COACHES' quarterly
the art and science of coaching swimming

Tapering for Champions

Spring means defrosting, blooming and, of course, tapering!

Compiled by Bob Steele, USS Coach Development Director

When it comes to tapering, coaches have more opinions than Newt Gingrich and his mother. That's why this issue of *Coaches' Quarterly* has a strong slant toward the topic. Keep in mind when reading about tapering, it must be applied to each swimmer's physiological characteristics and training background. Coaches must understand the difference between taper and rest. Taper is quality work at high-performance race speed and very energy consuming. Rest is storing energy. In an effort to present various viewpoints, here are a few tips and suggestions provided by some of America's finest coaches and swimmers—the people in the field:

Taper Time!
Shaving, tapering and swimming fast mixed well for Gary Hall.

"The most important thing about tapering is how hard you worked during the season. Tapering must be individualized. Swimmers need to be careful with diet and out-of-pool activities, which may ruin a season of hard work. Rest in and out of the pool. Rest, rest, rest."

Jim Wood—Berkeley (N.J.) Aquatic Club

"You've got to believe to receive or those who believe do receive. It's at least 90% mental. Swimmers must have faith in the coach, teammates and training. Talk to your swimmers about training and taper; pre-season, mid-season, and pre-championship. Incorporate items from the swimmers."

Jim Crampton—Raleigh, N.C.

"Protect the aerobic base while tapering during overload high-performance work. Maintain the integrity of aerobic base to provide proper ability to recover from races and to properly prepare without it becoming an overload at the competition. Determine the minimum amount of yardage to swim per day at the meet. Daily total incudes: warm-up, warm-down and pre-race prep. Factor this in when planning the rest phase and the amount of aerobic work to maintain an efficient aerobic base to support the meet."

Pete Malone—Kansas City (Mo.) Blazers

"Have courage to work hard. Have courage to rest."

Shaun Jordan—University of Texas

"Individualize tapers by event groups. One taper doesn't fit all. Don't taper 12-and-unders. Realize 13-17 year olds are not the same as 20-year-olds. Work stroke rate and stroke tempo during taper. Don't sprint or work broken swims to a great extent into the meet. Trust your work and taper and don't try to prove how fast they can be during the taper."

Ira Klein—Auburn (Ala.) University

"Swimmers should keep a workout logbook, so you can look back at the things that worked for you, and those that didn't, in past seasons. Then you can keep using the helpful things. Don't be discouraged if you feel tired or slow or tight, you will get through this phase and feel fast."

Jill Johnson—Massachusetts Bay Marlins

Different Strokes

Biomechanical Analysis—Stroke Frequency/Velocity Testing Protocol

By Mike Keeler, Assistant Men's Swimming Coach, Purdue University and Budd Termin, Head Men's Swimming Coach, SUNY: Buffalo

All swimming performances are a combination of stroke rate and distance per stroke. An improvement in performance is largely a result of either improving the distance per stroke or increasing the stroke rate or combinations of either slightly improving stroke rate and/or distance per stroke. (bib. 1-5). The basics of the test were originally described by Craig, Boomer, et. al. (1). The test described below is a practical application of the stroke rate/velocity distance per stroke test and is simple to perform and gives an objective evaluation of the athlete's technique from a very slow speed to a maximal speed that can only be maintained for 6-8 seconds. The stroke rate velocity information can then be used in practice and in meets as an objective method of evaluating the athlete's technique and provides important feedback during practice and meets.

Definitions

Arm Cycle: One complete stroke revolution; ex. backstroke and freestyle — left arm to left arm; breaststroke and butterfly — hand entry to hand entry.

Stroke Rate: The number of arm cycles a swimmer would take in one minute.

Distance per Stroke: The distance travelled in one arm cycle.

Swim Time: The length of time the swimmer takes to swim the 10-meter test area.

Cycle Time: The amount of time the swimmer takes to complete two arm cycles.

Methods

1. Using either a 25-yard or 50-meter pool, mark off a 10 meter segment approximately 10 meters from the end of the pool. Place a 5-10 foot pole at the mark with the pole extending a few feet over the water. This pole allows for a good sight line down the length of the pole as the swimmer swims by the mark.

2. The swimmer will then perform a series of swims through this segment. The swims should progress from very slow (1:30 per 100 meters) to all-out speed (a speed that can only be maintained for 6-8 seconds). Ample rest should be provided between each effort especially during the maximum effort bouts. It is best to cycle 4-6 swimmers through the test as this provides sufficient rest between each swim.

3. The coach will time the swimmer between the marks, starting the watch when the head passes the pole and stopping when his head passes the end pole. It is important that the swimmer be up and swimming when going through the 10-meter segment as we are measuring stroking efficiency only. At the same time, the coach or an assistant charts the amount of time it takes to complete two arm cycles. Before the test begins, it is important the swimmers understand they are not to change their stroke technique, only that the stroke rate will be progressively increased. As the test proceeds, the cycle time and 10-meter time will progressively decrease. There will come a point in this test where the cycle time will continue to decrease but the 10-meter time will not decrease. The swimmers at this point will lose their perceived "feel" for the water. It is important to reassure the swimmers not to worry about this lose of "feel", but just continue to increase their stroke rate (decrease their cycle time). For the test to be as accurate as possible, it is important to collect two or three trials where the stroke rate continues to increase, while the velocity continues to decrease (slower 10-meter times). This step is needed to insure the peak velocity has been obtained. This peak velocity is a speed that the athlete can only maintain of 6-8 seconds. All competitive events longer then the 50-yard freestyle are a percentage of this peak speed. Because most swimmers have probably never used stroke rates this high, there are normally windows of increased velocities at stroke rates that may not feel technically comfortable for the swimmers, but if not enticed to these higher stroke rates the coach may underestimate the maximum velocity potential of the athlete. The importance of obtaining these very high stroke rates can not be understated, as it is very important to obtain the true peak velocity to insure an accurate test. (Note: The last three trials in Table 1: Examples of Swim Time and Cycle Data)

Table 1: Examples of Swim Time and Cycle Time Data

Swim Time (time for 10 meters)	Cycle time (time for 2 cycles)
9.76	3.42
8.54	3.04
7.45	2.56
7.00	2.45
6.89	2.13
6.45 (fastest time recorded)	1.78
6.56 (slower time)	1.60 (faster cycle time =
6.70 (slower time)	1.55 = higher stroke rate)

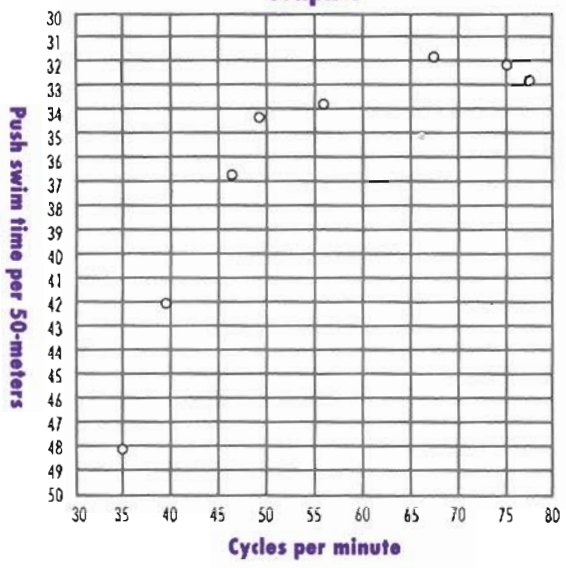
Table 2: Conversion of Swim and Cycle Time into 50 Time and Stroke Rate

Swim Time	Projected 50 Time	Cycle Time	Cycles per min.
9.76 x 5 =	48.80	120/3.42 =	35.08
8.54 x 5 =	42.70	120/3.04 =	39.47
7.45 x 5 =	37.25	120/2.56 =	46.87
7.00 x 5 =	35.00	120/2.45 =	48.97
6.89 x 5 =	34.45	120/2.13 =	56.33
6.45 x 5 =	32.25	120/1.78 =	67.41
6.56 x 5 =	32.80	120/1.60 =	75.00
6.70 x 5 =	33.50	120/1.55 =	77.41

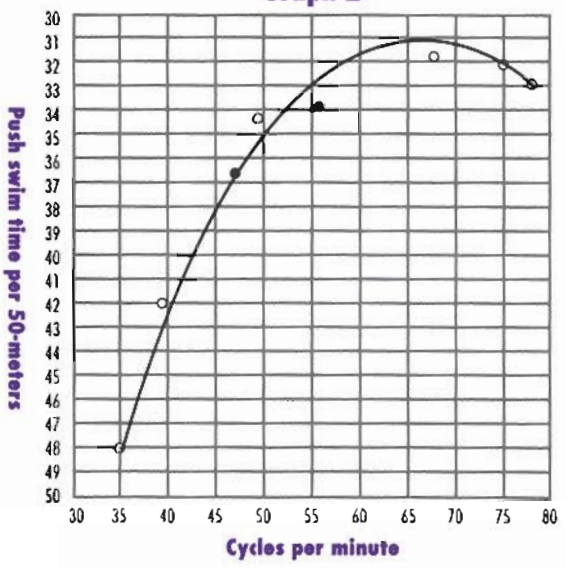
Table 3: Example of the Use of the Push-off Factor

50 M Time	Push-off Factor	Push 50 M Time	Cycles per min.
48.80	0.7 =	48.10	35.08
42.70	0.7 =	42.00	39.47
37.25	0.7 =	36.55	46.87
35.00	0.7 =	34.30	48.97
34.45	0.7 =	33.75	56.33
32.25	0.7 =	31.55	67.41
32.80	0.7 =	32.10	75.00
33.50	0.7 =	32.80	77.40

Graph 1



Graph 2



4. By multiplying the swim time by 5 you can find the projected speed for 50 meters of pure swimming. By taking 120 and dividing by the cycle time you can get cycles per minunte. (See Table 2: Conversion of Swim Time and Cycle Time and stroke Rate)

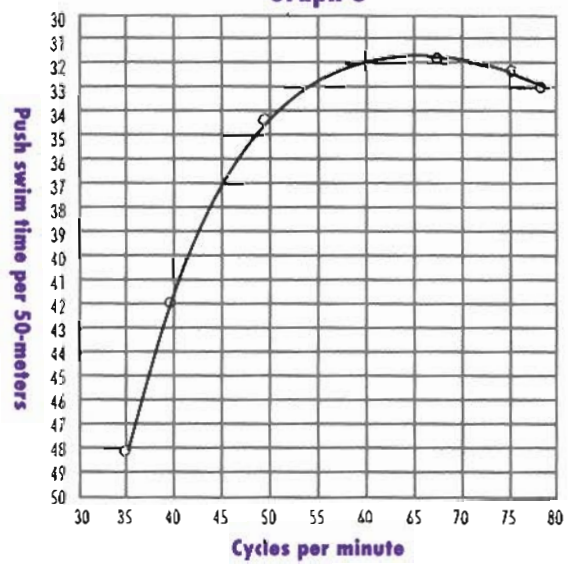
5. Reducing the swim time by 0.7 tenths of a second will account for the increased speed obtained during the push-off. This time was empirically derived and may or may not be completely accurate but in the practical setting seems to work well (See Table 3: Example of the Use of the Push-off Factor).

6. The information can then be graphed with the push 50 M time on the Y axis and the cycles per minute time on the X-axis. (See Graph 1).

7. A regression line can be run through the data for comparisons from year to year. (See Graph 2). From a more practical viewpoint, and a procedurally easier method, you should exclude the points that show a higher stroke rate for a time that the swimmer could swim with a lower stroke rate. (See Graph 2, black dots). If you then connect the dots you would then have a graph that shows the absolute lowest stroke rate for the time swum (See Graph 3). By using a stroke rate watch (Kellerman preferred) and checking the swimmer's time and stroke rate as the swimmer trains or races against the swimmer's grapes à coach, can objectively check if the swimmer is swimming efficiently.

8. It is important to remember that each individual's graph is a unique "fingerprint" of that swimmer's technical ability and the line can shift as the swimmer grows, and/or improves technique. Following these trends throughout a swimmer's career will give the coach an excellent record of what changes that swimmer made in the curve progressing throughout their career.

Graph 3



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