“NEURAL AND SENSORY APPLICATIONS OF INTERVENTION IN IMPROVING TECHNIQUE AT HIGH SPEED AND RACE PACE”

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“Neural and Sensory Applications of Intervention in Improving Technique at High Speed and Race Pace”

The question is –

How can technique and efficiency be improved and sustained at race speed and race pace swimming after 4 years or more of inefficient technique and motor pathway/muscle memory practice?

Quotes of influence which indicate the purpose of the contents of this presentation.

“The vast majority of athletes and swimmers can be trained to be good to great endurance athletes and swimmers, however only a very small few are born to be sprinters and/or breaststrokers”

… Bill Sweetenham

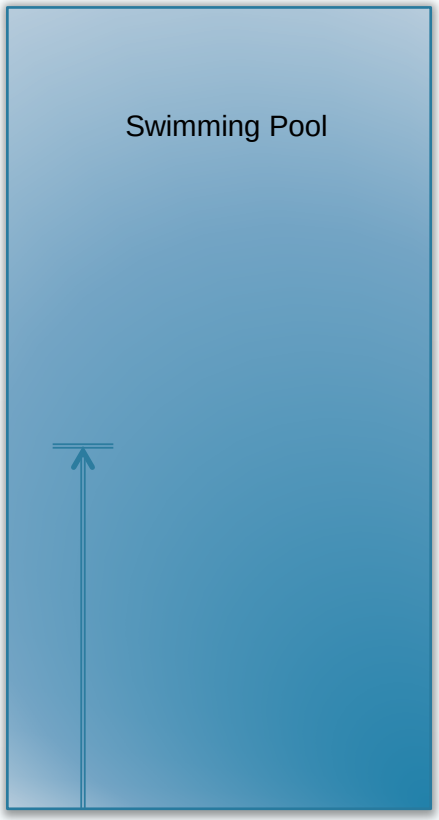
(EXPLANATION) –
Unfortunately a significant percentage of these endurance athletes and swimmers(based on flawed capability and capacity) desire and dream to be sprint or speed athletes and swimmers. This is in contrast to nearly all speed and sprint people who have absolutely no desire, aspiration or inspiration to be endurance athletes and swimmers. This separation is a winning point of difference in swimming for China and the USA where there remains a real focus on 200m up and 1500/800m down swimming, in addition to the speed programmes. Both these countries have coaches, athletes and programmes pursuing success in these events with real intent focused on the Olympic podium.

THE CONFLICT AND CONFUSION OF HAVING ENDURANCE ATHLETES FOCUSED ON SPEED EVENTS CHALLENGES ACCURATE TECHNIQUE DEVELOPMENT. COMPROMISED TECHNIQUE DEVELOPMENT IS RESPONSIBLE FOR LIMITING MANY SENIOR ATHLETES IN ACHIEVING THEIR OPTIMAL PERFORMANCE.

“Anyone can become a marathon runner; but you are born a sprinter”

… Article from Mercedes Benz Magazine 01-2014

Step 1



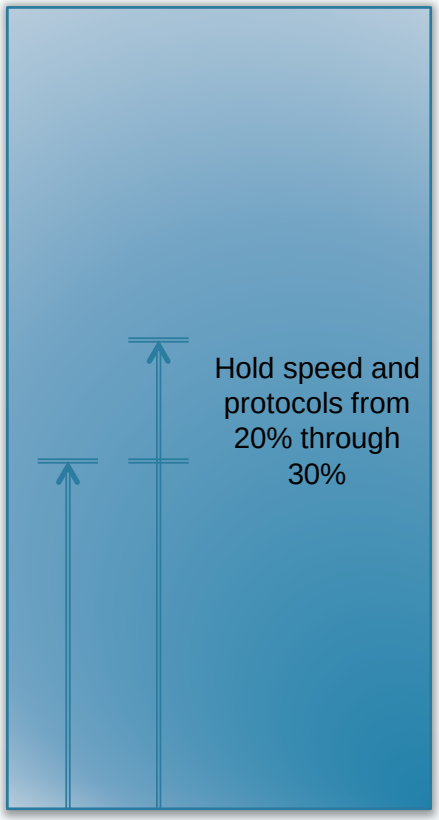
20%* of race distance (20 metres)

*The 20% referred to here is based on the 100m event and would be applied proportionately to longer or shorter events

<u>Station 1</u>
X1 Push
Or
X2 → 1 Push
→ 1 Dive
Videoed

Record time and number of strokes along with number of breaths – all at goal pace/speed.

Step 2



*The 20% and 30% distances are achievable, given that the athlete is utilising a new and improved technique.

<u>Station 2</u>

X1 Push

Or

X2 → 1 Push

→ 1 Dive

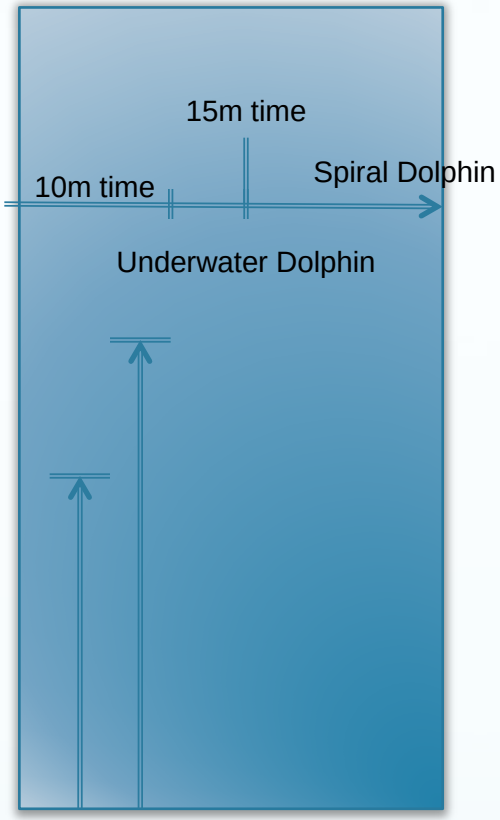
Videoed

Record speed and number of strokes along with breathing pattern. The progression of speed will advance from previous best time to goal speed and goal protocols with exact precision.

Add push 20 + dive 30 = dive 50
Add push 30 + dive 20 = dive 50
Measure difference in speed and goal protocols.

Step 3

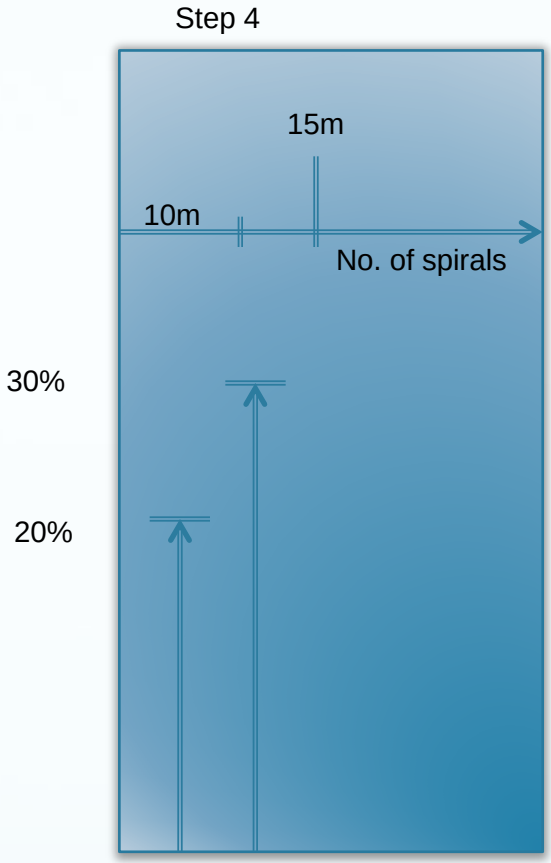
Station 3 – underwater dolphin kick at optimal speed X1 or X2



Spiral dolphin kick is where the athlete executes a dolphin kick on their front, to the side, on their back and then on the opposite side, and then on their front.

Measure 10 metre speed and 15 metre speed and record number of spirals to the opposite edge of pool, plus speed (ie. total time).

Count number of kicks.



Station 4
Video monitor combinations/single –

- Best performance
- New technique improved image
- Mirrors (wall)
- 2-3 sets of up to 3 exercises of 2-3 repeats
- Roof pulleys technique modelling “mirror”
- Call room replay
- Next major venue
- Skills
- Motivational

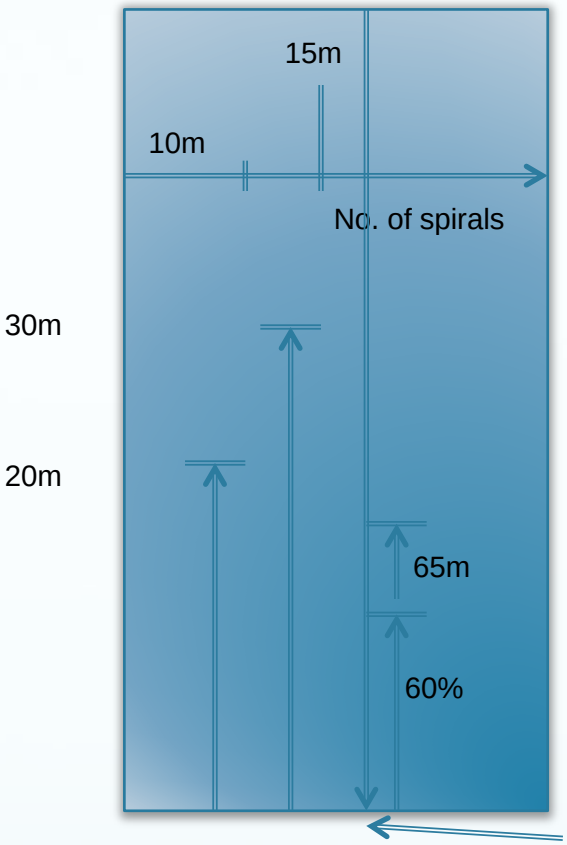
Utilsiing statistical analysis and observation, the staff (exercise physiologist, biomechanist, strength coach) will identify flawed technique due to changes in strength and mobility.

This has the potential to inhibit change and the staff should re-direct the athlete to the required treatment in order to address the improved skills and technique so that injury does not occur.

- Technique modelling (improved motor pathway)
- Improved technique
- Muscle recruitment → Warm up muscles in preference to energy systems; Activation for improved technique
- Improved muscle memory

Step 5

Station 5 – dive 60% of race distance at 100% of race speed/pace



Video monitor recording desired technical performance –

- Muscle recruitment
- Improved technique and modelling
- Muscle preparation for speed and movement
- Aggressive activation

Development

40% to 50% to 60%
OR
45% to 50% to 65%

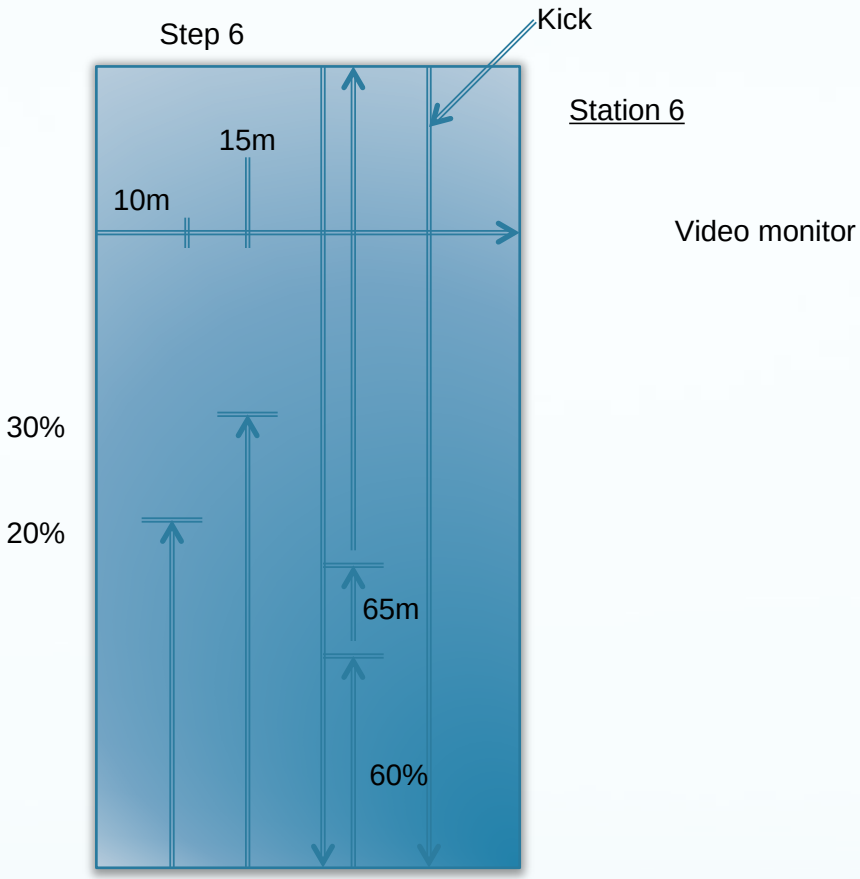
Record 50m – 50% time and protocols

Video monitor recording actual technical performance –

Compare 10m and 15m speeds and number of underwater dolphin kicks from Station 5 to the same values in Station 3.

The video (I-pad, GoPro, camera) should have recorded technique and skill improvements from Station 1 and 2 to Station 6. This should now be reviewed and comparisons (improvements) reviewed in detail by Coach, Biomechanist, Exercise Physiologist and Strength & Conditioning coaching personnel.

Add dive 50m (50%) to 30m (30%) and 20m (20%) for FES and efficiency of 50% of race distance at 100% of goal speed.



Video monitor

Choice OR 1 of each either Kick X1 or Pull X1

- Kick race time and measure distance
- Kick 50% of race distance (measure time plus %)
- Resistance pull race time (videoed) and measure distance
- Resistant pull 50% of race distance (measure time plus %)

NOTES

This can be repeated 4 times commencing with any step and building on a weekly basis. 4 times in the most appropriate and measured combination or single application. The stations may be varied in terms of commencing each practice. There is evidence that the greatest advantage and improvement gained is when athletes commence the set at Station No. 4.

1. Distance (measure speed and number of strokes) ie. speed efficiency index = time plus stroke count.
2. Speed – Time (measure distance and number of strokes) either as achieved in 1. or according to goal time/speed or previous best time/speed.
3. Number of strokes (measure distance and speed/time).
4. Combination of ALL of the above.

ADDITIONAL SUPPORTING INFORMATION:

5. Stroke rate (model) to failure (utilising the above).
6. Optimal speed to failure (measure distance and time).

All of the above must be measured and recorded utilising “the improved technique” only.

NOTES - Distance and Percentage Charts

Race Distance

Percentage	50m	100m	200m	400m	800m	1500m/ Open Water
20%	10	20	40	80	120	300
30%	15	30	60	120	240	450
40%	20	40	80	160	320	600
60%	30	60	120	240	480	900
Recommended No. of repeats Based on X times race distance	4-6	3-6	3	3	3	3

Using combinations of above percentages for the multi-event athlete	100-200m	200-400m	400-800/1500m
	2-4	2-4	2-4
No. of repeats	1	1	1

Time + stroke count is often used as a measure, however “time” is a continuous variable and “stroke count” is a discrete variable. “Speed” (or more accurately – velocity - m/second) is a function of distance and time. Therefore efficiency is the ability to maintain velocity (ie. with minimal variation) throughout the required distance. Swimming efficiency is therefore related to energy expenditure and the way this is converted to mechanical application of power. As this process does not measure energy, caution must be exercised on how “efficiency” is defined.

Stroke rate (and therefore stroke count) provides the athlete and staff with an indication of mechanical efficiency. The goal is to swim fast (ie. greater m/second) at an economical stroke rate.

This concept has been practised for 4 weeks (4 exposures) using it once per week followed by 2 weeks with only 1-2 exposures per week. Then repeated for a further 4 weeks at once per week, but with the process focused on where the individual responded best to the application of the new technique and skill in the first block of 4 weeks.

Athletes in groups could commence the rehearsal practice by commencing each set at each (but different) station. It is possible and practical to commence the same station in each training exposure.

It could look like this (example of a 12-16 week cycle):

•2 weeks at 1 exposure to 2 applications, usually 1 distance.

•4 weeks at 4 exposures to all 4 concepts with varying commencement points ie. (example only) –

Week 1	3-2-1-4
Week 2	2-1-3-4
Week 3	4-3-2-1
Week 4	1-2-3-4

•2 weeks repeat from the first 2 weeks

•4-5 weeks as above but drop 1 week series each week (race preparation).

•Sequentially download with improved performance.

•2 weeks repeat from the first 2 weeks

•4-5 weeks as above but drop 1 week series each week (race preparation)

•Sequentially download with improved performance.

•Rest/recovery in each set is based on the need of the individual. Enough rest for the practice protocols not to reflect compromise due to inadequate rest and with as little rest as possible to achieve the targeted outcome.

•Measure rest with 20-40 breaths in preference to a time-governed interval. Focus the athlete on exhaling.

With progression 4, the 60% repeat can be built up from 40% to 50% and finally 60%. However this would cease where the improved and modified technique broke down.

The 60% could also be achieved by a progression of 45% to 50% to 60% of race distance at 100% of first personal best pace/speed, then accurate conversion into goal pace/speed where efficiency is maintained or improved.

The percentages all relate to percentage of race distance at 100% of previous best speed converting into goal speed as early as possible in the practice and rehearsal process.

Given that the majority of athletes compete in at least two distances, the stations can be manipulated to address this need, both within a station or by set up to many event specifics.

As an example, the 20% and 30% can be completed at 50 metre distances and the 60% at 100 metre distances. Also the practice sets may take an odds and evens approach with varied sets focusing on speed development (50 metre event) and other sets focusing on the longer events (100 or 200 metres).

In this case, both speeds and distances would change and vary to suit the needs of the individual and the event, ie. in Sets 1 and 2 the focus might be on the 100m event and in Sets 3 and 4 focusing on the 200m event. The mixture of 400-200 distances is also possible.

With advanced preparation in the process of performance to perfection, the athlete might do a series of 6 repeats (instead of 4) with the 5th set being “soft” in effort but high in skill and technique demand. This would usually occur in the second series of 4 repeats.

The longer the target distance, then the fewer repeats. However the demand for both improved technique and speed does not change, and must not be compromised.

The new improved technique required must be made clear to the athlete well before the process of performance to perfection commences.

Supporting practice sets once improved technique is achieved and confirmed are (based on improved protocols):

A) 16-20 repeats of (sustaining improved skill and technique):

1) 25% of race distance at 100% of previous best time converted over time to goal protocols (distance – speed – number of strokes – stroke rates)

2) As above with 30% of race distance at 100% of previous time converted over time to goal protocols (distance – speed – number of repeats – stroke rates)

A shared concept with New Zealand canoe coach and coach of world champion canoe athletes – Coach Gordon Walker.

B) A one-off test repeat of – 125% of race distance at 100% of previous best pace to goal pace
1) +15%; 2) +12%; 3) +10%; 4) +8% possible for some athletes; 5) +6-4%

The athlete must hold improved technique and skill. Stop wherever improved technique breaks down.

C) 10X50 or 12X50 (reduce by 1 second per 50m from goal pace +10 seconds or +12 seconds at minimum/maximum values, holding improved technique – must be monitored to identify technical failure. Minimum number of improved technique strokes plus appropriate speed reduction of 1 second per 50m.

CONCLUSION

It is well accepted by experienced coaches that it is possible to add speed and fitness to efficiency, but rarely can the reverse be put in place. This model or concept, when accurately applied to enhanced individual efficiency even after more than 4 years of 12 hours per week of incorrect motor pathway and muscle memory will improve technique and skills at the senior level.

However, this concept may not improve technique at slower speeds. Coaches and athletes have battled against trying to significantly improve technique at speeds slower than race pace/speed only to find at higher speeds and under fatigue and pressure that they revert back to the original and inefficient technique and speed efficiency that were in place prior to the improvements made at slower speeds.

The identification of aggressive “racing” competitive talent often goes hand in hand with repeated technique and skill breakdown. The concept included within this presentation has the potential to combat and defeat this when applied with clinical precision.

I have applied this concept successfully to numerous international podium athletes over a 15 year period.