

TRANSFER OF TRAINING: Discussions and Recommendations Nick Ball

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AUT SPORTS PERFORMANCE
RESEARCH INSTITUTE NEW ZEALAND

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1

ORIGIN STORY A tale of 2 experiences



2

What do we mean by 'Transfer of Training'?



3

TRANSFER OF TRAINING – WHAT IS IT?

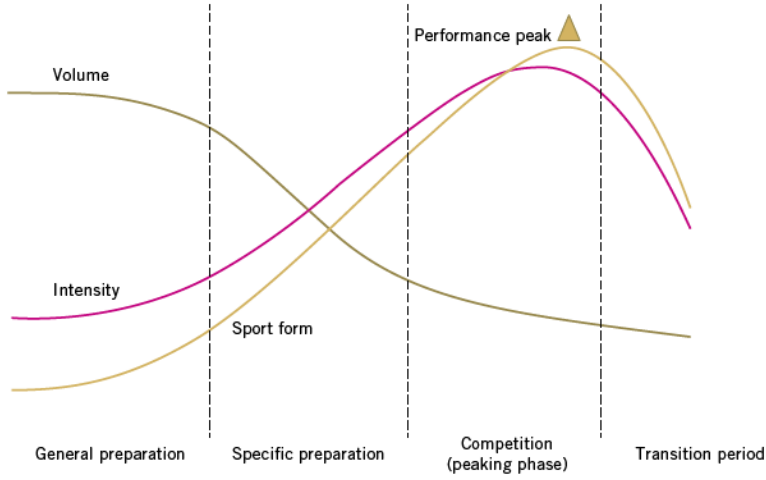
Response in one task or trained situation affects the **response** in another task or untrained situation (Thorndike, 1903)

Influence of **previous experiences** on performing the **same skill in a new context** (Magill and Anderson, 2014).

The **gain (or loss)** in the **proficiency** in one motor task as a result of practice on some other motor task (Schmidt & Lee, 1999)



4

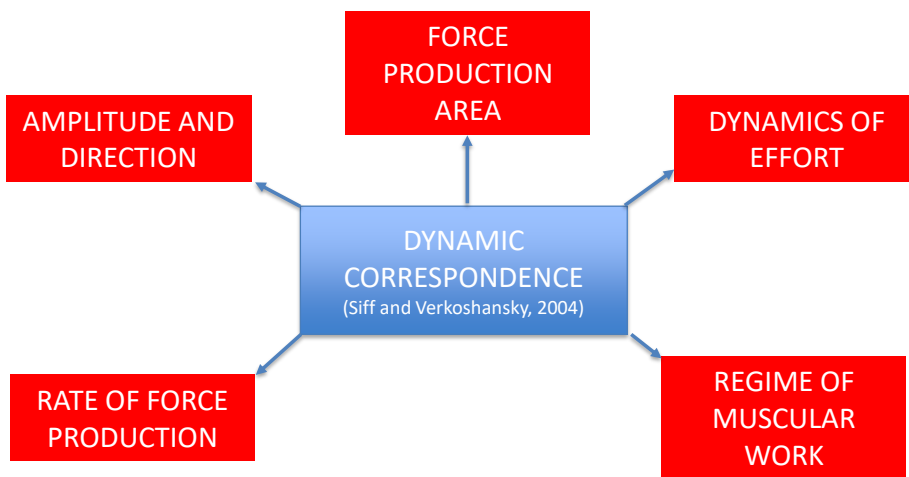


But wait with increased specificity, load will typically decrease?

5



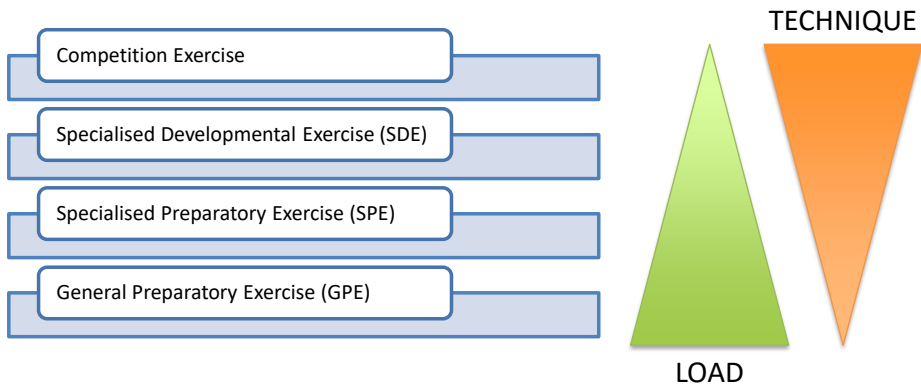
What options do we have to enhance transfer? Physiological and Mechanical Focus (Capacity)



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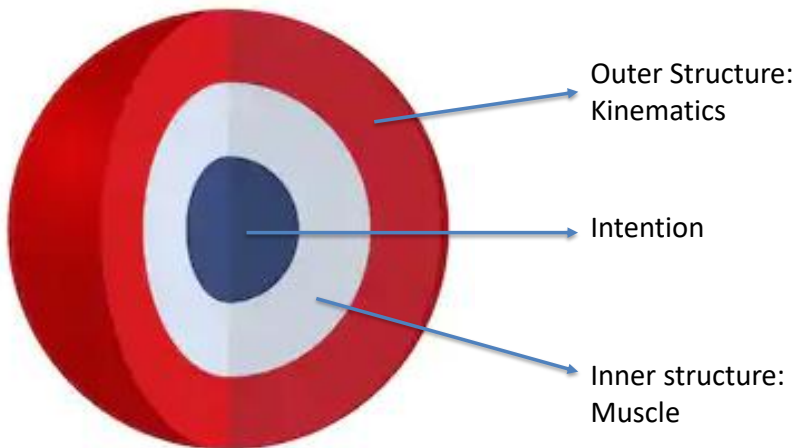
Bondarchuk's Transfer Progression



7

What options do we have to enhance transfer? Sensory-neuromotor Control Focus (Skill)

» Frans Bosch (2010)



8

Discussion Point 1

Skill Training and Capacity (Strength)
Training should be kept separate
(Issurin, 2016)

Strength cannot exist unless it is linked
with skill (co-ordination) and context
(Bosch, 2010)

CAPACITY

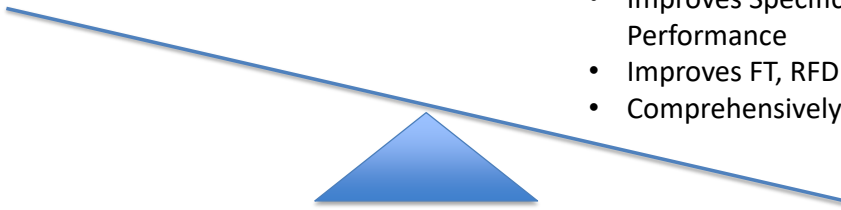
TRANSFER OF STRENGTH TRAINING TO PERFORMANCE

Low Transfer?

- Population difference
- Correlation does not equal causation.
- Lack of intramuscular and neuromuscular similarity
- Limited Relationship to Agility

High Transfer

- Improves Generic Performance
- Improves Specific Performance
- Improves FT, RFD and FV.
- Comprehensively studied



29/11/2019

Title of Presentation

11

11

Coaches perspective on role of strength and power in elite sports performance. Burnie et al (2018)

ROLE OF STRENGTH TRAINING

- | | |
|---|--|
| <ul style="list-style-type: none"> • Non-specific training key focus was muscle level adaptations • Sport Strength and Gym Strength are different | <ul style="list-style-type: none"> • Non-specific early and increase specificity later • Specific exercises – ideally add increased resistance to sporting movements |
|---|--|

ABILITY OF STRENGTH TRAINING TO TRANSFER

- | | |
|--|--|
| <ul style="list-style-type: none"> • No direct correlation • Athlete dependant • Skills session alongside resistance exercises is desirable | <ul style="list-style-type: none"> • Need to give technique time to adapt • Skill work needed to prevent athlete getting slower whilst strength training |
|--|--|

12

SKILL



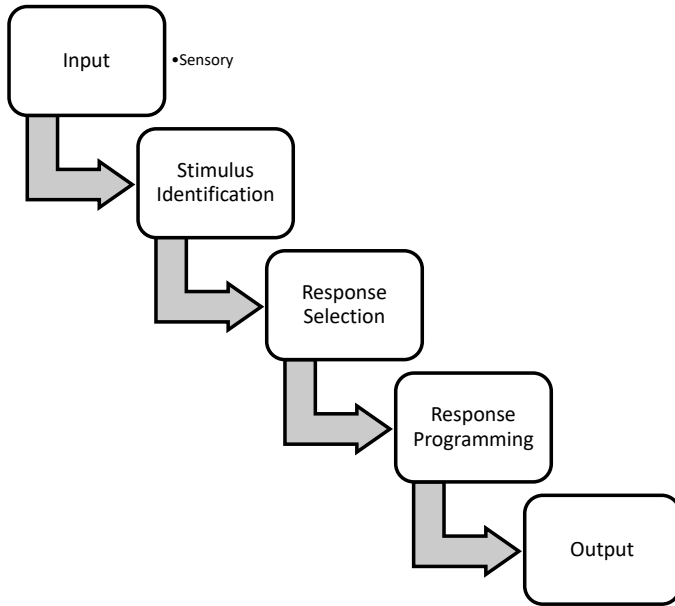
13



We need to provide the engine, but we also need to teach them to steer.

14

Phases of Motor Planning – S&C points of influence – Cognitive Model



15

APPLICATION – Simple lay up (Single Leg Takeoff)

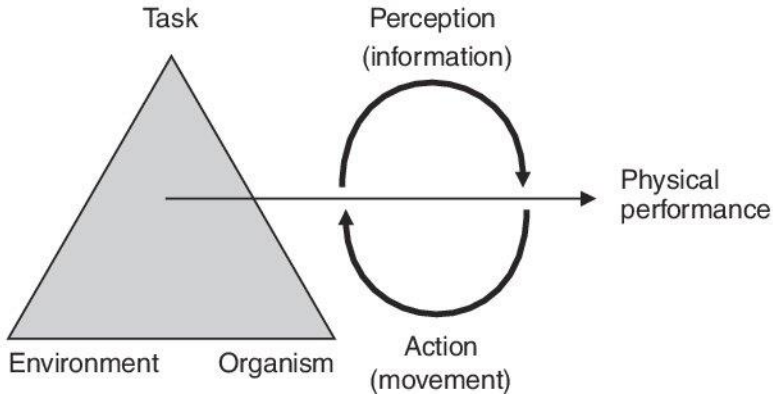
	Stimulus ID	Response Selection	Response Programming
Problem to solve	Get as close to the basket as possible	Pattern based on: Speed Strength Position	Recall central motor pattern
Physio / mech element	Jump off one leg and maintain upper body posture.	Optimise projection angle. Maximise takeoff velocity.	Plant leg – SL triple extension Non-plant leg – Aggressive hip flexion and knee drive
S&C coach influence	none	Strength and Power capacity enhancement to help form movement goal and select most effective result. SSC / RFD, Eccentric and Conc Strength, Triple Extension Promote stable states of movement	



16

Phases of Motor Planning – S&C points of influence – Ecological Model

In many sports we are not asking an athlete to repeat a solution, we are asking them to repeatedly solve a problem.

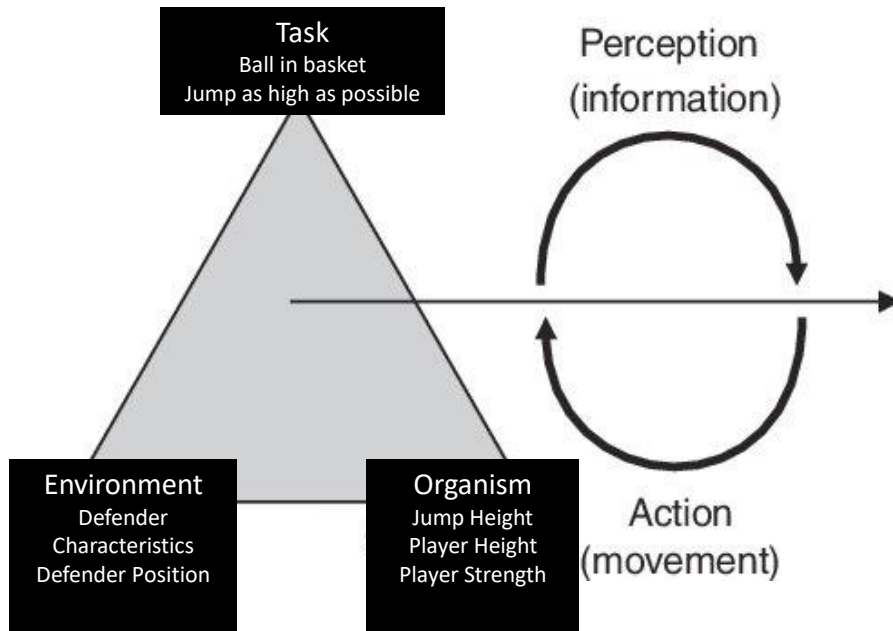


Capabilities can influence the action and perception

17



Phases of Motor Planning – S&C points of influence – Ecological Model



18



Single Leg Takeoff – Attractor States (Takeoff Phase)



Attractor	Exercise
Plantar Flexion at Toe-Off	SPE: Step-up to high box
Plant Foot Contact slightly in front of COM	SPE: Step up from Split stance GPE: SL Back Extension
Plant Leg Retraction, Swing Leg Hip Flexion	GPE: Push Press to Split
Trunk Extended (with arms)	SPE: Overhead stick drills
Elevated Swing Side Pelvis	SPE: Hip Lock drills Skipping Drills

Self Organisation challenged through Aquabags etc.

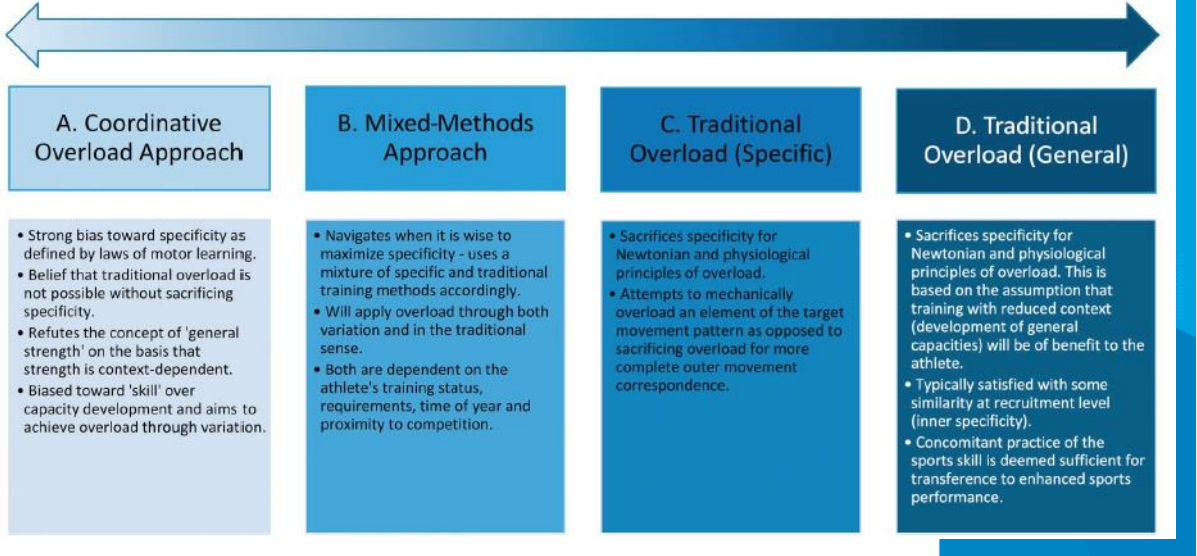
SDE: Power Skip included as a contrast

COMP: Lay-up –'Jump and Bumps'

SHOULDN'T WE JUST BLEND IT ALL TOGETHER?

ULTIMATE FENCE SITTER

Mixed Methods – Brealey and Bishop (2019)



21

Foam Roll
Movement Prep
Co-ordination Challenges
Jump / Plyos / Sprint Mech
Weightlifting Derivative
a. Core Lift 1
b. Loaded Co-ordination
a. Core Lift 2
b. Loaded Co-ordination
a. Supplementary 1
b. Supplementary 2
Anti-Rotation Trunk / Core



- n=12
- In-season strength increases of ~10% (max 23% lowest 5%)
- Anecdotal increased coach and Athlete perception.
- 0 soft tissue injuries



22

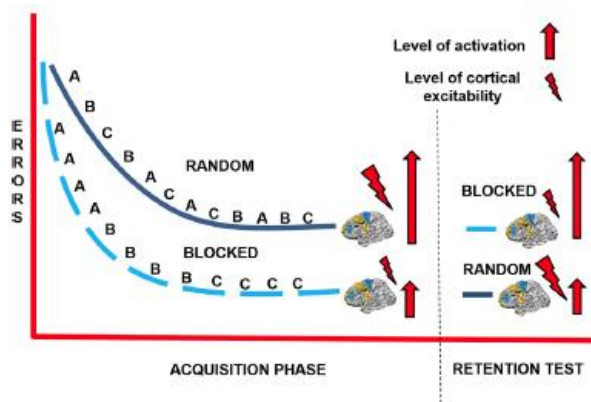
PRACTICE SEQUENCING



23

Random is better for skill retention.

Block better for skill stability.



Methods used to implement Random practice in S&C:

- Contrast Training - vary 2nd exercise
- Circuit based Training - vary exercise order.

24

We can help the learning, retention and transfer process by designing practice / exercises / drills that include.....

Goal (with Reward)

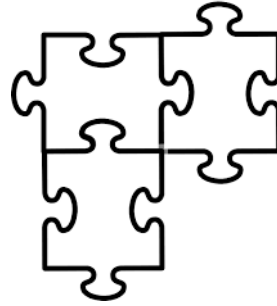
(Diedrichsen et al, 2010)

Failure (with Feedback)

(Wymbs et al, 2016)

Reconsolidation of the skill
(structured and unstructured)

(Musgens et al, 2018; Wymbs et al 2016)



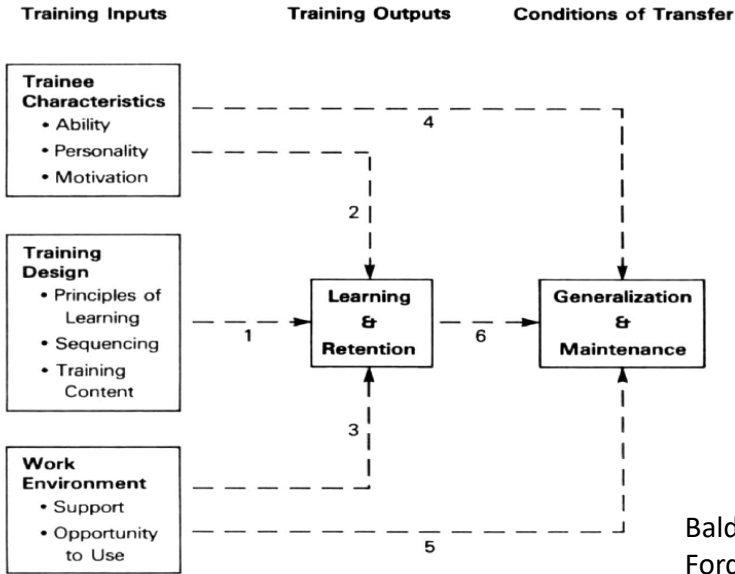
25

BUT WAIT.

IS TRANSFER BASED ON MORE THAN JUST THE EXERCISES WE PRESCRIBE?

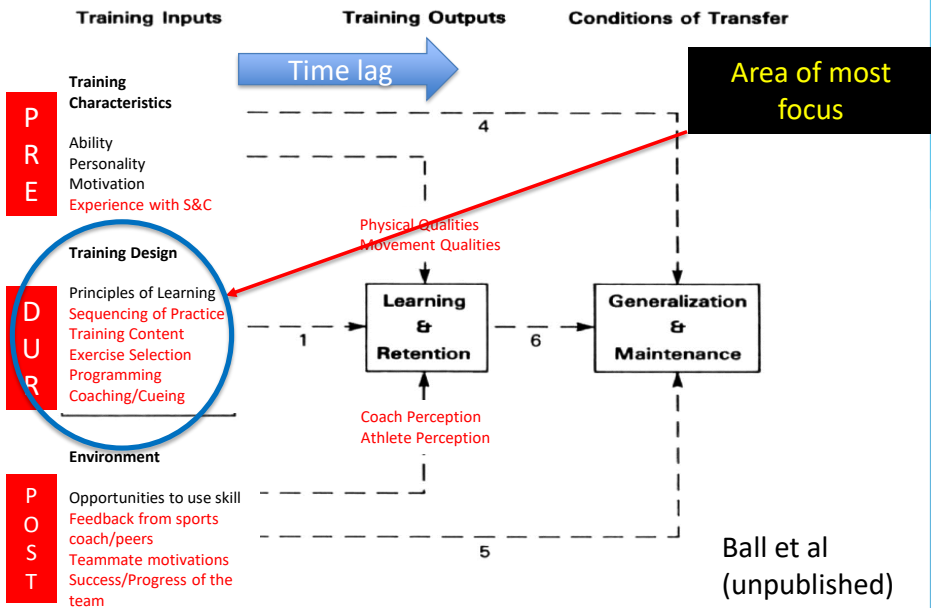


26



Baldwin and Ford (1988)

27



Ball et al (unpublished)

TRAINING TRANSFER MODEL

28

TAKE HOME MESSAGES

- » Not all exercises you prescribe will directly enhance transfer, but they need to feed into the bigger picture of transfer into athletic movement.
- » To best enhance transfer, base the exercises you prescribe on the movement profile from the sport, individual needs and the underpinning evidence of how we learn and retain skills.
- » Maximizing the transfer of training effects not only includes the exercises prescribed but individual athlete characteristics and opportunities (affordances) for the transfer to take place.
- » There is still a whole lot we don't know in this area.....

29



Thanks go to:

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30

