



A/B TESTING IN R

A/B Testing Research Questions

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Instructor



What is A/B testing?

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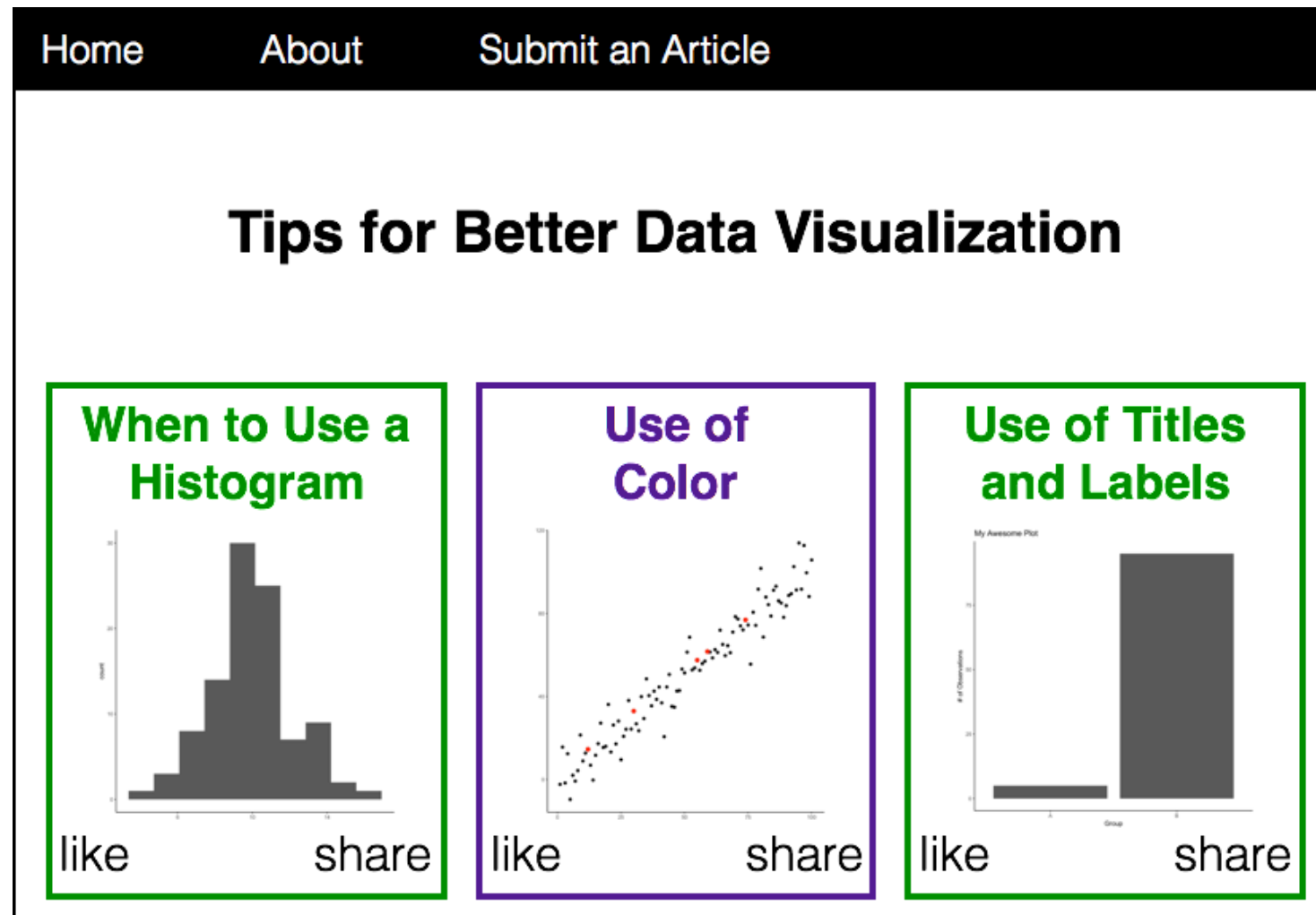


Uses of A/B testing

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

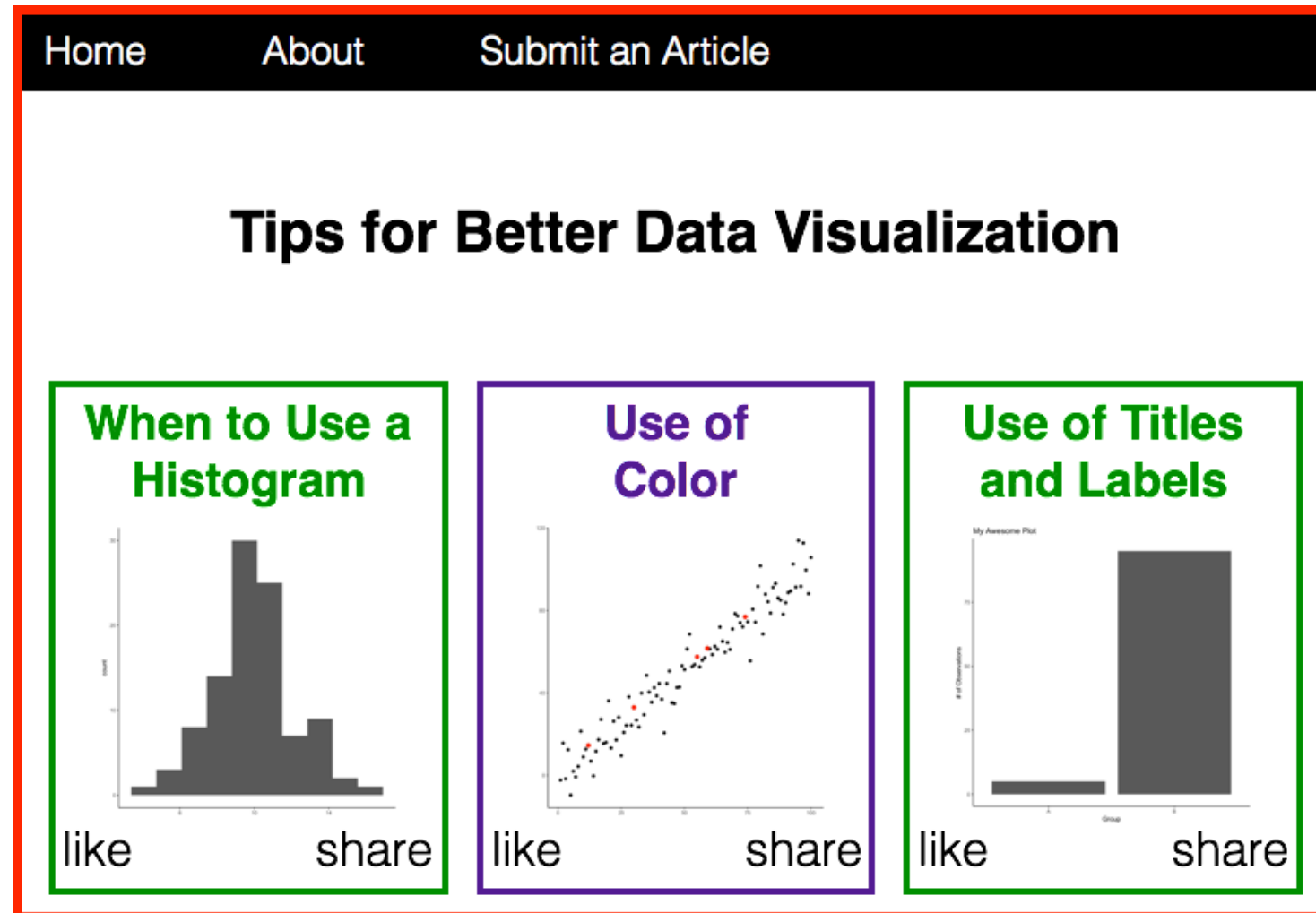


Data visualization website



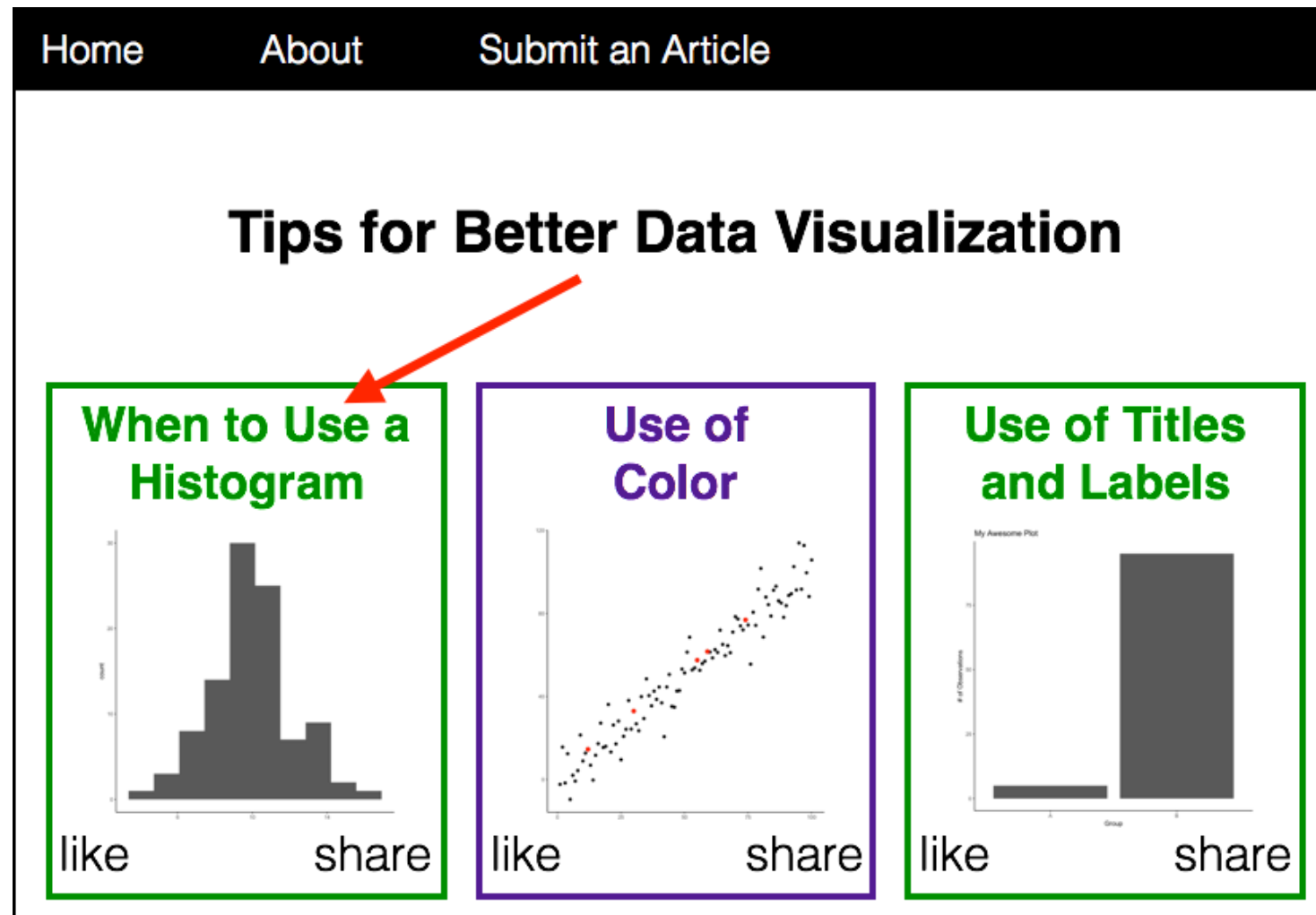


Data visualization website

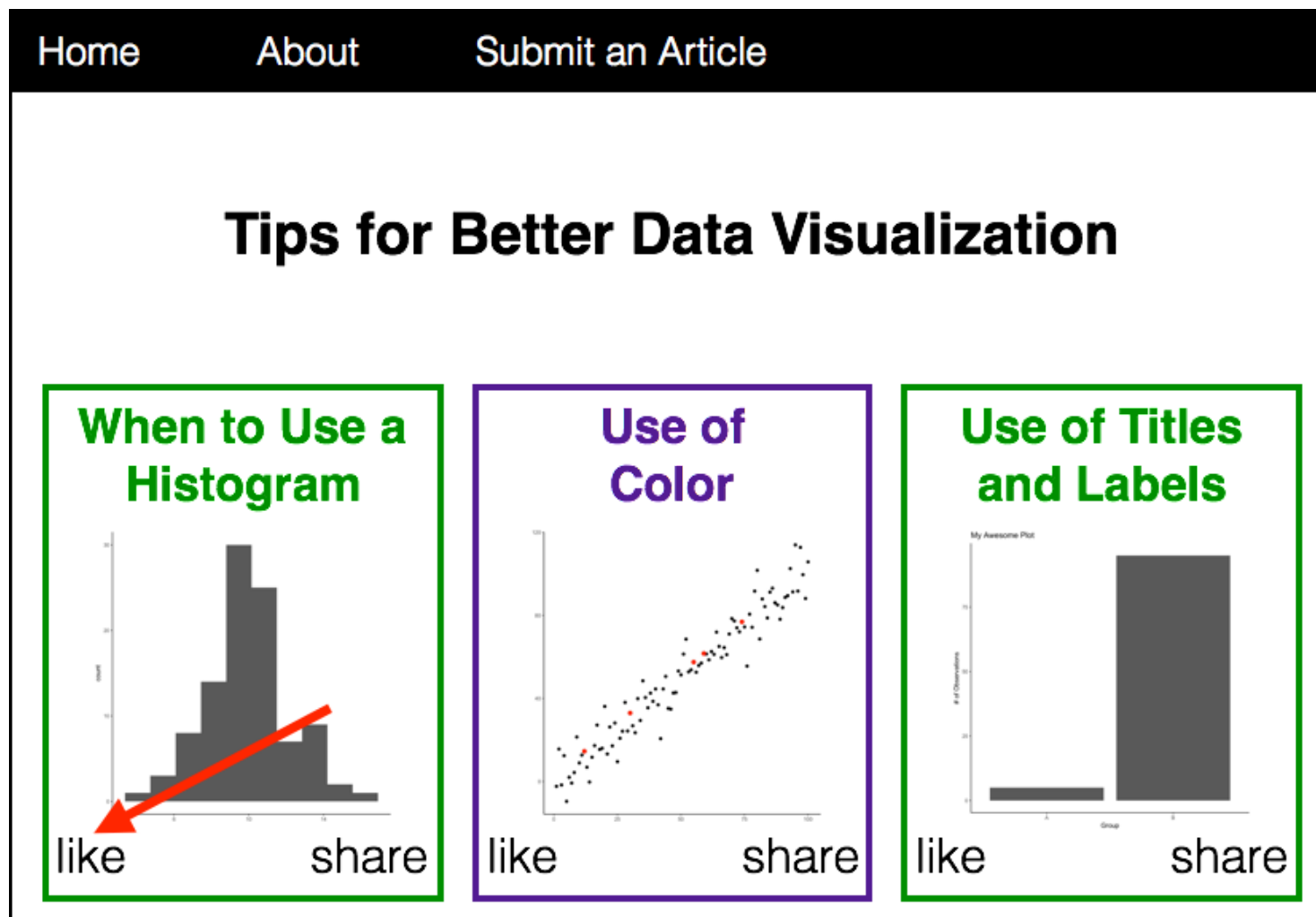




Data visualization website

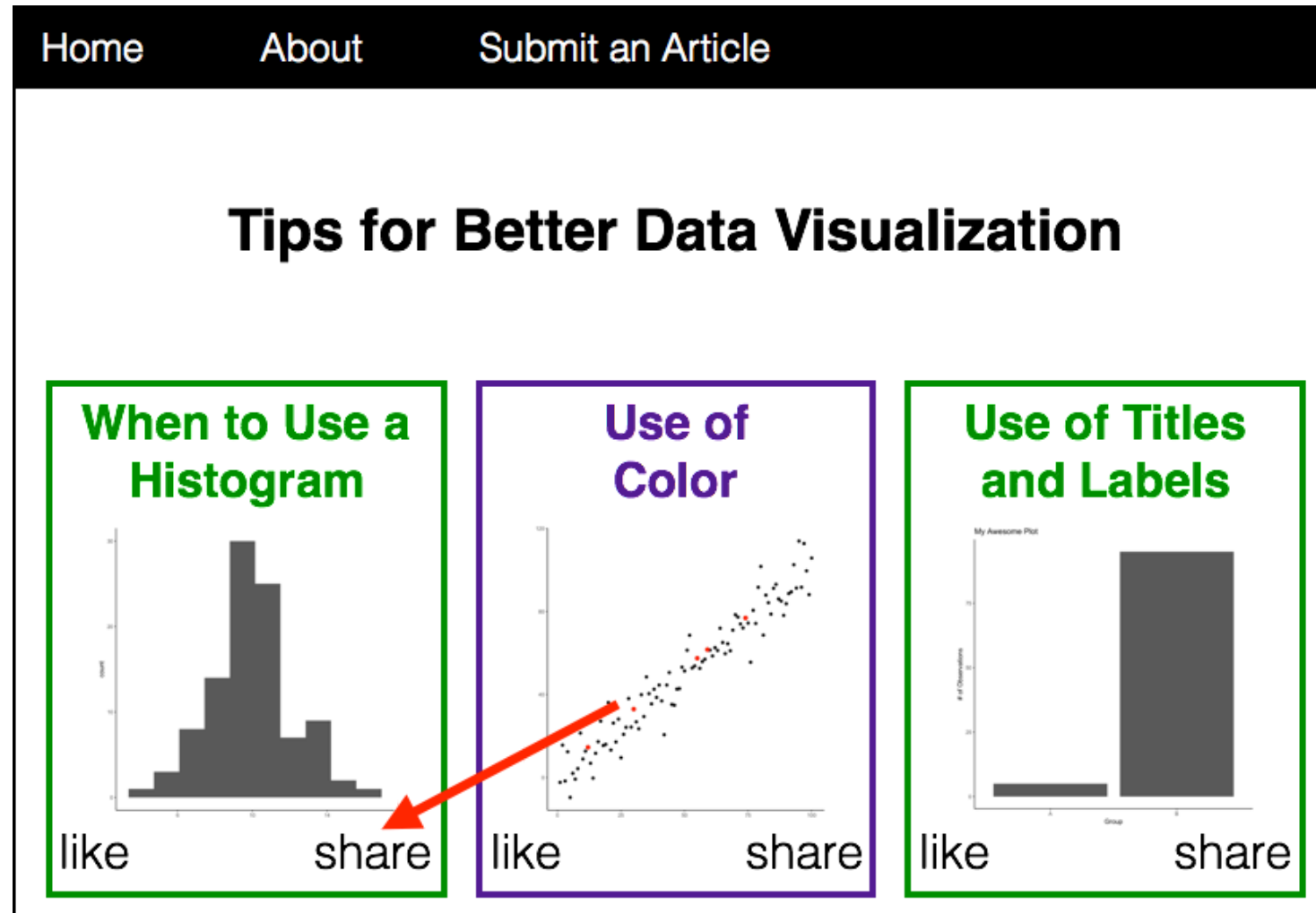


Data visualization website





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
```



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Let's practice!

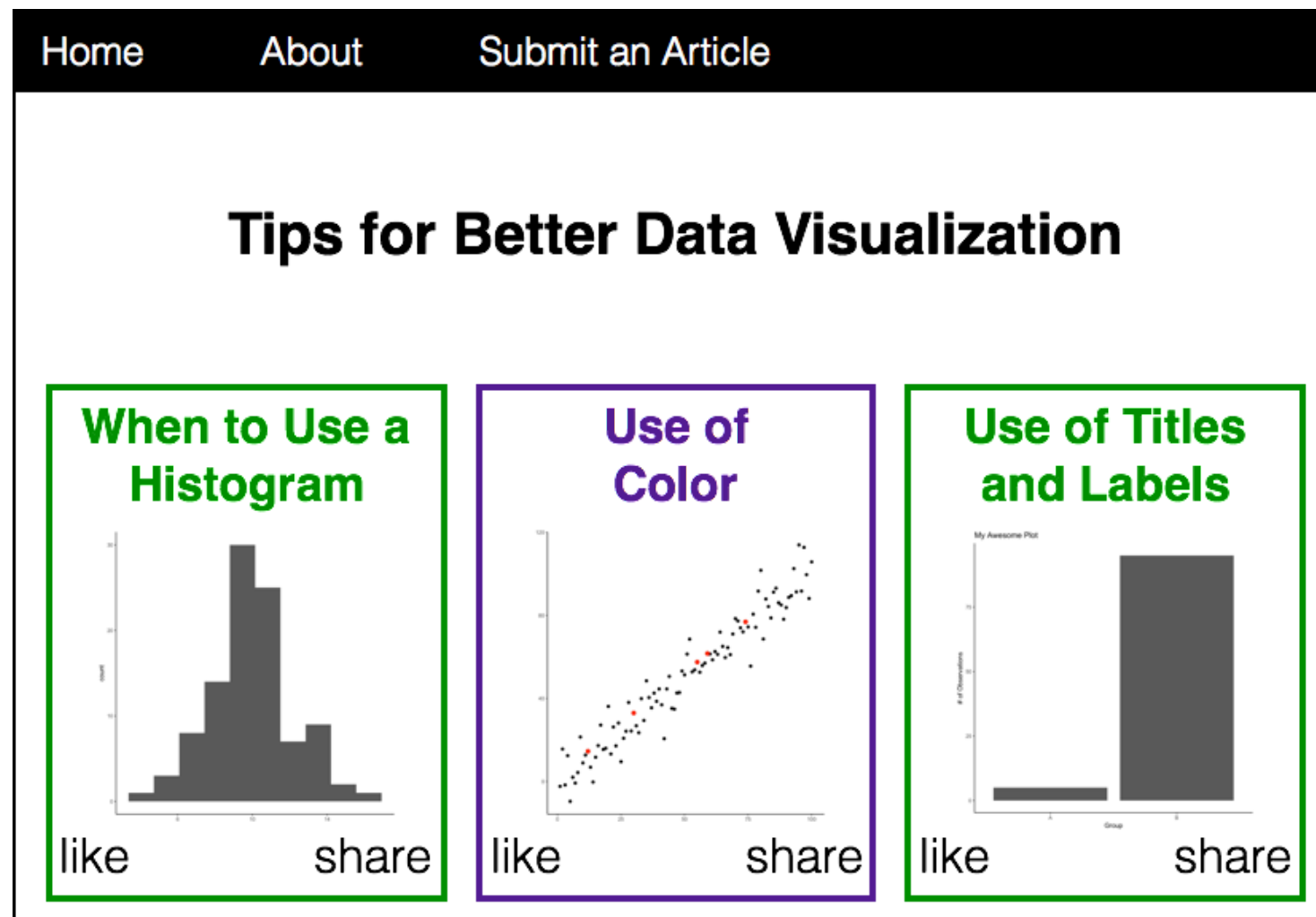


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Assumptions and Types of A/B Testing

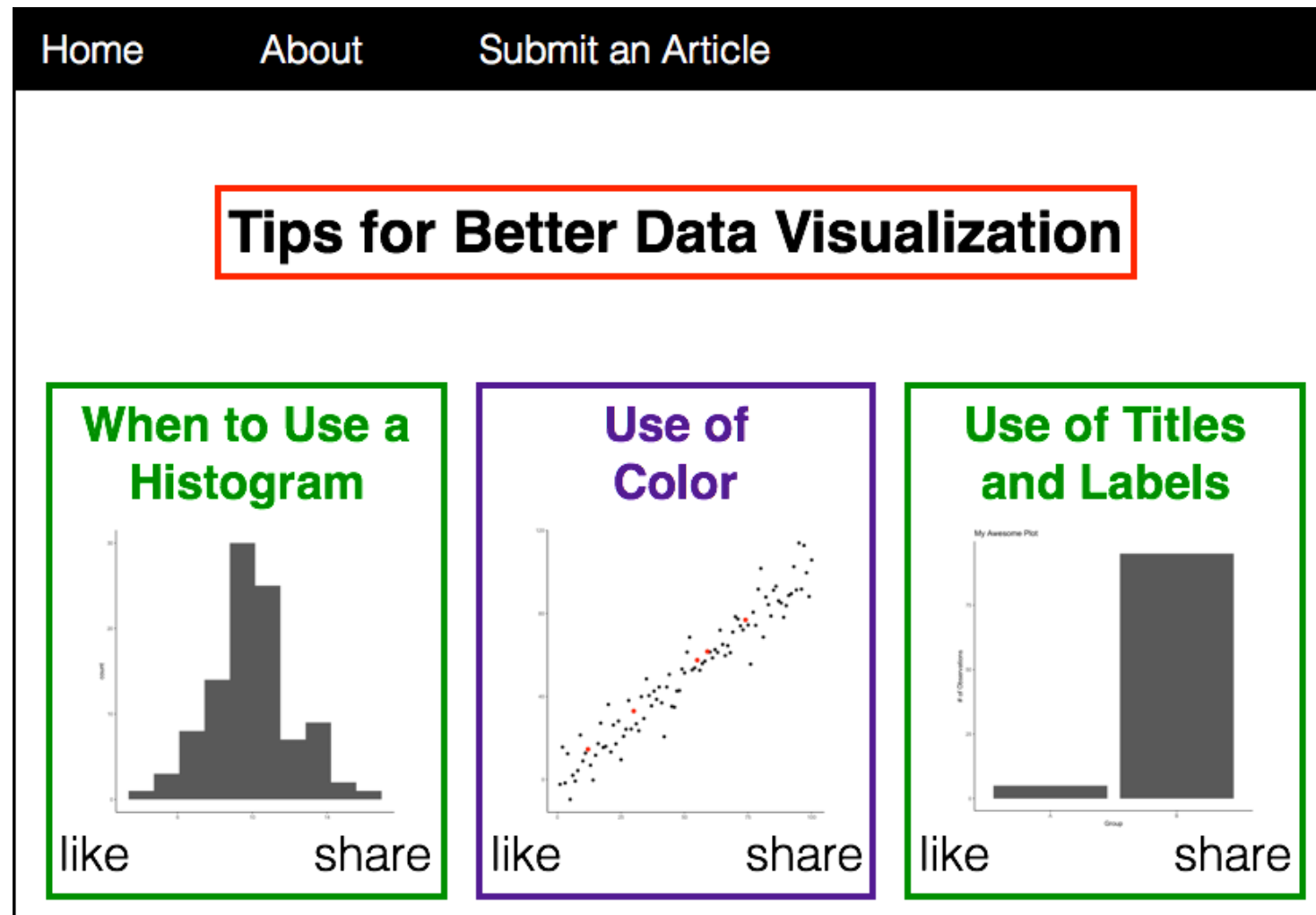
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Data visualization website



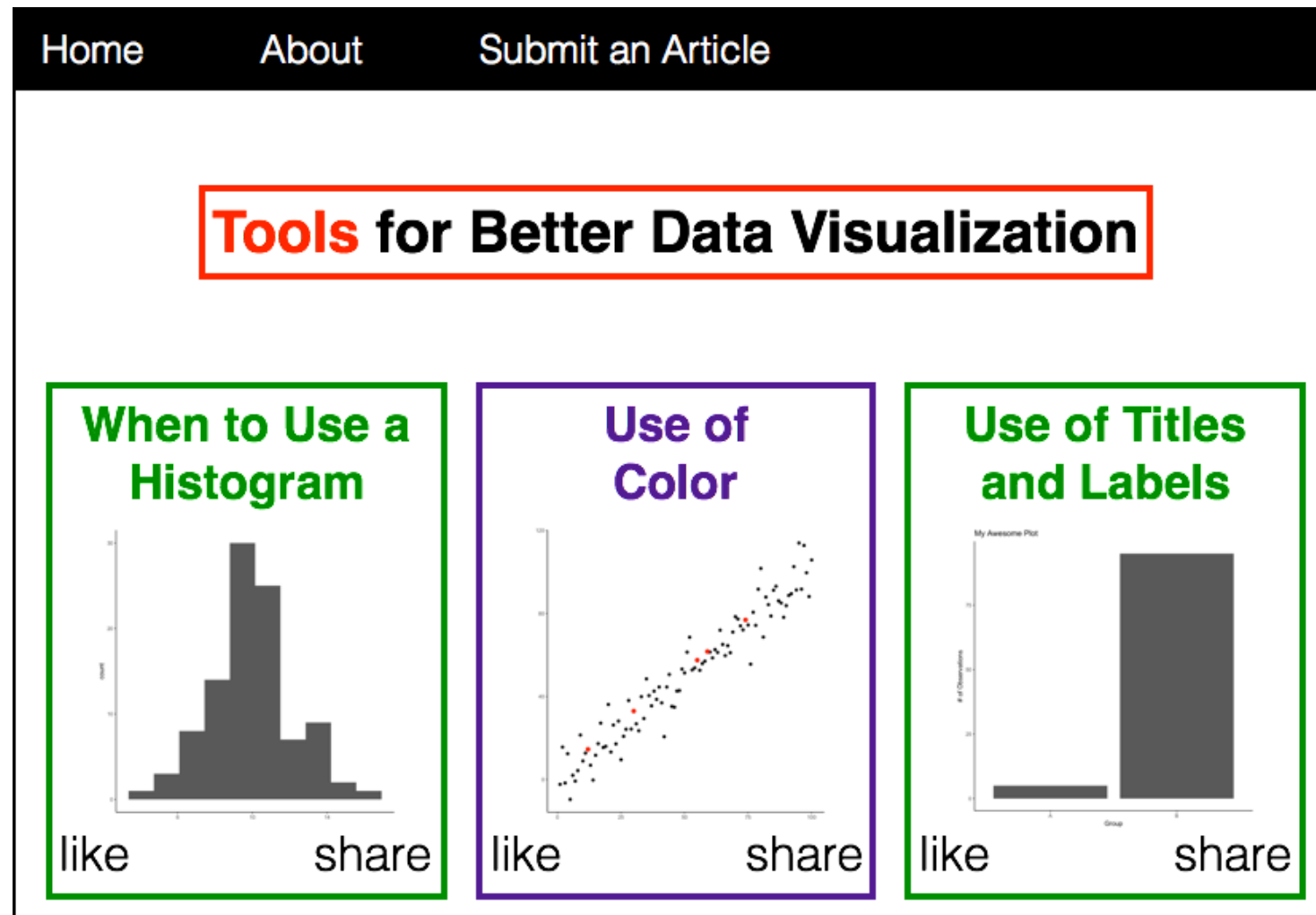


Data visualization website





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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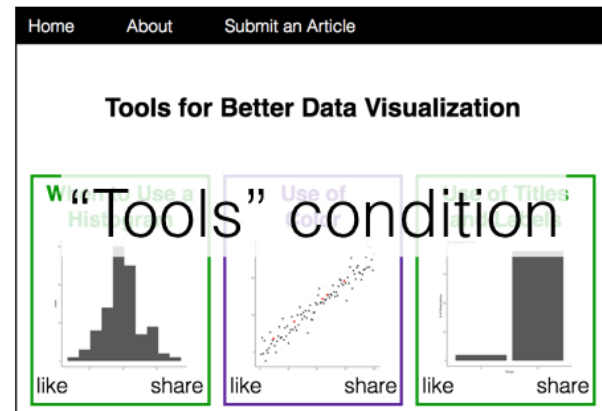
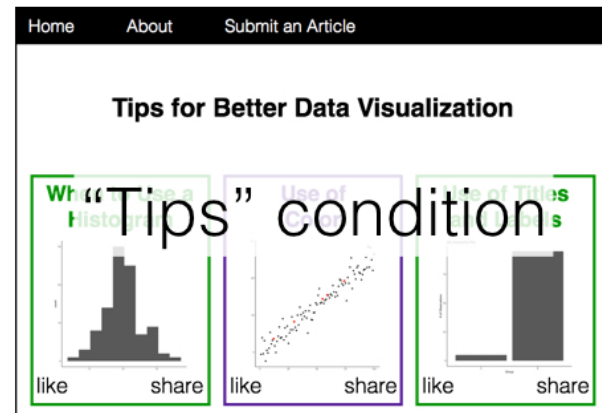


Confounding variables

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

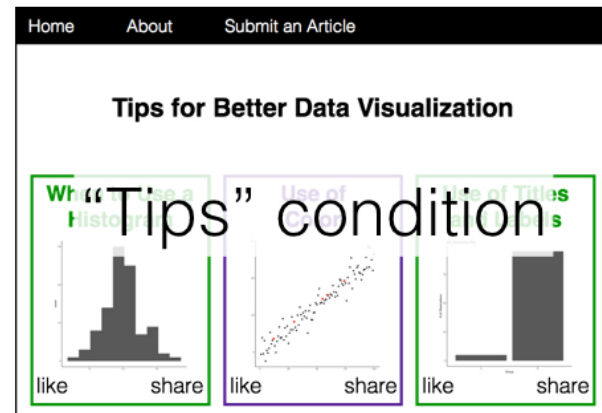


Confounding variables - internal

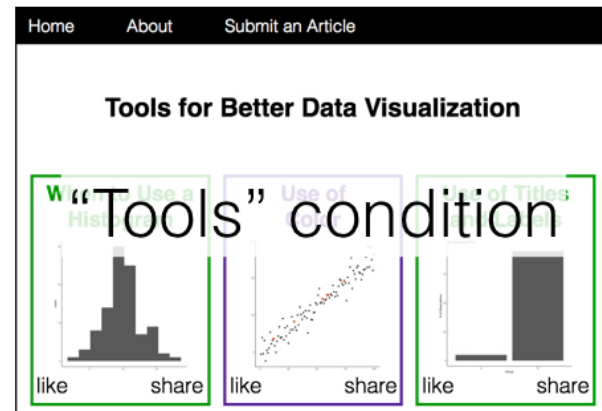




Confounding variables - internal

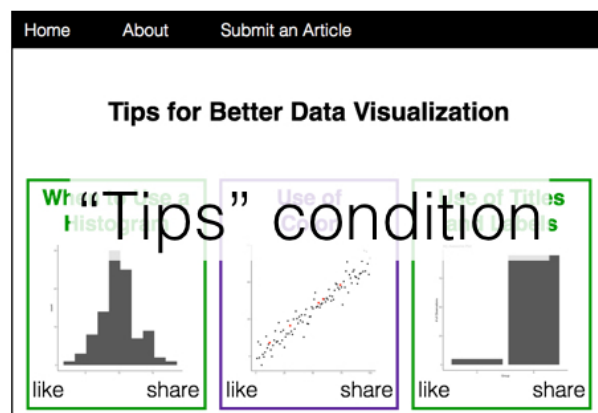


month 1
20%
click ‘like’



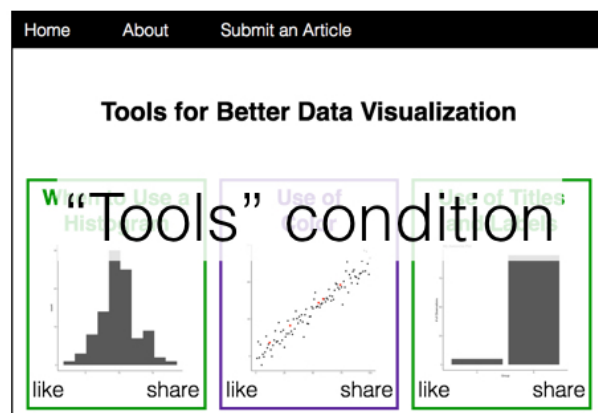
month 1
10%
click ‘like’

Confounding variables - internal



month 1
20%
click ‘like’

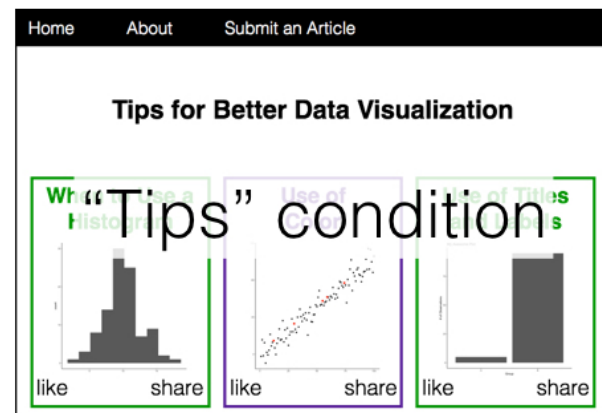
of letters?
frequency of word?



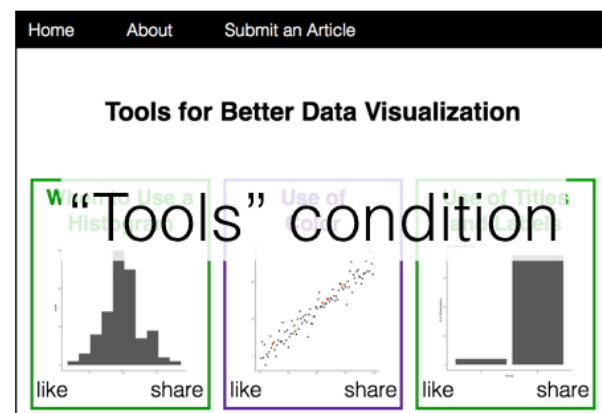
month 1
10%
click ‘like’



Confounding variables - external

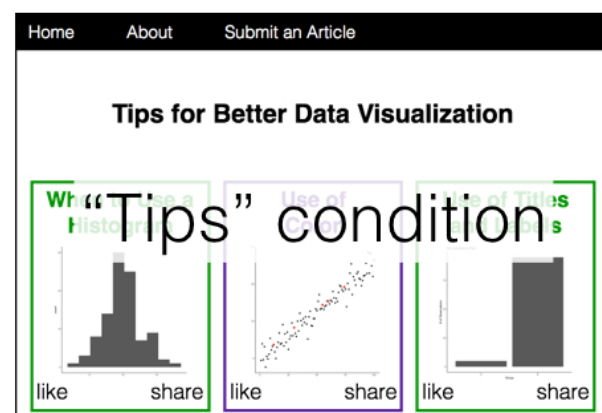


month 1
20%
click ‘like’



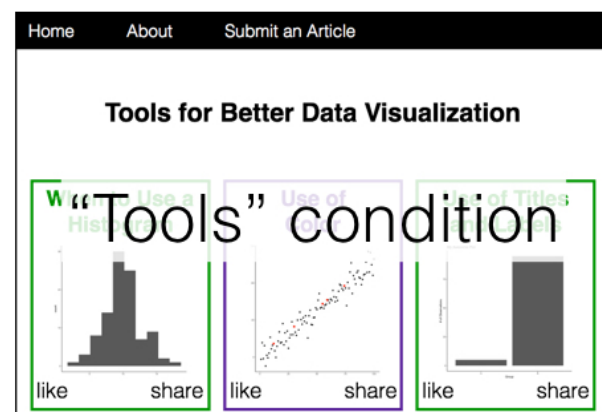
month 1
10%
click ‘like’

Confounding variables - external



month 1
20%
click 'like'

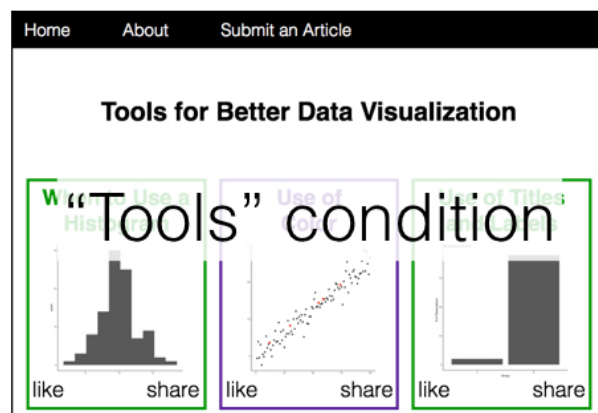
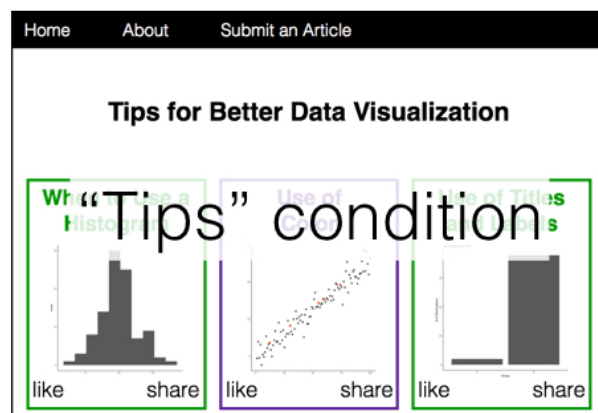
month 2
20%
click 'like'



month 1
10%
click 'like'

month 2
30%
click 'like'

Confounding variables - external



month 1
20%
click 'like'

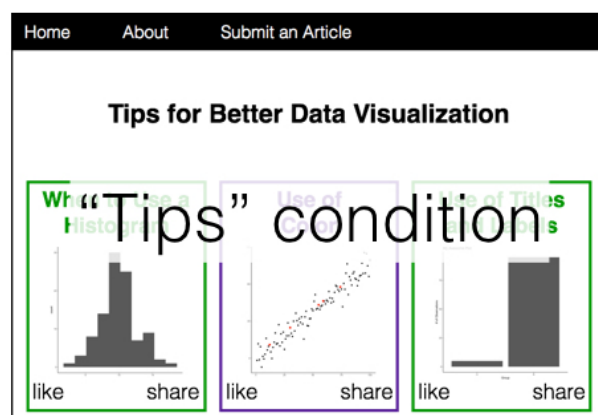
month 2
20%
click 'like'

Ages 20 - 35:
50%
Ages 35+:
50%

month 1
10%
click 'like'

month 2
30%
click 'like'

Confounding variables - external

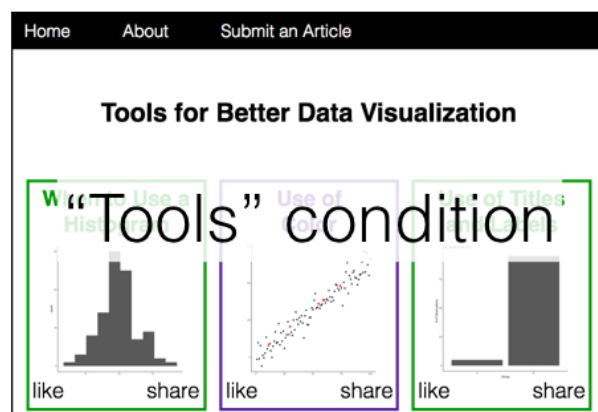


month 1
20%
click 'like'

Ages 20 - 35:
50%
Ages 35+:
50%

month 2
20%
click 'like'

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



month 1
10%
click 'like'

month 2
30%
click 'like'



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Let's practice!



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Side Effects

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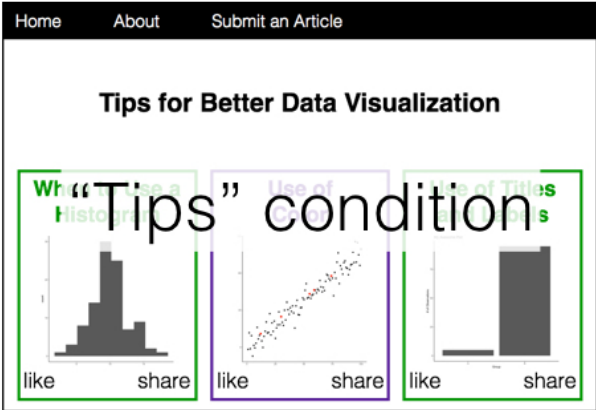


Side effects

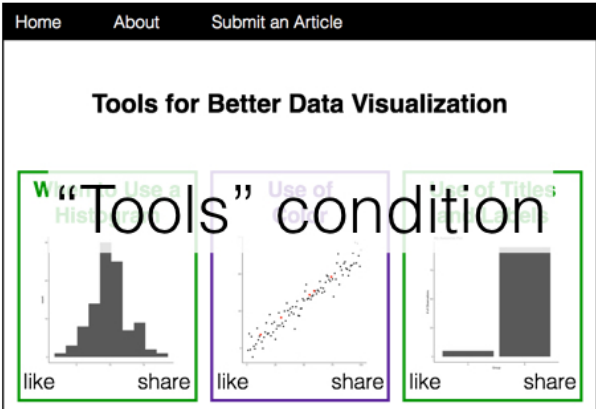
A **side effect** is an *unintended consequence* of a change you made.



Side effects

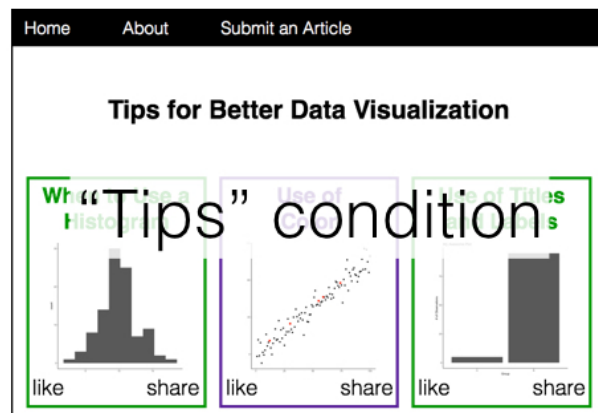


month 1
20%
click 'like'



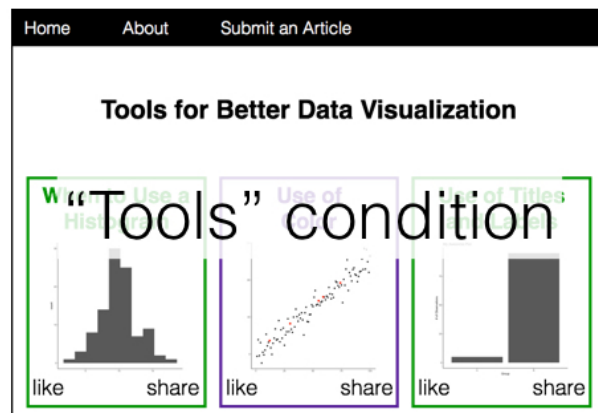
month 1
10%
click 'like'

Side effects



5 seconds to load

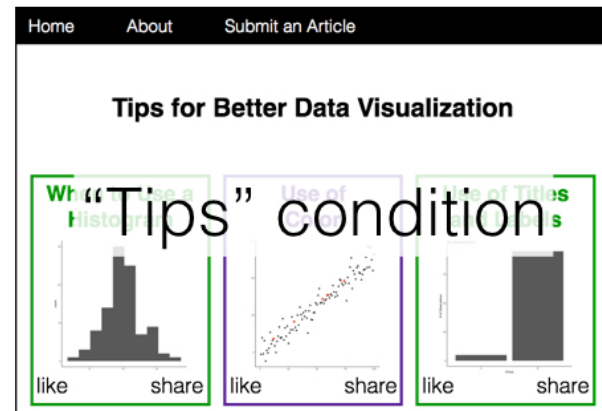
month 1
20%
click 'like'



month 1
10%
click 'like'

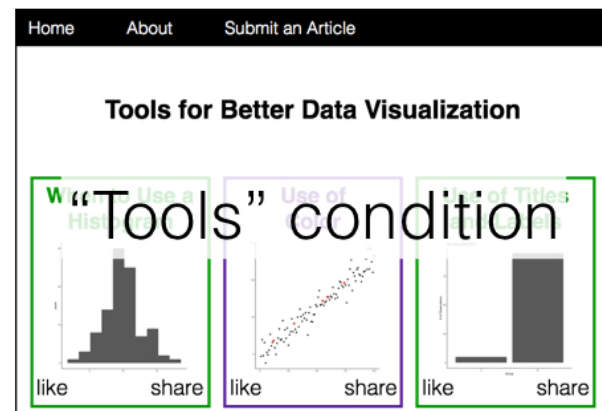


Side effects



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"



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