WHAT IS CSS?

'CSS' stands for Critical Swim Speed – the same thing as lactate threshold. The technical distinction is that you measure lactate threshold by taking blood samples during exercise, which is difficult and intrusive to do in a pool environment.

CSS Testing

Instead of using blood samples, swimmers are tested over two time-trials over 200m and 400m. These are then used to calculate your pace rather than go through a 1500m time-trial. Face it, who wants to do a 1500m time-trial?

(400m time – 200m time) / 2   =   CSS (time per 100m)

For example: 400m time = 6:46, 200m time = 3:12
Gives a CSS time of (6:46-3:12)/2 = (3:34)/2 = 1:47 per 100m

The beauty of the CSS calculation is that it splits up the anaerobic and aerobic components of your fitness so that you can focus solely on the aerobic parts, assuming you are a distance swimmer/triathlete. Your CSS score is then used to determine interval times, effort and estimated target pacing for your training and longer swims.

CSS tests should be carried out periodically as the swimmer gains fitness, skill and pacing awareness, with the goal of improving the CSS score throughout the season.

Understanding CSS scores

Take 2 swimmers, a sprinter or middle distance swimmer (petrol engine) and a distance swimmer (diesel engine) racing side by side in a longer event. At some point the distance swimmer will overtake the sprinter in terms of performance. If you think about it, this has to be the case otherwise the best sprinters in the world would also be the best distance swimmers in the world and vice-versa.
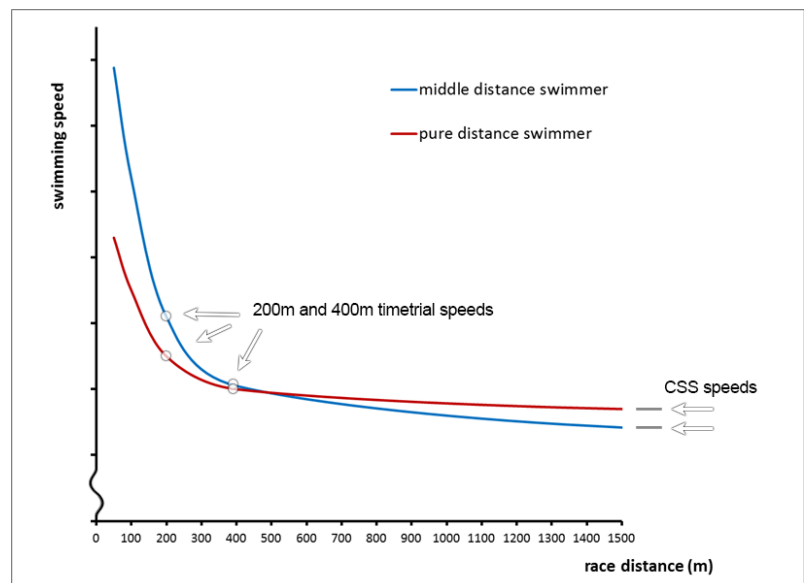
Dodgy results

Swimmers MUST make every effort to do their best time on the day for the 400m and the 200m swim via best effort and smart pacing. Every now and then, a dodgy result is achieved, and swimmers ask why. Here are the 4 main causes:

- It was an off day. Life sometimes gets in the way whether this be tiredness from training, poor nutrition, or family and work stresses.
- The swimmer did not pace the set well and literally blew up. This could be due to inexperience or over eagerness.
- The swimmer is not fit enough to recover within in the 10-15 minutes allocated between the tests.
- The swimmer is trying to "Game the system" by deliberately swimming a slow 200m to get a better score. Whilst this may be a good ego boost to see your name up there with the faster swimmers in the group, it is frowned upon by the coaches. Gaming the system may result in a faster CSS time, but an unrealistic CSS time will see you either struggle in the sets prescribed or end up training in a much higher anaerobic zone which will not help improve your diesel engine in the long run. Do not do it!

Training Prescription

Whilst the CSS score is your predicted 1500m race time, it is unrealistic to expect a swimmer to hold this during each and every 4km training session, especially with short rest intervals. Instead, the coach may prescribe different sets varying in length such that the target pace is of the form CSS + X seconds, where the goal is to stick to these paces either with/without a tempo trainer, thus helping to train pace awareness. Whilst the CSS times may feel easy to achieve over a few reps, you are advised to stick with it as prescribed, holding the pace will get increasingly difficult as the training set (say 1500m +) progresses. If however you are able to maintain the CSS prescribed times over several training sessions, try tweaking it slightly to make it more challenging, noting that even 1 sec per 100m change can represent a fair leap.

For example, if CSS = 1:47 per 100m, following rep distances might be set as follows:
200m reps @ CSS pace + 1 to 2 sec = 1:48 – 1:49 pace
400m reps @ CSS pace + 3 to 4sec = 1:50-1:51 pace
*800m reps @ CSS pace + 8 to 10sec = 1:55-1:57 pace*

Typically the swimmer will be asked to use the tempo trainer in mode 1 such that it beeps every 25m. So if the desired CSS pace is 1:55 (115 sec) per 100m, the tempo trainer will be set to beep every 115/4 = 28.75 seconds

Why do it?

The goal is to develop your lactate threshold. CSS based training sets are prescribed such that the swimmer is swimming at or about their lactate threshold speed for sustained periods of time. This stimulates the body to develop your aerobic system, which improves your distance performances.

Alistair Brownlee *describes this quite nicely:*

> *The most important technical thing about swimming is the ratio between your threshold speed and your maximum speed. There are 3 types of swimmers in triathlon: those that have a relatively high maximum speed to a lower threshold speed; those that have a relatively low maximum speed to a low threshold; those that have a relatively low maximum and threshold speed. Triathletes in the first and last groups often perform remarkably similarly in races, even though on paper those from the first are much better swimmers.*
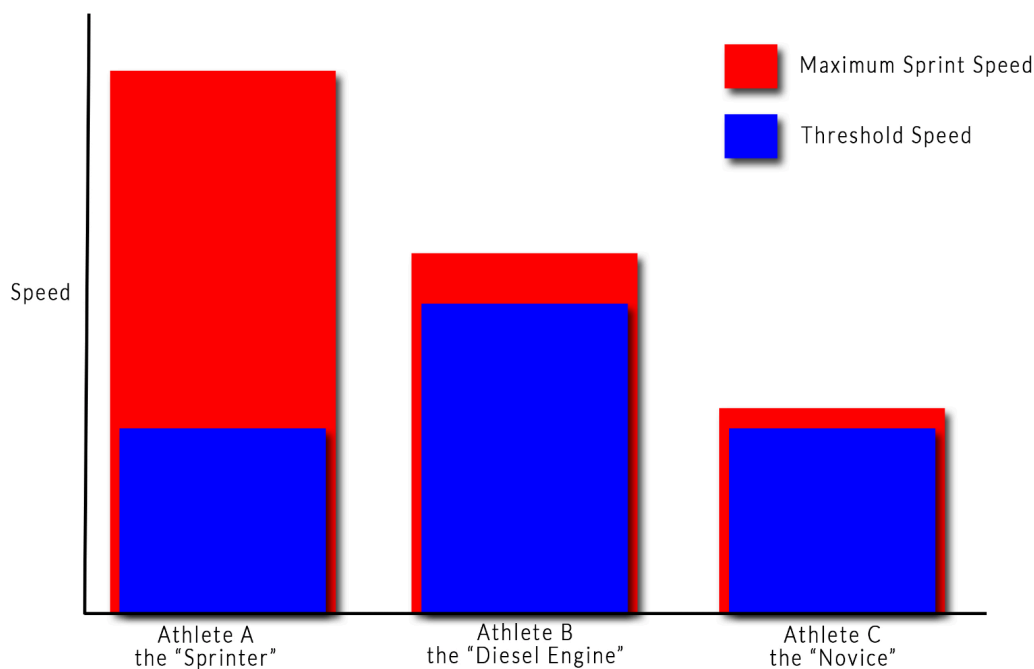
CSS training not only builds your distance swimming "diesel engine" but also contributes enormously to Pace Awareness. Many swimmers often set out too quickly in races and training only to fade tremendously.

With consistency in training, which includes working at chipping away at the CSS threshold sets, as swimmer can expect to improve 0.1 to 0.2 per 25m every week or two. Doesn't sound a like much of an improvement? 0.1 per 25m is equivalent to 0.4 seconds per 100m. After 20 weeks, that's a whopping 8 seconds per 100m, or 2min32 seconds over 1.9km half ironman. Of course the rate of improvement will depend on the swimmers existing background and experience but at Swim Lab we have had triathletes do just that.

Here are just a few of the many success stories from some Swim Lab swimmers:

Name	Pace Improvement		Period	Name	Pace Improvement		Period
Mary	2:27	2:06	2014-2016	Mandy	1:48	1:39	2014-2016
Evelyn	2:15	1:59	2016	Nick	1:46	1:38	2014-2016
Dave	2:17	1:58	2014-2015	Fed	1:41	1:35	2014-2016
Stuart	2:08	1:46	2013-2016	Jeff	1:40	1:30	2013-2016
Laurent	2:17	1:45	2015-2016	Ross	1:46	1:38	2015-2016
Margaret	1:54	1:44	2015-2016	Alec	1:35	1:29	2014-2016
Ben	1:56	1:43	2013-2016	Patrice	1:37	1:28	2015-2016
Damo	2:06	1:52	2013-2016	Marc	1:40	1:34	2014-2016
Rob	1:47	1:39	2014-2016	Mark	1:32	1:26	2014-2016
Ross	1:52	1:39	2013-2016	Toby	1:24	1:18	2014-2015

Unsurprisingly, these swimmers have managed these improvements due largely to their commitment and to consistency to training.

Race Prediction

Once you have established your CSS time, this can also be used to estimate your race time whether this be 750m, 1.5km, 1.9km, 3.8km, 5km etc. Surprisingly with great accuracy too.