

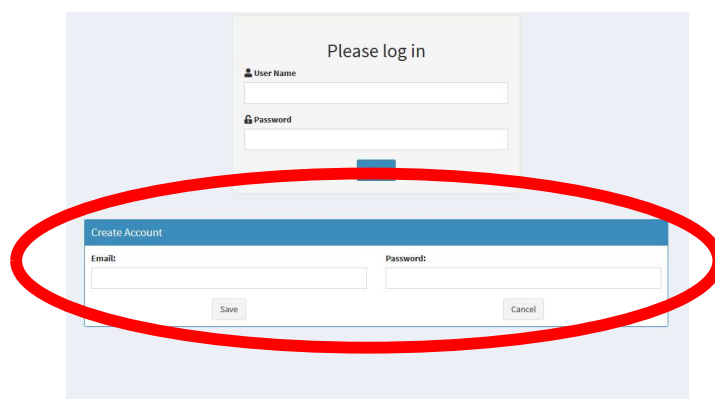
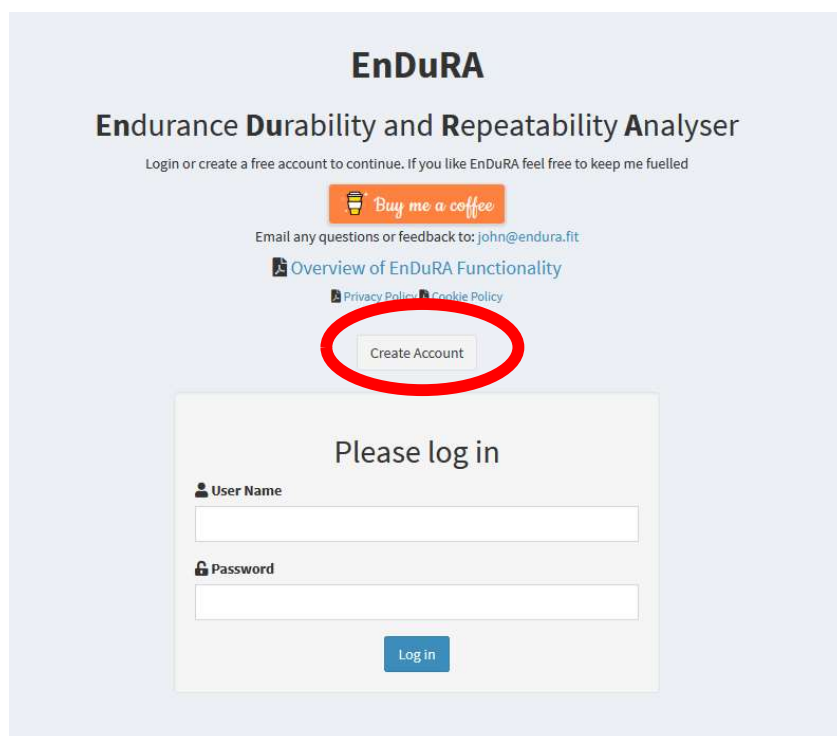
# Watts my CP

John Peters – 8<sup>th</sup> December 2021

Critical Power (CP), or Critical Speed (CS) for you runners, seems to be a hot topic in my social media echo chamber at the moment. It's certainly something we hang a number of other metrics off in EnDuRA. But how do you calculate your CP?

## First you need an EnDuRA Account

Well hopefully you've already done this, but if not its free and pretty straightforward. Go to <http://www.endura.fit> click on the "Create Account" button, then populate the blue box with a new user name and password.



A couple of things to note:

- Email and Username are the same thing (I've never got round to fixing this!).
- Email/Username is case sensitive when logging in.

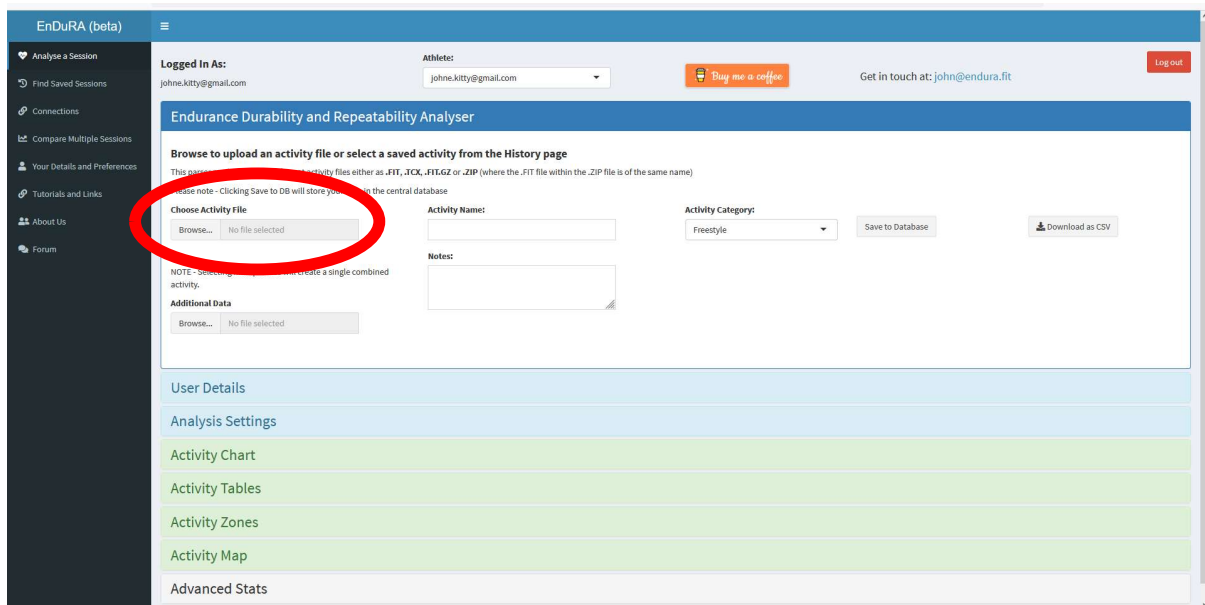
## Next you need some data

As the focus of this is calculating your CP what you really need are some data files (preferably FIT files) that contain some maximum efforts between 2 and 15 minutes.

There are two ways to get data into EnDuRA.

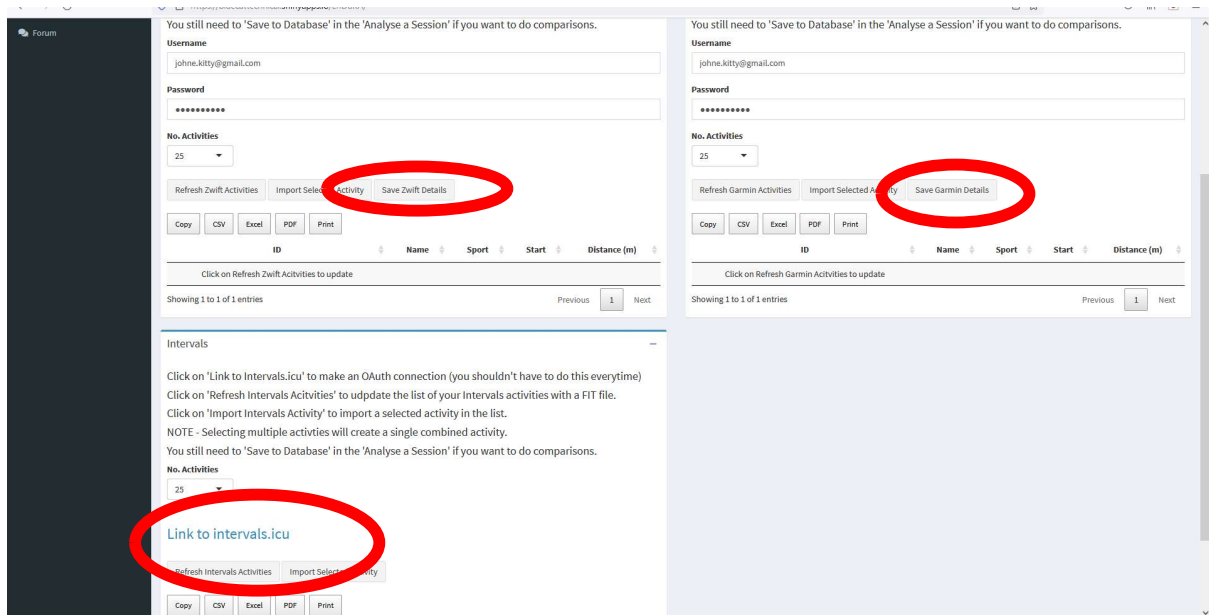
### Import downloaded files

On the “Analyse a Session” page you’ll see a “Choose Activity File” browse option towards the top left. Click on this, select a file to load, and after a bit of thinking by EnDuRA you’ll see your activity in all its glory.



### Connecting to another service

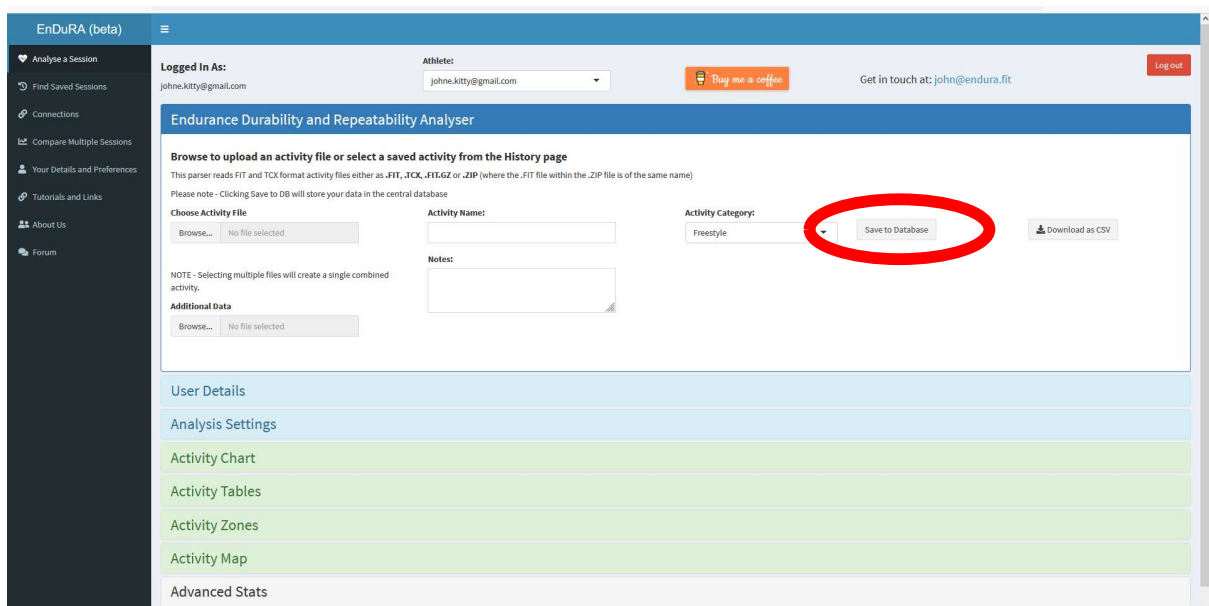
At the moment EnDuRA can connect to Zwift, Garmin and Intervals. These can be found on the connections page. Firstly create the connection by either entering and saving your Zwift/Garmin username and password, or instigating the authentication between EnDuRA and Intervals.



After this the process is the same no matter the third party app. Click on the “Refresh...Activities” button and you’ll see a table of recent activities. Select the one you want to import (and only one, selecting multiple binds them into a single activity) and hit the relevant Import button. After a bit of thinking you should see your activity in all its glory in the Analyse a Session page.

### Don’t forget to save to the database

This is the most important step! EnDuRA CP calculations are part of the activity comparison page, and this only works for activities saved to the database. So remember, after you’ve imported an activity hit the “Save to Database” button (feel free to give it a meaningful name and category if you want).



## OK I have some data, how do I get my CP?

Finally what this is all about! As I alluded to, the CP calculation is part of the activity comparison process. First you need to pick those activities you want to use, i.e. activities that include those maximal 2-15 minute efforts. The timeframe is up to you, it depends on what you want the result to represent. Is it “where am I at now?” (pick some more recent activities) or is it “what’s my best CP ever?”, or something else. What ever it is just be conscious of the activities you including in the analysis.

### So lets pick some activities

Go to the “Find Saved Sessions” page and pick some activities. A few tips to help you find the activities you’re interested in:

- The table is multi-select, just pick the ones you want
- Use the “Show 10 entries” option to see more (or less)
- Each column can be sorted using the little arrows at the top
- Use the search box to filter the activities in the table; useful if you’ve used key words in the title or category.

The screenshot shows the EnDuRA (beta) web application interface. The top navigation bar includes the EnDuRA (beta) logo, a menu icon, and a 'Log out' button. The sidebar on the left contains navigation options: Analyse a Session, Find Saved Sessions (active), Connections, Compare Multiple Sessions, Your Details and Preferences, Tutorials and Links, About Us, and Forum. The main content area is titled 'Options' and contains instructions: 'Select a single session and click Load to Analyse' and 'Select multiple sessions to Compare'. Below the instructions are buttons for 'Load from the Database', 'Clear Selections', and 'Delete Selected Activities'. The 'Sessions' section displays a table with 10 entries. The table has columns for User Name, File Name, Activity Type, Date, Duration, Name, and Category. The data is as follows:

User Name	File Name	Activity Type	Date	Duration	Name	Category
johnne.kitty@gmail.com	7354957271.zip	Running	2021-08-23	00:34:00	6min Assessment	Maximal Aerobic Power (MAP) Test
johnne.kitty@gmail.com	7222151603.zip	Running	2021-07-31	00:35:15	2 Mile Assessment	Maximal Aerobic Power (MAP) Test
johnne.kitty@gmail.com	7192054677.zip	Running	2021-07-26	00:22:00	6 Min Assessment	Maximal Aerobic Power (MAP) Test
johnne.kitty@gmail.com	765850741339724432.ft	Cycling	2021-03-08	00:56:28	step WU with sprint and 6min max	Maximal Aerobic Power (MAP) Test
johnne.kitty@gmail.com	8061796806.zip	Running	2021-01-06	00:46:17	6 minute Assessment	Maximal Aerobic Power (MAP) Test
johnne.kitty@gmail.com	4262459521.zip	Running	2019-11-18	00:32:00	6 minute assessment	Maximal Aerobic Power (MAP) Test

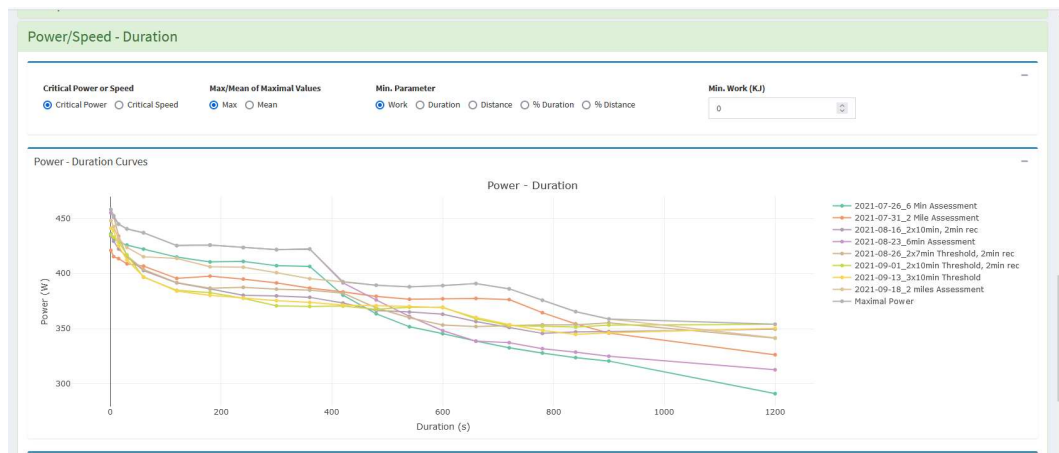
Showing 1 to 6 of 6 entries (filtered from 357 total entries) Previous 1 Next

### Now let “Compare Multiple Sessions”

Switch to the “Compare Multiple Session” page. Anything that you’ve selected in the table above (Find Saved Sessions) will automatically be include in the compare. If you want to change the activities go back to the “Find Saved Sessions” page and change your selection.

There’s a few options at the top of the Comparison page, but we can ignore these for now. That’s for another blog!

Scroll down the page until you can see “Power/Speed Duration” and click on the box to expand. The first thing you’ll see is a bunch of options, leave as they are for the moment, we’ll come back to them! Next you’ll see a chart showing your Power-Duration curve for each of the selected activities, plus one for the max across them all. You can filter in/out what you see in the chart by clicking on the items in the legend.



Ok, Very pretty, but Watts my CP?

Scroll down a little further to the next chart and we start to get an answer. The chart on the left shows your Work-Duration relationship, with a fitted line, and in the header, voila your CP!! (plus your W' as its part of the deal). Essentially what you've got is a calculated maximal power curves across a range of times. By default everything between 2 and 15 minutes is used.



Yeah but some of those efforts weren't really maximal

Its more than likely that you've not done an all out effort for each time period. The "slackers" are easy to spot as the ones below the orange line. Its easy to remove these from the calculation by unchecking the "Use" box in the middle table. Have a play, including and excluding different durations to see the impact on your CP and W'. This is the flexibility of EnDuRA.

The final table on the right gives your predicted values for different durations (essentially the orange line). A combination of using these and the actual values in the middle table should give you a good idea of what to enter in your EnDuRA parameters ("Your Details and Preferences" page). But take the 60 minutes (3600 seconds) value with a pinch of salt, I don't think the CP model works well much beyond 30 minutes.

And if you really want to know all of the values that made up that first Power-Duration chart you can see them in a table at the very bottom of the page. This might be useful to highlight

if one particular session is dominating the analysis (e.g. all your max efforts came from a single ride).

## But I'm a runner and don't have one of those fancy running power meters

Remember those options I told you to ignore, lets scroll back up to them. Everything else I've told you so far still stands (right from the very beginning of this blog). Just switch to Critical Speed and you have a CS and D' calculation.



## Hasn't there been some really interesting analysis in fatigue and CP?

Yes there has. Peter Leo, James Spragg et al have recently published some interesting research in this field, and that what some of those other options are for, i.e. what's my CP when I'm fatigued.

Pick the parameter you want to use as your limiter (Work, Duration, Distance, % Duration or % Distance) and then the limiting value. For example, to only count those portions of activities after 2000KJ have been burned, pick work and enter 2000; to only count the second half of an activity (in time) select % Duration and enter 50; and so on, you get the idea.

Min. Parameter  
 Work  Duration  Distance  % Duration  % Distance

Min. % Duration (0-100)  
50

## So what's that Max/Mean option about?

Phew, we're nearly there. That if you want to do everything I've just described but use the mean of the individual activity maximums instead.

## Could I use this to get a Team CP, say from a race?

Yes you could. Not sure of the validity or usefulness of the result, but just for fun if you upload all your riders files from a single race/stage and do all of the above you'll get a "Team CP".

## OK I know my CP (or CS) and my best efforts for key durations, now what do I do?

That is the topic of another blog that I'll hopefully get round to writing soon!