

Making it **easier** to be **tidy**

Session 8

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Statistical Horizons, September 2021

Load the packages, as always

```
library(here)      # manage file paths
```

```
## here() starts at /Users/kjhealy/Documents/courses/data_wrangling
```

```
library(socviz)    # data and some useful functions
```

```
##
```

```
## Attaching package: 'socviz'
```

```
## The following object is masked from 'package:kjhutils':
```

```
##
```

```
##      %nin%
```

```
library(tidyverse) # your friend and mine
```

```
## — Attaching packages ————— tidyverse 1.3.1 —
```

```
## ✓ ggplot2 3.3.5      ✓ purrr   0.3.4
```

```
## ✓ tibble  3.1.4      ✓ dplyr   1.0.7
```

```
## ✓ tidyr   1.1.3      ✓ stringr 1.4.0
```

```
## ✓ readr   2.0.1      ✓ forcats 0.5.1
```

```
## — Conflicts ————— tidyverse_conflicts() —
```

```
## x readr::edition_get() masks testthat::edition_get()
```

```
## x dplyr::filter()      masks stats::filter()
```

```
## x purrr::is_null()     masks testthat::is_null()
```

```
## x dplyr::lag()         masks stats::lag()
```

```
## x readr::local_edition() masks testthat::local_edition()
```

```
## x dplyr::matches()     masks tidyr::matches(), testthat::matches()
```

```
library(haven)     # for Stata, SAS, and SPSS files
```

```
library(broom)     # tidy model summaries
```

**Moving
ahead**

Some helpful things

The RStudio Community

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🔒 📌 🗑️ Welcome to the RStudio Community!

meta

Welcome to community.rstudio.com — we're glad to have you! This welcome page will give you some advice on how to get the most out of the site if you're getting or giving help. We want this to be a friendly, inclusive com... [read more](#)



0

8.8k

2018-07-22

🗑️ what does that mean %in% in this code? •

General



2

72

19m

🗑️ "William" in the Northeast ggplot Help •

tidyverse ggplot2



5

69

28m

🗑️ Error while running RSelenium •

shiny



4

27

28m

🗑️ Too slow to repsond •



0

16

40m

🗑️ Relative risk (RR) using categorical variables •



0

18

1h

The **reprex** package



reprex

part of the [tidyverse](#)
2.0.0.9000

Reference

Articles ▾

News ▾



Overview

Prepare reprexes for posting to [GitHub issues](#), [StackOverflow](#), in Slack [messages](#) or [snippets](#), or even to paste into PowerPoint or Keynote slides. What is a reprex ? It's a **re**producible **ex**ample, as coined by [Romain Francois](#).

Given R code on the clipboard, selected in RStudio, as an expression (quoted or not), or in a file ...

- run it via `rmarkdown::render()`,
- with deliberate choices re: `render()` arguments, knitr options, and Pandoc options.

Get resulting runnable code + output as

- Markdown, suitable for GitHub or Stack Overflow or Slack, or as
- R code, augmented with commented output, or as
- Plain HTML or (experimental) Rich Text

The result is returned invisibly, written to a file and, if possible, placed on the clipboard. Preview an HTML version in RStudio viewer or default browser.

Installation



Links

Download from CRAN at

[https://cloud.r-project.org/
package=reprex](https://cloud.r-project.org/package=reprex)

Browse source code at

<https://github.com/tidyverse/reprex/>

Report a bug at

[https://github.com/tidyverse/reprex/
issues](https://github.com/tidyverse/reprex/issues)

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Developers

Best demonstrated live

When asking for help, make a **reproducible example**

```
library(reprex)
```

```
library(tidyverse)
```

```
starwars %>%  
  count(homeworld, species) %>%  
  mutate(pct = n / sum(n) * 100) %>%  
  arrange(desc(pct))
```

```
## # A tibble: 58 × 4  
##   homeworld species      n  pct  
##   <chr>      <chr>   <int> <dbl>  
## 1 Tatooine   Human         8  9.20  
## 2 Naboo     Human         5  5.75  
## 3 <NA>      Human         5  5.75  
## 4 Alderaan  Human         3  3.45  
## 5 Naboo     Gungan        3  3.45  
## 6 <NA>      Droid         3  3.45  
## 7 Corellia  Human         2  2.30  
## 8 Coruscant Human         2  2.30  
## 9 Kamino    Kaminoan       2  2.30  
## 10 Kashyyyk Wookiee       2  2.30  
## # ... with 48 more rows
```

The **usethis** package

usethis **2.0.1.9000**



Setup

Reference

Articles ▾

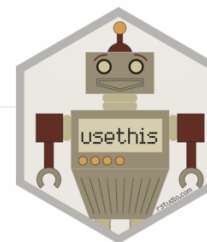
News ▾

Search...



usethis

usethis is a workflow package: it automates repetitive tasks that arise during project setup and development, both for R packages and non-package projects.



Installation

Install the released version of usethis from CRAN:

```
install.packages("usethis")
```

Or install the development version from GitHub with:

```
# install.packages("devtools")
devtools::install_github("r-lib/usethis")
```

Usage

Most `use_*`() functions operate on the *active project*: literally, a directory on your computer. If you've just used usethis to create a new package or project, that will be the active project. Otherwise, usethis verifies that current working directory is or is below a valid project directory and that becomes the active project. Use `proj_get()` or `proj_sitrep()` to manually query the project and [read more in the docs](#).

A few usethis functions have no strong connections to projects and will expect you to provide a path.

Links

Download from CRAN at
<https://cloud.r-project.org/package=usethis>

Browse source code at
<https://github.com/r-lib/usethis/>

Report a bug at
<https://github.com/r-lib/usethis/issues>

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Developers

[Hadley Wickham](#)

Author

[Jennifer Bryan](#)

Author, maintainer

[Malcolm Barrett](#)

Author

The packages that made these slides



Never **paste** tables into a slide again!

```
---  
  
# Never .kjh-orange[copy and paste] code to a slide again!  
  
.pull-left[  
  
![:scale 100%](img/xaringan-sample.png)  
  
]  
  
.pull-right[  
  
```${r}  
Oh no, its the GSS
gss_sm %>%
 count(bigregion, religion)
```,  
  
]
```

religion	Northeast	Midwest	South	West
Protestant	158	325	650	238
Catholic	162	172	160	155
Jewish	27	3	11	10
None	112	157	170	180
Other	28	33	50	48
NA	1	5	11	1

Tables, tables, tables

The **gtsummary** package is very powerful. There are a number of other very good tidy table-making options too.

```
library(gtsummary)
```

```
trial
```

```
## # A tibble: 200 × 8
```

```
##   trt      age marker stage grade response death ttdeath
##   <chr>  <dbl>  <dbl> <fct> <fct>    <int> <int>    <dbl>
## 1 Drug A    23   0.16  T1    II         0     0      24
## 2 Drug B     9   1.11  T2     I         1     0      24
## 3 Drug A    31   0.277 T1    II         0     0      24
## 4 Drug A    NA   2.07  T3   III         1     1     17.6
## 5 Drug A    51   2.77  T4   III         1     1     16.4
## 6 Drug B    39   0.613 T4     I         0     1     15.6
## 7 Drug A    37   0.354 T1    II         0     0      24
## 8 Drug A    32   1.74  T1     I         0     1     18.4
## 9 Drug A    31   0.144 T1    II         0     0      24
## 10 Drug B   34   0.205 T3     I         0     1     10.5
## # ... with 190 more rows
```

Tables, tables, tables

The **gtsummary** package is very powerful. There are a number of other very good tidy table-making options too.

```
trial %>%  
  tbl_summary(  
    by = trt, # split table by group  
    missing = "no" # don't list missing data separately  
  ) %>%  
  add_n() %>% # add column with total number of non-missing observations  
  add_p() %>% # test for a difference between groups  
  modify_header(label = "**Variable**") %>% # update the column header  
  bold_labels()
```

Tables, tables, tables

Variable	N	Drug A, N = 98 ¹	Drug B, N = 102 ¹	p-value ²
Age	189	46 (37, 59)	48 (39, 56)	0.7
Marker Level (ng/mL)	190	0.84 (0.24, 1.57)	0.52 (0.19, 1.20)	0.085
T Stage	200			0.9
T1		28 (29%)	25 (25%)	
T2		25 (26%)	29 (28%)	
T3		22 (22%)	21 (21%)	
T4		23 (23%)	27 (26%)	
Grade	200			0.9
I		35 (36%)	33 (32%)	
II		32 (33%)	36 (35%)	
III		31 (32%)	33 (32%)	
Tumor Response	193	28 (29%)	33 (34%)	0.5
Patient Died	200	52 (53%)	60 (59%)	0.4
Months to Death/Censor	200	23.5 (17.4, 24.0)	21.2 (14.6, 24.0)	0.14
¹ Median (IQR); n (%)				
² Wilcoxon rank sum test; Pearson's Chi-squared test				

Tables, tables, tables

gtsummary() straight out of the box:

```
gss_sm %>%  
  select(race, degree, marital) %>%  
  drop_na() %>%  
  tbl_summary(  
    by = race, # split table by group  
    missing = "no" # don't list missing data separately  
  ) %>%  
  add_n() %>% # add column with total number of non-missing observations  
#  modify_header(label = "**Variable**") %>% # update the column header  
  bold_labels()
```

Tables, tables, tables

Variable	N	White, N = 2,096 ¹	Black, N = 487 ¹	Other, N = 276 ¹
degree	2,859			
Lt High School		197 (9.4%)	60 (12%)	71 (26%)
High School		1,057 (50%)	292 (60%)	112 (41%)
Junior College		166 (7.9%)	33 (6.8%)	17 (6.2%)
Bachelor		426 (20%)	71 (15%)	39 (14%)
Graduate		250 (12%)	31 (6.4%)	37 (13%)
marital	2,859			
Married		979 (47%)	121 (25%)	110 (40%)
Widowed		196 (9.4%)	35 (7.2%)	18 (6.5%)
Divorced		363 (17%)	93 (19%)	39 (14%)
Separated		55 (2.6%)	27 (5.5%)	20 (7.2%)
Never Married		503 (24%)	211 (43%)	89 (32%)
¹ n (%)				

Tables, tables, tables

With a bit more work ...

```
trial %>%
  select(trt, age, marker) %>%
  tbl_summary(
    by = trt,
    type = all_continuous() ~ "continuous2",
    statistic = all_continuous() ~ c("{N_nonmiss}",
                                     "{mean} ({sd})",
                                     "{median} ({p25}, {p75})",
                                     "{min}, {max}"),
    missing = "no"
  ) %>%
  italicize_levels()
```


Tables, tables, tables

Characteristic	Drug A, N = 98	Drug B, N = 102
Age		
<i>N</i>	91	98
<i>Mean (SD)</i>	47 (15)	47 (14)
<i>Median (IQR)</i>	46 (37, 59)	48 (39, 56)
<i>Range</i>	6, 78	9, 83
Marker Level (ng/mL)		
<i>N</i>	92	98
<i>Mean (SD)</i>	1.02 (0.89)	0.82 (0.83)
<i>Median (IQR)</i>	0.84 (0.24, 1.57)	0.52 (0.19, 1.20)
<i>Range</i>	0.00, 3.87	0.00, 3.64

The power of lists

Similar to earlier, but simpler:

```
library(gapminder)

### Fit as a function, for clarity
fit_ols <- function(df) {
  lm(lifeExp ~ log(gdpPercap), data = df)
}

out_le <- gapminder %>%
  filter(continent %nin% "Oceania") %>%
  group_by(continent) %>%
  nest() %>%
  mutate(model = map(data, fit_ols),
         mod_sum = map(model, glance),
         mod_terms = map(model, tidy, conf.int = TRUE),
         ) %>%
  unnest(cols = c(mod_terms))
```

The power of lists

```
out_le
```

```
## # A tibble: 8 × 11
## # Groups:   continent [4]
##   continent data      model mod_sum term      estimate std.error statistic    p.value
##   <fct>      <list>  <lis> <list> <chr>      <dbl>      <dbl>      <dbl>      <dbl>
## 1 Asia      <tibbl... <lm>  <tibble... (Inte...      9.58        2.71         3.54 4.46e- 4
## 2 Asia      <tibbl... <lm>  <tibble... log(g...      6.25        0.331        18.9 3.73e- 57
## 3 Europe    <tibbl... <lm>  <tibble... (Inte...     13.0        1.92         6.76 5.52e- 11
## 4 Europe    <tibbl... <lm>  <tibble... log(g...      6.31        0.205        30.8 8.06e-103
## 5 Africa    <tibbl... <lm>  <tibble... (Inte...      7.60        2.63         2.89 4.03e- 3
## 6 Africa    <tibbl... <lm>  <tibble... log(g...      5.69        0.361        15.8 1.86e- 47
## 7 Americas  <tibbl... <lm>  <tibble... (Inte...     -19.1        4.82        -3.95 9.65e- 5
## 8 Americas  <tibbl... <lm>  <tibble... log(g...      9.72        0.558        17.4 2.51e- 47
## # ... with 2 more variables: conf.low <dbl>, conf.high <dbl>
```

The power of lists

```
## Nice formatting of the numbers
## There are many convenience packages
## like this; it's not too hard to write your own, either
# remotes::install_github("tjmahr/printy")

text_ready <- out_le %>%
  mutate(
    across(c(estimate, conf.low, conf.high),
           printy::fmt_fix_digits, 2),
    se = printy::fmt_fix_digits(std.error, 3),
    ci = glue::glue("[{conf.low}, {conf.high}]")
  ) %>%
  select(continent, term, estimate, se, ci)
```

The `printy` package is by [T.J. Mahr](#)

The power of lists

```
text_ready
```

```
## # A tibble: 8 × 5
## # Groups:   continent [4]
##   continent term          estimate se      ci
##   <fct>      <chr>          <chr>   <chr> <glue>
## 1 Asia      (Intercept)      9.58    2.706 [4.26, 14.90]
## 2 Asia      log(gdpPercap)  6.25    0.331 [5.60, 6.90]
## 3 Europe    (Intercept)     12.97    1.917 [9.19, 16.74]
## 4 Europe    log(gdpPercap)  6.31    0.205 [5.91, 6.71]
## 5 Africa    (Intercept)      7.60    2.632 [2.43, 12.77]
## 6 Africa    log(gdpPercap)  5.69    0.361 [4.98, 6.40]
## 7 Americas  (Intercept)    -19.07    4.824 [-28.56, -9.58]
## 8 Americas  log(gdpPercap)  9.72    0.558 [8.62, 10.82]
```

The power of lists

Now ...

```
stats <- text_ready %>%  
  mutate(term = janitor::make_clean_names(term)) %>%  
  printy::super_split(continent, term) # Thanks again, TJ Mahr
```

The power of lists

Why are we doing this?

```
stats
```

```
## $Africa
## $Africa$intercept
## # A tibble: 1 × 5
## # Groups:   continent [1]
##   continent term      estimate se      ci
##   <fct>      <chr>      <chr>   <chr> <glue>
## 1 Africa    intercept  7.60    2.632 [2.43, 12.77]
##
## $Africa$log_gdp_percap
## # A tibble: 1 × 5
## # Groups:   continent [1]
##   continent term              estimate se      ci
##   <fct>      <chr>              <chr>   <chr> <glue>
## 1 Africa    log_gdp_percap  5.69    0.361 [4.98, 6.40]
##
##
## $Americas
## $Americas$intercept
## # A tibble: 1 × 5
## # Groups:   continent [1]
```

The power of lists

The Intercept term for Africa was 'r stats\$Africa\$intercept\$estimate' 'r stats\$Africa\$intercept\$ci'.

For Europe it was 'r stats\$Europe\$intercept\$estimate' 'r stats\$Europe\$intercept\$ci'

The Intercept term for Africa was 7.60 [2.43, 12.77].

For Europe it was 12.97 [9.19, 16.74].

For more, see [this post by TJ Mahr](#):

<https://www.tjmahr.com/lists-knitr-secret-weapon/>