Pick Up The Pace: Building Speed Into Distance Workouts

Scott Christensen

- Stillwater, Minnesota, head coach for 37 years.
- 1997 National High School Champions (*The Harrier*).
- Four Stillwater alumni have broken 4:00 in the mile since 2003.
- Fourteen year USATF Level 2 Lead Instructor in Endurance. Past 5 years with USTFCCCA.
- USA World Cross Country Team Leader 2003 and 2008.

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"Never stray far from race pace"

Vern Gambetta
USA

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Outline of Pick up the Pace Presentation

- Speed in Training Theory
- Anaerobic Training Sequences and Schemes
- Anaerobic Training Techniques
- Conclusion

High Intensity Involves a Commitment to Work Hard

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What If?

- You could only do three different workouts throughout the year for an 800 meter runner?
- You could only do three different workouts throughout the year for a 1600 meter runner?
- You could only do three different workouts throughout the year for 3200/5000 meter runner?

Do You Agree?

- 800: tempo run, 6 x 200, 6 x 400
- 1600: tempo run, 5 x 1000, 5 x 600
- 3200/5000: long run, $vVO_{2\ max}$, 8 x 400

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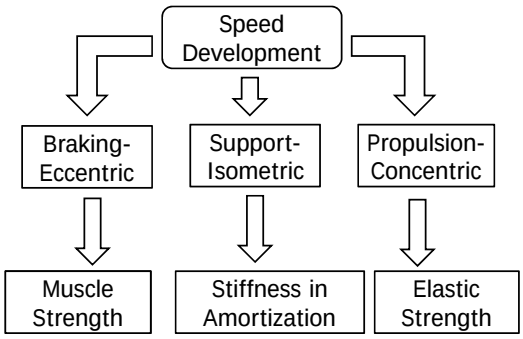
The Primary Physical Performance Components

- Strength
- Speed → max and race specific
- Flexibility
- Coordination
- Endurance



Aerobic vs Anaerobic at Max Effort

Astrand 2003, Noakes 2004, Chapman 2004

Event	Duration	Aerobic	KCAL used	Anaerobic Glycolytic	KCAL used	Anaerobic Alactic	KCAL used	Total KCAL used
800 Meters	2 minutes	50 %	45	44 %	40	6 %	5	90
1600 Meters	4 minutes	70 %	100	28 %	42	2 %	3	145
3200 Meters	10 minutes	87 %	249	13 %	36	<1 %	1	286
5000 Meters	15 minutes	92 %	372	8 %	32	<1 %	1	405
10,000 Meters	30 minutes	95 %	700	5 %	30	<1 %	1	730

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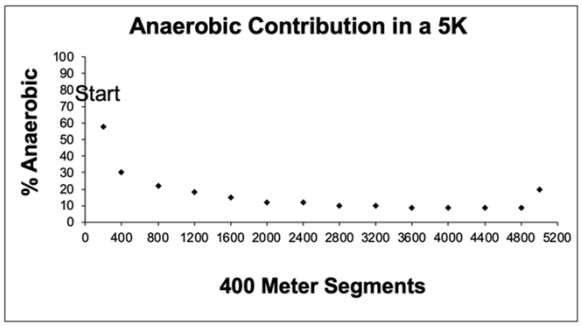
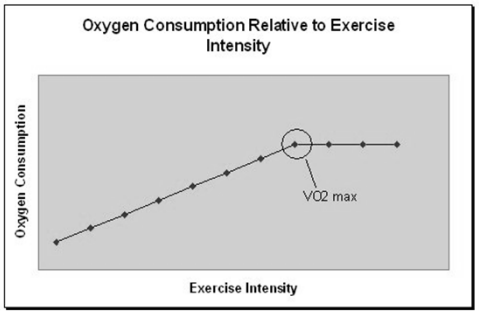
When is the Anaerobic Energy Used?



Maxed Out Aerobic System



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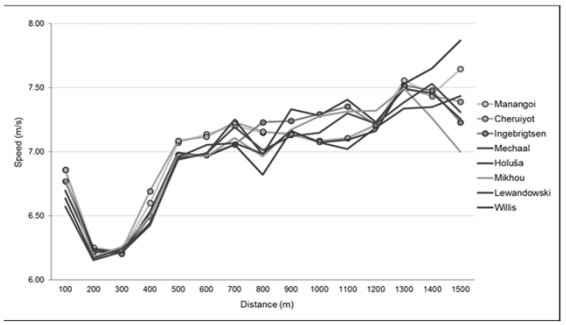
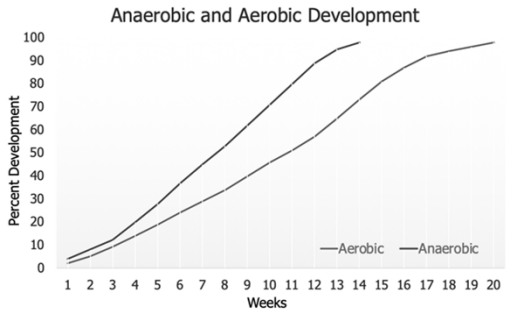
Racing is Anything but Even-Pace
2017 World Championship Men's 1500



How Long Does it Take to Develop Fitness?



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Mold Anaerobic Development Phases into Specific Training Periods

General Prep – 4-10 weeks
Little anaerobic work
Specific Prep - 4 weeks
Introduce anaerobic work
Pre Comp – 4 weeks
Interval anaerobic work
Comp – 3 weeks
Repetition anaerobic work

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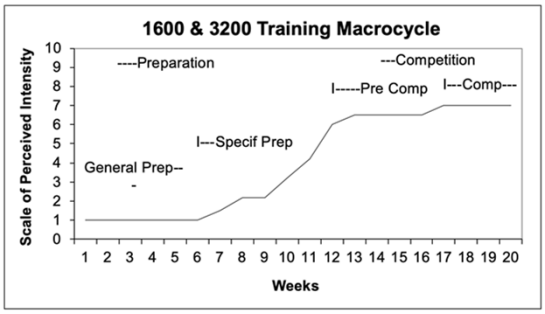
Training Period - Perceived Intensity



The Multi-Paced Distance Training Scheme

- Structured on 7-12 day microcycles for distance events based on race length and time of year.
- Forget most 7 day weeks.
- Training groups: novice, emerging, and experienced.
- Use Sundays to fit the group.
- Theoretically, one day off every 21 day until competition period.

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The Components of the Training Microcycles

- The long run, tempo run, strength run, recovery run, and races are included within the 7-12 day microcycles.
- Microcycles also include training sessions of distinctively varied velocity/intensity paces that deliver significant energy chiefly through the anaerobic system.
- This is the multi-paced training scheme.

Why Divide Fast Anaerobic Running into Repeats?

- Intervals have short and incomplete rest.
- Repetition Runs are longer with more complete rest.
- Intervals = efficiency work
- Repetition Running= capacity work
- Work may be anaerobic or aerobic.
- Intensity is determined by rest period.
- Total workout volume can exceed race distance, but not individual bouts of work.

Workout Construction

- Aerobic workouts are mainly done with bouts of continuous runs.
- Anaerobic workouts are mainly done with bouts of interval or repetition runs
- Interval runs are work punctuated with periods of incomplete rest

The 5 Levels of the Training Scheme that are Considered Anaerobic

- Strength Running (short bursts of resistance)
- Speed (30-60 meters)
- Speed Endurance (60-150 meters)
- Special Endurance 1 (150-300 meters)
- Special Endurance 2 (300-600 meters)

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Components of the Anaerobic Training Session

- Theme
- Extent
- Volume
- Intensity
- Ancillary
- Regeneration

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Regeneration Timeframe

24 hours

- Normal long runs, strength runs, recovery runs, moderate tempo runs, max speed sprints

48 hours

- Races, long runs plus, Speed Endurance, basic Special Endurance 1 & 2, strong tempo runs, $VO_{2\ max}$, LT runs

72 hours

- Long races, very strong Special Endurance 1 & 2, very strong or long tempo runs

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General Prep Period Training
Weeks 3 & 4 of Season

- Sunday: 6 mi BR
- Monday: 4 mi TR
- Tuesday: 6 mi BR
- Wednesday: 8 mi LR
- Thursday: 7 * Hills +
- Friday: 7 mi RR
- Saturday: Rest

40 miles

- Sunday: 6 mi BR
- Monday: 3 * 1 mi @ $VO_{2\ max}$ +
- Tuesday: 5 mi RR
- Wednesday: 7 mi BR
- Thursday: 9 mi LR
- Friday: 7 Hills +
- Saturday: 5 mi RR

44 miles

Specific Prep Period Training

- Day 1: 7 mi RR
- Day 2: 4.5 mi TR +
- Day 3: 6 x short hill repeats +
- Day 4: 8 x 350 meters +, Special Endurance 2
- Day 5: Race
- Day 6: 7 mi RR
- Day 7: 4 x 1600 meters at $vVO_{2\ max}$ pace +
- Day 8: 10 mile LR
- Day 9: 6 x 150 meters +, Special Endurance 1

60 miles this microcycle

Pre Comp Period Training

- Day 1: 7 mi BR
- Day 2: 4 x long hill repeats +
- Day 3: 6 mi RR
- Day 4: 5 x 1000 meters at $vVO_{2\ max}$ pace +
- Day 5: 5 mi RR
- Day 6: Race
- Day 7: 12 mi LR
- Day 8: 10 x 400 (grass) Intensive Tempo +
- Day 9: 7 mi RR

55 miles this microcycle

Comp Period Training

- Day 1: 8 x flying 30 meters +
- Day 2: 2 x 1 mi at $vVO_{2\ max}$ +
- Day 3: 5 mi RR
- Day 4: 3 x 300 +, Special Endurance 1
- Day 5: 5 mi RR
- Day 6: 3 mi RR
- Day 7: Race
- Day 8: 6 mi LR
- Day 9: 3 x 500 +, Special Endurance 2

40 miles this microcycle

Strength Run

- Greater applied force against resistance is the goal.
- Any running is strength work.
- Hills are the main target workout.
- 10 seconds, 35-45 seconds, 3 minutes, 7 minutes bouts of work.
- 4 minute jog of incomplete recovery.
- Sets of 3-8.

Max Speed Work

- 3 mi wup
- 6-8 x 30 meters on the fly on the track
- 3 min rest between each repeat
- 4 mile continuous run
- Cool down

Stillwater 30 Meter Fly Progression

	30 M max 9	30 M M/S 9	30 M max 12	30 M M/S 12	M/S % Change 9-12
Watson	4.19s	7.15	3.31s	9.06	-19%
Hall	4.18s	7.17	3.42s	8.77	-18%
Blankenship	4.14s	7.25	3.34s	8.98	-19%
Stansbury	4.21s	7.13	3.54s	8.47	-16%

Speed Endurance Workout

- *With a measuring wheel and can of spray paint, mark a dot on the track exactly 150 meters from the finish line.*
- 2 mile very active warm-up.
- Extent of work is 6 * 150 meters on the track at max effort. Use a starting device.
- Rest is 4 minutes.
- Time goal is 97% of 400 meter speed.
  Ex. 60 sec 400 runner (15 sec) divided by .97 = 16 seconds
- 3 mile easy run.

Special Endurance 1 Workout

- 2 mile active warm-up.
- Several very active strides.
- Extent of work is 2 sets of 3 repeats of 200 meters on the track.
- Time goal is 95% of 400 meter speed
  Ex 60 sec 400 4unner (30 sec) divide by .95 = 32 seconds
- Rest is incomplete at 3 min between repeats and 5 minutes between the sets.
- Sometimes you just have to run very hard.
- 2 mile jog

Special Endurance 2

- 2 mile active warm-up.
- Several very fast strides.
- Extent of work is 8 * 400 meters at near max date pace effort on the grass.
- Time goal is 92% of 400 meter speed.
  Ex 60 sec 400 runner. Divide 60 by .92 = 65 seconds
- Rest is 4 minutes.
- 2 mile jog cool down. Stretch and elevate.

Anaerobic Type Distance Workouts

- 6 * 80 meter hills
- 5 * 90 meter strides
- 5 * 80 sec runs on grass
- 6 * 400 with 3 min rest
- 6 * 400 with 70 sec rest
- 10 * flying 30 meters with 3 min rest
- 2 * 3 * 300 with 3 min rest
- 6 * 45 sec runs with 2 min rest
- 5 * 50 sec runs on grass
- Strength (Int Tempo)
- Strength (Ext Tempo)
- Special Endurance 2
- Special Endurance 2
- Special Endurance 2
- Speed
- Special Endurance 1
- Special Endurance 1
- Special Endurance 1

Stillwater Case Study

Athlete Profiling Data

- Max 30 meters [date]
- Max 30 meters [PR]
- 400 pace [date]
- 400 pace [PR]
- $vVO_{2\ max}$ pace [date]
- $vVO_{2\ max}$ pace [PR]
- 7000 pace [date]
- 7000 pace [PR]
- Racing Performances

$VO_{2\ max}$, ECON, and Hydrogen Tolerance Factor Progression

	400 9	400 12	3200 9	3200 12	7000 9	7000 12
Krahn	51	49.3	8:58	8:55	23:10	21:48
Hall	59	51.1	9:44	9:09	23:48	22:21
Blankenship	60	49.2	9:58	9:08	23:58	22:34
J Watson	59	49.3	9:36	9:09	23:23	22:16
L Watson	60	50.3	9:33	9:08	23:33	22:08
Graham	61	51.6	10:08	9:09	24:25	22:11

Four-Year Lactate Tolerance, $vVO_{2\ max}$, and Economy Changes

	400 Hydrogen Tolerance	3200 Aerobic Capacity	7000 Economy
Krahn	-1%	No change	-6.1%
Hall	-12%	-5.9%	-6.2%
Blankenship	-18%	-8.3%	-5.8%
J Watson	-17%	-4.8%	-4.7%
L Watson	-17%	-4.3%	-6.1%
Graham	-16%	-8.9%	-9.1%

Testing for Anaerobic Speed Reserve (ASR)

	30 M max 9	30 M m/s 9	30 M max 12	30 M m/s 12	m/s % Change 9-12
Krahn	3.34s	8.98	3.31s	9.06	-1%
Hall	4.18s	7.17	3.42s	8.77	-18%
Blankenship	4.14s	7.25	3.34s	8.98	-19%
Stevens	4.21s	7.13	3.44s	8.72	-18%

Anaerobic Speed Reserve (ASR) Cross-Sectional Comparison

	30 M m/s 11	$vVO_{2\ max}$ m/s 11	ASR Ratio 11	Runner Type
Krahn	9.02	5.92	1.52	2
Hall	8.57	5.76	1.48	1
Blankenship	8.64	5.80	1.48	1
Stevens	8.72	5.65	1.54	2

This is What is Supposed to Happen

Last 8 x 100 Splits
2016 Olympic Trials 1500 Meter Finals

	Centrowitz	Andrews	Blankenship	Manzano
800	15.0	15.2	15.0	15.0
700	14.2	13.9	14.2	14.2
600	14.1	14.3	14.1	14.3
500	13.9	13.6	14.0	13.8
400	13.9	14.0	13.9	14.0
300	13.3	13.5	13.7	13.6
200	13.4	13.4	14.2	14.0
100	13.3	13.4	14.4	14.7

Last 8 x 100 Splits
Ben Blankenship 2007 & 2016

	2007 Juniors	2016 OT	% Change
800	16.9	15.0	-12%
700	16.8	14.2	-15%
600	16.6	14.1	-15%
500	15.8	14.0	-11%
400	14.9	13.9	-7%
300	14.5	13.7	-6%
200	14.4	14.2	-1%
100	14.3	14.4	+1%

Last 8 x 100 Splits
Ben Blankenship 2005 & 2007

	2005 State	2007 Juniors	% Change
800	17.6	16.9	-4%
700	17.5	16.8	-4%
600	17.4	16.6	-5%
500	17.7	15.8	-11%
400	16.9	14.9	-12%
300	16.3	14.5	-13%
200	16.4	14.4	-13%
100	16.4	14.3	-13%

Take-Home Points

1. Aerobic development is the main focus of cross country training. Anaerobic is still crucial.
2. However, do not wait to start fast work, just give lots of aerobic work between anaerobic efforts.
3. Encourage running strong on the harder days and gentle running on the easier days.
4. Avoid getting caught in too many “medium” efforts. Use lots of variety.
5. Do all of the various modalities of aerobic and anaerobic work and follow the scientific guidelines.

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