A/B TESTING IN R

A/B Testing Research Questions

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What is A/B testing?

A/B testing is the use of experimental design and statistics to compare two or more variants of a design.

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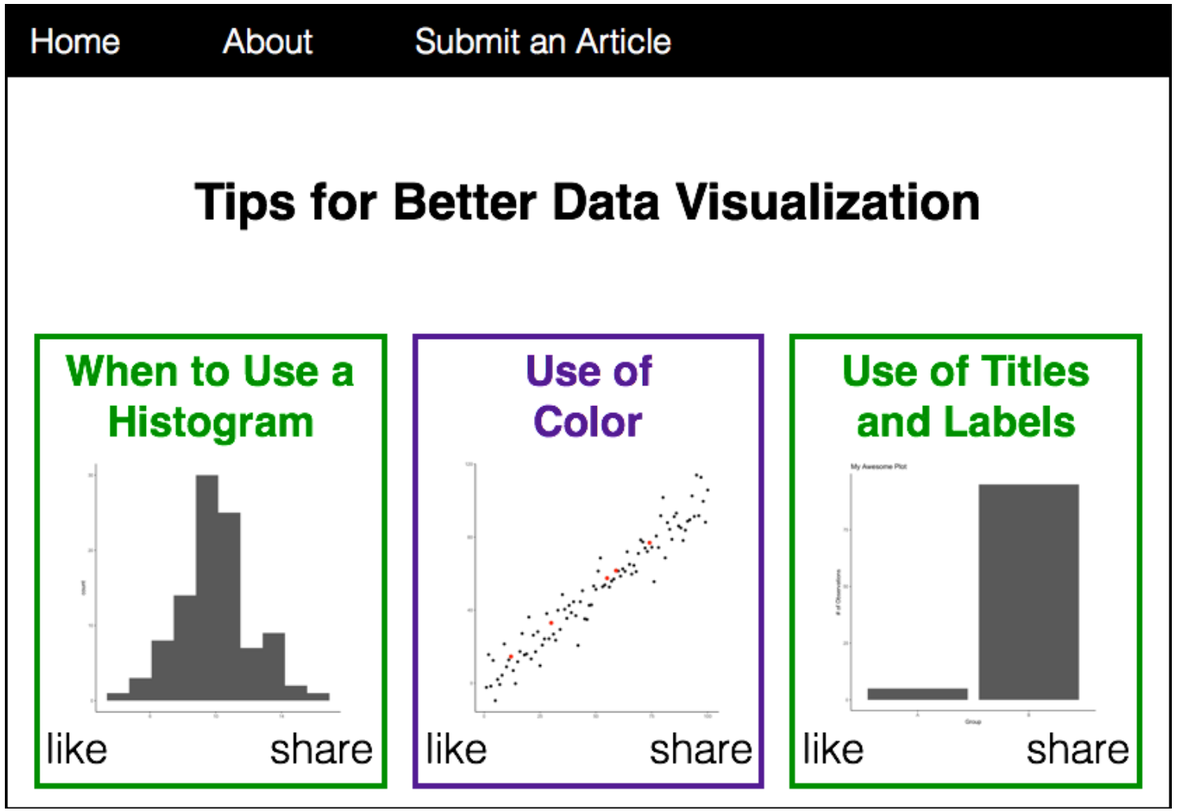
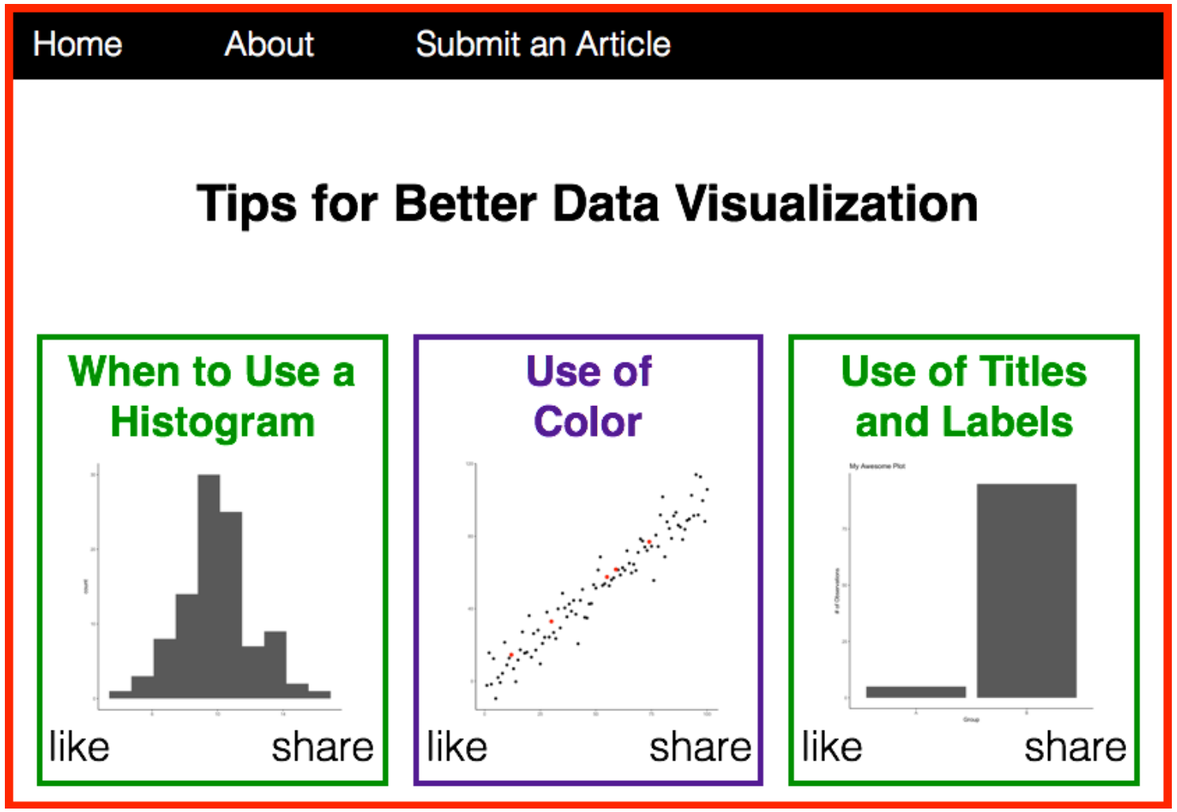
Uses of A/B testing

- Conversion rates (e.g., clicks or purchases)
- Engagement (e.g., sharing, "like"ing)
- Dropoff rate
- Time spent on a website

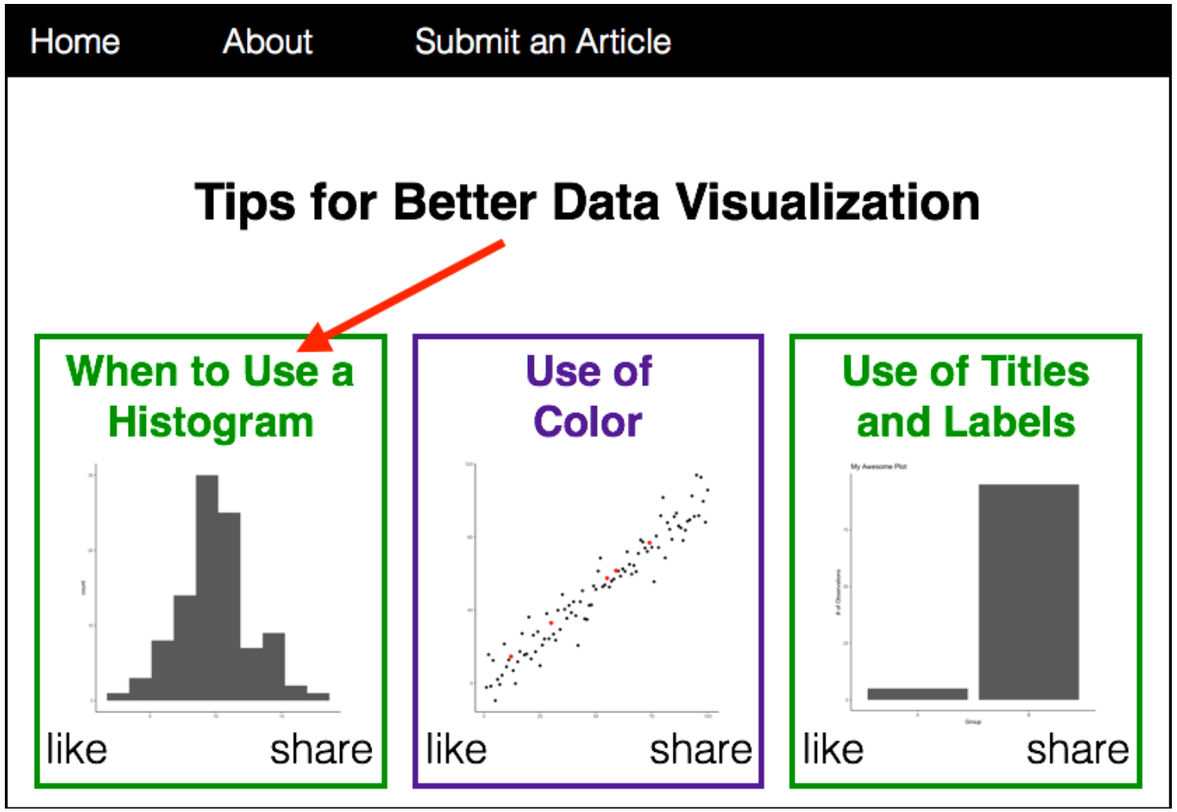
Data visualization website



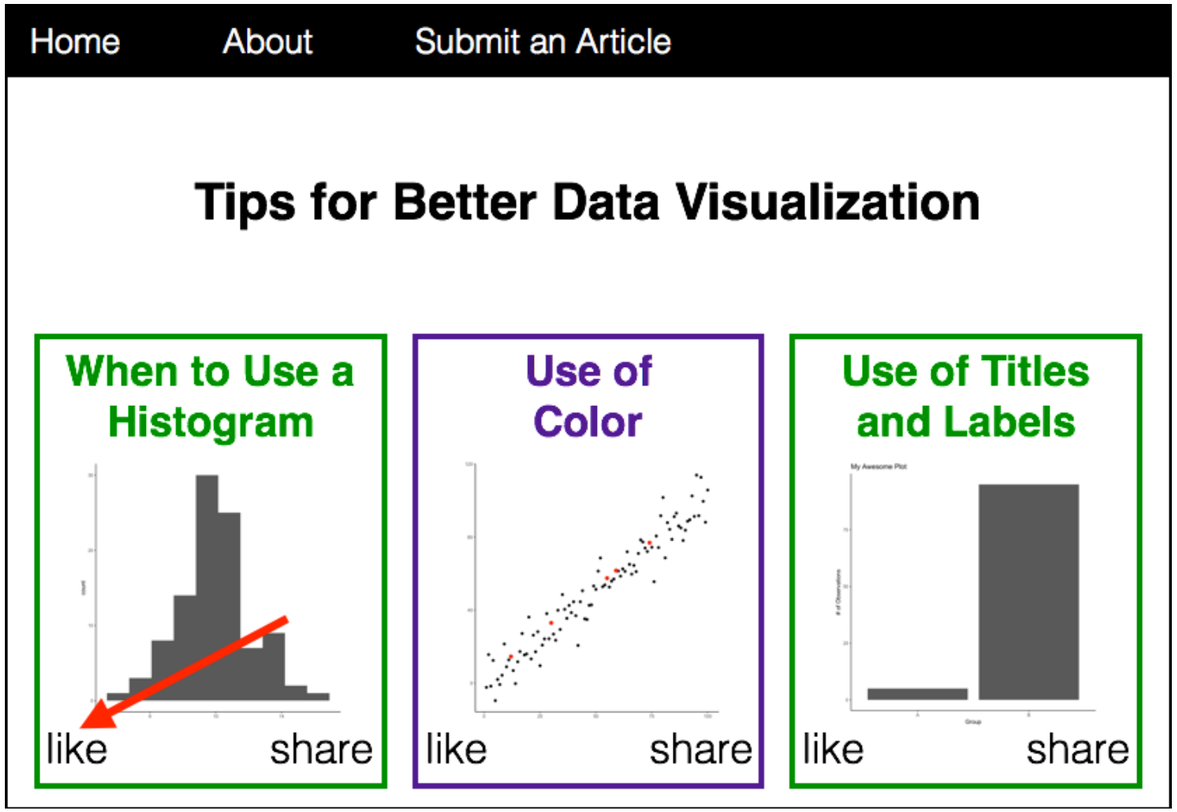
Data visualization website



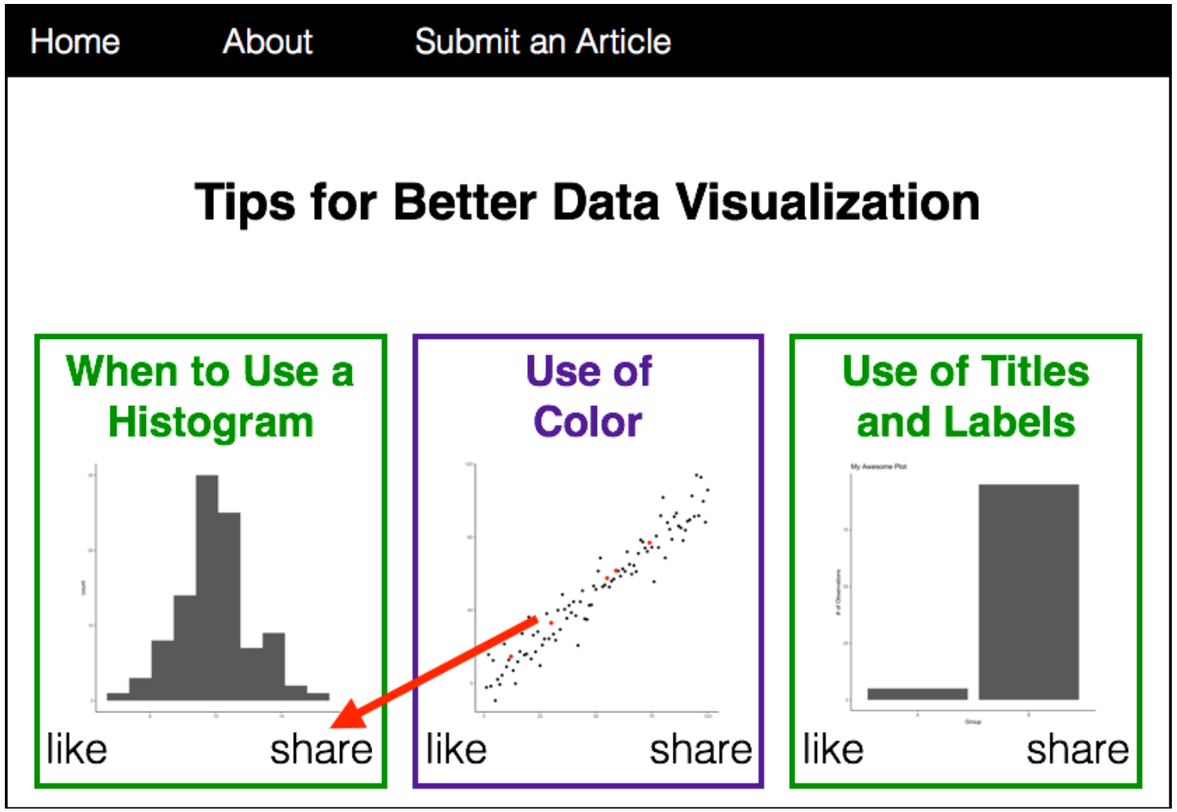
Data visualization website



Data visualization website



Data visualization website



Time spent on homepage

```
library(tidyverse)
library(lubridate)

str(viz_website_2017)
```

```
Classes ‘tbl_df’, ‘tbl’ and 'data.frame':    182500 obs. of  5 variables:
 $ visit_date             : Date, format: "2017-01-01" "2017-01-01" "2017-01-01"
 $ time_spent_homepage_sec: num  41.4 64.9 48.7 59.6 56.2 ...
 $ clicked_article        : int  0 0 1 0 1 1 1 1 1 0 ...
 $ clicked_like           : int  0 0 0 0 0 1 0 0 0 0 ...
 $ clicked_share          : int  0 0 0 0 0 0 0 0 0 0 ...
```

Time spent on homepage

```
library(tidyverse)
library(lubridate)

str(viz_website_2017)

viz_website_2017 %>%
  summarize(mean(time_spent_homepage_sec))
```

```
# A tibble: 1 x 1
  `mean(time_spent_homepage_sec)`
                            <dbl>
1                        67.29971
```

Time spent on homepage

```
library(tidyverse)
library(lubridate)

str(viz_website_2017)

viz_website_2017 %>%
  group_by(month(visit_date)) %>%
  summarize(mean(time_spent_homepage_sec))
```

```
# A tibble: 12 x 2
   `month(visit_date)` `mean(time_spent_homepage_sec)`
                 <dbl>                           <dbl>
 1                   1                        58.97295
 2                   2                        60.02026
 3                   3                        69.98907
 4                   4                        49.89426
 5                   5                        48.02607
 6                   6                        59.89163
 7                   7                        60.11506
 8                   8                        60.05151
 9                   9                        70.01241
10                  10                        79.98697
11                  11                        89.88108
12                  12                       100.06631
```

A/B TESTING IN R

Let's practice!

A/B TESTING IN R

Assumptions and Types of A/B Testing

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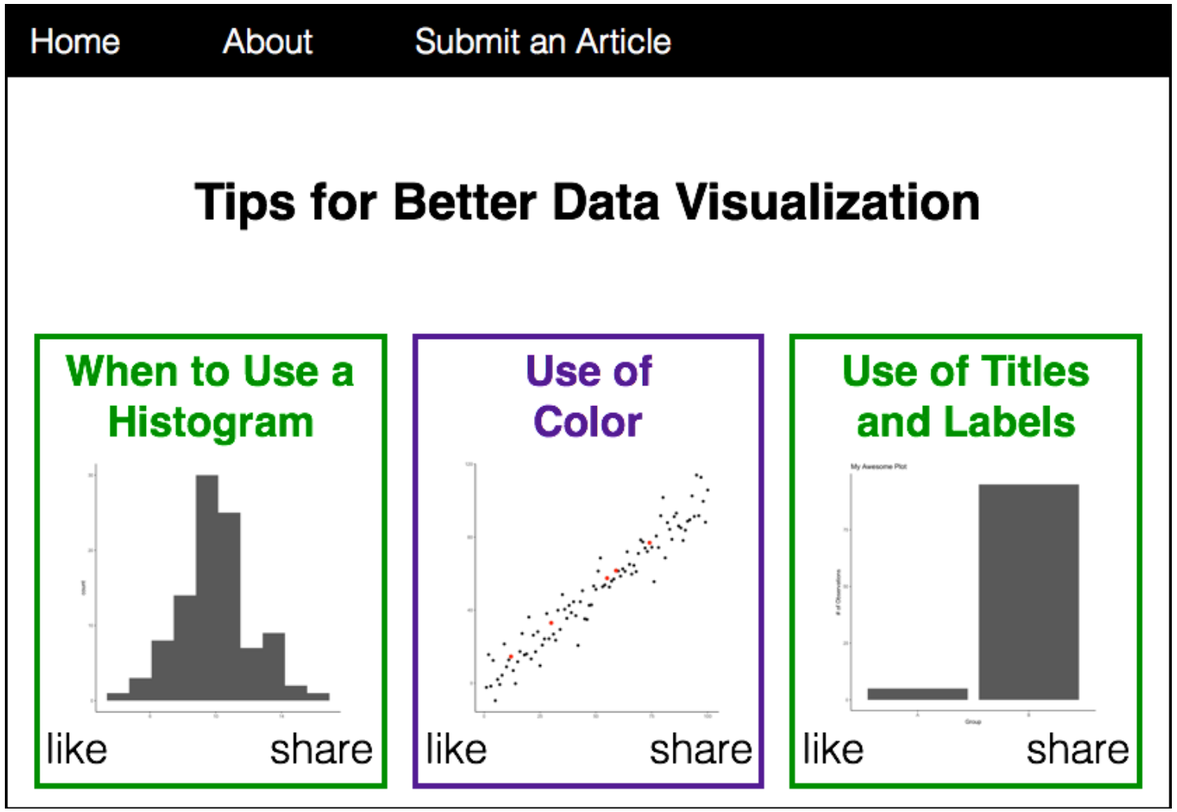
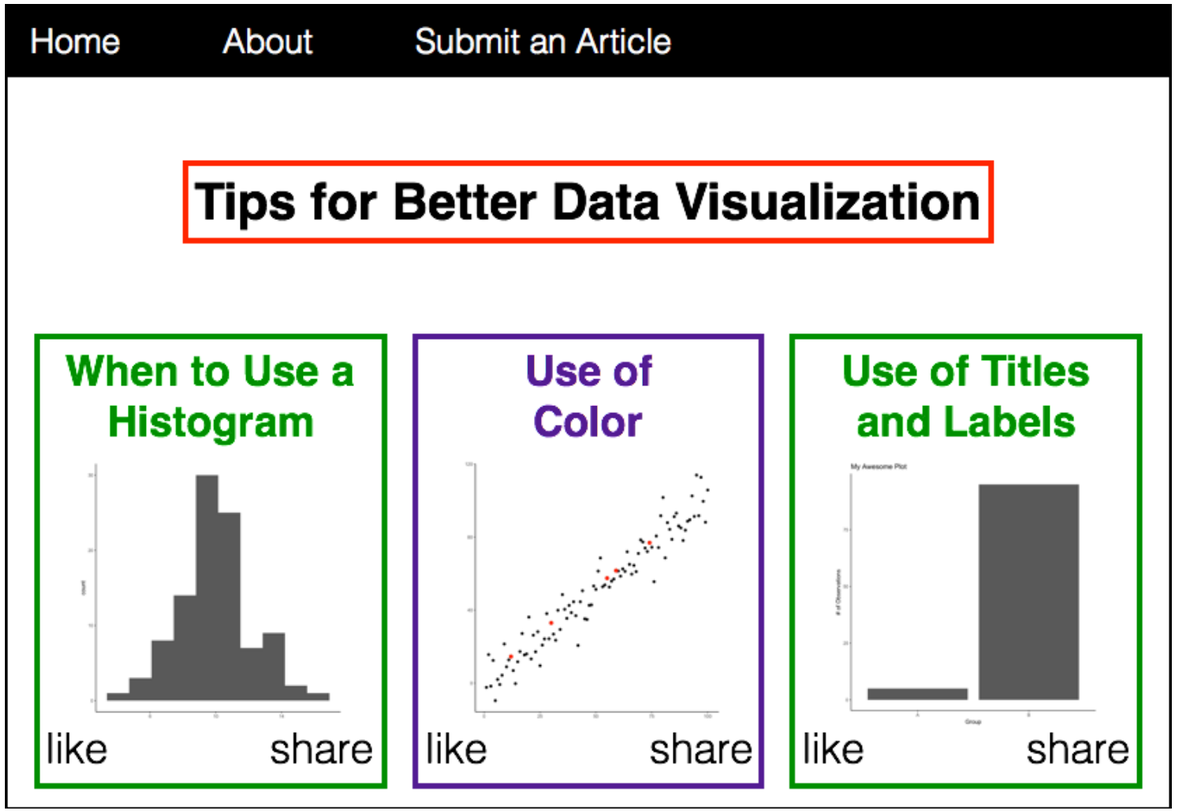
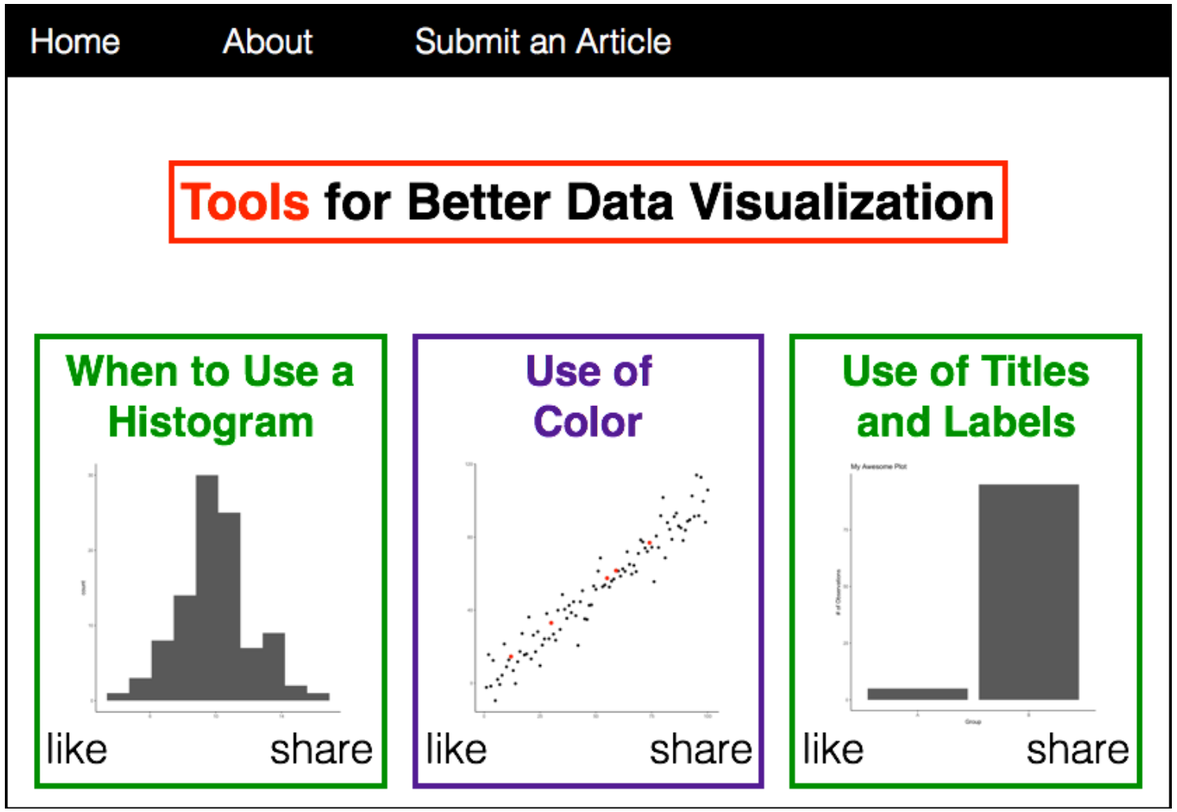
Data visualization website



Data visualization website



Data visualization website



Within group vs. between group

- **within** - each participant sees both conditions
- **between** - different groups of participants see different conditions
  - ***Assumption: There should be nothing qualitatively different between the two groups of participants***

Types of A/B testing

- **A/B** - compare a control and a test condition ("Tips" vs. "Tools")
- **A/A** - compare two groups of control conditions ("Tips (group 1)" to "Tips (group 2)")
- **A/B/N** - compare a control condition to any number of different test conditions (e.g., "Tips" vs. "Tools" vs. "Strategies")

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Let's practice!

A/B TESTING IN R

Confounding Variables

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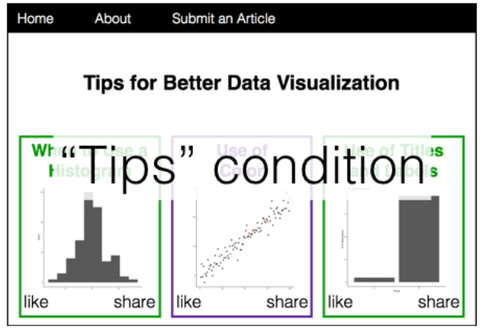
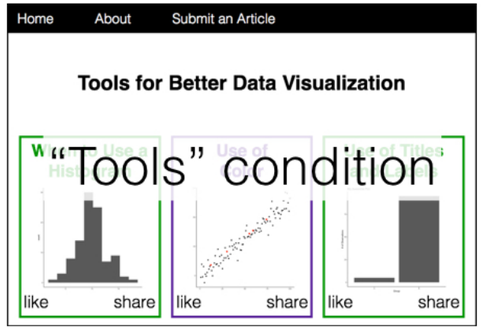
Confounding variables

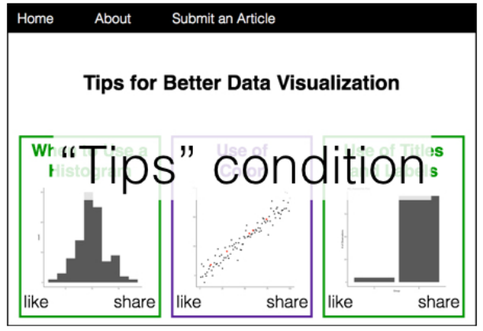
A **confounding variable** is an element of the environment that could affect your ability to find out the *truth* of an A/B experiment.

Confounding variables - internal

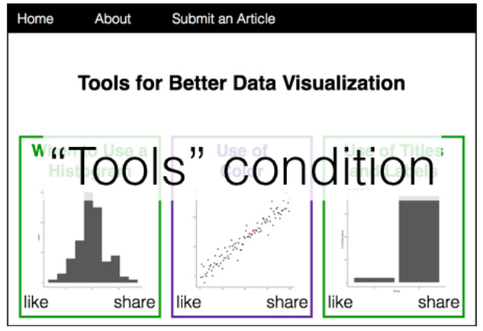




Confounding variables - internal

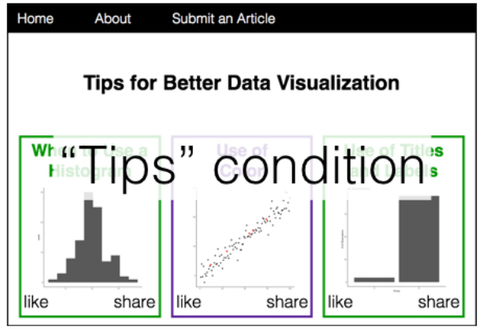


month 1
20%
click 'like'



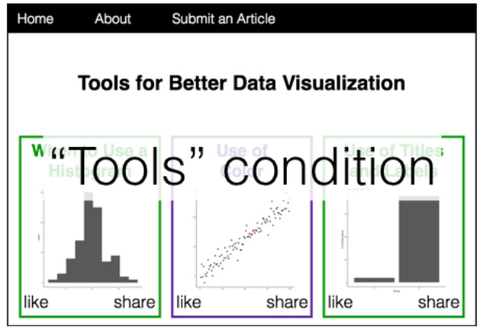
month 1
10%
click 'like'

Confounding variables - internal



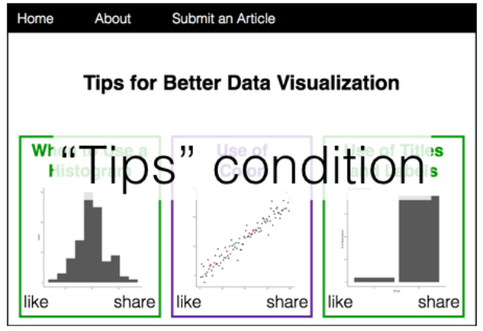
month 1
20%
click 'like'

# of letters?
frequency of word?

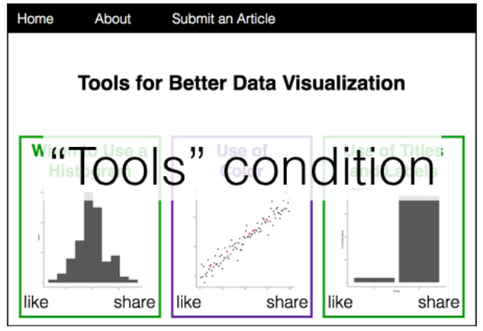


month 1
10%
click 'like'

Confounding variables - external

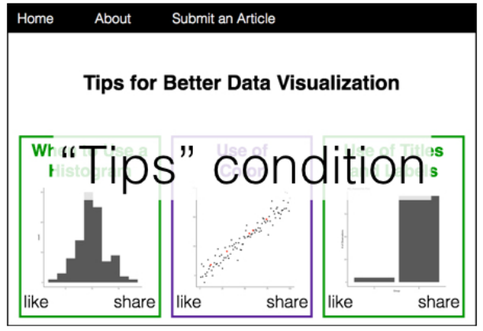


month 1
20%
click 'like'



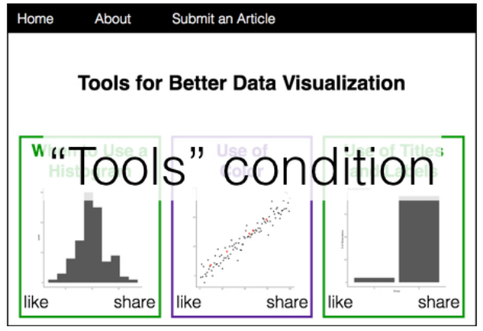
month 1
10%
click 'like'

Confounding variables - external



month 1
20%
click 'like'

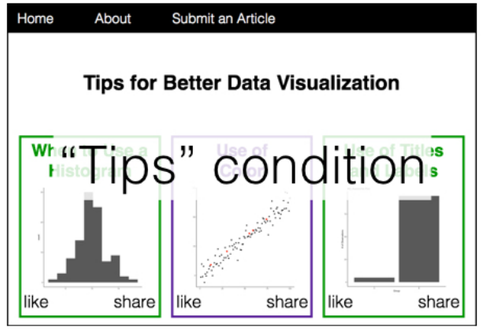
month 2
20%
click 'like'



month 1
10%
click 'like'

month 2
30%
click 'like'

Confounding variables - external

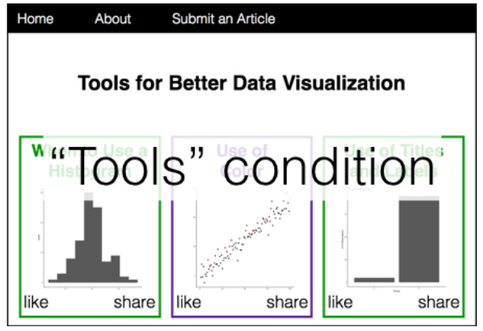


month 1
20%
click 'like'

month 2
20%
click 'like'

Ages 20 - 35:
50%

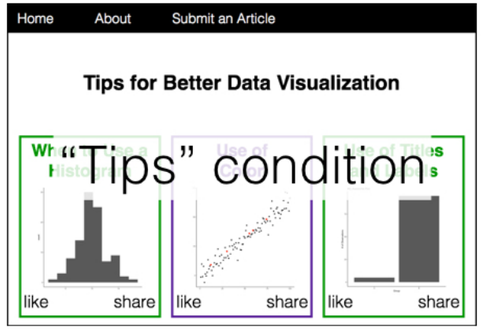
Ages 35+:
50%



month 1
10%
click 'like'

month 2
30%
click 'like'

Confounding variables - external



"Tips" condition

month 1
20%
click 'like'

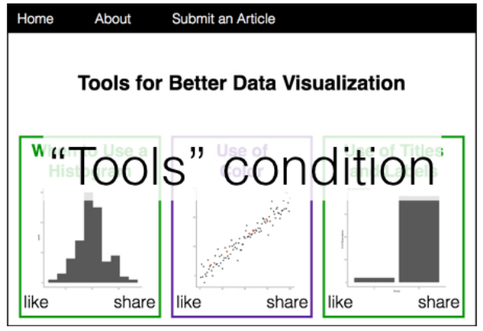
month 2
20%
click 'like'

Ages 20 - 35:
50%

Ages 20 - 35:
10%

Ages 35+:
50%

Ages 35+:
90%



"Tools" condition

month 1
10%
click 'like'

month 2
30%
click 'like'

A/B TESTING IN R

Let's practice!

A/B TESTING IN R

Side Effects

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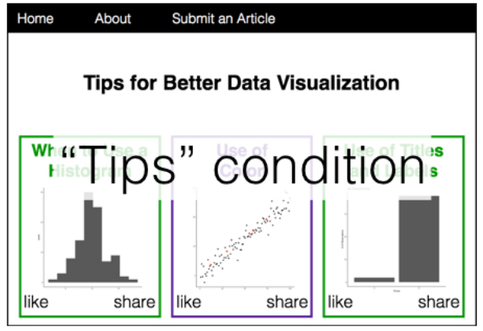
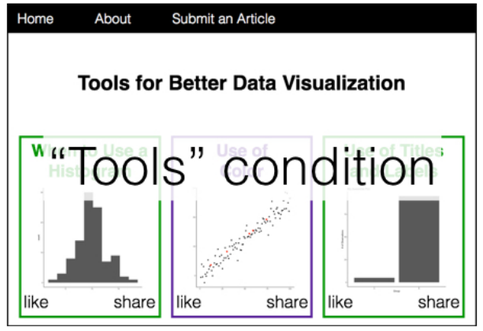
Side effects

A **side effect** is an *unintended consequence* of a change you made.

Side effects

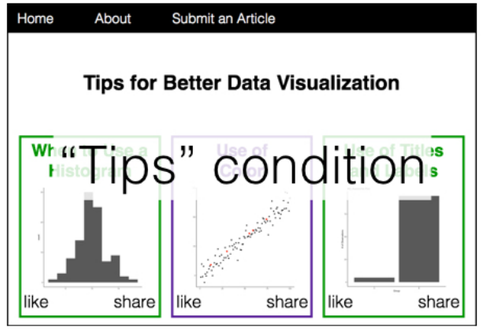


month 1
20%
click ‘like’



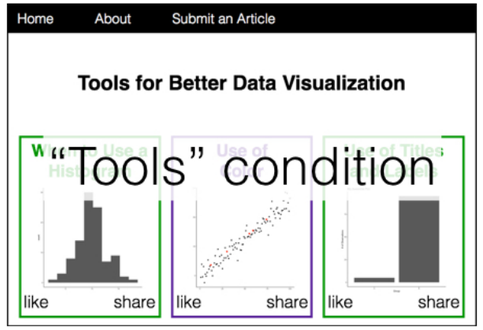
month 1
10%
click ‘like’

Side effects



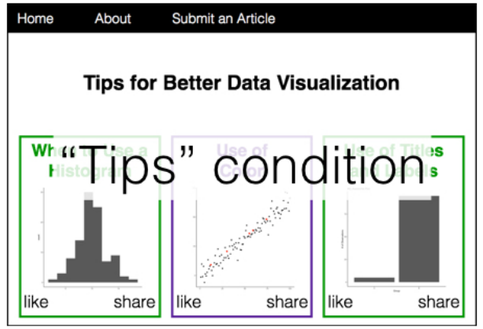
5 seconds to load

month 1
20%
click ‘like’



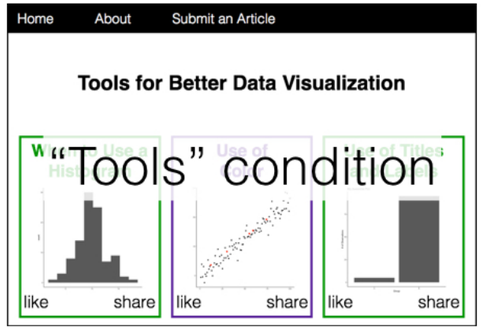
month 1
10%
click ‘like’

Side effects



5 seconds to load

month 1
20%
click ‘like’



7 seconds to load

month 1
10%
click ‘like’

Examples of side effects

- Load times
- Information "above the fold"

A/B TESTING IN R

Let's practice!