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## Training Theory – The Why

**"You can't make the grass grow faster by pulling on the blades"**  
African Proverb



**Chris Parno - Sprints/Hurdles/Relays**  
Associate Head Track and Field Coach  
christopher.parno@mnsu.edu – 507.779.5833

 @chrisparno  
 @chris\_parno

Big ideas. Real-world thinking.

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## The Background

-  **University of Minnesota – Duluth**
  - < B.S. Physical and Health Education
  - < Coach – John Fulkrod
  - < Sprints/Hurdles/Multi
-  **Augustana University – Sioux Falls, SD**
  - < M.A. Sports Administration
  - < Jim Vahrenkamp/Tracy Hellman
  - < Graduate Assistant Sprints/Hurdles/Jumps
-  **Minnesota State University (2012)**
  - < Associate Head Coach
  - < Sprints/Hurdles/Relays
  - < Recruiting Coordinator

### Mentors/Influences

- Charles Clinton – USATF
- Boo Schexnayder - USTFCCCA
- Kebba Tolbert – Harvard
- Mark Mangiacotti – Harvard
- Tony Veney - USATF
- Gabe Sanders – Boston
- Andreas Behm – Altis
- Dan Pfaff – Retired
- Jim Vahrenkamp – UND
- Ernie Clark – NAU
- Sammy Dabbs – Private sector
- Justin Wickard – Tier1Athlete

"Brain to pick, an ear to listen, and a push in the right direction"

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## History of Professional Development

- USATF**
  - < Level 1 Certification (2011)
  - < Emerging Elite Sprint/Hurdles Coach Clinic (2014)
  - < Level 2 Certification (2015)
    - ✓ Sprints/Hurdles/Relays (2015)
    - ✓ Jumps/Multi (2016)
  - < Level 3 Certification - Sprints (2017)
  - < USATF Instructor Training – (2018)
  - < USATF Mid-American Regional Education Coordinator
    - ✓ Level 1 Schools Director
  - < Level 2 Instructor (2022, 2023)
  - < Level 3 Advisor (2023)
- USTFCCCA**
  - < Technical Certification (2011)
    - ✓ Tech Cert Instructor
  - < Track and Field Program Management Certification (2013)
  - < Sprint, Hurdle, and Relay Event Specialist (2013)
  - < Combined Events Specialist (2014)
  - < Strength and Conditioning Advanced Endorsement (2015)
  - < Short Sprints Masters Endorsement (2017)
  - < Hurdle Masters Endorsement (2018)
- IAAF**
  - < Level 5 certification (2017) – Sprints
- Altis**
  - < Short Sprints Course (2020)
  - < Hurdle Course (2021)



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When a sprint/hurdle coach begins working with performance driven athletes, the successful coaches (whether cognizant or not) develop a philosophy based on the only thing that matters when the gun is fired









Ralph Mann

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## Path for Today

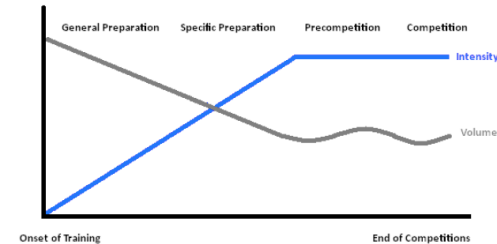
- **Understand training parameters/themes (ingredients)**
  - < Acceleration, max velocity, speed endurance, special endurance, tempo's, etc.
  - < What do I mean when I say one of the above words....(intensities, duration, etc.)
- **Overview of principles within training theory/application (recipe)**
  - < Progressions, overload, specificity, adaptation, variation, rate coding, myelination, etc.
- **Putting it all together/synthesis (meal)**
  - < Compatible training, organization within training plan, when/where (part 2 "the how")



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## Verbiage/Intent is IMPORTANT



- **Volume – Total amount of training (per session/month/year)**
  - < Progressive loading and unloading of volume based on time of season and goal of stimulus
- **Intensity – The measured difficulty of activity/training**
  - < Percentage based off some type of testing data or PR performance
- **Density – How often a theme is present within training plan**
  - < High weekly speed density = multiple speed training session per week

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## Generalized Neuromuscular/Energy System Breakdown

Gary Winkler

Terminology	Length of Run	Component	Energy System	% of Predicted Performance	Rest Interval Between Reps/Sets	Daily Volume Ranges 100/200/110/100mH	Daily Volume Ranges 400/400mH
ABSOLUTE SPEED	20-80m	Speed (s) Anaerobic power	Anaerobic Alactic	90-95% 95 - 100%	3-5 / 6-8 min 3-5 / 6-8 min	300-800m 300-500m	300-900m 300-600m
SPEED ENDURANCE	50-80m	Alactic Short Speed End. (ASSE)	Anaerobic Alactic	90 - 95% 95 - 100%	1-2 / 5-7 min 2-3 / 7-10 min	300-800m 300-800m	600-1200m 600-1200m
SPEED ENDURANCE	80m	Glycolytic Short Speed End. (GSSE)	Anaerobic Glycolytic	90 - 95% 95 - 100%	1 / 3 min 1 / 4 min	300-800m 300-800m	600-1200m 600-1200m
SPEED ENDURANCE	0-150m	Speed Endurance (SE)	Anaerobic Glycolytic	90 - 95% 95 - 100%	5 - 6 min 6 - 10 min	300-900m 300-500m	400-1000m 400-800m
SPECIAL ENDURANCE I	150-300m	Long Speed Endurance (LSE)	Anaerobic Glycolytic	90 - 95% 95 - 100%	10 - 12 min 12 - 15 min	600-900m 300-900m	600-1200m 300-1000m
SPECIAL ENDURANCE II	300-600m	Lactic Tolerance (LAT)	Lactic Acid Tolerance	90 - 95% 95 - 100%	15 - 20 min Full	300-600m 300-600m	900-1200m 300-900m
INTENSIVE TEMPO	100-600m	Anaerobic Capacity (ANC)	Mixed: Aerobic Anaerobic	80 - 89%	30s - 5 / 3-10 min	800-1800m	1000-2800m
EXTENSIVE TEMPO	200-800m 100-200m	Aerobic Capacity (AC)	Aerobic Aerobic	40 - 79% 60 - 79%	45 - 2 min 30s / 2-3 min	1400-2500m 1400-1800m	2400-4000m 1800-3000m
CONTINUOUS TEMPO	1600-6400m	Aerobic (AC)	Aerobic	40 - 60%	Heart Rate 130-150	1600-3200m	3200-6400m

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## Running Based Training Themes

### Foundational Training Concepts



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## Training Acceleration

- **What:**
  - < Max intensity movement to overcome initial inertia (resting state)
  - < Generally, 0-30m/40m (dependent on age, strength levels, max velocity)
  - < High amplitude of movements. "cover as much ground as quickly as possible"
  - < "Full recovery" between sets/ reps
    - ✓ 1-1.5 minute per 10m segment (more in later or higher volume sessions)
- **When**
  - < General/specific prep
  - < Always present in max velocity runs
- **How (more to come in second session):**
  - < Combinations of high intensity runs over 10-40m intervals
    - ✓ 8x20m w/2-3 minutes rest
    - ✓ 10x30m w/3-minute rest
    - ✓ 2x20, 3x30, 4x40m w/ 2-4-minute rest
  - < Rest intervals are usually 1:1.5 of prescribed distance
  - < Sled, hills, other forms of resisted runs



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Athlete	RT	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m	50-60 m	60-70 m	70-80 m	80-90 m	90-100 m	0-100 m
BOWIE	0.182	2.07	1.15	1.02	0.94	0.93	0.93	0.94	0.95	0.95	0.97	10.85
TA LOU	0.180	2.01	1.14	1.04	0.96	0.94	0.92	0.93	0.96	0.97	0.99	10.86
SCHIPPERS	0.155	2.07	1.16	1.02	0.95	0.94	0.93	0.94	0.97	0.98	1.00	10.96
AHOURE	0.184	2.01	1.14	1.03	0.96	0.96	0.95	0.95	0.97	0.99	1.02	10.98
THOMPSON	0.200	2.06	1.15	1.01	0.95	0.96	0.95	0.96	0.97	0.98	0.99	10.98
AHYE	0.151	2.02	1.17	1.04	0.96	0.95	0.95	0.96	0.97	0.99	1.00	11.01
SANTOS	0.150	2.04	1.17	1.04	0.96	0.96	0.95	0.96	0.97	1.00	1.01	11.06
BAPTISTE	0.142	2.01	1.16	1.05	0.96	0.95	0.95	0.97	0.99	1.01	1.04	11.09

Note: RT = reaction time. The gold shaded cells indicate the fastest splits for that section. Split times include RT and rounded to two decimal places.

Athlete	RT	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m	50-60 m	60-70 m	70-80 m	80-90 m	90-100 m	0-100 m
GATLIN	0.138	1.88	1.02	0.91	0.90	0.88	0.86	0.86	0.87	0.87	0.87	9.92
COLEMAN	0.123	1.87	1.00	0.90	0.88	0.87	0.86	0.88	0.88	0.88	0.92	9.94
BOLT	0.183	1.96	1.02	0.90	0.88	0.88	0.85	0.85	0.86	0.86	0.89	9.95
BLAKE	0.137	1.89	1.03	0.91	0.90	0.89	0.88	0.87	0.88	0.87	0.87	9.99
SIMBINE	0.141	1.92	1.03	0.92	0.92	0.87	0.84	0.86	0.87	0.88	0.90	10.01
VICAUT	0.152	1.95	1.03	0.90	0.89	0.87	0.87	0.88	0.89	0.90	0.90	10.08
PRESCOD	0.145	2.04	1.05	0.92	0.92	0.89	0.86	0.86	0.87	0.88	0.88	10.17
SU	0.224	2.03	1.03	0.92	0.91	0.89	0.89	0.89	0.89	0.90	0.92	10.27

Note: RT = reaction time. The gold shaded cells indicate the fastest splits for that section. Split times include RT and rounded to two decimal places.

Meter mark before fastest 10m split – Acceleration is individualized  
We can't always put acceleration in a box

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## Absolute Speed – Max Velocity

Terminology	Length of Run	Component	Energy System	% of Predicted Performance	Rest Interval Between Reps/Sets	Daily Volume Ranges 100-200 / 110-130w/H	Daily Volume Ranges 400-600mH
ABSOLUTE SPEED	20-80m	Speed (s) Anaerobic power	Anaerobic Alactic	90-95% 95-100%	3-5 / 6-8 min 3-5 / 6-8 min	300-500m 300-500m	300-600m 300-600m

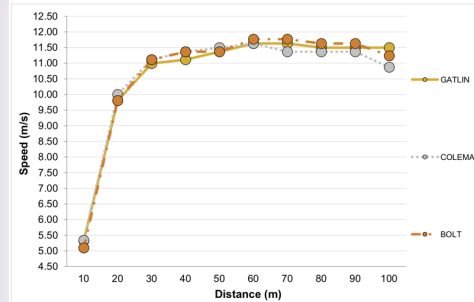
- **What**
  - < Max intensity movement (fastest 10m segments possible) \*Hold for 30m\*
  - < Generally, runs of 30-80m, dependent on age, strength levels, quality of acceleration  
Example: accel to 30m, max v = 30-60m
  - < High/Maximal intensities, amplitude of movements (100% efforts)
  - < Full recovery between sets/ reps 1-1.5:1 rest ratio per prescribed distance (body language)
- **When**
  - < Progressively built through entire training year
  - < Put emphasis on acceleration understanding beforehand
  - < "Driving, Pushing, Projection" cue should eventually bring hips under COM
    - ✓ "Push 30m segment down the track"
- **How**
  - < Combinations of high intensity runs over 30-80m
    - ✓ 5x30m fly runs (30m accel zone)
    - ✓ 6x50m sprints
    - ✓ 2x40m, 2x50m, 2x60m (fly 10, fly 20, fly 30)



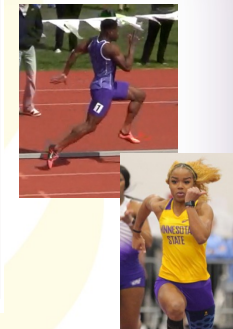
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## Absolute Speed Visual Representation



- Max velocity segments (20-30 total meters) begin when acceleration ends



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### Speed Endurance

<b>SPEED ENDURANCE</b>	50-80m	Alactic Short Speed End. (ASSE)	Anaerobic Alactic	90 - 95% 95 - 100%	1-2 / 5-7 min 2-3 / 7-10 min	300-800m 300-800m	600-1200m 600-1200m
<b>SPEED ENDURANCE</b>	80m	Glycolytic Short Speed End. (GSSE)	Anaerobic Glycolytic	90 - 95% 95 - 100%	1 / 3 min 1 / 4 min	300-800m 300-800m	600-1200m 600-1200m
<b>SPEED ENDURANCE</b>	0-150m	Speed Endurance (SE)	Anaerobic Glycolytic	90 - 95% 95 - 100%	5 - 6 min 6 - 10 min	300-900m 300-900m	400-1000m 400-800m

- **What**
  - < Max intensity movement (fastest 10m segments possible with the least fall off after Max V segment)
  - < Generally, **80-150m, will look different based on** dependent on age, strength levels, quality of previous segments
  - < High/maximal intensities, amplitude of movements – increased technical focus in latter stages
  - < Recoveries are based on overall goal of (ASSE, GSSE, SE)
- **When**
  - < "Locks in" speed qualities....I repeat...SPEED qualities (must build first)
  - < Concerted effort to build quality acceleration and speed characteristics (mindless sprinting)
  - < Time trials, longer testing reps and early season races ARE speed endurance workouts
- **How (bridging the gap)**
  - < ASSE 3x3x60m –95%+ intensity, 3m/6m recovery – Technical focus on second rep (540m)
  - < GSSE 2x5x40m – 95%+ intensity, 1m/4m recovery – Technical focus on second rep (400m)
  - < SE 3x120 – AFAP, 10–12-minute recovery – seamless transition through phases, hold through end

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### Further Thoughts of Speed Endurance

- **Capacity and technical proficiency before power/endurance**
- **Technical model = ENDURANCE**
  - < Producing and applying productive force always!
  - < Sloppy technique at end of races...
- **Races PROVIDE endurance work**
  - < Must factor in early season (especially high school)
  - < Race...full recovery....race...full recovery, etc. (more to come)
    - ✓ Not Race, Workout, Race, Workout
- **WHERE DO WE PROGRESS TO?**





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### Special Endurance

<b>SPECIAL ENDURANCE I</b>	150-300m	Long Speed Endurance (LSE)	Anaerobic Glycolytic	90 - 95% 95 - 100%	10 - 12 min 12 - 15 min	600-900m 300-800m	600-1200m 300-1000m
<b>SPECIAL ENDURANCE II</b>	300-600m	Lactic Tolerance (LAT)	Lactic Acid Tolerance	90 - 95% 95 - 100%	15 - 20 min Full	300-600m 300-600m	900-1200m 300-500m

- **What**
  - < High intensity work that involves all previous speed subsets, but focus' on glycolytic capabilities
  - < Broken in to two subsections I and II, FULL recovery needed based on distances
  - < Athletes must learn to deal with by-product of SE (hydrogen ions associated with LA)
- **When**
  - < Late in specific prep, focus on accel/speed dev while building aerobic/anaerobic capacity through tempo work (future slide)
  - < 1-2 times per week depending on meet schedule (races are included and considered special endurance)
- **How**
  - < Special Endurance 1 – 1x250, 1x200, 1x150 w/15 min recovery (paces 95% of current 200m PR – 600m total)
  - < Special Endurance 2 – 2x Broken 400m's (300/100) 1:30m recovery (incomplete)/20 min recovery

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### Further Thoughts of Special Endurance

- **How much is enough?**
  - < Preparation is important, but always know where we are at in the grand plan
- **Counting meets/races as SE?**
  - < How does this concept affect the days following meets
- **QUALITY work vs. death march**
  - < The different between a TOUGH workout and a DUMB workout
    - ✓ Puking is not the end goal
  - < Can always add rest to keep quality high



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## Progressions of Sprint Training

1. Acceleration
2. Max Velocity
3. Speed Endurance
  1. Special Endurance



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## Tempo

INTENSIVE TEMPO	100-600m	Anaerobic Capacity (ANC)	Mixed: Aerobic/Aerobic	80 - 89%	30s - 5 / 3-10 min	800-1800m	1000-2800m
EXTENSIVE TEMPO	200-800m 100-200m	Aerobic Capacity (AC)	Aerobic/Aerobic	40 - 79% 60 - 79%	45 - 2 min 30s / 2-3 min	1400-2500m 1400-1800m	2400-4000m 1800-3000m
CONTINUOUS TEMPO	1600-6400m	Aerobic (AC)	Aerobic	40 - 60%	Heart Rate 130-150	1600-3200m	3200-6400m

- **What**
  - < Varied intensity works (based on intent) addressed Aerobic/Aerobic capacity.
  - < Wide range of prescribed distances, recoveries based off goal of workout
  - < Incomplete rests are used until upper intensities are met (Intensive)
- **When**
  - < Select starting point based off event, work through intensities during specific prep, revert to recovery/regeneration days during competitive season
  - < Special Endurance – race modeling style workout will take the place of tempo during competitive cycles (tempo progresses to special endurance)
- **How**
  - < Continuous Tempo – fartlek/low intensity style runs, not prevalent in most short sprint programs.
  - < Extensive Tempo – 15x100m grass runs at 75% intensity w/45-1:00 recovery
  - < Intensive Tempo – 6x200m at 80% w/2-minute recovery
    - ✓ Distance and rest dictate what category you are living in.

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## Thoughts on Tempo

- Continuous Tempo is outside of the scope of importance for sprinters (summer/off-season/recovery)
- Tempo throughout the season in some fashion
  - < Long sprints run continuous fartlek style 200s for recovery days at MSU vs. ALL SPEED in early years
- Can assist in building “mental toughness”
  - < Not for punishment, but for an understanding of race day conditions and race day feelings
  - < Some sprinters like to feel “strong”
- Intervals (incomplete rest) vs repetitions (complete rest)
- Must build a capacity before power/tolerance...bigger bucket before filling bucket

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## Progressions of Tempo Training

1. Continuous Tempo\*\*
2. Extensive Tempo
3. Intensive Tempo
4. Special Endurance



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## Secondary Training Themes

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## Sprint Drills

- **What:**
  - < "Sprint Development Drills are various modifications of walking, running, and skipping mechanics, designed to serve as dynamic flexibility exercises and specific technical teaching progressions." Boo Schexnayder
    - ✓ Allow for rehearsal of sprint components, coordination and overall flexibility
    - ✓ Improve recruitment, rate coding, synchronization/coordination
- **When:**
  - < Year round, involved in warm-up portions of neuromuscular (sprint focused) days
  - < Some will be in place, some will be traveling over 10m-40m
  - < Can be used after diagnosing issues within sprinting



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## Plyometrics/Multi-Jumps

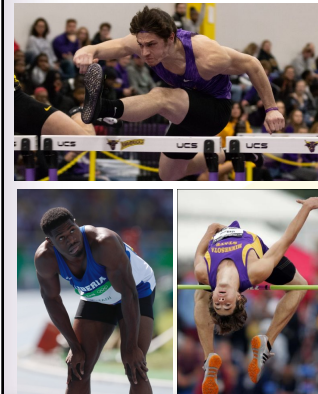


- **What:**
  - < Used to develop reactive strength and elastic abilities
  - < Force application and position of application are key aspects
    - ✓ Where and how are we contacting the ground
  - < Involve short bounds, ankle pops, in place jumps, extended/speed bounds, depth jumps
- **When:**
  - < Progressive building through
    - ✓ Ankle pops, in place jumps, short bounds, extended bounds, depth jumps

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## Medicine Ball/Multi-Throws



- **Medicine Ball:**
  - < Medicine ball is external load being used
  - < General strength movements used to improve body awareness, coordination, and address isolated strength needs
  - < Lower intensity, controlled movements, most likely done in a circuit fashion
- **Multi-Throws**
  - < Medicine ball is external load being used
  - < Highly intensive to improve power and coordination
  - < Specific to performance (acceleration/explosive chest pass)
  - < Focus on quality of movement, firing patterns and limit quantities to ensure both

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## General Strength Circuit

- **What:**

- < Little to no external load with bodyweight being the main form of resistance.
- < Address coordination, flexibility, balance/control and injury prevention (return to running)
- < Can assist with general energy system fitness/endurance

- **When:**

- < Throughout the training year
- < Can be added as w/u modality, post workout, recovery, when muscle imbalances/dysfunctions are present (rehab)
- < Most often used by MSU on recovery/regeneration days



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## Other Training Modality Thoughts

- **Flexibility work**

- < Involved in w/u, sprint drills, dynamic work, hurdle mobility exercises
- < Proper technical instruction will positively effect flexibility.

- **Static Flexibility**

- < Can be appropriate and used in limited quantities, challenge ranges of motion without dynamic elements
- < General loosening, can use bands or partner for assistance



- **Hurdle Mobility Work**

- < Allows joints to work through large ranges of motion while calling on balance and coordination
- < Cues for hurdlers can be used, open hip, knee above the ankle



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## KNOWLEDGE -> PLAN Where to next?

### Given Truths in Training Theory

Guidance of the Plan

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## Coaching Philosophy

- **Your philosophy will have the single greatest impact on the athlete's performance.**

- < A philosophy is the lens through which a person sees the world: Has a profound effect on training decisions we make.
- < Sometimes more based on beliefs rather than bona fide facts
- < There are really no right or wrong coaching philosophies, there are only rational and irrational.
- < Most of the time, philosophies based on all previous training themes and parameters will result in superior training programs and well-training athletes vs. those that are based on irrational thoughts.

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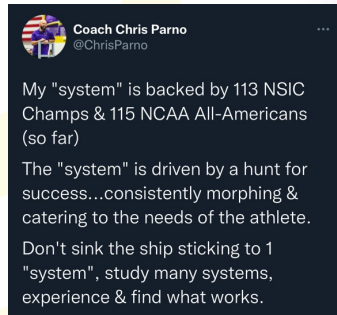
## Building Your Philosophy? What Do We Believe In?

- **Where do you fall? Must you CLAIM one?**

- < Short to Long?
- < Short to Short?
- < Long to Short?
- < Long to Long?
- < Coaching the individual?
- < Concurrent?

- **Can we be in both?**

Know the systems, study them, allow for flexibility



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## 5 Bio-motor Abilities

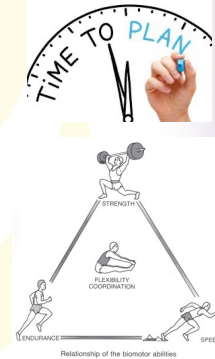
- **ROAD MAP**

1. Speed - Power, Accel, Max V, End.
  2. Strength – Static, Dynamic, Power
  3. Endurance – Aerobic, Anaerobic, Speed
  4. Flexibility – Static, Dynamic
  5. Coordination – Intra and Inter Muscle, Biomechanics
- ✓ **\*\*Psychological\*\*** - preparedness, anxiety, competition, etc.

- **Ensuring these are all present**

- < Multi-Lateral Training

- **Not all created equal (event dependent)**



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## Stages of Learning

- **When planning training, time of year, training age and time within designated program need to take in to account the follow:**

- < Acquisition
  - ✓ Early attempts at the skill, familiarization
- < Refinement
  - ✓ Time spent after initial acquisition increasing efficiency and accuracy
- < Stabilization
  - ✓ Able to replicate the skill easily and effectively and can now adapt skill to different situations

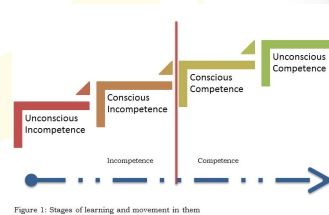


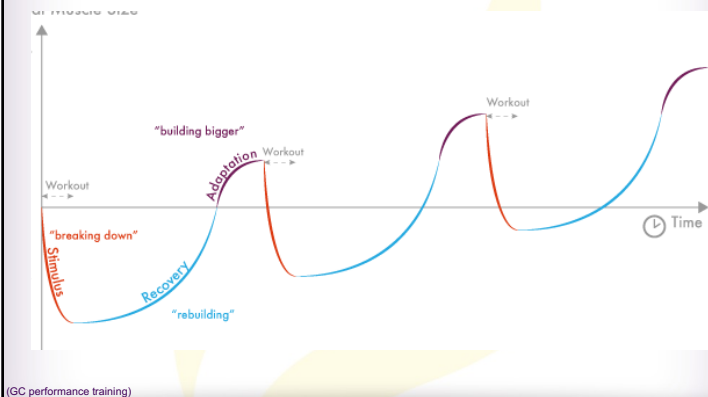
Figure 1: Stages of learning and movement in three

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## Overload Principle

- < To get an adaptation, the stimulus must be over what the body is already accustomed to.

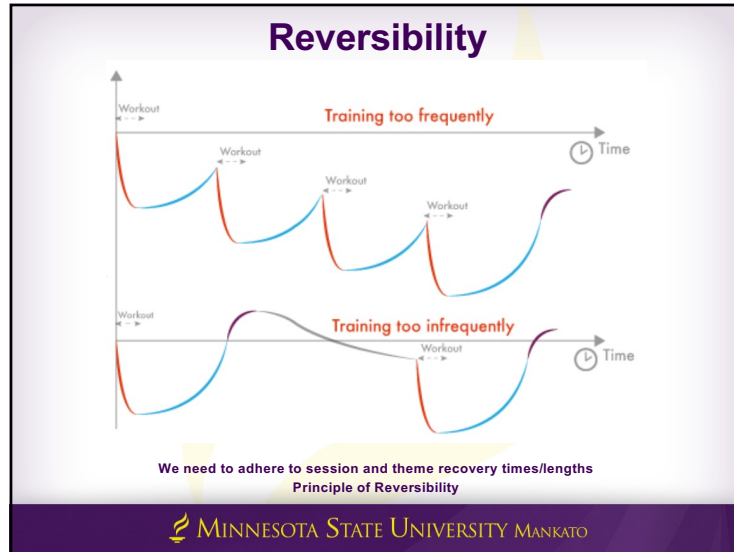


(GC performance training)

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## Adaptation



- **Training is focused on making continual/progressive adaptations**
  - < "Adapt or die" –Tony Wells
- **SPECIFICITY**
  - < "adaptation is specific to the stress or stimulus placed upon the body. The body will adapt in a manner that enables it to better cope with similar stress in the future". – Boo Schexnayder
  - < Send clear messages to the body with that you are trying to improve
- **21-28 day of similar type of stimulus for adaptation**
  - < Must increase (mesocycle themes)
  - < Building similarly themes workouts with proper rest in between will build adaptation

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## Further Thoughts

- **We need planned variance in training**
  - < Increase intensity over time – progressive
  - < Allows for adaptation of training theme
  - < Planned rest for injury prevention/overuse
  - < Long term commitment to the plan
- **Individualization**
  - < Large groups of athletes will need similar adaptations (themes)
    - ✓ As athletes get closer to genetic ceiling, more individualized training may be needed based off their strengths
    - ✓ MSU 4x400m example: 49.05, 49.47, 49.76, 50.00
      - Eventually ran 3:08.53
      - Each slightly different runners



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## Final Guidelines – General Sequencing

- **General to Specific**
- **Simple to Complex**
- **Capacity to Power**

Acceleration > Speed Development > Speed Endurance  
 Continuous Tempo\* > Extensive Tempo > Intensive Tempo > Special Endurance  
 In Place jumps > Baby Bounds > Speed Bounds  
 Gen Strength > Power Dev > Absolute Strength > Reactive Strength

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## Understanding Event Needs

(VANDER HARTMANN)

distance	ATP / CRPH %	anaerobic-lac %	aerobic %
30 m	80	19	1
60 m	55	43	2
100 m	25	70	5
200 m	15	60	25
400 m	12	43	45
800 m	10	30	60
1500 m	8	20	72
3000 m	5	15	80
5000 m	4	10	86
10000 m	3-2	12-8	85-90
marathon	0	5-2	95-98

IAAF IV

Table #1: Energy System Contributions for the Three Sprint Race Distances

	ATP-CP Anaerobic Alactic	Glycolysis Anaerobic-Lactic	Aerobic
100 meters	85%	10-13%	2-5%
200 meters	52%	38%	10%
400 meters	22%	55%	23%

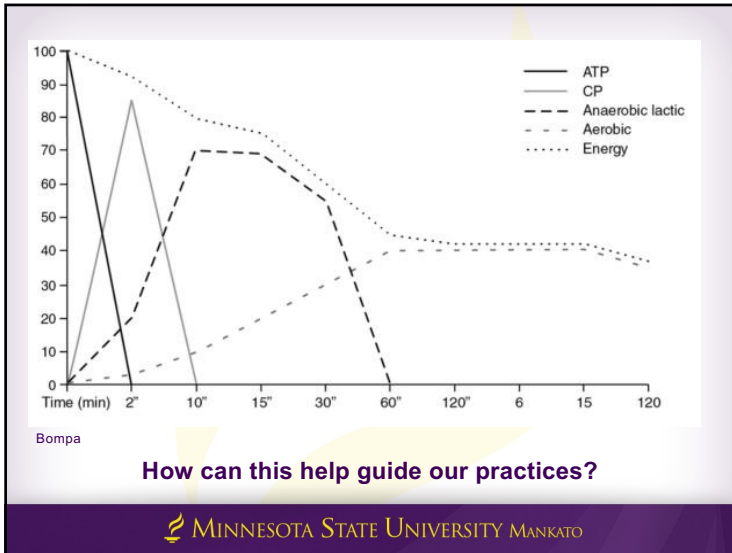
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Table 3.2 Energy System Contributions in Track-and-Field Perf

Event	Duration	ATP-CP	GLYCOGEN	
			Lactic	Aerobic
100 m	10 sec.	53%	44%	3%
200 m	20 sec.	26%	46%	29%
400 m	45 sec.	12%	50%	38%
800 m	1 min. 45 sec.	6%	33%	61%
1,500 m	3 min. 40 sec.	—	20%	80%
5,000 m	13 min.	—	12.5%	87.5%

Bompa

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## Compatible/Complimentary Training

### • Grouping training by demand

- < If it's a neuro day, it's a neuro day (send a clear message)
  - ✓ Components on that day will be neuro focused
  - ✓ Example:
    - Acceleration development and double support multi-throws
    - General strength circuits/mobility work after tempo sessions (fatigue)
- < Daily Plans
  - ✓ Starting the day with elements of highest demand.
  - ✓ Poor Examples:
    - Heavy lifting before speed development training
    - Extensive tempo before acceleration development session
    - Intensive tempo before multi-throws
  - ✓ Good Examples
    - Acceleration Development before multi-throws
    - General strength circuit before/after tempo
    - Lifting post neural days

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## Dimmer Switch Affect

### • When one energy system is the focus, others are resting (intensity dependent)

- < Tempo/lower intensity days can be done post neuro days.
- < If tempo intensity is done too high or not as prescribed that turns in to neuro day.
  - ✓ Importance of percentages for pacing/paces



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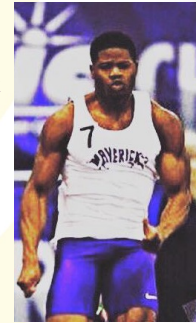
## PUT THE KNOWLEDGE TO WORK

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## Stylistic/Thematic Warm-ups

- **Ascending Warm-ups**
  - < Intensity increases over the duration
  - < Ends with highest intensity movements preparing for high intensity neuromuscular work
    - ✓ Acceleration/Max Velocity/Hurdling
- **Descending Warm-ups**
  - < More general in nature, prepare body for work
  - < Intensities build, then level out towards end
    - ✓ tempo training, general work
- **Recovery Warm-ups**
  - < Can help foster recovery after meets
    - ✓ Static/dynamic flex, facial stretch, rolling/therapy ball



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## Neuromuscular/Speed Days

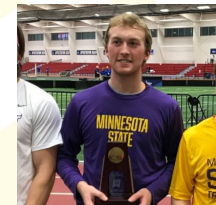
- **High intensity/sprint focused training days**
  - < Acceleration, Speed Development, Speed Endurance, Special Endurance (within reason)
- **Manageable overall volumes, too much volume, or too little rest changes intent of workout**
- **Should be primary focused in any speed-based program (concurrent plan)**
  - < Motor patterns, muscle recruitment, rate coding, myelination, Inter/Intramuscular coordination
- **48-72 hours between high level neuro days (deeper in the pool\*\*)**
- **High technical component**
- **Usually earlier in the week when athletes may be more rested**

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## Tempo/Aerobic

- **Aerobic Work**
  - < Capacity: Ability to perform large amounts of aerobic work (ext. tempo)
  - < Power: Ability to perform a single extended aerobic effort (upper level ext. tempo)
    - ✓ Capacity before Power
  - < Mindful of energy system distribution across sprint events
- **Bucket Example**
  - < Capacity increases the size of the bucket
  - < Allows more before pouring over



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## Recovery – Example Practice Session

- Importance of general strength
  - < Injury protocols/prevention
- Endocrine response (hormonal)
  - < Anabolic hormones (testosterone and HGH)
- Lactate: “mild to moderate levels”
- Psychological break from training/demands of competition
- Metabolic fatigue vs Neuromuscular Fatigue



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## Thank You!!

**Chris Parno**

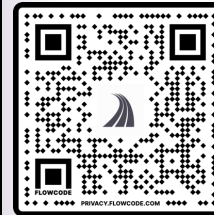
Associate Head Coach  
Sprints/Hurdles/Relays

Minnesota State University  
[christopher.parno@mnsu.edu](mailto:christopher.parno@mnsu.edu)

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