

Facebook Ad Analysis

Case 3

Section 23 Team 3K Members:

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Project Mandate

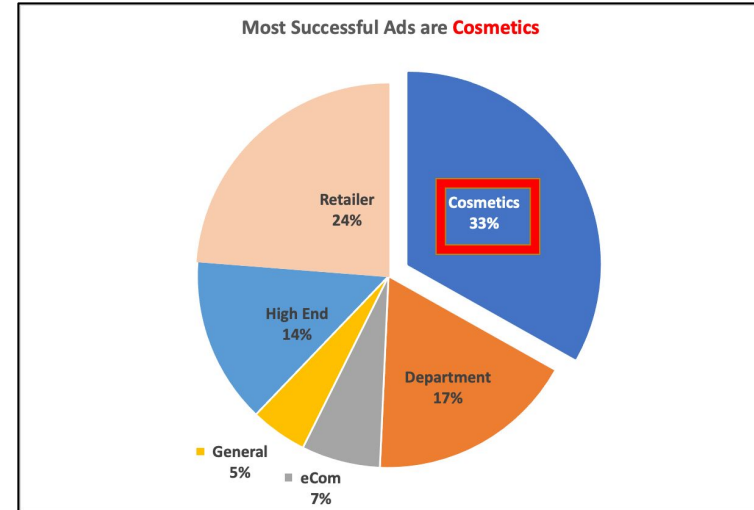
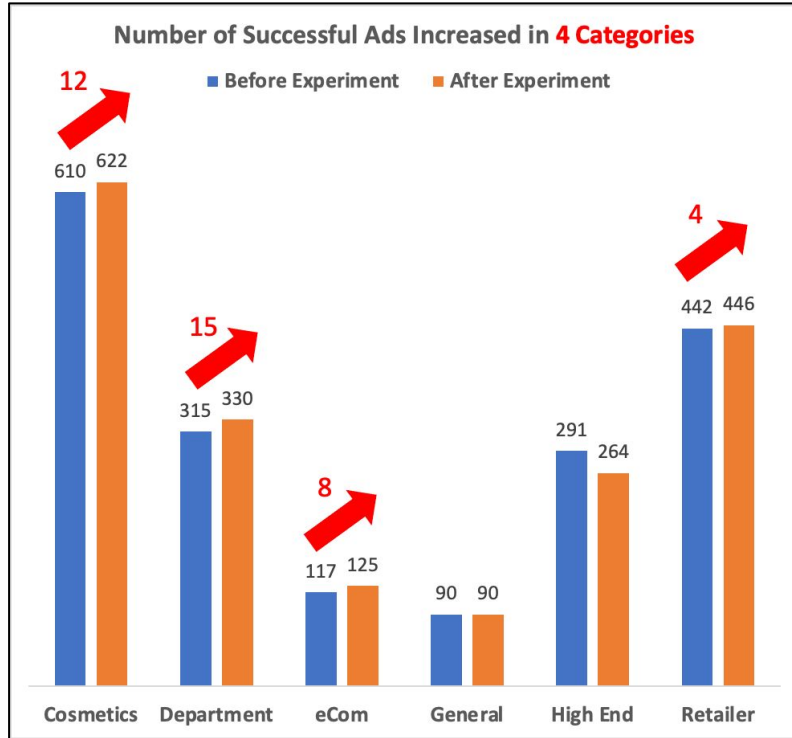
- Creation of Data product with two new columns
 - Score - Predicted score based on the value
 - Extend - Whether the ad was successful
- Various Ad insights based on category, age, placement and Adtype
- Impact of Follow up experiment in ad demographics

Data Product

1. **Score**- Margin value gained through number of clicks per dollar spent given the margin per click is 0.0068
2. **Extend** - Whether the ad was successful or not based on the return value. As specified by the company, we used 12.5% as baseline

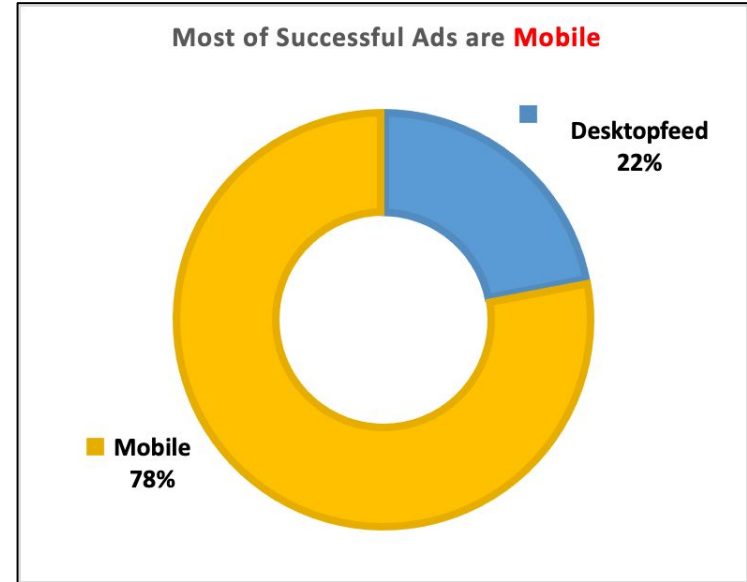
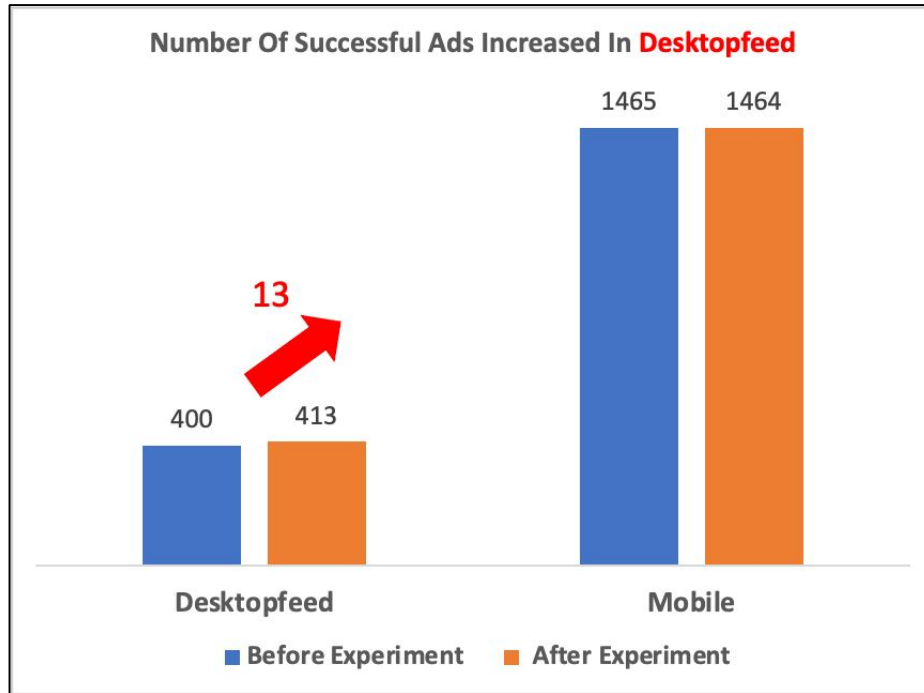
	date	adType	category	placement	keywords	body	ageMean	clickThroughRate	clickPerDollar	score	extend
1	3/26/2013	Photo Post	High End	mobile	#Lululemon Athletica	Click ""Like"" to become a fan of Retail Store X!	27.0	0.022897	143.103306	0.973102	No
2	3/26/2013	Photo Post	High End	mobile	#Lululemon Athletica	Click ""Like"" to become a fan of Retail Store X!	27.0	0.021678	135.490221	0.921334	No
3	3/26/2013	Photo Post	General	desktopfeed	#Lululemon Athletica	Click ""Like"" to become a fan of Retail Store X!	27.0	0.011579	72.371285	0.492125	No
4	3/26/2013	Photo Post	Cosmetics	mobile	#Lucky Brand Jeans	Need inspiration for your spring wardrobe? ""L...	52.0	0.038147	238.421795	1.621268	Yes
5	3/26/2013	Photo Post	High End	mobile	#Lucky Brand Jeans	Need inspiration for your spring wardrobe? ""L...	52.0	0.03829	211.433106	1.437745	Yes

1) Growth rate increased in 67% of the categories



- Department increased the largest number of successful Ads, which is 15 Ads.
- E-commerce increased by 6.8%, which has the largest growth rate.
- E-commerce increased the largest of percentage of total amount which is 1.8%.

2) All of newly increased successful ads are Desktopfeed

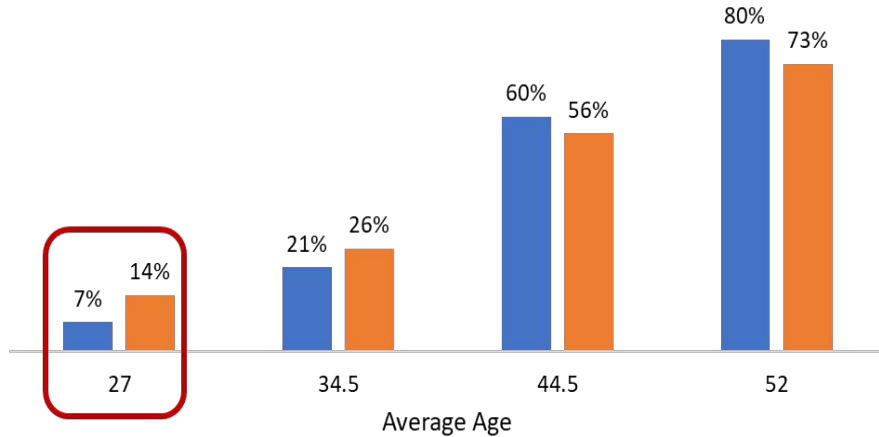


- Growth rate of Desktopfeed is 3.25%
- Desktopfeed increased 0.65% of its total amount

3) Increase In Successful Ads Marketed To Younger Generation

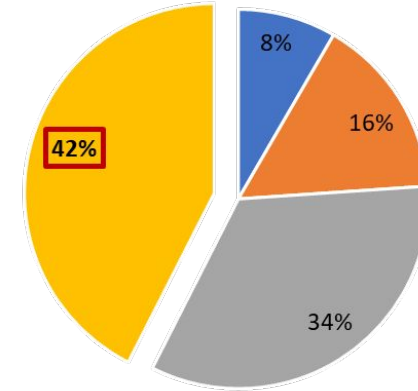
The percentage of successful advertisement

■ Before experiment ■ After experiment



Number of successful ads after experiment

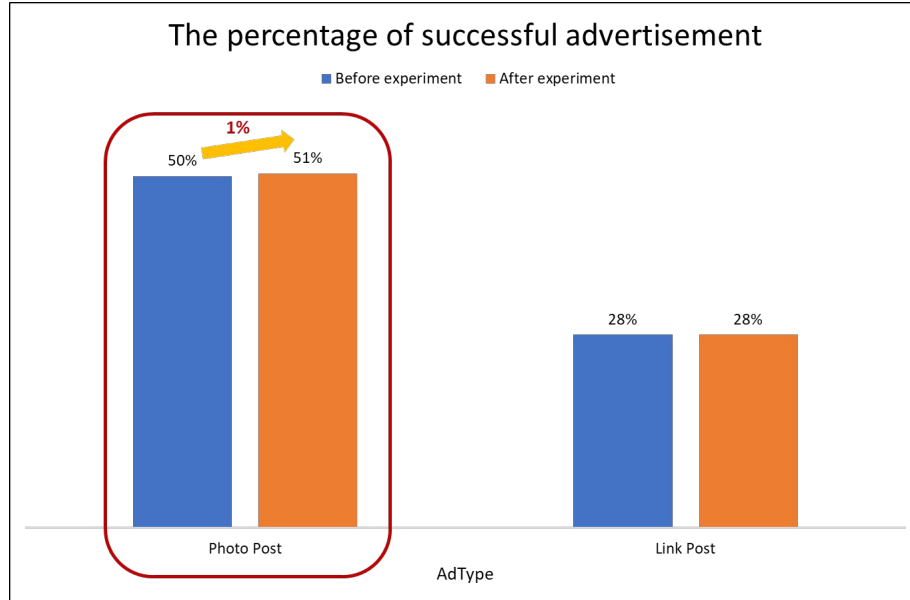
■ 27 ■ 34.5 ■ 44.5 ■ 52



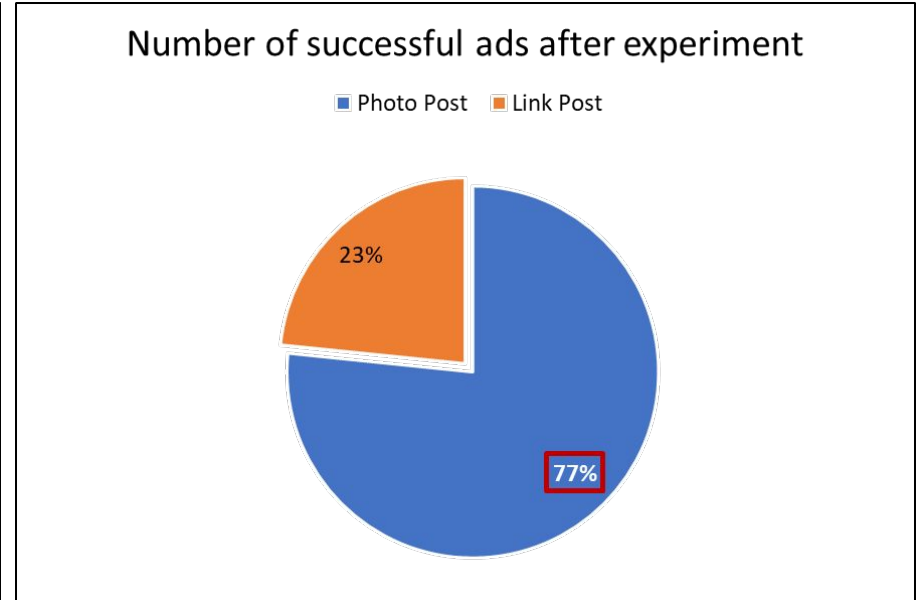
- Young people: **highest** growth rate

- Old people: **largest** number of successful ads

4) Photo-posted Ads Are More Effective



- Photo Post:
 - increased by **1%**
 - **Higher** percentage of successful ads



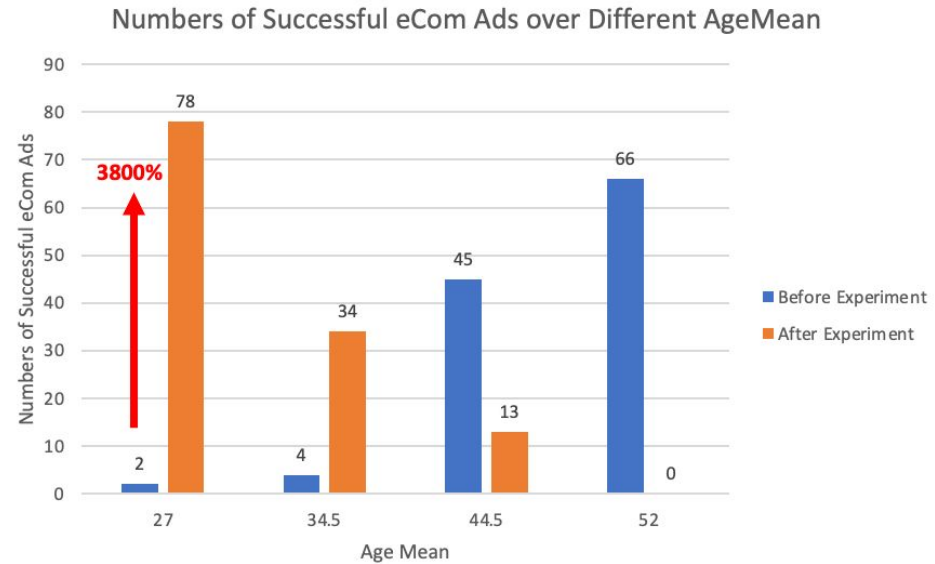
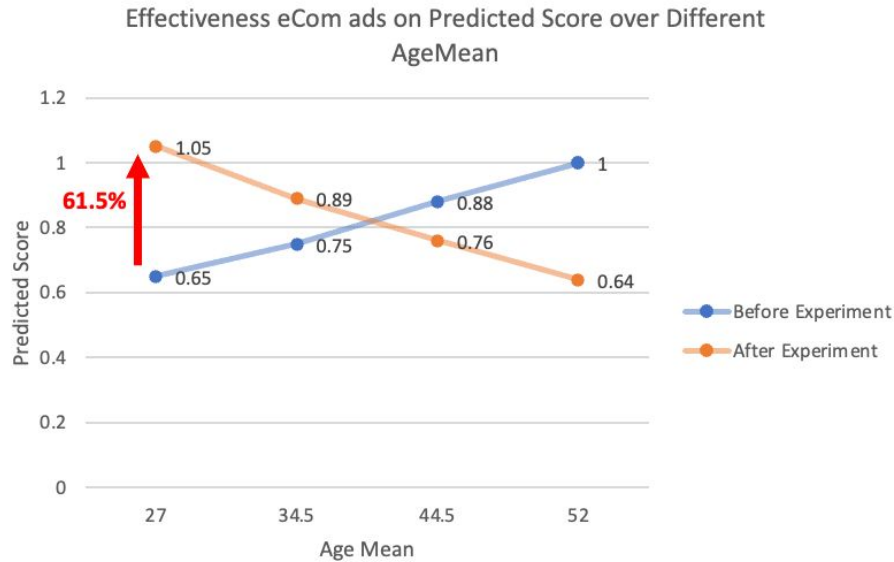
- Most of successful ads are **photo-posted**

5) Interaction Effect Between Category and Age Mean



- Best Combination (Category + Age Mean): **General** + **27** Increase Rate = **2.27%**
- Worst Combination (Category + Age Mean): **Department** + **27** Increase Rate = **-1.09%**

6) eCommerce Ads Impact Youngest Customers the Most



Overall Ads Insights

- **Cosmetics and Mobile** have the most successful ads.
- **Photo-posted ads** are more successful than link-posted ads.
- **Ecommerce and Desktopfeed** have the highest growth rate after experiments.
- **General and mean age 27** have the best effect with a highest predicted growth rate.
- **Youngest consumers (27)** has the greatest growth rate in successful ads and has the best effect on newly designed eCommerce ads.

Appendix I

Creation of Score and extend columns-

```
fbdata <- read.csv(file.choose())
FollowupData <- read.csv(file.choose())
summary(fbdata)
value = function(x, output){return (x * 0.0068)}
extend = function(x, output){if(x > 1.125) "Yes" else "No"}
fbdata$score <- sapply(fbdata$clickPerDollar, value)
fbdata$extend <- sapply(fbdata$score, extend)
FollowupData$score <- sapply(FollowupData$clickPerDollar, value)
FollowupData$extend <- sapply(FollowupData$score, extend)
```

Appendix II

#Category

```
fbdata_t <- subset(fbdata, extend == "Yes")  
follow_t <- subset(follow, extend == "Yes")  
table(fbdata_t$category, useNA='always')  
table(follow_t$category, useNA='always')  
table(fbdata$category)
```

#Placement

```
table(fbdata_t$placement, useNA='always')  
table(follow_t$placement, useNA='always')  
table(follow$placement, useNA='always')  
table(fbdata$placement)
```

Appendix III

#AgeMean

```
nrow(subset(FollowupData, FollowupData$AgeMean == 27 & FollowupData$extend == "Yes"))
nrow(subset(FollowupData, FollowupData$AgeMean == 34.5 & FollowupData$extend == "Yes"))
nrow(subset(FollowupData, FollowupData$AgeMean == 44.5 & FollowupData$extend == "Yes"))
nrow(subset(FollowupData, FollowupData$AgeMean == 52 & FollowupData$extend == "Yes"))

nrow(subset(FollowupData, FollowupData$AgeMean == 27 & FollowupData$extend == "Yes"))/nrow(subset(FollowupData, FollowupData$AgeMean == 27))
nrow(subset(FollowupData, FollowupData$AgeMean == 34.5 & FollowupData$extend == "Yes"))/nrow(subset(FollowupData, FollowupData$AgeMean == 34.5))
nrow(subset(FollowupData, FollowupData$AgeMean == 44.5 & FollowupData$extend == "Yes"))/nrow(subset(FollowupData, FollowupData$AgeMean == 44.5))
nrow(subset(FollowupData, FollowupData$AgeMean == 52 & FollowupData$extend == "Yes"))/nrow(subset(FollowupData, FollowupData$AgeMean == 52))

nrow(subset(fbdata, fbdata$AgeMean == 27 & fbdata$extend == "Yes"))/nrow(subset(fbdata, fbdata$AgeMean == 27))
nrow(subset(fbdata, fbdata$AgeMean == 34.5 & fbdata$extend == "Yes"))/nrow(subset(fbdata, fbdata$AgeMean == 34.5))
nrow(subset(fbdata, fbdata$AgeMean == 44.5 & fbdata$extend == "Yes"))/nrow(subset(fbdata, fbdata$AgeMean == 44.5))
nrow(subset(fbdata, fbdata$AgeMean == 52 & fbdata$extend == "Yes"))/nrow(subset(fbdata, fbdata$AgeMean == 52))
```

#AdType

```
fbphotoPostY <- nrow(subset(fbdata, fbdata$adType == "Photo Post" & fbdata$extend == "Yes"))
fbphotoPostY/nrow(subset(fbdata, fbdata$adType == "Photo Post"))

fbLinkY <- nrow(subset(fbdata, fbdata$adType == "Link Post" & fbdata$extend == "Yes"))
fbLinkY/nrow(subset(fbdata, fbdata$adType == "Link Post"))

fdphotoPostY <- nrow(subset(FollowupData, FollowupData$adType == "Photo Post" & FollowupData$extend == "Yes"))
fdphotoPostY/nrow(subset(FollowupData, FollowupData$adType == "Photo Post"))

fdLinkPostY <- nrow(subset(FollowupData, FollowupData$adType == "Link Post" & FollowupData$extend == "Yes"))
fdLinkPostY/nrow(subset(FollowupData, FollowupData$adType == "Link Post"))

nrow(subset(FollowupData, FollowupData$adType == "Photo Post" & FollowupData$extend == "Yes"))
nrow(subset(FollowupData, FollowupData$adType == "Link Post" & FollowupData$extend == "Yes"))
```

Appendix IV

```
Call:
lm(formula = `score(before)` ~ factor(adType) + factor(category) +
  factor(placement) + ageMean + ageMean * factor(category),
  data = change)

Residuals:
    Min       1Q   Median       3Q      Max
-0.34412 -0.06445 -0.00004  0.06373  0.31291

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      0.4517380   0.0142942   31.603 < 2e-16 ***
factor(adType)Photo Post  0.0513051   0.0032223   15.922 < 2e-16 ***
factor(category)Department -0.3237873   0.0196114  -16.510 < 2e-16 ***
factor(category)eCom      -0.1848444   0.0237841   -7.772 9.56e-15 ***
factor(category)General   -0.4008067   0.0272984  -14.682 < 2e-16 ***
factor(category)High End  -0.3132812   0.0194770  -16.085 < 2e-16 ***
factor(category)Retailer  -0.2572600   0.0190814  -13.482 < 2e-16 ***
factor(placement)mobile   0.2287790   0.0031023   73.746 < 2e-16 ***
ageMean            0.0168383   0.0003489   48.257 < 2e-16 ***
factor(category)Department:ageMean 0.0026415   0.0004860    5.436 5.75e-08 ***
factor(category)eCom:ageMean -0.0028159   0.0005849   -4.815 1.52e-06 ***
factor(category)General:ageMean 0.0022205   0.0006656    3.336 0.000857 ***
factor(category)High End:ageMean 0.0006324   0.0004774    1.325 0.185356
factor(category)Retailer:ageMean 0.0016143   0.0004717    3.422 0.000627 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.09498 on 4417 degrees of freedom
Multiple R-squared:  0.8621,    Adjusted R-squared:  0.8617
F-statistic: 2124 on 13 and 4417 DF, p-value: < 2.2e-16
```

Interaction regression about score(before)

```
Call:
lm(formula = change ~ factor(adType) + factor(category) + factor(placement) +
  ageMean + ageMean * factor(category), data = change)

Residuals:
    Min       1Q   Median       3Q      Max
-0.41559 -0.08114  0.00110  0.08128  0.42417

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      -2.551e-03   1.802e-02  -0.142   0.887
factor(adType)Photo Post   5.060e-03   4.062e-03   1.246   0.213
factor(category)Department -1.335e-02   2.472e-02  -0.540   0.589
factor(category)eCom       1.207e+00   2.998e-02  40.266 <2e-16 ***
factor(category)General    2.753e-02   3.441e-02   0.800   0.424
factor(category)High End   1.544e-02   2.455e-02   0.629   0.530
factor(category)Retailer  -1.516e-02   2.406e-02  -0.630   0.529
factor(placement)mobile    -3.830e-03   3.911e-03  -0.979   0.327
ageMean              2.110e-04   4.399e-04   0.480   0.632
factor(category)Department:ageMean 2.691e-05   6.126e-04   0.044   0.965
factor(category)eCom:ageMean -3.029e-02   7.373e-04 -41.079 <2e-16 ***
factor(category)General:ageMean -5.720e-04   8.391e-04  -0.682   0.495
factor(category)High End:ageMean -5.893e-04   6.018e-04  -0.979   0.328
factor(category)Retailer:ageMean 2.972e-04   5.946e-04   0.500   0.617
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1197 on 4417 degrees of freedom
Multiple R-squared:  0.3711,    Adjusted R-squared:  0.3692
F-statistic: 200.5 on 13 and 4417 DF, p-value: < 2.2e-16
```

Interaction regression about score change

Appendix V

```
Call:
lm(formula = score ~ factor(adType) + factor(category) + factor(placement) +
    ageMean + ageMean * factor(category), data = fbdata)

Residuals:
    Min       1Q   Median       3Q      Max
-0.34412 -0.06445 -0.00004  0.06373  0.31291

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      0.4517380   0.0142942   31.603 < 2e-16 ***
factor(adType)Photo Post    0.0513051   0.0032223   15.922 < 2e-16 ***
factor(category)Department -0.3237873   0.0196114  -16.510 < 2e-16 ***
factor(category)eCom       -0.1848444   0.0237841   -7.772 9.56e-15 ***
factor(category)General    -0.4008067   0.0272984  -14.682 < 2e-16 ***
factor(category)High End  -0.3132812   0.0194770  -16.085 < 2e-16 ***
factor(category)Retailer   -0.2572600   0.0190814  -13.482 < 2e-16 ***
factor(placement)mobile    0.2287790   0.0031023   73.746 < 2e-16 ***
ageMean            0.0168383   0.0003489   48.257 < 2e-16 ***
factor(category)Department:ageMean 0.0026415   0.0004860    5.436 5.75e-08 ***
factor(category)eCom:ageMean -0.0028159   0.0005849   -4.815 1.52e-06 ***
factor(category)General:ageMean 0.0022205   0.0006656    3.336 0.000857 ***
factor(category)High End:ageMean 0.0006324   0.0004774    1.325 0.185356
factor(category)Retailer:ageMean 0.0016143   0.0004717    3.422 0.000627 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.09498 on 4417 degrees of freedom
Multiple R-squared:  0.8621,    Adjusted R-squared:  0.8617
F-statistic: 2124 on 13 and 4417 DF,  p-value: < 2.2e-16
```

Interaction Regression of
ageMean*factor(category) Before Experiment

```
Call:
lm(formula = score ~ factor(adType) + factor(category) + factor(placement) +
    ageMean + ageMean * factor(category), data = FollowupData)

Residuals:
    Min       1Q   Median       3Q      Max
-0.31760 -0.06426 -0.00077  0.06220  0.32587

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      4.492e-01  1.409e-02  31.887 < 2e-16 ***
factor(adType)Photo Post    5.636e-02  3.176e-03  17.750 < 2e-16 ***
factor(category)Department -3.371e-01  1.933e-02 -17.444 < 2e-16 ***
factor(category)eCom       1.022e+00  2.344e-02  43.623 < 2e-16 ***
factor(category)General    -3.733e-01  2.690e-02 -13.875 < 2e-16 ***
factor(category)High End  -2.978e-01  1.919e-02 -15.517 < 2e-16 ***
factor(category)Retailer   -2.724e-01  1.880e-02 -14.487 < 2e-16 ***
factor(placement)mobile    2.249e-01  3.057e-03  73.578 < 2e-16 ***
ageMean            1.705e-02  3.439e-04  49.581 < 2e-16 ***
factor(category)Department:ageMean 2.668e-03  4.789e-04  5.572 2.67e-08 ***
factor(category)eCom:ageMean -3.310e-02  5.764e-04 -57.435 < 2e-16 ***
factor(category)General:ageMean 1.648e-03  6.560e-04  2.513  0.012 *
factor(category)High End:ageMean 4.311e-05  4.705e-04  0.092  0.927
factor(category)Retailer:ageMean 1.911e-03  4.648e-04  4.112 3.99e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.0936 on 4417 degrees of freedom
Multiple R-squared:  0.8673,    Adjusted R-squared:  0.8669
F-statistic: 2221 on 13 and 4417 DF,  p-value: < 2.2e-16
```

Interaction Regression of
ageMean*factor(category) After Experiment