

Training Design

Talk 3

Presenter

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“A goal without a method is nonsense.”

W. Edwards Deming

- Training Principles
- Training Methods
- Training Sets and Types of Sets
- Practice Design
- Useful Thoughts



Training Principles

- Progression (*volume & intensity*)
- Continuity
(*general to specific*)
- Regularity
- Overload
- Specificity
- Reversibility
- Variety
- Balance
- Recovery
- Individuality
- Confluence (*sensitive periods for development*)

Training Methods In Swimming

- Variable (*Fartlek*)
- Continuous (Over Distance Training)
- Interval Training
- Repetition Training
- Sprint Training
- Competition (Time Trials)

Variable (*Fartlek*)

Thanks, Gustaf "Gösta" Holmér!

- Swimming relatively long distances (800 and over) using a variety of speeds
- Can be loosely or highly organized:
 - 4x {5 minutes slow + 400 sustained effort at a set pace
{5 minutes at moderate effort + 50 max effort
- The main quality developed by this method is endurance but also can develop speed
- Cardio-respiratory endurance is positively affected
- Should be used by all swimmers extensively early in the season

Continuous (Over Distance)

- Training at distances greater than the distance of the event
- Speed is slower than the actual race, but not always (ex. time trial)
- Threefold purpose
 - Improves endurance and cardio-respiratory endurance, increase the number of functional capillaries in the active muscles
 - Permits swimmer to swim at a steady but somewhat slower than race pace to concentrate on stroke mechanics
 - Builds confidence

*** Continuous (Over Distance) And Variable (Fartlek) Training**

* Develop endurance in terms of cardiac efficiency slower than Interval Training, but the endurance attained is more stable and longer-lasting

* After the introduction of Interval and Repetition training, these methods are often neglected, especially in age-group programs

Interval Training Method

Slow Interval Training [S.I.T]

- Swim at speeds slower than race speed, with a short rest interval and incomplete recovery of HR. Rest is always shorter than swim time
- Ex: 30 x 50 sw stroke @:45 @200 p + 0:3” (hold 34.5)
- Beneficial for cardio-vascular reserve, not so much for speed

•Fast Interval Training [F.I.T.]

- Permits longer rest intervals (greater HR recovery) and faster speed
- Ex: 20 x 50 sw stroke @ 1 @200p (hold 31.5)
- Beneficial for both cardiac and skeletal muscle, improves the ability to resist fatigue and operate anaerobically

Repetition Training [R.T.]

- Swim Repeats that are shorter distance and at a faster speed than race speed (100's at a faster speed than 200 race), from dive or push
- Rest interval long enough to permit almost complete recovery of HR and respiratory rate
- # of repeat swims is fewer than in interval training
- These are NOT all-out efforts, but fast controlled speed
- Pace is determined by the distance he/she is swimming and the target time
- Also can be considered *PACE* or *TEMPO* work

Sprint Training

- All-out efforts at top sprinting speed, from dive or push
- Can be done in series
 - 8 x 25 @ 1 or 6 x 50 @ 2' or
 - Isolated efforts (1 x 75, 1 x 50, 1 x 25)
 - Usually done in $\frac{1}{4}$ of the competition distance (I.e. 25, 50)
 - Or ultra-shorts (12.5, 15 m from dive, 5m turn in-out)
- One of the best methods to improve strength (along with dry land ex)
- Indiscriminate use may cause excessive fatigue and poor stroke mechanics
- Emphasis on this type of training should come late in training

Competition Method (Time Trials)

- All-out effort swim in competition events done in training
- An opportunity to learn how to swim a race
- Used mostly in the *Competition period of training* or during prolonged stretches of training with no swim meets
- Great for refining race strategy, developing the sense of pace in a single rep
- Prepares swimmers to race with maximal efforts at any time
- Absence of multiple repetitions and rest intervals makes results easily comparable
- Offers instant feedback for the evaluation of swimmers' progress and the effect of prior training
- Based on time trial performance training can be individualized/fine-tuned to achieve desired results

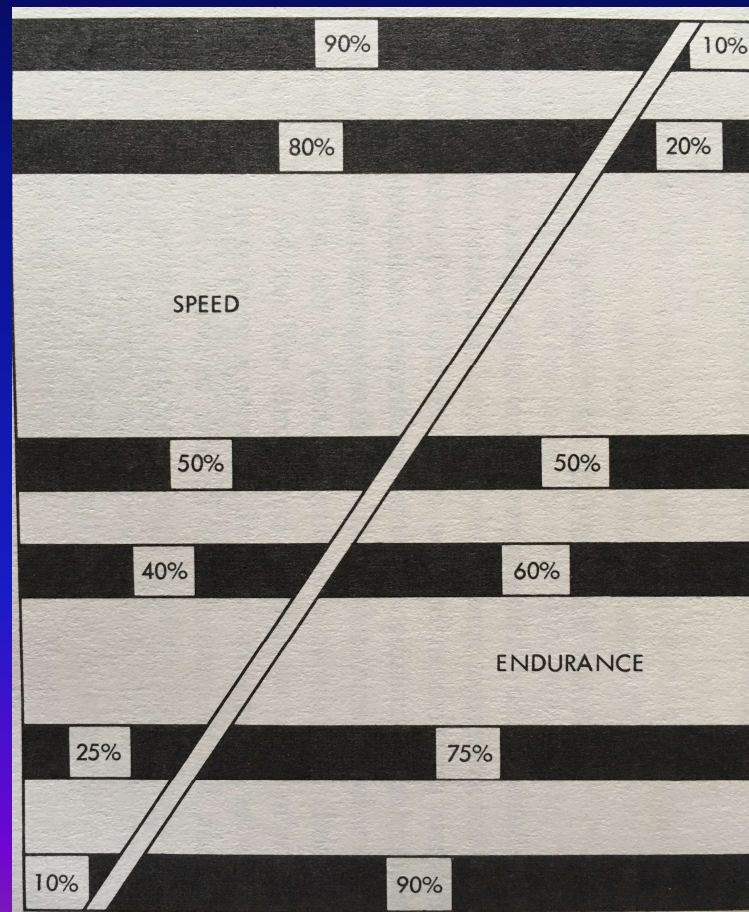
Relative % Contribution of the Various Methods of Training to Speed and Endurance

Sprint Training
Repetition Training

Fast Interval Training
Slow Interval Training

Fartlek Training

Over Distance Training



James E Counsilman, 1968

Training Methods Used In Season

Training Phase	Training Methods Used
Short-Course Season	
Pre-Season (3)	Over Distance, Fartlek, Ultra-Shorts
Aerobic Build Up (4)	Over Distance, Fartlek, Interval, Sprint
Quality (5)	Over Distance, Fartlek, Fast Interval, Repetition, Sprint
Competition (4-5)	Fast Interval, Repetition, Sprint, Comp.
Active rest (1-2)	Over Distance, Fartlek
Long-Course Season	
Similar pattern, just much shorter Pre-Season	

Useful Thoughts

Thanks, "Dr. V"erkhoshansky!



- ◆ *There is no universal and absolutely effective method of training if it is taken out of context of a concrete training process*
- ◆ *Every training method can (and should) be chosen in accordance with current goals, level of the athletes and type of prior training they were subjected to.*

Types Of Sets

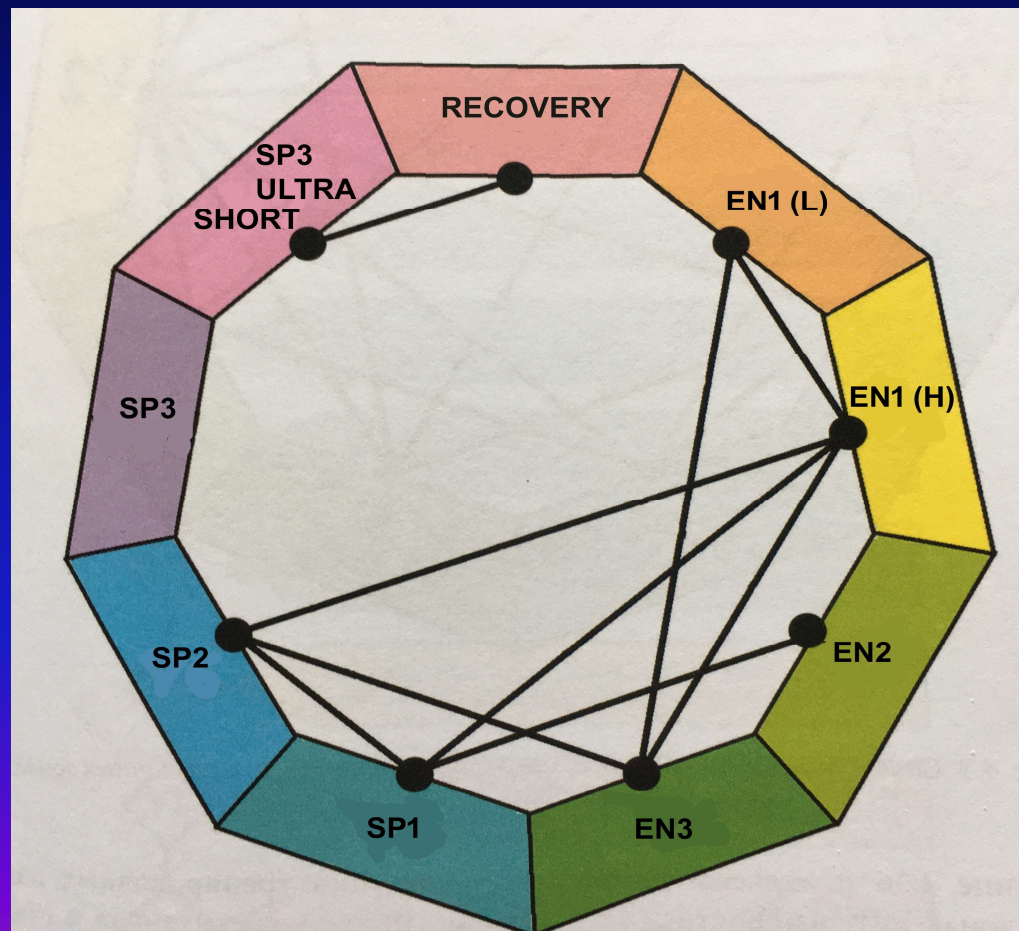
- Straight Set Of Repeats (ex 10 x 100 @2 , hold 57s)
- Decreasing Distance Sets (5-4-3-2-1, descending times)
- Decreasing Rest Interval Sets (50's @45/:40/:35)
- Pyramids (1-2-3-4-3-2-1)
- Simulators, or Broken Swims (100+50+50 ri:10)
- Progressive Set: (ex 10 x 100 @2 Descending from 1' to :53")
- Alternating Progressive-Regressive Set
 - 20 x 50 @1 Odds: descending, Evens: Ascending
- Easy-Fast (active recovery sets, effectively used during taper or early in the season)

Suggested Straight Sets for Slow/Fast Interval and Repetition Training

Dist	Sprinters			Middle Distance			Distance		
	S.I.T.	F.I.T.	R.T.	S.I.T.	F.I.T.	R.T.	S.I.T.	F.I.T.	R.T.
50	20	20	8	40	30	16	40	30	16
100	15	12	5	20	15	5	25	20	8
200	8	6	2	10	8	4	16	10	8
400	4	3	1	6	4	2	8	5	3
800	2	1	0	2	2	1	4	3	2
1500	0	0	0	1	1	0	2	1	1

James E Counsilman, 1968

Intensity Zones Training Compatibility in a Single Practice



Viktor Avdienko, 2019

Weekly Program Pattern

	MON	TUE	WED	THU	FRI	SAT
EMPHASIS/ INTENSITY	LOW	MOD	HIGH	LOW	MOD	HIGH
STROKE/ EMPHASIS	PROJECT / PRIME	FR/IM	FR / FR	FR / PROJECT	FR / IM	PRIME
INTENSITY ZONES PRIMARY	EN1-2	EN1-2	EN3 SP1	EN1-2	EN1	EN3 SP1
INTENSITY ZONES SECONDARY	SP3	EN3, SP2	REC	SP3	EN3, SP2	REC



"Intensity is overrated. Consistency is underrated"

Useful Thoughts



- *“There is a certain natural tendency to overlook anything that simple and important.”*
- * I must admit that in the past I had a tendency to be extra drawn to elegant concepts and it was distracting me from the simple truths.

Basic Practice Structure

1. Warm-up
2. Kick set
3. Pull Set
4. Pre-Set (to bridge the HR)
5. Main Set
6. Warm-down

Keep the “Flow”

Practice Developmental Focus Points

1. Skills (const)
2. *Basic Endurance (const)
3. Top End Speed (const)
4. Race Specific (variable)
 1. * Speed
 2. * Endurance
5. Warm Down

** “Don’t try to chase two rabbits at the same time, especially if they run in opposite directions.”*

Weekly Plan, Developmental Focus Points

Week 8	M	T	W	TH	FR	SAT
KICK	BK	BR	IM	FR	FL	IM-WEAK
PULL	BR	IM	FR	FL	BK	FR-IM
SPR	IM	FR	FL	BK	BR	WEAK
DIST	FR	FL	BK	BR	IM	FR-IM
DRILL	FL	BK	BR	IM	FR	WEAK
SKILL	U/W	TURN	U/W	TURNS	U/W	15 M
WEEK 9	M	T	W	TH	FR	SAT
KICK	BR	IM	FR	FL	BR	IM-MJR
PULL	IM	FR	FL	BK	FR	MJR
SPR	FR	FL	BK	BR	IM	MJR
DIST	FL	BK	BR	IM	FLY	FR
DRILL	BK	BR	IM	FR	BK	MJR
SKILL	U/W	DIVE	U/W	DIVE	U/W	15 M

Workout Timeline

	60 min	90 min	120 min
Warm Up ⁺	8	10	12
Kick/Pull		15	20
Endurance ⁺	30 ±	40 ±	60 ±
Skill # ⁺	8	10	12
Recovery ⁺	2	2	2
Main Set	10 ±	15 ±	20 ±
Warm-Down ⁺	2	2	6

continuous feedback

⁺ kick/pull/drills used in segments

± range influenced by race preparation

Useful Thoughts



“It is ... of first-rate importance that you ... know how to figure something out from what you already know.”

Richard Feihman

Modular Design Approach



Create a library of effective Training Sets, *LEGO*-like components, for all physical qualities that need training and development

Training Sets as “Modules”

How many ways can you kick/pull an 800?

- 1 X 800
- 2 X 400
- 3 X 250
- 4 X 200
- 5 X 150
- 6 X 125
- 8 X 100
- 10 X 75
- 16 X 50
- 32 X 25
- { 8 X 50
- { 16 X 25
- { 4 X 100
- { 8 X 50
- { 2 X 200
- { 4 X 100
- { 1 X 400
- { 2 X 200
- { 10 X 50
- { 10 X 25
- 10 X { 50 + 25
- { 6 X 100
- { 6 X 50
- 6 X { 100 + 50
- { 3 X 200
- { 2 X 100
- 3 X { 200 + 100
- 100-200-300-
200-100
- 25-50-75-100...
150...-25

Training Sets as “Modules”

Stroke Distance Sets of 1200 yds

- 48 X 25
 - 24 X 50
 - 16 X 75
 - 12 X 100
 - 10 X 125
 - 8 X 150
 - 6 X 200
 - 6 X 225
 - 5 X 250
 - 4 X 300
 - 3 X 400
 - 2 X 600
 - 1 X 1200
- { 12 X 50
24 X 25
 - 16 X { 50
25
 - { 6X100
12X50
 - 8 X { 100
50
 - { 5X150
5 x 100
- { 3 X 200
6 X 100
 - 4 X { 200
100
 - { 2 X 300
3 X 200
 - 3 X { 300
100
 - { 100-200-300
300-200-100

Training Sets as “Modules”

Aerobic Threshold (En1) Specialties / IM 3000

- 3 X 1000
- 4 X 800
- 4 X 700
- 5 X 600
- 6 X 500
- 8 X 400
- 10 X 300
- 12 x 250
- 15 x 200
- 20 x 150
- 24 x 125
- 30 x 100

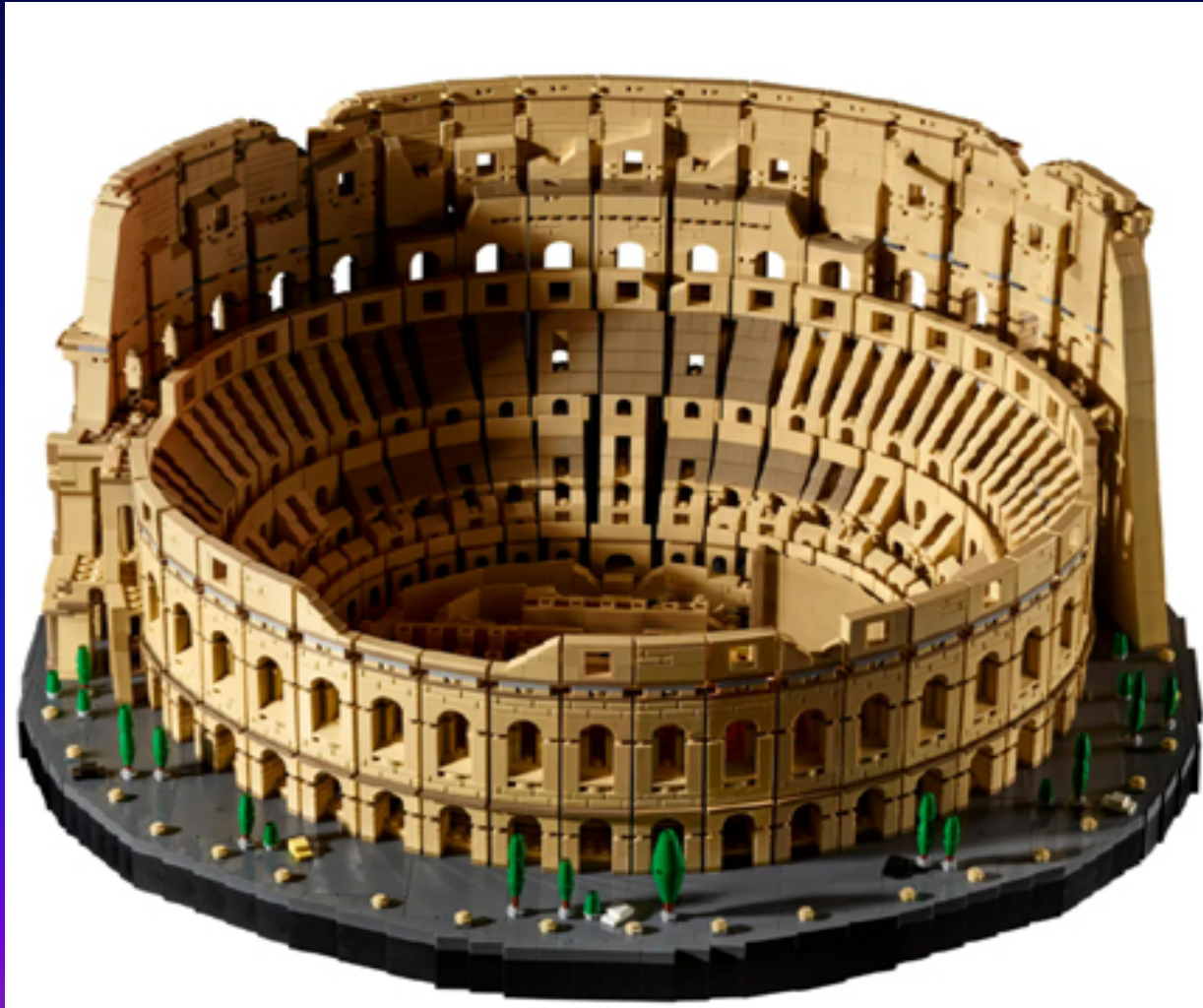
- 3 X $\left\{ \begin{array}{l} 400 \\ 300 \\ 200 \\ 100 \end{array} \right.$
- 2 X $\left\{ \begin{array}{l} 600 \\ 500 \\ 400 \end{array} \right.$
- 2 X $\left\{ \begin{array}{l} 500 \\ 400 \\ 300 \\ 200 \\ 100 \end{array} \right.$

- 6 X $\left\{ \begin{array}{l} 200 \\ 300 \end{array} \right.$
- 8 X $\left\{ \begin{array}{l} 300 \\ 100 \end{array} \right.$
- 10 X $\left\{ \begin{array}{l} 200 \\ 100 \end{array} \right.$
- 12 X $\left\{ \begin{array}{l} 150 \\ 100 \end{array} \right.$
- 5 X $\left\{ \begin{array}{l} 300 \\ 200 \\ 100 \end{array} \right.$
- 24 X {75 + 50
- 30 X {75 + 25

For In-Depth

reference Component Sets
organized by Intensity Zones see
presentation slides from The Physiology
Talk #1

Avoid Creating A Workout That Looks Like This



Simplicity Mixed With Some Complexity Works Better



Eventually, With Refinements
It Will Become This



90 Minute Practice Plan for 10-11 yo Age Group Swimmers

segment	content	example	duration	start time
1.	warm up	1 stroke alt w/ free		
		50 bk @ 16 strokes	10 min	3:30 PM
		50 fr @ 18 strokes		
		50 br @ 11 strokes		
		50 fr @ 18 strokes		
2.	kicking	no fins		
		25s / 50s or all fast 25s	15 min	3:40 PM
3.	drills	instruction drills or		
		swims in 25's	15 min	3:55 PM
		interactive		4:10 PM
4.	main set			
		dive 50's, 75's, 100 fr or stroke	30 min	
5.	technique	easy / long drills		
			10 min	4:40 PM
6.	sprints	skill refinement with speed		
	relays	contests	10 min	4:50 PM
		odd relay combinations		
		br arms/fly kick	end	5:00 PM
		flutter fly		
		dog paddle etc		

105- Minute Practice Plan for Advanced 12-14 yo Swimmers

segment	content	example	duration	start time
1.	warm up	with 1 senior event 400 im 500 fr 200 fl 200 br etc	10 -15 min	3:30 PM
2.	kicking	1 leg, both legs kick timed kick 100.200.400 1/week mostly fast 25's or 50's	10-15 min	3:45 PM
3.	pull / scull	free + stroke 1 arm/fist/hold breath catch up	15 min	4:00 PM
4.	endurance set	work on knowing time, even splitting :30" rest 400's, :15" RI 200's long swim 1500-2000 ladders / pyramids 100-200-300-400 alt free / im	30 - 45 min	4:15 PM
5.	technique	skill drills	10 min	5:00 PM
6.	sprints	end practice on high note 50s bk/br	10 min	5:10 PM
	relays	25's fly		
			end	5:20 PM

A Valuable Piece Of Advise

Thank you, Teacher! Dr. Sergey M. Gordon



“What is important is a constant change of content in a weekly plan to reflect the adaptations that have already taken place. Coaches should avoid repetitive use of one “*perfectly organized microcycle*” throughout the season.”

Mission “~~Impossible~~”:

Balanced Development of specific endurance

Distance Orientation	$\frac{200}{100}$	$\frac{500}{200}$	$\frac{1650}{500}$
Sprint (50-100)	2.222 ± 0.027	2.727 ± 0.037	3.526 ± 0.095
Distance (500-1650)	2.111 ± 0.032	2.638 ± 0.051	3.445 ± 0.034

Alex Nikitin, 1994-2012



Best Times Analysis (Sprint profile)

Best time 100 Free 45.8

- Time 50: $45.8 / 2.222 = 20.63$ sec
- Time 200: $45.8 \times 2.222 = 101.76$ sec (1:41.7)
- Time 500: $101.76 \times 2.727 = 277.52$ sec (4:37.5)



Best Times Analysis (Distance profile)

Goal time **500 Free** 4:30.00 (270 sec)

- Time **50**: $48.48 / 2.111 = 22.96$ sec
- Time **100**: $102.35 / 2.111 = 48.48$ sec
- Time **200**: $270 / 2.638 = 102.35$ sec (**1:42.35**)
- Time **1650**: $270 \times 3.445 = 930.15$ (**15:30.15**)



In conclusion, a few more thoughts

- “The way you do anything is the way you do everything.”
- You don’t need hundreds of concepts, methods or tricks in your head – there are a few basic, time-filtered fundamental ones that are good enough.
- “The more *basic* knowledge you have, the less new knowledge you have to get. When you look at something *new*, try to connect it to something you already understand.
- It is way better to read and reread fewer books but good and timeless ones and then think.