



Motor Learning Best Practices: From Theory to Practice

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April 3, 2009

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Today's Presentation

- Overview of motor learning principles related to skill complexity
- Building appropriate progression
 - Equipment modifications
 - Manipulating environmental conditions
 - Adjusting practice
- quickstart tennis



Adults Games for Children?

- Regulation Games are not always age-appropriate
- Must often adapt and modify regulation game
- Practice teachers and students always think that means breaking things apart (that can be problematic if artificial breaks are made)
- What are other ways to modify, simplify, etc. for the younger learner?



Consider Tennis

Poulton's Skill Continuum

CLOSED

OPEN



SELF-PACED

EXTERNALLY PACED

FIXED ENVIRONMENT

CHANGING ENVIRONMENT

OPEN SKILL

○ CHARACTERISTICS

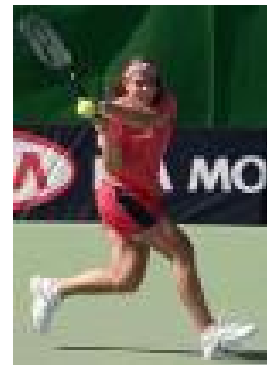
- SPATIAL AND TEMPORAL CONTROL
- LOW PREDICTABILITY
- MOVING ENVIRONMENT
- SKILL LEVEL OF PERFORMER
- DEGREE OF MOVEMENT



Gentile's Taxonomy

Movement Dimensions (Columns)

Movement	Dimensions		
Body Stability; No Object Manipulation	Body Stability; Object Manipulation	Body Transport; No Object Manipulation	Body Transport; Object Manipulation



Gentile's Taxonomy

Environmental Dimension: (Rows)

Stable Environment;
No Inter-trial Variability (ITV)



Stable Environment; ITV



Moving Environment; No ITV



Moving Environment; ITV



Gentile's Taxonomy

	Body Stability; No Object Manipulation	Body Stability; Object Manipulation	Body Transport; No Object Manipulation	Body Transport; Object Manipulation
Stable Environment; No Inter-trial Variability (ITV)	1 Free Throw	2 Penalty shot in field hockey to same location each attempt	3 Running Long Jump	4 "Happy Gilmore" on driving range to no target
Stable Environment; ITV	5 Softball Pitcher	6 <i>Tennis Serve - Expert</i>	7 High Jump	8 Pole Vault
Moving Environment; No ITV	9 Riding on an escalator	10 Hitting a baseball from a pitching machine at 1 speed/location	11 Running on a treadmill at variable speeds	12 <i>Hitting ground - strokes from a tennis machine while one the move</i>
Moving Environment, ITV	13 Catcher guarding the plate and tagging out a baserunner	14 <i>Tennis Serve - Novice</i>	15 Running a cross country race	16 <i>Return of Serve Groundstrokes</i>

Accuracy and Movement



Fitts Law

Speed Accuracy Trade-off

3 Factors Influence Movement Accuracy

Distance

Target Size

Movement Speed

Distance

Reciprocal Tapping Task



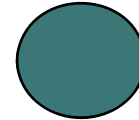
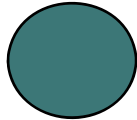
Increased distance = increase movement time

Target Size

A



B



Smaller Targets = Increased Movement Time or
Decreased Accuracy

Improving Accuracy in Tennis

Decrease Distance

Move closer to net

Choke down on racquet

Short handle racquet or paddle

Increase Target size

Larger Ball

Larger racquet face

Increase the boundaries



Improving Accuracy in Sport



Slow Speed to Increase Accuracy

Sports that Require both Accuracy and Speed

- How do we teach these?



TEACHER FACILITATION OF SKILL

- DESIGNING APPROPRIATE SKILL PRACTICE



Variations: Tennis Groundstrokes

- Environmental Dimension
 - Moving Environment
 - Unpredictable
 - Inter-trial Variability
 - Position of object in space
 - Quite variable
- Movement Dimension
 - Body Transport: Yes
 - Object Manipulation: Yes



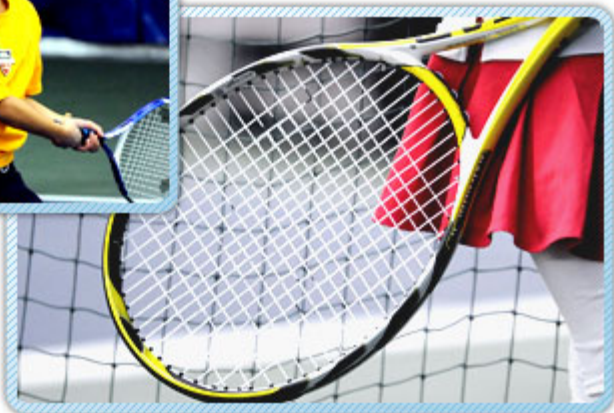
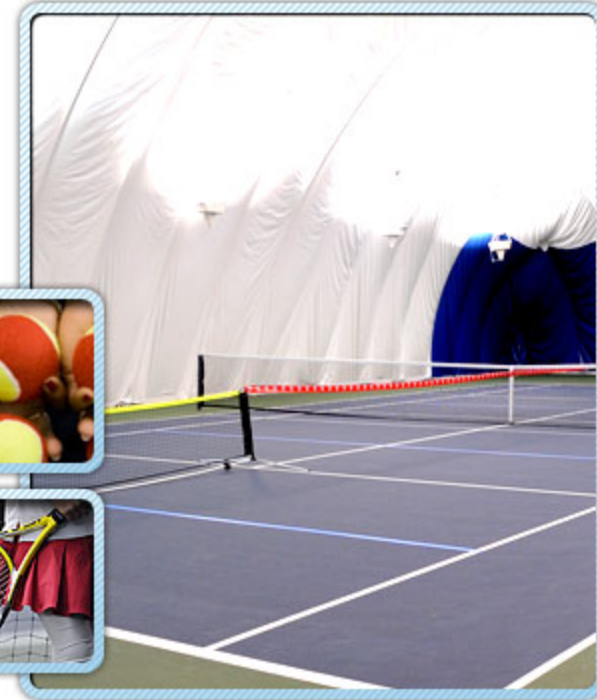
Other Characteristics of the Tennis



- Fast paced
- A lot of space to cover
- Lots of movement
- Must keep ball within boundaries on other side
- Lower net in middle of court
- Other?

Equipment Modifications

- Smaller Racquets
- Larger Balls
- Less compression in ball
- Smaller court
- Lower net



Tennis Serve

Objective

- To get ball into required court area with sufficient velocity to gain some advantage
- Thus, serve presents an accuracy/speed problem for the learner and the facilitator
 - Since speed and accuracy trade off, and both are important, must emphasize both



Analyzing and Enhancing Performance



■ http://www.tennisfuzz.com/tennis_amazingshots.aspx