

SWIMMING SCIENCE BULLETIN

Number 48

Produced, edited, and copyrighted by

Professor Emeritus Brent S. Rushall, San Diego State University

March 3, 2014

[Editor's Note: US Swimming's High-performance Consultant, Dan McCarthy, briefly considered Ultra-short Race-pace Training (USRPT) in an article posted to the organization's web site:

<http://www.usaswimming.org/ViewNewsArticle.aspx?TabId=0&itemid=5857&mid=8712>.

The opinions expressed are good examples of belief-based coaching concepts that fly in the face of research evidence (i.e., belief vs. fact basis of reasoning). The major beliefs expressed were:

- *"The concept [USRPT] has been around for decades, but has enjoyed a fresh resurgence."*
- *". . . [USRPT] is a well thought-out and well-researched theory."*
- *"Race pace training should be perfect and a rehearsal for competition, but a good strength and conditioning program is an asset to an athlete, not a counter-productive waste of time."*

Concerns with the Principle of Specificity as applied to *"highly skilled and conditioned athletes"* were:

- *". . . ceiling for the acquisition of skills like coordination and strength may be genetically predisposed";*
- *". . . deficiencies or imbalances in their stroke or posture . . . an effective dry-land program . . . can correct those issues";* and
- *"Many coaches believe . . . performing . . . movement against resistance builds specific strength through that newly acquired range of motion".*

When one attempts to criticize an evidence-based model, at least an understanding of what is and is not a theory should be known. Beliefs are theoretical. Principles derived from evidence (facts) are not. If one relies on research evidence, the six bulleted quotes above would be deemed false, or equivocal at best.

Daniel O Thompson III, a medical doctor and experienced and successful swimming coach, took exception to Dan McCarthy's opinion-based impression and penned the following assessment of the US Swimming's representative's misinformation.]

In reply to Dan McCarthy's article, "Addressing Ultra-Short Race Pace Training."**Daniel O. Thompson III, MD****3 February, 2014**

My compliments on what appears to be a good-faith effort to explain USRPT. Please permit me a few clarifications, however, for enquiring USAS coaches:

I. McCarthy refers to USRPT as a theory. No, USRPT is not a theory in the sense of an hypothesis awaiting confirmation. Rather, it is the practical application of two scientific facts: 1) The Principle of Specificity operates in competitive swimming, i.e., energetics and skills are specific to velocity; and 2) training that is true to the Principle of Specificity (and of adequate volume) transfers optimally to racing; otherwise, it does not. These facts are demonstrated by published research studies cited by Dr. Brent Rushall in the *Swimming Science Journal*.

II. McCarthy lists three "concerns" that challenge 2) above, and he then concludes that "a good strength or conditioning program is an asset to an athlete, not a counter-productive waste of time." Here he contradicts reputable research to the contrary, also cited in the *Swimming Science Journal*.

The only valid way to refute scientific research is to discredit its design (e.g., the use of lab rats as subjects) or to produce countervailing research. Instead, McCarthy tries to counter science with unsupported opinion -- and unwittingly makes himself an example of the belief-based mindset that Dr. Rushall has crusaded against for years.

There are a great many of us, coaches and swimmers alike, who look to the *Swimming Science Journal* for evidence-based facts and inferences that cut through the present tangle of pseudoscience, anecdote, and dogma. As High Performance Consultant for USA Swimming, McCarthy should adhere to a similar standard. Have him challenge USRPT if he must -- but creditably. Then we can evaluate the objective merits of these engaging issues.

III. McCarthy also says that "the concept [of USRPT] has been around for decades." No, Rushall conceived USRPT in the late 2000s. He touched upon it in his 2009 ASCA lecture and presented it in toto in his 2011 treatise, *Swimming Energy Training in the 21st Century: the Justification for Radical Changes*, published in the *Swimming Science Journal*. He coined the term "USRPT" in 2012.

USRPT fuses two earlier sub-concepts: 1) from 1960s research, that a maximum training stimulus is obtained by serial sprint-bursts on short-rest intervals; and 2) from 1990s and 2000s research, that technique, velocity, and energy supply are interdependent. Thus, USRPT represents a new application of the Principle of Specificity.¹

Here is a typical USRPT set. It is race-specific for stroke, distance, pace, technique, and mental readiness -- and hence has little in common with other forms of high-intensity training.

[30 x 25 freestyle at 100 freestyle race-pace, on 15-second rest intervals, holding a low, streamlined head position while implementing racing strategies and imagining that one's fiercest rival is in the adjacent lane.]²

Endnotes

¹ In the early 1960s, Swedish scientists published research on the benefit of short-work, short-rest repetitions (<http://coachsci.sdsu.edu/csa/vol71/astrand.htm>). The pace was full-bore, without the specificity of USRPT. Rushall used this form of interval training with great success in high-school rowing, and Forbes and Ursula Carlile used it effectively in swimming. To label it, Rushall coined the term "ultra-short" in his 1967 Honors MSc thesis at Indiana University. He first published the term in an article in 1970: Rushall, B. S. (1970). An aspect of

sprint training. *Compete*, 2(7), 2 pp. The article was reprinted in *Amateur Athlete*, May, 1970; *Swimming World*, May, 1970; and *International Swimmer*, June, 1970.

In the ensuing 45 years, however, swimming came to be dominated by aerobic and lactate tolerance training, and the only mention of “*ultra-short*” was by Rushall, in publications such as Rushall, B. S., & Pyke, F. S. (1991). *Training for sports and fitness*. Melbourne, Australia: Macmillan of Australia. Nonetheless, rowers, kayakers, and track athletes used ultra-short to great advantage, as did some teams in various codes of football (Australian Rules, Rugby Union, Rugby League). And in 1996, Rushall used it to train two girls in Kayak who dominated the US Olympic Trials.

Then, in 1990, the following landmark study on velocity-specific techniques attracted Rushall’s interest: Toussaint, H. M., Knops, W., De Groot, G., & Hollander, A. P. (1990). The mechanical efficiency of front crawl swimming. *Medicine and Science in Sports and Exercise*, 22, 402-408. [<http://coachsci.sdsu.edu/swim/biomechs/toussai1.htm>].

At the time, however, Rushall was preoccupied. He coached rowing, commuted to Australia as Director of Coaching for NSW Swimming, and busied himself with dispelling the myths of lift theory and Bernoulli's Principle as being key mechanisms of propulsion in swimming: Rushall, B. S., Holt, L. E., Sprigings, E. J., & Cappaert, J. M. (1994). A re-evaluation of the forces in swimming. *Journal of Swimming Research*, 10, 6-30. Reprinted in Russia -- *Plavanie*, 6(5), 18-36. (<http://coachsci.sdsu.edu/swim/bullets/forces1.htm>).

But then, in the 1990s and early 2000s Belgian, Dutch, and Portuguese scientists produced further exciting research on the interdependence of technique, velocity, and energy supply. This grabbed Rushall’s full attention, and he embarked on a deeper exploration of its implications for swimming, as related to the Principle of Specificity. He found no research to support the belief that traditional training (and its adjuncts, such as land-training) consistently benefited performance. Ultimately, in 2011, USRPT came together as a mature concept, formally presented in *Swimming Energy Training in the 21st Century: the Justification for Radical Changes*.

It was then that a groundswell of broad-minded coaches and swimmers took notice and brazenly put USRPT to the test. These included Team Indie, with Michael Andrew, and two of the leading age-group clubs in Australia, Cherrybrook Carlile and the Carlile Swimming Clubs. A grass-roots phenomenon was born. Rushall responded by adopting his current role as mentor to the movement -- with seminars, consultations, and, as feedback streamed in, explanatory articles in the *Swimming Science Bulletin*. He says, “*To this date, I have had not one suggestion where I might be wrong in the interpretation of the research involving humans and sporting endeavors.*”

² For racing strategies, see Rushall, B. S. (1995). *Personal best: a swimmer’s handbook for racing excellence*. Spring Valley, CA: Sports Science Associates [<http://brentrushall.com/personal/index.htm>].