An Analysis of the Olympic Swimming Events

Edited by Dick Hannula

When the Australian Swim Coaches & Teachers' Convention/Clinic was held in conjunction with the Quadrennial Gold Medal Clinic this year, the results were a very excellent clinic. My wife and I attended. It was my 3rd Australian Coaches' Clinic and my 6th swimming related trip to Australia.

David Pyne and Cassie Trewin from the Australian Institute of Sport's Department of Physiology presented an Analysis of the Sydney Olympics that may warrant the consideration of swimming coaches on every level. I will be quoting from the printed proceedings of the clinic.

One of the first areas of consideration was the placement of swimmers, based on the 1999 – 2000 rankings, at the Olympic Games. 87% of Olympic medals were ranked in the top 10. There are few total surprises coming from outside the top 10. Female swimmers were in a 95% group, and the male swimmers were in a 78% group. The placement at the Olympic Games became somewhat more open when comparing only the top 3 ranked swimmers in each event. 60% of the medals were attained by the top 3 ranked swimmers with men and women both at 60%. When it came to the gold medal winner being ranked #1 in the world leading into the Olympics, it was a 50/50 proposition. 50% of the gold medal winners were ranked #1 coming into the Games. 48% for males, and 54% for females.

The pacing patterns and racing strategies analysis indicated which split yielded the most successful results. Looking at the free style events, the 100 results indicated that the 2nd 50 was the most correlated to the final time. This held true for both male and female swimmers. In the 200, and 400 free, it was the middle laps that were most correlated. It was the 2nd and 3rd 50 of the 200's, and it was the 2nd and 3rd 100 of the 400's. In the 200, the male swimmers correlated closely on the 2nd, 3rd, and 4th 50's. Female swimmers trended towards getting out on the 1st 50, and were less highly correlated than the males in subsequent 50's. In the 400, male swimmers correlated as they did in the 200, and women with all four 100's.

The next area of analysis was on stroke rate. In the free events there was no significant correlation between stroke rate on any 50 meter lap and the final placing. The exception was in the 400 where a higher stroking rate correlated with a higher placing. The average mean stroke rate by free events:

	50	100	200	400
Male	59.2	51.8	47.0	41.9
Female	62.2	53.0	48.1	48.3

The stroke length analysis. There was no significant correlation between the final time and the stroke length on any given lap, except in the women's 100 free. The medal winners had a stroke length on the 1st 50 that was closer to the average over the entire race. The non medalists had a shorter stroke length in the first 25 but a longer stroke length at the finish. The average mean stroke length in meters for each 50 meter over the free events.

	50	100	200	400
Male	2.18	2.29	2.34	2.45
Female	1.84	1.99	2.03	1.95

In the 50 and 100 free, the trend was to go out with a faster stroke rate before experiencing a slight decline to finish. In the 200 and 400 free, it was a variable pattern. The swimmers started with a higher stroke rate, dropped to a lower rate through the middle, and lifted to a higher stroke rate for the finish.

In stroke length pattern, there was no trend in the 50's, some increasing stroke length in the 2nd 25, some decreasing. In the 100, 200, and 400 free there was a variable pattern in opposite direction from stroke rate. Stroke length started close to the race average in the 1st lap, increasing in the middle laps, and below average on the final lap. The exception was in the women's 400 with a decline in stroke length each lap.

The analysis of the Olympic butterfly, breaststroke and backstroke 100 and 200 events showed the following results. The 100 events are often decided in the 2nd 50 meter lap. These are "back end" events, where the finish lap is all-important, and generally decides where the medals go. In the 200 event, the important laps appear to be the 2nd and 3rd 50 meter laps. The 2nd lap split sets up the pace for the rest of the race.

In the men's 100 butterfly, the 2nd 50 meter lap had a differential of just over 3 seconds with the most successful finalists. The winner had a 3.34 seconds differential and was out a bit slower the 1st 50 than the 2nd place finisher with a 3.98 differential. All 8 male finalists had a differential of 3 plus seconds (all in the 3 range, but under 4 seconds). The female 100 butterfly had a wider range of 2nd 50 differential. The gold medalist had a 3.27 seconds differential, and a high differential of 5.15 cost Jenny Thompson a medal in the event.

In the male 200 butterfly, the event was decided in the 3rd and final 50 meter laps.

There was only a small correlation in the 1st and 2nd 50 meter laps. The first 4 finishers in the event split under 30 seconds on the 3rd 50, with the last 4 finishers over 30 seconds on the 3rd 50. The final 50 had the highest correlation with the final time. Tom Malchow's 4th 50 was the 2nd fastest of the final at 30.08 to win the gold. The fastest 4th 50 went to Michael Phelps with a 29.87 seconds, but his 3rd 50 was over 30 seconds. Misty Hyman's win in the female 200 butterfly was the biggest upset of the meet. She had the fastest split 50's on the 2nd and 4th 50's.

In the male 100 meters backstroke, all the medalists had a strong correlation between both 1st and 2nd 50 splits and the final times. The gold medal winner, Lenny Krayzelburg, was the only swimmer out in under 26 seconds (25.99), and was the fastest back in the 2nd 50 in 27.73. His differential between each 50 was a 1.74 seconds drop off. All of the medalists in this event had a drop off differential of under 2 seconds. In the women's 100 backstroke also indicated a high correlation between both 50's and the final placing. Gold medalist, Diana Mocanu, swam the fastest 2nd 50 in 30.41. She was the only swimmer under 31 seconds in the back half. Two swimmers had a faster 1st 50 than her. The differential drop off between 50's were tighter in the women's event. Diana had only a .61 seconds differential. The Japanese swimmer, Mai Nakamura, had the fastest 1st 50 at 29.17 but finished with a 31.38 for a 2.21 differential. It was still good for the silver medal.

The 200 men's backstroke final fitted the trend where middle distance races are decided in the 2nd, and 3rd laps. In this race, Krayzelburg the winner, had the fastest split in both the 2nd (29.22) and the 3rd (29.46) laps. There was no correlation at all

between the final 50 split times and the final times. The entire field came home between 30.25 and 30.71 seconds, with Krayzelburg's 30.71 the 2nd slowest of the field. The race was clearly won on the 2nd and 3rd laps. The women's 200 backstroke was similar to the men's final. In the 2nd lap, there was almost a perfect correlation between the split time, and the final time. The winner, Diana Mocanu, had the fastest split of 32.11, and the silver and bronze medalists had the 2nd and 3rd fastest splits of the 2nd lap. The trend continued through the 3rd and final laps.

In the men's 100 meters breaststroke final there was a small negative correlation between the 1st 50 split and the final time. All swimmers were out between 28.64 and 29.23, with the gold and bronze medalists as the slowest 2 swimmers in the 1st 50. The race was decided in the 2nd 50 with a strong .94 correlation. The gold medalist Domenico Fioravanti was the fastest home in 31.55, with the bronze medalist the 2nd fastest in 31.68. Fioravanti had a very good 2.64 seconds differential between split 50's. The women's 100 breaststroke was a different race than the men's. The 1st 50 correlation of .84 indicates that the women were out faster than the non medalists. Megan Quann, the winner, had a 2nd 50 drop off of 3.75 seconds. This was the 4th best of the 8 finalists.

The men's 200 breaststroke was generally decided in either the 2nd or 3rd lap. There was essentially no correlation between the 1st 50 and the final times, a correlation of only .12. The race was essentially decided in the 3rd 50 where the winner split 33.20 and was the only swimmer under 34 seconds for that lap. His 2nd 100 was a good 2.61 drop off from his 1st 100. In the women's 200 breaststroke, Agnes Kovacs, the winner, had the 2nd, 4th, 4th, and fastest splits in each

of the successive laps. The 3rd lap correlated most highly with final times at .82 for the field. The 2nd and 3rd laps correlated most highly with the final times in this event. The swimmers were generally out in around 33 seconds with subsequent laps around 3 seconds slower at a 36 to 37 seconds per 50. Kovacs dropped 3.07 seconds in the 2nd 100 over her 1st 100. She was the only swimmer under 37 seconds on the final 50 (36.57).

What do you get from these statistics? That is for each of us to decide. One of the first things that I concluded was that a swimmer going into the championship meet, any championship meet at whatever level, needs to have swum fast at some point during the qualifying period leading into the championship. There were very few swimmers stretching from beyond the top 10 in the world to Olympic medals. This is generally true even on a state high school level.

Another consideration for all coaches and swimmers is pacing or racing strategies. Almost all of the 100's were decided in the 2nd 50, the back half of the race. A swimmer must have a strong endurance factor gained in their training to get home strong. The ability to control the 1st 50 out time is critical to the success of the 100's. The middle laps were very important in the 200, and 400 distances. The ability to sustain speed through the middle laps was a determining factor in the outcome of those events. I'm certain that every coach has their own take on these statistics. Sometimes it's necessary to wade through statistics to reinforce some of our personal racing, pacing, and training techniques.