experiment

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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)</pre>
```

Now, we carry out the experiment.

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()</pre>
```

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.

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

# section 1 treatments
sec1_trts</pre>
```

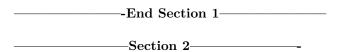
```
## [1] " Plastic bottle, true label, coke first"
```

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

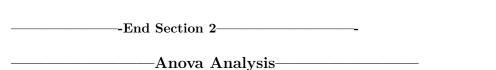
We created a google form to collect the responses, which we will match up to the subjects. We will then append each subjects response to the data.frame at his/her respective position.

Below we create the dataframe and response values

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.



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



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

```
# Combine into one dataframe
#exp_data <- rbind(exp1, exp2)</pre>
```

```
# 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</pre>
```

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</pre>
```

```
##
      bottle_type label
                                      response
                              order
## 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
              can false Pepsi First 0.65570580
## 5
## 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
         plastic false Coke First 0.69070528
## 13
## 14
              can false Coke First 0.79546742
           glass false Coke First 0.02461368
## 15
## 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)</pre>
sim2_resp <- runif(18)</pre>
sim2 exp <- exp2
sim2_exp$response <- sim2_resp</pre>
```

```
# Data of all 36 replications
sim_data <- as.data.frame(rbind(sim1_exp,sim2_exp))</pre>
# define function to get a new experiment each time
replicate_expr <- function(names){</pre>
  sim1 trts <- asn trt(demo names)</pre>
  sim1_resp <- runif(18)</pre>
  sim1_exp <- exp1
  sim1_exp$response <- sim1_resp</pre>
  # First dataset
  return(sim1_exp)
}
t <- replicate_expr(demo_names)</pre>
t2 <- replicate_expr(demo_names2)</pre>
exp_data <- as.data.frame(rbind(t,t2))</pre>
summary(aov(lm(response~order*label*bottle_type, data=exp_data)))
##
                             Df Sum Sq Mean Sq F value Pr(>F)
                              1 0.0024 0.00238 0.026 0.874
## order
                              2 0.0233 0.01166 0.128 0.881
## label
## 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
                            18 1.6453 0.09141
## Residuals
```

End