

A Case Study of an Olympic Gold Medalist and How Sport Science Saved the Day: 3 Day Rollover Cycles Formatting

Dan A. Pfaff
ALTIS
Phoenix, AZ



Athlete History, Genetics and Sport Demands and Energy Leaks

Induction Interviews
Debrief Systems
Gate Keepers
Networks
Key Genetical Markers

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Induction History, Sept. 2009

- Age 23, 1.90, 86Kilos LJer
- 15 grade 1 or 2 Hamstring/adductor tears, left leg
- 17 grade 1 or 2 Hamstring/adductor tears, right leg
- Talus fracture and repair right foot
- Ligament tears, both ankles; lateral and medial
- Hip labrum issue, right hip
- 3 Hernia surgeries
- Poor lifestyle, numerous upper respiratory issues
- Poor nutrition skills, numerous GI issues
- Poor sleep hygiene

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WHAT ARE THE BIG ROCKS?

WHAT DO WE ANALYZE?

WHAT CAUSES LEAKS AND ABERRATIONS?

HOW DO WE CHANGE THINGS?



Why Even Bother?

- “Cost/Benefit Analysis” is critical in determining change in movement strategies.
- Energy Leaks or Interruptions
- Chronic Injury Factors
- Acute Injury Factors

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Whiplash Issues



Bowleggedness

Chronic and Acute injury factors

Energy Leaks can lead to both types of injury classifications.

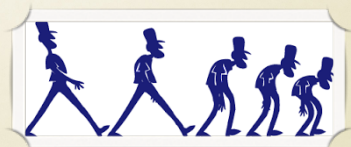
Chronic pain and **injury** refers to the sort of physical **injury**, illness, or disease that develops slowly and is persistent and long-lasting, or constantly recurring over time. Many **chronic injuries** have mild symptoms and low-grade pain, and are often ignored or simply overlooked for months or even years.

An **acute injury** is an **injury** that occurs suddenly during activity, often a sprain or strain. A sprain is an **injury** to a ligament connecting bones – commonly caused by over-stretching an ankle, knee or wrist. A strain is an **injury** to a muscle or tendon – commonly due to over-stretching and tearing the muscle or tendon.

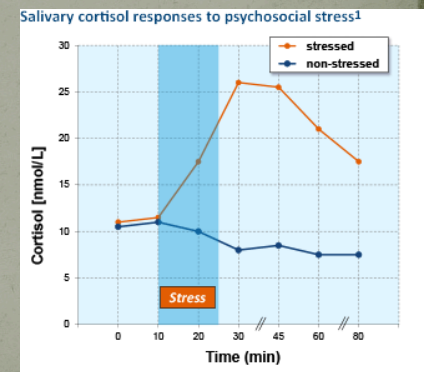
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The Fatigue Factor in all Equations

- TMG and EMG studies
- Force Plates, Opti-jump
- 3 D Kinematic Camera System
- Weak versus Tired Muscle Systems?
- Session, Week, Cycle and Games Factors



Biochemical Assays



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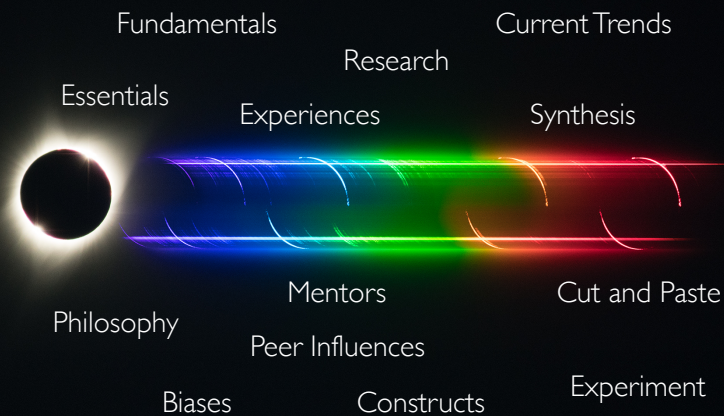
Origin of Design

- Dozens of athletes all over the world at one time!
- Pre-era of email, dropbox, Skype and the IT paradigm
- My wife and family
- Environmental Factors
 - Weather
 - Meet Promoters and Agents
 - Facilities and Equipment
 - Travel Issues
 - Support Staff Issues
 - Levels of Performance
 - Health
 - Length of Season

Components and Critical Analysis

- Jump Specific Needs
- Acceleration and Speed Enhancement Needs
- Power Maintenance
- Recovery
- Readiness for Next Comp
- Work Capacity Upkeep
- Metrics For Analysis
- Wellness
- Battery Recharge
 - Emotional
 - Mental

How We Coach and Plan



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The Essentials

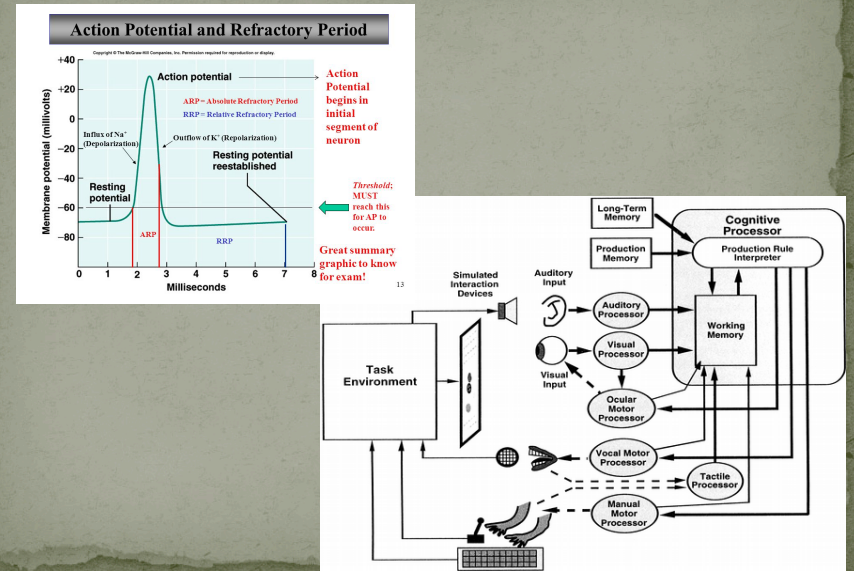
- Menu items, bang for the buck ranking of KPIs
- Volume
- Intensity
- Density, the most under utilized variable.....

The Density Issue in Programming

- Return to Play
- Chronic Injury Management
- Aging Athlete
- KPI Hierarchy
- Biological Battery Conservation
- Lack of Research On Refractory Phases and Dynamics

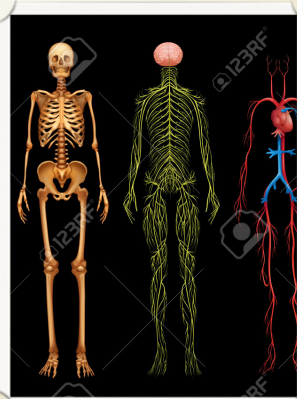
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Refractory Periods and Curves



MOVEMENT CONTROL FACTORS

- Muscle Systems
- Skeletal System
- Fascial Systems
- Tendons, Ligaments, Bursae, Fat Pads and Capsules
- Joint Hydraulics
- Brain, Spinal Cord and CNS
- Proprioceptors
- Lymphatic System
- Organs



HUMAN HYDRAULICS SYSTEMS

- Collagen Matrix
- Fascia
- Capsules
- Retinaculum
- Bursae
- Fat Pads
- Lymphatics
- Vascular System
- Vestibular System



Movement Screens or Grids

- Coaches have been using this concept for centuries, its called watching practice intently.
- Every item on the training schedule is a movement screen
- One must train the eye to see using landmarks, planes, axes and angles.
- Seeing in real time is built upon video and photo review skills.

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Is There a Technical Model?

- **Common denominators** of positions, movement schemes and vectors.
- **Intra and Inter athlete studies** are critical. Ditto **Longitudinal** study.
- **Logic, common sense and replicability** are critical coaching tools.

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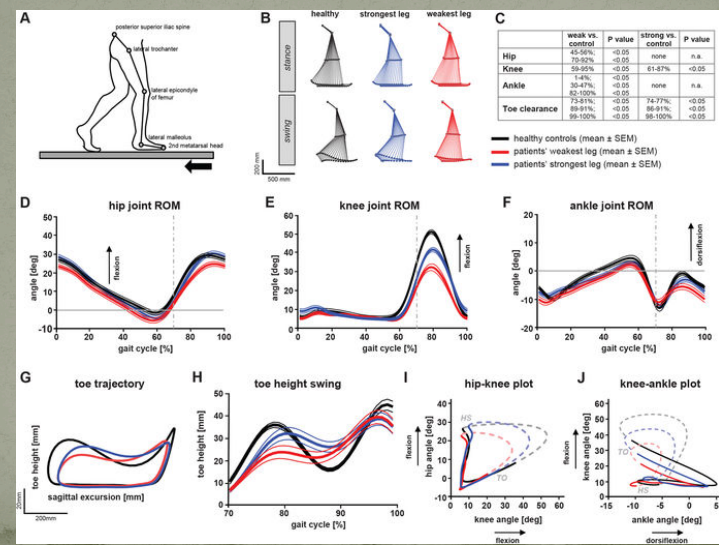
Nikolai Bernstein

Inference Issues?



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Movement Signatures



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EXPRESSION

It is a bit more complicated than strength, power and rate of force development.

Movement signatures are critical factors in the return to play paradigm.

A Retrospective Analysis of Concurrent Pathology in ACL-Reconstructed Knees of Elite Alpine Ski Racers

Matthew J. Jordan,^{§†‡} PhD, Patricia Doyle-Baker,[†] PhD, Mark Heard,[§] MD, Per Aagaard,[†] PhD, and Walter Herzog,[†] PhD

Investigation performed at the Canadian Sport Institute Calgary and the Human Performance Laboratory at the University of Calgary, Calgary, Alberta, Canada

International Journal of Sports Medicine, 2017
Note: This article will be published in a forthcoming issue of the *International Journal of Sports Medicine*. The article appears here in its accepted, peer-reviewed form, as it was provided by the submitting author; it has not been copyedited, proofread, or formatted by the publisher.

Kinetic Sprint Asymmetries on a Non-Motorised Treadmill in rugby union athletes

Authors S. R. Brown¹, M. R. Cross^{1,2}, O. Girard^{2,3}, F. Brocherie^{4,5}, P. Samozino⁶, J.-B. Morin^{1,4}

Affiliation ¹Sports Performance Research Institute New Zealand (SPRINZ), Auckland University of Technology, Auckland, New Zealand; ²Institute of Sports Sciences (ISSUL), University of Lausanne, Lausanne, Switzerland; ³Athlete Health and Performance Research Centre, Aspetar Orthopaedic and Sports Medicine Hospital, Doha, Qatar; ⁴Laboratory Sport, Expertise and Performance, Research Department, National Institute of Sport, Expertise and Performance (INSEP), Paris, France; ⁵Intra-University Laboratory of Human Movement Biology (LIBM), Université Savoie Mont Blanc, Le Bourget-du-Lac, France; ⁶Laboratory of Human Motricity, Education, Sport and Health (LAMHES), Université Côte d'Azur, Nice, France

Open Access
Variability of a "force signature" during windmill softball pitching and relationship between discrete force variables and pitch velocity

Sophia Nimphius^{1,2,3}, Michael R. McGuigan^{4,5}, Timothy J. Suchomel¹, Robert U. Newton^{4,6}

¹Centre for Exercise and Sports Science Research, Edith Cowan University, Joondalup, WA 6027, Australia; ²Hortley Sporting Australia High Performance Centre, Canberra, NSW 2607, Australia; ³Sport Performance Research Institute New Zealand, School of Sport and Recreation, Auckland University of Technology, 600, New Zealand; ⁴Department of Exercise Science, East Stroudsburg University, East Stroudsburg, PA 18042-2099, U.S.A.; ⁵Centre for Clinical Research, University of Queensland, Royal Brisbane & Women's Hospital Campus, Herston, QLD 4029, Australia

article info

Article history:

Received 22 April 2018; Revised 8 March 2019; Accepted 7 March 2019

Keywords:

Performance Kinetics Softball Monitoring Pitching Fatigue

1. Introduction

abstract

This study assessed reliability of discrete ground reaction force (GRF) variables over multi-epoch pitching trials, investigated the relationships between discrete GRF variables and pitch velocity (PV) and assessed the variability of the "force signature" or continuous force-time curve during the pitching motion of windmill softball pitchers. Intraclass correlation coefficient (ICC) for all discrete variables was high (0.96-0.99) while the coefficient of variation (CV) was low (1.4-5.7%). Thus discrete variables were simultaneously correlated to PV, showed minimal task force (CV=0.81), and a 0.833 and time

ERGONOMICS, KPIS AND HIERARCHIES

- Isolatory Versus Concurrent Mythologies
- Forces, Velocities, Angles and Movement Expression are a Dynamic System.



Interventions

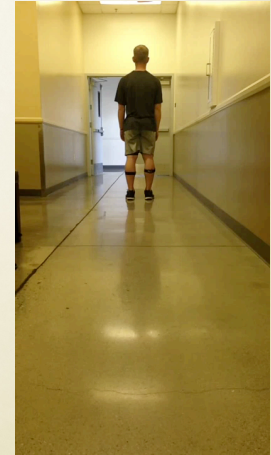
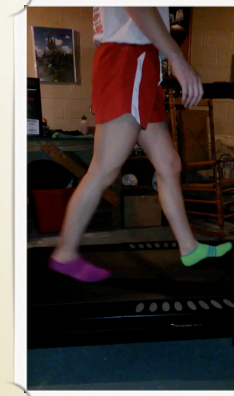
- Mobility Exercises
- Prescribed Flexibility or Fascial Exercises
- Activation Exercises
- Soft Tissue Manipulation
- Joint Manipulation
- Acupuncture
- Recue correct themes or movements
- Plan B
- Plan C
- Cessation of session
- Refinement of Long Term Rehab/Pre-hab Strategies

Day 1

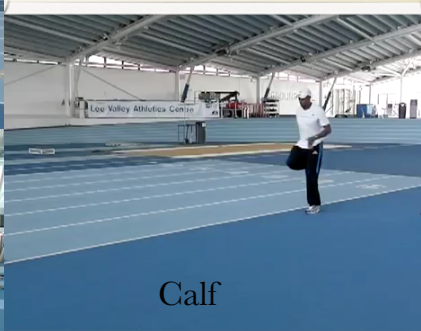
- Warm-up A or B, WC or Wellness Grid
- Acceleration Development or Approach Work (10-40m, with sets of 3 or 4 x 3 efforts in each set) use 2-3' and 8-12' recoveries; can use blocks, rollovers or fly-ins... emphasize mechanics, rhythm and relaxation.....can add one to two special speed endurance runs with 15-20' recoveries after 20' rest from first component
- Multiple Jump Series: 5 x 5 hurdles at 30-90cm and 2-4m spacing dynamic format; or multiple throw series Grenade x 5 reps (OHB, BLF, repeat with one jump before launch)Cycle ball weight each week
- Wt. Training: Olympic lifts, Presses, and Leg Series; Ancillary lifts: Russian Twists and Negative Toe Risers
- Cool Down with 5' of jog/skip routines

PROGRESSIONS

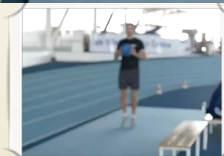
- Walking



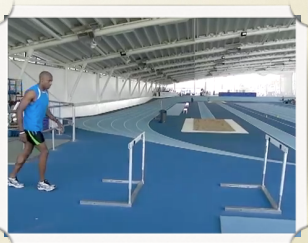
DRIBBLING EXERCISES



PLYOMETRICS



ADVANCED PLYOS

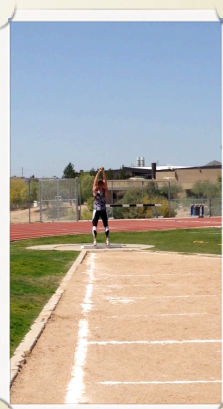


ACCELERATION

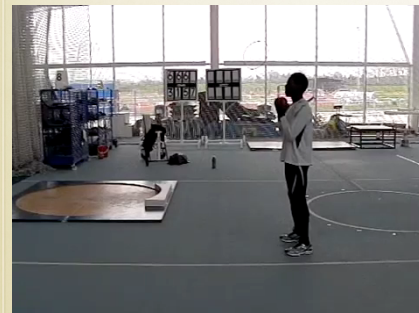
A complex, real time, real world task.



SIMPLE POWER DEVELOPMENT THROWS



COMPLEX, CONVERSION THROWS



Day 2

- Warm-up B
- Jump Specific Technical Training: approaches x 4-6 and then 10-12 short run jumps or competition specific jumps or
- Technical Runs on Grass or in Flats; 6-8 runs x 50m , full recovery needed!
- General Strength Series
- Medicine Ball Series
- Hurdle Mobility Series
- Cool down with multidirectional series for 5', Soft tissue work deep and multiple grids by therapist

DUAL VIDEO OF TAKEOFF MECHANISM



- Takeoff

Day 3

- Warm-up C with Target Soft Tissue Lead In
- Speed or Special Speed Endurance Runs; 2-3sets x 3 runs x 40-60m with 2-4 within set' and 10-20' between set recoveries
- Alternative Workout Options: Alactic Runs of 1-2 X 90 or 120m SFS runs; use full recovery; or 3 x 90m with 8'-10' at 90% rhythm motif
- Elastic Endurance Series: Skips for height and distance, scissor bounds, alternate leg bounds, etc. (total 300- 500m workloads)
- Wt. Training. As on Monday with variations or eliminations
- Mixed Cool Down Rhythms





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2012 Olympic Debrief

- Olympic Gold Medal
- 18 competitions completed
- 12 missed sessions
- 2 grade 2 tears right medial hamstrings
- 1 stress reaction cuboid, right foot
- 1 umbilical hernia
- 3 respiratory bouts
- 1 food poisoning episode

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Insights

- Has allowed for consistent levels of high performance for up to 3 months.
- One athlete due to circumstances used it for 10 months and excelled in multiple components
- Improves Coach Sanity Levels
- Simplifies feedback from athletes and performance service providers
- There is comfort in routines
- It forces both the athlete and coach to define KPI's

