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REACTION TO SERGEI BELIAEV'S SWIMMING TECHNIQUE ARTICLE *"ULTRA-SHORT RACE-PACE TRAINING"*

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This paper constitutes a reaction to Sergei Beliaev's *Swimming Technique* article, *"Ultra-short Race-pace training"* (February, 2015, pp. 5-7; http://magazines.swimmingworld.com:9997/St/MagazinePDF/201502.pdf).

When considering popular concepts, it is always worthwhile to consider negatives as well as the positives about the entity. However, the original source and subsequent alternatives about ideas need to be evaluated for validity and reliability. Standards for criticisms are equally as important as the presentation standards of any original article(s).

There are extensive articles about *Ultra-short Race-pace Training* (*USRPT*) posted free to the *World Wide Web* (*WWW*) at http://coachsci.sdsu.edu/swim/usrpt/table.htm. Each article is meant to expand or clarify aspects of the USRPT swimming coaching concept. The large majority of the contributions are written by this author. The general site, the *Swimming Science Journal* (http://coachsci.sdsu.edu/swim/index.htm) has been sponsored by San Diego State University, specifically the *School of Exercise and Nutritional Sciences* (http://ens.sdsu.edu/), for the past 20 years. The posting of items to that site must maintain academic standards, essentially those of the National Science Foundation and in this writer's particular case, the national psychological associations of Canada, the USA, and Australia. Periodically, contributions and postings are evaluated blindly in-house to consider whether the academic standards are maintained with regard to structure, content, and reasoning/logic. The web site would be removed if it was not of a standard that adequately reflects the academic standards of one of the best small research universities in the USA. Essentially, a reader can rely on the content presented particularly because of the need to indicate data-based reference sources that are of a scientific nature.

Anyone who criticizes USRPT should respond with valid and reliable information and arguments. This reaction paper evaluates some of Sergei Beliaev's comments according to those reasonable standards.

For a period of time, Sergei Beliaev was inaccurate when referring to USRPT. Figure 1 duplicates part of an announcement about a clinic offered by Sergei Beliaev in September, 2014. He termed the *RP* of USRPT as *"Rest-Pace Training"* rather than race-pace training. Thankfully, by now Sergei Beliaev has learned the correct name of the entity about which he speaks. This is the first clue that raises the suspicion that perhaps the clinic conductor might not be accurate in his depiction of USRPT because he did not even know its correct name for some time.

While the *Swimming Technique* article provides references in its text, it does not include a bibliography of those attributions and so there is no way of knowing whether or not there actually is support for Beliaev's content. It is not a rare event that people include unattributed or false references in the bodies of non-academic articles to make their contents seem more credible.

Sergei Beliaev immediately launches into labeling USRPT as *"Parametric Training"* (p. 5). Unfortunately, as will be implied later, USRPT is extremely multivariate which is moderated by a subset of those variables depending upon the individual nature and potential of any swimmer.

There is nothing implied or assumptive about those variables, the basic requirement for the declaration of one or more parameters. The most basic parametric entity is usually of the form $y = ax + c$ where *"x"* is the parameter or variable that has certain characteristics, for example, it exists as a normal distribution within a population when attempting to predict *"y"* from the known number *"a"*. USRPT is extremely complex when compared to other coaching models, particularly the limited factors referred to in the Beliaev article. The potential factors of technique, pedagogy, psychology, and swimming-fitness development propose suggestions for a coach's consideration when determining the individual requirements for the enhanced development of swimmers. In a mathematic/statistical sense, which is the correct environment for declaring behaviors/entities as being parametric or non-parametric, the disregard of quantification of USRPT factors renders it, if one must use a probably incorrect label, as being *"non-parametric"*. Beliaev's suggestion for a label suggests a failure to understand USRPT as described by Rushall (2015). It has been reported to this writer that *"Parametric Training"* is being discussed in swimming coaching circles. Because of the individuality of swimmers in a multivariate environment, any concept of effective training will not be represented by a mathematical model. It has been tried as TRIMP scores, an innovative development by Professor Eric Bannister of Simon Fraser University (Canada) in the late 1970s. TRIMPS correlated moderately with running load expressed as imprecise physiological measures (Rusko, 2004). When used for overall performance, it was of little value (Hellard et al., 2006; Savage et al., 1981). If one hears of USRPT as being a variation of *"Parametric Training"*, it can rightfully be asserted that *"they know not what it is about which they speak."*

Figure 1. A section of an announcement about a clinic to be offered by Sergei Beliaev where incorrect words were used as an expansion of USRPT.

It is stated that USRPT is supposed to explain *"how long athletes need to stay in specific training zones"* (p. 5). The stipulation that there are training phases for developing athletes is a theory, not based on scientific evidence, which developed mainly in the Eastern Bloc countries from the 1950s onward. That speculation evolved into a number of labeled theories and their variations often indicated as *"periodization"*, which is mentioned in the Beliaev article.. This writer has extensive experience with that theory and its variants (Rushall, 1984; Rushall & Pyke, 1991).

Unfortunately, periodization died a natural death when it was pointed out that it did not accommodate all athletes in all sports (Issurin, 2008).

The drawbacks of periodization have been listed (http://coachsci.sdsu.edu/csa/vol161/issurin.htm). The class of Soviet/Eastern-Bloc training theories, to one of which Sergei Beliaev alludes, has been dressed up as long-term *"periodization"*. However, it is largely irrelevant for today's 12-month trained swimmers/athletes. Issurin highlighted four weaknesses of the traditional training/planning model, as exemplified by Sergei Beliaev, that contradict the demands of modern competitive programs.

- An inability to provide multi-peak performances during the season/year;
- the drawbacks of long-lasting mixed-training programs;
- negative interactions of non-compatible workloads that induce conflicting training responses; and
- insufficient training stimuli to help highly qualified athletes to progress (as a result of mixed training).

Contemporary training theory, of which USRPT is an example, now accommodates:

- Frequent peaks within a year of competitions,
- a focus on very specialized training effects (largely specific velocity training with a marked reduction in irrelevant or "basic" training experiences) attained through a block of training over a relatively short period, and
- the recognition that swimmers have a continual state of general fitness upon which a block of specialized work superimposes specialized training effects.

A suggested new structure for training continually-adapted athletes was suggested by Rushall and Pyke (1991 – Chapter 17: *Team-sport Training*). That description applied to Australian Rules Football and was re-interpreted for swimming in Rushall (2014a – pp. 44-47).

Sergei Beliaev's adherence to long outmoded training theories is well known, particularly to those who attend the International Swimming Coaches' Association's annual convention.

On page 6 of the *Swimming Technique* article, Sergei Beliaev offers the following opinion about USRPT:

> ***How valid are the claims?***
>
> *USRPT authors make quite a few claims that are not entirely correct. According to Dr. Rushall ("Swimming in 21st Century," Swimming Science Bulletin), USRPT produces the following benefits in comparison to "traditional" (anything not USRPT) training:*

That quote is followed by Figure 2. Beliaev opines:

> *When these claims and comparisons are examined in depth, most are found to be at best only "partially true," while a few are simply misleading.*

Sergei Beliaev then goes on to state the most outrageous forms of developing power, speed, using as references the opinions of others and thereby committing the unacceptable strategy of appealing to non-data-based authorities for support of a set of spurious beliefs.

What is disturbing is that the table in Figure 2 has been falsified. It is another indication of the lack of precision in Sergei Beliaev's communication.

In the body of his article, Beliaev infers that supportive research does not exist for USRPT. Figure 3 illustrates a section of an article by this writer comparing USRPT with traditional training on quite a number of factors normally of interest to swimming coaches (Rushall, 2014b). It is apparent that Figure 2 is derived from the same table as in Figure 3 (pp. 2-3). What is worrying is that Sergei Beliaev has removed the fourth column titled *"References"* from the source table. Since the removal of that important column does not allow one to assess if there is any support for the data-based attributes of USRPT, one is left to assume that perhaps there was a deliberate attempt at reader obfuscation through the purposeful removal of important information by Sergei Beliaev.

Feature	USRPT	Traditional Training
Trains race physiology/fitness	Yes	No
Trains physiological capacities better	Yes	No
Primarily uses alactacid and aerobic energy	Yes	No
Varying work-to-rest ratios produces different metabolic responses. [Mixed sets are bad.]	No	Yes
Produces largest volume of beneficial work	Yes	No
Produces greatest energy expenditure	Yes	No
Produces better carbohydrate and fat utilization	Yes	No
Best developer of aerobic adaptation	Yes	No
Needed to improve maximal accumulated oxygen deficit	Yes	No
Best for developing lactate tolerance	Yes	No
Best for developing power	Yes	No
Conditions swimmers better to race	Yes	No

Figure 2. A table from Sergei Beliaev's article ostensibly to support his claim that USRPT does not produce many changes and is based on insufficient evidence.

The numbers in the *References* column of Figure 3 indicate the reference number in the reference list at the end of the Rushall (2014b) article. It can be seen that on some factors there are extensive references supporting the better effects of USRPT when compared to traditional training, an example of which is partially explained *"as the way to do it"* on page 6 of the *Swimming Technique* article.

A reader has to decide if the statements of Sergei Beliaev and their distortions and inaccuracies, and deliberate falsifications of an evidentiary table, are more reliable than those that give the references upon which they are based (i.e., this author's USRPT articles).

Most of the references used by Sergei Beliaev are very old (more than 25 years). Only one author is repeatedly referenced in the 2000s. That must be compared to the recent dates of the majority of articles in this writer's papers (the majority are after 2000 and up to 2014). That fact alone

serves to stamp the basis for Sergei Beliaev's arguments as being outmoded and when the inaccuracies/imprecision of his content are considered alongside that of USRPT or its component's data-based attributions, the reliability of the *Swimming Technique* article should be deemed unacceptable. Although *Swimming Technique* is not an academic publication, one should expect to read valid and reliable information as a consequence of subscriptions. Advertisers surely must expect to be associated with trustworthy information. If one wanted to see good and bad content in the *Swimming Technique*, contrast the Beliaev article with the data-based article authored by Dr. Rod Havriluk (2015) immediately following it.

What is the value of publishing misleading and deceptively written articles? In this 21st century, there have to be advancements over the swimming training theories of 30-50 years ago.

TABLE 1. COMPARISON OF USRPT AND TRADITIONAL TRAINING ON A NUMBER OF TRAINING AND SWIMMER FEATURES.

Feature	USRPT	Traditional Training	References[2]
Trains race physiology/fitness	Yes	No	25; 43; 57
Trains physiological capacities better	Yes	No	1; 5; 14; 22; 23; 24; 45; 47; 59; 61; 64
Primarily uses alactacid and aerobic energy	Yes	No	15
Varying work-to-rest ratios produce different metabolic responses. [Mixed sets are bad.]	No	Yes	19
Produces largest volume of beneficial work	Yes	No	2; 60
Produces greatest energy expenditure	Yes	No	52
Produces better carbohydrate and fat utilization	Yes	No	54
Best developer of aerobic adaptation	Yes	No	10; 37; 58; 63
Needed to improve maximal accumulated oxygen deficit	Yes	No	62
Best for developing lactate tolerance	Yes	No	9

Figure 3. The complete table width of most of the original material corresponding to Sergei Beliaev's table in his *Swimming Technique* article. The removal of the reference column would not allow readers to assess the scientific validity of the comparative statements.

One other criticism of the type of talk in which Sergei Beliaev engages is that the theories developed in the USSR and other Eastern Bloc countries from the 1950s to even the present day were not reliable. How can one advocate that there are certain methods of how athletes should be trained when those methods are based on programs that used performance-enhancing drugs (PEDs) extensively (Kalinski, Dunbar, & Szygula, 2001; Kalinski et al., 2002; Kalinski, 2003)? How much were performances enhanced by the training methodology and how much were they influenced by the PEDs? We will never know.

Sergei Beliaev mentions several principles within his article. Some are well known, for example the *Principle of Specificity*. In this writer's opinion, two quoted principles standout as being unusual in sport. A Google search indicated 20K hits for the *"Principle of Pendulum"*. However, the first four pages of WWW references pertain to physics and not exercise disciplines. It does not seem to be a high-use concept in sports, if at all. The *"Principle of Skills Acquisition"* only yields four hits in Google. One of those is the *Swimming Technique* article in question. These low use terms could obscure dubious content and are but one more indication of the spurious nature of Sergei Beliaev's claims and language.

Even the manner in which Sergei Beliaev refers to the *Principle of Specificity* with regard to USRPT is wrong. He infers that USRPT was written to conform to the principle. That is untrue. USRPT developed over a nine-year period from an extensive review of scientific work (from the 1930s on) mostly in competitive swimming but also in other sports (e.g., kayaking, rowing/sculling) of a like category. The conclusions of that review were stated to include the external validity of those articles. Only when those conclusions were contemplated was it determined that the research considered strongly supported the *Principle of Specificity*. USRPT was not developed to conform to specificity; it only turned out that way.

It is in the realm of motor skills learning that Sergei Beliaev fails miserably. His statements about skill learning are contrary to what is known about skill acquisition and pedagogy (Rushall, 2006; Rushall & Ford, 1982; Rushall & Siedentop, 1972). He repeats several of the spurious learning ideas incorrectly propagated in the swimming literature (see Rushall, 2013 and the critique of the recent false directions adopted by British Swimming). A particular example is the advocacy of learning techniques by swimming slow. In the 1930-1940 era of motor learning, there was a debate called the *"speed versus accuracy dilemma"*. Essentially, it involved pondering whether to teach skill-elements first and then elevate performance to a desirable level or does one have an athlete perform at the desirable speed (effort-level) first and then hone skill-elements at that speed. The debate ended early in the 1950s in favor of speed first and then the introduction of technique elements at the desired velocity/effort-level. It is clearly evident in the research literature that swimming techniques vary with velocity, that is, as a swimmer increases forward velocity techniques change to accommodate the new and different requirements of the changed velocity (Rushall, 2009). The correct technique for swimming at 1.9 m/s cannot be learned at 1.3 m/s velocity. The neural activation patterns in the brain are very different for both velocities, the activation, timing, and extent of muscle use are different, and the swimmer-sensations of both are also very different and discriminable. The swimming dogma of introducing technique concepts at low velocities and practicing them at low velocities is false and erroneous for producing improvements in serious swimmers. It is interesting that Rod Havriluk's article (2015) also made the point about the uselessness and dangers of slow-swimming for technique development. He even stated that it would be undesirable for learners. One could also take an inferential leap and assert that an implication from Havriluk's work is that slow-swimming and drills are where the undesirable catch-up-stroke freestyle technique is developed. Dr. Havriluk also added that the catch-up stroke, which is exhibited by many top distance and slow-swimmers alike, is a source for shoulder injuries (e.g., *swimmer's shoulder*).

It is acknowledged that slow-swimming has its advantages but they are restricted at best to learn-to-swim individuals and not swimmers in serious training. Slow-swimming instruction is productive in beginner-learning environments when it is used to introduce stroke elements and developing confidence for swimming long distances. It is counterproductive in advanced training situations. There is a science of instructing intellectual and motor skills that is called *"pedagogy"*.

It has been elucidated for swimming (Rushall, 2011). Sergei Beliaev would do well to read that resource. This writer recommends that any discussion by Beliaev about skill learning and instruction in the *Swimming Technique* article be disregarded.

USRPT has four components. In order of importance they are: i) Technique, ii) Pedagogy, iii) Psychology, and iv) Conditioning (Rushall, 2015). Those four components are interrelated. A valid critique of USRPT should address the totality of those concept factors. To not address them could indicate a possible lack of the writer's awareness of USRPT as it should be implemented or a ruse to mislead a reader. Sergei Beliaev does not address the preferred first three of the four USRPT components.

One could go on paragraph by paragraph and refute the statements made by Sergei Beliaev in his *Swimming Technique* article. It is hoped that if *Swimming Technique* publishes other articles about USRPT that the authors will have read and assimilated the information that exists about it. It is deceitful and of no value to anyone other than perhaps the author to criticize an entity when one does not know its correct name or what it entails. The information that exists on the *WWW* in the *Swimming Science Journal* is scientific because it is based overwhelmingly on data-based presentations and publications. By adhering to scientific standards for information reporting and the interpretation of investigations on defined topics, the generalizations that have been developed for USRPT can be deemed reliable and valid at least to the date of the most recent study used to support one or more causal relationships. That cannot be said about Sergei Beliaev's proposals and criticisms.

Unfortunately, *Swimming Technique* erred by publishing Sergei Beliaev's article that is misleadingly critical of USRPT. The *Swimming Technique* editors and authority have to question the social value of publishing such information. It is a departure from the usual standard of validity in articles it usually presents. However, the publication of this reaction is a positive step because it allows some balance in the discussion of USRPT. Readers are free to adopt or reject using USRPT. It is disappointing that mostly unqualified individuals try to convince readers not to try USRPT by using unvetted blogs and bulletin boards concerning swimming. *Swimming Technique* has demonstrated its duty to present both sides of a modern-swimming story.

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