The Science of Skill Learning: Coaching Applications

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Youth Sports

- Over 26 million youth involved in organized sport
- Johnston et al. (2007) found over 35% of high school males and females are involved in varsity sports

- Usually involves 2-5 practices per week plus games
- Provides ample opportunity for skill learning
- Coach influence on skill development is very high

Coaching Education

Several national organizations exist for coaches

- National Association for Sport and Physical Education (NASPE)
- National Federation of State High School Associations (NFHS)
- American Sport Education Program (ASEP)

Almost every sport has a national organization with coaching education programs

- E.g. Soccer (NSCAA, US Youth Soccer, AYSO)

Coaching Requirements

- Child/Adolescent sports
  - Usually volunteer and often parents of participants
  - Limited certification/education requirements
- Age Group (Travel and/or Competitive)
  - Playing experience ☹, Sport Specific License, Coaching Experience
- High School
  - Most require coaches to be ASEP certified
    - Paper/Pencil test, very basic, often used as liability coverage

Hiring past "good" players is an inappropriate practice, yet incredibly prevalent in coaching at all levels

Sources of Education

- "I always remembered what my coach used to make us do…."
  - If you were 15, now 35……that is 20 year old knowledge!!!
    - Has anything changed in 20 years?
  - What if your coach used the same educational methodology?
  - Coaching licenses are important but often limited to basic pedagogy (e.g. be positive, sport specific activities)
  - Lemyre et al. (2007) found professional development is limited
  - Understanding the science of skill learning is essential for enhanced performance and learning

Motor Skill Learning

Definition

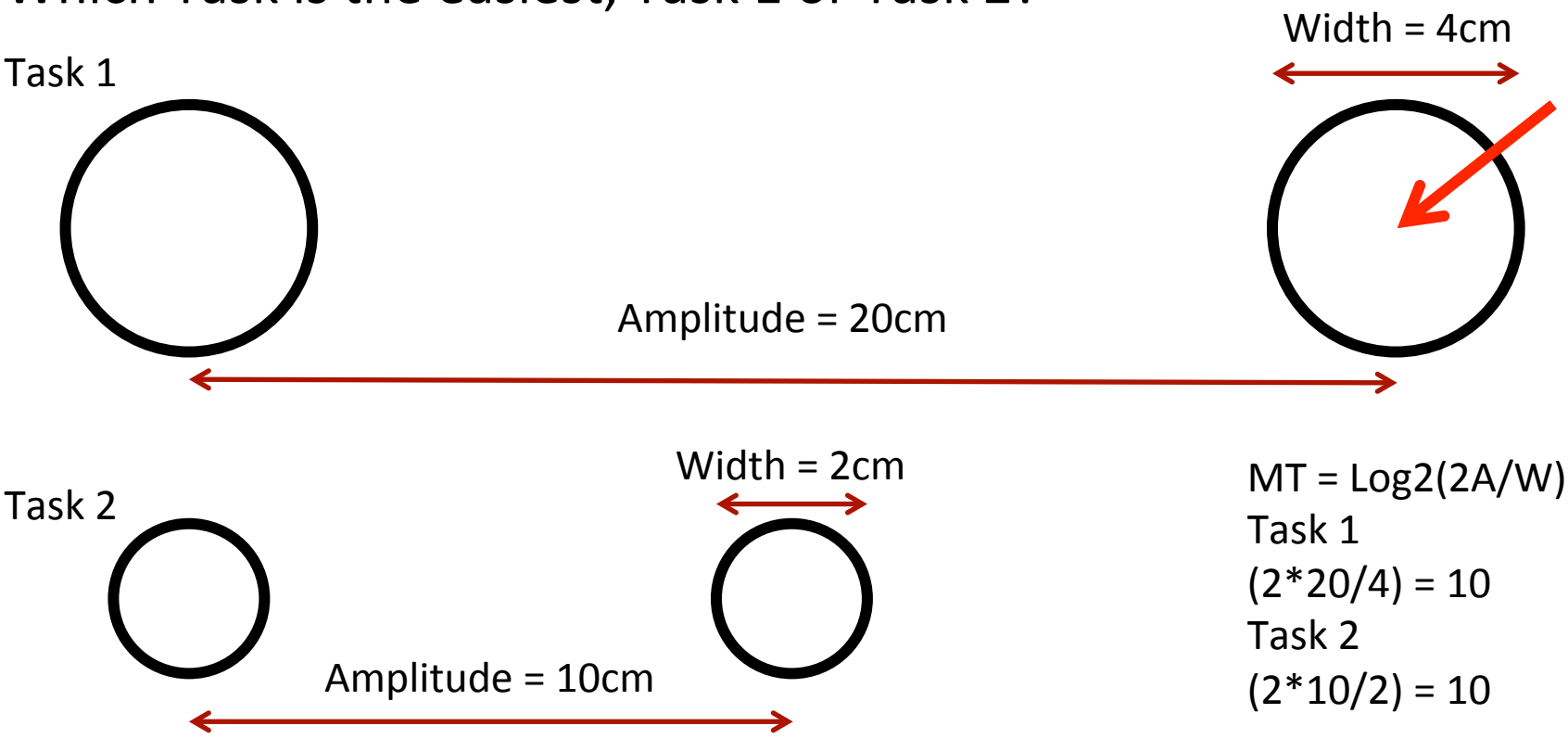
- Set of processes associated with practice and/or experience leading to a relatively permanent changes in the capability for movement

- One of the 4 Pillars of Sport & Exercise Science
  - Biomechanics, Exercise Physiology, Motor Behavior, Sport Psychology
- How people learn and how practitioners can facilitate learning

Motor Skill Learning Concepts

Speed/Accuracy Trade Off

Which Task is the easiest, Task 1 or Task 2?



MT = Log2(2A/W)
Task 1
(2*20/4) = 10
Task 2
(2*10/2) = 10

SAME DIFFICULTY

Speed/Accuracy Trade Off

- Fitts (1954) identified a relationship between task difficulty and movement time
  - If accuracy demands are increased, speed must decrease

Coaching Applications

- Numerous applications to equipment and activity design
- Belkin & Eliot (1997) emphasizing accuracy during skill acquisition impedes the development of an efficient movement pattern

Practice Schedule

Contextual Interference

- Shea & Morgan (1979) found random practice (ABCBCA) was more beneficial than blocked practice (AABBCC)

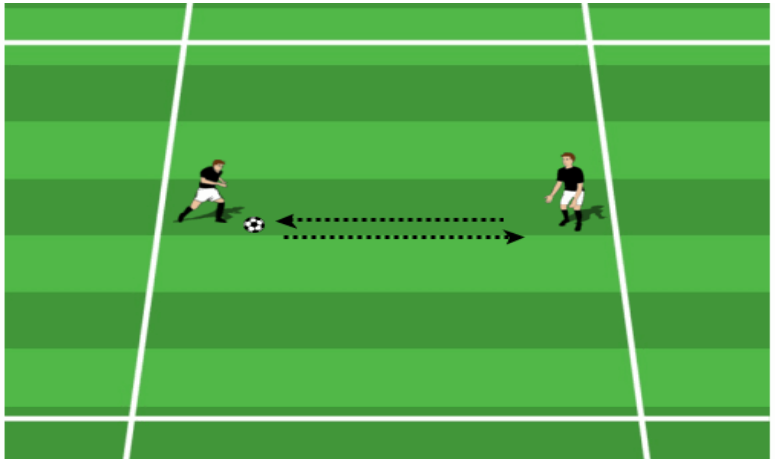
Coaching Applications

- Goode & Magill (1986), Hall, Domingues & Cavazos (1994), Memmert (2006) found random learning benefit
  - badminton serves, baseball hits for skilled players, basketball free throw

- Create activities that involve switching between tasks or practicing different versions of the same task during practice

Practice Schedule

EXAMPLES



Feedback

- Salmoni, Schmidt & Walter (1985) identified 4 functions of feedback (KR)
  - Dependency (performers rely on external feedback)
- Relative frequency of KR has shown learning benefits for reduced % of feedback during learning

Coaching Applications

- Talk less frequently
- Lead to correct response
- Promote Self Evaluation

“There’s no donuts in baseball!”

- Weighted bat warm up is thought to increase swing speed “at bat”
- DeRenne et al. (1992) investigated the effects of weighted bat warm up on swing velocity with a regulation bat
  - Found warm up with donut resulted in a slower swing velocity with regulation bat

Coaching Applications

- Baseball is an interceptive timing skill
  - Best practice is pitch timing “on deck”
- Weighted bat warm up does not increase swing speed “at bat” – LET’S STOP DOING IT

Constraints-Led Approach

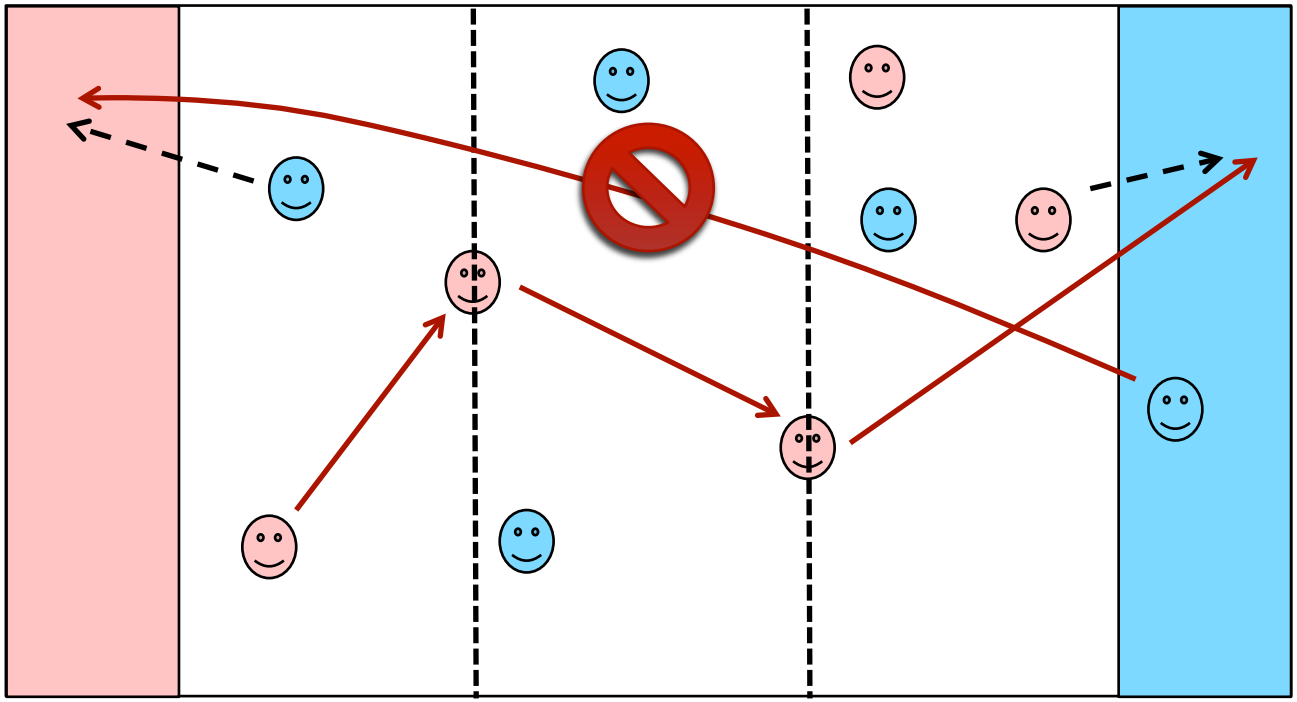
- Coaches **have to** coach (instruct) during practice to enhance learning
  - Or do they?
- Hands off practitioner
  - Instructor is facilitator, enhances learning through advanced planning and activity design
  - Conditions and modifications encourage learners to problem solve to meet task requirements (Coker, 2009)
- Nakayama (2008) found when activity area was manipulated performance changed as a function of activity dimensions

Coaching Applications

- 3 Stage Model of Activity Design
  1. Concept (E.g. Possession progression)
  2. Cues (E.g. Teaching Cues and Emphasis)
  3. Design (E.g. Dimensions, # of Players, Conditions and Modifications)

Constraints-Led Approach & TGfU

- The Constraints-Led Approach has significant ties with the TGfU curriculum model (Thorpe, Bunker & Almond, 1986)
  - Condition = e.g. 5 passes before trying to score
  - Modification = e.g. dimensions



Suggestions

- Obtain appropriate resources related to your field
  - Textbooks, journal articles, workshops, AAHPERD presentations!
- Be a discerning consumer
  - Just because your coach did it, doesn't mean it is "best practice"
- Be reflective on your own practice
  - If practice doesn't go well, maybe your activities or instruction had something to do with it
- Be a student of your sport
  - Your sport is skill learning, it just happens to be in a sport!

Questions?

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