

# Study1\_MotivationAging-Reinforcement\_Analyses

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*4/29/2018*

## Study 1: Age-Related Differences in Motivational Integration and Cognitive Control: Liquid Feedback as Reinforcement

This is an analysis of subject task performance in study 1 in the motivation aging study, in which we examine age-related differences in how individuals integrate the motivational value of monetary and liquid studies, and whether and how this integrated motivational value interacts with cognitive control. In the study, subjects perform a cued task-switching paradigm, where they have to classify a letter (vowel/consonant) or digit (odd/even). During the baseline runs, they don't receive any feedback and are told to respond "as quickly and accurately as possible." During the incentive runs, they receive a drop of liquid (2 mL) to indicate successful attainment of monetary reward in a single trial. Each subject performs 3 incentive runs in which they must respond accurately and faster than a criterion RT to earn monetary reward. Liquid feedback (blocked) served as reinforcement and signaled successful attainment of monetary reward. Criterion RT is calculated on subject performance during the baseline run (30%).

### Loading relevant packages

```
library(ggplot2)
library(gridExtra)
library(dplyr)
library(tidyr)
library(broom)
library(lme4)
library(lmerTest)
library(sjPlot)
library(pander)
source("summarySEwithin2.R")
library(RColorBrewer)
```

### Specify colors

```
display.brewer.pal(n = 8, name = 'Set2')
```



Set2 (qualitative)

```
brewer.pal(n = 8, name = "Set2")

## [1] "#66C2A5" "#FC8D62" "#8DA0CB" "#E78AC3" "#A6D854" "#FFD92F" "#E5C494"
## [8] "#B3B3B3"

colors.OAYA<-c("#66C2A5", "#FC8D62")
```

## Path Directories of Data Input/Output

```
# data directories
data.path<-paste0("/Users/debbieyee/Box Sync/CCPLab_Liquid_Studies_ARCHIVE/",
                  "2018_MotivationAging/Study1_OA_Reinforcement/SubjectData/",
                  "TrimmedData/OAYA_LiqPos_RewardData.csv")
runkey.path<-paste0("/Users/debbieyee/Box Sync/CCPLab_Liquid_Studies_ARCHIVE/",
                    "2018_MotivationAging/Study1_OA_Reinforcement/SubjectData/",
                    "TrimmedData/OAYA_LiqPos_runkey.csv")
runkey.path<-paste0("/Users/debbieyee/Box Sync/CCPLab_Liquid_Studies_ARCHIVE/",
                    "2018_MotivationAging/Study1_OA_Reinforcement/SubjectData/",
                    "TrimmedData/OAYA_LiqPos_runkey.csv")
figure.path<-paste0("/Users/debbieyee/Box Sync/CCPLab_Liquid_Studies_ARCHIVE/",
                    "2018_MotivationAging/MotivationAging_Analyses/Figures")
```

## Format the Data For Analysis

```
# Read in the data
data<-read.csv(data.path,header = TRUE) %>% select(-X)
runkey<-read.csv(runkey.path, header = TRUE) %>% filter(include=="yes")

# Formatting incentive data
```

```

incentive<- data %>% inner_join(y = runkey, by = c("subID","block","group")) %>%
  mutate(subRewarded=(RT<critRT & ACC==1)*1,
    ERR=ifelse(ACC==0,1,0),
    block=factor(block, levels=c(7,8,9), labels=c(1,2,3)),
    money=factor(rewType, levels=c("Reward1","Reward2","Reward4"), labels=c("$","$$","$$$")),
    moneyCode=factor(rewType, levels=c("Reward1","Reward2","Reward4"), labels=c(-1,0,1)),
    liqCode=factor(liquid, levels=c("saltwater","neutral","juice"), labels=c(-1,0,1)),
    liqCodeJvN=factor(liquid, levels=c("saltwater","neutral","juice"), labels=c(0,-1,1)),
    liqCodeSvN=factor(liquid, levels=c("saltwater","neutral","juice"), labels=c(-1,1,0)),
    groupCode=factor(group, levels=c("YA","OA"), labels=c(0,1)),
    blockCode=factor(block, levels=c(1,2,3), labels=c(-1,0,1)))
incentive$moneyCode<-as.numeric(levels(incentive$moneyCode)[incentive$moneyCode])
incentive$liqCode<-as.numeric(levels(incentive$liqCode)[incentive$liqCode])
incentive$liqCodeJvN<-as.numeric(levels(incentive$liqCodeJvN)[incentive$liqCodeJvN])
incentive$liqCodeSvN<-as.numeric(levels(incentive$liqCodeSvN)[incentive$liqCodeSvN])
incentive$groupCode<-as.numeric(levels(incentive$groupCode)[incentive$groupCode])
incentive$blockCode<-as.numeric(levels(incentive$blockCode)[incentive$blockCode])

# Calculate average monetary earnings per group
test<-incentive %>% filter(group=="YA") %>% group_by(subID) %>% summarise(totalreward=sum(moneyearned))
mean(test$totalreward)

## [1] 4.499444
sd(test$totalreward)

## [1] 0.7665148
test<-incentive %>% filter(group=="OA") %>% group_by(subID) %>% summarise(totalreward=sum(moneyearned))
mean(test$totalreward)

## [1] 3.940227
sd(test$totalreward)

## [1] 0.7635672

```

## Summarise/Consolidate Incentive Data

```

# summarise means by subject
groupRT.means = incentive %>% group_by(subID, group) %>%
  filter(!is.na(subRewarded), ACC==1) %>% filter(!is.na(subRewarded), ACC==1) %>%
  summarise(n=n(),meanRT = mean(RT))
group.means = incentive %>% group_by(subID, group) %>% filter(!is.na(subRewarded)) %>%
  summarise(n=n(), meanRR = mean(subRewarded), seRR= sd(subRewarded)/sqrt(length(subRewarded)),
    meanACC = mean(ACC), meanERR = mean(ERR))

# summarise means by monetary reward only
rewRT.means = incentive %>% group_by(subID, money, group, block) %>%
  filter(!is.na(subRewarded), ACC==1) %>% filter(!is.na(subRewarded), ACC==1) %>%
  summarise(n=n(),meanRT = mean(RT))
rew.means = incentive %>% group_by(subID,money, group, block) %>% filter(!is.na(subRewarded)) %>%
  summarise(n=n(), meanRR = mean(subRewarded), meanACC = mean(ACC), meanERR = mean(ERR))

# summarise means by liquid incentive type only

```

```

liqRT.means = incentive %>% group_by(subID, liquid, group, block) %>% filter(!is.na(subRewarded), ACC==1) %>% summarise(meanRT = mean(RT))
liq.means=incentive %>% group_by(subID, liquid, group, block) %>% filter(!is.na(subRewarded)) %>% summarise(n=n(), meanRR = mean(subRewarded), meanACC = mean(ACC), meanERR = mean(ERR))

# summarise the means of the incentive data for each subject, grouped by condition
incentive9RT.means <- incentive %>% group_by(subID, liquid, money, group, block) %>%
  filter(!is.na(subRewarded), ACC==1) %>% summarise(n=n(), meanRT = mean(RT)) %>%
  mutate(moneycode = as.numeric(as.character(factor(money,levels=c("$","$$","$$$","$$$$"),
    labels=c(-1,0,1)))),
    liqcode = as.numeric(as.character(factor(liquid,levels=c("saltwater","neutral","juice"),
    labels=c(-1,0,1)))) %>%
  ungroup(subID) %>% mutate(subID=as.factor(subID))
incentive9.means = incentive %>% group_by(subID, liquid, money, group, block) %>%
  filter(!is.na(subRewarded)) %>%
  summarise(n = n(), meanRR = mean(subRewarded), meanACC = mean(ACC), meanERR = mean(ERR)) %>%
  mutate(moneycode = as.numeric(as.character(factor(money,levels=c("$","$$","$$$","$$$$"),
    labels=c(-1,0,1)))),
    liqcode = as.numeric(as.character(factor(liquid,levels=c("saltwater","neutral","juice"),
    labels=c(-1,0,1)))) %>%
  ungroup(subID) %>% mutate(subID=as.factor(subID))

```

## Reward Rate Plots

Plot: histogram of reward rate by age group

```
RR.sum=summarySE2(data=group.means, measurevar = "meanRR", groupvars = c("group"))
```

```

##
## Attaching package: 'data.table'
##
## The following objects are masked from 'package:dplyr':
##
##   between, first, last
pandoc.table(RR.sum)

```

```

##
## -----
##  group    N   meanRR    sd      se      ci
## -----
##    OA     44   0.5769   0.1146   0.01727  0.03483
##
##    YA     54   0.6445   0.1159   0.01577  0.03162
## -----

```

```

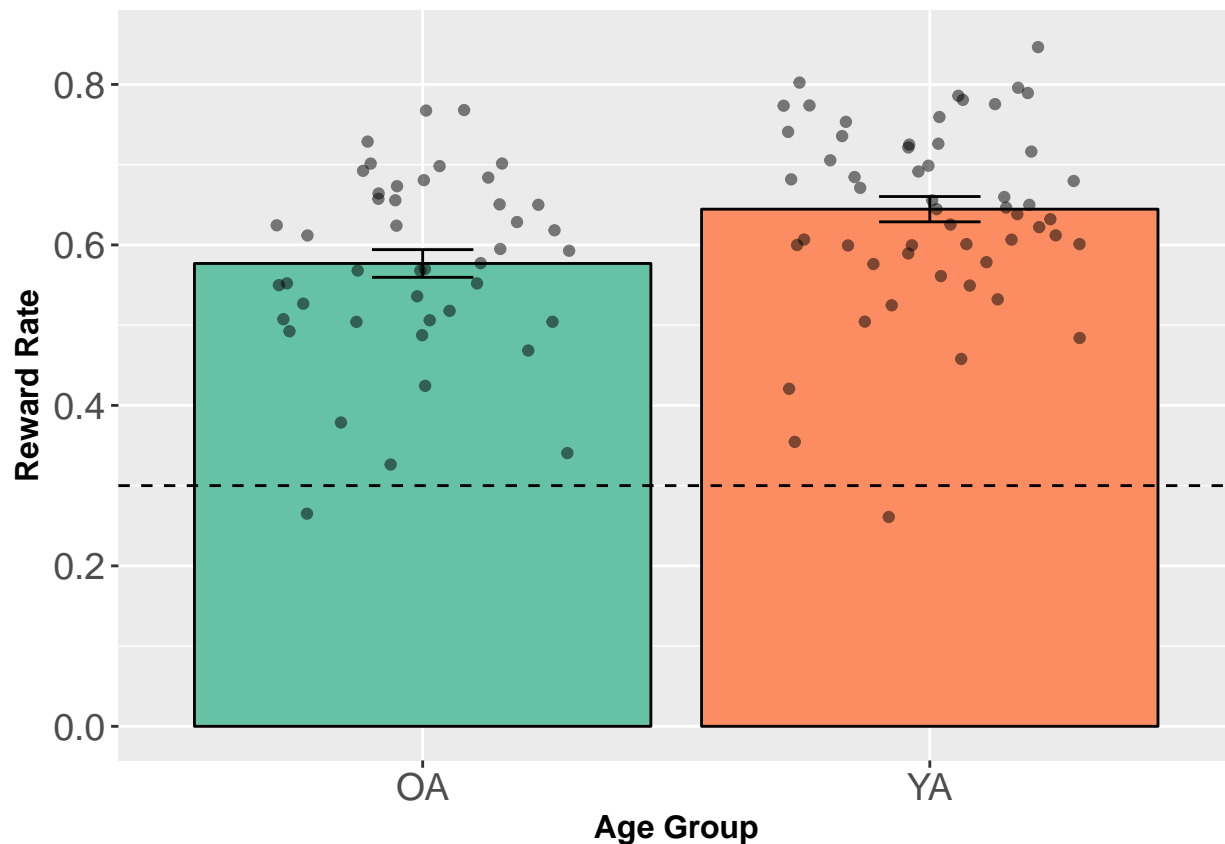
p.RR.0<-ggplot() +
  geom_bar(data = RR.sum, aes(x=group, y=meanRR, fill=group),
    color="black", fill=colors.OAYA, stat="identity") +
  geom_errorbar(data = RR.sum,
    mapping=aes(x=group, y=meanRR,
      ymin=meanRR-se, ymax=meanRR+se),
    stat="identity", width=0.2) +

```

```
geom_point(data = group.means, aes(x=group, y=meanRR),
           stat="identity", position=position_jitter(w=.3), alpha=0.5) +
geom_hline(yintercept = .30, linetype="dashed") +
xlab("Age Group") + ylab("Reward Rate") +
coord_cartesian(ylim=c(0,.85)) +
theme(#plot.title=element_text(size=22,face="bold", vjust=2),
      axis.title=element_text(size=12,face = "bold"),
      axis.text=element_text(size=14),
      legend.position="none",
      strip.text.x = element_text(size = 12))
```

## Warning: Ignoring unknown aesthetics: y

p.RR.0



Plot: mean reward rate by monetary reward and age group

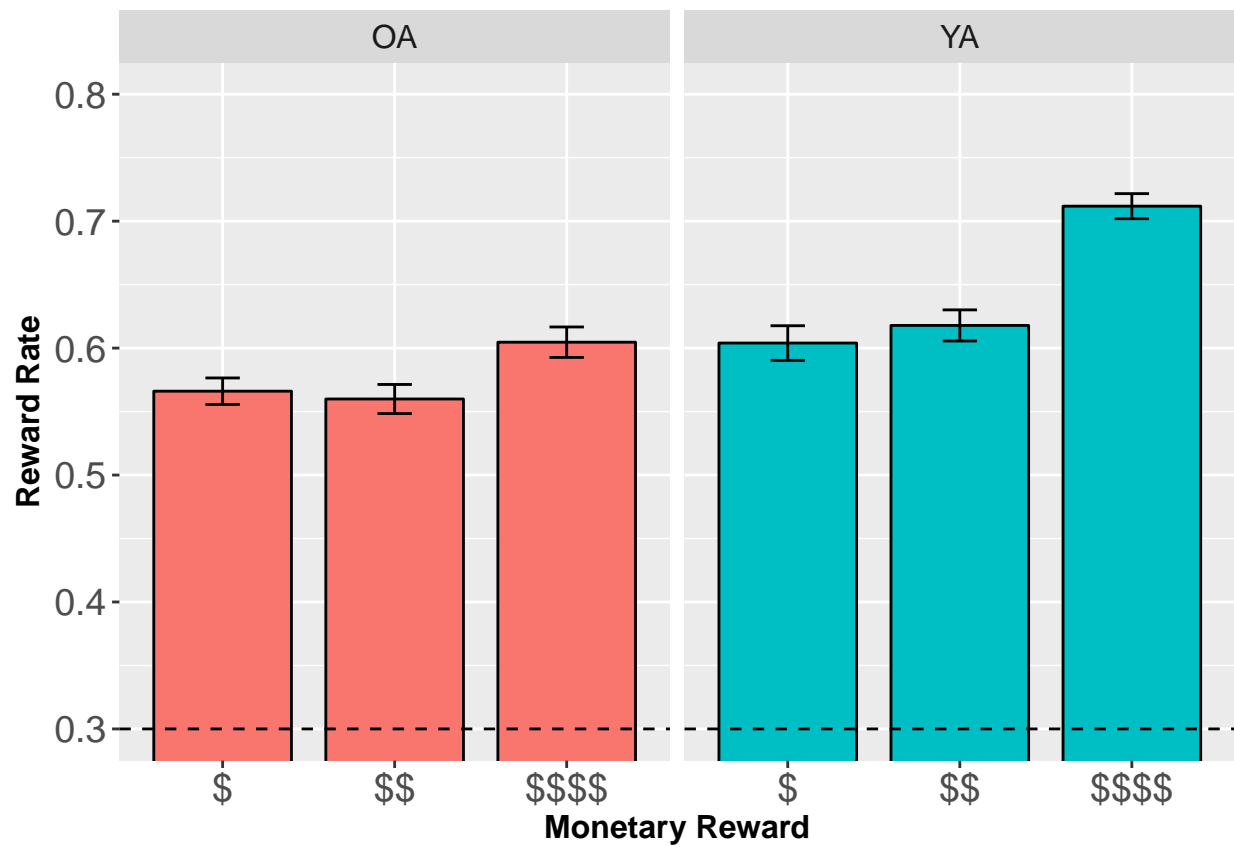
```
RR.sum=summarySEwithin2(data=rew.means, measurevar = "meanRR", withinvars = c("money"),
                        betweenvars = c("group"), idvar = "subID")
pandoc.table(RR.sum)
```

```
##
## -----
##  group  money    N  meanRR  meanRRNormed    sd      se      ci
## -----
##   OA      $    132   0.5661      0.6033   0.1198  0.01043  0.02063
```

```
##
## OA      $$      132  0.5599      0.5972      0.1316      0.01146      0.02266
##
## OA      $$$$     132  0.6046      0.6419      0.1378      0.012      0.02373
##
## YA      $       162  0.604      0.5736      0.1735      0.01363      0.02692
##
## YA      $$      162  0.6179      0.5875      0.1558      0.01224      0.02418
##
## YA      $$$$     162  0.7118      0.6814      0.1256      0.009867     0.01949
## -----
```

```
p.RR.1<-ggplot(RR.sum, aes(x=money, y=meanRR, fill=group)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
    stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
    aes(ymin=meanRR-se, ymax=meanRR+se), width=.2) +
  facet_grid(.~group) +
  geom_hline(yintercept = .30, linetype="dashed") +
  xlab("Monetary Reward") + ylab("Reward Rate") +
  #ggtitle("Task Performance Across Money") +
  coord_cartesian(ylim=c(.3,.8)) +
  scale_fill_discrete(name="Monetary Reward") +
  theme(#plot.title=element_text(size=22,face="bold", vjust=2),
    axis.title=element_text(size=12,face = "bold"),
    axis.text=element_text(size=14),
    legend.position="none",
    strip.text.x = element_text(size = 12))
```

```
p.RR.1
```



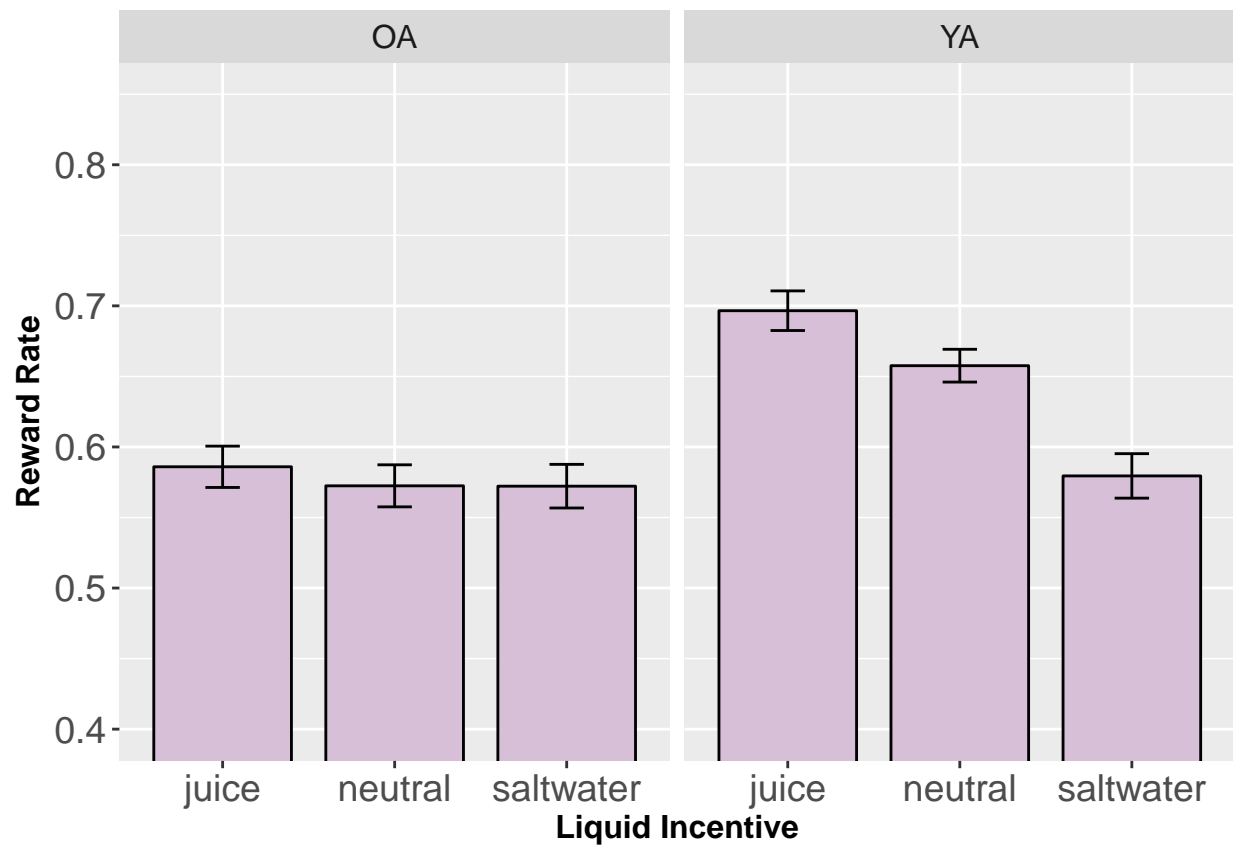
## Plot: mean reward rate by liquid type and age group

```
RR.sum=summarySEwithin2(data=liq.means, measurevar = "meanRR", withinvars = c("liquid"),
                        betweenvars = c("group"), idvar = "subID")
pandoc.table(RR.sum)
```

```
##
## -----
##  group    liquid      N  meanRR  meanRRNormed    sd      se      ci
## -----
##   OA      juice      44  0.5859    0.6232    0.09714  0.01464  0.02953
##
##   OA      neutral     44  0.5724    0.6097    0.09889  0.01491  0.03006
##
##   OA      saltwater    44  0.5722    0.6095    0.1026   0.01546  0.03118
##
##   YA      juice      54  0.6966    0.6662    0.1032   0.01405  0.02817
##
##   YA      neutral     54  0.6576    0.6272    0.08538  0.01162  0.02331
##
##   YA      saltwater    54  0.5795    0.5491    0.1158   0.01576  0.03161
## -----
```

```
p.RR.2<-ggplot(RR.sum, aes(x=liquid, y=meanRR)) +
  geom_bar(position=position_dodge(width=0.8), color="black", fill='thistle',
           stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
               aes(ymin=meanRR-se, ymax=meanRR+se), width=.2) +
  facet_grid(.~group) +
  xlab("Liquid Incentive") + ylab("Reward Rate") +
  #ggtitle("Task Performance Across Liquid Type") +
  coord_cartesian(ylim=c(.4,.85)) +
  scale_fill_discrete(name="Monetary Reward") +
  theme(#plot.title=element_text(size=22,face="bold", vjust=2),
        axis.title=element_text(size=12,face = "bold"),
        axis.text=element_text(size=14),
        legend.position="none",
        strip.text.x = element_text(size = 12))
p.RR.2
```





## Plot: mean reward rate by money, liquid, and age group

```
RR.sum=summarySEwithin2(data=incentive9.means, measurevar = "meanRR",
                        withinvars = c("money","liquid"), betweenvars = c("group"),
                        idvar = "subID")
pandoc.table(RR.sum)
```

```
##
## -----
##  group    money    liquid    N    meanRR    meanRRNormed    sd    se    ci
## -----
##  OA      $      juice    44    0.5788    0.6161    0.08623    0.013    0.02622
##
##  OA      $      neutral  44    0.5611    0.5984    0.1102    0.01662    0.03351
##
##  OA      $      saltwater 44    0.5582    0.5955    0.1138    0.01715    0.03459
##
##  OA     $$      juice    44    0.5682    0.6055    0.1097    0.01654    0.03335
##
##  OA     $$      neutral  44    0.5554    0.5927    0.1206    0.01818    0.03667
##
##  OA     $$      saltwater 44    0.5561    0.5934    0.1135    0.01711    0.03451
##
##  OA     $$$$     juice    44    0.6108    0.6481    0.127    0.01915    0.03861
##
##  OA     $$$$     neutral  44    0.6009    0.6381    0.104    0.01567    0.0316
##
##  OA     $$$$     saltwater 44    0.6023    0.6396    0.1281    0.01931    0.03895
##
##  YA      $      juice    54    0.6696    0.6392    0.09627    0.0131    0.02628
##
##  YA      $      neutral  54    0.6256    0.5952    0.1288    0.01753    0.03516
##
##  YA      $      saltwater 54    0.5168    0.4864    0.1689    0.02299    0.0461
##
##  YA     $$      juice    54    0.6678    0.6374    0.1336    0.01818    0.03645
##
##  YA     $$      neutral  54    0.6256    0.5952    0.1175    0.016    0.03208
##
##  YA     $$      saltwater 54    0.5602    0.5298    0.1301    0.0177    0.0355
##
##  YA     $$$$     juice    54    0.7523    0.7219    0.09888    0.01346    0.02699
##
##  YA     $$$$     neutral  54    0.7216    0.6913    0.09788    0.01332    0.02672
##
##  YA     $$$$     saltwater 54    0.6615    0.6311    0.1081    0.01471    0.0295
## -----
```

```
# first plot
p.RR.3<-ggplot(RR.sum, aes(x=liquid, y=meanRR, fill=money)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
           stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
               aes(ymin=meanRR-se, ymax=meanRR+se), width=.2) +
```

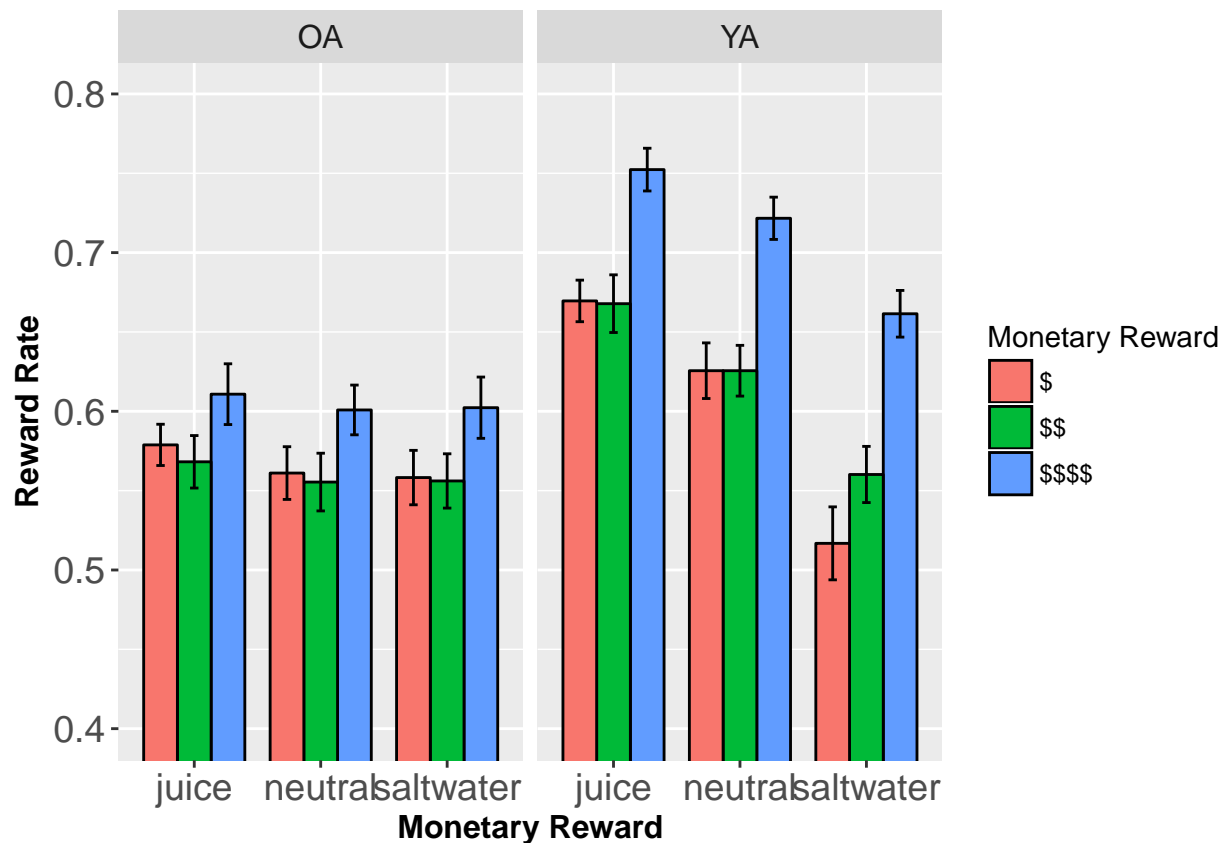
```

xlab("Monetary Reward") + ylab("Reward Rate") +
facet_grid(.~group) +
#ggtitle("Punishment Avoidance Across Money and Liquid Type") +
scale_fill_brewer(palette="Pastel2") +
coord_cartesian(ylim=c(.4,.8)) +
scale_fill_discrete(name="Monetary Reward") +
theme(#plot.title=element_text(size=22,face="bold", vjust=2),
      axis.title=element_text(size=12,face = "bold"),
      axis.text=element_text(size=14),
      legend.position="right",
      strip.text.x = element_text(size = 12))

```

## Scale for 'fill' is already present. Adding another scale for 'fill',  
## which will replace the existing scale.

p.RR.3

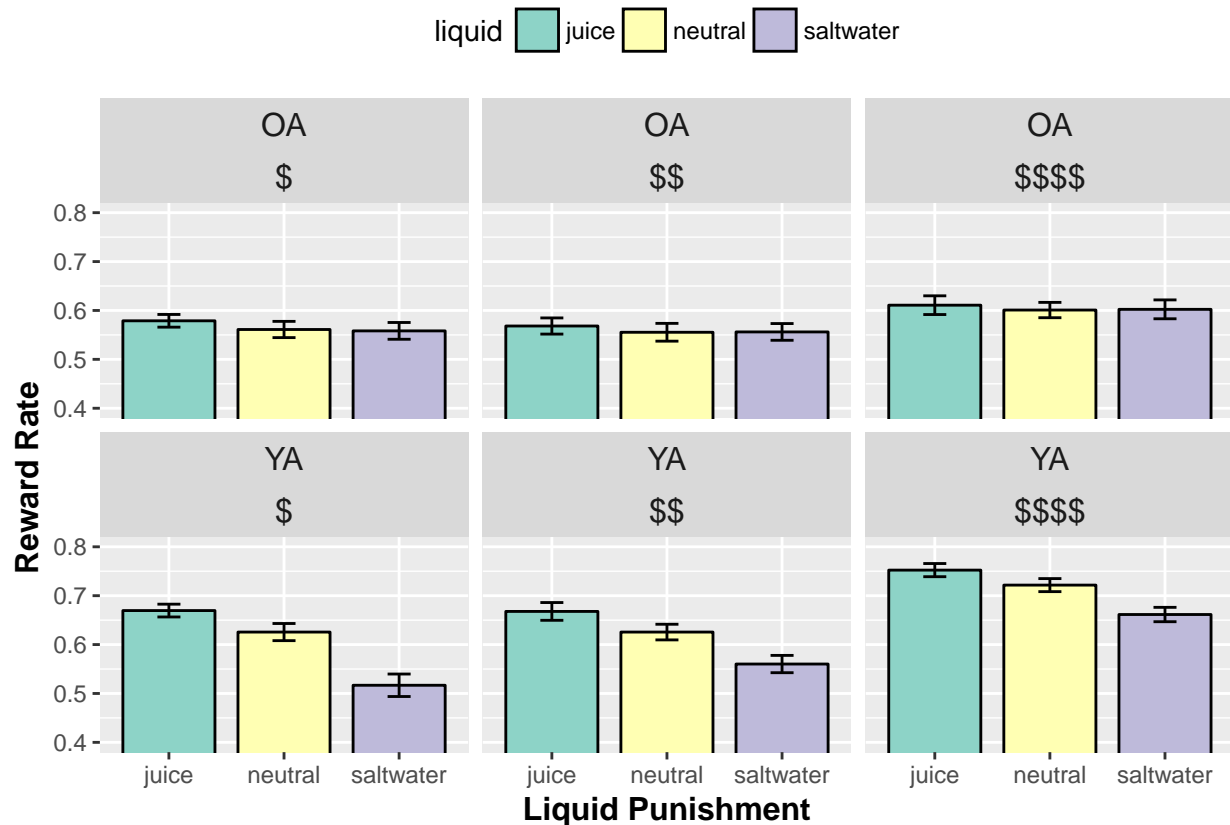


```

# second plot
p.RR.4<-ggplot(RR.sum, aes(x=liquid, y=meanRR, fill=liquid)) +
  geom_bar(position=position_dodge(width=0.8),
           color="black", stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
               aes(ymin=meanRR-se, ymax=meanRR+se), width=.2) +
  facet_wrap(group~money) +
  xlab("Liquid Punishment") + ylab("Reward Rate") +
  #ggtitle("Task Performance Across Money and Liquid Type") +
  coord_cartesian(ylim=c(.4,.8)) +

```

```
scale_fill_brewer(palette="Set3") +
#scale_fill_manual(name="Monetary Reward") +
theme(#plot.title=element_text(size=22,face="bold", vjust=2),
      axis.title=element_text(size=12,face = "bold"),
      #axis.text=element_text(size=14),
      legend.position="top",
      strip.text.x = element_text(size = 12))
p.RR.4
```



```
# ggplot(data = incentive9.means, mapping = aes(x = money, y = meanRR, col=subID, group=subID)) +
# facet_grid(~liquid) +
# geom_point() +
# geom_line()
```

Plot: mean reward rate by block and age group

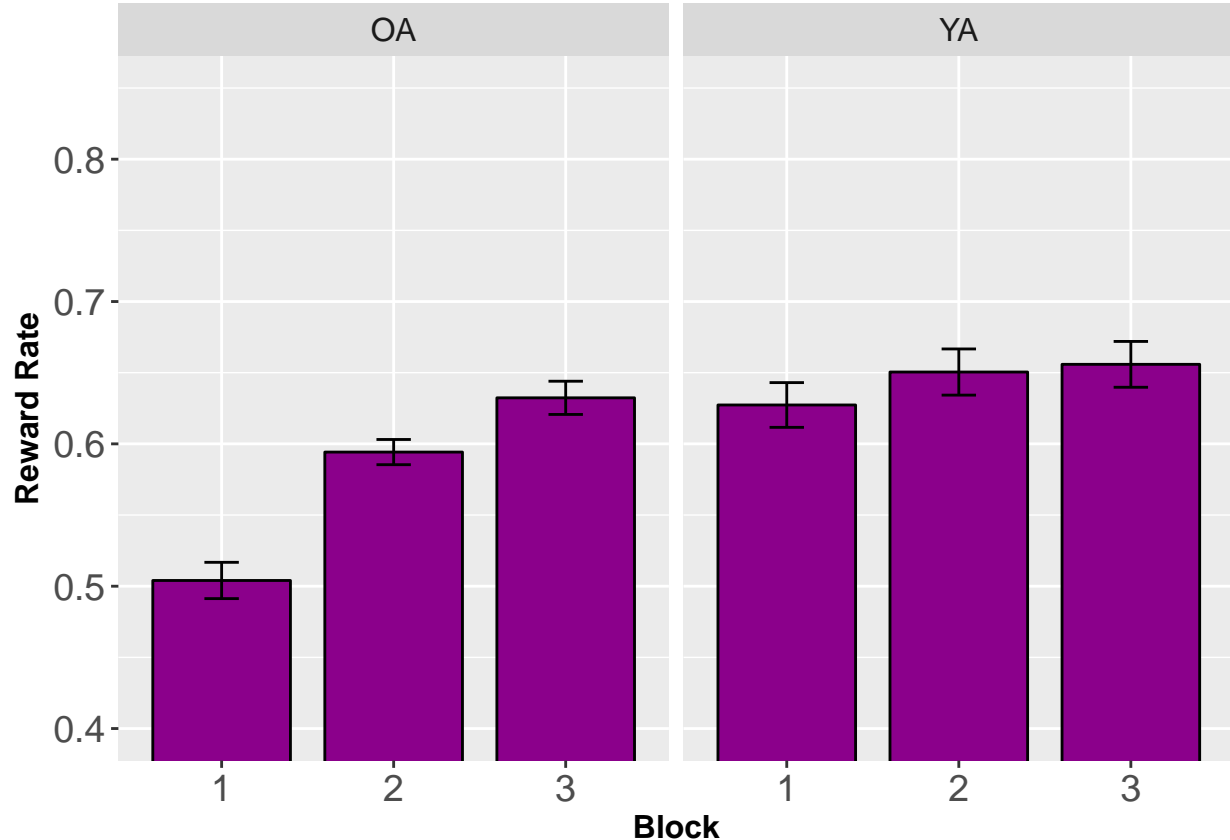
```
RR.sum=summarySEwithin2(data=liq.means, measurevar = "meanRR", withinvars = c("block"),
                        betweenvars = c("group"), idvar = "subID")
pandoc.table(RR.sum)
```

```
##
## -----
## group  block  N   meanRR  meanRRNormed  sd      se      ci
## -----
## OA      1     44   0.504    0.5413         0.08456 0.01275 0.02571
##
```

```
## OA      2      44  0.5942    0.6315    0.05875  0.008856  0.01786
##
## OA      3      44  0.6323    0.6696    0.07742  0.01167  0.02354
##
## YA      1      54  0.6273    0.5969    0.1155   0.01572  0.03152
##
## YA      2      54  0.6505    0.6201    0.1192   0.01621  0.03252
##
## YA      3      54  0.6559    0.6255    0.1183   0.0161  0.03229
## -----
```

```
p.RR.5<-ggplot(RR.sum, aes(x=block, y=meanRR)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
    fill='darkmagenta',stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
    aes(ymin=meanRR-se, ymax=meanRR+se), width=.2) +
  facet_grid(.~group) +
  xlab("Block") + ylab("Reward Rate") +
  #ggtitle("Task Performance Across Liquid Type") +
  coord_cartesian(ylim=c(.4,.85)) +
  scale_fill_discrete(name="Monetary Reward") +
  theme(#plot.title=element_text(size=22,face="bold", vjust=2),
    axis.title=element_text(size=12,face = "bold"),
    axis.text=element_text(size=14),
    legend.position="none",
    strip.text.x = element_text(size = 12))
```

p.RR.5



## Plot: mean reward rate by block, money, and age group

```
RR.sum=summarySEwithin2(data=incentive9.means, measurevar = "meanRR",
                        withinvars = c("money","block"), betweenvars = c("group"),
                        idvar = "subID")
pandoc.table(RR.sum)
```

```
##
## -----
##  group  money  block  N  meanRR  meanRRNormed  sd  se  ci
## -----
##  OA      $      1   44  0.5107   0.5479      0.1004  0.01514  0.03054
##
##  OA      $      2   44  0.5838   0.6211      0.09093  0.01371  0.02764
##
##  OA      $      3   44  0.6037   0.641      0.09451  0.01425  0.02873
##
##  OA     $$      1   44  0.4759   0.5131      0.1004  0.01514  0.03053
##
##  OA     $$      2   44  0.5952   0.6325      0.07892  0.0119   0.02399
##
##  OA     $$      3   44  0.6087   0.646      0.1047   0.01579  0.03185
##
##  OA    $$$$      1   44  0.5256   0.5629      0.1203  0.01813  0.03656
##
##  OA    $$$$      2   44  0.6037   0.641      0.08237  0.01242  0.02504
##
##  OA    $$$$      3   44  0.6847   0.722      0.08716  0.01314  0.0265
##
##  YA      $      1   54  0.6001   0.5697      0.1512  0.02058  0.04128
##
##  YA      $      2   54  0.6227   0.5923      0.1268  0.01726  0.03462
##
##  YA      $      3   54  0.5891   0.5587      0.1701  0.02315  0.04644
##
##  YA     $$      1   54  0.5903   0.5599      0.1216  0.01654  0.03318
##
##  YA     $$      2   54  0.6291   0.5987      0.1418  0.01929  0.03869
##
##  YA     $$      3   54  0.6343   0.6039      0.1383  0.01882  0.03774
##
##  YA    $$$$      1   54  0.6916   0.6612      0.1077  0.01465  0.02939
##
##  YA    $$$$      2   54  0.6997   0.6693      0.1197  0.01629  0.03267
##
##  YA    $$$$      3   54  0.7442   0.7138      0.09039  0.0123   0.02467
## -----
```

```
# first plot
p.RR.6<-ggplot(RR.sum, aes(x=block, y=meanRR, fill=money)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
           stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
               aes(ymin=meanRR-se, ymax=meanRR+se), width=.2) +
```

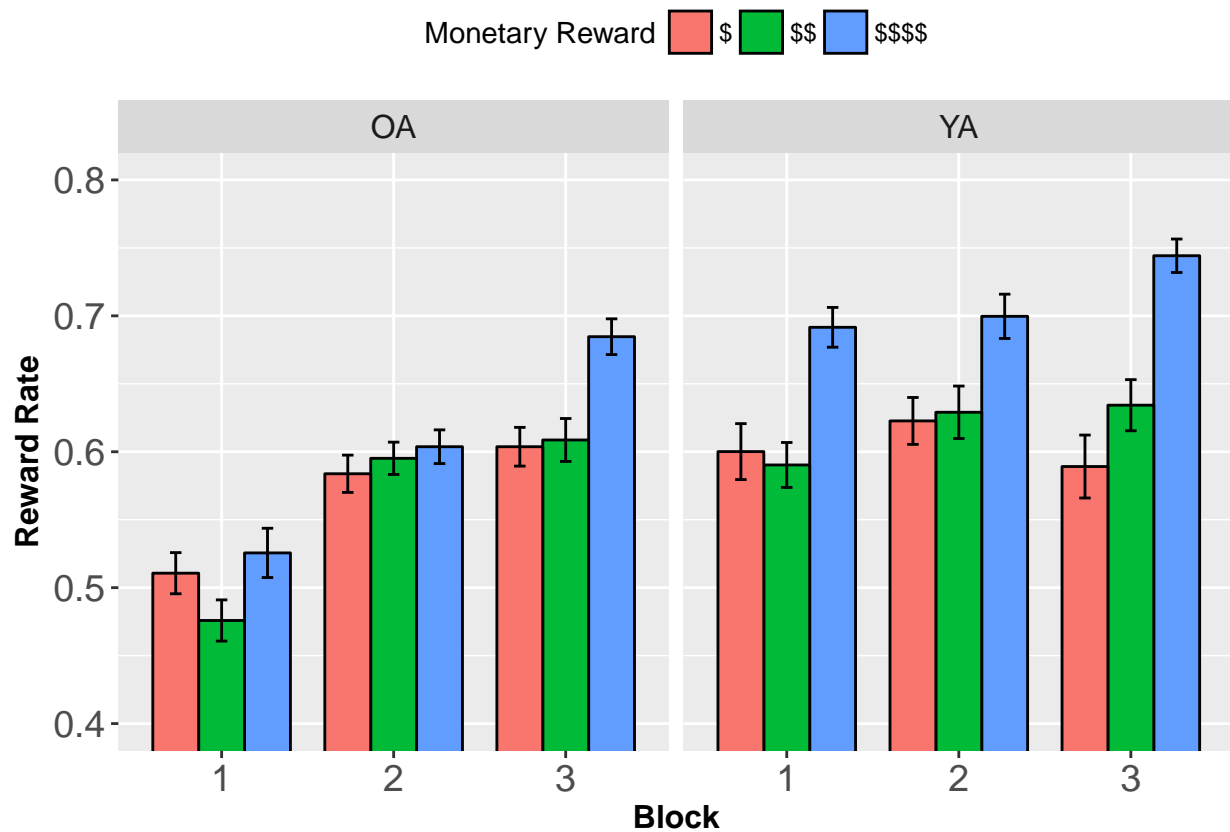
```

xlab("Block") + ylab("Reward Rate") +
facet_grid(.~group) +
#ggtitle("Punishment Avoidance Across Money and Liquid Type") +
scale_fill_brewer(palette="Pastel2") +
coord_cartesian(ylim=c(.4,.8)) +
scale_fill_discrete(name="Monetary Reward") +
theme(#plot.title=element_text(size=22,face="bold", vjust=2),
      axis.title=element_text(size=12,face = "bold"),
      axis.text=element_text(size=14),
      legend.position="top",
      strip.text.x = element_text(size = 12))

```

## Scale for 'fill' is already present. Adding another scale for 'fill',  
## which will replace the existing scale.

p.RR.6



# Generalized Linear Mixed Effects Models of Reward Rate Effects by Condition (Money, Liquid, Block)

## Omnibus Incentive Motivation Effects by Age Group

### Reward Rate by Monetary Reward and Age Group

```
# Monetary Reward Effect
m.RR.money <-glmer(formula = subRewarded ~ moneyCode * groupCode + (1+moneyCode|subID),
  data = incentive, family = binomial)
summary(m.RR.money)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode * groupCode + (1 + moneyCode | subID)
## Data: incentive
##
##          AIC          BIC    logLik deviance df.resid
## 36155.7    36213.4 -18070.9   36141.7     28217
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.5238 -1.0790  0.6020  0.7781  1.8581
##
## Random effects:
##   Groups Name            Variance Std.Dev. Corr
##   subID   (Intercept) 0.23811    0.4880
##           moneyCode  0.01212    0.1101   -0.16
## Number of obs: 28224, groups: subID, 98
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)      0.63110    0.06859   9.201 < 2e-16 ***
## moneyCode         0.24920    0.02613   9.536 < 2e-16 ***
## groupCode        -0.30862    0.10215  -3.021 0.00252 **
## moneyCode:groupCode -0.16710    0.03835  -4.358 1.31e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) monyCd gropCd
## moneyCode    -0.075
## groupCode    -0.670  0.050
## mnyCd:grpCd  0.051 -0.681 -0.083
```

```
# YA
m.RR.money.YA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
  data = subset(incentive,groupCode==0), family = binomial)
summary(m.RR.money.YA)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
```



```
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, groupCode == 0)
##
##      AIC      BIC   logLik deviance df.resid
## 19409.8 19448.0 -9699.9 19399.8   15547
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.5666 -1.0924  0.5779  0.7372  1.8434
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr
## subID (Intercept) 0.25574  0.5057
##      moneyCode    0.01781  0.1335  -0.05
## Number of obs: 15552, groups: subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.63220    0.07102   8.902  <2e-16 ***
## moneyCode    0.25050    0.02813   8.904  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr)
## moneyCode -0.019
```

```
# Money $ (Low)
```

```
m.RR.1.money.YA.rew1 <-glmer(formula = subRewarded ~ liqCode + (1+liqCode|subID),
                             data = subset(incentive, moneyCode== -1 & group=="YA"), family = binomial)
summary(m.RR.1.money.YA.rew1)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ liqCode + (1 + liqCode | subID)
## Data: subset(incentive, moneyCode == -1 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
##  6587.7  6620.4 -3288.8  6577.7   5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.3654 -1.0507  0.5789  0.7439  4.2355
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr
## subID (Intercept) 0.3254  0.5704
##      liqCode      0.1986  0.4456  -0.63
## Number of obs: 5184, groups: subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.44154    0.08337   5.296 1.18e-07 ***
```

```

## liqCode      0.35052    0.07137    4.911 9.05e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr)
## liqCode -0.496

# Money $$ (Medium)
m.RR.1.money.YA.rew2 <-glmer(formula = subRewarded ~ liqCode + (1+liqCode|subID),
                             data = subset(incentive, moneyCode==0 & group=="YA"), family = binomial)
summary(m.RR.1.money.YA.rew2)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ liqCode + (1 + liqCode | subID)
## Data: subset(incentive, moneyCode == 0 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
## 6596.9   6629.7  -3293.4   6586.9     5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.7617 -1.0969  0.5829  0.7713  1.8903
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr
## subID (Intercept) 0.2920   0.5404
##      liqCode      0.2091   0.4573  -0.27
## Number of obs: 5184, groups: subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.51405    0.07959   6.459 1.05e-10 ***
## liqCode      0.25842    0.07272   3.554 0.00038 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr)
## liqCode -0.206

# Money $$$$ (High)
m.RR.1.money.YA.rew4 <-glmer(formula = subRewarded ~ liqCode + (1+liqCode|subID),
                             data = subset(incentive, moneyCode==1 & group=="YA"), family = binomial)
summary(m.RR.1.money.YA.rew4)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ liqCode + (1 + liqCode | subID)
## Data: subset(incentive, moneyCode == 1 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid

```

```

##    6001.1    6033.9   -2995.5    5991.1      5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.8882 -1.0569  0.5039  0.6243  2.1198
##
## Random effects:
##   Groups Name            Variance Std.Dev. Corr
##   subID  (Intercept) 0.28346  0.5324
##           liqCode    0.07369  0.2715  -0.29
## Number of obs: 5184, groups:  subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.96984    0.07949  12.201  < 2e-16 ***
## liqCode      0.22756    0.05450   4.175 2.97e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr)
## liqCode -0.157
# OA
m.RR.money.OA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                      data = subset(incentive,group=="OA"), family = binomial)
summary(m.RR.money.OA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
## 16749.7 16786.9 -8369.8 16739.7    12667
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.7980 -1.0783  0.6617  0.8247  1.7064
##
## Random effects:
##   Groups Name            Variance Std.Dev. Corr
##   subID  (Intercept) 0.217087 0.46593
##           moneyCode  0.005865 0.07659  -0.39
## Number of obs: 12672, groups:  subID, 44
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.32200    0.07264   4.433 9.29e-06 ***
## moneyCode    0.08181    0.02542   3.218 0.00129 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:

```

```

##          (Intr)
## moneyCode -0.171

# Money $ (Low)
m.RR.money.OA.rew1 <-glmer(formula = subRewarded ~ liqCode + (1+liqCode|subID),
  data = subset(incentive, moneyCode== -1 & group=="OA"), family = binomial)
summary(m.RR.money.OA.rew1)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ liqCode + (1 + liqCode | subID)
## Data: subset(incentive, moneyCode == -1 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
## 5613.2   5645.0 -2801.6   5603.2     4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.0686 -1.0212  0.6134  0.8213  1.7884
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
## subID (Intercept) 0.27474  0.5242
##      liqCode      0.03455  0.1859   -0.19
## Number of obs: 4224, groups: subID, 44
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.28263    0.08535   3.312 0.000928 ***
## liqCode      0.04306    0.04841   0.889 0.373801
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr)
## liqCode -0.105

# Money $$ (Medium)
m.RR.money.OA.rew2 <-glmer(formula = subRewarded ~ liqCode + (1+liqCode|subID),
  data = subset(incentive, moneyCode==0 & group=="OA"), family = binomial)
summary(m.RR.money.OA.rew2)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ liqCode + (1 + liqCode | subID)
## Data: subset(incentive, moneyCode == 0 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
## 5683.8   5715.5 -2836.9   5673.8     4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.6978 -1.0598  0.6628  0.8577  1.4982

```

```

##
## Random effects:
##   Groups Name      Variance Std.Dev. Corr
##   subID (Intercept) 0.17846  0.4224
##           liqCode   0.08255  0.2873   0.11
## Number of obs: 4224, groups: subID, 44
##
## Fixed effects:
##           Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.25157    0.07123   3.532 0.000413 ***
## liqCode      0.02655    0.05841   0.455 0.649383
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##           (Intr)
## liqCode 0.077
# Money $$$$ (High)
m.RR.money.OA.rew4 <-glmer(formula = subRewarded ~ liqCode + (1+liqCode|subID),
                           data = subset(incentive, moneyCode==1 & group=="OA"), family = binomial)
summary(m.RR.money.OA.rew4)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ liqCode + (1 + liqCode | subID)
## Data: subset(incentive, moneyCode == 1 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
## 5524.0  5555.8 -2757.0  5514.0    4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.0242 -1.1063  0.6281  0.7872  1.8613
##
## Random effects:
##   Groups Name      Variance Std.Dev. Corr
##   subID (Intercept) 0.23731  0.4871
##           liqCode   0.07191  0.2682  -0.07
## Number of obs: 4224, groups: subID, 44
##
## Fixed effects:
##           Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.44708    0.08037   5.563 2.65e-08 ***
## liqCode      0.01973    0.05690   0.347   0.729
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##           (Intr)
## liqCode -0.046

```

## Reward Rate by Liquid and Age Group

```
# Monetary Reward Effect
m.RR.liquid <-glmer(formula = subRewarded ~ moneyCode * liqCode * groupCode + (1+moneyCode|subID),
  data = incentive, family = binomial)
summary(m.RR.liquid)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode * liqCode * groupCode + (1 + moneyCode |
## subID)
## Data: incentive
##
##          AIC          BIC    logLik deviance df.resid
## 35990.9 36081.6 -17984.4 35968.9    28213
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.8313 -1.0738  0.5838  0.7798  2.2101
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
## subID (Intercept) 0.24148  0.4914
## moneyCode 0.01248  0.1117  -0.17
## Number of obs: 28224, groups: subID, 98
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    0.63776    0.06914   9.225 < 2e-16 ***
## moneyCode      0.24914    0.02639   9.442 < 2e-16 ***
## liqCode        0.27271    0.02145  12.716 < 2e-16 ***
## groupCode     -0.31522    0.10297  -3.061  0.0022 **
## moneyCode:liqCode -0.05632    0.02632  -2.140  0.0324 *
## moneyCode:groupCode -0.16711    0.03862  -4.327 1.51e-05 ***
## liqCode:groupCode -0.24308    0.03117  -7.799 6.25e-15 ***
## moneyCode:liqCode:groupCode 0.04347    0.03822   1.137  0.2554
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) monyCd liqCod gropCd mnyCd:lC mnyCd:gC lqCd:C
## moneyCode   -0.083
## liqCode      0.015  0.010
## groupCode   -0.671  0.056 -0.010
## monyCd:lqCd  0.003  0.047  0.046 -0.002
## mnyCd:grpCd  0.057 -0.682 -0.007 -0.090 -0.032
## liqCd:grpCd -0.011 -0.007 -0.688  0.008 -0.031  0.004
## mnyCd:lqC:C -0.002 -0.032 -0.031  0.001 -0.688  0.023  0.025

# YA
m.RR.liquid.YA <-glmer(formula = subRewarded ~ moneyCode * liqCode + (1+moneyCode|subID),
  data = subset(incentive,group=="YA"), family = binomial)
summary(m.RR.liquid.YA)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode * liqCode + (1 + moneyCode | subID)
## Data: subset(incentive, group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
## 19242.7 19296.3 -9614.4 19228.7   15545
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.8790 -1.0750  0.5596  0.7286  2.1966
##
## Random effects:
## Groups Name             Variance Std.Dev. Corr
## subID (Intercept) 0.26183  0.5117
## moneyCode 0.01856  0.1362  -0.07
## Number of obs: 15552, groups: subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    0.63889    0.07183   8.894  <2e-16 ***
## moneyCode      0.25040    0.02850   8.786  <2e-16 ***
## liqCode        0.27303    0.02146  12.721  <2e-16 ***
## moneyCode:liqCode -0.05605    0.02635  -2.127   0.0334 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) monyCd liqCod
## moneyCode   -0.032
## liqCode      0.015  0.009
## monyCd:liqCd 0.003  0.045  0.047

# Juice
m.RR.liquid.YA.juice <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                             data = subset(incentive, liqCode==1 & group=="YA"), family = binomial)

## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control
## $checkConv, : Model failed to converge with max|grad| = 0.00284983 (tol =
## 0.001, component 1)

summary(m.RR.liquid.YA.juice)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, liqCode == 1 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
## 6165.0 6197.8 -3077.5 6155.0   5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
```

```

## -3.8038 -1.1394 0.5251 0.6816 1.3090
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## subID (Intercept) 0.285187 0.5340
## moneyCode 0.003387 0.0582 1.00
## Number of obs: 5184, groups: subID, 54
##
## Fixed effects:
## Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.89090 0.07944 11.215 < 2e-16 ***
## moneyCode 0.21858 0.03990 5.478 4.3e-08 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr)
## moneyCode 0.218
## convergence code: 0
## Model failed to converge with max|grad| = 0.00284983 (tol = 0.001, component 1)

# Neutral
m.RR.money.YA.neut <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
data = subset(incntive, liqCode==0 & group=="YA"), family = binomial)
summary(m.RR.money.YA.neut)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incntive, liqCode == 0 & group == "YA")
##
## AIC BIC logLik deviance df.resid
## 6357.7 6390.5 -3173.9 6347.7 5179
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -2.3830 -1.0525 0.5665 0.6802 3.1229
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## subID (Intercept) 0.36088 0.6007
## moneyCode 0.08514 0.2918 -0.47
## Number of obs: 5184, groups: subID, 54
##
## Fixed effects:
## Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.69152 0.08748 7.905 2.67e-15 ***
## moneyCode 0.23003 0.05506 4.178 2.94e-05 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr)
## moneyCode -0.308

```



```

# Saltwater
m.RR.money.YA.salt <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                           data = subset(incentive, liqCode== -1 & group=="YA"), family = binomial)
summary(m.RR.money.YA.salt)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, liqCode == -1 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
## 6495.0   6527.7 -3242.5  6485.0     5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.4393 -0.9915  0.5251  0.7704  4.9680
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr
## subID (Intercept) 0.6386   0.7992
##      moneyCode    0.1081   0.3289  -0.37
## Number of obs: 5184, groups: subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.33243    0.11311   2.939  0.00329 **
## moneyCode    0.34037    0.05864   5.804 6.47e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr)
## moneyCode -0.272

# OA
m.RR.liquid.OA <-glmer(formula = subRewarded ~ moneyCode * liqCode + (1+moneyCode|subID),
                       data = subset(incentive,groupCode==1), family = binomial)
summary(m.RR.liquid.OA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode * liqCode + (1 + moneyCode | subID)
## Data: subset(incentive, groupCode == 1)
##
##      AIC      BIC   logLik deviance df.resid
## 16751.8 16803.9 -8368.9 16737.8     12665
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.8131 -1.0780  0.6615  0.8277  1.7432
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr

```

```

## subID (Intercept) 0.217160 0.46600
## moneyCode 0.005874 0.07664 -0.39
## Number of obs: 12672, groups: subID, 44
##
## Fixed effects:
## Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.32205 0.07264 4.433 9.28e-06 ***
## moneyCode 0.08178 0.02542 3.217 0.0013 **
## liqCode 0.02959 0.02260 1.309 0.1905
## moneyCode:liqCode -0.01287 0.02770 -0.465 0.6422
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr) monyCd liqCod
## moneyCode -0.171
## liqCode 0.001 0.000
## monyCd:liqCd 0.000 0.003 0.005
# Juice
m.RR.liquid.OA.juice <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
data = subset(incentive, liqCode==1 & group=="OA"), family = binomial)
summary(m.RR.liquid.OA.juice)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, liqCode == 1 & group == "OA")
##
## AIC BIC logLik deviance df.resid
## 5548.4 5580.1 -2769.2 5538.4 4219
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -2.1802 -1.0283 0.6101 0.8139 1.7116
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## subID (Intercept) 0.2975482 0.54548
## moneyCode 0.0009153 0.03025 1.00
## Number of obs: 4224, groups: subID, 44
##
## Fixed effects:
## Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.36982 0.08843 4.182 2.89e-05 ***
## moneyCode 0.07264 0.03995 1.818 0.069 .
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr)
## moneyCode 0.113

```

```
# Neutral
m.RR.money.OA.neut <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
  data = subset(incentive, liqCode==0 & group=="OA"), family = binomial)
summary(m.RR.money.OA.neut)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, liqCode == 0 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
## 5531.8   5563.6 -2760.9   5521.8     4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.2211 -1.0019  0.6106  0.8056  1.8021
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
## subID (Intercept) 0.367186 0.60596
## moneyCode 0.003483 0.05902 -0.56
## Number of obs: 4224, groups: subID, 44
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.31532    0.09702   3.250  0.00115 **
## moneyCode    0.08602    0.04081   2.108  0.03505 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr)
## moneyCode -0.113
```

```
# Saltwater
m.RR.money.OA.salt <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
  data = subset(incentive, liqCode== -1 & group=="OA"), family = binomial)
summary(m.RR.money.OA.salt)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, liqCode == -1 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
## 5572.3   5604.1 -2781.2   5562.3     4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.8872 -1.0768  0.6257  0.8300  1.9767
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
```

```
## subID (Intercept) 0.307252 0.55430
## moneyCode 0.006367 0.07979 -0.13
## Number of obs: 4224, groups: subID, 44
##
## Fixed effects:
## Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.30555 0.08962 3.410 0.000651 ***
## moneyCode 0.09577 0.04133 2.318 0.020473 *
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr)
## moneyCode -0.032
```

## Reward Rate by Block and Age Group

```
# Monetary Reward and Block Effect
m.RR.block <-glmer(formula = subRewarded ~ moneyCode * blockCode * groupCode + (1+moneyCode|subID),
  data = incentive, family = binomial)
summary(m.RR.block)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula:
## subRewarded ~ moneyCode * blockCode * groupCode + (1 + moneyCode |
## subID)
## Data: incentive
##
## AIC BIC logLik deviance df.resid
## 35986.6 36077.3 -17982.3 35964.6 28213
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -2.7313 -1.0624 0.5843 0.7755 1.8687
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## subID (Intercept) 0.24110 0.4910
## moneyCode 0.01234 0.1111 -0.14
## Number of obs: 28224, groups: subID, 98
##
## Fixed effects:
## Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.632341 0.069054 9.157 < 2e-16 ***
## moneyCode 0.250767 0.026235 9.558 < 2e-16 ***
## blockCode 0.070045 0.021255 3.295 0.000983 ***
## groupCode -0.305320 0.102907 -2.967 0.003008 **
## moneyCode:blockCode 0.079152 0.026089 3.034 0.002414 **
## moneyCode:groupCode -0.165484 0.038578 -4.290 1.79e-05 ***
## blockCode:groupCode 0.209924 0.031216 6.725 1.76e-11 ***
## moneyCode:blockCode:groupCode -0.003968 0.038277 -0.104 0.917431
```

```

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) monyCd blkCd  grpCd  mnyCd:bC mnyCd:gC blcC:C
## moneyCode  -0.065
## blockCode   0.006  0.017
## groupCode  -0.671  0.044 -0.004
## mnyCd:blkC  0.005  0.019  0.054 -0.004
## mnyCd:grpC  0.044 -0.679 -0.011 -0.072 -0.013
## blkCd:grpC -0.004 -0.011 -0.681  0.007 -0.037   0.014
## mnyCd:blC:C -0.003 -0.012 -0.037  0.004 -0.681   0.024   0.033

# YA
m.RR.block.YA <-glmer(formula = subRewarded ~ moneyCode * blockCode + (1+moneyCode|subID),
                      data = subset(incentive,groupCode==0), family = binomial)
summary(m.RR.block.YA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode * blockCode + (1 + moneyCode | subID)
## Data: subset(incentive, groupCode == 0)
##
##      AIC      BIC   logLik deviance df.resid
## 19394.6 19448.2 -9690.3 19380.6   15545
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.7734 -1.0923  0.5706  0.7359  1.8518
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr
## subID (Intercept) 0.25641  0.5064
## moneyCode 0.01789  0.1337  -0.04
## Number of obs: 15552, groups: subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    0.63335    0.07110   8.907 < 2e-16 ***
## moneyCode      0.25195    0.02818   8.941 < 2e-16 ***
## blockCode      0.07020    0.02127   3.301 0.000964 ***
## moneyCode:blockCode 0.07935    0.02611   3.039 0.002371 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) monyCd blkCd
## moneyCode  -0.014
## blockCode   0.005  0.016
## mnyCd:blkC  0.005  0.018  0.055

#block1
m.RR.block1.YA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                      data = subset(incentive,blockCode==-1 & group=="YA"), family = binomial)

```

```
summary(m.RR.block1.YA)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, blockCode == -1 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
## 6697.7   6730.5 -3343.9   6687.7     5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.8994 -1.1374  0.6240  0.7542  1.4505
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
## subID (Intercept) 0.17844  0.4224
## moneyCode 0.03197  0.1788  -0.36
## Number of obs: 5184, groups: subID, 54
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.54528    0.06469   8.429 < 2e-16 ***
## moneyCode    0.20058    0.04380   4.580 4.66e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr)
## moneyCode -0.162
```

```
#block2
```

```
m.RR.block2.YA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                        data = subset(incentive,blockCode==0 & group=="YA"), family = binomial)
summary(m.RR.block2.YA)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, blockCode == 0 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
## 6229.3   6262.1 -3109.6   6219.3     5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.6500 -1.0624  0.5297  0.6758  4.0293
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
## subID (Intercept) 0.63947  0.7997
## moneyCode 0.03608  0.1899  -0.11
```

```

## Number of obs: 5184, groups:  subID, 54
##
## Fixed effects:
##           Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.66613    0.11341   5.873 4.27e-09 ***
## moneyCode    0.19179    0.04634   4.139 3.49e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##           (Intr)
## moneyCode -0.047

#block3
m.RR.block3.YA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                      data = subset(incentive,blockCode==1 & group=="YA"), family = binomial)
summary(m.RR.block3.YA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, blockCode == 1 & group == "YA")
##
##      AIC      BIC   logLik deviance df.resid
##  6104.0   6136.8  -3047.0   6094.0     5179
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.5600 -0.9055  0.5000  0.6544  3.8601
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr
## subID (Intercept) 0.63820  0.7989
##      moneyCode    0.09633  0.3104  -0.65
## Number of obs: 5184, groups:  subID, 54
##
## Fixed effects:
##           Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.70782    0.11351   6.236 4.50e-10 ***
## moneyCode    0.38442    0.05805   6.623 3.53e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##           (Intr)
## moneyCode -0.442

# OA
m.RR.block.OA <-glmer(formula = subRewarded ~ moneyCode * blockCode + (1+moneyCode|subID),
                      data = subset(incentive,groupCode==1), family = binomial)
summary(m.RR.block.OA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )

```

```

## Formula: subRewarded ~ moneyCode * blockCode + (1 + moneyCode | subID)
## Data: subset(incentive, groupCode == 1)
##
##      AIC      BIC   logLik deviance df.resid
## 16595.9 16648.1 -8291.0 16581.9    12665
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.1739 -1.0409  0.6219  0.8237  1.8971
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
## subID (Intercept) 0.222787 0.47200
##      moneyCode    0.006143 0.07838 -0.35
## Number of obs: 12672, groups: subID, 44
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)      0.32656    0.07356   4.440 9.01e-06 ***
## moneyCode         0.08502    0.02569   3.310 0.000934 ***
## blockCode         0.27950    0.02285  12.231 < 2e-16 ***
## moneyCode:blockCode 0.07459    0.02800   2.663 0.007735 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) monyCd blkCd
## moneyCode   -0.151
## blockCode    0.009  0.014
## mnyCd:blkC   0.004  0.033  0.014
##
#block1
m.RR.block1.OA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
  data = subset(incentive,blockCode== -1 & group=="OA"), family = binomial)
summary(m.RR.block1.OA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, blockCode == -1 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
##  5718.6  5750.3 -2854.3  5708.6    4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.6126 -0.9654  0.6201  0.9182  1.9026
##
## Random effects:
## Groups Name          Variance Std.Dev. Corr
## subID (Intercept) 0.236175 0.48598
##      moneyCode    0.003205 0.05661 -0.11
## Number of obs: 4224, groups: subID, 44
##

```



```

## Fixed effects:
##           Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.01309    0.07983   0.164   0.870
## moneyCode    0.03149    0.03967   0.794   0.427
##
## Correlation of Fixed Effects:
##           (Intr)
## moneyCode -0.022

#block2
m.RR.block2.OA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                      data = subset(incentive,blockCode==0 & group=="OA"), family = binomial)
summary(m.RR.block2.OA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, blockCode == 0 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid
## 5538.9  5570.7 -2764.5  5528.9     4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.2817 -1.0905  0.6408  0.8049  1.7943
##
## Random effects:
## Groups Name      Variance Std.Dev. Corr
## subID  (Intercept) 0.275514 0.52489
##          moneyCode  0.004809 0.06935 -1.00
## Number of obs: 4224, groups: subID, 44
##
## Fixed effects:
##           Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.40171    0.08554   4.696 2.65e-06 ***
## moneyCode    0.03930    0.04105   0.957   0.338
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##           (Intr)
## moneyCode -0.238

#block3
m.RR.block3.OA <-glmer(formula = subRewarded ~ moneyCode + (1+moneyCode|subID),
                      data = subset(incentive,blockCode==1 & group=="OA"), family = binomial)
summary(m.RR.block3.OA)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: subRewarded ~ moneyCode + (1 + moneyCode | subID)
## Data: subset(incentive, blockCode == 1 & group == "OA")
##
##      AIC      BIC   logLik deviance df.resid

```

```
##    5363.5    5395.2   -2676.7    5353.5      4219
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.4038 -1.0811  0.5789   0.7473   1.5316
##
## Random effects:
##   Groups Name            Variance Std.Dev. Corr
##   subID  (Intercept) 2.969e-01 0.544902
##           moneyCode  9.641e-05 0.009819 -1.00
## Number of obs: 4224, groups:  subID, 44
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.57931    0.08869   6.532 6.49e-11 ***
## moneyCode    0.18523    0.04089   4.530 5.89e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr)
## moneyCode -0.017
```

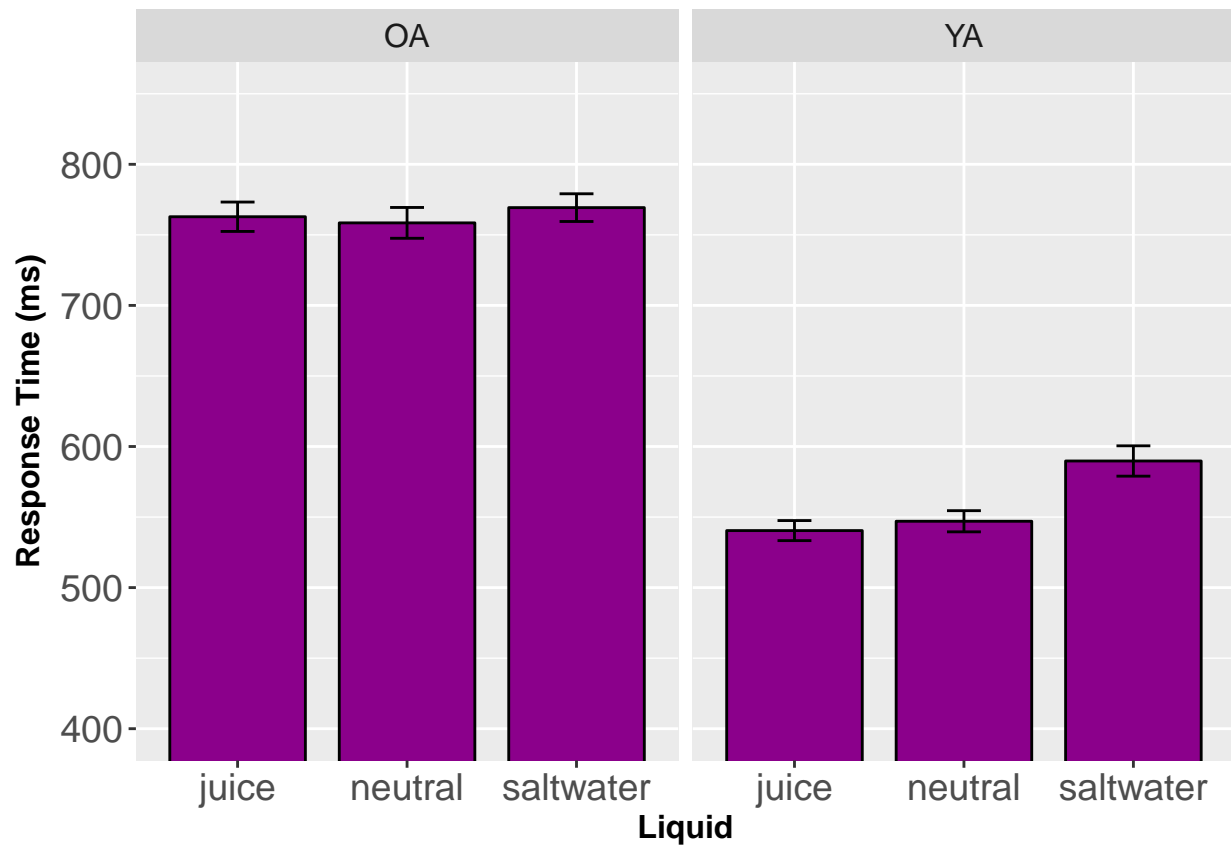
## RT by liquid and age group

```
RT.sum=summarySEwithin2(data=liqRT.means, measurevar = "meanRT", withinvars = c("liquid"),
                        betweenvars = c("group"), idvar = "subID")
pandoc.table(RT.sum)
```

```
##
## -----
##  group    liquid      N   meanRT   meanRTNormed    sd      se      ci
## -----
##   OA        juice     44    762.8      650.2      69.07   10.41    21
##
##   OA        neutral    44    758.5      645.8      72.46   10.92   22.03
##
##   OA        saltwater  44    769.3      656.6      65.15    9.822   19.81
##
##   YA        juice     54    540.4      632.2      52.18    7.101   14.24
##
##   YA        neutral    54    547        638.8      55.13    7.502   15.05
##
##   YA        saltwater  54    589.7      681.5      78.93   10.74   21.54
## -----
```

```
p.RT.2<-ggplot(RT.sum, aes(x=liquid, y=meanRT)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
           fill='darkmagenta', stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
               aes(ymin=meanRT-se, ymax=meanRT+se), width=.2) +
  facet_grid(.~group) +
  xlab("Liquid") + ylab("Response Time (ms)") +
```

```
#ggtitle("Task Performance Across Money") +
coord_cartesian(ylim=c(400,850)) +
scale_fill_discrete(name="Monetary Reward") +
theme(#plot.title=element_text(size=22,face="bold", vjust=2),
      axis.title=element_text(size=12,face = "bold"),
      axis.text=element_text(size=14),
      legend.position="none",
      strip.text.x = element_text(size = 12))
p.RT.2
```



## RT by block and age group

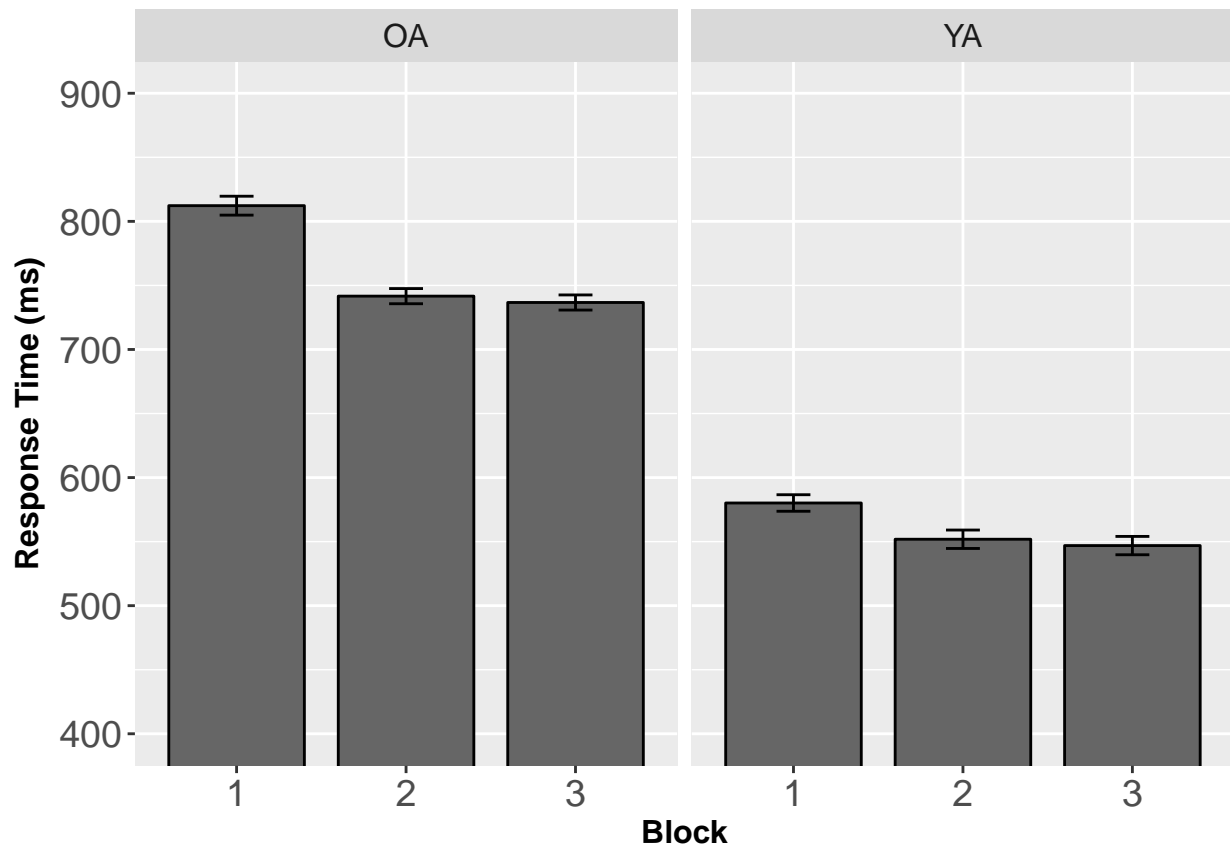
```
RT.sum=summarySEwithin2(data=rewRT.means, measurevar = "meanRT", withinvars = c("block"),
                        betweenvars = c("group"), idvar = "subID")
pandoc.table(RT.sum)
```

```
##
## -----
##  group    block     N  meanRT  meanRTNormed    sd     se     ci
## -----
##   OA       1     132   812.3      700         84.75  7.377  14.59
##
##   OA       2     132   741.6      629.4       68.07  5.924  11.72
##
```

```
## OA      3      132    736.7      624.4      67.85    5.906    11.68
##
## YA      1      162    580.1      671.7      82.19    6.457    12.75
##
## YA      2      161    551.9      643.6      91.2     7.188    14.2
##
## YA      3      162    546.9      638.5      91.2     7.165    14.15
## -----
```

```
p.RT.3<-ggplot(RT.sum, aes(x=block, y=meanRT)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
    fill='gray40', stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
    aes(ymin=meanRT-se, ymax=meanRT+se), width=.2) +
  facet_grid(.~group) +
  xlab("Block") + ylab("Response Time (ms)") +
  #ggtitle("Task Performance Across Money") +
  coord_cartesian(ylim=c(400,900)) +
  scale_fill_discrete(name="Monetary Reward") +
  theme(#plot.title=element_text(size=22,face="bold", vjust=2),
    axis.title=element_text(size=12,face = "bold"),
    axis.text=element_text(size=14),
    legend.position="none",
    strip.text.x = element_text(size = 12))
```

p.RT.3



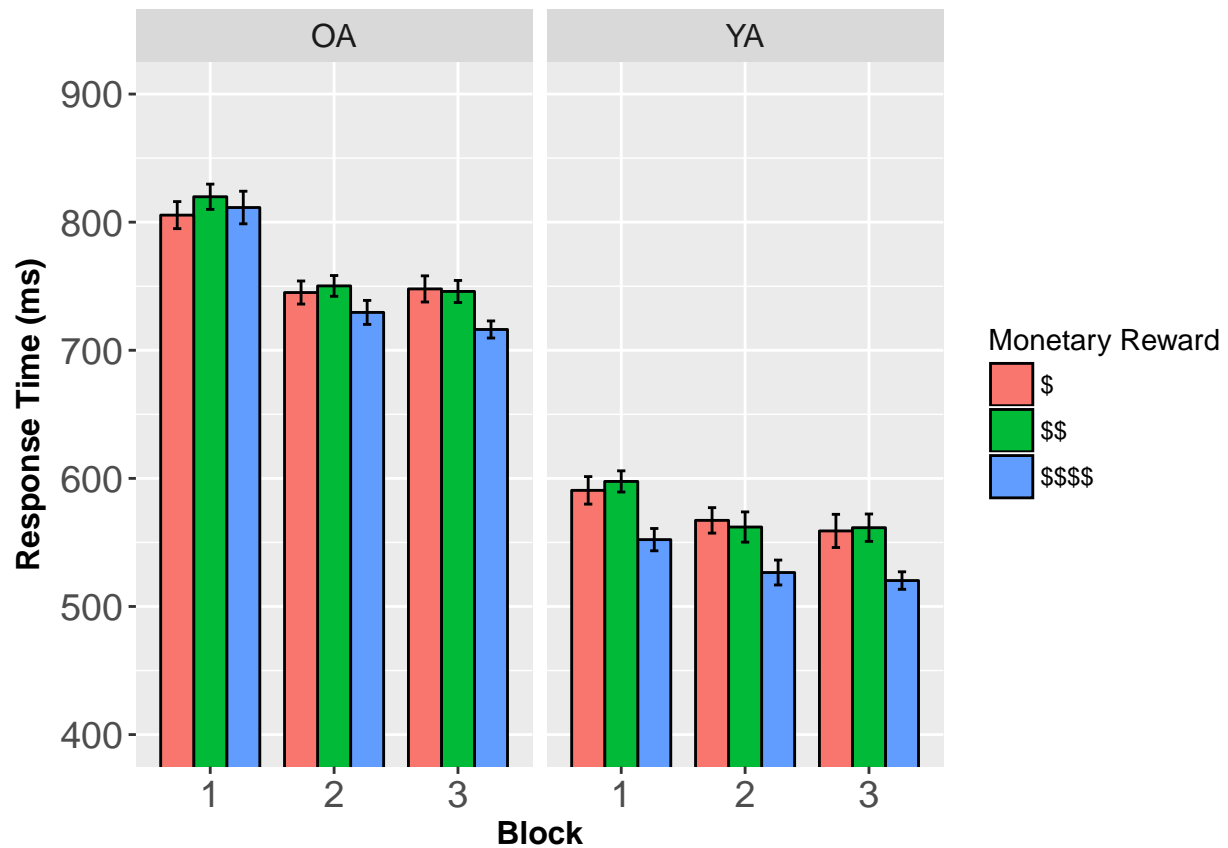
## RT by money, block and age group

```
RT.sum=summarySEwithin2(data=rewRT.means, measurevar = "meanRT", withinvars = c("money","block"),
                        betweenvars = c("group"), idvar = "subID")
pandoc.table(RT.sum)
```

```
##
## -----
##  group  money  block  N  meanRT  meanRTNormed  sd  se  ci
## -----
##  OA      $      1   44  805.5    693.3         69.94  10.54  21.26
##
##  OA      $      2   44  745.1    632.8         59.72  9.002  18.16
##
##  OA      $      3   44  747.9    635.7         67.71  10.21  20.59
##
##  OA     $$      1   44  819.8    707.6         65.41  9.861  19.89
##
##  OA     $$      2   44  750.2     638         53.75  8.104  16.34
##
##  OA     $$      3   44  745.9    633.7         57.01  8.594  17.33
##
##  OA    $$$$      1   44  811.4    699.2         84.39  12.72  25.66
##
##  OA    $$$$      2   44  729.6    617.3         62.16  9.371  18.9
##
##  OA    $$$$      3   44  716.2     604         44.27  6.674  13.46
##
##  YA      $      1   54  590.6    682.2         78.96  10.74  21.55
##
##  YA      $      2   54  567.2    658.8         73.13  9.951  19.96
##
##  YA      $      3   54   559     650.5         95.14  12.95  25.97
##
##  YA     $$      1   54  597.6    689.2         60.76  8.269  16.59
##
##  YA     $$      2   53   562     654.3         85.95  11.81  23.69
##
##  YA     $$      3   54  561.5    653.1         78.43  10.67  21.41
##
##  YA    $$$$      1   54  552.2    643.7         63.95  8.702  17.45
##
##  YA    $$$$      2   54  526.5    618.1         71.4   9.717  19.49
##
##  YA    $$$$      3   54  520.2    611.8         50.19  6.83   13.7
## -----
```

```
p.RT.4<-ggplot(RT.sum, aes(x=block, y=meanRT, fill=money)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
           stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
               aes(ymin=meanRT-se, ymax=meanRT+se), width=.2) +
  facet_grid(.~group) +
  xlab("Block") + ylab("Response Time (ms)") +
```

```
#ggtitle("Task Performance Across Money") +
coord_cartesian(ylim=c(400,900)) +
scale_fill_discrete(name="Monetary Reward") +
theme(#plot.title=element_text(size=22,face="bold", vjust=2),
      axis.title=element_text(size=12,face = "bold"),
      axis.text=element_text(size=14),
      legend.position="right",
      strip.text.x = element_text(size = 12))
p.RT.4
```



Accuracy

Accuracy by block and age group

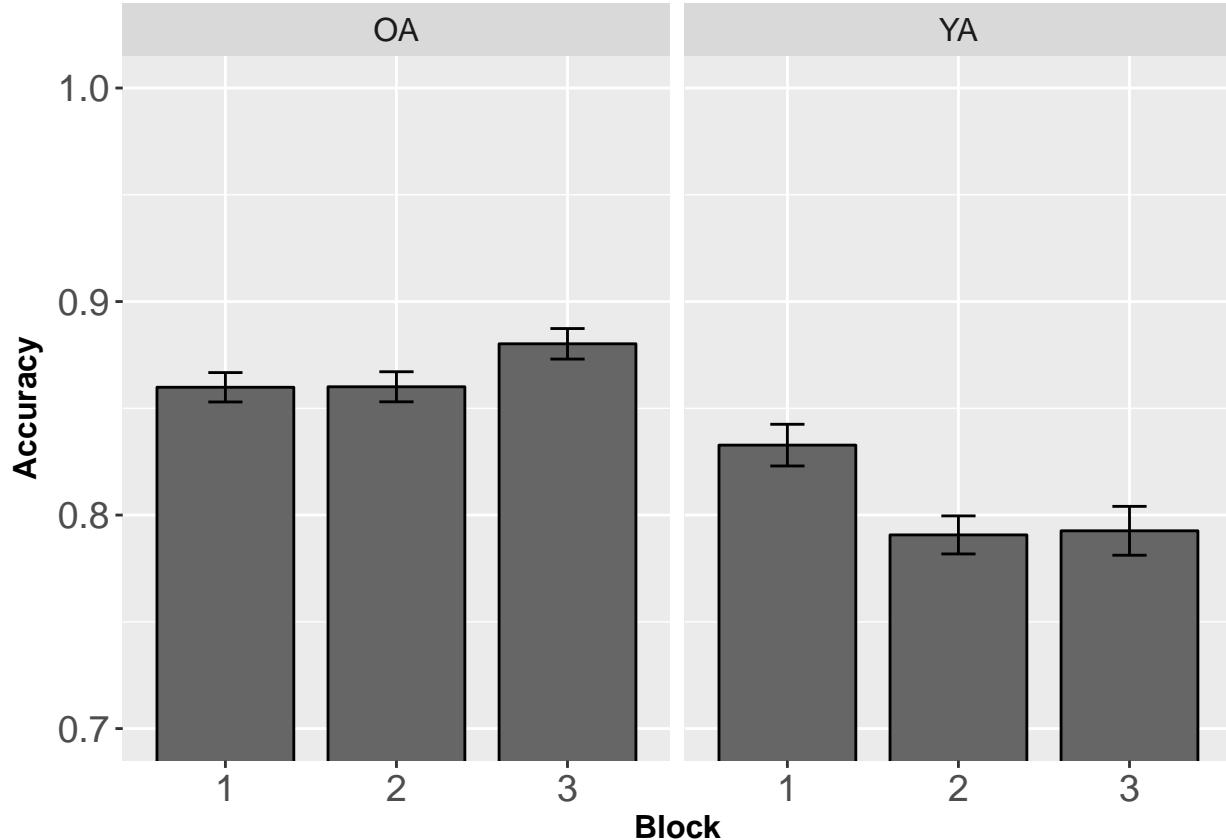
```
ACC.sum=summarySEwithin2(data=rew.means, measurevar = "meanACC", withinvars = c("block"),
                          betweenvars = c("group"), idvar = "subID")
pandoc.table(ACC.sum)
```

```
##
## -----
##  group  block  N  meanACC  meanACCNormed  sd  se  ci
## -----
##  OA      1    132  0.8598    0.826         0.07908  0.006883  0.01362
##
```

```
## OA      2      132  0.8601      0.8263      0.08085  0.007037  0.01392
##
## OA      3      132  0.8802      0.8464      0.08213  0.007149  0.01414
##
## YA      1      162  0.8328      0.8603      0.1243   0.009767  0.01929
##
## YA      2      162  0.7907      0.8182      0.1134   0.008912  0.0176
##
## YA      3      162  0.7926      0.8202      0.1456   0.01144   0.02259
## -----
```

```
p.ACC.1<-ggplot(ACC.sum, aes(x=block, y=meanACC)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
    fill='gray40', stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
    aes(ymin=meanACC-se, ymax=meanACC+se), width=.2) +
  facet_grid(.~group) +
  xlab("Block") + ylab("Accuracy") +
  #ggtitle("Task Performance Across Money") +
  coord_cartesian(ylim=c(0.7,1)) +
  scale_fill_discrete(name="Monetary Reward") +
  theme(#plot.title=element_text(size=22,face="bold", vjust=2),
    axis.title=element_text(size=12,face = "bold"),
    axis.text=element_text(size=14),
    legend.position="right",
    strip.text.x = element_text(size = 12))
```

p.ACC.1



## Accuracy by money, block and age group

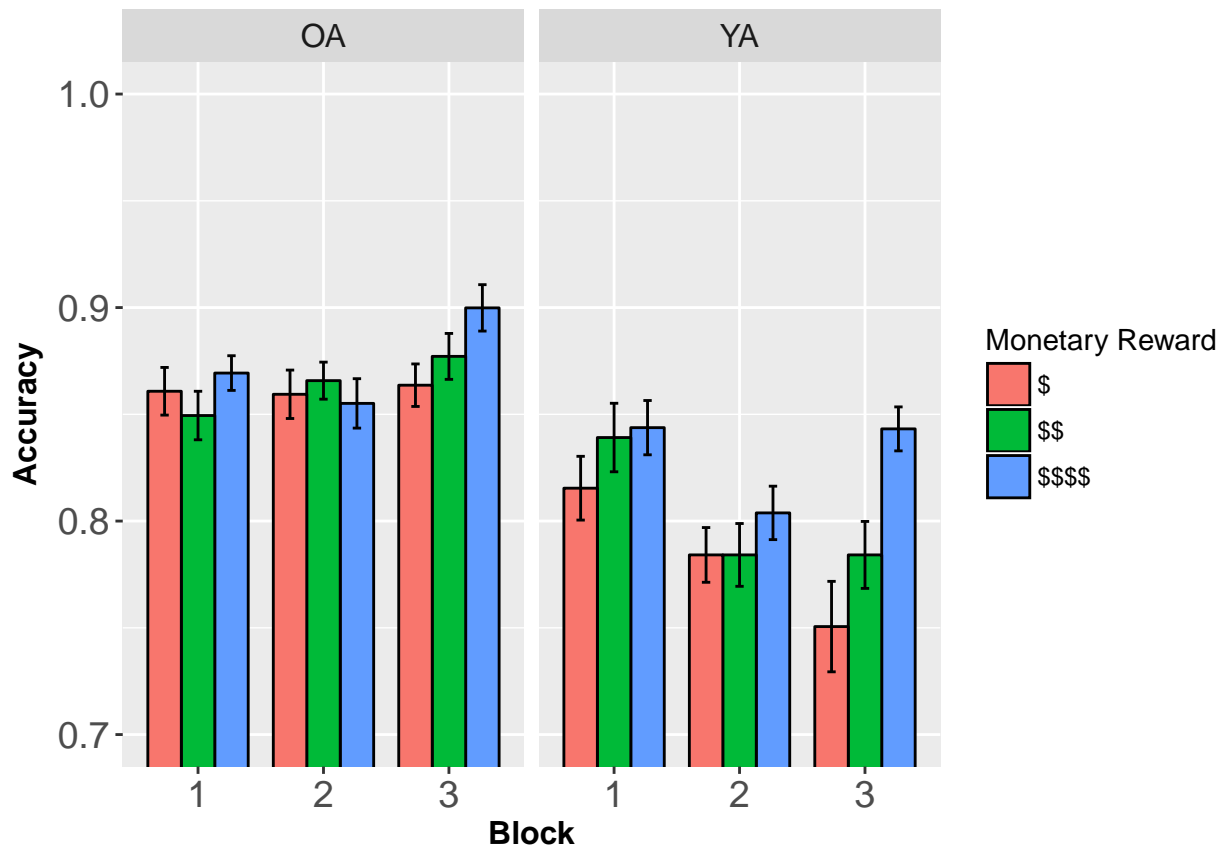
```
ACC.sum=summarySEwithin2(data=rew.means, measurevar = "meanACC", withinvars = c("money","block"),
                          betweenvars = c("group"), idvar = "subID")
pandoc.table(ACC.sum)
```

```
##
## -----
##  group  money  block  N  meanACC  meanACCNormed  sd      se      ci
## -----
##  OA      $      1    44  0.8608    0.827          0.07404  0.01116  0.02251
##
##  OA      $      2    44  0.8594    0.8256          0.07522  0.01134  0.02287
##
##  OA      $      3    44  0.8636    0.8298          0.06606  0.009959  0.02008
##
##  OA      $$     1    44  0.8494    0.8156          0.07535  0.01136  0.02291
##
##  OA      $$     2    44  0.8658    0.832           0.05757  0.00868  0.0175
##
##  OA      $$     3    44  0.8771    0.8433          0.07132  0.01075  0.02168
##
##  OA      $$$$    1    44  0.8693    0.8355          0.05387  0.008121  0.01638
##
##  OA      $$$$    2    44  0.8551    0.8213          0.07678  0.01157  0.02334
##
##  OA      $$$$    3    44  0.8999    0.8661          0.07205  0.01086  0.0219
##
##  YA      $      1    54  0.8154    0.8429          0.1097   0.01493  0.02995
##
##  YA      $      2    54  0.7841    0.8117          0.09425  0.01283  0.02573
##
##  YA      $      3    54  0.7506    0.7781          0.1557   0.02118  0.04249
##
##  YA      $$     1    54  0.8391    0.8667          0.1179   0.01604  0.03218
##
##  YA      $$     2    54  0.7841    0.8117          0.1081   0.0147   0.02949
##
##  YA      $$     3    54  0.7841    0.8117          0.1153   0.01569  0.03146
##
##  YA      $$$$    1    54  0.8438    0.8713          0.09346  0.01272  0.02551
##
##  YA      $$$$    2    54  0.8038    0.8314          0.09196  0.01251  0.0251
##
##  YA      $$$$    3    54  0.8432    0.8707          0.07569  0.0103   0.02066
## -----
```

```
p.ACC.2<-ggplot(ACC.sum, aes(x=block, y=meanACC, fill=money)) +
  geom_bar(position=position_dodge(width=0.8), color="black",
           stat="identity", width=0.8) +
  geom_errorbar(position=position_dodge(width=0.8),
               aes(ymin=meanACC-se, ymax=meanACC+se), width=.2) +
  facet_grid(.~group) +
  xlab("Block") + ylab("Accuracy") +
```



```
#ggtitle("Task Performance Across Money") +
coord_cartesian(ylim=c(0.7,1)) +
scale_fill_discrete(name="Monetary Reward") +
theme(#plot.title=element_text(size=22,face="bold", vjust=2),
      axis.title=element_text(size=12,face = "bold"),
      axis.text=element_text(size=14),
      legend.position="right",
      strip.text.x = element_text(size = 12))
p.ACC.2
```



## Cog Aging 2018 Poster

```
# Cog Aging path
cog.path="/Users/debbieyee/Documents/Conferences/2018/Cognitive Aging/Figures/"
ggsave(filename = "Study1_RR_money.eps", plot = p.RR.1, device = "eps",
        path = cog.path, width = 5.5, height = 5, scale = 1)
ggsave(filename = "Study1_RR_liquid.eps", plot = p.RR.2, device = "eps",
        path = cog.path, width = 5.5, height = 5, scale = 1)
ggsave(filename = "Study1_RR_moneyliquid.eps", plot = p.RR.3, device = "eps",
        path = cog.path, width = 8, height = 5, scale = 1)
ggsave(filename = "Study1_RR_block.eps", plot = p.RR.5, device = "eps",
        path = cog.path, width = 5.5, height = 5, scale = 1)
ggsave(filename = "Study1_RR_moneyblock.eps", plot = p.RR.6, device = "eps",
        path = cog.path, width = 7, height = 5, scale = 1)
ggsave(filename = "Study1_ACC_moneyblock.eps", plot = p.ACC.2, device = "eps",
```

```
path = cog.path, width = 7, height = 4, scale = 1)
ggsave(filename = "Study1_RT_moneyblock.eps", plot = p.RT.4, device = "eps",
path = cog.path, width = 7, height = 4, scale = 1)
```