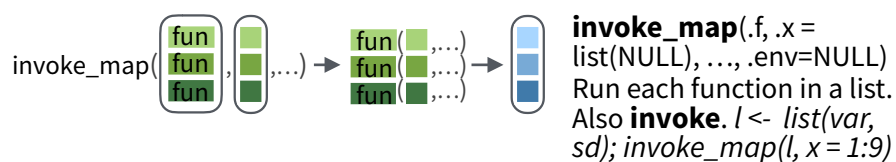
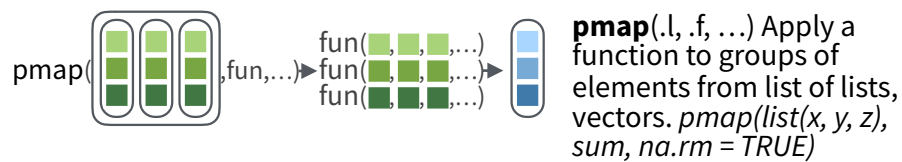
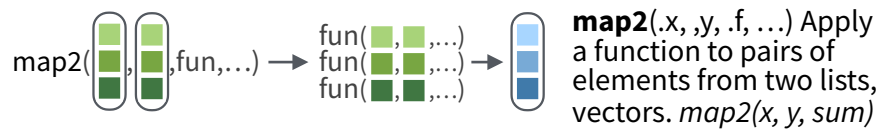
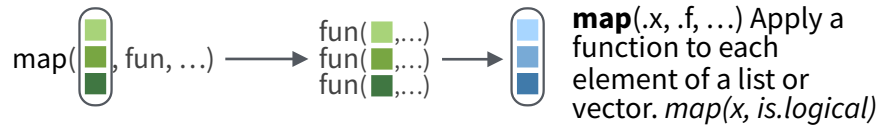


Apply functions with purrr : : CHEAT SHEET



Apply Functions

Map functions apply a function iteratively to each element of a list or vector.



lmap(.x, .f, ...) Apply function to each list-element of a list or vector.

imap(.x, .f, ...) Apply .f to each element of a list or vector and its index.

OUTPUT

map(), **map2()**, **pmap()**, **imap** and **invoke_map** each return a list. Use a suffixed version to return the results as a specific type of flat vector, e.g. **map2_chr**, **pmap_lgl**, etc.

Use **walk**, **walk2**, and **pwalk** to trigger side effects. Each return its input invisibly.

function	returns
map	list
map_chr	character vector
map_dbl	double (numeric) vector
map_dfc	data frame (column bind)
map_dfr	data frame (row bind)
map_int	integer vector
map_lgl	logical vector
walk	triggers side effects, returns the input invisibly

SHORTCUTS - within a purrr function:

"name" becomes **function(x) x[["name"]]**, e.g. *map(l, "a")* extracts a from each element of l

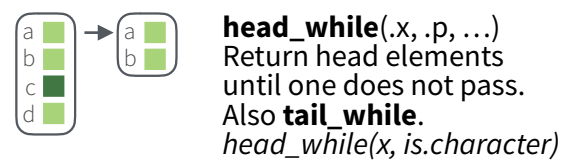
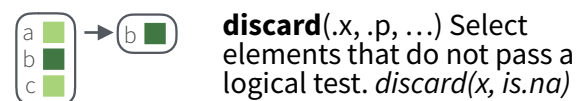
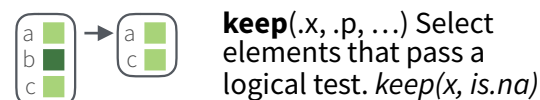
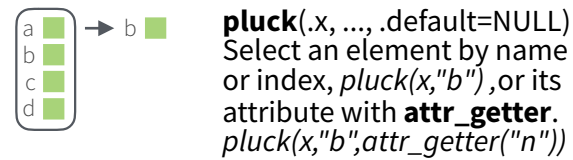
~ .x .y becomes **function(.x, .y) .x .y**, e.g. *map2(l, p, ~.x+.y)* becomes *map2(l, p, function(l, p) l + p)*

~ .x becomes **function(x) x**, e.g. *map(l, ~ 2+.x)* becomes *map(l, function(x) 2 + x)*

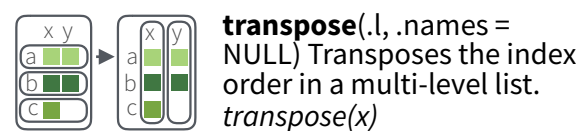
~ ..1 ..2 etc becomes **function(..1, ..2, etc) ..1 ..2 etc**, e.g. *pmap(list(a, b, c), ~..3+..1-..2)* becomes *pmap(list(a, b, c), function(a, b, c) c + a - b)*

Work with Lists

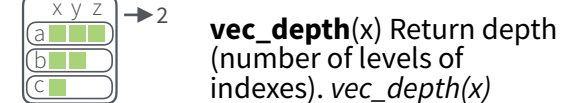
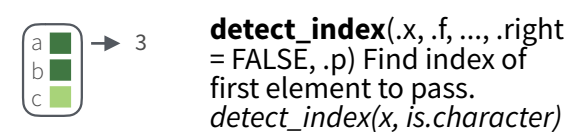
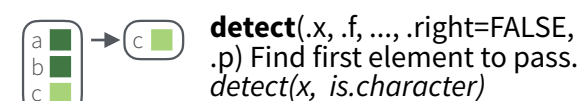
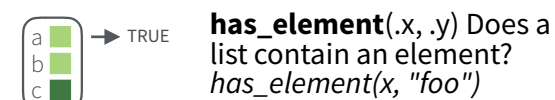
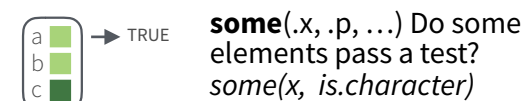
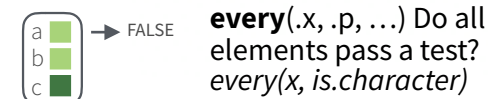
FILTER LISTS



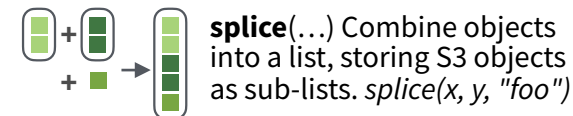
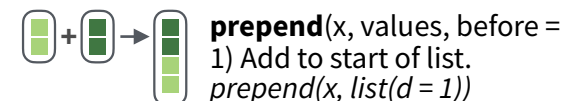
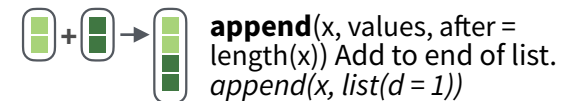
RESHAPE LISTS



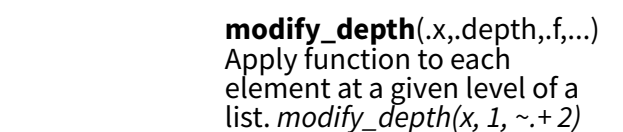
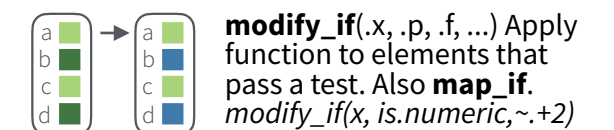
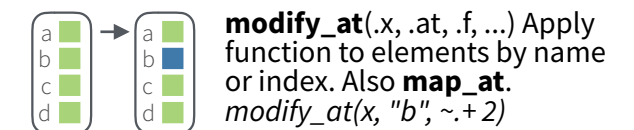
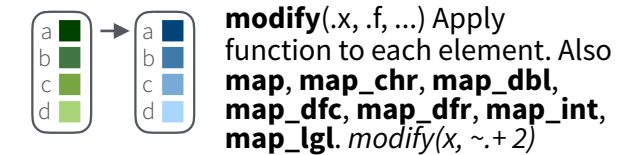
SUMMARISE LISTS



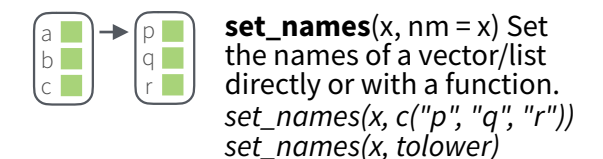
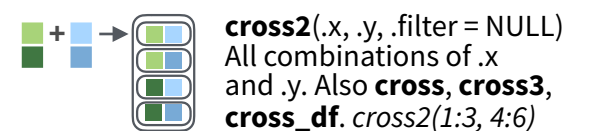
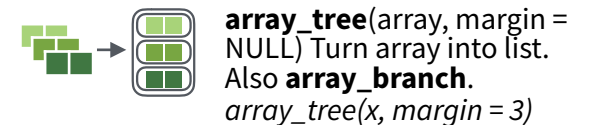
JOIN (TO) LISTS



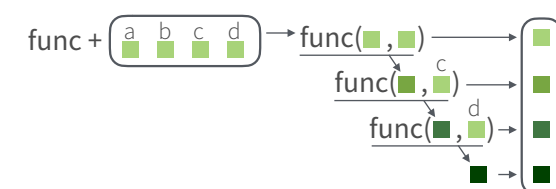
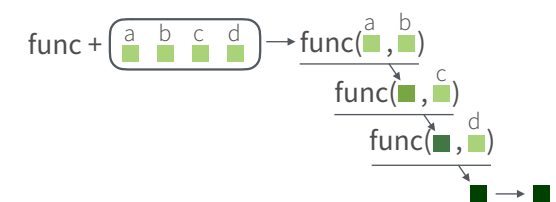
TRANSFORM LISTS



WORK WITH LISTS



Reduce Lists



Modify function behavior

compose() Compose multiple functions.

lift() Change the type of input a function takes. Also **lift_dl**, **lift_dv**, **lift_ld**, **lift_lv**, **lift_vd**, **lift_vl**.

rerun() Rerun expression n times.

negate() Negate a predicate function (a pipe friendly!)

partial() Create a version of a function that has some args preset to values.

safely() Modify func to return list of results and errors.

quietly() Modify function to return list of results, output, messages, warnings.

possibly() Modify function to return default value whenever an error occurs (instead of error).





Nested Data

A **nested data frame** stores individual tables within the cells of a larger, organizing table.

Species	data
setosa	<tibble [50 x 4]>
versicolor	<tibble [50 x 4]>
virginica	<tibble [50 x 4]>

"cell" contents

Sepal.L	Sepal.W	Petal.L	Petal.W
5.1	3.5	1.4	0.2
4.9	3.0	1.4	0.2
4.7	3.2	1.3	0.2
4.6	3.1	1.5	0.2
5.0	3.6	1.4	0.2

n_iris\$data[[1]]

Sepal.L	Sepal.W	Petal.L	Petal.W
7.0	3.2	4.7	1.4
6.4	3.2	4.5	1.5
6.9	3.1	4.9	1.5
5.5	2.3	4.0	1.3
6.5	2.8	4.6	1.5

n_iris\$data[[2]]

Sepal.L	Sepal.W	Petal.L	Petal.W
6.3	3.3	6.0	2.5
5.8	2.7	5.1	1.9
7.1	3.0	5.9	2.1
6.3	2.9	5.6	1.8
6.5	3.0	5.8	2.2

n_iris\$data[[3]]

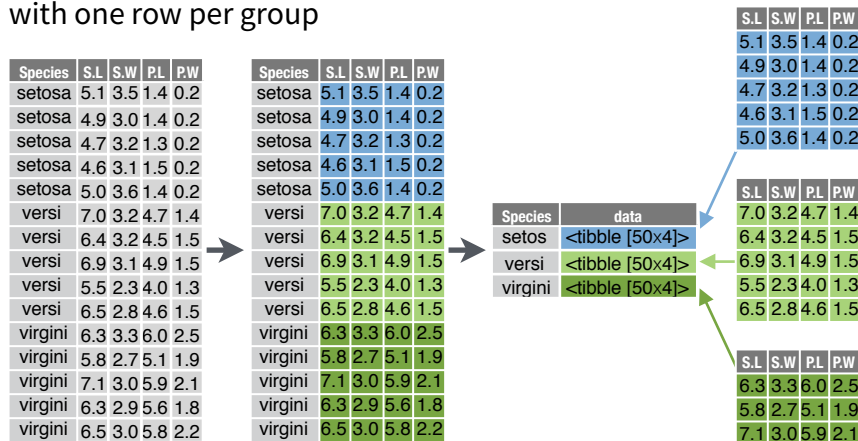
Sepal.L	Sepal.W	Petal.L	Petal.W
6.3	3.3	6.0	2.5
5.8	2.7	5.1	1.9
7.1	3.0	5.9	2.1
6.3	2.9	5.6	1.8
6.5	3.0	5.8	2.2

Use a nested data frame to:

- preserve relationships between observations and subsets of data
- manipulate many sub-tables at once with the **purrr** functions **map()**, **map2()**, or **pmap()**.

Use a two step process to create a nested data frame:

1. Group the data frame into groups with **dplyr::group_by()**
2. Use **nest()** to create a nested data frame with one row per group



```
n_iris <- iris %>% group_by(Species) %>% nest()
```

tidyr::nest(data, ..., .key = data)
For grouped data, moves groups into cells as data frames.

Unnest a nested data frame with **unnest()**:



```
n_iris %>% unnest()
```

tidyr::unnest(data, ..., .drop = NA, .id=NULL, .sep=NULL)
Unnests a nested data frame.

List Column Workflow

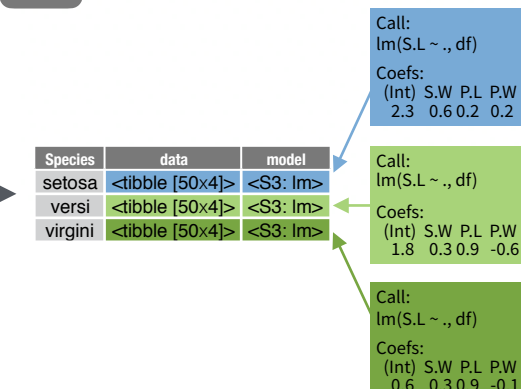
Nested data frames use a **list column**, a list that is stored as a column vector of a data frame. A typical **workflow** for list columns:

1 Make a list column

Species	S.L	S.W	P.L	P.W
setosa	5.1	3.5	1.4	0.2
setosa	4.9	3.0	1.4	0.2
setosa	4.7	3.2	1.3	0.2
setosa	4.6	3.1	1.5	0.2
setosa	5.0	3.6	1.4	0.2
versi	7.0	3.2	4.7	1.4
versi	6.4	3.2	4.5	1.5
versi	6.9	3.1	4.9	1.5
versi	5.5	2.3	4.0	1.3
virgini	6.3	3.3	6.0	2.5
virgini	5.8	2.7	5.1	1.9
virgini	7.1	3.0	5.9	2.1
virgini	6.3	2.9	5.6	1.8

```
n_iris <- iris %>%
  group_by(Species) %>%
  nest()
```

2 Work with list columns



```
mod_fun <- function(df)
  lm(Sepal.Length ~ ., data = df)

m_iris <- n_iris %>%
  mutate(model = map(data, mod_fun))
```

3 Simplify the list column

Species	beta
setosa	2.35
versi	1.89
virgini	0.69

```
b_fun <- function(mod)
  coefficients(mod)[[1]]

m_iris %>% transmute(Species,
  beta = map_dbl(model, b_fun))
```

1. MAKE A LIST COLUMN - You can create list columns with functions in the **tibble** and **dplyr** packages, as well as **tidyr**'s **nest()**

tibble::tribble(...)

Makes list column when needed

```
tribble(~max, ~seq,
  3, 1:3,
  4, 1:4,
  5, 1:5)
```

tibble::tibble(...)

Saves list input as list columns

```
tibble(max = c(3, 4, 5), seq = list(1:3, 1:4, 1:5))
```

tibble::enframe(x, name="name", value="value")

Converts multi-level list to tibble with list cols

```
enframe(list('3'=1:3, '4'=1:4, '5'=1:5), 'max', 'seq')
```

dplyr::mutate(data, ...) Also **transmute()**

Returns list col when result returns list.

```
mtcars %>% mutate(seq = map(cyl, seq))
```

dplyr::summarise(data, ...)

Returns list col when result is wrapped with **list()**

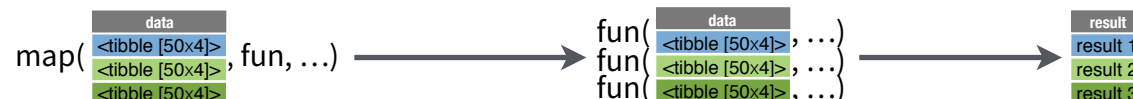
```
mtcars %>% group_by(cyl) %>%
  summarise(q = list(quantile(mpg)))
```

2. WORK WITH LIST COLUMNS - Use the **purrr** functions **map()**, **map2()**, and **pmap()** to apply a function that returns a result element-wise to the cells of a list column. **walk()**, **walk2()**, and **pwalk()** work the same way, but return a side effect.

purrr::map(x, .f, ...)

Apply .f element-wise to .x as .f(.x)

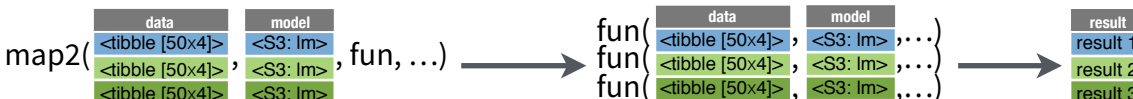
```
n_iris %>% mutate(n = map(data, dim))
```



purrr::map2(x, .y, .f, ...)

Apply .f element-wise to .x and .y as .f(.x, .y)

```
m_iris %>% mutate(n = map2(data, model, list))
```



purrr::pmap(.l, .f, ...)

Apply .f element-wise to vectors saved in .l

```
m_iris %>%
  mutate(n = pmap(list(data, model, data), list))
```



3. SIMPLIFY THE LIST COLUMN (into a regular column)

Use the **purrr** functions **map_lgl()**, **map_int()**, **map_dbl()**, **map_chr()**, as well as **tidyr**'s **unnest()** to reduce a list column into a regular column.

purrr::map_lgl(x, .f, ...)

Apply .f element-wise to .x, return a logical vector

```
n_iris %>% transmute(n = map_lgl(data, is.matrix))
```

purrr::map_int(x, .f, ...)

Apply .f element-wise to .x, return an integer vector

```
n_iris %>% transmute(n = map_int(data, nrow))
```

purrr::map_dbl(x, .f, ...)

Apply .f element-wise to .x, return a double vector

```
n_iris %>% transmute(n = map_dbl(data, nrow))
```

purrr::map_chr(x, .f, ...)

Apply .f element-wise to .x, return a character vector

```
n_iris %>% transmute(n = map_chr(data, nrow))
```

