A/B Testing Research Questions

INTRODUCTION TO A/B TESTING IN R

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

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.
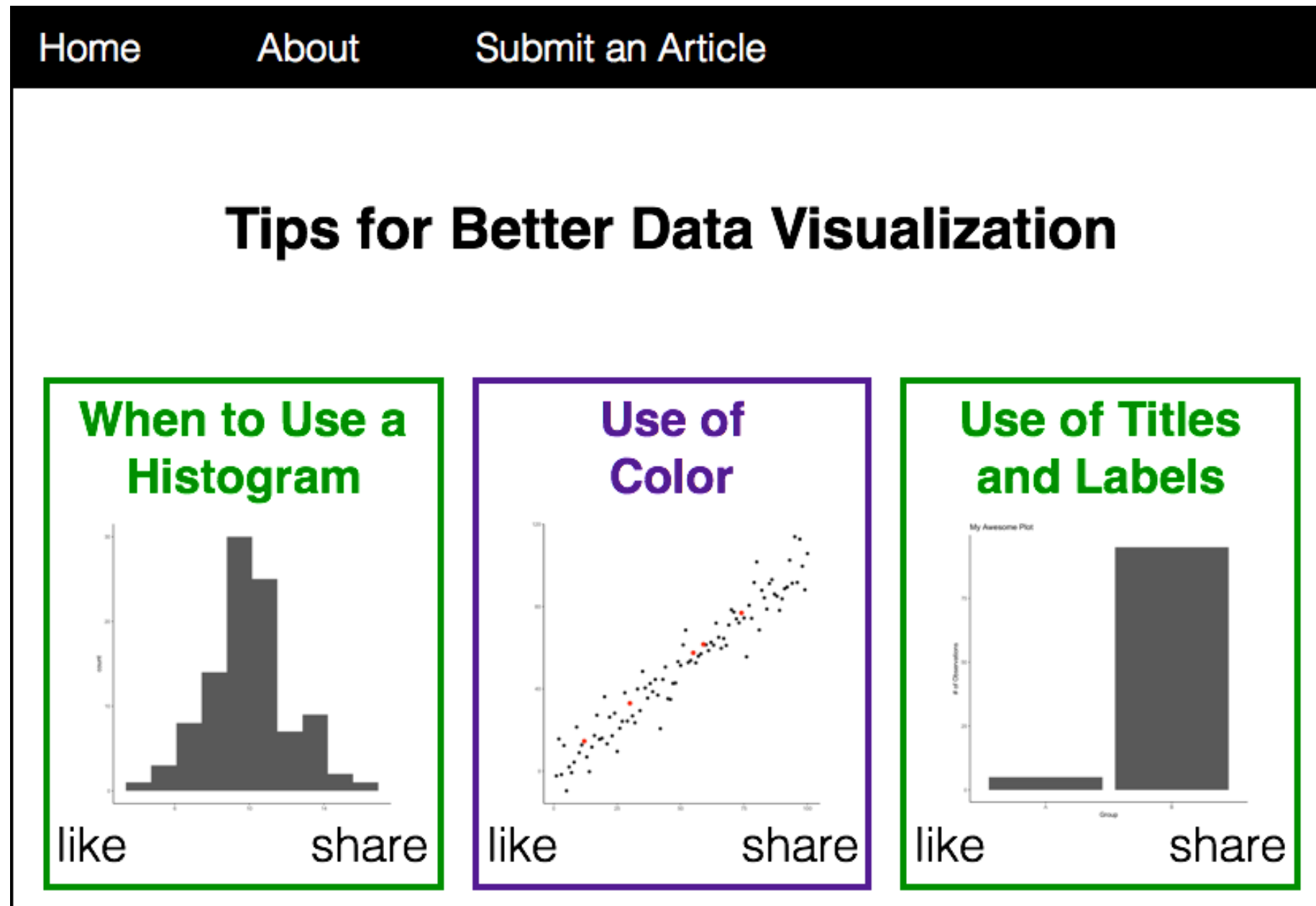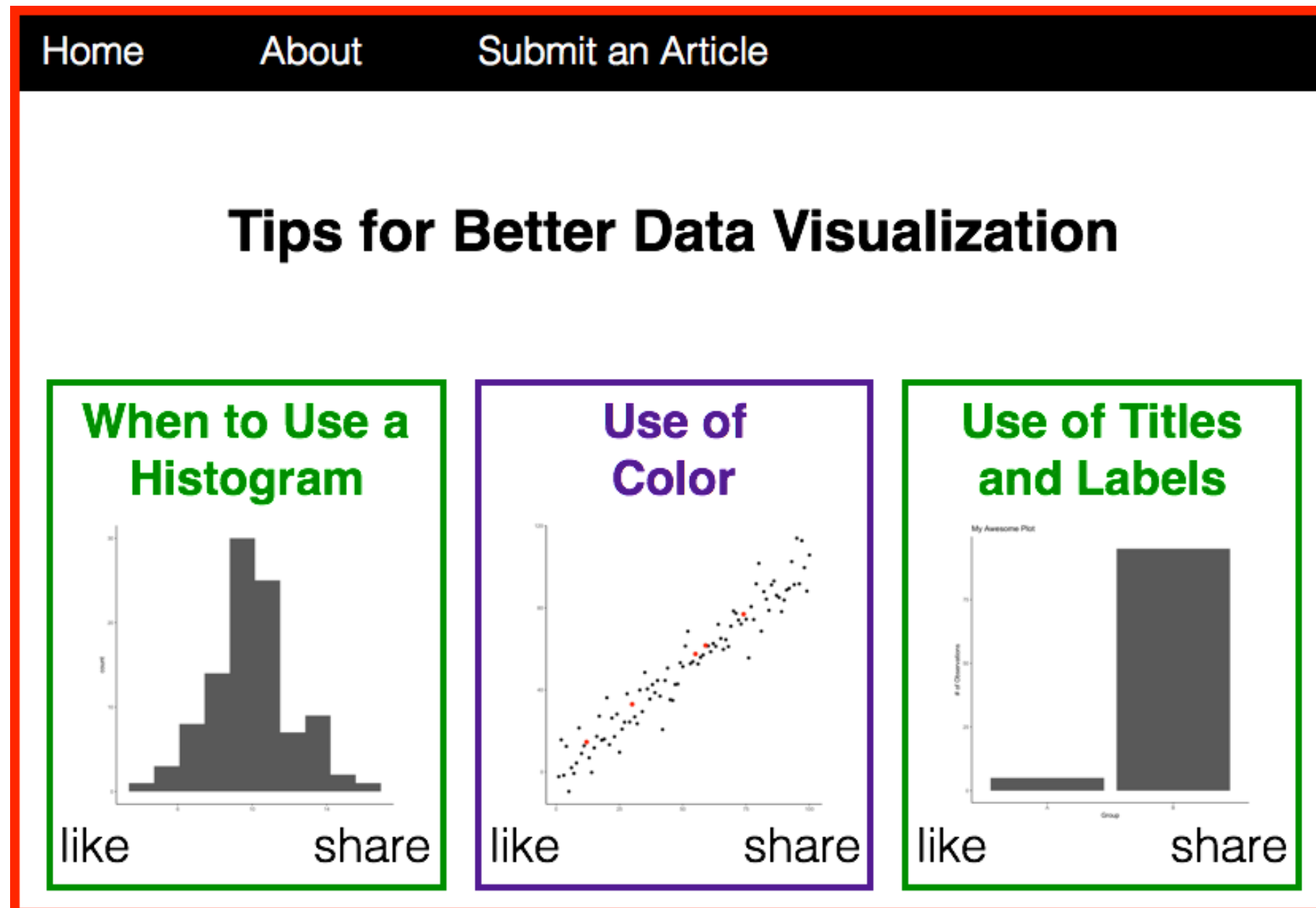
Uses of A/B testing

- Conversion rates (e.g., clicks or purchases)

- Engagement (e.g., sharing, "like"ing)

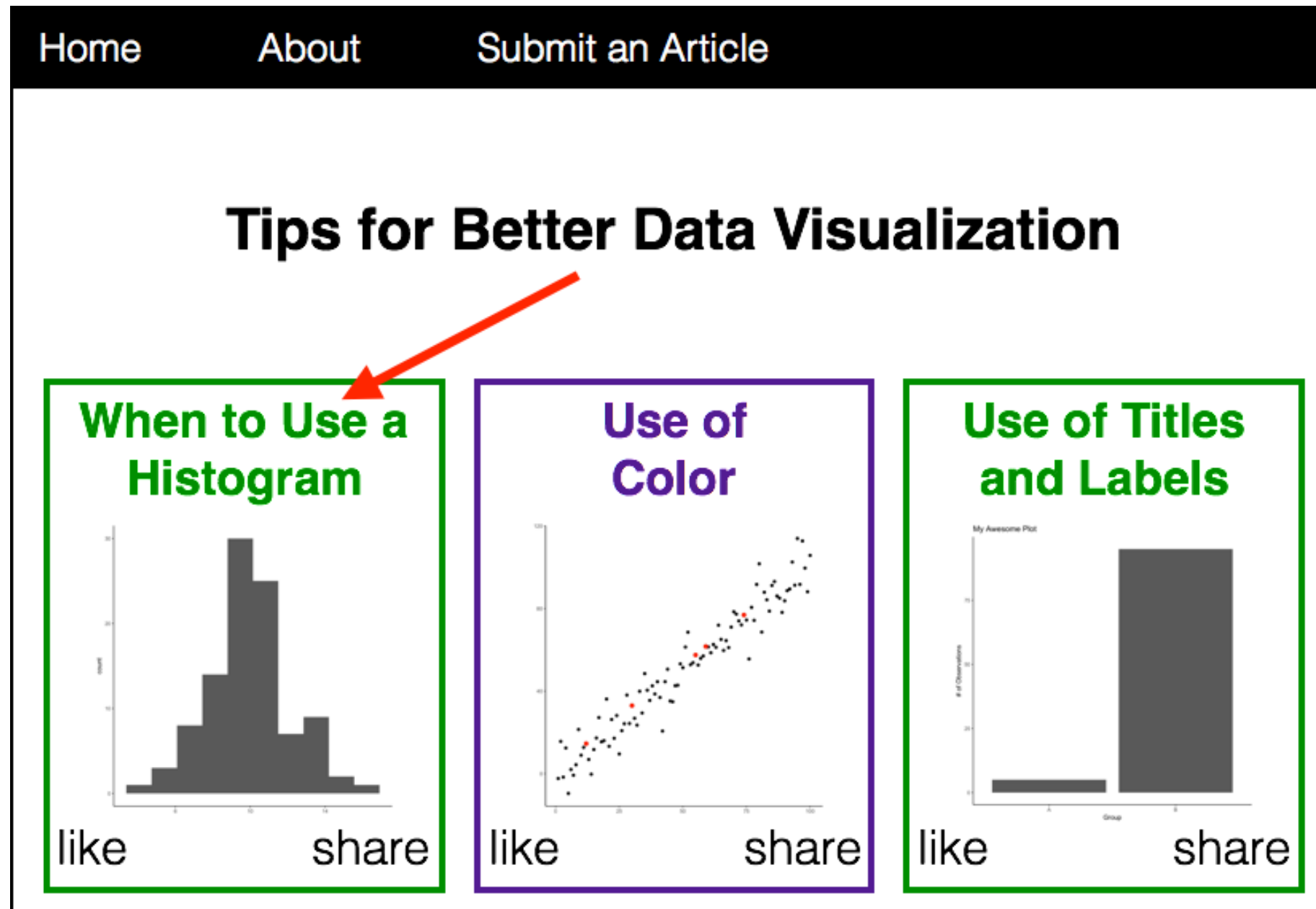- Dropoff rate

- Time spent on a website

Data visualization website
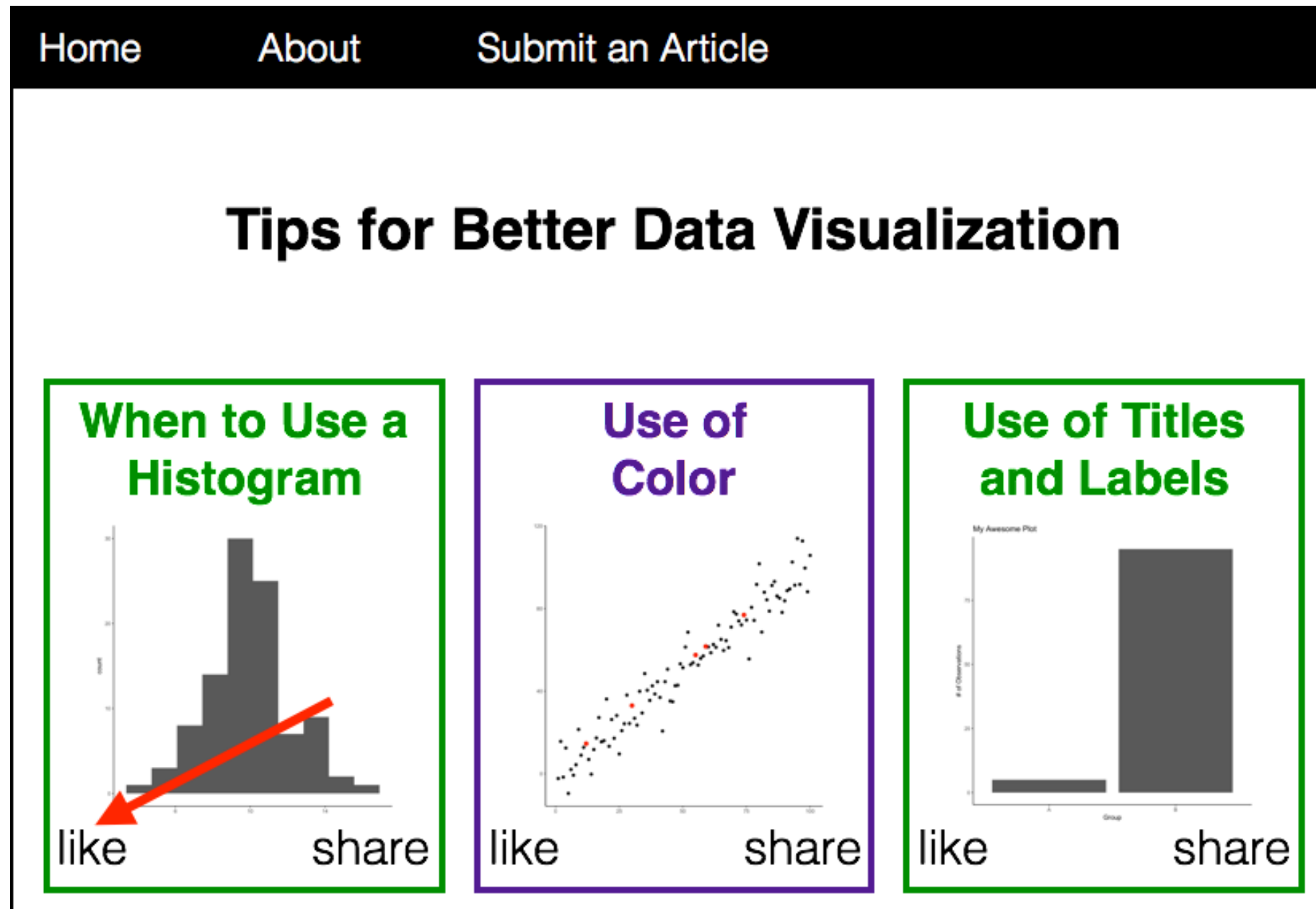
Data visualization website
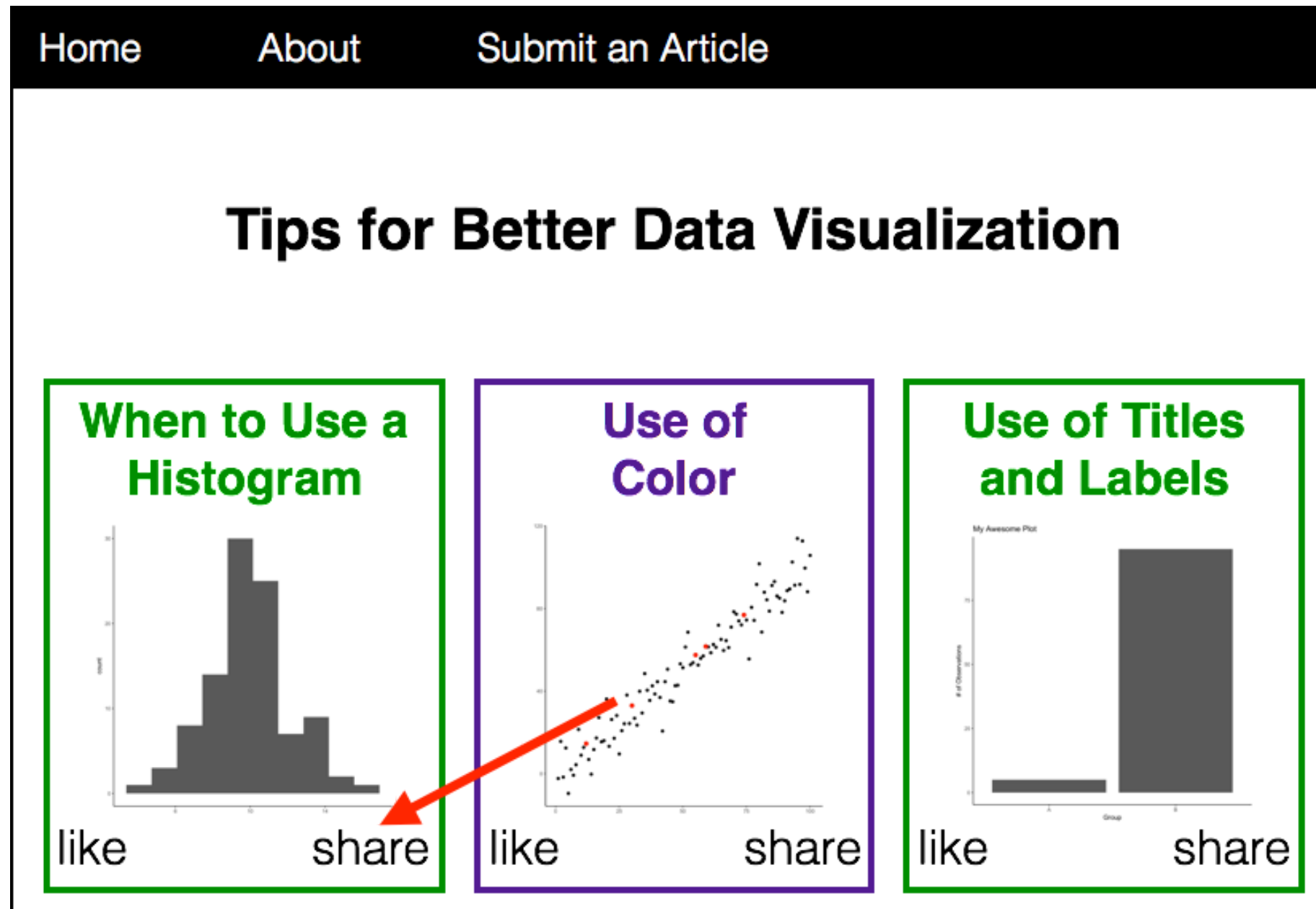
Data visualization website

Data visualization website

Data visualization website

Time spent on homepage

```r
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

```r
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

```r
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
```
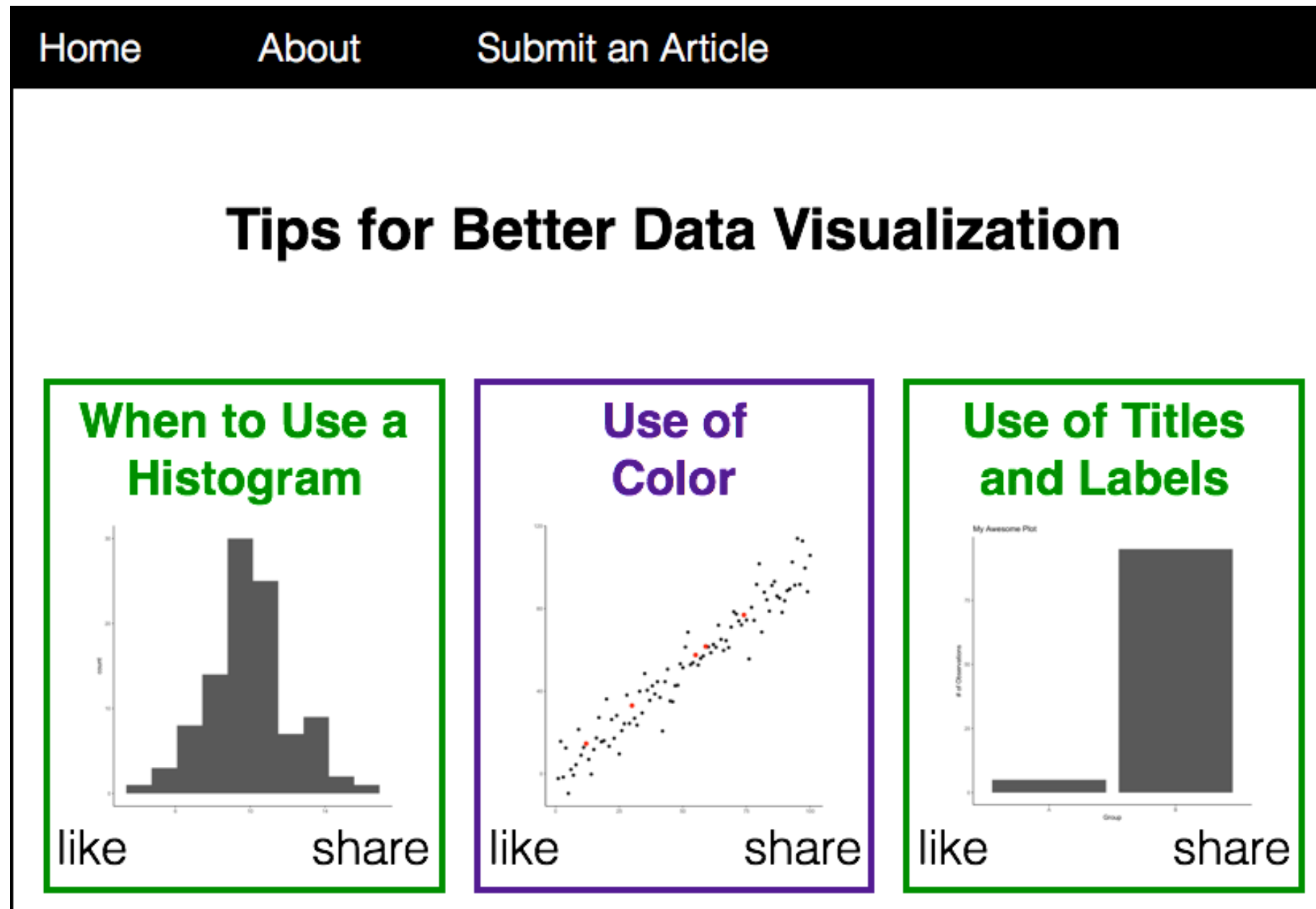
Let's practice!

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Assumptions and Types of A/B Testing

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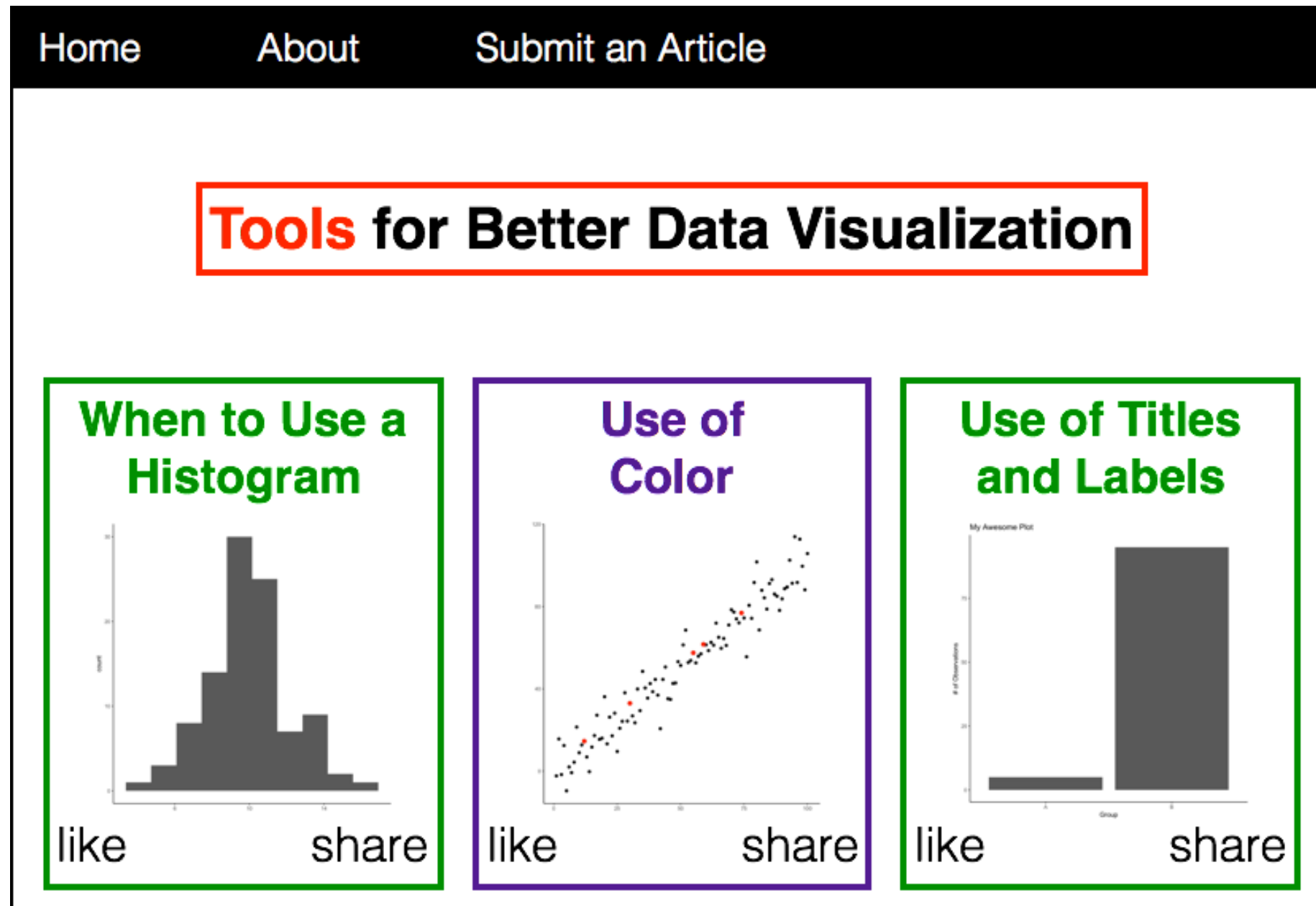Instructor

Data visualization website

Data visualization website
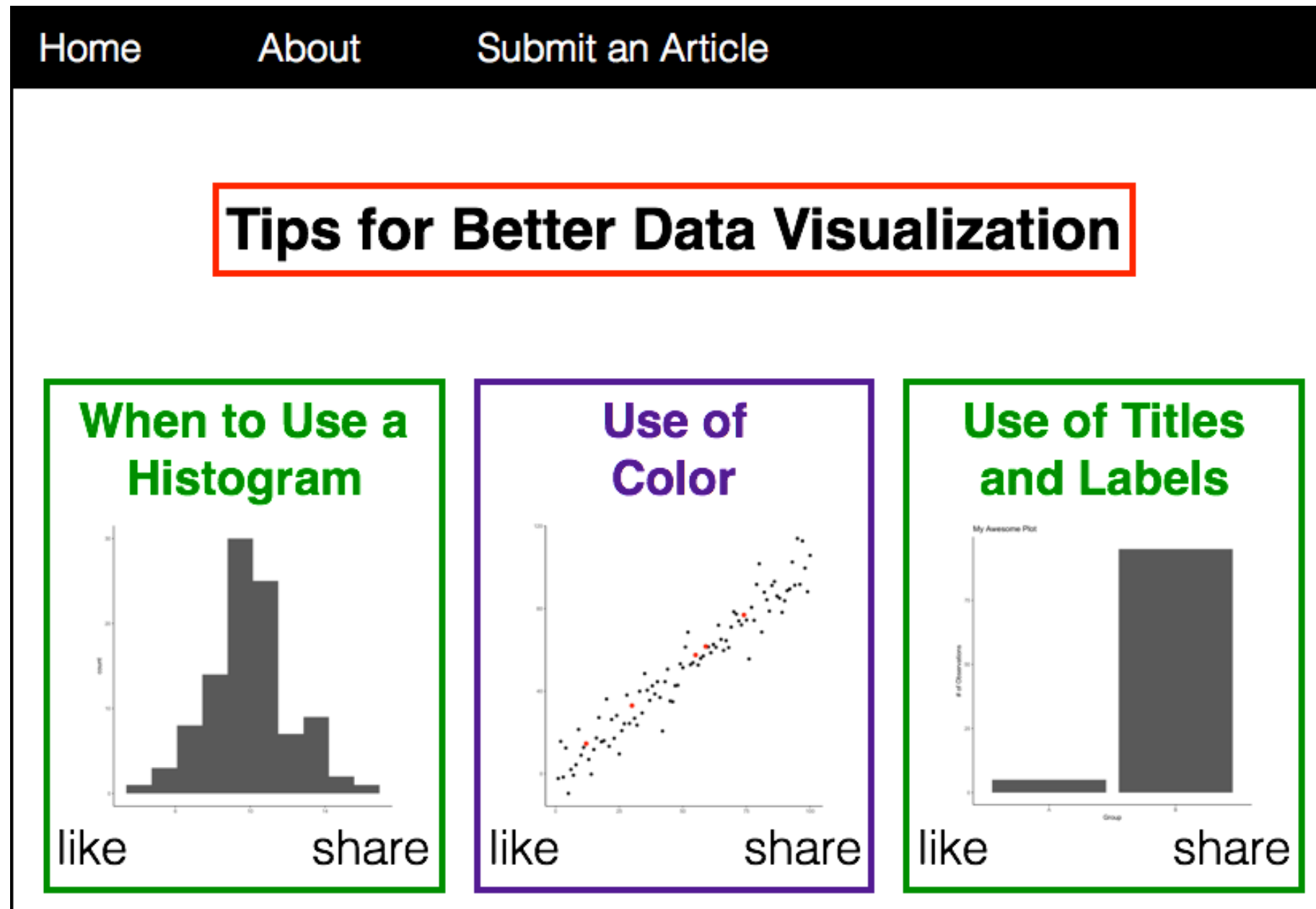
Data visualization website

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")

Let's practice!

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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
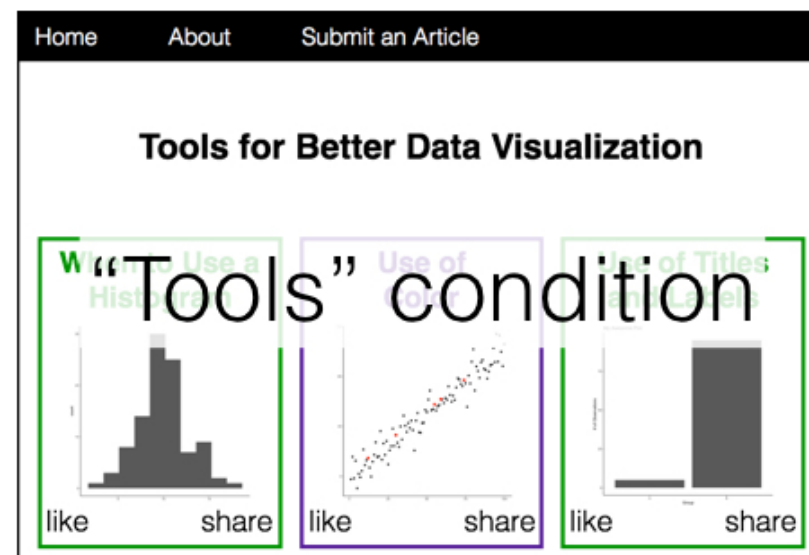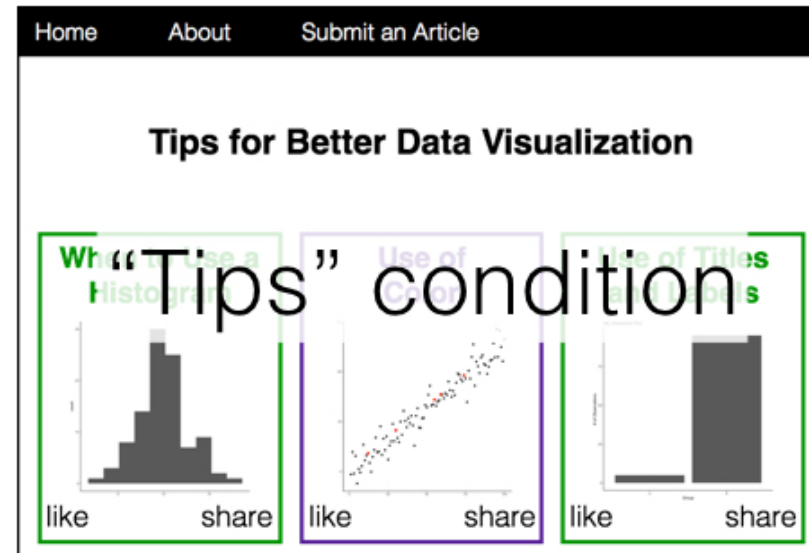
Confounding variables - internal

month 1
20%
click 'like'

# of letters?
frequency of word?
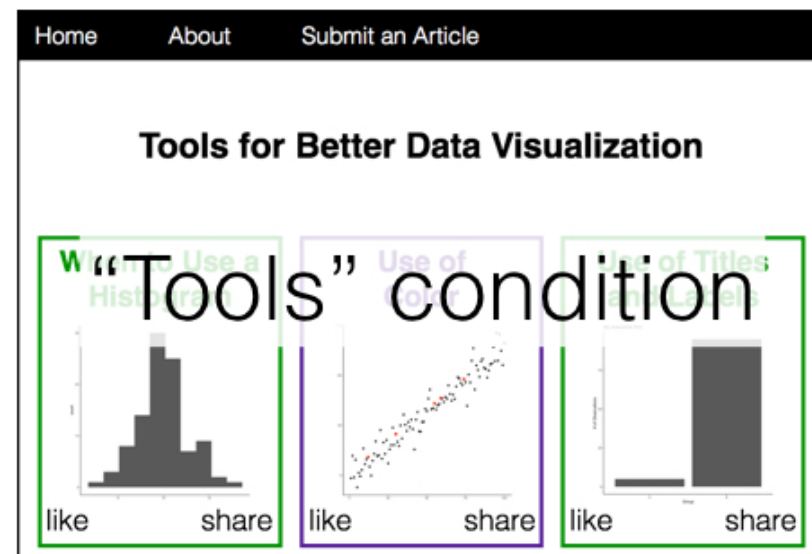
month 1
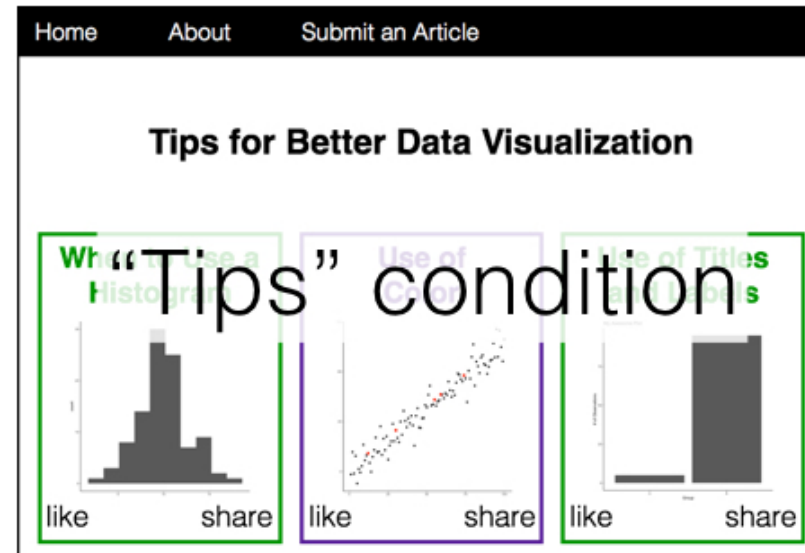10%
click 'like'

Confounding variables - external
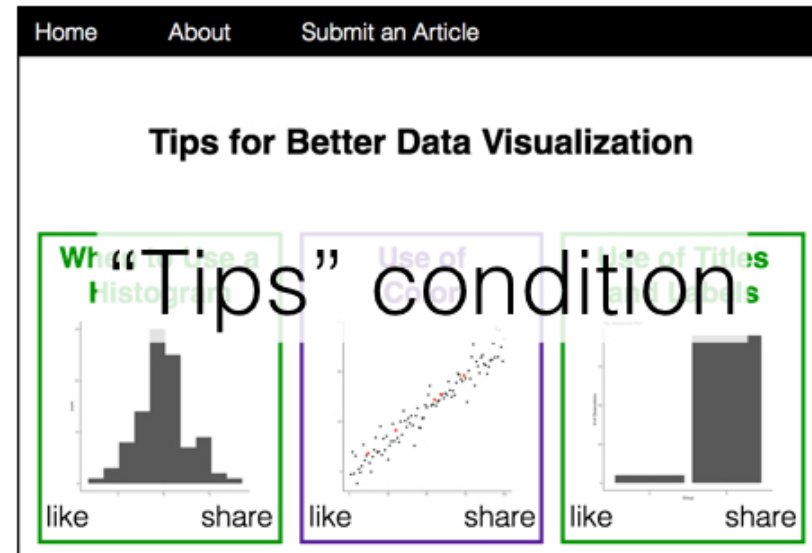
month 1
20%
click 'like'

month 1
10%
click 'like'
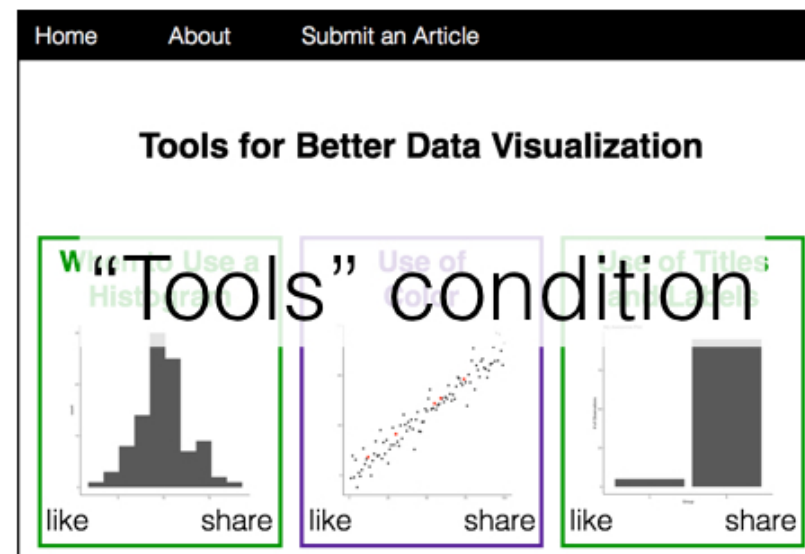
Confounding variables - external

"Tips" condition

month 1
20%
click 'like'

month 2
20%
click 'like'

"Tools" condition

month 1
10%
click 'like'

month 2
30%
click 'like'

Confounding variables - external

Confounding variables - external

"Tips" condition
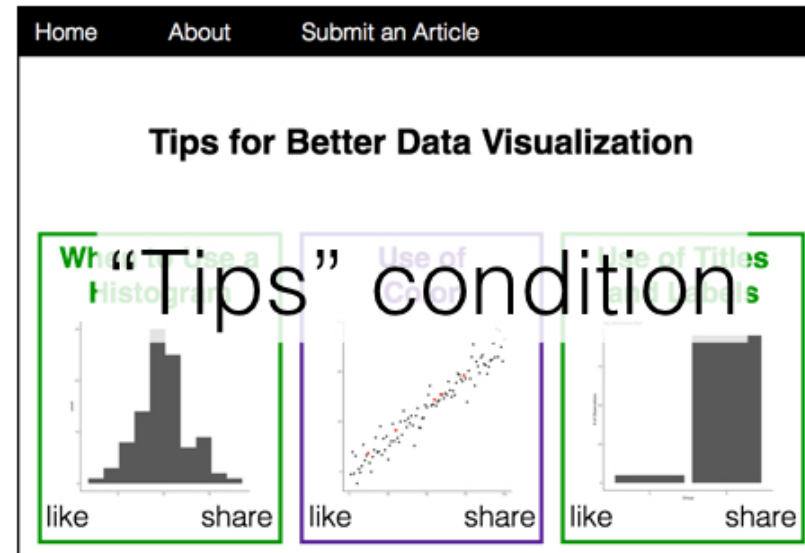
month 1
20%
click 'like'

month 2
20%
click 'like'
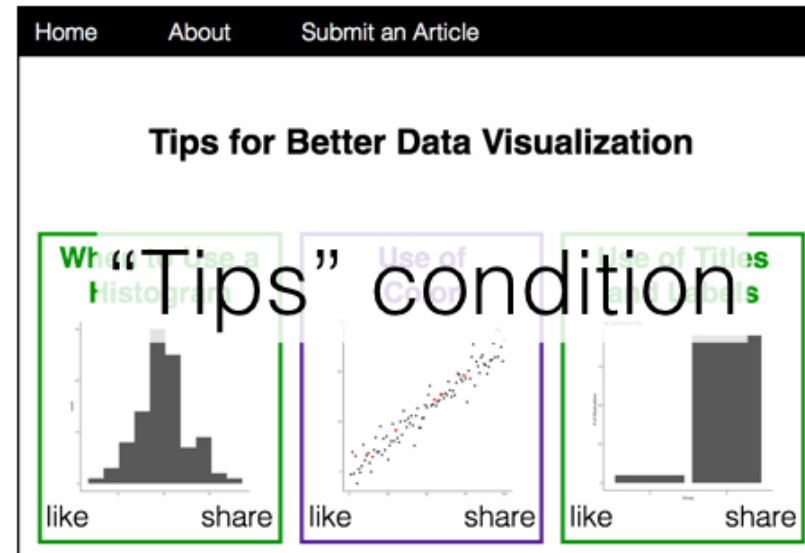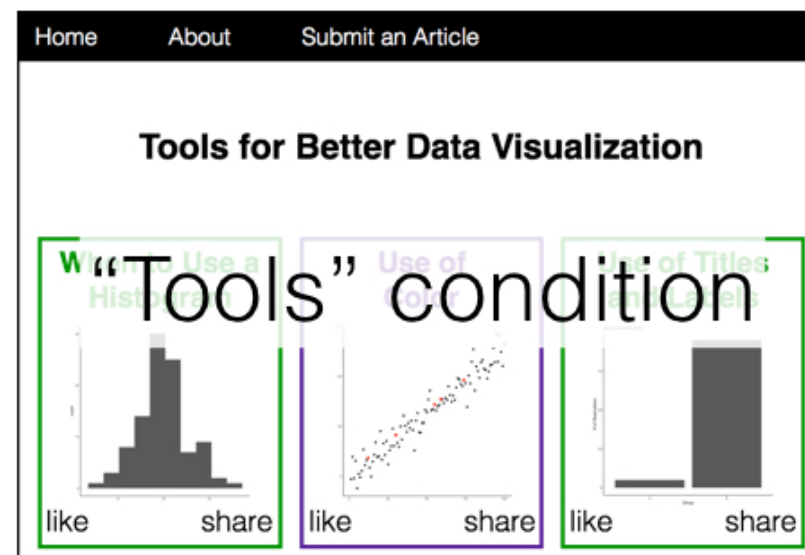
Ages 20 - 35:
50%
Ages 35+:
50%

Ages 20 - 35:
10%
Ages 35+:
90%

"Tools" condition

month 1
10%
click 'like'

month 2
30%
click 'like'

Let's practice!

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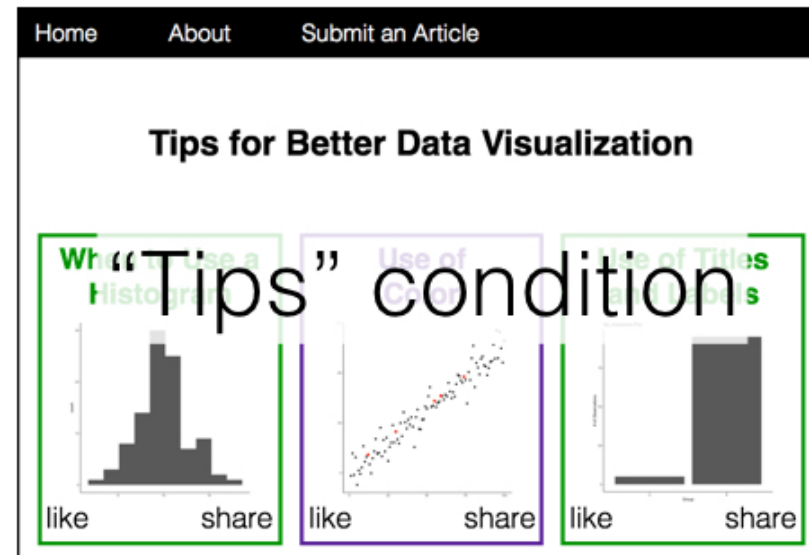
Side Effects

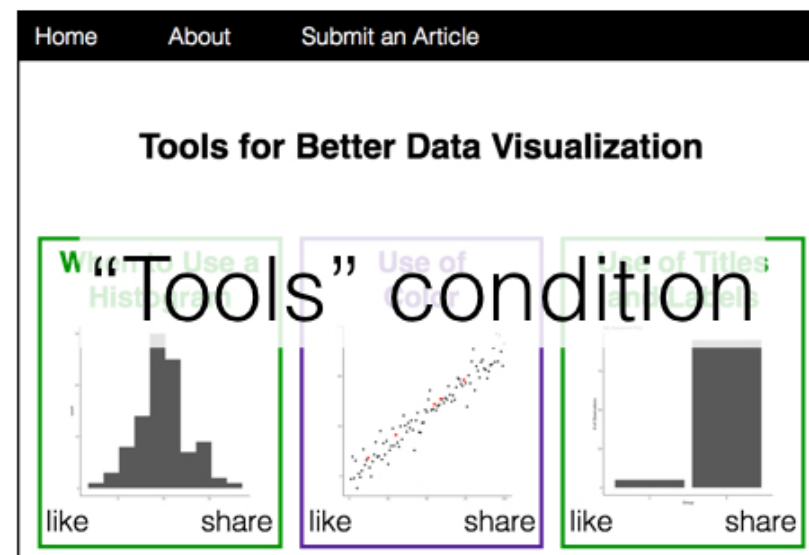## INTRODUCTION TO A/B TESTING IN R

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Side effects

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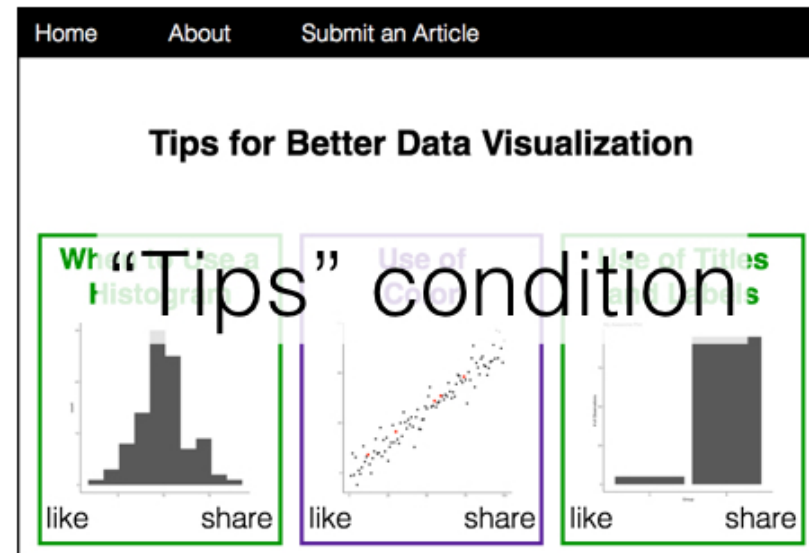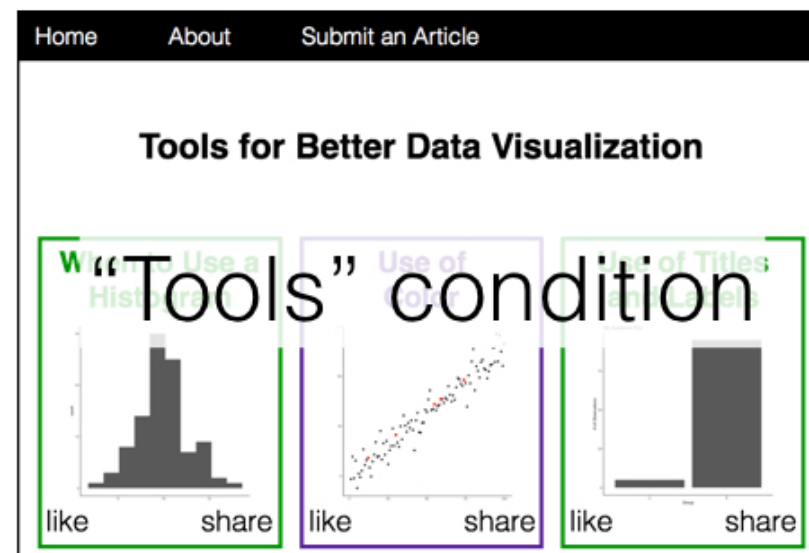
Side effects

Side effects

5 seconds to load

"Tips" condition

month 1
20%
click 'like'

"Tools" condition

month 1
10%
click 'like'

Side effects
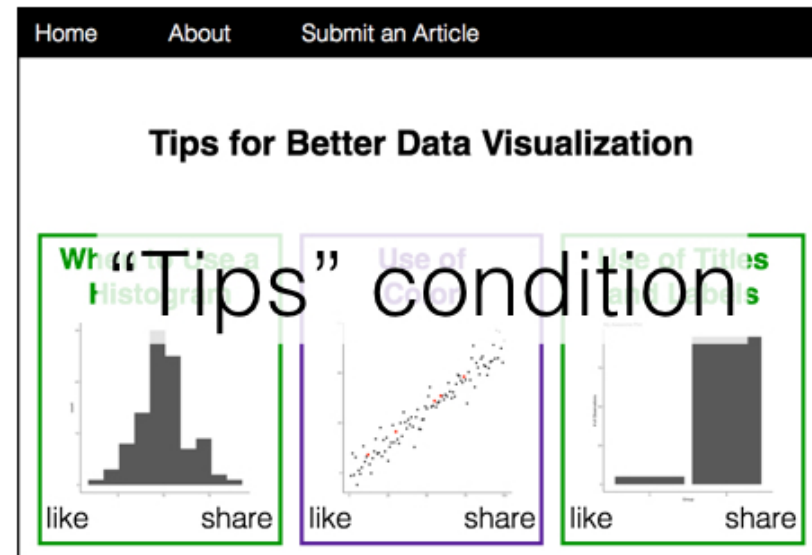
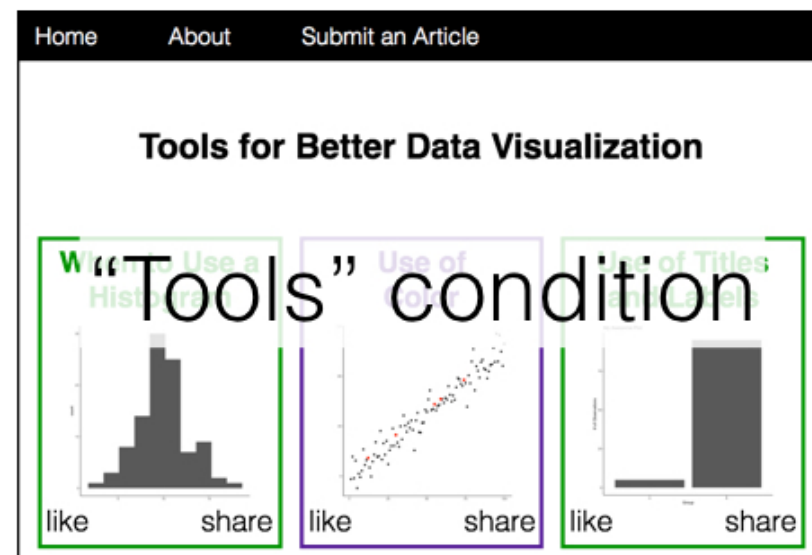**5 seconds to load**

month 1
20%
click 'like'

7 seconds to load

month 1
10%
click 'like'

Examples of side effects

- Load times

- Information "above the fold"

Let's practice!

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