Models for Dissertation Document

Hayley Brooks

2023-03-12

### This R markdown file includes all models of results reported in the main text and appendix of Hayley Brooks’ Dissertation.

Main text model results:

# Account for current trial-level variables, strategy, and round:  
model1 = glmer(choice ~ 1 + gainScaled + safeScaled + evLevScaled + roundRecode\*strategyRecode + (1|subID), data=rdmDFclean , family = "binomial")  
summary(model1)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: choice ~ 1 + gainScaled + safeScaled + evLevScaled + roundRecode \*   
## strategyRecode + (1 | subID)  
## Data: rdmDFclean  
##   
## AIC BIC logLik deviance df.resid   
## 31127.6 31194.7 -15555.8 31111.6 32406   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -148.431 -0.595 0.142 0.587 14.062   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## subID (Intercept) 1.157 1.075   
## Number of obs: 32414, groups: subID, 124  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -0.05629 0.10096 -0.558 0.57717   
## gainScaled 12.59125 0.68694 18.330 < 2e-16 \*\*\*  
## safeScaled -16.07157 1.34337 -11.964 < 2e-16 \*\*\*  
## evLevScaled -8.23973 2.66697 -3.090 0.00200 \*\*   
## roundRecode -0.00704 0.01407 -0.500 0.61673   
## strategyRecode 0.09960 0.01990 5.006 5.56e-07 \*\*\*  
## roundRecode:strategyRecode 0.05627 0.01951 2.885 0.00392 \*\*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) gnScld sfScld evLvSc rndRcd strtgR  
## gainScaled -0.002   
## safeScaled 0.000 0.925   
## evLevScaled -0.009 -0.980 -0.980   
## roundRecode 0.001 -0.015 -0.013 0.014   
## strategyRcd 0.000 0.013 -0.001 -0.006 -0.005   
## rndRcd:strR 0.001 0.012 0.006 -0.009 0.009 0.001

# Save predicted values for contextual models:  
rdmDFclean$predModel1= predict(model1,type="link");   
  
# Does risk-taking change as a function of past outcome, shift, earnings and expectations?  
model2 = glm(choice ~ 0 + pastOC1sc + signedShiftsc + earnNormalizedOverall + linExpectation, data=rdmDFclean, family="binomial", offset=predModel1)  
summary(model2);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + earnNormalizedOverall +   
## linExpectation, family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4541 -0.7829 0.1981 0.7674 3.2736   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.17555 0.04955 -3.543 0.000396 \*\*\*  
## signedShiftsc 0.51615 0.20202 2.555 0.010622 \*   
## earnNormalizedOverall 1.20453 0.25269 4.767 1.87e-06 \*\*\*  
## linExpectation -0.86596 0.20621 -4.199 2.68e-05 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30218 on 32162 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30226  
##   
## Number of Fisher Scoring iterations: 4

# Do people track earnings and expectations across rounds?  
model3 =glm(choice ~ 0 + pastOC1sc + signedShiftsc + earnNormalizedOverall+ linExpectation+ earningsAcrossRounds + linExpAcrossRounds, data=rdmDFclean, family="binomial", offset=predModel1)  
summary(model3);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + earnNormalizedOverall +   
## linExpectation + earningsAcrossRounds + linExpAcrossRounds,   
## family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4544 -0.7823 0.1978 0.7669 3.2733   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.17360 0.05059 -3.432 0.0006 \*\*\*  
## signedShiftsc 0.51767 0.20208 2.562 0.0104 \*   
## earnNormalizedOverall 0.90002 0.39394 2.285 0.0223 \*   
## linExpectation -0.60659 0.32764 -1.851 0.0641 .   
## earningsAcrossRounds 0.56765 0.56855 0.998 0.3181   
## linExpAcrossRounds -0.50907 0.50201 -1.014 0.3105   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30217 on 32160 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30229  
##   
## Number of Fisher Scoring iterations: 4

# Does strategy interact with temporal context?  
model4= glm(formula = choice ~ 0 + pastOC1sc\*strategyRecode + signedShiftsc\*strategyRecode + earnNormalizedOverall\*strategyRecode + linExpectation\*strategyRecode, family = "binomial", data = rdmDFclean, offset = predModel1)  
summary(model4);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode + signedShiftsc \*   
## strategyRecode + earnNormalizedOverall \* strategyRecode +   
## linExpectation \* strategyRecode, family = "binomial", data = rdmDFclean,   
## offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4471 -0.7822 0.1977 0.7685 3.2627   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.17760 0.04959 -3.581 0.000342 \*\*\*  
## strategyRecode -0.08464 0.03221 -2.627 0.008604 \*\*   
## signedShiftsc 0.52432 0.20213 2.594 0.009489 \*\*   
## earnNormalizedOverall 1.19847 0.25290 4.739 2.15e-06 \*\*\*  
## linExpectation -0.85947 0.20636 -4.165 3.12e-05 \*\*\*  
## pastOC1sc:strategyRecode 0.09221 0.05568 1.656 0.097728 .   
## strategyRecode:signedShiftsc 0.34395 0.20250 1.699 0.089399 .   
## strategyRecode:earnNormalizedOverall -0.05615 0.25483 -0.220 0.825596   
## strategyRecode:linExpectation 0.16695 0.21596 0.773 0.439487   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30207 on 32157 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30225  
##   
## Number of Fisher Scoring iterations: 4

# Does the effect of strategy on risk vary with round?  
model5 = glm(formula = choice ~ 0 + pastOC1sc\*strategyRecode\*roundRecode + signedShiftsc\*strategyRecode\*roundRecode + earnNormalizedOverall\*strategyRecode\*roundRecode + linExpectation\*strategyRecode\*roundRecode, family = "binomial", data = rdmDFclean, offset = predModel1)  
summary(model5)

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode \* roundRecode +   
## signedShiftsc \* strategyRecode \* roundRecode + earnNormalizedOverall \*   
## strategyRecode \* roundRecode + linExpectation \* strategyRecode \*   
## roundRecode, family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4442 -0.7825 0.1982 0.7686 3.2780   
##   
## Coefficients:  
## Estimate Std. Error z value  
## pastOC1sc -0.177811 0.049623 -3.583  
## strategyRecode -0.083395 0.032228 -2.588  
## roundRecode 0.002057 0.032229 0.064  
## signedShiftsc 0.524585 0.202339 2.593  
## earnNormalizedOverall 1.197887 0.255285 4.692  
## linExpectation -0.859308 0.208308 -4.125  
## pastOC1sc:strategyRecode 0.090644 0.055723 1.627  
## pastOC1sc:roundRecode 0.065774 0.055725 1.180  
## strategyRecode:roundRecode -0.030176 0.032226 -0.936  
## strategyRecode:signedShiftsc 0.344605 0.202699 1.700  
## roundRecode:signedShiftsc -0.084039 0.202696 -0.415  
## strategyRecode:earnNormalizedOverall -0.027505 0.257189 -0.107  
## roundRecode:earnNormalizedOverall -0.162579 0.257235 -0.632  
## strategyRecode:linExpectation 0.142014 0.217804 0.652  
## roundRecode:linExpectation 0.096686 0.217850 0.444  
## pastOC1sc:strategyRecode:roundRecode 0.019266 0.055709 0.346  
## strategyRecode:roundRecode:signedShiftsc 0.357323 0.202699 1.763  
## strategyRecode:roundRecode:earnNormalizedOverall -0.018356 0.257246 -0.071  
## strategyRecode:roundRecode:linExpectation 0.066684 0.217862 0.306  
## Pr(>|z|)   
## pastOC1sc 0.000339 \*\*\*  
## strategyRecode 0.009663 \*\*   
## roundRecode 0.949116   
## signedShiftsc 0.009525 \*\*   
## earnNormalizedOverall 2.7e-06 \*\*\*  
## linExpectation 3.7e-05 \*\*\*  
## pastOC1sc:strategyRecode 0.103800   
## pastOC1sc:roundRecode 0.237869   
## strategyRecode:roundRecode 0.349076   
## strategyRecode:signedShiftsc 0.089116 .   
## roundRecode:signedShiftsc 0.678430   
## strategyRecode:earnNormalizedOverall 0.914834   
## roundRecode:earnNormalizedOverall 0.527369   
## strategyRecode:linExpectation 0.514383   
## roundRecode:linExpectation 0.657175   
## pastOC1sc:strategyRecode:roundRecode 0.729467   
## strategyRecode:roundRecode:signedShiftsc 0.077930 .   
## strategyRecode:roundRecode:earnNormalizedOverall 0.943114   
## strategyRecode:roundRecode:linExpectation 0.759541   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30200 on 32147 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30238  
##   
## Number of Fisher Scoring iterations: 4

# Does the effect of strategy on risk co-vary with working memory capacity, ERQ and motivation?  
model6 = glm(choice~0 + pastOC1sc\*strategyRecode + signedShiftsc\*strategyRecode + earnNormalizedOverall\*strategyRecode + linExpectation\*strategyRecode + suppSpan0\*strategyRecode + reapSpan0\*strategyRecode + motivationNumeric\*strategyRecode + compositeSpanScore\*strategyRecode, data=rdmDFclean, family="binomial",offset=predModel1);  
summary(model6);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode + signedShiftsc \*   
## strategyRecode + earnNormalizedOverall \* strategyRecode +   
## linExpectation \* strategyRecode + suppSpan0 \* strategyRecode +   
## reapSpan0 \* strategyRecode + motivationNumeric \* strategyRecode +   
## compositeSpanScore \* strategyRecode, family = "binomial",   
## data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.0571 -0.7806 0.1925 0.7680 3.2834   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.207827 0.061629 -3.372 0.000746 \*\*\*  
## strategyRecode 0.061022 0.097221 0.628 0.530228   
## signedShiftsc 0.111114 0.224731 0.494 0.621004   
## earnNormalizedOverall 1.298978 0.289986 4.479 7.48e-06 \*\*\*  
## linExpectation -0.925158 0.245150 -3.774 0.000161 \*\*\*  
## suppSpan0 -0.009828 0.035982 -0.273 0.784738   
## reapSpan0 -0.015256 0.042020 -0.363 0.716549   
## motivationNumeric 0.008105 0.059732 0.136 0.892065   
## compositeSpanScore -0.016493 0.063645 -0.259 0.795526   
## pastOC1sc:strategyRecode 0.096036 0.062474 1.537 0.124242   
## strategyRecode:signedShiftsc 0.321104 0.224820 1.428 0.153214   
## strategyRecode:earnNormalizedOverall -0.043091 0.289842 -0.149 0.881815   
## strategyRecode:linExpectation 0.122701 0.245163 0.500 0.616732   
## strategyRecode:suppSpan0 -0.023903 0.036140 -0.661 0.508348   
## strategyRecode:reapSpan0 -0.082019 0.042068 -1.950 0.051212 .   
## strategyRecode:motivationNumeric -0.113903 0.105178 -1.083 0.278828   
## strategyRecode:compositeSpanScore -0.043808 0.072731 -0.602 0.546959   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 23831 on 25678 degrees of freedom  
## Residual deviance: 23784 on 25661 degrees of freedom  
## (6736 observations deleted due to missingness)  
## AIC: 23818  
##   
## Number of Fisher Scoring iterations: 4

# Because reappraisal appears to be the only covariate that may be related to strategy-use, our next question is does the effect of strategy on temporal context in risk co-vary with ERQ reappraisal?  
model7 = glm(choice~0 + pastOC1sc\*strategyRecode\*reapSpan0 + signedShiftsc\*strategyRecode\*reapSpan0 + earnNormalizedOverall\*strategyRecode\*reapSpan0 + linExpectation\*strategyRecode\*reapSpan0, data=rdmDFclean, family="binomial",offset=predModel1);  
summary(model7);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode \* reapSpan0 +   
## signedShiftsc \* strategyRecode \* reapSpan0 + earnNormalizedOverall \*   
## strategyRecode \* reapSpan0 + linExpectation \* strategyRecode \*   
## reapSpan0, family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4847 -0.7823 0.1960 0.7669 3.2644   
##   
## Coefficients:  
## Estimate Std. Error z value  
## pastOC1sc -0.22500 0.05279 -4.262  
## strategyRecode -0.05601 0.03421 -1.637  
## reapSpan0 0.08113 0.08256 0.983  
## signedShiftsc 0.43406 0.21491 2.020  
## earnNormalizedOverall 1.17069 0.27835 4.206  
## linExpectation -0.80246 0.22692 -3.536  
## pastOC1sc:strategyRecode 0.02284 0.05940 0.384  
## pastOC1sc:reapSpan0 0.32015 0.14782 2.166  
## strategyRecode:reapSpan0 -0.18959 0.08670 -2.187  
## strategyRecode:signedShiftsc 0.24040 0.21529 1.117  
## reapSpan0:signedShiftsc 0.44683 0.54700 0.817  
## strategyRecode:earnNormalizedOverall -0.00660 0.28026 -0.024  
## reapSpan0:earnNormalizedOverall 0.74441 0.74849 0.995  
## strategyRecode:linExpectation 0.13242 0.23663 0.560  
## reapSpan0:linExpectation -0.96690 0.63154 -1.531  
## pastOC1sc:strategyRecode:reapSpan0 0.51575 0.14948 3.450  
## strategyRecode:reapSpan0:signedShiftsc 0.59924 0.54707 1.095  
## strategyRecode:reapSpan0:earnNormalizedOverall 0.14930 0.74875 0.199  
## strategyRecode:reapSpan0:linExpectation -0.20139 0.63337 -0.318  
## Pr(>|z|)   
## pastOC1sc 2.03e-05 \*\*\*  
## strategyRecode 0.101574   
## reapSpan0 0.325710   
## signedShiftsc 0.043411 \*   
## earnNormalizedOverall 2.60e-05 \*\*\*  
## linExpectation 0.000406 \*\*\*  
## pastOC1sc:strategyRecode 0.700644   
## pastOC1sc:reapSpan0 0.030325 \*   
## strategyRecode:reapSpan0 0.028764 \*   
## strategyRecode:signedShiftsc 0.264152   
## reapSpan0:signedShiftsc 0.414006   
## strategyRecode:earnNormalizedOverall 0.981211   
## reapSpan0:earnNormalizedOverall 0.319960   
## strategyRecode:linExpectation 0.575739   
## reapSpan0:linExpectation 0.125764   
## pastOC1sc:strategyRecode:reapSpan0 0.000560 \*\*\*  
## strategyRecode:reapSpan0:signedShiftsc 0.273363   
## strategyRecode:reapSpan0:earnNormalizedOverall 0.841950   
## strategyRecode:reapSpan0:linExpectation 0.750510   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 29800 on 31647 degrees of freedom  
## Residual deviance: 29718 on 31628 degrees of freedom  
## (767 observations deleted due to missingness)  
## AIC: 29756  
##   
## Number of Fisher Scoring iterations: 4

Appendix model results:

# In this dataset, we find that signed shift is better behaved than splitting up positive and negative shift:  
  
model2\_b\_posNegShift = glm(choice ~ 0 + pastOC1sc + posShiftsc + negShiftsc + earnNormalizedOverall + linExpectation, data=rdmDFclean, family="binomial", offset=predModel1)  
summary(model2\_b\_posNegShift);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + posShiftsc + negShiftsc +   
## earnNormalizedOverall + linExpectation, family = "binomial",   
## data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4544 -0.7826 0.1985 0.7679 3.2733   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.17357 0.04967 -3.495 0.000475 \*\*\*  
## posShiftsc 0.39175 0.28916 1.355 0.175491   
## negShiftsc 0.64039 0.28921 2.214 0.026810 \*   
## earnNormalizedOverall 1.20204 0.25272 4.756 1.97e-06 \*\*\*  
## linExpectation -0.86079 0.20639 -4.171 3.04e-05 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30218 on 32161 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30228  
##   
## Number of Fisher Scoring iterations: 4

# AIC is better (lower) with signed shift.  
  
# In previous datasets, we find that shift effect is short lasting (shift immediately before a trial). Is that the case here?   
model2\_c\_howFarBack = glm(choice ~ 0 + pastOC1sc + signedShiftsc + + earnNormalizedOverall + linExpectation + signedShift\_1triback, data=rdmDFclean, family="binomial", offset=predModel1)  
summary(model2\_c\_howFarBack);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + +earnNormalizedOverall +   
## linExpectation + signedShift\_1triback, family = "binomial",   
## data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4535 -0.7826 0.1981 0.7675 3.2743   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.18102 0.04999 -3.621 0.000293 \*\*\*  
## signedShiftsc 0.51513 0.20203 2.550 0.010778 \*   
## earnNormalizedOverall 1.22395 0.25376 4.823 1.41e-06 \*\*\*  
## linExpectation -0.87944 0.20684 -4.252 2.12e-05 \*\*\*  
## signedShift\_1triback 0.16600 0.19872 0.835 0.403520   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30217 on 32161 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30227  
##   
## Number of Fisher Scoring iterations: 4

# Yes, adding shift 1 trial back is not significant.

# Do people track earnings and expectations across rounds? (additional analyses)  
# Just include earnings and expectations across rounds (remove earnings and expectations within round)  
model3\_b =glm(choice ~ 0 + pastOC1sc + signedShiftsc + earningsAcrossRounds + linExpAcrossRounds, data=rdmDFclean, family="binomial", offset=predModel1)  
summary(model3\_b);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + earningsAcrossRounds +   
## linExpAcrossRounds, family = "binomial", data = rdmDFclean,   
## offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4567 -0.7793 0.1997 0.7694 3.2708   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.1411 0.0493 -2.862 0.00421 \*\*   
## signedShiftsc 0.5001 0.2016 2.480 0.01314 \*   
## earningsAcrossRounds 1.5371 0.3651 4.210 2.55e-05 \*\*\*  
## linExpAcrossRounds -1.2606 0.3185 -3.958 7.57e-05 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30229 on 32162 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30237  
##   
## Number of Fisher Scoring iterations: 4

# AIC is worse when accounting for earnings and expectations across rounds relative to earnings/expectations within rounds but the effects are significant.  
  
# Because the effects of earnings and expectations across rounds is significant when in a model alone, perhaps some people track earnings across tasks. Who are the people tracking earnings and expectations across rounds? People who repeat the same condition across rounds may treat earnings and expectations continuous across rounds whereas people who switched conditions may have treated the rounds more independently.

# Do people who switch conditions vs. repeat conditions treat earnings and expectations differently across rounds?  
  
# defining condition codes:  
condcode1 = rcsSubLevelWide\_clean$subID[rcsSubLevelWide\_clean$condCode==1]  
condcode2 = rcsSubLevelWide\_clean$subID[rcsSubLevelWide\_clean$condCode==2]  
condcode3 = rcsSubLevelWide\_clean$subID[rcsSubLevelWide\_clean$condCode==3]  
condcode4 = rcsSubLevelWide\_clean$subID[rcsSubLevelWide\_clean$condCode==4]  
  
  
# Subset data for those who repeated conditions (condition codes 1 and 4)  
repeatconditions = c(condcode1, condcode4)  
rdmDFrepeatCond = rdmDFclean[as.numeric(rdmDFclean$subID) %in% repeatconditions,]  
  
# Subset data for those who switched conditions (condition codes 2 and 3)  
switchconditions = c(condcode2, condcode3)  
rdmDFswitchCond = rdmDFclean[as.numeric(rdmDFclean$subID) %in% switchconditions,]  
  
  
# Run trial-level models that include round x strategy as we did in model 1 in main analysis:  
model1\_repeatConditions= glmer(choice ~ 1 + gainScaled + safeScaled + evLevScaled + roundRecode\*strategyRecode + (1|subID), data=rdmDFrepeatCond , family = "binomial")  
summary(model1\_repeatConditions);

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: choice ~ 1 + gainScaled + safeScaled + evLevScaled + roundRecode \*   
## strategyRecode + (1 | subID)  
## Data: rdmDFrepeatCond  
##   
## AIC BIC logLik deviance df.resid   
## 15488.1 15549.7 -7736.1 15472.1 16206   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -90.324 -0.591 0.174 0.580 15.134   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## subID (Intercept) 0.8174 0.9041   
## Number of obs: 16214, groups: subID, 62  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 0.013866 0.122112 0.114 0.90959   
## gainScaled 13.198869 0.983326 13.423 < 2e-16 \*\*\*  
## safeScaled -17.069436 1.939197 -8.802 < 2e-16 \*\*\*  
## evLevScaled -8.120549 3.830472 -2.120 0.03401 \*   
## roundRecode -0.004081 0.019943 -0.205 0.83784   
## strategyRecode 0.265203 0.116621 2.274 0.02296 \*   
## roundRecode:strategyRecode 0.054794 0.019945 2.747 0.00601 \*\*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) gnScld sfScld evLvSc rndRcd strtgR  
## gainScaled -0.003   
## safeScaled -0.001 0.922   
## evLevScaled -0.010 -0.979 -0.980   
## roundRecode 0.001 -0.019 -0.014 0.016   
## strategyRcd 0.000 0.001 -0.006 0.002 0.001   
## rndRcd:strR 0.002 0.016 0.008 -0.012 0.013 0.000

model1\_swithConditions= glmer(choice ~ 1 + gainScaled + safeScaled + evLevScaled + roundRecode\*strategyRecode + (1|subID), data=rdmDFswitchCond , family = "binomial")  
summary(model1\_swithConditions);

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: choice ~ 1 + gainScaled + safeScaled + evLevScaled + roundRecode \*   
## strategyRecode + (1 | subID)  
## Data: rdmDFswitchCond  
##   
## AIC BIC logLik deviance df.resid   
## 15620.4 15681.9 -7802.2 15604.4 16192   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -117.816 -0.599 0.069 0.589 11.649   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## subID (Intercept) 1.408 1.186   
## Number of obs: 16200, groups: subID, 62  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -0.12379 0.15637 -0.792 0.4286   
## gainScaled 11.95340 0.95311 12.541 < 2e-16 \*\*\*  
## safeScaled -15.31438 1.86162 -8.226 < 2e-16 \*\*\*  
## evLevScaled -8.04798 3.70024 -2.175 0.0296 \*   
## roundRecode -0.01106 0.01986 -0.557 0.5778   
## strategyRecode 0.09332 0.01989 4.693 2.7e-06 \*\*\*  
## roundRecode:strategyRecode 0.18179 0.15211 1.195 0.2321   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) gnScld sfScld evLvSc rndRcd strtgR  
## gainScaled 0.001   
## safeScaled 0.004 0.927   
## evLevScaled -0.012 -0.981 -0.981   
## roundRecode 0.000 -0.011 -0.012 0.012   
## strategyRcd -0.001 0.018 0.000 -0.009 -0.006   
## rndRcd:strR -0.002 -0.001 -0.004 0.002 0.001 0.000

# Trial-level model summaries for switch vs repeat conditions -> strategy increases risk-taking for everyone, but this effect is stronger over time for people who repeat condition. More time with specific strategy = stronger effect of that strategy.  
  
  
# Save predicted values to the switch and repeat datasets  
rdmDFrepeatCond$pred= predict(model1\_repeatConditions,type="link");   
rdmDFswitchCond$pred= predict(model1\_swithConditions,type="link");   
  
# Do we see the same temporal context effects as above in the whole dataset  
# For repeat conditions:  
model2\_repeatConditions = glm(choice ~ 0 + pastOC1sc + signedShiftsc + linExpectation + earnNormalizedOverall, data=rdmDFrepeatCond, family="binomial", offset=pred);  
summary(model2\_repeatConditions);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + linExpectation +   
## earnNormalizedOverall, family = "binomial", data = rdmDFrepeatCond,   
## offset = pred)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.2622 -0.7749 0.2414 0.7643 3.3203   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.19370 0.06969 -2.780 0.005441 \*\*   
## signedShiftsc 0.43834 0.28725 1.526 0.127006   
## linExpectation -0.96905 0.29042 -3.337 0.000848 \*\*\*  
## earnNormalizedOverall 1.32371 0.35448 3.734 0.000188 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 15055 on 16090 degrees of freedom  
## Residual deviance: 15031 on 16086 degrees of freedom  
## (124 observations deleted due to missingness)  
## AIC: 15039  
##   
## Number of Fisher Scoring iterations: 4

# main effects as above except no effect of signed shift (p = .13) in people who repeat condition  
  
# switch:  
model2\_switchConditions = glm(choice ~ 0 + pastOC1sc + signedShiftsc + linExpectation + earnNormalizedOverall, data=rdmDFswitchCond, family="binomial", offset=pred);  
summary(model2\_switchConditions);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + linExpectation +   
## earnNormalizedOverall, family = "binomial", data = rdmDFswitchCond,   
## offset = pred)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.3515 -0.7889 0.0980 0.7687 3.1646   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.15647 0.07061 -2.216 0.02670 \*   
## signedShiftsc 0.60205 0.28439 2.117 0.03426 \*   
## linExpectation -0.77153 0.29361 -2.628 0.00860 \*\*  
## earnNormalizedOverall 1.09369 0.36128 3.027 0.00247 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 15179 on 16076 degrees of freedom  
## Residual deviance: 15160 on 16072 degrees of freedom  
## (124 observations deleted due to missingness)  
## AIC: 15168  
##   
## Number of Fisher Scoring iterations: 3

# main effects same as above - including effect of signed shift for people who switch conditions  
  
  
  
# Could people who switch vs. repeat be treating expectations and earnings differently (i.e. tracking earnings across rounds)?  
  
# Repeat:  
model3\_repeatcond\_acrossRounds = glm(choice ~ 0 + pastOC1sc + signedShiftsc + linExpAcrossRounds + earningsAcrossRounds, data=rdmDFrepeatCond, family="binomial", offset=pred);  
summary(model3\_repeatcond\_acrossRounds);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + linExpAcrossRounds +   
## earningsAcrossRounds, family = "binomial", data = rdmDFrepeatCond,   
## offset = pred)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.2514 -0.7728 0.2424 0.7656 3.3178   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.16583 0.06954 -2.385 0.0171 \*   
## signedShiftsc 0.43785 0.28677 1.527 0.1268   
## linExpAcrossRounds -1.76568 0.45233 -3.903 9.48e-05 \*\*\*  
## earningsAcrossRounds 2.12118 0.51788 4.096 4.21e-05 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 15055 on 16090 degrees of freedom  
## Residual deviance: 15030 on 16086 degrees of freedom  
## (124 observations deleted due to missingness)  
## AIC: 15038  
##   
## Number of Fisher Scoring iterations: 4

#AIC is an improvement from model above with expectations and earnings within round (AIC: 15039)   
  
# Switch  
model\_switchcond\_acrossRounds = glm(choice ~ 0 + pastOC1sc + signedShiftsc + linExpAcrossRounds + earningsAcrossRounds, data=rdmDFswitchCond, family="binomial", offset=pred);  
summary(model\_switchcond\_acrossRounds);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + linExpAcrossRounds +   
## earningsAcrossRounds, family = "binomial", data = rdmDFswitchCond,   
## offset = pred)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.3555 -0.7838 0.0990 0.7693 3.1577   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.11390 0.07008 -1.625 0.1041   
## signedShiftsc 0.57462 0.28387 2.024 0.0429 \*  
## linExpAcrossRounds -0.78267 0.45090 -1.736 0.0826 .  
## earningsAcrossRounds 0.98241 0.51749 1.898 0.0576 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 15179 on 16076 degrees of freedom  
## Residual deviance: 15168 on 16072 degrees of freedom  
## (124 observations deleted due to missingness)  
## AIC: 15176  
##   
## Number of Fisher Scoring iterations: 3

# AIC much worse than model with linear expectations and earnings within round (AIC: 15160)  
  
# Summary -> people who repeat conditions seem to track expectations and earnings across rounds (direction of effects are consistent across groups though) but people who switch appear to treat expectations and earnings separately across rounds.

# MOTIVATION  
# Does motivation interact with strategy to influence risk-taking?  
model6\_b\_motivationOnly = glm(choice~0+pastOC1sc\*strategyRecode + signedShiftsc\*strategyRecode + earnNormalizedOverall\*strategyRecode + linExpectation\*strategyRecode + strategyRecode\*motivationNumeric, data=rdmDFclean, family="binomial", offset=predModel1);  
summary(model6\_b\_motivationOnly);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode + signedShiftsc \*   
## strategyRecode + earnNormalizedOverall \* strategyRecode +   
## linExpectation \* strategyRecode + strategyRecode \* motivationNumeric,   
## family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4434 -0.7808 0.1980 0.7703 3.2645   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.15889 0.05459 -2.910 0.00361 \*\*   
## strategyRecode -0.09760 0.07378 -1.323 0.18587   
## signedShiftsc 0.53307 0.20241 2.634 0.00845 \*\*   
## earnNormalizedOverall 1.17114 0.25502 4.592 4.38e-06 \*\*\*  
## linExpectation -0.80903 0.21516 -3.760 0.00017 \*\*\*  
## motivationNumeric -0.03252 0.03948 -0.824 0.41002   
## pastOC1sc:strategyRecode 0.09192 0.05569 1.651 0.09879 .   
## strategyRecode:signedShiftsc 0.34430 0.20248 1.700 0.08905 .   
## strategyRecode:earnNormalizedOverall -0.05678 0.25497 -0.223 0.82377   
## strategyRecode:linExpectation 0.16781 0.21607 0.777 0.43737   
## strategyRecode:motivationNumeric 0.01760 0.09011 0.195 0.84513   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30206 on 32155 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30228  
##   
## Number of Fisher Scoring iterations: 4

# ERQ REAPPRAISAL  
model6\_b\_reappraisalOnly = glm(choice~0+pastOC1sc\*strategyRecode + signedShiftsc\*strategyRecode + earnNormalizedOverall\*strategyRecode + linExpectation\*strategyRecode + strategyRecode\*reapSpan0, data=rdmDFclean, family="binomial", offset=predModel1);  
summary(model6\_b\_reappraisalOnly);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode + signedShiftsc \*   
## strategyRecode + earnNormalizedOverall \* strategyRecode +   
## linExpectation \* strategyRecode + strategyRecode \* reapSpan0,   
## family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4262 -0.7818 0.1951 0.7680 3.2647   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -1.777e-01 5.023e-02 -3.538 0.000403 \*\*\*  
## strategyRecode -7.066e-02 3.282e-02 -2.153 0.031322 \*   
## signedShiftsc 4.947e-01 2.036e-01 2.430 0.015117 \*   
## earnNormalizedOverall 1.262e+00 2.576e-01 4.898 9.66e-07 \*\*\*  
## linExpectation -9.071e-01 2.101e-01 -4.317 1.58e-05 \*\*\*  
## reapSpan0 -1.471e-02 3.756e-02 -0.392 0.695248   
## pastOC1sc:strategyRecode 8.804e-02 5.624e-02 1.565 0.117484   
## strategyRecode:signedShiftsc 3.095e-01 2.040e-01 1.517 0.129223   
## strategyRecode:earnNormalizedOverall 9.197e-05 2.595e-01 0.000 0.999717   
## strategyRecode:linExpectation 1.200e-01 2.195e-01 0.547 0.584518   
## strategyRecode:reapSpan0 -8.878e-02 3.792e-02 -2.341 0.019212 \*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 29800 on 31647 degrees of freedom  
## Residual deviance: 29741 on 31636 degrees of freedom  
## (767 observations deleted due to missingness)  
## AIC: 29763  
##   
## Number of Fisher Scoring iterations: 4

# ERQ SUPPRESSION  
# Does habitual use of expressive suppression interact with strategy to influence risk-taking?  
model6\_c\_suppressionOnly = glm(choice~0+pastOC1sc\*strategyRecode + signedShiftsc\*strategyRecode + earnNormalizedOverall\*strategyRecode + linExpectation\*strategyRecode + strategyRecode\*suppSpan0, data=rdmDFclean, family="binomial", offset=predModel1);  
summary(model6\_c\_suppressionOnly);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode + signedShiftsc \*   
## strategyRecode + earnNormalizedOverall \* strategyRecode +   
## linExpectation \* strategyRecode + strategyRecode \* suppSpan0,   
## family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4554 -0.7814 0.1953 0.7686 3.2625   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.180596 0.050131 -3.603 0.000315 \*\*\*  
## strategyRecode -0.083811 0.032571 -2.573 0.010078 \*   
## signedShiftsc 0.494523 0.203661 2.428 0.015175 \*   
## earnNormalizedOverall 1.277359 0.257834 4.954 7.26e-07 \*\*\*  
## linExpectation -0.923177 0.210181 -4.392 1.12e-05 \*\*\*  
## suppSpan0 -0.008941 0.030529 -0.293 0.769630   
## pastOC1sc:strategyRecode 0.088509 0.056238 1.574 0.115526   
## strategyRecode:signedShiftsc 0.314132 0.204026 1.540 0.123640   
## strategyRecode:earnNormalizedOverall 0.028594 0.259741 0.110 0.912340   
## strategyRecode:linExpectation 0.097063 0.219681 0.442 0.658608   
## strategyRecode:suppSpan0 -0.032433 0.030552 -1.062 0.288430   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 29800 on 31647 degrees of freedom  
## Residual deviance: 29745 on 31636 degrees of freedom  
## (767 observations deleted due to missingness)  
## AIC: 29767  
##   
## Number of Fisher Scoring iterations: 4

# COMPOSITE SPAN (WORKING MEMORY CAPACITY)  
# Does working memory capacity interact with strategy to influence risk-taking?  
model6\_d\_compositeSpanOnly = glm(choice~0+pastOC1sc\*strategyRecode + signedShiftsc\*strategyRecode + earnNormalizedOverall\*strategyRecode + linExpectation\*strategyRecode + strategyRecode\*compositeSpanScore, data=rdmDFclean, family="binomial", offset=predModel1);  
summary(model6\_d\_compositeSpanOnly);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc \* strategyRecode + signedShiftsc \*   
## strategyRecode + earnNormalizedOverall \* strategyRecode +   
## linExpectation \* strategyRecode + strategyRecode \* compositeSpanScore,   
## family = "binomial", data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.0600 -0.7812 0.1963 0.7687 3.2769   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.206062 0.058909 -3.498 0.000469 \*\*\*  
## strategyRecode -0.039459 0.053763 -0.734 0.462988   
## signedShiftsc 0.154198 0.222409 0.693 0.488115   
## earnNormalizedOverall 1.210543 0.282489 4.285 1.83e-05 \*\*\*  
## linExpectation -0.855756 0.237161 -3.608 0.000308 \*\*\*  
## compositeSpanScore -0.008379 0.046920 -0.179 0.858275   
## pastOC1sc:strategyRecode 0.101127 0.061657 1.640 0.100977   
## strategyRecode:signedShiftsc 0.369715 0.222628 1.661 0.096777 .   
## strategyRecode:earnNormalizedOverall -0.103955 0.282100 -0.369 0.712497   
## strategyRecode:linExpectation 0.173619 0.239236 0.726 0.468010   
## strategyRecode:compositeSpanScore -0.032308 0.070604 -0.458 0.647240   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 24293 on 26197 degrees of freedom  
## Residual deviance: 24250 on 26186 degrees of freedom  
## (6217 observations deleted due to missingness)  
## AIC: 24272  
##   
## Number of Fisher Scoring iterations: 4

# Summary -> across these covariates (suppression, motivation and span), there is no main effect of them or an interaction with strategy. Because ERQ reappraisal was the strongest effect from the beginning (in a model that accounted for all covariates), this appears to be the strongest effect and the other covariates may require follow up in future work.

# In previous datasets, we have found an interaction between past outcome and earnings. Do we see that here?  
  
# Interact past outcome with both global timescale variables:  
model2\_POCxEarn\_POCxExp = glm(choice ~ 0 + pastOC1sc + signedShiftsc + earnNormalizedOverall\*pastOC1sc + linExpectation\*pastOC1sc, data=rdmDFclean, family="binomial", offset=predModel1)  
summary(model2\_POCxEarn\_POCxExp);

##   
## Call:  
## glm(formula = choice ~ 0 + pastOC1sc + signedShiftsc + earnNormalizedOverall \*   
## pastOC1sc + linExpectation \* pastOC1sc, family = "binomial",   
## data = rdmDFclean, offset = predModel1)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -4.4390 -0.7778 0.1985 0.7694 3.2943   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## pastOC1sc -0.34588 0.07866 -4.397 1.1e-05 \*\*\*  
## signedShiftsc 0.53988 0.20222 2.670 0.00759 \*\*   
## earnNormalizedOverall 0.27013 0.35897 0.753 0.45174   
## linExpectation -0.14877 0.29185 -0.510 0.61023   
## pastOC1sc:earnNormalizedOverall 3.42749 0.96449 3.554 0.00038 \*\*\*  
## pastOC1sc:linExpectation -2.39657 0.79483 -3.015 0.00257 \*\*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 30261 on 32166 degrees of freedom  
## Residual deviance: 30199 on 32160 degrees of freedom  
## (248 observations deleted due to missingness)  
## AIC: 30211  
##   
## Number of Fisher Scoring iterations: 4

# There is an interaction between past outcome and earnings, as well as past outcome and expectations. This means that the negative effect of past outcome is stronger when earnings increase and flips as expectations increase. The joint effect of earnings and expectations on the past outcome effect is that when earnings are more than expected, the effect of past outcome is positive and is negative when earnings are less than expected. The effect is weakest when earnings and expectations are very low (i.e. at the beginning of the task) and is strongest when earnings and expectations are large (toward the end of the task).  
  
# See Dissertation Appendix for discussion of these results.