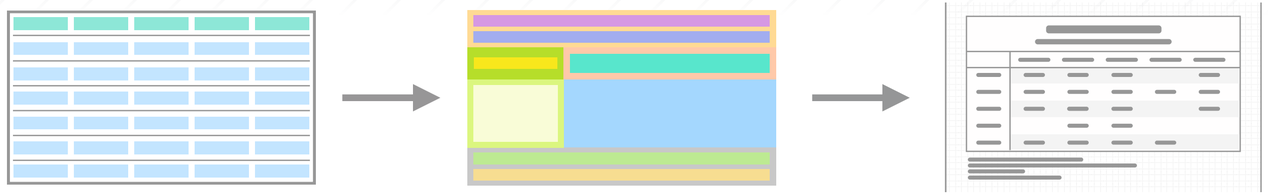
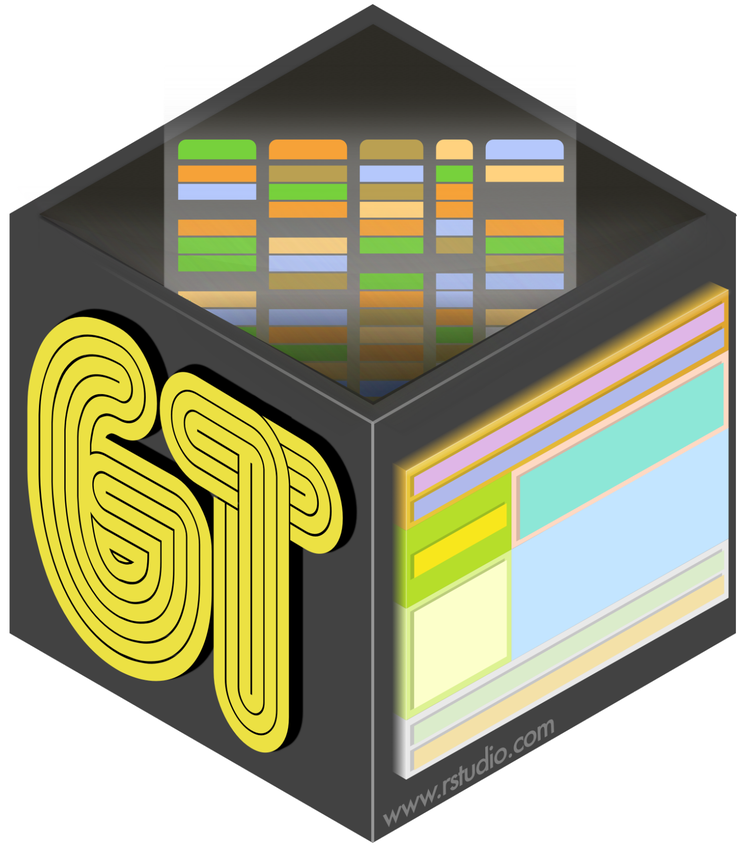
An Introduction to the **gt** Package



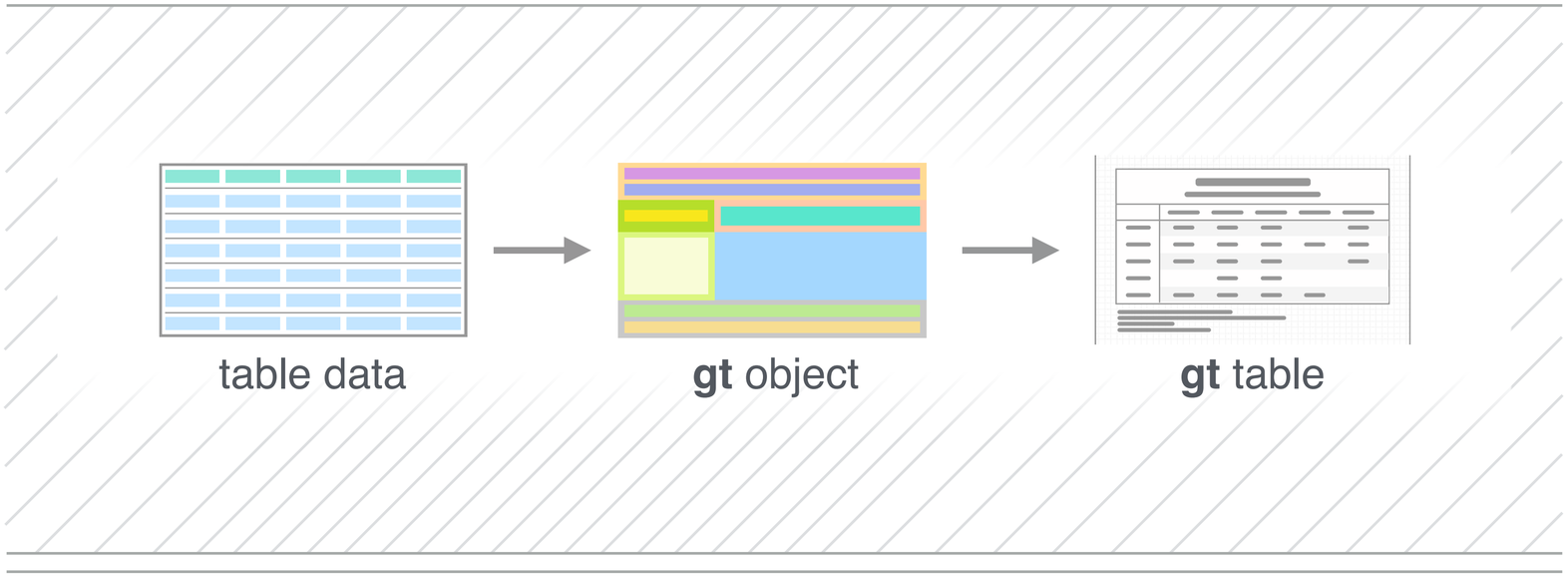


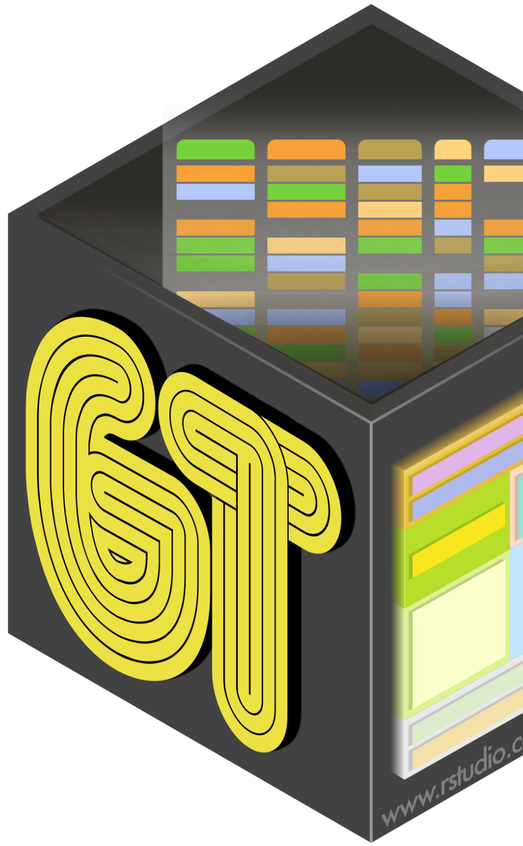
rich-iannone

@riannone

rich@rstudio.com

An Introduction to the **gt** Package





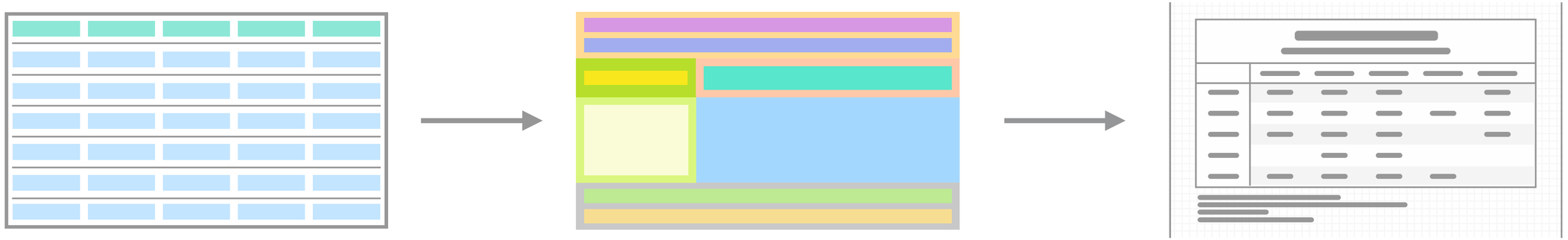
The **gt** package lets us create display tables with a declarative interface, allowing us to fine-tune the final appearance.

Integrate the tables in **R Markdown** docs and **Shiny** applications.

Program with **gt** to make tables as output objects in packages.

*The Typical Workflow for Making Tables with **gt***

① table data → ② **gt** object → ③ **gt** table

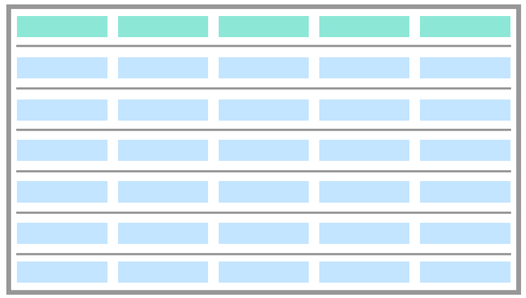


Put your data in a form that's reasonably close to the expected form of the display table.

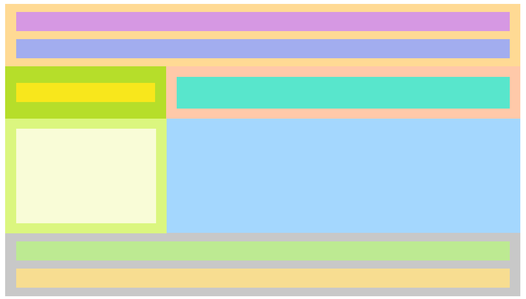
Use **dplyr** and **tidyr** and other great Tidyverse 📦s.

*The Typical Workflow for Making Tables with **gt***

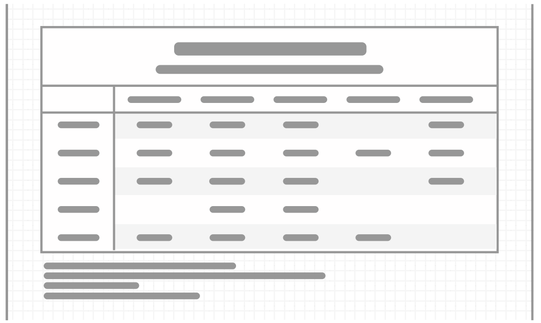
① table data



② **gt** object



③ **gt** table



Put your data in a form that's reasonably close to the expected form of the display table.

Use **dplyr** and **tidyr** and other great Tidyverse 📦s.

Add table components, group rows together, add spanner labels, footnotes, format cells, add styles…

Use **gt**'s functions to build. Preview in **RStudio**.

*The Typical Workflow for Making Tables with **gt***

① ② ③

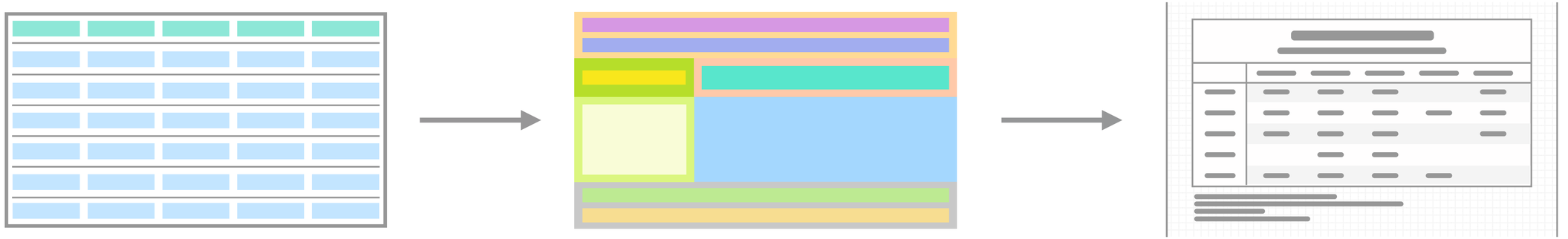


table data | **gt** object | **gt** table

Put your data in a form that's reasonably close to the expected form of the display table.

Add table components, group rows together, add spanner labels, footnotes, format cells, add styles…

Output the table to **HTML**, save an image. **RTF** and **LaTeX** output is possible as well.

Use **dplyr** and **tidyr** and other great Tidyverse 📦s.

Use **gt**'s functions to build. Preview in **RStudio**.

Use tables in **Shiny** apps, reports, packages, etc.

Categorizing the Useful Features of a Table

The Cars of gtcars

These are some fine automobiles

				Performance			
	Year	Trim	Transmission	MPG	HP	Torque	MSRP[1]
Germany							
BMW i8	2016	Mega World Coupe	6 Speed *Automatic/Manual*	28c 29h[2]	357 @5800rpm	420 @3700rpm	$140,700
Mercedes-Benz AMG GT	2016	S Coupe	7 Speed *Automatic*	16c 22h	503 @6250rpm	479 @1750rpm	$129,900
Italy							
Ferrari LaFerrari	2015	Base Coupe	7 Speed *Automatic*	12c 16h	949 @9000rpm[3]	664 @6750rpm	$1,416,362
Lamborghini Aventador	2015	LP 700-4 Coupe	7 Speed *Automatic*	11c 18h	700 @8250rpm	507 @5500rpm	$397,500
United States							
Dodge Viper	2017	GT Coupe	6 Speed *Manual*	12c 19h	645 @5000rpm	600 @5000rpm	$95,895
Ford GT	2017	Base Coupe	7 Speed *Automatic*	11c 18h	647 @6250rpm	550 @5900rpm	$447,000
Japan							
Acura NSX	2017	Base Coupe	9 Speed *Automatic*	21c 22h	573 @6500rpm	476 @2000rpm	$156,000
Nissan GT-R	2016	Premium Coupe	6 Speed *Automatic*	16c 22h	545 @6400rpm	436 @3200rpm	$101,770

[1] All prices in U.S. dollars (USD).

[2] Best gas mileage (city) of all the **gtcars**.

[3] The highest horsepower of all the **gtcars**.

Source: Various pages within the Edmonds website.

Categorizing the Useful Features of a Table

table header
with a title
and a subtitle

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	Year	Trim	Transmission	MPG	HP	Torque	MSRP[1]
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Categorizing the Useful Features of a Table

table header
with a title
and a subtitle

row labels
along with
row grouping

The Cars of gtcars

These are some fine automobiles

	Year	Trim	Transmission	Performance			MSRP[1]
				MPG	HP	Torque	
Germany							
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Categorizing the Useful Features of a Table

table header
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column labels
along with
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The Cars of **gtcars**

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Germany							
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Categorizing the Useful Features of a Table

table header
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data formatting
need to transform raw
data for presentation

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footnotes
are in the right order

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a source note

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Categorizing the Useful Features of a Table

We always want the ordering of footnotes to be correct.

This sort of thing should never have to be done manually.

The Cars of gtcars

These are some fine automobiles

	Year	Trim	Transmission	Performance			
				MPG	HP	Torque	MSRP[1]
Germany							
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Source: Various pages within the Edmonds website.

1
2
3

1
2
3

footnotes
are in the right order

Categorizing the Useful Features of a Table

To do this right, **gt** will index the locations *left-to-right then top-to-bottom.*

The Cars of gtcars 1

These are some fine automobiles 2

3	Year 5	Trim 6	Transmission 7	Performance 4 MPG 8	HP 9	Torque 10	MSRP[1] 11
Germany 13							
BMW i8 14	15 2016	16 Mega World Coupe	17 6 Speed *Automatic/Manual*	28c 18 29h[2]	357 19 @5800rpm	420 20 @3700rpm	21 $140,700
Mercedes-Benz AMG GT 22	23 2016	24 S Coupe	25 7 Speed *Automatic*	16c 26 22h	503 27 @6250rpm	479 28 @1750rpm	29 $129,900
Italy 30							
Ferrari LaFerrari 31	32 2015	33 Base Coupe	34 7 Speed *Automatic*	12c 35 16h	949 36 @9000rpm[3]	664 37 @6750rpm	38 $1,416,362
Lamborghini Aventador 39	40 2015	41 LP 700-4 Coupe	42 7 Speed *Automatic*	11c 43 18h	700 44 @8250rpm	507 45 @5500rpm	46 $397,500
United States 47							
Dodge Viper 48	49 2017	50 GT Coupe	51 6 Speed *Manual*	12c 52 19h	645 53 @5000rpm	600 54 @5000rpm	55 $95,895
Ford GT 56	57 2017	58 Base Coupe	59 7 Speed *Automatic*	11c 60 18h	647 61 @6250rpm	550 62 @5900rpm	63 $447,000
Japan 64							
Acura NSX 65	66 2017	67 Base Coupe	68 9 Speed *Automatic*	21c 69 22h	573 70 @6500rpm	476 71 @2000rpm	72 $156,000
Nissan GT-R 73	74 2016	75 Premium Coupe	76 6 Speed *Automatic*	16c 77 22h	545 78 @6400rpm	436 79 @3200rpm	80 $101,770

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Categorizing the Useful Features of a Table

All of this ensures that footnotes appear as you might expect.

The Cars of gtcars

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	Year	Trim	Transmission	Performance MPG	Performance HP	Performance Torque	MSRP[1]
Germany							
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1

2

3

Categorizing the Useful Features of a Table

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1

2

3

We can apply the same footnote to multiple locations.

Base coupe[1]
GT coupe[1]
[1] These coupe

gt will preserve the same footnote mark

Multiple footnotes can be applied to the same location.

Base coupe[1,2,3]
GT coupe[1,4,5]
[1] These coupes can h
[2] Base models tend to
[3] This is the only optic
[4] Although labeled as
[5] Final year in which t

gt can handle complex footnote marks in a logical manner

You don't have to use numerals as footnote marks.

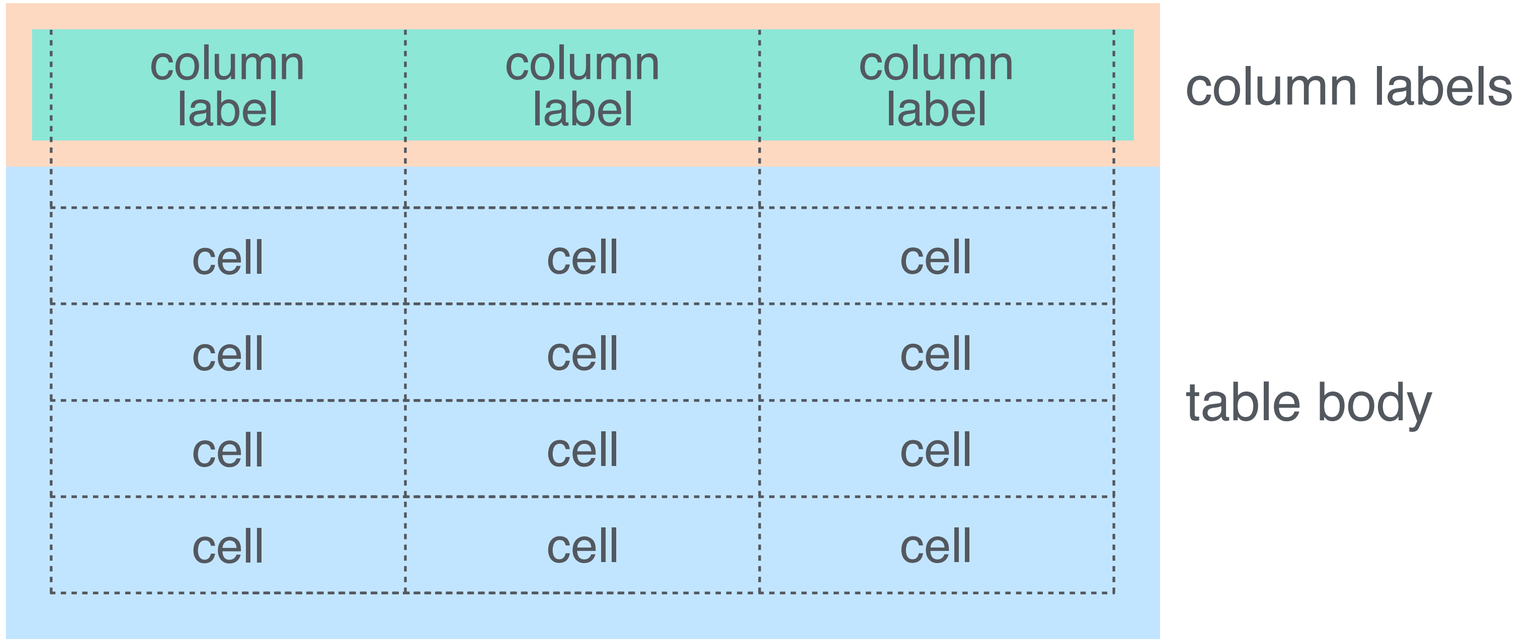
some options: *1,2,3* *a,b,c* *,†,††,¶

*The **gt** Package Formalizes the Parts of a Table*

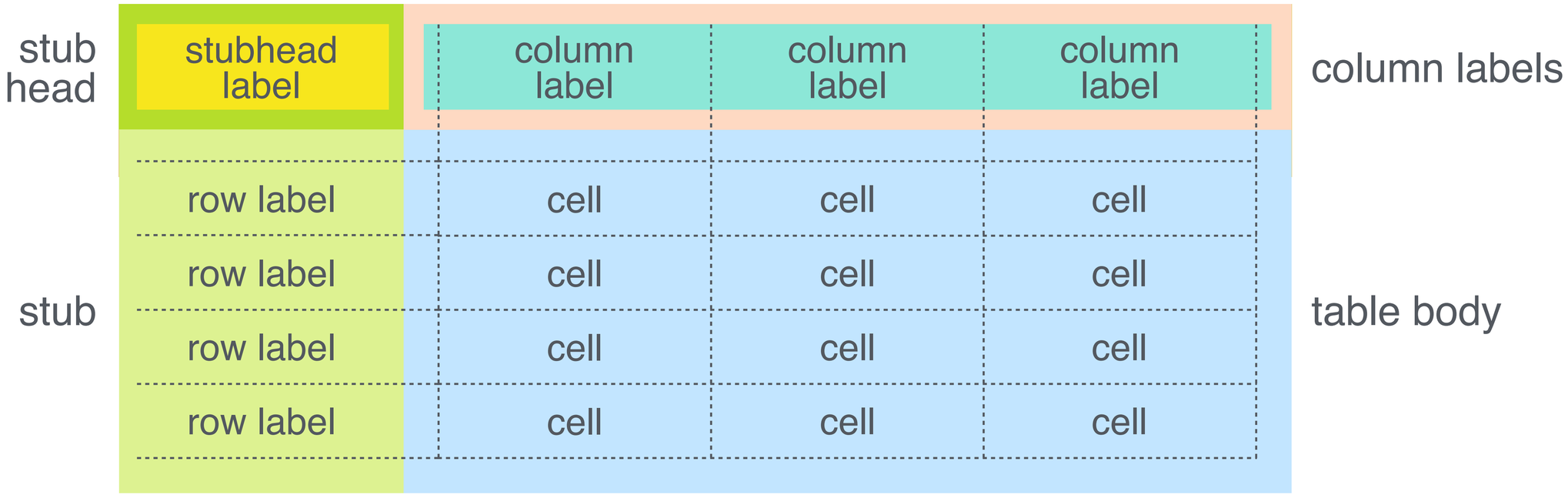
and we can use as many or as few as we need

*The Structural Parts of a **gt** Table*

This is the most basic form of a **gt** table:

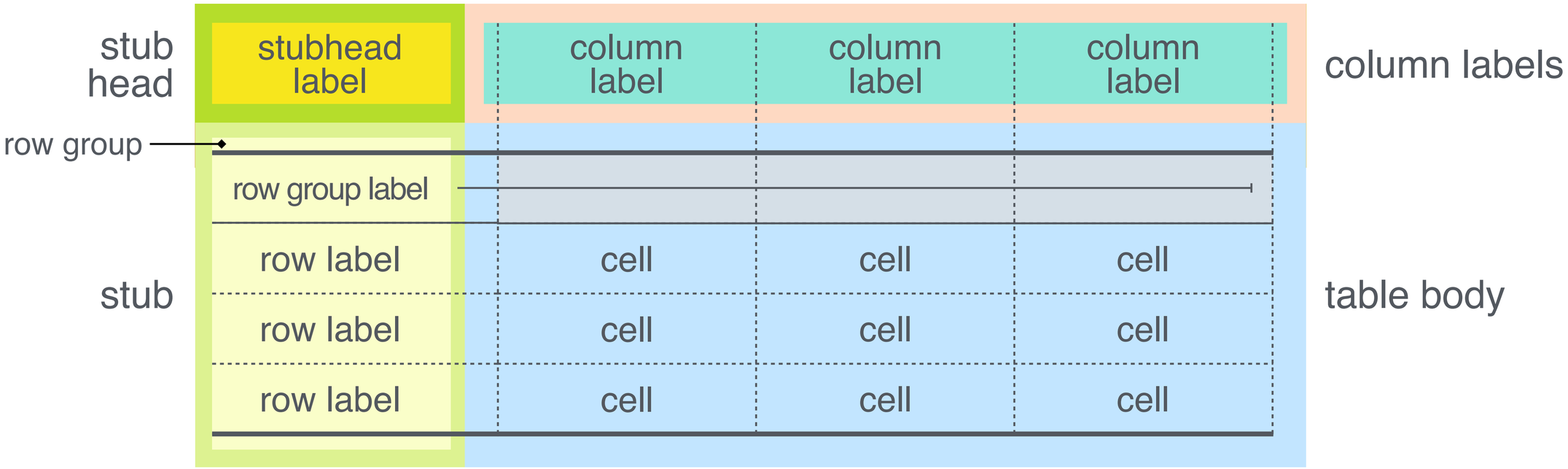


*The Structural Parts of a **gt** Table*



A table stub is not always needed but it can be useful.

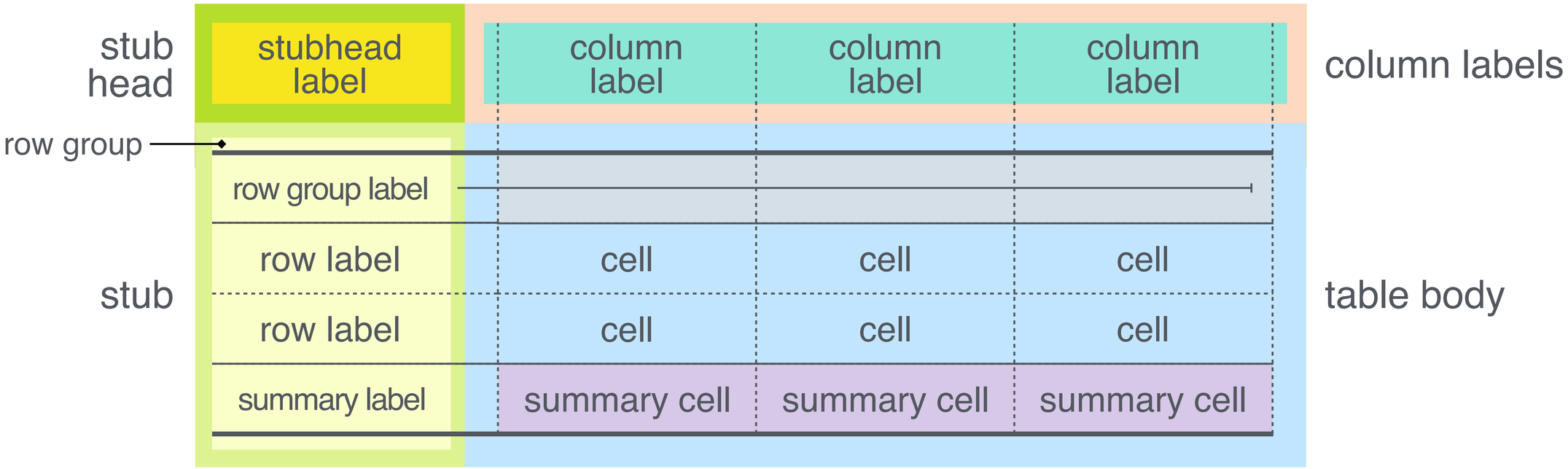
*The Structural Parts of a **gt** Table*



A table stub is not always needed but it can be useful.

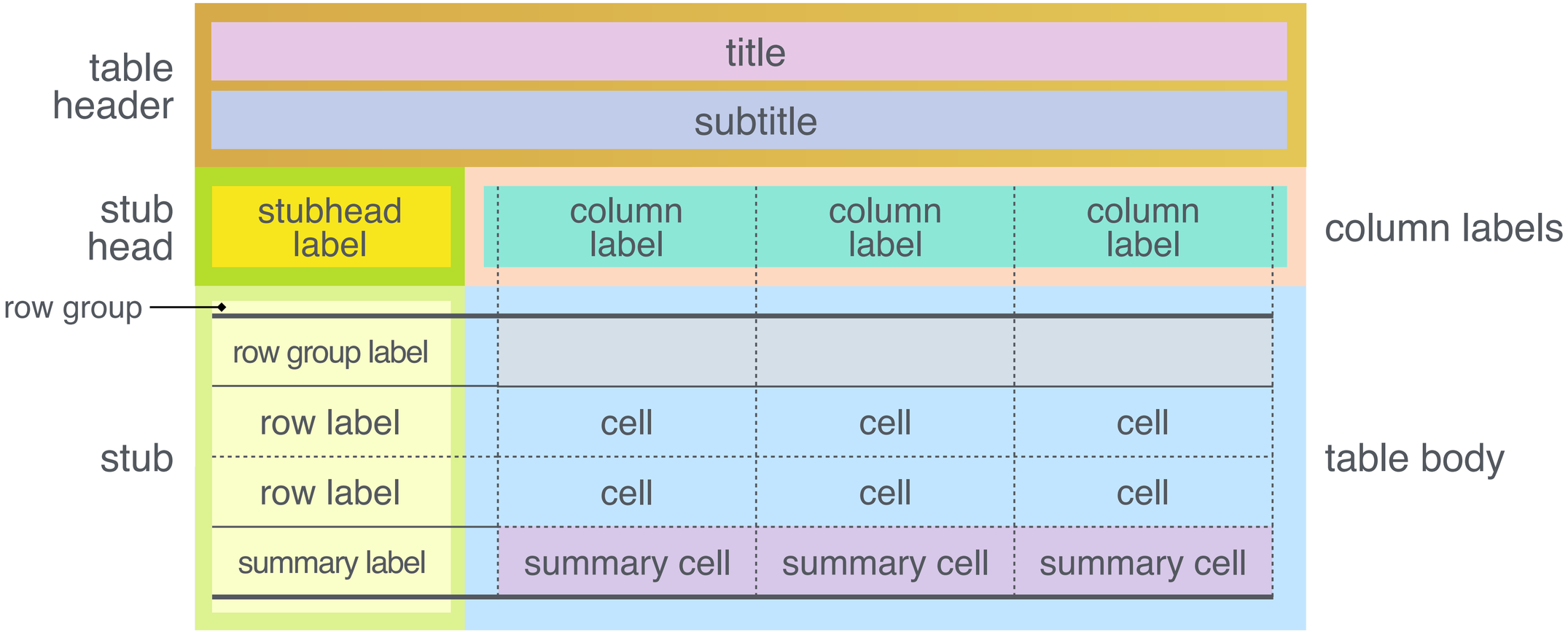
Rows can be grouped, and they can have labels.

*The Structural Parts of a **gt** Table*



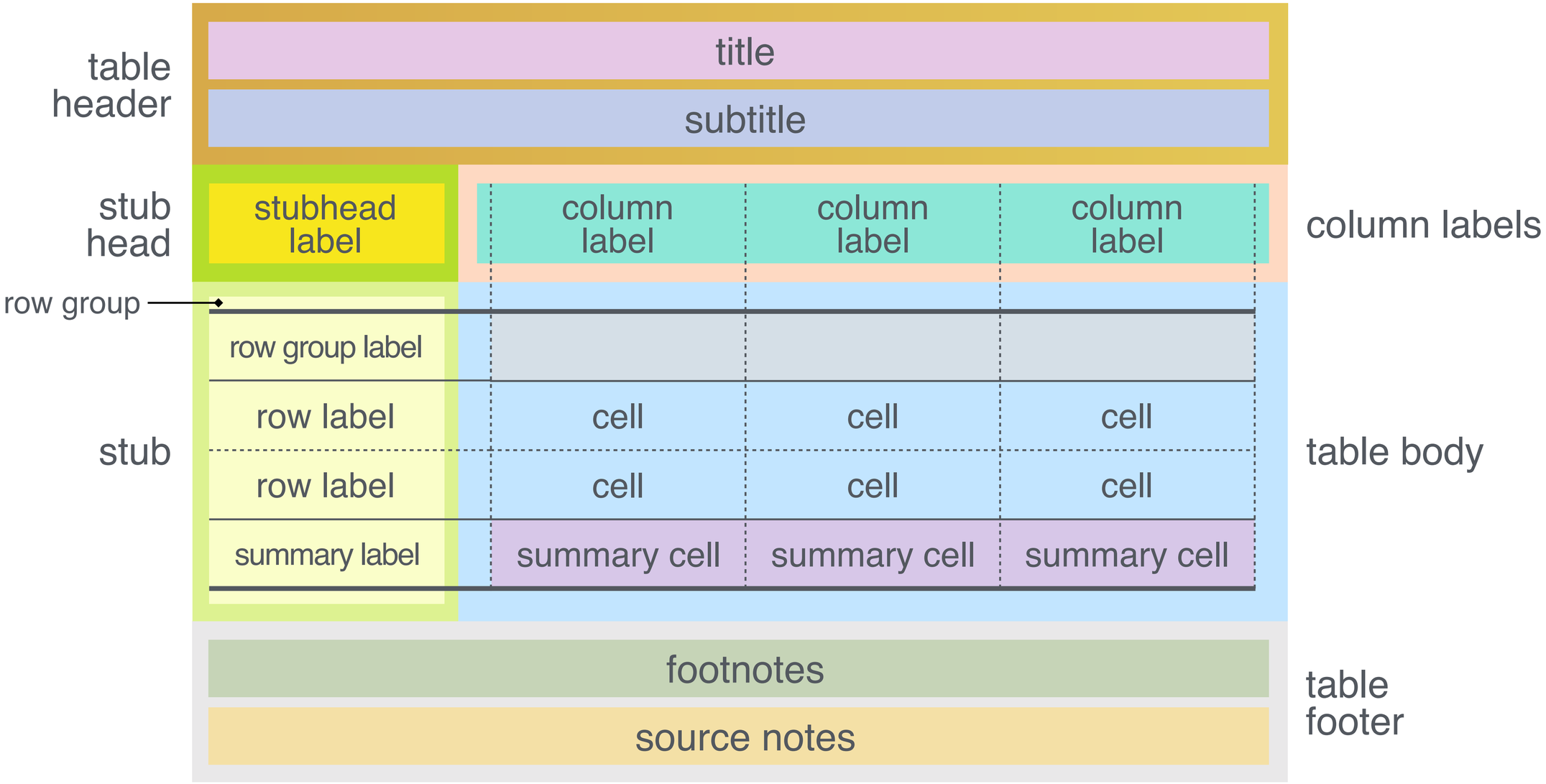
A table stub is not always needed but it can be useful.
Rows can be grouped, and they can have labels.
Summary rows can be added to groups (or, we can have a *grand summary*).

*The Structural Parts of a **gt** Table*



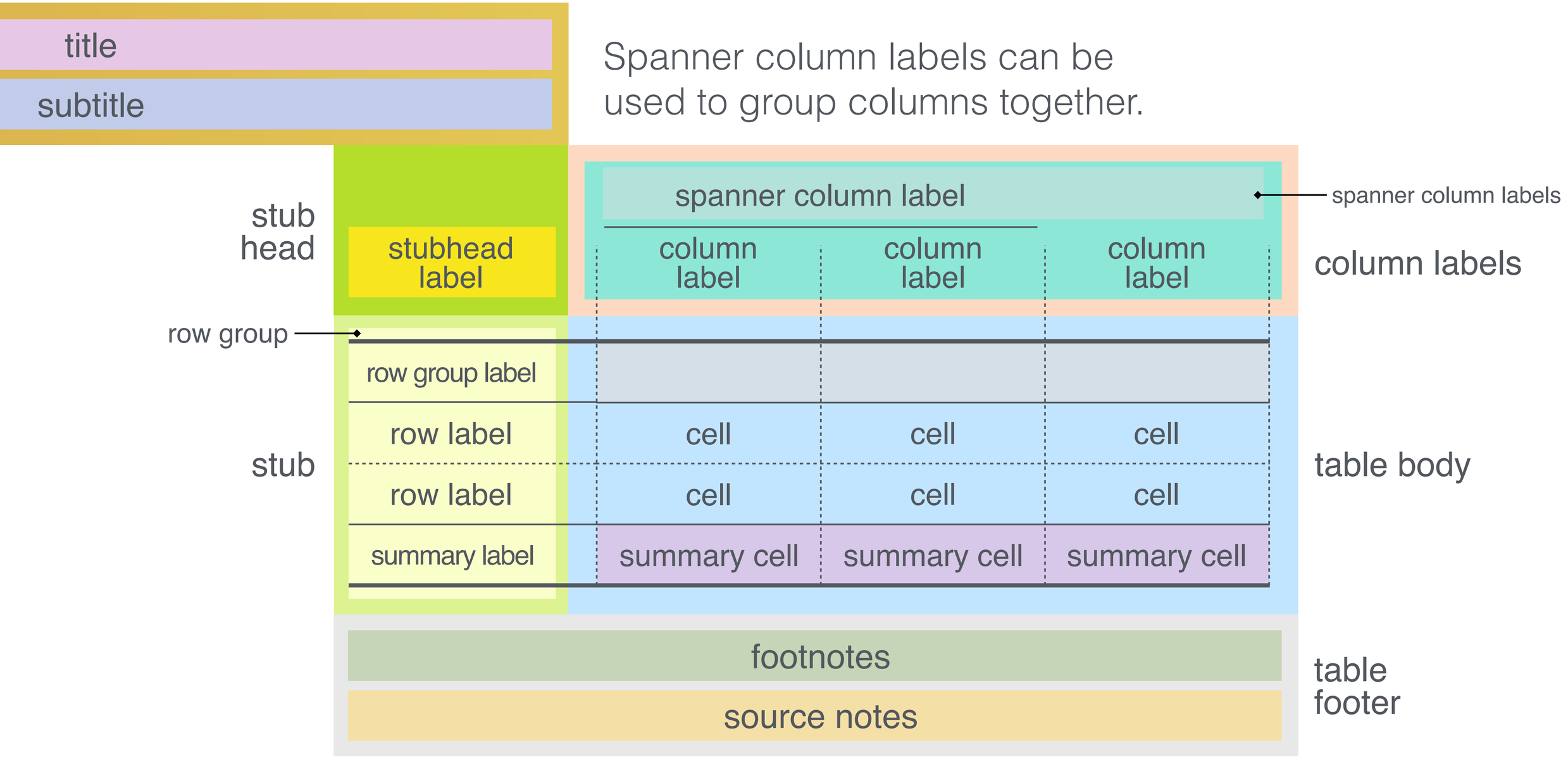
A table header is a great place to add a title and a subtitle.

*The Structural Parts of a **gt** Table*

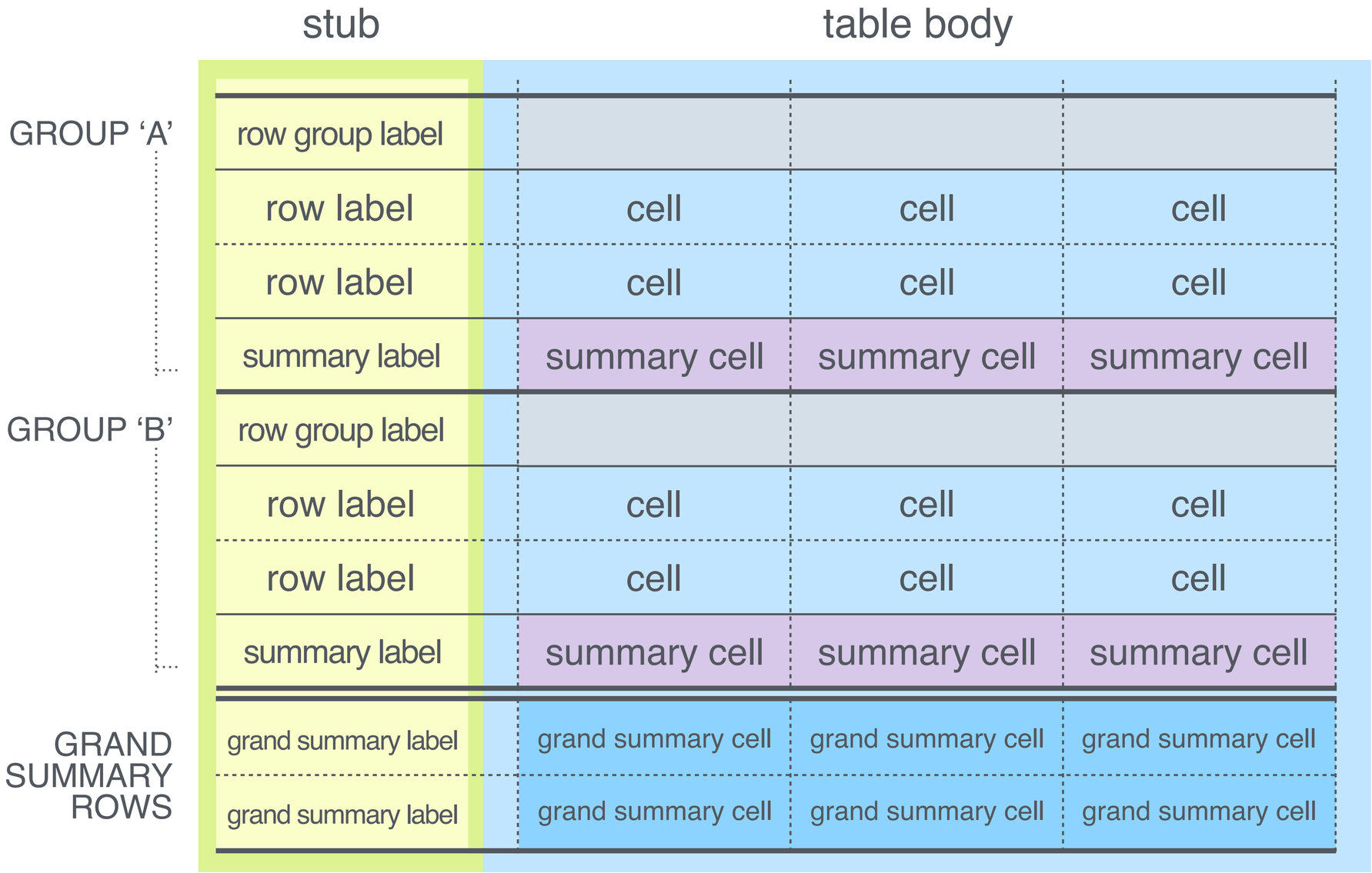


Footnotes and source notes serve as useful annotations.

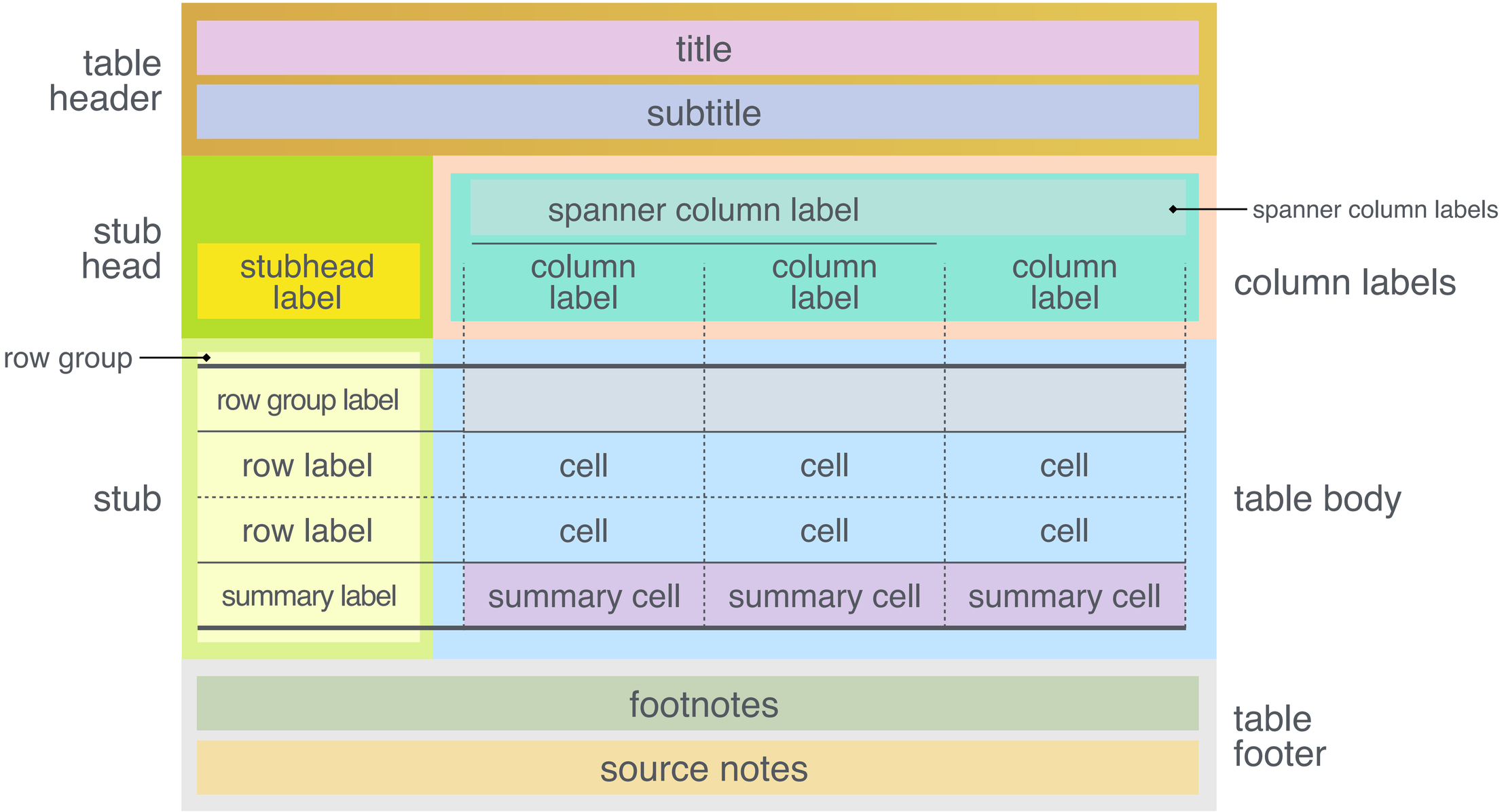
*The Structural Parts of a **gt** Table*



*The Structural Parts of a **gt** Table*



*The Structural Parts of a **gt** Table*



*Let's Look at Some of **gt**'s Functions*

countrypops

sza

gtcars

sp500

pizzaplace

exibble

The **gt** package comes with *six* example datasets.

countrypops
12,470 × 5

sza
816 × 4

gtcars
47 × 15

sp500
16,607 × 7

pizzaplace
49,574 × 7

exibble
8 × 9

The **gt** package comes with *six* example datasets.

They are of various sizes and subject matter. There are some nice examples available at:

`gt.rstudio.com/articles/gt-datasets`

exibble
8 × 9

The **gt** package comes with *six* example datasets.

They are of various sizes and subject matter. There are some nice examples available at:

`gt.rstudio.com/articles/gt-datasets`

All of the following examples will use `exibble`: a dataset that's great for small examples.

The First Function You Need to Know

Create Table

`gt()`

CODE

```
exibble %>% gt()
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

Work with Table Components, Add Style

Create or Modify Parts

`tab_header()` `tab_spanner()` `tab_spanner_delim()` `tab_row_g`

CODE

```
exibble %>% gt() %>% tab_header(md("**gt** is cool"))
```

TABLE

gt is cool

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

Work with Table Components, Add Style

Create or Modify Parts

`tab_source_note()` `tab_style()` `tab_options()`

CODE

```
exibble %>% gt() %>% tab_header(md("**gt** is cool")) %>% tab_source_note("From gt.")
```

TABLE

gt is cool

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

From gt.

Work with Table Components, Add Style

Create or Modify Parts

`tab_options()`

CODE

```
exibble %>% gt() %>% tab_header(md("**gt** is cool")) %>%
  tab_options(table.width = pct(100))
```

TABLE

gt is cool

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

The Formatting Functions

Format Data

`fmt_number()` `fmt_scientific()` `fmt_percent()` `fmt_currency(`

CODE

```
exibble %>% gt() %>% fmt_number(num, decimals = 2)
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
0.11	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.22	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
33.33	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
444.40	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5,550.00	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
777,000.00	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8,880,000.00	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

The Formatting Functions

Format Data

`fmt_scientific()` `fmt_percent()` `fmt_currency()` `fmt_date()`

CODE

```
exibble %>% gt() %>% fmt_scientific(num)
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
1.11×10^{-1}	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.22	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.33×10^{1}	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.44×10^{2}	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.55×10^{3}	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.77×10^{5}	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.88×10^{6}	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

The Formatting Functions

Format Data

`fmt_scientific()` `fmt_percent()` `fmt_currency()` `fmt_date()`

CODE

```
exibble %>% gt() %>% fmt_scientific(num, rows = num >= 10^3)
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
0.1111	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.2220	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
33.3300	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
444.4000	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.55×10^{3}	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.77×10^{5}	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.88×10^{6}	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

The Formatting Functions

Format Data

`fmt_currency()` `fmt_date()` `fmt_time()` `fmt_datetime()` `fmt`

CODE

try `info_currencies()`

```
exibble %>% gt() %>% fmt_currency(currency, currency = "EUR")
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	2015-01-15	13:35	2018-01-01 02:22	€49.95	row_1	grp_a
2.222e+00	banana	two	2015-02-15	14:40	2018-02-02 14:33	€17.95	row_2	grp_a
3.333e+01	coconut	three	2015-03-15	15:45	2018-03-03 03:44	€1.39	row_3	grp_a
4.444e+02	durian	four	2015-04-15	16:50	2018-04-04 15:55	€65,100.00	row_4	grp_a
5.550e+03	NA	five	2015-05-15	17:55	2018-05-05 04:00	€1,325.81	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	€13.26	row_6	grp_b
7.770e+05	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew	eight	2015-08-15	20:20	NA	€0.44	row_8	grp_b

The Formatting Functions

Format Data

`fmt_date()` `fmt_time()` `fmt_datetime()` `fmt_markdown()` `fmt`

CODE

try `info_date_style()`

```
exibble %>% gt() %>% fmt_date(date, date_style = 2)
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	Thursday, January 15, 2015	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana	two	Sunday, February 15, 2015	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut	three	Sunday, March 15, 2015	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian	four	Wednesday, April 15, 2015	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	NA	five	Friday, May 15, 2015	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	Monday, June 15, 2015	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew	eight	Saturday, August 15, 2015	20:20	NA	0.440	row_8	grp_b

The Formatting Functions

Format Data

`fmt_missing()` `fmt()` `text_transform()` `data_color()`

CODE

```
exibble %>% gt() %>% fmt_missing(columns = everything())
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	—	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
—	fig	six	2015-06-15	—	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	—	19:10	2018-07-07 05:22	—	row_7	grp_b
8.880e+06	honeydew	eight	2015-08-15	20:20	—	0.440	row_8	grp_b

How to Do Modifications on Entire Columns

Modify Columns

`cols_align()` `cols_width()` `cols_label()` `cols_move_to_start`

CODE

```
exibble %>% gt() %>% cols_align(c(char, fctr), align = "right")
```

TABLE

num	char	fctr	date	time	datetime	currency	row	group
1.111e-01	apricot	one	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana	two	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut	three	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian	four	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	NA	five	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig	six	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew	eight	2015-08-15	20:20	NA	0.440	row_8	grp_b

How to Do Modifications on Entire Columns

Modify Columns

`cols_hide()` `cols_merge_range()` `cols_merge_uncert()` `cols_m`

CODE

```
exibble %>% gt() %>% cols_hide(matches("date|time"))
```

TABLE

num	char	fctr	currency	row	group
1.111e-01	apricot	one	49.950	row_1	grp_a
2.222e+00	banana	two	17.950	row_2	grp_a
3.333e+01	coconut	three	1.390	row_3	grp_a
4.444e+02	durian	four	65100.000	row_4	grp_a
5.550e+03	NA	five	1325.810	row_5	grp_b
NA	fig	six	13.255	row_6	grp_b
7.770e+05	grapefruit	seven	NA	row_7	grp_b
8.880e+06	honeydew	eight	0.440	row_8	grp_b

How to Do Modifications on Entire Columns

Modify Columns

`cols_merge()`

CODE

```
exibble %>% gt() %>% cols_merge(columns = c(char, fctr), pattern = "{1} ({2})")
```

TABLE

num	char	date	time	datetime	currency	row	group
1.111e-01	apricot (one)	2015-01-15	13:35	2018-01-01 02:22	49.950	row_1	grp_a
2.222e+00	banana (two)	2015-02-15	14:40	2018-02-02 14:33	17.950	row_2	grp_a
3.333e+01	coconut (three)	2015-03-15	15:45	2018-03-03 03:44	1.390	row_3	grp_a
4.444e+02	durian (four)	2015-04-15	16:50	2018-04-04 15:55	65100.000	row_4	grp_a
5.550e+03	NA (five)	2015-05-15	17:55	2018-05-05 04:00	1325.810	row_5	grp_b
NA	fig (six)	2015-06-15	NA	2018-06-06 16:11	13.255	row_6	grp_b
7.770e+05	grapefruit (seven)	NA	19:10	2018-07-07 05:22	NA	row_7	grp_b
8.880e+06	honeydew (eight)	2015-08-15	20:20	NA	0.440	row_8	grp_b

More Functions

- Create Table
- Create or Modify Parts
- Format Data
- Modify Columns
- Modify Rows
- Add Rows
- Helper Functions
- Image Addition Functions
- Table Option Functions
- Information Functions
- Datasets
- Shiny Functions
- Export Functions

There is *a lot* of useful information about each function in **gt**'s *Function Reference* section

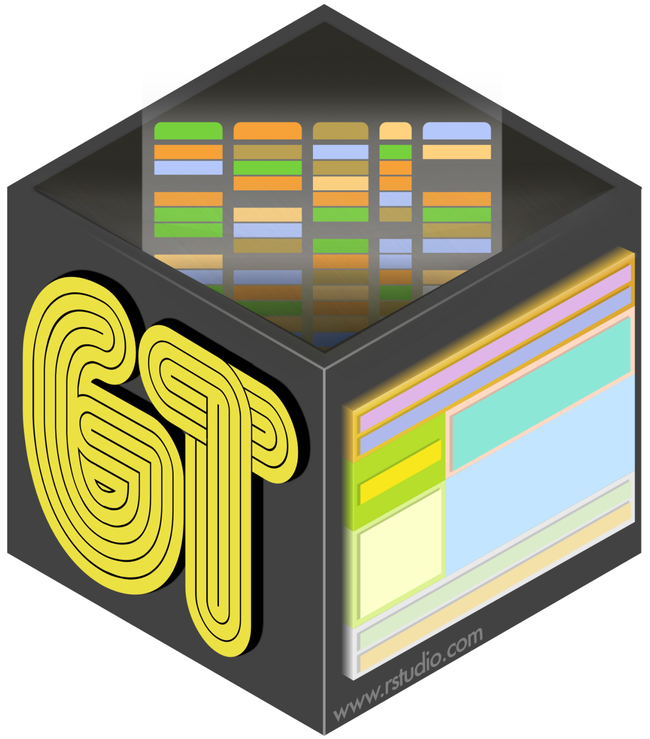
`gt.rstudio.com/reference`

You can try out dozens of examples in RStudio Cloud

The link is available in the package README

`github.com/rstudio/gt`

Demo



https://github.com/rich-iannone/presentations

rich-iannone @riannone rich@rstudio.com