If you’re only going to read one line of this post let it be this one: `v0.6.0` of `SwimmeR` is now available from CRAN and it’s better now than ever before. But don’t just stop at one line though, grab that update and come along on this journey, deep into the heart of `SwimmeR`.

```
library(SwimmeR)
library(dplyr)
library(stringr)
library(flextable)

flextable_style <- function(x) {
  x %>%
    flextable() %>%
    bold(part = "header") %>% # bold header
    bg(bg = "#D3D3D3", part = "header") %>% # puts gray background behind
the header row
    align_nottext_col(align = "center", header = TRUE, footer = TRUE) %>%
# center alignment
    autofit()
}
```

The rest of this post, which I promise will be super interesting and even have jokes, is about the tidy framework, inconsistencies in source material, subcategories and my failure to get all those things to play nicely together in the context of `SwimmeR`. I realize calling it a failure makes it sound like I was lying a few lines ago when I said that `SwimmeR v0.6.0` is better than ever before, but I wasn’t. Don’t jump to conclusions.

Breaking Change

Before going any further though there’s one important, breaking, change. The output of `swim_parse` has been modified, such that the `Grade` column is renamed to `Age` and the `School` column is renamed to `Team`. These are frankly overdue changes, which reflect the broader applicability of `SwimmeR` outside the American high school swimming arena I first developed it for. My apologies and please adjust your work flows.

Tidy Data

Tidy is a way of organizing data that’s been championed by Hadley Wickham. He’s, I think indisputably, the most famous proponent of `R`, and from his post as Chief Scientist at RStudio he’s in a prime position to drive his personal philosophies forward. One of those philosophies is tidy data. He also has a distinctive first name, so you’ll often see him referred to simply as Hadley, like he’s Kobe or Madonna or something, but that’s neither here nor there.

Tidy data has several benefits.

1. It’s easy to explain. Tidy data is simply data where each row is a distinct observation, or event (like a swim), and each column contains one and only one variable, like a name, or a time.

2. It’s easy to represent in a table, or even a spreadsheet.

3. It’s super easy to work with in `R`. This is arguably because of tidy data’s relative simplicity of

structure, but it's also in some part because Hadley Wickham/RStudio release tons of free, excellent, packages that use (and enforce the norms of) tidy data.

In spite of what I see as tidy data's real utility, bemoaning the influence of Hadley Wickham/RStudio is something of a sport in the `R` blog-o-sphere. This is the Swimming + Data Science blog though, and the only sport we care about here is swimming (and also diving). I've got my hands way too full dealing with getting `SwimmeR` releases out, the International Swim League changing their results formats for no reason, and breaststrokers trying to cheat all the time to be complaining about someone releasing free tools. I need all the help I can get.

Back to `SwimmeR v0.6.0` and its many improvements…

Splits

`SwimmeR` can now read split times. Both the `swim_parse` and `swim_parse_ISL` now have another argument, called `splits`. Setting `splits = TRUE` will direct each function to attempt to read in splits. The default is `FALSE` so splits won't be collected unless you, the user, decide they should be.

In `swim_parse` there's another argument, `splits_length`. This is the length of pool at which the splits are recorded. It's usually `50` (the default).

```
file_50 <- read_results("http://www.section1swim.com/Results/BoysHS/2020
/Sec1/Single.htm")

df_50 <- swim_parse(file_50, splits = TRUE)

df_50 %>%
  filter(Event == "Men 100 Yard Butterfly") %>%
  select(Place, Name, Finals_Time, Split_50:Split_100) %>%
  head(3) %>%
  flextable_style()
```

Place	Name	Finals_Time	Split_50	Split_100
1	Chung, Hudson H	51.98	24.82	27.16
2	Laidlaw, John F	52.15	24.91	27.24
3	Sakharuk, Nikita V	52.71	24.73	27.98

Sometimes though `splits_length` should be set to `25`, because splits are taken every 25 meters or yards.

```
file_25 <- read_results("https://github.com/gpilgrim2670/Pilgrim_Data/raw/master
/SwimmeR%20Demo%20Files/7th-snsc-scm-2017-full-results.pdf")

df_25 <- swim_parse(file_25, avoid = c("MR\\:", "NR\\:"), splits = TRUE,
split_length = 25)
```

```
df_25 %>%
  filter(Event == "Women 100 SC Meter IM") %>%
  select(Place, Name, Finals_Time, Split_25:Split_100) %>%
  head(3) %>%
  flextable_style()
```

Place	Name	Finals_Time	Split_25	Split_50	Split_75	Split_100
1	*Ling, Jessica	1:05.58	13.45	17.21	19.16	15.76
2	HO, Hui Ting Natalie	1:07.31	13.32	16.90	21.06	16.03
3	Cheong, Chloe	1:07.76	13.74	17.01	21.27	15.74

This is new, exciting, and undoubtedly the most requested feature, so there you go people – enjoy!

Relay Swimmers

`SwimmeR` can also now capture relay swimmers, by setting the argument `relay_swimmers = TRUE` inside either `swim_parse` or `swim_parse_ISL`. Like `splits`, `relay_swimmers` defaults to `FALSE` – using it is optional.

```
df_relay <- swim_parse(file_50, relay_swimmers = TRUE)

df_relay %>%
  filter(Event == "Men 400 Yard Freestyle Relay") %>%
  select(Place, Team, Finals_Time, Relay_Swimmer_1:Relay_Swimmer_4) %>%
  head(3) %>%
  flextable_style()
```

Place	Team	Finals_Time	Relay_Swimmer_1	Relay_Swimmer_2	Relay_Swimmer_3	Relay_Swimmer_4
1	Ardsley-Hast-Edge-Dobbs-Irv	3:12.34	Lee, Christian	Andrews, Samuel T	Vincent, Connor J	Pierce, Adrien T
2	Horace Greeley	3:16.06	Chung, Hudson H	Sakharuk, Nikita V	McHugh, Luke P	Laidlaw, John F
3	Wappingers	3:17.31	McGregor, Kyle T	McGregor, Matthew J	Holan, Steve	Smith, Sebastian L

The Troubles

Splits

“All that sounds great”, I hear you saying, “and your examples worked flawlessly!” Wrong, wrong,

wrong. I picked those examples as traps. Splits can be trouble, as Ricky Berens well knows.

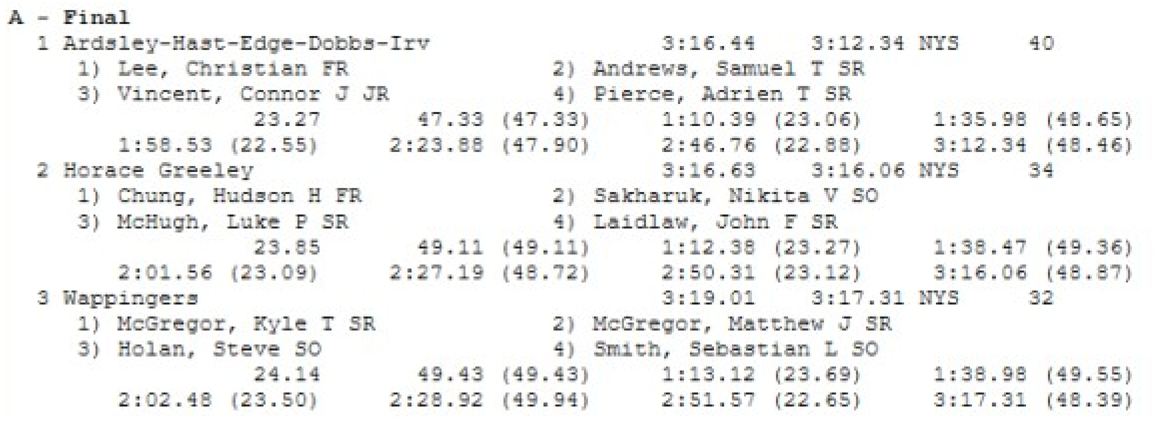
Not where you want a split

Here's the problem. `SwimmeR` reads in data from sources, but it also imposes a structure on that data, a tidy structure in fact. In versions prior to `v0.6.0` there was no issue with imposing a tidy structure, it didn't chafe at all, because the source data `SwimmeR` was reading in was fundamentally tidy. Each row was a swim, each column the corresponding event, or athlete name, or final time. Splits are different though.

There are two general types of splits, cumulative and non-cumulative. Cumulative splits work like this: The first 50 meters of your race takes you 29.00 seconds. The second 50 meters takes you 31.00 seconds. Your cumulative split for the 50 is 29.00, and for the 100 is 61.00 seconds (1:01.00). You keep going, your third 50 takes you 31.50 seconds, so your cumulative split for the 150 is 29.00 plus 31.00 plus 31.50, for a total of 92.50 seconds (1:32.50). That's all fine.

Non cumulative is the same, just without the adding. Your split for the 50 is still 29.00, for the next 50 (not the 100), it's 31.00, for the third 50 (not the 150) it's 31.50. This is fine too. `SwimmeR` prefers non-cumulative splits due to tidy principles – each split is it's own variable, rather than the splits being collections (sums, or accumulations) of other splits/variables but if only cumulative splits are available `SwimmeR` will take them.

Either cumulative or non-cumulative splits wouldn't be a problem, for `SwimmeR` or otherwise, and indeed both are often used together in swimming results, with non-cumulative printed inside parenthesis and cumulative outside. What about when the non-cumulative isn't quite non-cumulative? Sounds daft right, but that's the convention during relays. Take a look:



```
A - Final
  1 Ardsley-Hast-Edge-Dobbs-Irv                   3:16.44    3:12.34 NYS     40
     1) Lee, Christian FR              2) Andrews, Samuel T SR
     3) Vincent, Connor J JR           4) Pierce, Adrien T SR
                23.27       47.33 (47.33)     1:10.39 (23.06)     1:35.98 (48.65)
        1:58.53 (22.55)     2:23.88 (47.90)     2:46.76 (22.88)     3:12.34 (48.46)
  2 Horace Greeley                                3:16.63    3:16.06 NYS     34
     1) Chung, Hudson H FR             2) Sakharuk, Nikita V SO
     3) McHugh, Luke P SR              4) Laidlaw, John F SR
                23.85       49.11 (49.11)     1:12.38 (23.27)     1:38.47 (49.36)
        2:01.56 (23.09)     2:27.19 (48.72)     2:50.31 (23.12)     3:16.06 (48.87)
  3 Wappingers                                    3:19.01    3:17.31 NYS     32
     1) McGregor, Kyle T SR            2) McGregor, Matthew J SR
     3) Holan, Steve SO                4) Smith, Sebastian L SO
                24.14       49.43 (49.43)     1:13.12 (23.69)     1:38.98 (49.55)
        2:02.48 (23.50)     2:28.92 (49.94)     2:51.57 (22.65)     3:17.31 (48.39)
```

In the 1st place relay Christian Lee swims his first 50 in 23.27, then his next 50 in what? Not 47.33 – that's his total time, despite it being wrapped in parenthesis. Then Samuel Andrews dives in and he swims the third 50 in 23.06, for a total time 1:10.39. He swims his second 50 in – again, not 48.65, that's his cumulative 100. You see the problem. This problem is reproduced within the results from `swim_parse`.

```
df_50 %>%
  filter(Event == "Men 400 Yard Freestyle Relay") %>%
  select(Place, Team, Finals_Time, Split_50:Split_400) %>%
  head(3) %>%
  flextable_style()
```

Place	Team	Finals_Time	Split_50	Split_100	Split_150	Split_200	Split_250	Split_300	Split_350	Split_400
1	Ardsley-Hast-Edge-Dobbs-Irv	3:12.34	23.27	47.33	23.06	48.65	22.55	47.90	22.88	48.46
2	Horace Greeley	3:16.06	23.85	49.11	23.27	49.36	23.09	48.72	23.12	48.87
3	Wappingers	3:17.31	24.14	49.43	23.69	49.55	23.50	49.94	22.65	48.39

I could of course convert the cumulative splits to non-cumulative.

```
df_50 %>%
  rowwise() %>%
  mutate(
    Split_100 = case_when(
      str_detect(Event, "Men 400 Yard Freestyle Relay") ~
as.character(sec_format(Split_100) - sec_format(Split_50)),
      TRUE ~ Split_100
    ),
    Split_200 = case_when(
      str_detect(Event, "Men 400 Yard Freestyle Relay") ~
as.character(sec_format(Split_200) - sec_format(Split_150)),
      TRUE ~ Split_200
    ),
    Split_300 = case_when(
      str_detect(Event, "Men 400 Yard Freestyle Relay") ~
as.character(sec_format(Split_300) - sec_format(Split_250)),
      TRUE ~ Split_300
    ),
    Split_400 = case_when(
      str_detect(Event, "Men 400 Yard Freestyle Relay") ~
as.character(sec_format(Split_400) - sec_format(Split_350)),
      TRUE ~ Split_400
    )
  ) %>%
  filter(Event == "Men 400 Yard Freestyle Relay") %>%
  select(Place, Team, Finals_Time, Split_50:Split_400) %>%
  head(3) %>%
  flextable_style()
```

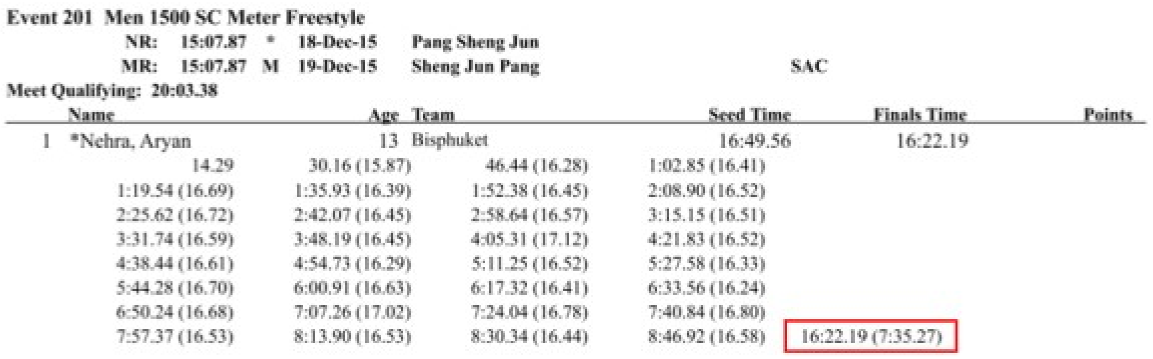
Place	Team	Finals_Time	Split_50	Split_100	Split_150	Split_200	Split_250	Split_300	Split_350	Split_400
1	Ardsley-Hast-Edge-Dobbs-Irv	3:12.34	23.27	24.06	23.06	25.59	22.55	25.35	22.88	25.58
2	Horace Greeley	3:16.06	23.85	25.26	23.27	26.09	23.09	25.63	23.12	25.75
3	Wappingers	3:17.31	24.14	25.29	23.69	25.86	23.50	26.44	22.65	25.74

I can do the conversion here, and I could have built the conversion into `swim_parse` and `swim_parse_ISL`, but there's a tension, between the extremely useful tidy framework on one hand, and fidelity to the source material on the other. `SwimmeR` thus far gives users the choice. You can choose to read in splits (and remember, the default is not to), and then you can choose how you treat splits if you decide to read them in. You can choose between tidiness and fidelity.

I may bundle the above code, for converting split types, into a future version of `SwimmeR` but if I do its use will also be at the discretion of the user.

Even deeper is the fact that (for example), the third 50 of a 200 Freestyle and the third 50 of a 200 Freestyle relay are both recorded in the same column (`Split_150`) but they're fundamentally different, because the third 50 on a relay begins with a relay pickup (a start from the blocks), and involves a fresh swimmer, where the third 50 in the individual event starts from a turn and involves the same swimmer who swam the first two 50s. One column contains two variables. That's a no-no. I could put relay splits in their own columns, but I'd have to break them up by relay type too. The 2nd 50 of a 200 Freestyle Relay is almost always done with the front crawl stroke (freestyle), but the 2nd 50 of a 200 Medley Relay is required to be swam breaststroke – different animals all together. Differentiating them means a lot lot lot of columns/variables.

And what if the length at which splits are taken varies within a meet, or even within a race? Have a look at this:



```
Event 201  Men 1500 SC Meter Freestyle
          NR:   15:07.87  *  18-Dec-15   Pang Sheng Jun
          MR:   15:07.87  M  19-Dec-15   Sheng Jun Pang                    SAC
Meet Qualifying:  20:03.38
     Name                          Age  Team                  Seed Time      Finals Time        Points
  1  *Nehra, Aryan                  13  Bisphuket              16:49.56         16:22.19
                 14.29        30.16 (15.87)    46.44 (16.28)   1:02.85 (16.41)
         1:19.54 (16.69)    1:35.93 (16.39)  1:52.38 (16.45)   2:08.90 (16.52)
         2:25.62 (16.72)    2:42.07 (16.45)  2:58.64 (16.57)   3:15.15 (16.51)
         3:31.74 (16.59)    3:48.19 (16.45)  4:05.31 (17.12)   4:21.83 (16.52)
         4:38.44 (16.61)    4:54.73 (16.29)  5:11.25 (16.52)   5:27.58 (16.33)
         5:44.28 (16.70)    6:00.91 (16.63)  6:17.32 (16.41)   6:33.56 (16.24)
         6:50.24 (16.68)    7:07.26 (17.02)  7:24.04 (16.78)   7:40.84 (16.80)
         7:57.37 (16.53)    8:13.90 (16.53)  8:30.34 (16.44)   8:46.92 (16.58)  16:22.19 (7:35.27)
```

The splits are by 25 for the first 800m of this 1500m freestyle, but for the last 700 there's only one split, for the whole 700m. `swim_parse` faithfully reproduces this, except that it doesn't know that suddenly the split length has changed mid-race. The result is a column labeled `Split_825` that isn't actually the 825m split.

```
df_25 %>%
  filter(Event == "Men 1500 SC Meter Freestyle") %>%
  select(Place, Name, Finals_Time, Split_700:Split_825) %>%
  head(3) %>%
  flextable_style()
```

Place	Name	Finals_Time	Split_700	Split_725	Split_750	Split_775	Split_800	Split_825
1	*Nehra, Aryan	16:22.19	16.80	16.53	16.53	16.44	16.58	7:35.27
2	Cheng, Jimmy	16:49.64	17.35	16.63	16.76	17.21	17.17	7:53.87
3	Abraham, Levente	17:06.60	17.64	17.51	17.63	17.48	17.65	8:03.36

There's nothing I can do here – I can't recreate splits that aren't included in some form in the source data. You'll just have to know what's going on in your results.

For further discussion of potential issues with `splits` please see `vignette("SwimmeR")`.

Relay Swimmers

Relay swimmers aren't anywhere near as troublesome as splits, but they're still in tension with tidy principles. Let's say you were interested in what races a particular athlete had participated in. It's easy to `filter` or in some other way subset the data based on `Name`. With `relay_swimmers = TRUE` though that athlete's name might be in `Name` or it might be in one of the relay swimmer columns. Having one variable (athlete name) in multiple columns is not tidy.

I could put relay swimmers in the names columns, but then what to do about their times? They don't have a `Finals_Time` in the normal sense, only their splits, and as you've just read that's a whole other mess.

Again my approach here has been reasonable fidelity to the results, and letting users decide if they want to opt into tidy troubles (by affirmatively setting `relay_swimmers = TRUE`).