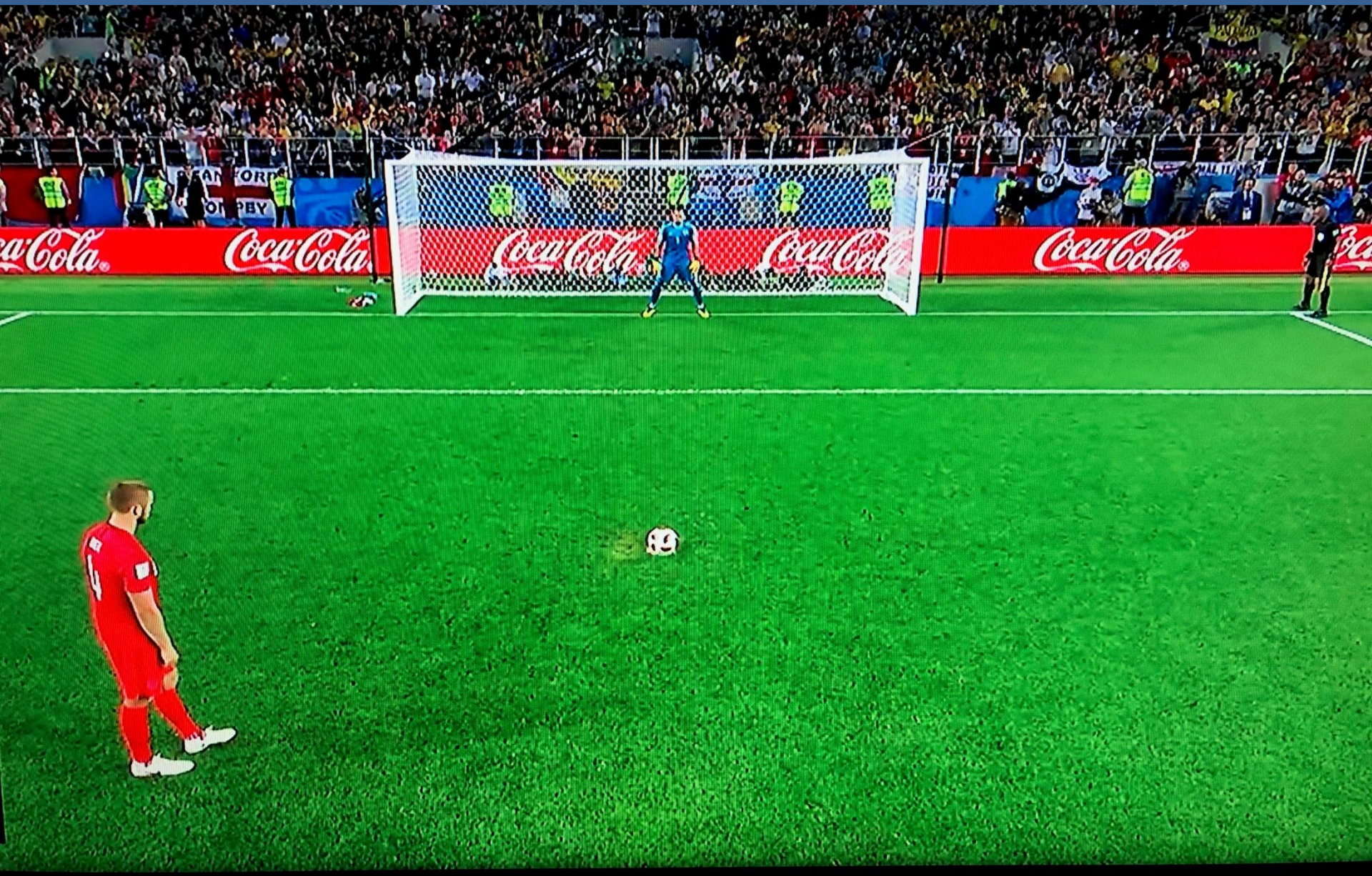
Adapted from Newell (1996)



Discovery, exploration and exploitation of a wide range of affordances of the environment (invitations to act).....

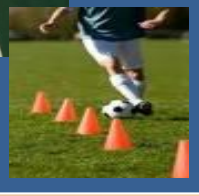
Affordances as invitations: A gap for scoring a goal

England v Columbia, World Cup Round of 16, Penalty shoot out, July 2018



Deeply intertwined relations between cognition, perception and actions: Key principle for designing practice tasks to enhance performance...

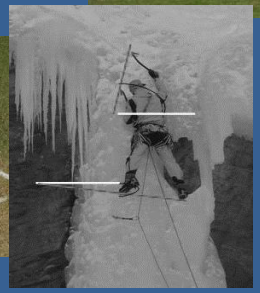
Specifying Information (Gold standard)

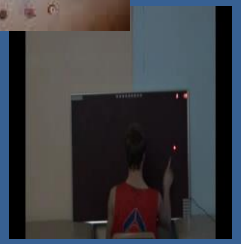


Non-Specifying Information (Less useful)

100% Specificity of Transfer

0% Generality of Transfer

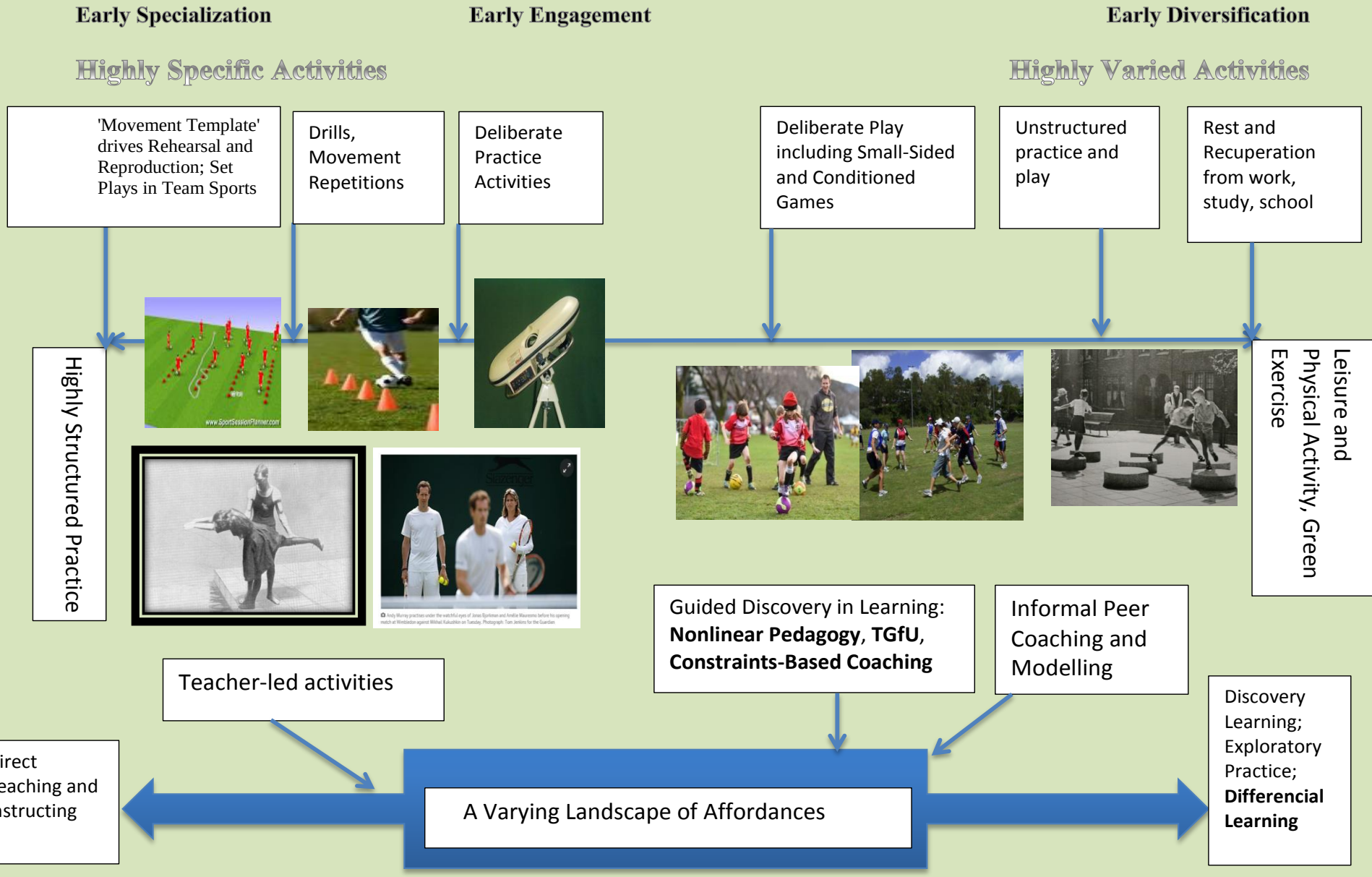




Near Transfer

Far Transfer

Figure 1: Relations between the macro-structure of talent development and the micro-structure of practice in sport and physical activity. Traditional practice design has a 'default' mode situated at the highly structured end of the continuum of task constraints, emphasising direct teaching/prescriptive coaching in athlete talent development. **Skill acquisition and talent development needs coaches to move between different regions of the practice structure spectrum based on the individual needs of an athlete at any one point in time (Davids, Güllich, Shuttleworth & Araujo, 2016).**



Embedding VR systems in athlete development programmes to enrich deeply intertwined relations between cognition, perception and action in football.....

Scanning behaviours, Orientation of the body when receiving the ball and weight distribution and postural regulation

Oppici L, Panchuk D, Serpiello FRand Farrow D (2017) Long-term Practice with Domain-Specific Task Constraints Influences Perceptual Skills. Frontiers in Psychology 8:1387. doi: 10.3389/fpsyg.2017.01387

Using VR to enrich athlete performance can be individualised according to player needs. Performance Analysis methods can help individualise player learning with VR systems to perceive affordances for playing a penetrative pass

Data from a professional football club academy U18s programme. Shows individual differences in capacity to play penetrative (through the lines) passes in a Small Sided Conditioned Game – 7v7 – 20 minutes

Player	Position		Total Forward Passes	Successful Forward Passes	Successful Forward Passes between 2 players
1	Goalkeeper		26	9	5
2 (10 mins)	Goalkeeper		13	5	1
3	Defender		19	14	9
4	Defender		10	7	4
5	Defender		11	9	5
6	Defender		11	10	4
7	Midfielder		11	8	4
8	Midfielder		19	13	6
9	Midfielder		8	5	3
10	Forward		3	2	1
11	Forward		5	2	2
12	Forward		4	3	1
13	Forward		5	4	0
14	Forward		5	3	1

Task Constraints designed in the SSCG by the U18s Coach:

1. Players asked to look to play forward at every opportunity (seek affordances for penetrative pass)

2. All players in the team in possession of the ball had to be on the half way line or in the opposition half for a scored goal to be valid (playing higher up the pitch and in a compact state)

3. If any opposition players were left in their opponent's half when a goal was scored, another goal would be added to the score for every player that was left in the opponent's half (constraint manipulated to ensure compactness when defending)

Scenario 1 – The receiver in red must control the pass from a teammate and turn to play a pass penetrating the defensive line into either small goal. Affordances for penetrative passing change emerge in the defensive line (largest distance between defenders invites penetrative passing)

Option to Receive the ball and turn quickly

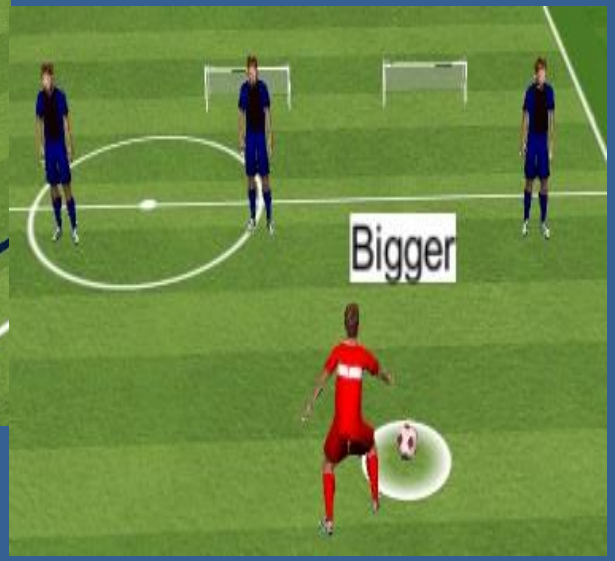
Affordances of Gaps/Spaces for passing

Scenario 2 – Find the biggest gap/space – Affordances for penetrative passing changes over time due to defender mobility in the defensive line (distance between defenders change

Perception of bigger gap/space between defenders that affords a penetrating pass

Receive the ball and turn

Gaps/Spaces have changed – Second scan needed



Take home messages:

- Problems of over specialisation and repetitive practice may be avoided by using enrichment programmes in sport
- Current problems with enrichment programmes to train brains, perceptual systems, cognitive capacities, vision, deliberate practice **separately and in isolation...**
- **Major Issues with transfer....research inconclusive**
- Ecological Dynamics: Emphasises the complex, intertwined relations between action, cognition and perception in practice designs

Use of VR systems in athlete enrichment embedded in complementary training alongside practice in small sided games?

Individualisation of training, searching specific fields in affordance landscape.....