experiment

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April 7, 2016

Experiment R-Code Guide

Set up randomization

First, we need to randomly assign each classmate a treatment.

We have a list of all 18 possible combinations, so we'll permute our subjects (classmates) and assign them to one of the 18 possible treatment combinations. The below code achieves this:

```
#classmate_list <- c()

trt_combinations <- c("Plastic bottle, true label, coke first","Plastic bottle, true label, pepsi first

# Returns a list of classmates names, along with the trt they receive
asn_trt <- function(classmatelist){
  permuted_index <- sample(seq(length(classmatelist)))
  new_list <- classmatelist[permuted_index]
  names_and_trts <- vector(mode="numeric", length=0)
  for (i in permuted_index){
    x <- paste(new_list[i], trt_combinations[i])
    names_and_trts <- append(names_and_trts, x)
  }
  return(names_and_trts)
}

# asn_trt(classmate_list)
```

Now, we carry out the experiment.

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————————Section 1————————

Step 1: Make a list of classmate names. We will use this list in a moment to dertermine which subjects are assigned which treatments.

```
# Classmate names
namelist1 <- c()
```

Step 2: Create list of who gets what treatment combination. By calling the **asn_trt** function onto **namelist1** our list of names for section 1, we create a list of who gets assigned which treatment.

```r
set.seed(123)
sec1_trts <- asn_trt(namelist1)

# section 1 treatments
sec1_trts
```

```
## [1] " Plastic bottle, true label, coke first"
```

Now that we know who gets what, we'll perform the experiment and add their response to our table.

We created a google form to collect the responses, which we will match up to the subjects. We will then append each subjects response to the data.frame at his/her respective position.

Below we create the dataframe and response values

```r
# Set up experiment table to gather response values
exp1 <- expand.grid(bottle_type = c("plastic","can","glass"),
                    label = c("true","false","none"),
                    order = c("Pepsi First","Coke First"))


#response1_list <- c()
#exp1$response <- response1_list
```

Once we have our data frame and response values, we are done. We'll perform the analysis after we've done the same as above for Section 2.

————————-End Section 1————————

————————Section 2————————-

Repeat the same steps for Section 1, but do so on the students in Section 2 and give them their own dataframe, **exp2**.

```r
exp2 <- expand.grid(bottle_type = c("plastic","can","glass"),
                    label = c("true","false","none"),
                    order = c("Pepsi First","Coke First"))
```

————————-End Section 2————————-

————————Anova Analysis————————

Now we have our two dataframes, one for each section. We can easily perform our analysis now.

Step 1: Combine the two dataframes into one

```r
# Combine into one dataframe
#exp_data <- rbind(exp1,exp2)
```

```
# Make factors so ANOVA works
#exp_data$bottle_type <- as.factor(exp_data$bottle_type)
#exp_data$label <- as.factor(exp_data$label)
#exp_data$order <- as.factor(exp_data$order)
#exp_data
```

Step 2: Perform ANOVA

```
#summary(aov(lm(response~order*label*bottle_type, data=exp_data)))
```

Example Simulation

```
demo_names <- c("Jared","Jane","isha","kyle",'rob','mark','jerry','stephanie','nura','kelly','william',

demo_names2 <- c("Karthik","Claus","Edith","Brett","Florine","Jonas",
"Hagarth","Muriel","Edward","Troy","Anders","Svenn","Roland","Nestor","Ben","Hans","Hanson","Oliver")

sim1_trts <- asn_trt(demo_names)
sim1_resp <- runif(18)
sim1_exp <- exp1
sim1_exp$response <- sim1_resp
# First dataset
sim1_exp
```

```
##    bottle_type label       order   response
## 1      plastic  true Pepsi First 0.88953932
## 2          can  true Pepsi First 0.69280341
## 3        glass  true Pepsi First 0.64050681
## 4      plastic false Pepsi First 0.99426978
## 5          can false Pepsi First 0.65570580
## 6        glass false Pepsi First 0.70853047
## 7      plastic  none Pepsi First 0.54406602
## 8          can  none Pepsi First 0.59414202
## 9        glass  none Pepsi First 0.28915974
## 10     plastic  true  Coke First 0.14711365
## 11         can  true  Coke First 0.96302423
## 12       glass  true  Coke First 0.90229905
## 13     plastic false  Coke First 0.69070528
## 14         can false  Coke First 0.79546742
## 15       glass false  Coke First 0.02461368
## 16     plastic  none  Coke First 0.47779597
## 17         can  none  Coke First 0.75845954
## 18       glass  none  Coke First 0.21640794
```

```
sim2_trts <- asn_trt(demo_names2)
sim2_resp <- runif(18)
sim2_exp <- exp2
sim2_exp$response <- sim2_resp
```

```r
# Data of all 36 replications
sim_data <- as.data.frame(rbind(sim1_exp,sim2_exp))


# define function to get a new experiment each time
replicate_expr <- function(names){
  sim1_trts <- asn_trt(demo_names)
  sim1_resp <- runif(18)
  sim1_exp <- exp1
  sim1_exp$response <- sim1_resp
  # First dataset
  return(sim1_exp)
}

t <- replicate_expr(demo_names)
t2 <- replicate_expr(demo_names2)
exp_data <- as.data.frame(rbind(t,t2))
summary(aov(lm(response~order*label*bottle_type, data=exp_data)))
```

```
##                          Df Sum Sq Mean Sq F value Pr(>F)
## order                     1 0.0024 0.00238   0.026  0.874
## label                     2 0.0233 0.01166   0.128  0.881
## bottle_type               2 0.3422 0.17111   1.872  0.183
## order:label               2 0.2410 0.12051   1.318  0.292
## order:bottle_type         2 0.0202 0.01010   0.111  0.896
## label:bottle_type         4 0.0598 0.01496   0.164  0.954
## order:label:bottle_type   4 0.2040 0.05101   0.558  0.696
## Residuals                18 1.6453 0.09141
```

End