

Off-Ice Training Principles in Hockey

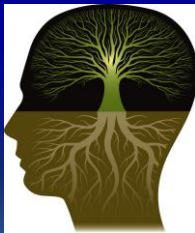
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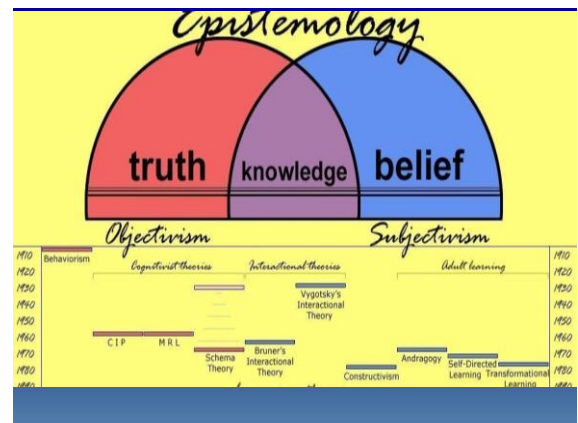
Presentation Overview

- Epistemology
- KPI's, Specificity & Training Transfer
- Current Principles
- Sport Science

Epistemology



Knowledge – what it is and how it is acquired



Evidence Based



Logical



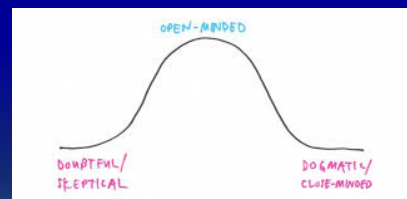
Experiential



Traditional



Skeptic -- Relativist -- Dogmatic



Relativism = Context Related Decision Making
(Limited Bias)



Context

Context is King





What? Why? How?

Exercise Selection

Exercise Technique

Program Design

Coaching Parameters



Team Sports Are Complex

↑ # of Variables = ↑ Complexity

↑ Subjectivity = ↑ Complexity

Context is Defined By:

Data – Observation

Situational Factors – Individual Factors

Hockey

- Scheduling Energy Demands
- Time
- Asymmetry
- Injuries
- Genetic Variability
- Defining KPI's (i.e. what is speed?)
 - 18 acceleration patterns (Power Skating)



Hockey Team ??

Levels of Context = A Series of Decisions:

- **Overview of Needs**
 - Injury History/Risk, NM Balance, Individual Factors
 - Identifying & Ranking KPI's (Performance Analysis)
 - Psychological, Environmental Considerations
- **Exercise Selection**
 - Highly Individual, Driven By Performance & Injury Prev. Factors
 - General & Specific
- **Micro Adaptation**
 - Comfort Zones, Movement Quality, Load Management
- **Macro Adaptation**
 - Planning, Workload Management, Phase Progression/Periodization
 - Least Effective Dose
- **Evaluation/Review**
 - Determining Validity & Reliability (Comprehensive & Honest)

Information Overload??



Study The Game & Identify.....



Key Performance INDICATOR

Key Performance INHIBITOR

Determining KPI's



INTER-Athlete Comparison

INTRA-Athlete Comparison

Generalizing the KPI's:
Common Denominators – Predictive Factors

L1 KPI's:

Basic Stats

L2 KPI's:

Analytics and Player Dev Stats

L1 & 2 Subjective

"O'Brien" Rubric

Physicality

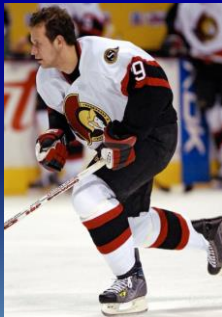
Skating

Energy

L3 KPI's (On-Ice)

- 1 Sit Position
- 2 Single Leg Loading
- 3 Stride
- 4 Transitions
- 5 Lumbo Pelvic Stability
- 6 Lean Angles
- 7 Upper & Lower Body Separation

Sit Position



Sit Position

- COM Distance from BOS
- Parallel Shin/Torso
- Neutral COP
- Neutral Spine/Pelvis
- Predictive Factors:
 - Jump Ratios, Ankle & Hip Flexion ROM
- Training Implications:
 - Preference – Perpetual Set up
 - Jump Signature (RFD from Bottom, Joint Angles at Peak Force)
 - Decreasing dependency on velocity & stretch reflex
 - Vertical Jumps vs Low Position Training (Detraining the Hip Ext Characteristics)
 - VJ and hockey?

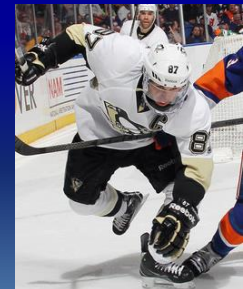


Single Leg Loading



Single Leg Loading

- COM Angle to BOS
- Influences:
 - Change of Direction
 - Weight Shift
 - Puck Protection
 - Minimizes COM Fall
 - Optimizes Propulsion
- Predictive Factors:
 - DL vs SL Strength & Power Ratios
 - Absolute SL Strength



Single Leg Loading



Single Leg Loading



Stride



Stride

- Frequency, Distance, Type, Variability
- Acceleration vs Transitional vs COD
 - F & B Crossover Strides, Stop Strides, Pivot Strides
 - Usage Ratios
- Influenced by other KPI's (Mech. Efficiency)
 - SP
 - SLL
 - LP Stab
- Predictive Factors:
 - NM Factors: Force & Velocity
 - Limb Speed
 - ROM Factors: Hip Ext, Med Rot, Lat Rot

Stride



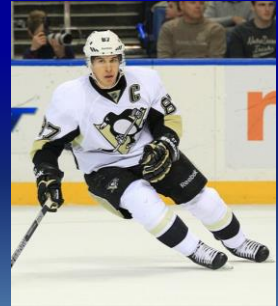
Locomotor Adaptability

- Maintaining Speed
 - 3 Stages of a Turn
 - 3 Stages of a Crossover Sequence
 - 3 Stages of a Pivot Sequence
- Transitions
 - Continuity During Complex Movements (Smooth vs Choppy)
 - Deception & Change of Speed (Skilled vs Blunt Movement)
 - Motor Learning & Motor Skill Acquisition (Key Variable)
 - Movement Variability (Micro & Macro, Gross & Fine Motor)
- Mechanical Preservation (SP & SLL)
 - Accelerational Transitions
 - Coming into contact with the puck

Lumbo Pelvic (Core) Stability

- During Stride Motions
 - Energy Leaks
- During Contact
 - Puck Protection, Maintaining Balance
- Shooting/Passing
 - Shunt Stability (Short Motion)
- Predictive Factors
 - Stabilization Tests, ROM, Standing or SL Posture
 - Best identified Dynamically (Locomotive)

Lean Angles



Lean Angles

- Maintains Equilibrium
 - Balance
 - Speed Transfer
- Optimize Turning Radius
- SP and SLL Principles are Applied (Low on Inside Leg)
- Performance Turning & Separation Applications
- Predictive Factors:
 - VSP – Postural Sway
 - Core Stability Measures (QL, Multifidi, TVA)
 - Basic ROM (Hip, Ankle)
 - Dynamic Movement Screen Tests (Looking at ROM)

Upper & Lower Body Separation



Upper & Lower Body Separation

- Shooting
 - Rotation ROM
- Playmaking
 - Maintenance of Speed During Playmaking
 - Increase Puck Range Without affecting Skating Pattern
 - Puck Protection Applications
- Injury Prevention
 - Decrease Rotation = Instability in the Lumbo Pelvic Complex
 - Decreased Rot = Increased Med Rot of the Hip (FAI)

Upper & Lower Body Separation



L4 KPI's

- On-Ice and Off-Ice Testing Variables that link to L3 KPI's
- Each L3 KPI's has it's L4

L4 KP-Indicators

- Single Leg Vertical Jump
- Squat Jump Signature
- SLS
- Broad , Crossover & Lateral Jumping
- Peak Wingate Power
- Energy Transfer (LP Stability + Joint Symmetry)
- Motor Learning (Subjective) / Vestibular Measures

L4 KP-Inhibitors

- Standing Pelvic Tilt & Hip ROM
- Trunk Rotation (Kneeling)
- SLS / OH Squat (AKH Relationship)
- Ant-Post, Med-Lat Relationships (Passive & Dynamic)
- Energy System Deficiencies
- Endocrine Measures, ANS Measures
- Muscle & Joint Asymmetries
- Subjective Movement Screening

Applied Sport Science



What is it?

Applied Sport Science

- Frequency of Measures
- Non-diagnostic (Looking for Flags/Patterns)
- Holistic Viewpoint (No single measure)
- Assist with Decision Making
 - Program Design
 - Workload Management
 - Coaching

Applied Sport Science

- GPS
- Endocrine Measures
 - IL6, IGG, Amylase, Cortisol, DHEA, Test
- Muscle & Strength Testing
- Movement Testing (Relevant Tasks – Establish Predictability)
- HRV – Power Output (CNS Fatigue)
- Sleep – EEG vs Accelerometry Data
- Subjective Energy/Well Being (Hooper MacKinnon)