

Analyzing Results

INTRODUCTION TO A/B TESTING IN R



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Instructor

Experiment results

```
library(tidyverse)
experiment_data <- read_csv("experiment_data.csv")
experiment_data
```

```
# A tibble: 588 x 3
  visit_date condition clicked_adopt_today
  <date>      <chr>          <int>
1 2018-01-01 control            0
2 2018-01-01 control            1
3 2018-01-01 control            0
4 2018-01-01 control            0
5 2018-01-01 test              0
```

Experiment results

```
library(tidyverse)

experiment_data <- read_csv("experiment_data.csv")
experiment_data
experiment_data %>%
  group_by(condition) %>%
  summarize(conversion_rate = mean(clicked_adopt_today))
```

```
# A tibble: 2 x 2
  condition conversion_rate
  <chr>         <dbl>
1 control      0.1666667
2 test        0.3843537
```

Plotting results

```
library(tidyverse)

experiment_data <- read_csv("experiment_data.csv")
experiment_data

experiment_data %>%
  group_by(condition) %>%
  summarize(conversion_rate = mean(clicked_adopt_today))
```

Plotting results

```
library(tidyverse)

experiment_data <- read_csv("experiment_data.csv")
experiment_data
experiment_data %>%
  group_by(visit_date, condition) %>%
  summarize(conversion_rate = mean(clicked_adopt_today))
```

Plotting results

```
library(tidyverse)

experiment_data <- read_csv("experiment_data.csv")
experiment_data
experiment_data_sum <- experiment_data %>%
  group_by(visit_date, condition) %>%
  summarize(conversion_rate = mean(clicked_adopt_today))
ggplot(experiment_data_sum,
       aes(x = visit_date,
           y = conversion_rate

           )) +
  geom_point() +
  geom_line()
```

Plotting results

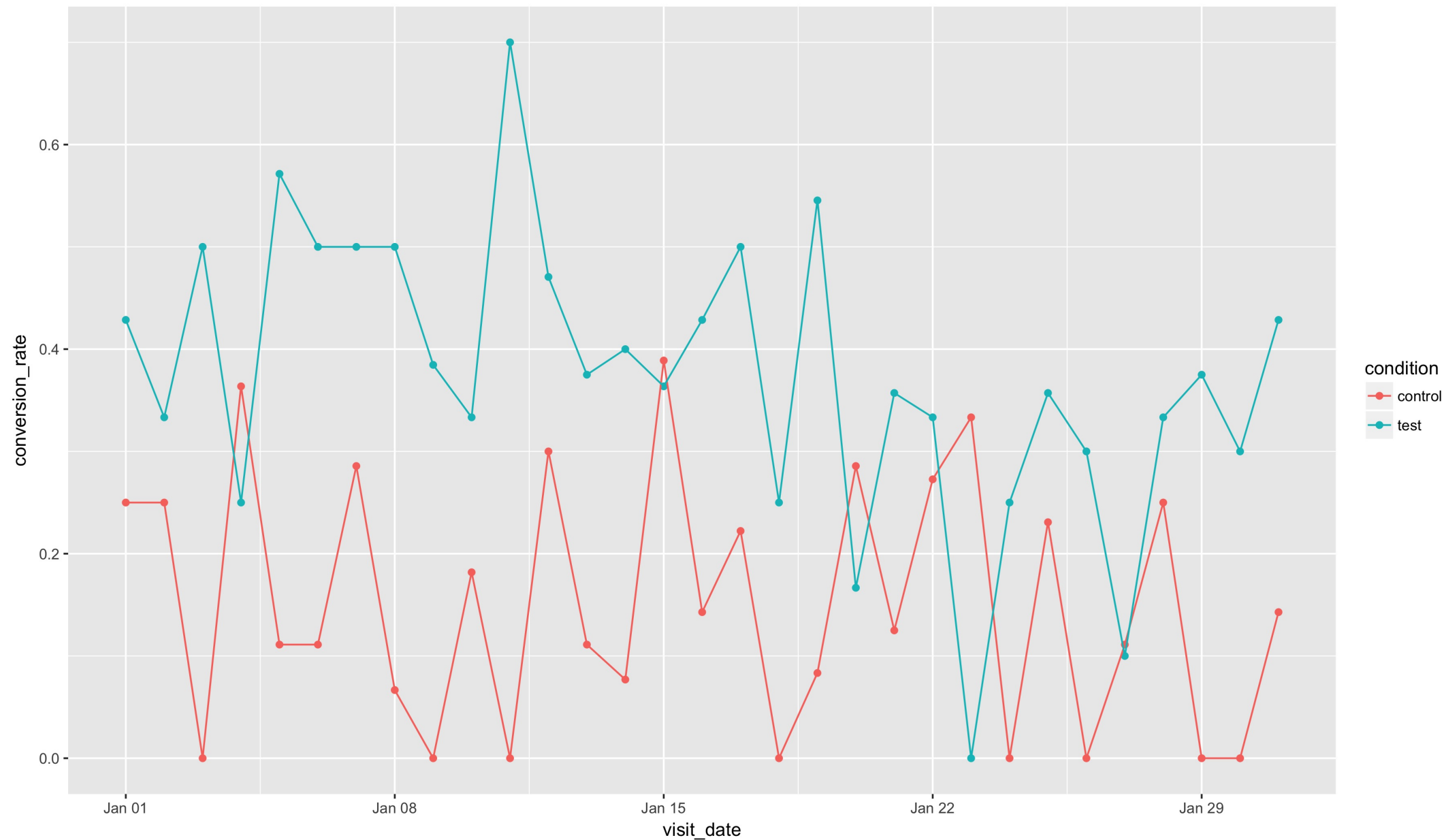
```
library(tidyverse)

experiment_data <- read_csv("experiment_data.csv")
experiment_data

experiment_data_sum <- experiment_data %>%
  group_by(visit_date, condition) %>%
  summarize(conversion_rate = mean(clicked_adopt_today))

ggplot(experiment_data_sum,
       aes(x = visit_date,
           y = conversion_rate,
           color = condition,
           group = condition)) +
  geom_point() +
  geom_line()
```

Plotting results



Analyzing results

```
library(tidyverse)
library(broom)

experiment_data <- read_csv("experiment_data.csv")

glm(
    ~
)
```

Analyzing results

```
library(tidyverse)
library(broom)

experiment_data <- read_csv("experiment_data.csv")

glm(clicked_adopt_today ~
    )
```

Analyzing results

```
library(tidyverse)
library(broom)

experiment_data <- read_csv("experiment_data.csv")

glm(clicked_adopt_today ~ condition,
      )
```

Analyzing results

```
library(tidyverse)
library(broom)

experiment_data <- read_csv("experiment_data.csv")

glm(clicked_adopt_today ~ condition,
     family = "binomial",
     )
```

Analyzing results

```
library(tidyverse)
library(broom)

experiment_data <- read_csv("experiment_data.csv")

glm(clicked_adopt_today ~ condition,
     family = "binomial",
     data = experiment_data)
```

Analyzing results

```
library(tidyverse)
library(broom)

experiment_data <- read_csv("experiment_data.csv")

glm(clicked_adopt_today ~ condition,
     family = "binomial",
     data = experiment_data) %>%
tidy()
```

	term	estimate	std.error	statistic	p.value
1	(Intercept)	-1.609438	0.1564922	-10.284464	8.280185e-25
2	conditiontest	1.138329	0.1971401	5.774212	7.731397e-09

Let's practice!

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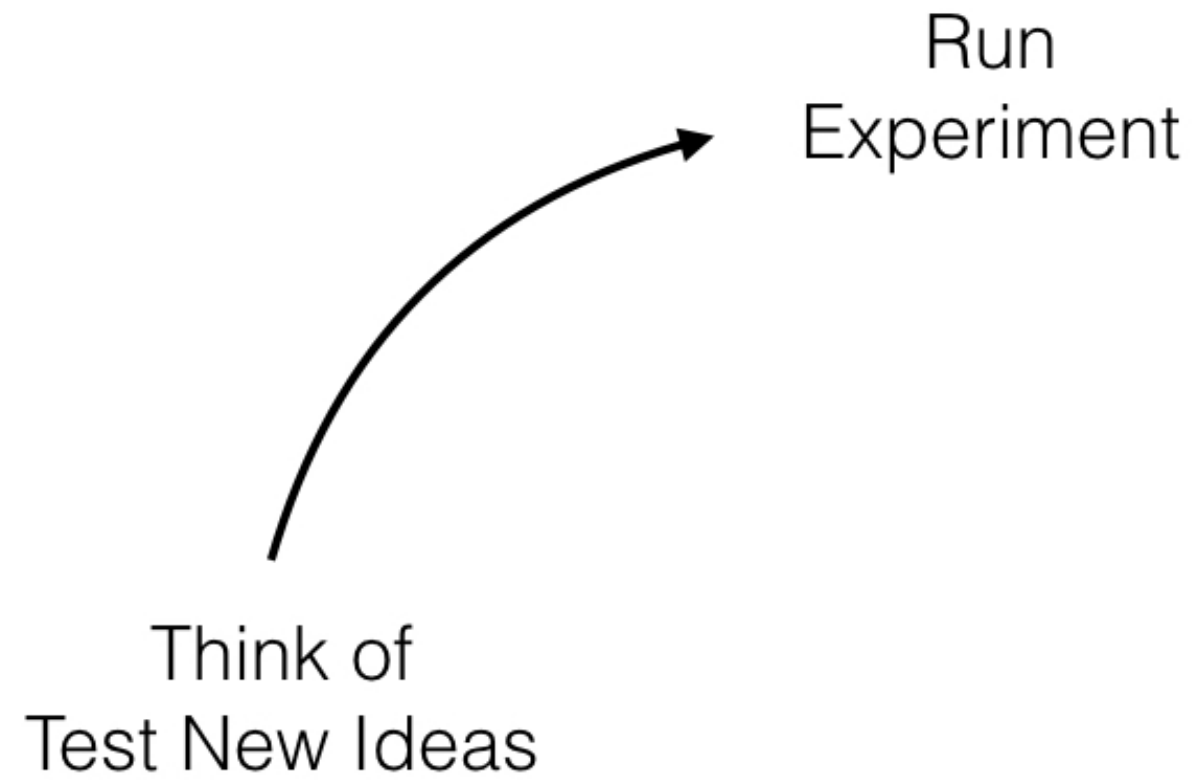
Designing Follow-up Experiments

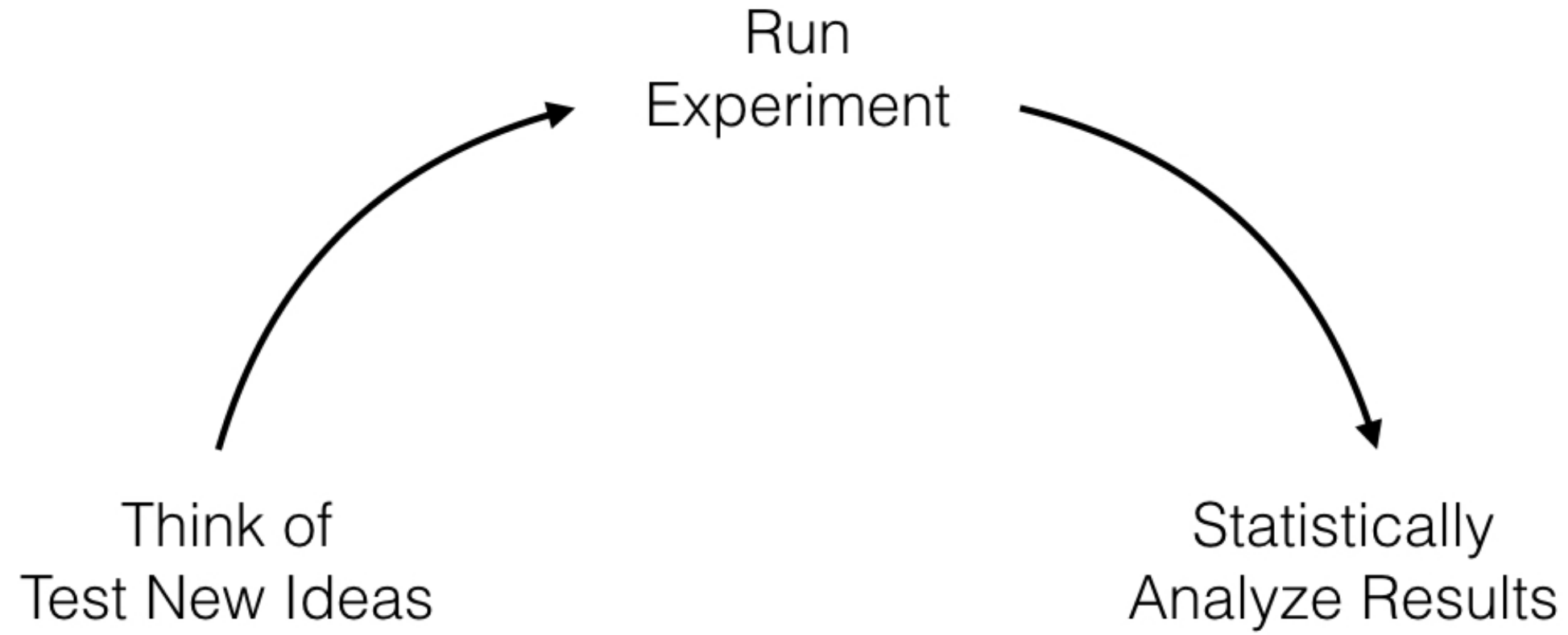
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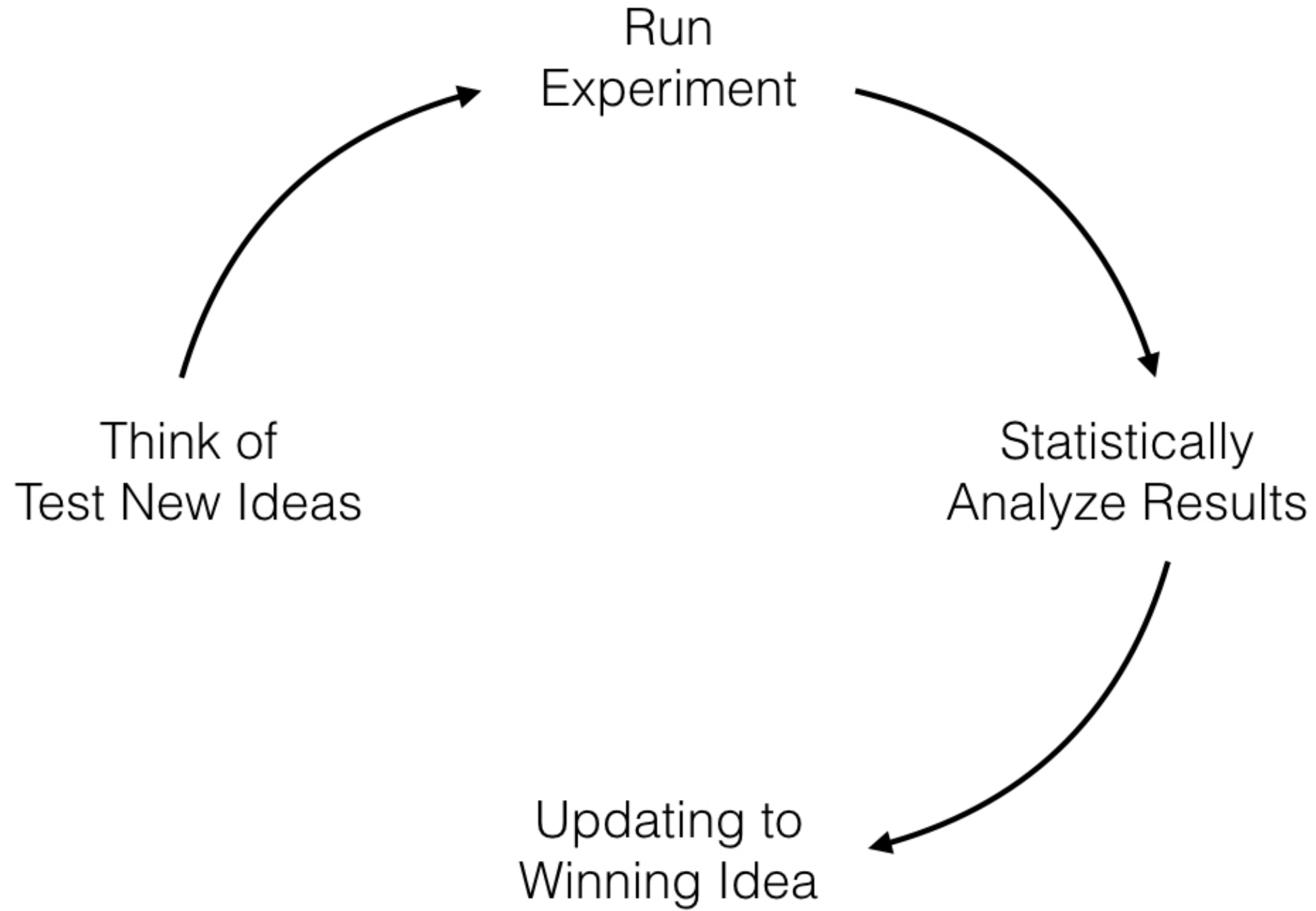


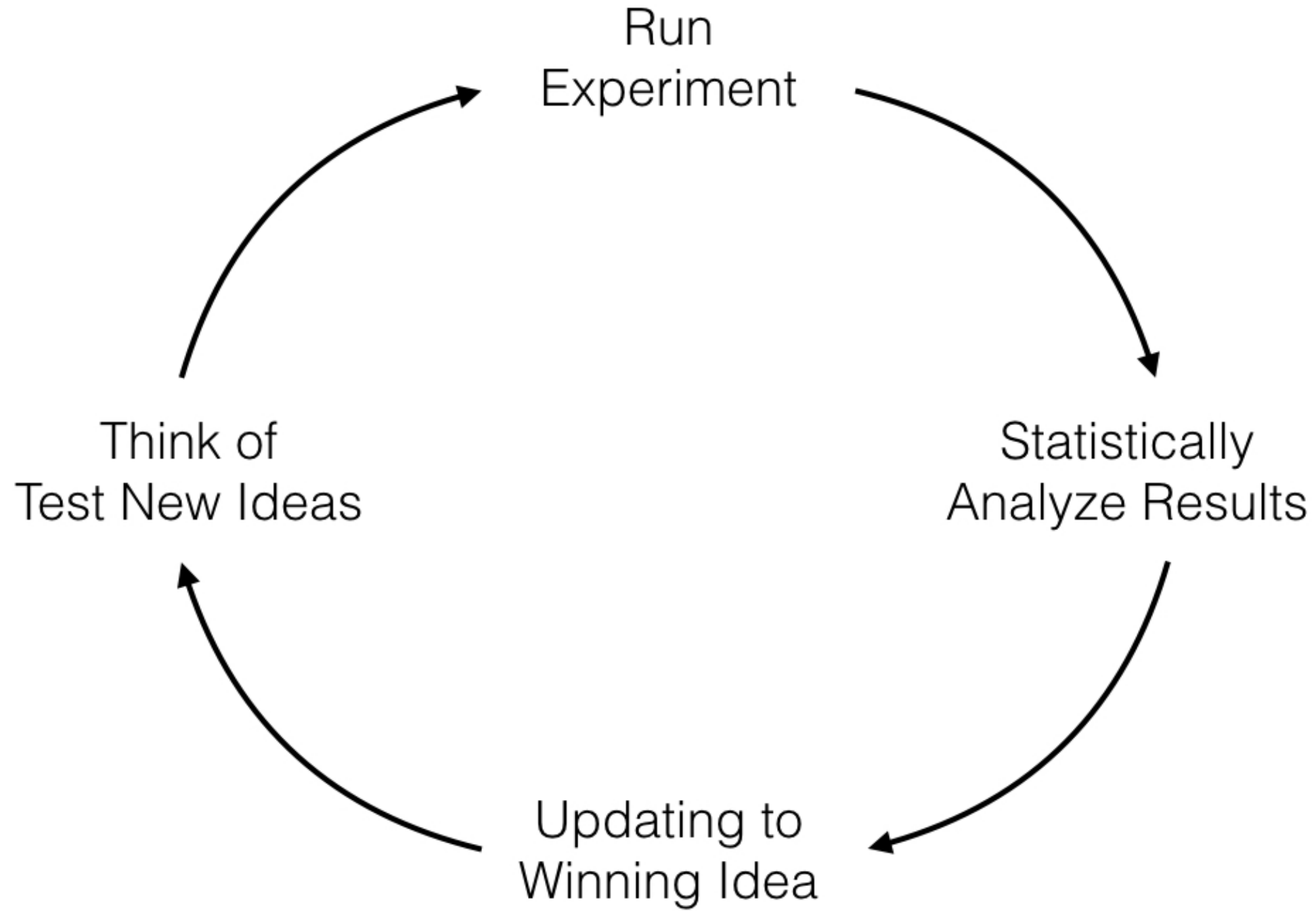
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Think of
Test New Ideas









Tips for designing a new experiment

- Build several small follow-up experiments
- Avoid **confounding variables**
- Test small changes

Follow-up experiment #1

1. Use a picture of a **kitten** in a hat instead of an adult cat.
2. Use a picture of **two cats or kittens** in hats instead of one.

Let's practice!

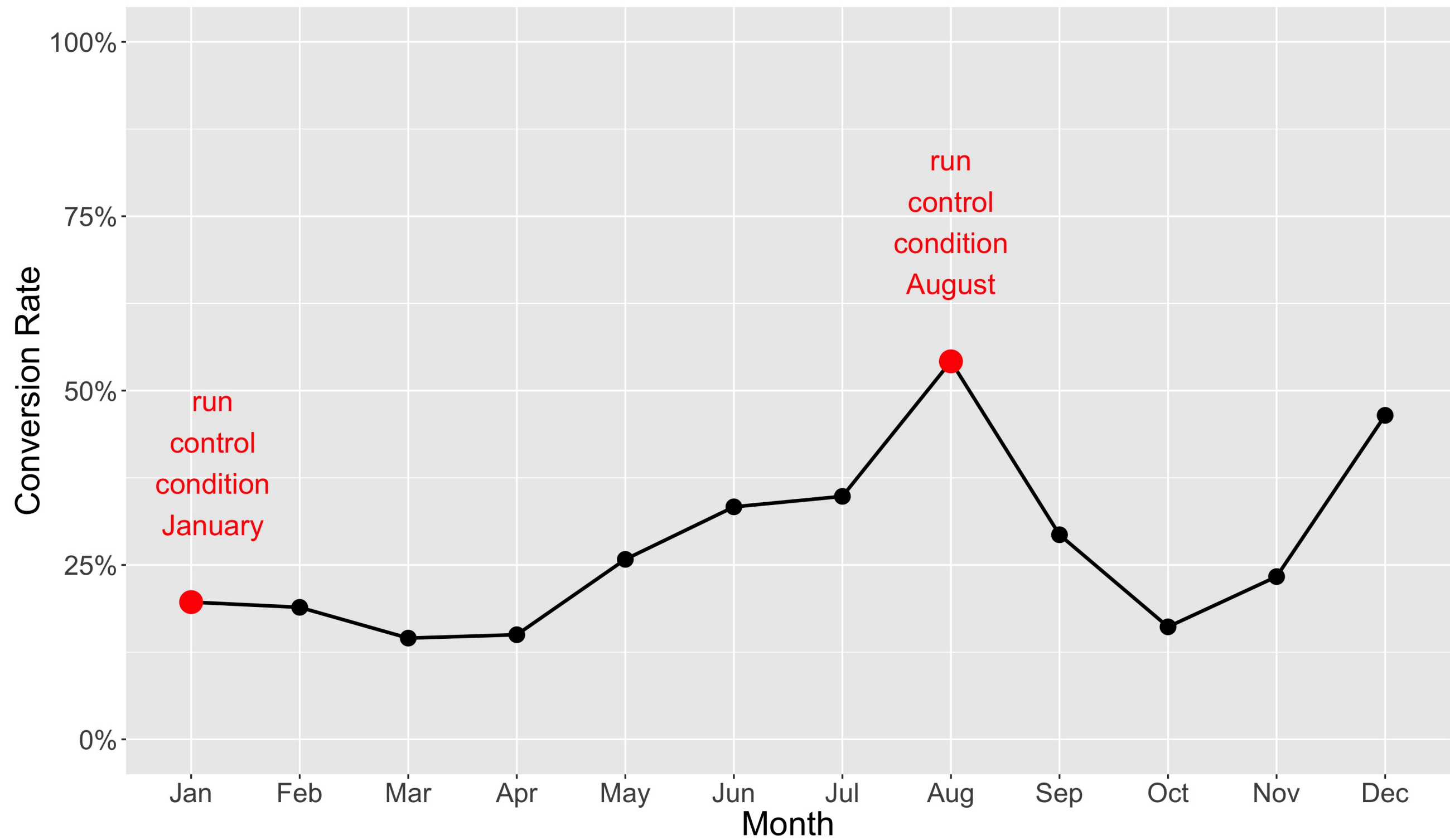
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Pre-follow-up Experiment Assumptions

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Let's practice!

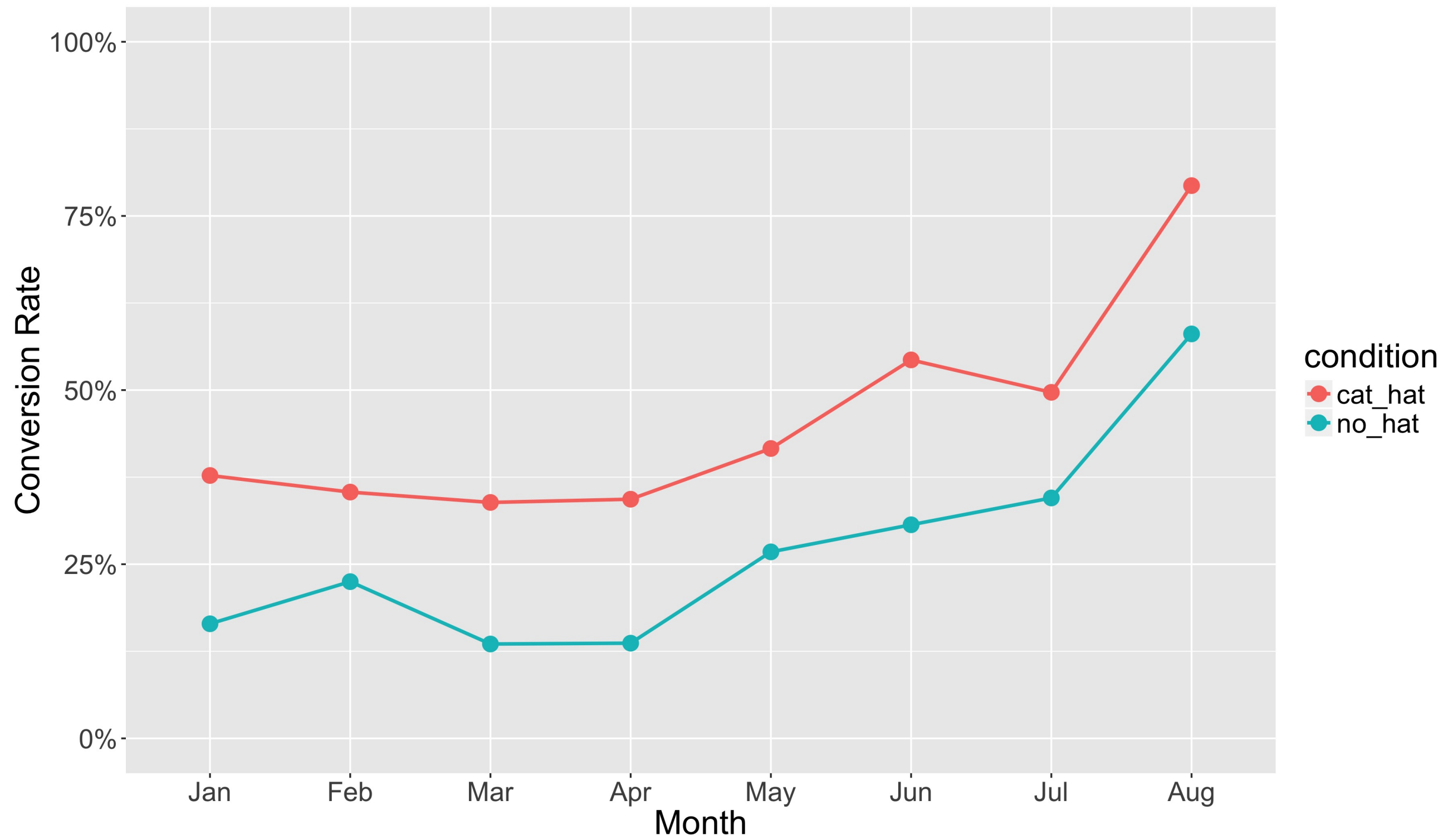
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Follow-up Experiment Assumptions

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Computing conversion rate difference

```
eight_month_checkin_data_sum <- eight_month_checkin_data %>%  
  mutate(month_text = month(visit_date, label = TRUE)) %>%  
  group_by(month_text, condition) %>%  
  summarize(conversion_rate = mean(clicked_adopt_today))
```

```
# A tibble: 16 x 3  
  month_text condition conversion_rate  
    <ord>      <chr>          <dbl>  
1      Jan   cat_hat      0.3774194  
2      Jan   no_hat      0.1645161  
3     Feb   cat_hat      0.3535714  
4     Feb   no_hat      0.2250000  
5     Mar   cat_hat      0.3387097
```

Computing conversion rate difference

```
eight_month_checkin_data_sum <- eight_month_checkin_data %>%  
  mutate(month_text = month(visit_date, label = TRUE)) %>%  
  group_by(month_text, condition) %>%  
  summarize(conversion_rate = mean(clicked_adopt_today))  
eight_month_checkin_data_diff <- eight_month_checkin_data_sum %>%  
  spread(condition, conversion_rate)
```

```
# A tibble: 8 x 3  
  month_text  cat_hat  no_hat  
    <ord>      <dbl>   <dbl>  
1      Jan 0.3774194 0.1645161  
2      Feb 0.3535714 0.2250000  
3      Mar 0.3387097 0.1354839  
4      Apr 0.3433333 0.1366667
```

Computing conversion rate difference

```
eight_month_checkin_data_sum <- eight_month_checkin_data %>%  
  mutate(month_text = month(visit_date, label = TRUE)) %>%  
  group_by(month_text, condition) %>%  
  summarize(conversion_rate = mean(clicked_adopt_today))  
eight_month_checkin_data_diff <- eight_month_checkin_data_sum %>%  
  spread(condition, conversion_rate) %>%
```


Computing conversion rate difference

```
eight_month_checkin_data_sum <- eight_month_checkin_data %>%  
  mutate(month_text = month(visit_date, label = TRUE)) %>%  
  group_by(month_text, condition) %>%  
  summarize(conversion_rate = mean(clicked_adopt_today))  
eight_month_checkin_data_diff <- eight_month_checkin_data_sum %>%  
  spread(condition, conversion_rate) %>%  
  mutate(condition_diff = cat_hat - no_hat)
```

```
# A tibble: 8 x 4  
  month_text  cat_hat  no_hat condition_diff  
    <ord>    <dbl>   <dbl>         <dbl>  
1      Jan 0.3774194 0.1645161      0.2129032  
2      Feb 0.3535714 0.2250000      0.1285714  
3      Mar 0.3387097 0.1354839      0.2032258  
4      Apr 0.3433333 0.1366667      0.2066667
```

Computing conversion rate difference

```
eight_month_checkin_data_sum <- eight_month_checkin_data %>%  
  mutate(month_text = month(visit_date, label = TRUE)) %>%  
  group_by(month_text, condition) %>%  
  summarize(conversion_rate = mean(clicked_adopt_today))  
eight_month_checkin_data_diff <- eight_month_checkin_data_sum %>%  
  spread(condition, conversion_rate) %>%  
  mutate(condition_diff = cat_hat - no_hat)  
mean(eight_month_checkin_data_diff$condition_diff)
```

```
0.1876171
```

```
sd(eight_month_checkin_data_diff$condition_diff)
```

```
0.03893739
```

Let's practice!

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