Physiology of Distance Training

Palatine Boys Distance Crew
Mentors

- Jeff Quick – Geneseo and Moline
- Gary Wieneke – University of Illinois
- Steve Currins – Beecher, Crete Monee, and Palatine
- Fred Miller – Palatine

Partner

- Joe Parks – St. Charles North and Palatine

Mentors and Partners
• Jack Daniels – *The Daniels Running Formula*
• Joe Vigil – *Road to the Top*
• Joe Newton – *Coaching Cross Country Successfully or Running to the Top of the Mountain*
• Brad Hudson – *Run Harder*
• Vern Gambetta – *Athletic Development*
• Jay Johnson – JayJohnson.com
• Renato Canova – Internet sources, LetsRun.com
• Pete Thompson – NewIntervalTraining.com
• Steve Magness – Scienceofrunning.com
• Science of Sport web site

Key Knowledge Sources
The Triangle Model

- Economy
- Power
- Core

Aerobic Power
Goals:

- Increased heart stroke volume
- Improved ability to clear/process lactate
- Increased capillarization and density of mitochondria

- **Long runs** – Each Monday from 5-14 miles (40-1:40 minutes) w/ 15-25 min progression finish
- **Recovery runs** – 35 min for frosh, 45 for sophs, 60 for varsity
- **Threshold runs**
  - 4-6.5 mi Morning Loop @ T pace or progression
  - Daniels cruise intervals (6-10 x 1000 or 4-6 x 1600 w/ 1 min)
- **VO2 max sessions**
  - Same as cruise interval sessions w/ increased rest
- **Lactate sessions** – Intervals w/ roll on rest
  - 2-3 x 8 x 400 @ 75-70 w/ 100 meter jog and 3-4 min set break

Building Aerobic Power
Goals:

- Improved efficiency
- Ability to handle more mileage
- Injury prevention

- **Strides** – 10 x 100 @ hard pace w/ 30-60 sec
- **Dynamic warm-up** – Stretching and drills
- **Rhythm speed** – 4 x 200 w/ 1 shift, 3 x 300 w/ 2 shifts
- **Mileage** – The body will either break down or adapt

Building Economy
Building Core Strength

**Goals:**
- Injury prevention
- Improved running posture

**Normal routine (3-4 days per week)**
- Front planks – 2 x 30-60 sec w/ advanced shoulder touches
- Back planks – 2 x 30-60 sec w/ advanced single leg lifts
- Side planks – 2 x 30-60 sec w/ advanced leg raises
- Scissor hips – 2 x 10-30 reps w/ toe point down
- Hip raises – 2 x 10-30 reps
- Lunge matrix – 10 reps on three planes (each leg)
- Foot stands – 2 x 30-2:00 on each leg
Goals:

- Neuromuscular recruitment
- Minimization of ground contact

- **Weight lifting** – Twice a week
  - Dead lift
  - Single leg squats
  - Box step-ups

- **Flys** – 4-8 x 40-80 fly w/ walk back rest

- **Hill sprints** – 6-10 @ 40-100 meter sprint w/ 4:00 jog

- **Plyometrics** – Added on to dynamic warm-up

# Building Power
An advanced training plan integrates these elements in a **systematic** and **progressive** fashion

- **SYSTEMATIC** – Organized year-round planning
- **PROGRESSIVE** – Constant growth in ability

Physiological Synthesis
Yearly Organization

- **Track** (18 weeks) – January through May
- 1-2 weeks off – Late May to early June
- **Early Bird Running Program** (5 weeks) + 5 weeks of unstructured training – June 1-August 10
- **Cross Country** (13 weeks) – August 10 – State CC meet
- **Polar Bear Winter Running** (8 weeks) – State CC meet through Christmas break
- 1-2 weeks off – Christmas break

Macro-cycles
Five Core Beliefs

- **#1 Year-Round Aerobic Training** – Training is cumulative. The most important training goal is to be able to train tomorrow.
- **#2 Non-Linear Periodization** - Never let an energy system go for any length of time.
- **#3 Scaffolding** – Emphasize growth both within a season and across a career for all training systems.
- **#4 Evolution** – Maintain principles within an innovation mindset. The field of endurance physiology is not stable.
- **#5 Differentiation** – Adapt when necessary.

Basic Principles
Mileage Matters

Consistent running volume is the #1 determinant of success.

• Freshmen
  • Summer = Consistent running
  • Season = 20-35 mpw (standard recovery pace = 7:00-8:00)

• Sophomores
  • Summer = 35-70 mpw progressing each week
  • Season = 35-50 mpw (standard recovery pace = 6:50-7:30)

• Juniors
  • Summer = 60-100 mpw progressing each week
  • Season = 50-80 mpw (standard recovery pace = 6:30-7:00)

• Seniors
  • Summer = 60-100 mpw progressing each week
  • Season = 50-80 mpw (standard recovery pace = 6:30-7:00)

Year-Round Aerobic Training
Early Bird Summer Running Program

- Palatine Park district program
- Focused on mileage and fundamental fitness of all energy systems

Sample varsity week from 2010-2012 summers:
- Sunday – Easy Run (60 minutes)
- Monday – Long Run (12-14 mi w/ 25-30 min progression)
- Tuesday – Mileage/Recovery (60-30 run in AM, 30-45 run in PM)
- Wednesday – Alternate Threshold and VO2 Max workouts
- Thursday – Mileage/Recovery (60-30 run in AM, 30-45 run in PM)
- Friday – Hills (3.5 mi wu, 5-10 x short hill w/ 3-4 min, 30/90 fartlek on 3.5 mi return)
- Saturday – 60-70 min steady state or block progression
- Optional double runs M-F led by team leaders
Polar Bear Winter Running

- Open gym format
- Workouts are student-determined within broad parameters
- Focused on maintenance of fundamental energy systems

Sample varsity week from 2010-2012 winter running:
- Sunday – Off or 30 min
- Monday – 7-14 mi long run w/ progression finish
- Tuesday – Mileage/Recovery (35-60 min)
- Wednesday – Alternate long and short fartlek
  - 20-35 min of segments w/ shortest segment @ 2 min w/ 1 min maximum rest
  - 8-12 min of segments w/ longest segment @ 1 min w/ 2 min minimum rest
- Thursday – Mileage/Recovery (35-60 min)
- Friday – Tempo run (4-6.5 mi @ T pace or progression)
- Saturday – Short hills (6-10 x 50-80 meter hill w/ 4 min jog rest)
Build a Baseline for Specialization

Non-linear Periodization requires attention to all energy systems at all times. Training is thus prescribed by ratios.

- Aerobic
  - VO2 max
  - Threshold
- Anaerobic
- Alactic system
- Supplemental work (power, core, and economy)

All distance runners need these systems, but they need them in different ratios.
Profile: Graham Brown (The Prodigy)

The Athletic Continuum

LOW

Aerobic Power

Economy

Power

Core

Motivation

HIGH
Example of Non-Linear Periodization

See handout.
First four weeks of 2013 Track and Field season
Seek Growth across the Season and Career

- Example: Long Run
  - 5-9 mi w/ 15 min progression (frosh)
  - 7-11 mi w/ 20 min progression (soph)
  - 9-14 mi w/ 25 min progression (varsity)

- Example: Roll-on Quarters within a track season
  - Session #1: 3-4 x (4 x 400 @ 75-70 w/ 100 jog and 3 min set)
  - Session #2: 2 x (6 x 400 @ 75-70 w/ 100 jog and 3 min set)
  - Session #3: 2 x (8 x 400 @ 75-70 w/ 100 jog and 3 min set)
  - Session #4: 2 x (8 x 400 @ 72-67 w/ 100 jog and 3 min set)
  - Session #5: 2 x (8 x 400 @ 70-65 w/ 100 jog and 3 min set)
Adapt and Grow with the Competition

**Claim:** High school cross country within Illinois and the United States is like a nuclear arms race.

- Expertise must grow
  - How can new learning help your athletes?
- Practice efficiency must improve
  - How can you get the best 2 hours out of your athletes?
The Art of Coaching Distance Runners

- When should the system principles take precedence?
- When should individual needs take precedence?

- Example: The Andrew Clingerman dilemma
  - Hard-core work ethic
  - Thick musculature
  - Aerobic deficit
  - Speed and track-oriented

Differentiation
How do you develop a winning kick?

Profile: Alec Bollman (The Snap Kicker)

How do I develop a state champion miler?
- Aerobic enough to stay in the race
- Explosive enough to kick and win

Answer: Constantly develop all systems. Specialize during track season.

- Frosh: 17:48, 10:24, 4:46, 2:09
- Soph: 15:25, 9:56, 4:30, 2:00
- Junior: 15:18, 9:38, 4:16.83, 1:56.4, 51.1r
- Senior: 15:04, 9:23, 4:13.79, 1:52.4, 50.5r

How do you develop a winning kick?
Profile: Mat Smoody (The Showboat)
How do I turn a half-miler into a cross country star without ruining his speed?
- Must retain explosiveness
- Must do enough aerobic work to handle the 3 mile distance

Answer: Emphasize mileage only during off-season. Foster confidence through speed and lessen traditional 5K training

- Frosh: 18:10, 10:12, 4:37, 1:55.8
- Soph: 14:52, 9:47, 4:30, 1:55.0
- Junior: 14:35, 9:37, 4:13, 1:51.8
- Senior: 14:25, 9:27, 4:17, 1:50.71

How do you make a fast guy strong?
Profile: Peter Tomkiewicz (The Polish Glacier)
How do I develop a two-miler with a kick?
- Cannot sacrifice aerobic base for pure power
- Must be able to kick situationally.

Answer: Accentuate mileage and tempo running strengths. Work constantly on neuromuscular recruitment.

- Frosh: 17:32, 10:27, 4:57, 2:18
- Soph: 16:40, 10:05, 4:46, 2:13
- Senior: 14:41, 9:18, 4:20, 2:03

How do you make a slow guy fast?
Profile: Ryan Wojdyla (The Program Kid)

How do you find that elusive fifth man?

- Must run 15:30-15:45 to be serviceable

Answer: Coach every athlete with an aerobic progression across his career. Emphasize improvement and character.

- Soph: 18:12, 11:03, 4:59, 2:16
- Junior: 16:55, 10:33, 4:51, 2:17
- Senior: 15:44, 9:59, 4:43, 2:07

How do you make chicken salad out of chicken s---?
• Physiology is the most important factor in winning races, but not the only one.

• Program matters. Part Two will address the culture that enables and sustains elite training for high school athletes.

• The physiology and the program reinforce one another.

Conclusion