

Lists

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Outline for today:

- 1)Recap of lists
- 2)How to assess *and* access lists
- 3)Doing things with lists

I. Recap of lists

R lists

- **Are a bit of a mess...**
 - Can contain:
 - different types of data (character, integers, etc.)
 - different lengths of data
 - other lists...

```
> str(got_chars)
List of 30
$ :List of 18
..$ url      : chr "https://www.anapioficeandfire.com/api/characters/1022"
..$ id       : int 1022
..$ name     : chr "Theon Greyjoy"
..$ gender   : chr "Male"
..$ culture  : chr "Ironborn"
..$ born     : chr "In 278 AC or 279 AC, at Pyke"
..$ died     : chr ""
..$ alive    : logi TRUE
..$ titles   : chr [1:3] "Prince of Winterfell" "Captain of Sea Bitch" "Lord of the Iron Islands (by law of the green lands)"
..$ aliases  : chr [1:4] "Prince of Fools" "Theon Turncloak" "Reek" "Theon Kinslayer"
..$ father   : chr ""
..$ mother   : chr ""
..$ spouse   : chr ""
..$ allegiances: chr "House Greyjoy of Pyke"
..$ books    : chr [1:3] "A Game of Thrones" "A Storm of Swords" "A Feast for Crows"
..$ povBooks : chr [1:2] "A Clash of Kings" "A Dance with Dragons"
..$ tvSeries : chr [1:6] "Season 1" "Season 2" "Season 3" "Season 4" ...
..$ playedBy : chr "Alfie Allen"
$ :List of 18
..$ url      : chr "https://www.anapioficeandfire.com/api/characters/1052"
..$ id       : int 1052
..$ name     : chr "Tyrion Lannister"
..$ gender   : chr "Male"
..$ culture  : chr ""
..$ born     : chr "In 273 AC, at Casterly Rock"
..$ died     : chr ""
..$ alive    : logi TRUE
..$ titles   : chr [1:2] "Acting Hand of the King (former)" "Master of Coin (former)"
..$ aliases  : chr [1:11] "The Imp" "Halfman" "The boyman" "Giant of Lannister" ...
..$ father   : chr ""
..$ mother   : chr ""
..$ spouse   : chr "https://www.anapioficeandfire.com/api/characters/2044"
..$ allegiances: chr "House Lannister of Casterly Rock"
..$ books    : chr [1:2] "A Feast for Crows" "The World of Ice and Fire"
..$ povBooks : chr [1:4] "A Game of Thrones" "A Clash of Kings" "A Storm of Swords" "A Dance with Dragons"
..$ tvSeries : chr [1:6] "Season 1" "Season 2" "Season 3" "Season 4" ...
..$ playedBy : chr "Peter Dinklage"
```

2. How to assess *and* access

Assessing lists

<https://purrr.tidyverse.org/>

<https://github.com/jennybc/repurrrsive>



```
[[30]]$name
[1] "Sansa Stark"

[[30]]$gender
[1] "Female"

[[30]]$culture
[1] "Northmen"

[[30]]$born
[1] "In 286 AC, at Winterfell"

[[30]]$died
[1] ""

[[30]]$alive
[1] TRUE

[[30]]$titles
[1] "Princess"

[[30]]$aliases
[1] "Little bird" "Alayne Stone" "Jonquil"

[[30]]$father
[1] ""

[[30]]$mother
[1] ""

[[30]]$spouse
[1] "https://www.anapiofire.com/api/characters/1052"

[[30]]$allegiances
[1] "House Baelish of Harrenhal" "House Stark of Winterfell"

[[30]]$books
[1] "A Dance with Dragons"

[[30]]$povBooks
[1] "A Game of Thrones" "A Clash of Kings" "A Storm of Swords" "A Feast for Crows"

[[30]]$tvSeries
[1] "Season 1" "Season 2" "Season 3" "Season 4" "Season 5" "Season 6"

[[30]]$playedBy
[1] "Sophie Turner"
```

Just calling the list does not usually
give you a usable output...

`str()` is your friend for basic list assessment

- `str(list, list.len = n)`


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..$ born     : chr "In 278 AC or 279 AC, at Pyke"
..$ died     : chr ""
..$ alive    : logi TRUE
..$ titles   : chr [1:3] "Prince of Winterfell" "Captain of Sea Bitch" "Lord of the Iron Islands (by law of the green lands)"
..$ aliases  : chr [1:4] "Prince of Fools" "Theon Turncloak" "Reek" "Theon Kinslayer"
..$ father   : chr ""
..$ mother   : chr ""
..$ spouse   : chr ""
..$ allegiances: chr "House Greyjoy of Pyke"
..$ books    : chr [1:3] "A Game of Thrones" "A Storm of Swords" "A Feast for Crows"
..$ povBooks : chr [1:2] "A Clash of Kings" "A Dance with Dragons"
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..$ father   : chr ""
..$ mother   : chr ""
..$ spouse   : chr "https://www.anapioficeandfire.com/api/characters/2044"
..$ allegiances: chr "House Lannister of Casterly Rock"
..$ books    : chr [1:2] "A Feast for Crows" "The World of Ice and Fire"
..$ povBooks : chr [1:4] "A Game of Thrones" "A Clash of Kings" "A Storm of Swords" "A Dance with Dragons"
..$ tvSeries : chr [1:6] "Season 1" "Season 2" "Season 3" "Season 4" ...
..$ playedBy : chr "Peter Dinklage"
```

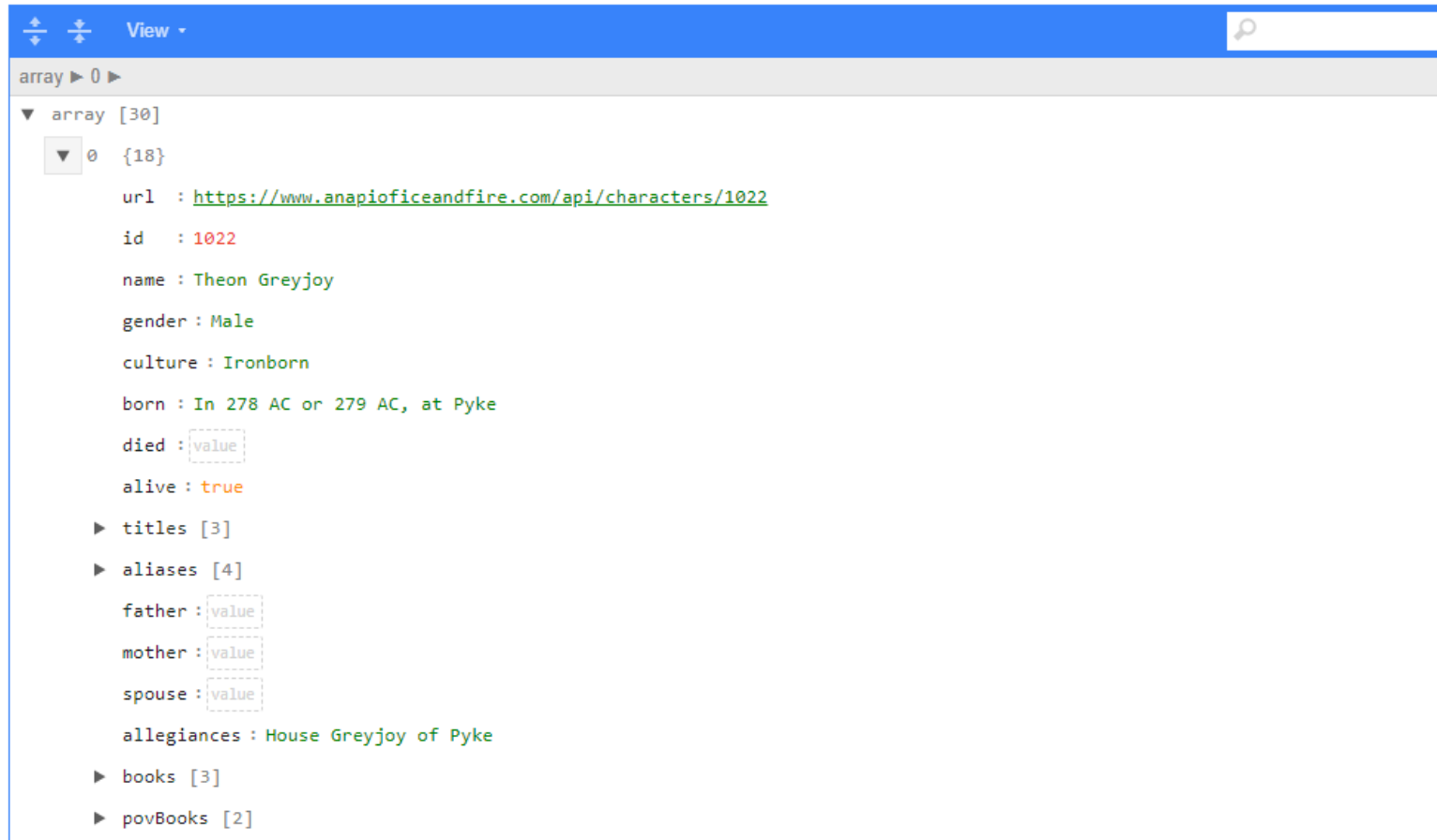
```
> str(got_chars, list.len = 5)
List of 30
 $ :List of 18
  ..$ url      : chr "https://www.anapioficeandfire.com/api/characters/1022"
  ..$ id       : int 1022
  ..$ name     : chr "Theon Greyjoy"
  ..$ gender   : chr "Male"
  ..$ culture  : chr "Ironborn"
  .. [list output truncated]
 $ :List of 18
  ..$ url      : chr "https://www.anapioficeandfire.com/api/characters/1052"
  ..$ id       : int 1052
  ..$ name     : chr "Tyrion Lannister"
  ..$ gender   : chr "Male"
  ..$ culture  : chr ""
  .. [list output truncated]
 $ :List of 18
  ..$ url      : chr "https://www.anapioficeandfire.com/api/characters/1074"
  ..$ id       : int 1074
  ..$ name     : chr "Victarion Greyjoy"
  ..$ gender   : chr "Male"
  ..$ culture  : chr "Ironborn"
  .. [list output truncated]
```

Listviewer

<https://github.com/timelyportfolio/listviewer>

A package that let's you interact with lists

`listviewer::jsonedit(got_chars, mode = "view")`



map() – a versatile tool

- **You can do a lot with map() and it's brethren – it can replace for loops and is a super powerful and concise means of functional programming!**

See here for more on this awesome tool: <https://r4ds.had.co.nz/iteration.html#the-map-functions>

- **map(**

*.x = list or vector of things you want to iterate, (e.g. **your list**)*

*.f = function or formula (or with lists, a component within – e.g. “**name**” or **3**)*

... = other options passed to your function

)

```
> map(got_chars, "name")  
[[1]]  
[1] "Theon Greyjoy"  
  
[[2]]  
[1] "Tyrion Lannister"  
  
[[3]]  
[1] "Victarion Greyjoy"  
  
[[4]]  
[1] "Will"
```

```
> map(got_chars, 3)  
[[1]]  
[1] "Theon Greyjoy"  
  
[[2]]  
[1] "Tyrion Lannister"  
  
[[3]]  
[1] "Victarion Greyjoy"  
  
[[4]]  
[1] "Will"
```

What about multiple elements of a list?

- We can use **map()** to do this too:
- Note that **.f = `[`** here, which is used to index
 - alternatively, you can use **magrittr::extract** in place of **`[`**
- We can use the **...** to specify the vector of elements we want

```
> map(got_chars, `[`, c("name", "culture", "gender", "born"))
[[1]]
[[1]]$name
[1] "Theon Greyjoy"

[[1]]$culture
[1] "Ironborn"

[[1]]$gender
[1] "Male"

[[1]]$born
[1] "In 278 AC or 279 AC, at Pyke"

[[2]]
[[2]]$name
[1] "Tyrion Lannister"

[[2]]$culture
[1] ""

[[2]]$gender
[1] "Male"

[[2]]$born
[1] "In 273 AC, at Casterly Rock"
```

Accessing lists using base R



Accessing lists using purr's map()

- **map()** always returns a list as output
- **There are different flavours of map() that give different outputs though**
 - **map_chr()** = character vector
 - **map_dbl()** or **map_int()** = numbers
 - **map_lgl()** = logical vector
 - **map_dfr()** = outputs a dataframe! (more on this later)

```
> names <- map_chr(got_chars, "name")
> names
[1] "Theon Greyjoy"      "Tyrion Lannister"  "Victarion Greyjoy" "Will"              "Areo Hotah"        "Chett"
[7] "Cressen"           "Arianne Martell"  "Daenerys Targaryen" "Davos Seaworth"    "Arya Stark"        "Arys Oakheart"
[13] "Asha Greyjoy"      "Barristan Selmy"  "Varamyr"           "Brandon Stark"     "Brienne of Tarth"  "Catelyn Stark"
[19] "Cersei Lannister"  "Eddard Stark"     "Jaime Lannister"   "Jon Connington"    "Jon Snow"          "Aeron Greyjoy"
[25] "Kevan Lannister"   "Melisandre"       "Merrett Frey"      "Quentyn Martell"   "Samwell Tarly"     "Sansa Stark"
```


3. Getting to dataframe heaven

map_dfr(), our saviour

```
> map_dfr(got_chars, `[`, c("name", "culture", "gender", "id", "born", "alive"))
# A tibble: 30 x 6
```

	name <chr>	culture <chr>	gender <chr>	id <int>	born <chr>	alive <lgl>
1	Theon Greyjoy	"Ironborn"	Male	1022	"In 278 AC or 279 AC, at Pyke"	TRUE
2	Tyrion Lannister	" "	Male	1052	"In 273 AC, at Casterly Rock"	TRUE
3	Victarion Greyjoy	"Ironborn"	Male	1074	"In 268 AC or before, at Pyke"	TRUE
4	Will	" "	Male	1109	" "	FALSE
5	Areo Hotah	"Norvoshi"	Male	1166	"In 257 AC or before, at Norvos"	TRUE
6	Chett	" "	Male	1267	"At Hag's Mire"	FALSE
7	Cressen	" "	Male	1295	"In 219 AC or 220 AC"	FALSE
8	Arianne Martell	"Dornish"	Female	130	"In 276 AC, at Sunspear"	TRUE
9	Daenerys Targaryen	"Valyrian"	Female	1303	"In 284 AC, at Dragonstone"	TRUE
10	Davos Seaworth	"Westeros"	Male	1319	"In 260 AC or before, at King's Landing"	TRUE

```
# ... with 20 more rows
```

Exercise time!

- See the exercises in “Exercises.R”



Summary

- Lists can be pretty scary
- purrr has some great tools for dealing with lists