Basic_Analyses_12_20_2017

December 29, 2017

1 Basic Analyses:

To-DO: - decide which subjects to exclude.

- replot the regression coefficients.
- correlate intercept model parameters across sessions
- read in the stai data.

```
GIT SHA: 92307d54843325a3e1fb1c807084a9476eca0da4
```

2 read in data + nobrainer

2.1 gainloss

```
C:\Users\Hanna\Anaconda2\lib\site-packages\pandas\core\indexing.py:288: SettingWithCopyWarning
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  self.obj[key] = _infer_fill_value(value)
C:\Users\Hanna\Anaconda2\lib\site-packages\pandas\core\indexing.py:465: SettingWithCopyWarning
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  self.obj[item] = s
```

2.2 shock

```
../functions/NoBrainer_Analysis_AllinOne.py:42: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  df['left_better']=lb
```

```
../functions/NoBrainer_Analysis_AllinOne.py:43: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  df['right_better']=rb
```

3 Model fit - individual subjects

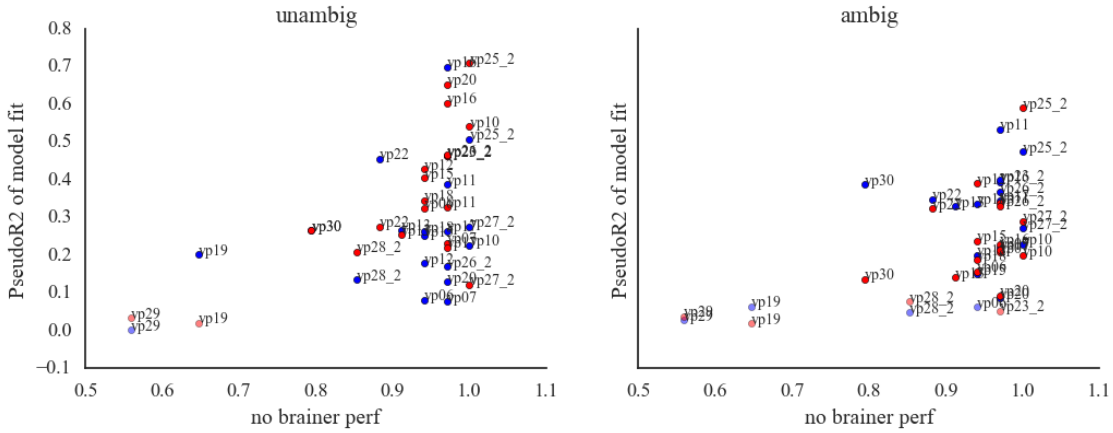
3.1 gainloss

3.2 shock

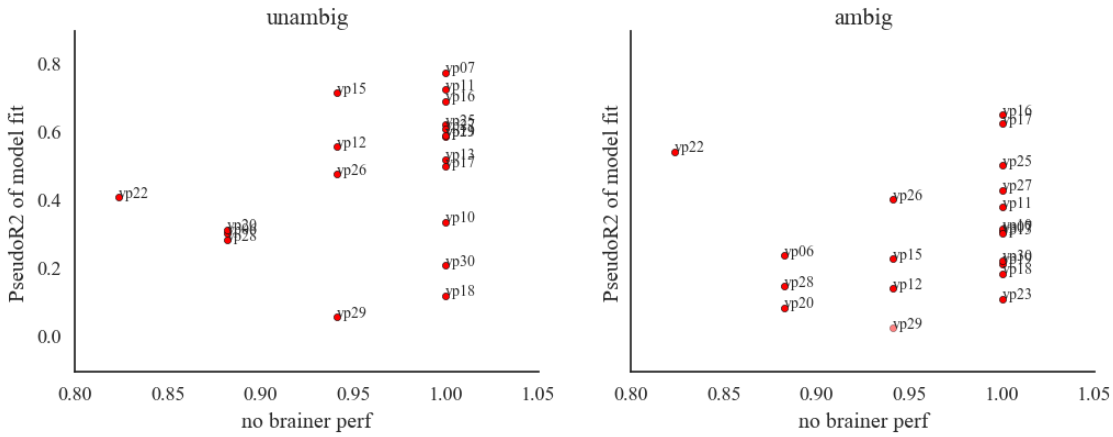
3.2.1 scatterplots for model fit and significance

gainloss

```
C:\Users\Hanna\Anaconda2\lib\site-packages\matplotlib\axes\_axes.py:531: UserWarning: No labell
  warnings.warn("No labelled objects found. "
```

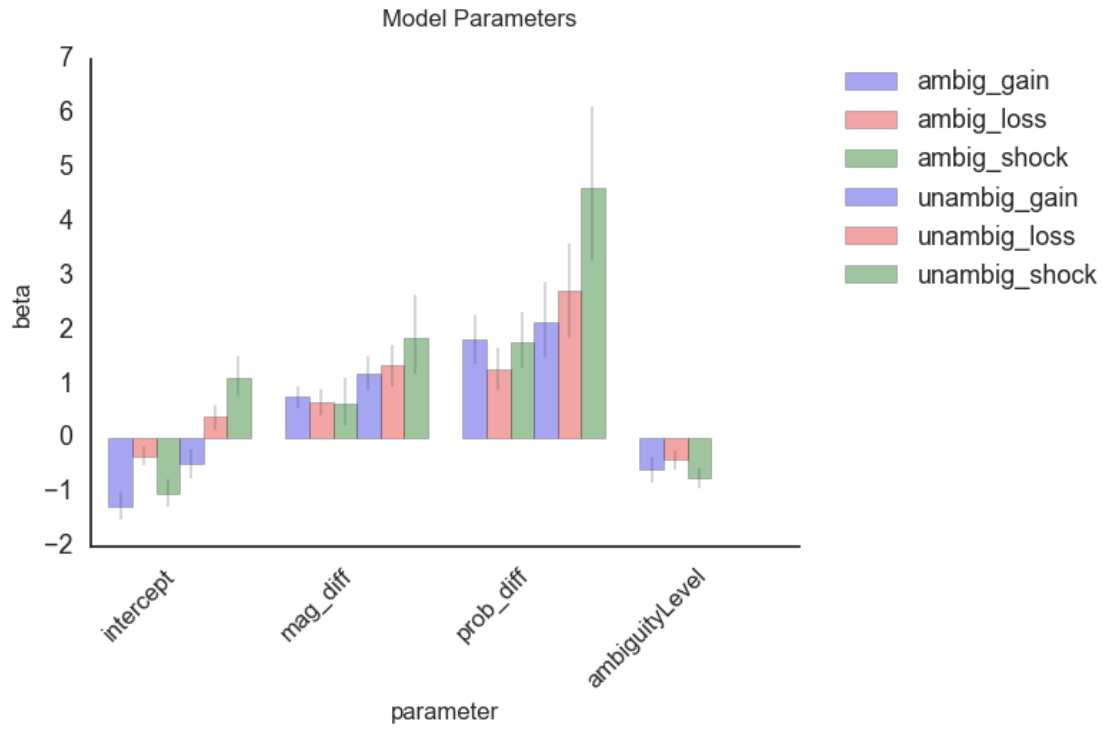


shock



- what the hell is going on with the subjects that have .95 no brainer and <0.1 R2.

3.2.2 bargraph for parameters

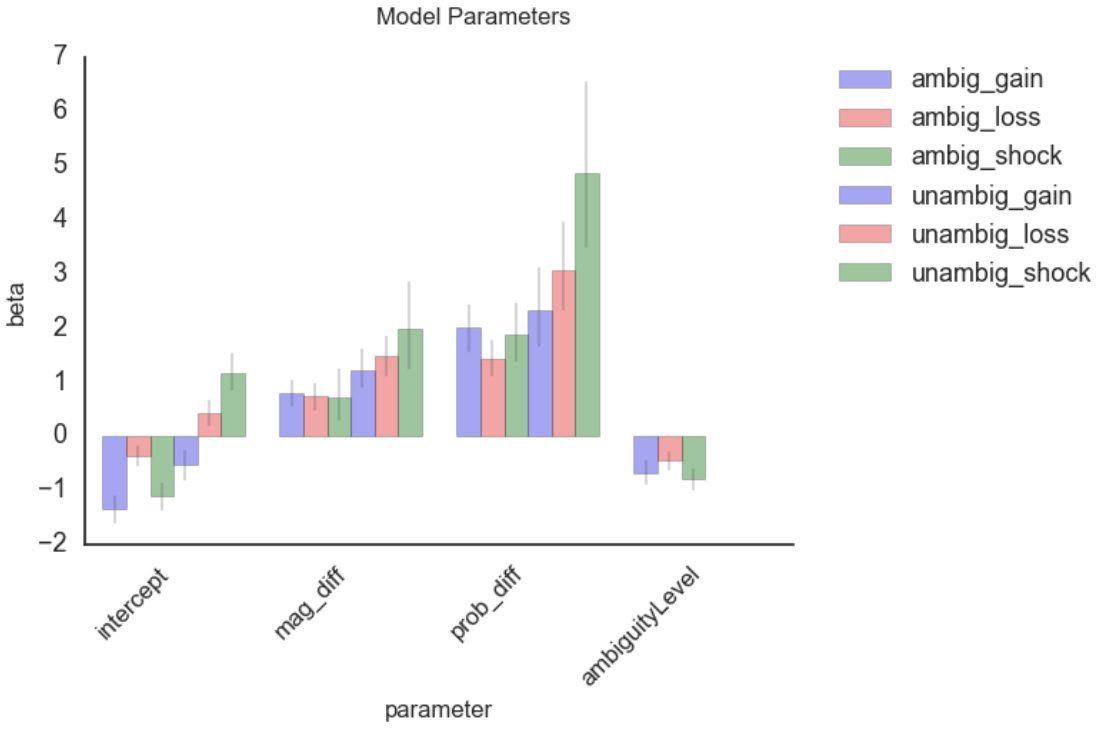


- remove bad fitting subjects - vp19 and vp29

140
126

280
252

420
378



4 Plot individual parameter per task

- add x axis labels

5 Triplet dataframe

5.1 ambiguous trials

5.2 unambiguous trials

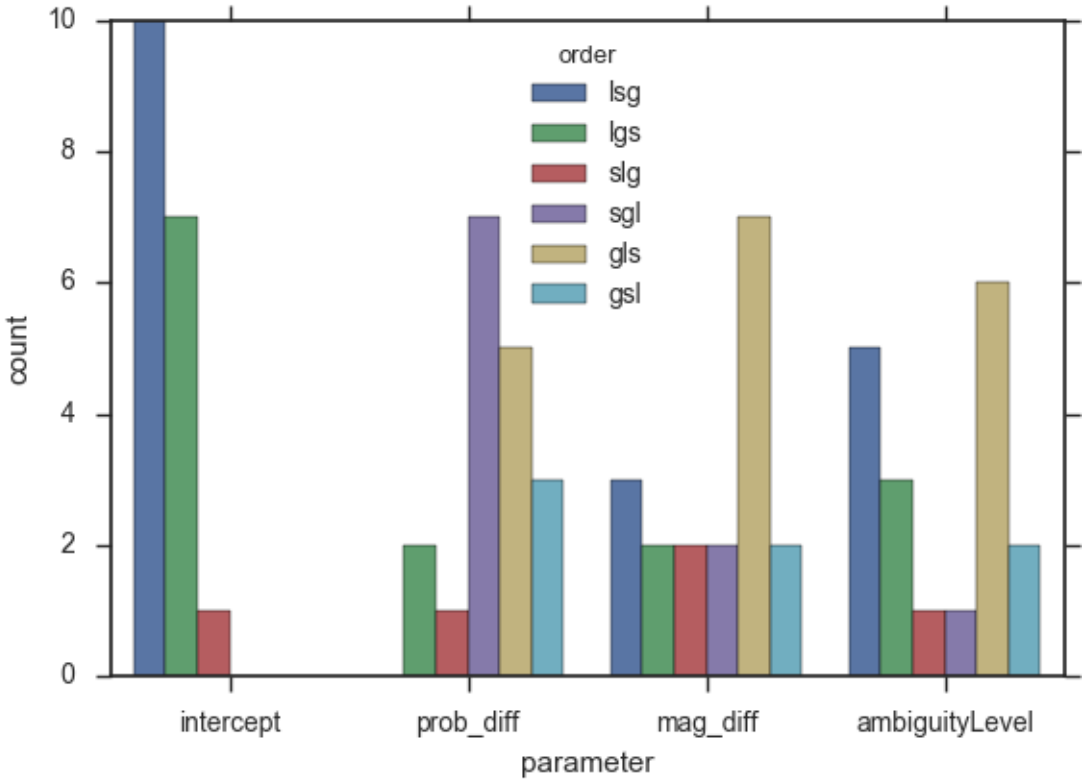
- needs to be adjusted/completed in .py file

6 subject count per order of task

-function need to go to a .py file

```
Out[33]: lsg    10
         lgs     7
         slg     1
         Name: order, dtype: int64

Out[34]: sgl    7
         gls    5
         gsl    3
         lgs    2
         slg    1
         Name: order, dtype: int64

Out[35]: gls    7
         lsg    3
         sgl    2
         lgs    2
         slg    2
         gsl    2
         Name: order, dtype: int64

Out[36]: gls    6
         lsg    5
         lgs    3
         gsl    2
         slg    1
         sgl    1
         Name: order, dtype: int64

Out[37]:     MID      gain         se_gain      loss         se_loss     shock  \
         0  vp06  0.618895   0.39654069989  0.171944  0.302125573416  1.654646
         1  vp07  1.156406   0.40292163675  1.251173  0.389190478561  1.871591
         2  vp10  1.631189  0.447625740324  1.461982  0.403165070184  1.241292
         3  vp11  4.201267   1.09595628298  2.184089  0.512258574857  2.164188
         4  vp12  1.411448  0.427845850988  2.093028  0.496851595753  0.877154

                se_shock order
         0  0.424077566921   sgl
         1  0.478225225102   slg
         2  0.429255250639   gls
         3  0.524700221893   gls
         4   0.35425932307   lgs

Out[40]: order           gls  gsl  lgs   lsg  sgl  slg
         parameter
         ambiguityLevel  6.0  2.0  3.0   5.0  1.0  1.0
         intercept       0.0  0.0  7.0  10.0  0.0  1.0
         mag_diff        7.0  2.0  2.0   3.0  2.0  2.0
         prob_diff       5.0  3.0  2.0   0.0  7.0  1.0
```

```
Out[41]: Power_divergenceResult(statistic=array([  7.33333333,  32.        ,   6.66666667,  11
                 4.51571721e-02]))

Out[42]: <matplotlib.axes._subplots.AxesSubplot at 0xa8a50d0>
```



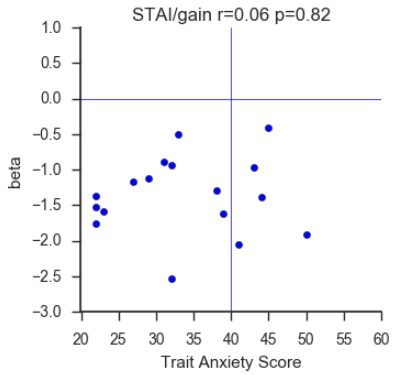
7 Traits (STAI)

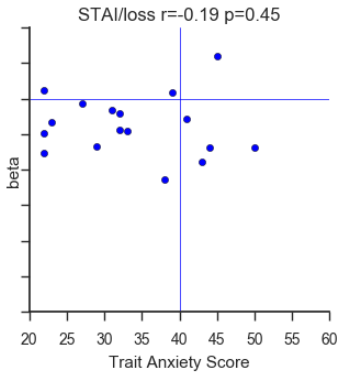
7.1 read in data and prepare dataframe

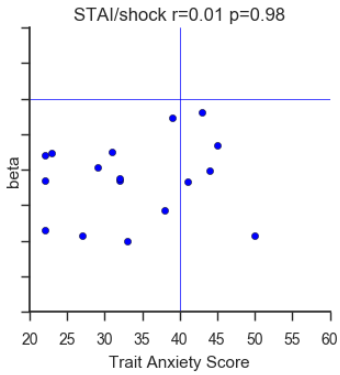
7.2 Plot STAI and Triplet (Ambiguous)

- why can't I set x axis limits?
- apparently it makes it so that both axes are of the same length, also true if figsize is not set

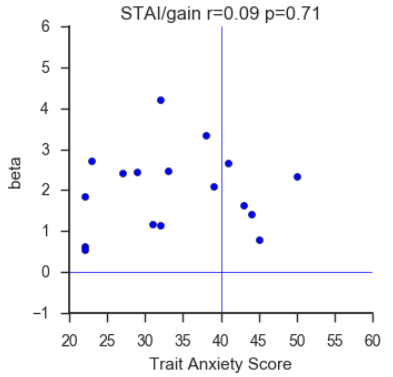
Ambiguity Presence

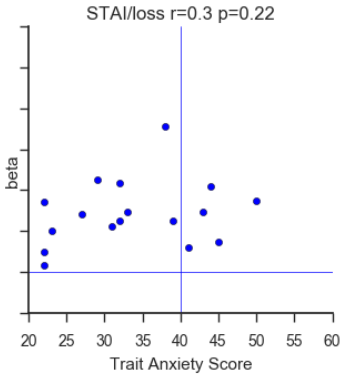


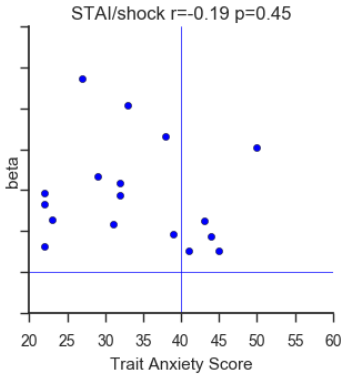




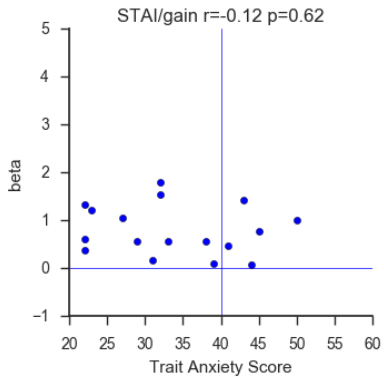
ProbabilityDifference

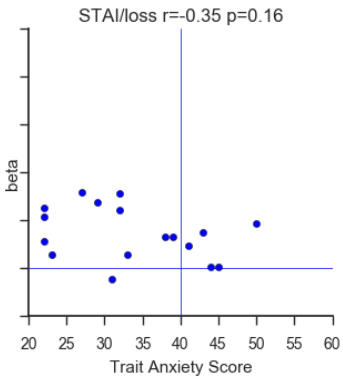


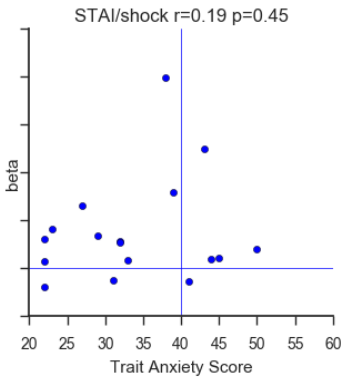


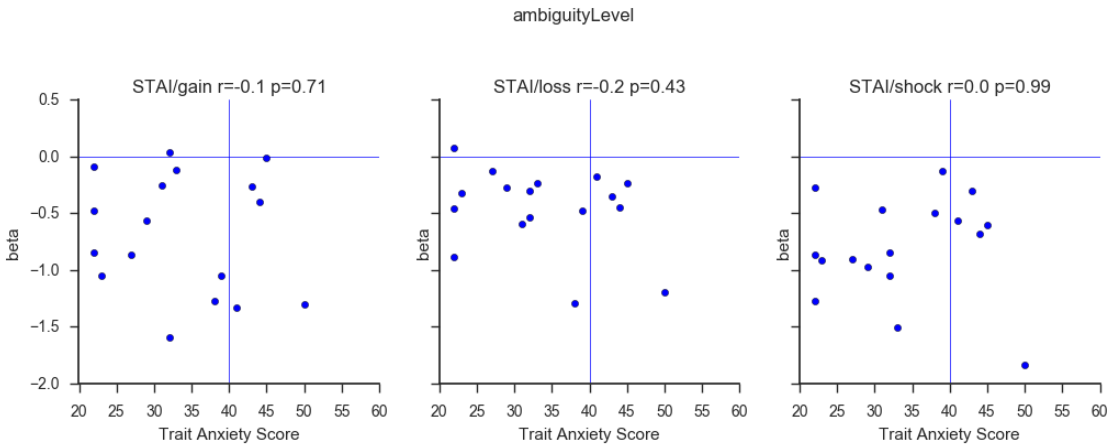


mag_diff









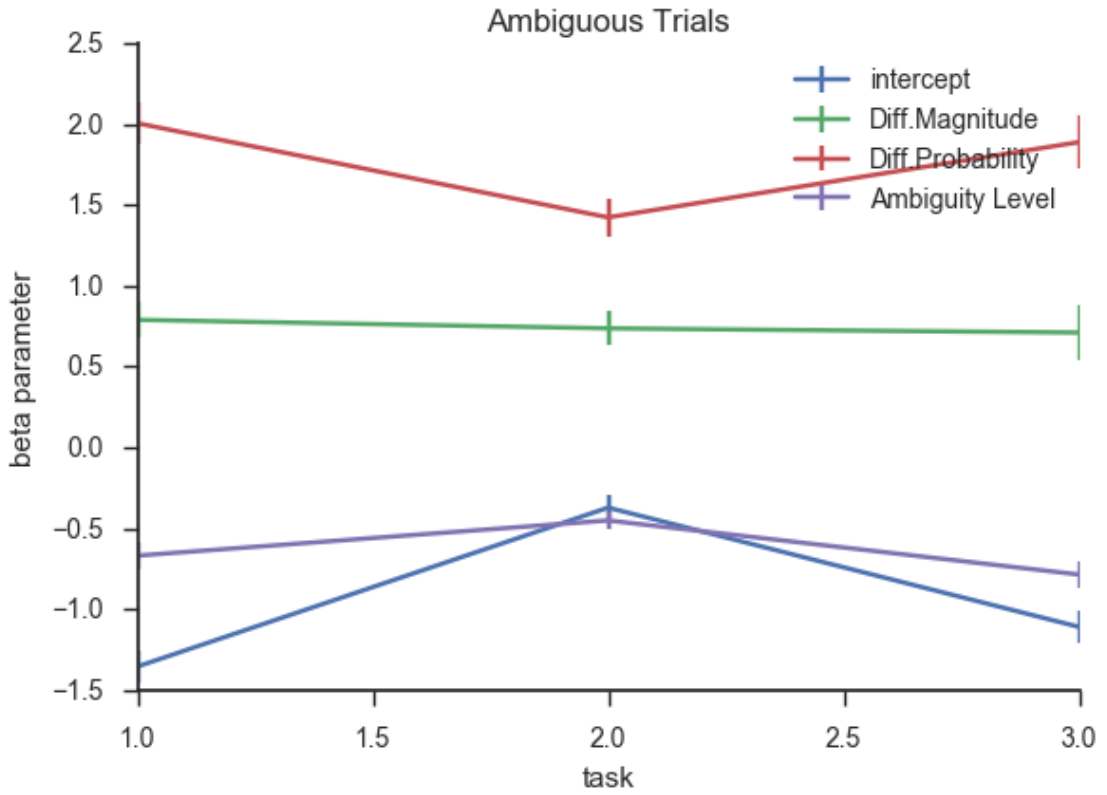
8 Mean parameters per task (gain, loss, shock)

8.1 Ambiguous Trials

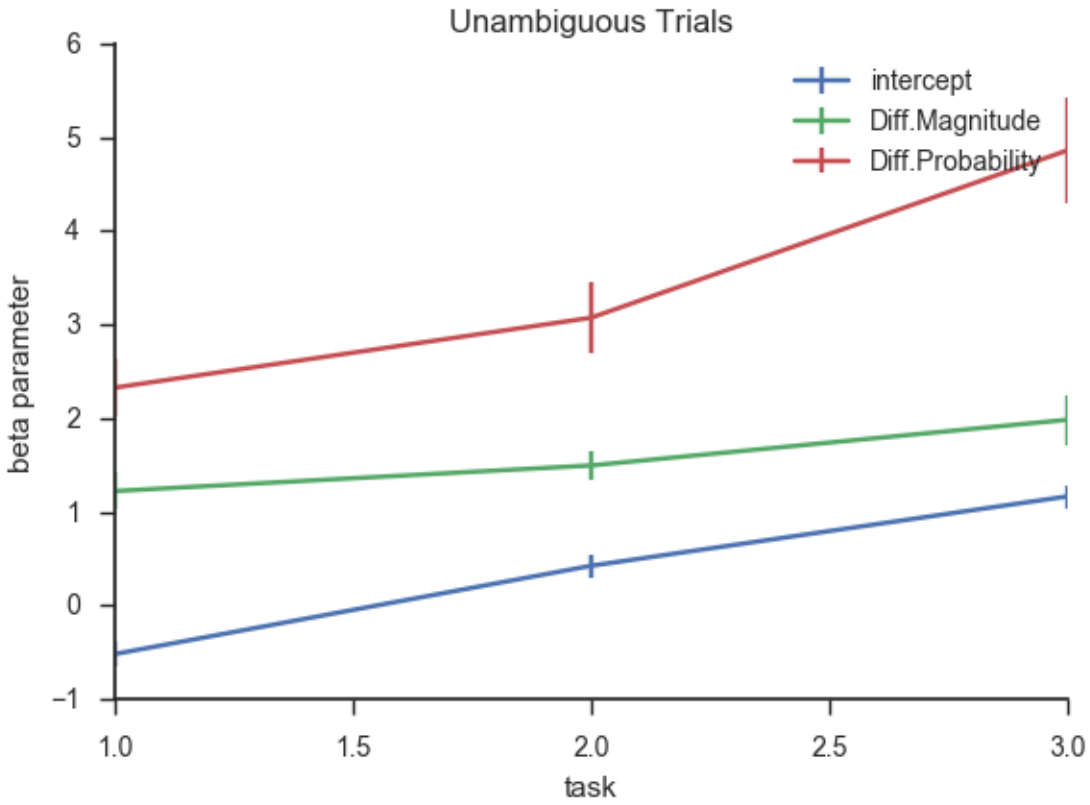
8.1.1 plot mean parameter per task

plot mean parameter per task with errorbars adjusted between gain, loss, and shock

Out[55]: <Container object of 3 artists>



Out[56]: <Container object of 3 artists>



8.1.2 plot scatterplot showing the spearman correlation (r and pvalue) of tasks for each parameter

8.1.3 function to work on for plots (not in .py yet)

- errorbars don't work yet. They have to be specified differently and I couldn't find out how
- diagonal lines

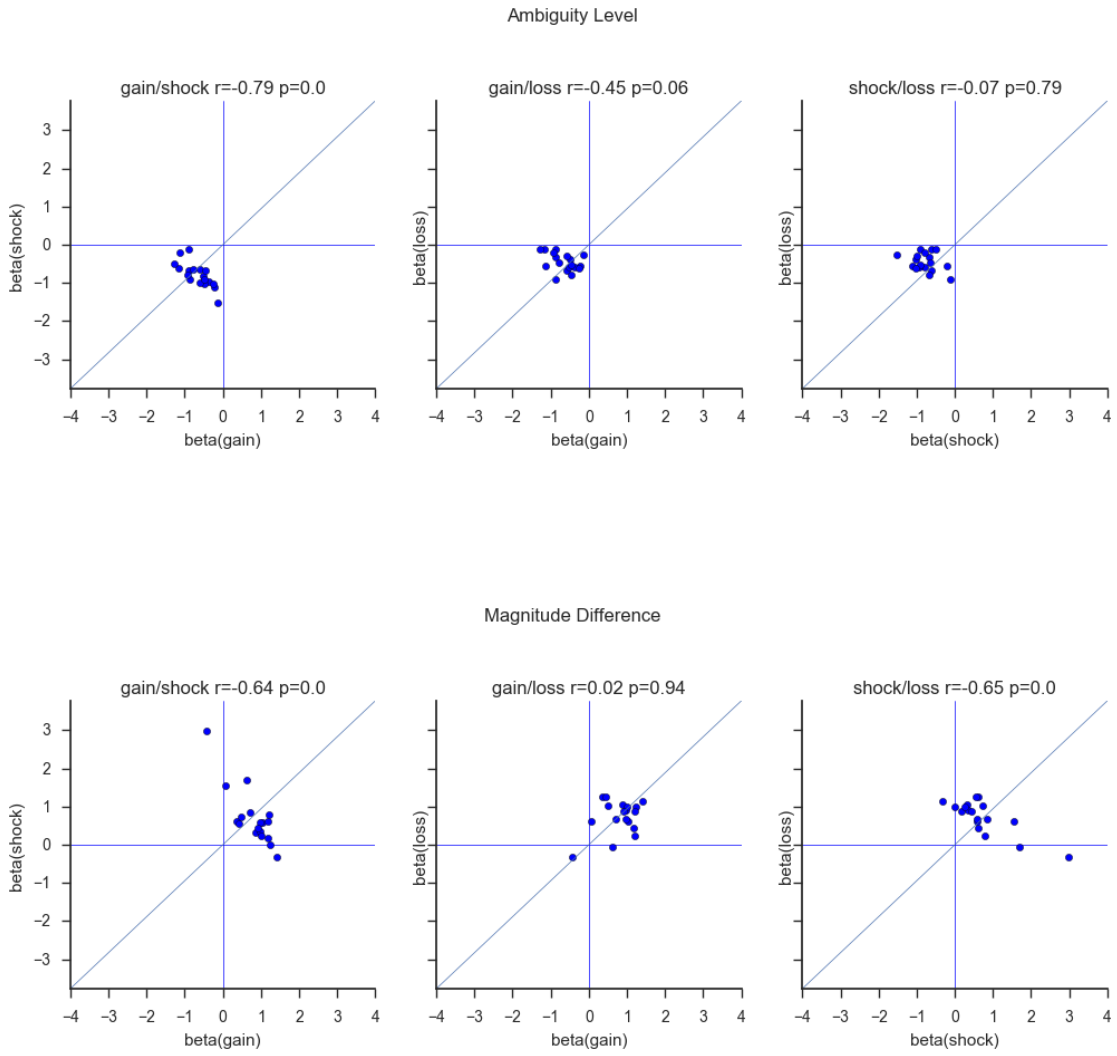
Code snippet for trying to make errorbars work

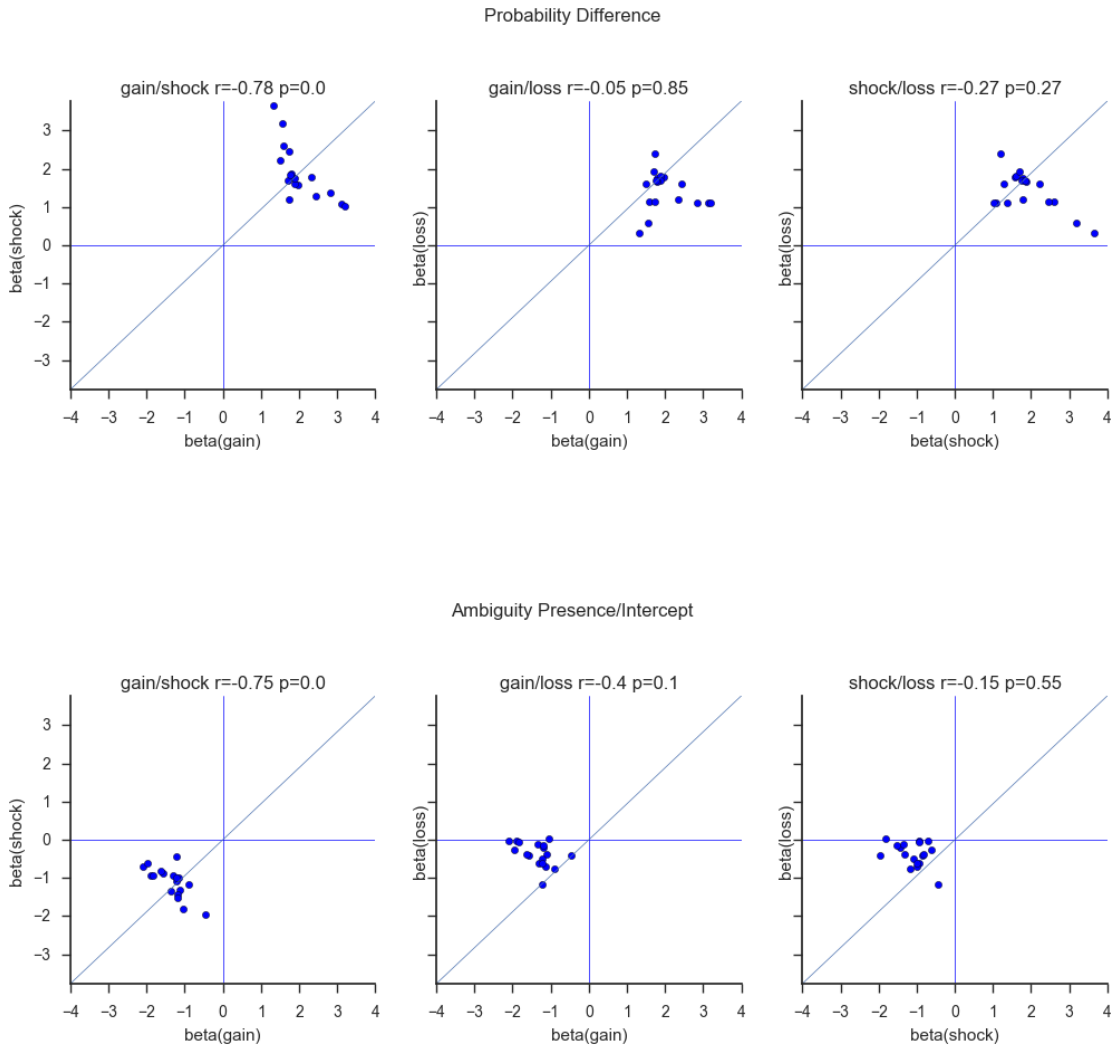
- error message: err must be a scalar, the same dimensions as x, or 2xN., but they are all 18
- tried within the pandas dataframe as well as as_matrix()

yerr = triplet_intercept['se_shock'].as_matrix() xerr = triplet_intercept['se_gain'].as_matrix() x = triplet_intercept['gain'].as_matrix() y = triplet_intercept['shock'].as_matrix() fig,axes = plt.subplots(1,3,figsize=(12,4),sharey=True,sharex=True) axes[0].scatter(x,y) axes[0].errorbar(x,y, xerr=xerr, yerr=yerr) axes[0].axhline(y=0.000,c="blue",linewidth=0.5,zorder=0) axes[0].axvline(x=0.000,c="blue",linewidth=0.5,zorder=0)

Function to modify

- add errorbars (not done)
- add horizontal and vertical lines (done)
- add diagonal lines (not done)





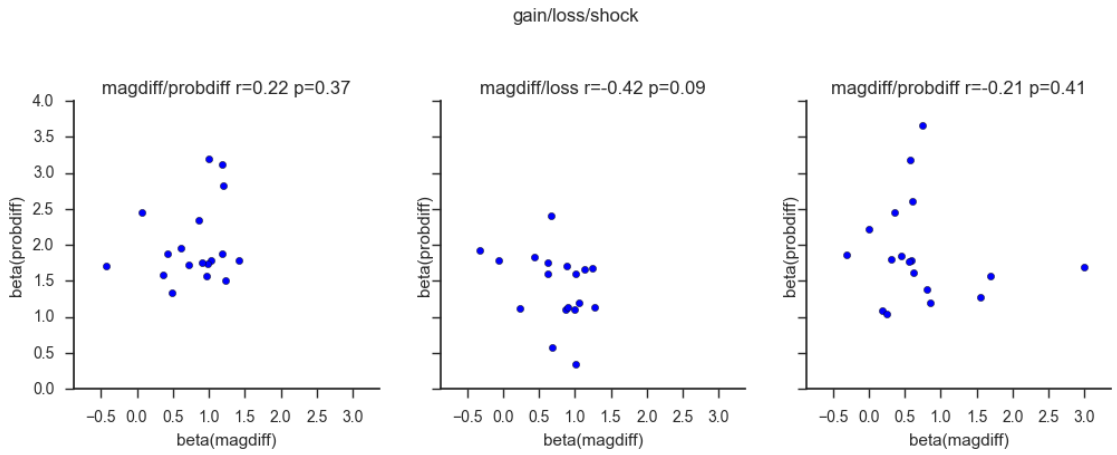
correlation between magdiff and probdiff for every task

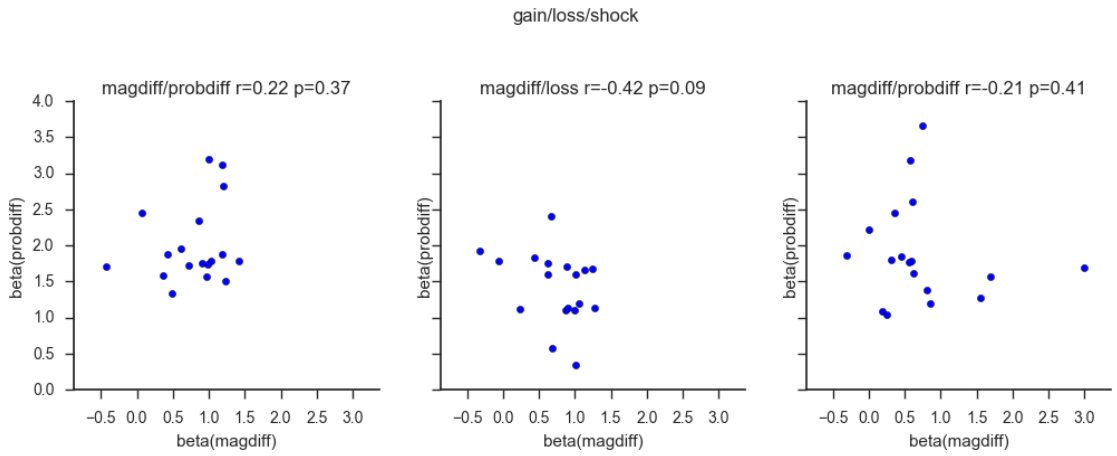
Out[59]:

	MID	gain	se_gain	loss	se_loss	shock	\
0	vp06	0.366461	0.373872390106	1.270487	0.397230853501	0.602149	
1	vp07	1.235052	0.500751241075	1.007034	0.448858198922	-0.002988	
2	vp10	0.616540	0.471796507085	-0.059910	0.350738826281	1.682467	
3	vp11	1.190468	0.570428761953	0.864671	0.455677006624	0.183958	
4	vp12	0.714948	0.326222167367	0.677174	0.364067239233	0.846975	
5	vp13	0.866847	0.371510227865	1.060894	0.351103925664	0.311356	
6	vp15	1.026639	0.300999452458	0.618214	0.308330344047	0.594244	
7	vp16	0.973662	0.371408478842	0.686024	0.313982927669	0.579411	
8	vp17	0.487127	0.434771384462	1.014686	0.459401118695	0.737283	
9	vp18	0.062016	0.363747371708	0.620377	0.343782687546	1.556705	
10	vp20	1.182881	0.334838532673	0.431423	0.280910566251	0.624793	
11	vp22	0.979105	0.443079916251	0.900631	0.402826997701	0.359361	

```
12   vp23   0.994921   0.395538428921   0.997404   0.294355619924   0.246772
13   vp25  -0.424506   0.389128860625  -0.328864   0.431970684469   2.992467
14   vp26   0.433216   0.362321313843   1.249877   0.476093117545   0.556005
15   vp27   1.412369   0.476558135705   1.138681   0.413672162174  -0.311953
16   vp28   0.910447   0.346726123353   0.881337   0.320636647955   0.447313
17   vp30   1.195446   0.475774761712   0.244071    0.29284864353   0.799580

          se_shock order
0   0.340973983094   lsg
1   0.350742462653   gls
2   0.607684259638   sgl
3   0.361630378166   gls
4   0.311961116926   sgl
5   0.333461005008   lgs
6   0.321908540456   gls
7   0.539998302049   gls
8   0.549959950479   lsg
9    0.44872521146   slg
10  0.292330140334   gsl
11  0.423284980761   gls
12  0.326472703359   lgs
13   1.02615885213   slg
14  0.377026099795   lsg
15  0.423355508437   gls
16  0.321390785517   gls
17  0.367379060758   gsl
```

Out[68]:





9 Statistics

9.1 prepare dataframe

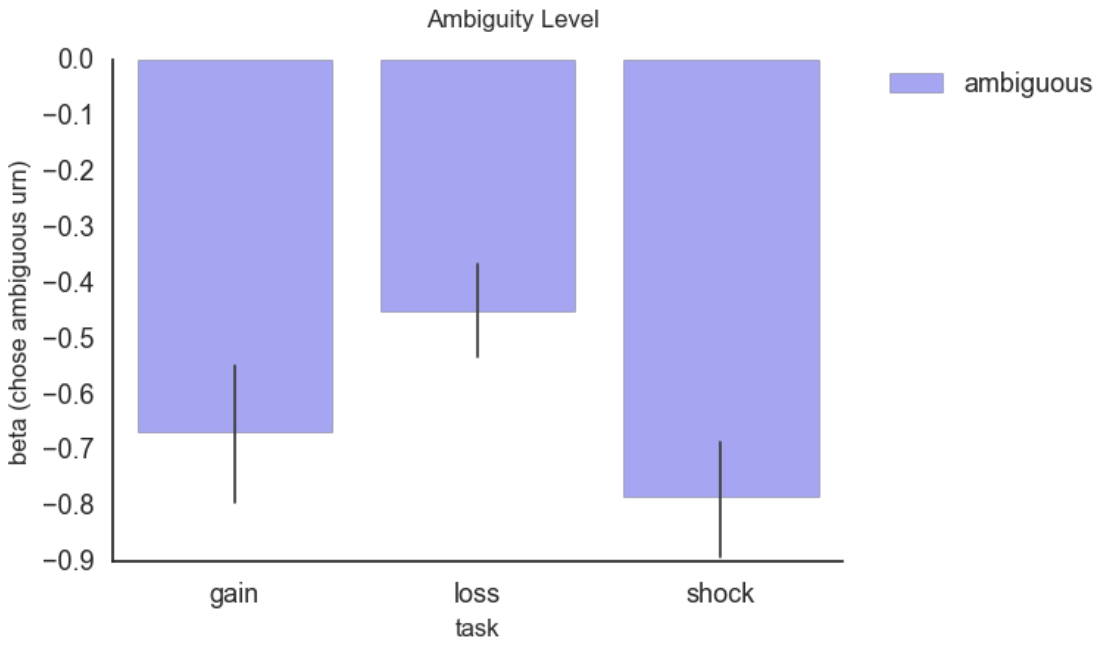
Out[69]:

	MID	parameter	task	beta	se	condition
1	vp06	intercept	gain	-1.759563	0.343866292919	ambiguous
2	vp06	mag_diff	gain	0.362886	0.373872390106	ambiguous
3	vp06	prob_diff	gain	0.618895	0.39654069989	ambiguous
4	vp06	ambiguityLevel	gain	-0.476255	0.306502282594	ambiguous
5	vp06	intercept	loss	0.111916	0.25354260985	ambiguous

9.2 define function for graphs

9.3 Group Ambiguity Differences Across Tasks

9.3.1 Task differences in ambiguity level



Gain as reference

```
Out[72]: <class 'statsmodels.iolib.summary2.Summary'>
         """
                   Mixed Linear Model Regression Results
         ========================================================
         Model:              MixedLM Dependent Variable: beta
         No. Observations:   54      Method:             REML
         No. Groups:         18      Scale:              0.1384
         Min. group size:    3       Likelihood:         -33.0842
         Max. group size:    3       Converged:          Yes
         Mean group size:    3.0
         --------------------------------------------------------
                       Coef.  Std.Err.   z    P>|z| [0.025 0.975]
         --------------------------------------------------------
         Intercept     -0.667    0.104 -6.408 0.000 -0.871 -0.463
         task[T.loss]   0.218    0.124  1.755 0.079 -0.025  0.461
         task[T.shock] -0.117    0.124 -0.942 0.346 -0.360  0.126
         Intercept RE   0.057    0.122
         ========================================================
```

```
"""
```

Loss as reference

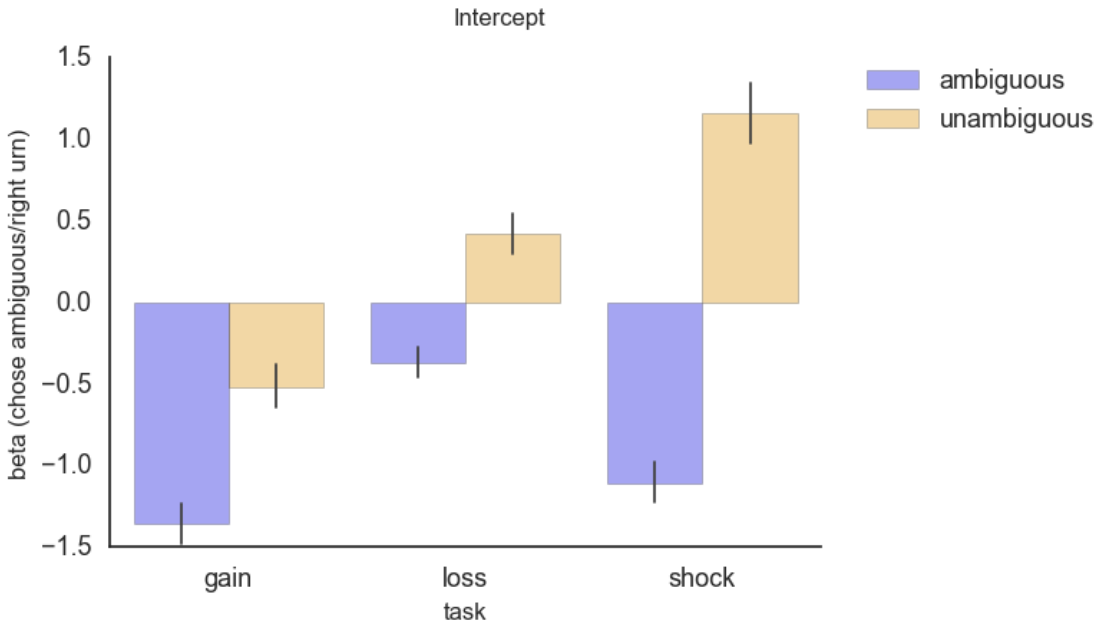
```
Out[74]: <class 'statsmodels.iolib.summary2.Summary'>
"""
          Mixed Linear Model Regression Results
=========================================================
Model:              MixedLM Dependent Variable: beta
No. Observations:   54      Method:             REML
No. Groups:         18      Scale:              0.1384
Min. group size:    3       Likelihood:         -33.0842
Max. group size:    3       Converged:          Yes
Mean group size:    3.0
---------------------------------------------------------
               Coef.  Std.Err.   z    P>|z| [0.025 0.975]
---------------------------------------------------------
Intercept     -0.450    0.104 -4.318 0.000 -0.654 -0.245
task[T.shock] -0.334    0.124 -2.697 0.007 -0.577 -0.091
task[T.gain]  -0.218    0.124 -1.755 0.079 -0.461  0.025
Intercept RE   0.057    0.122
=========================================================

"""
```

shock as reference

```
Out[76]: <class 'statsmodels.iolib.summary2.Summary'>
"""
         Mixed Linear Model Regression Results
=========================================================
Model:              MixedLM Dependent Variable: beta
No. Observations:   54      Method:             REML
No. Groups:         18      Scale:              0.1384
Min. group size:    3       Likelihood:         -33.0842
Max. group size:    3       Converged:          Yes
Mean group size:    3.0
---------------------------------------------------------
              Coef.  Std.Err.   z    P>|z| [0.025 0.975]
---------------------------------------------------------
Intercept    -0.784    0.104 -7.530 0.000 -0.988 -0.580
task[T.gain]  0.117    0.124  0.942 0.346 -0.126  0.360
task[T.loss]  0.334    0.124  2.697 0.007  0.091  0.577
Intercept RE  0.057    0.122
=========================================================

"""
```

9.3.2 Task differences in ambiguity presence

Gain as reference



Out[78]: <class 'statsmodels.iolib.summary2.Summary'>

```
"""
                        Mixed Linear Model Regression Results
========================================================================================
Model:                      MixedLM          Dependent Variable:          beta
No. Observations:           108              Method:                      REML
No. Groups:                 18               Scale:                       0.3141
Min. group size:            6                Likelihood:                  -98.6720
Max. group size:            6                Converged:                   Yes
Mean group size:            6.0
----------------------------------------------------------------------------------------
                                      Coef.  Std.Err.    z    P>|z| [0.025 0.975]
----------------------------------------------------------------------------------------
Intercept                             -1.353    0.139 -9.718 0.000 -1.626 -1.080
task[T.loss]                           0.982    0.187  5.259 0.000  0.616  1.349
task[T.shock]                          0.245    0.187  1.314 0.189 -0.121  0.612
condition[T.unambiguous]               0.832    0.187  4.455 0.000  0.466  1.198
task[T.loss]:condition[T.unambiguous] -0.039    0.264 -0.148 0.882 -0.557  0.479
task[T.shock]:condition[T.unambiguous] 1.439    0.264  5.448 0.000  0.922  1.957
Intercept RE                           0.035    0.061
========================================================================================

"""
```

Loss as reference

```
Out[80]: <class 'statsmodels.iolib.summary2.Summary'>
         """
                          Mixed Linear Model Regression Results
         ========================================================================================
         Model:                       MixedLM          Dependent Variable:          beta
         No. Observations:            108              Method:                      REML
         No. Groups:                  18               Scale:                       0.3141
         Min. group size:             6                Likelihood:                  -98.6720
         Max. group size:             6                Converged:                   Yes
         Mean group size:             6.0
         ----------------------------------------------------------------------------------------
                                                Coef.  Std.Err.    z    P>|z| [0.025 0.975]
         ----------------------------------------------------------------------------------------
         Intercept                              -0.371    0.139 -2.662 0.008 -0.643 -0.098
         task[T.shock]                          -0.737    0.187 -3.945 0.000 -1.103 -0.371
         condition[T.unambiguous]                0.793    0.187  4.246 0.000  0.427  1.159
         task[T.shock]:condition[T.unambiguous]  1.478    0.264  5.596 0.000  0.961  1.996
         task[T.gain]                           -0.982    0.187 -5.259 0.000 -1.349 -0.616
         task[T.gain]:condition[T.unambiguous]   0.039    0.264  0.148 0.882 -0.479  0.557
         Intercept RE                            0.035    0.061
         ========================================================================================

         """
```

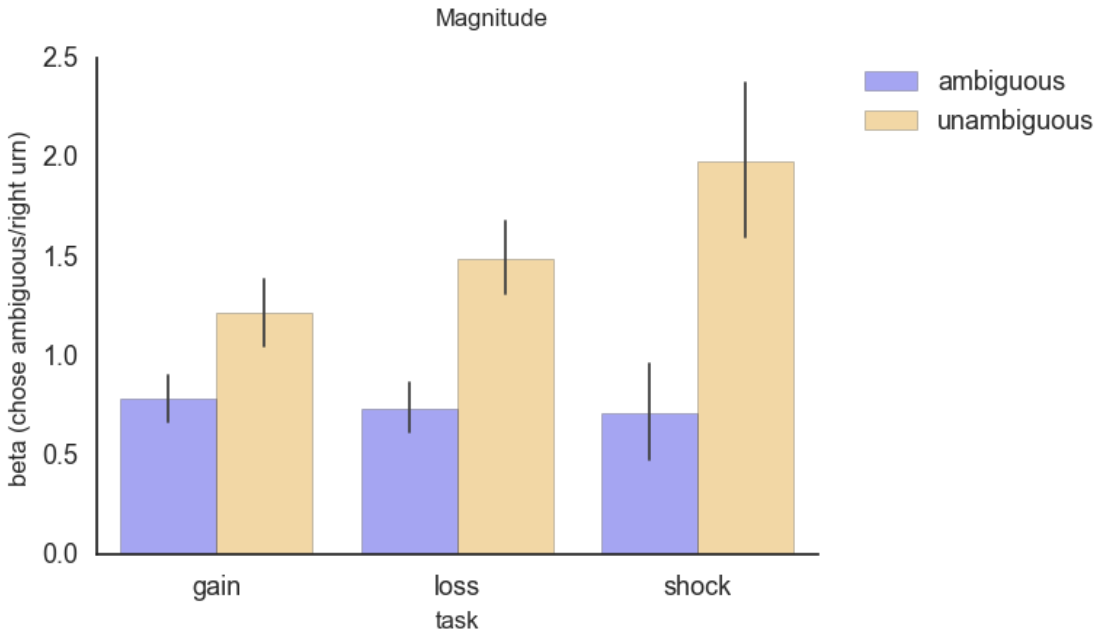
shock as reference

```
Out[82]: <class 'statsmodels.iolib.summary2.Summary'>
         """
                          Mixed Linear Model Regression Results
         ========================================================================================
         Model:                       MixedLM          Dependent Variable:          beta
         No. Observations:            108              Method:                      REML
         No. Groups:                  18               Scale:                       0.3141
         Min. group size:             6                Likelihood:                  -98.6720
         Max. group size:             6                Converged:                   Yes
         Mean group size:             6.0
         ----------------------------------------------------------------------------------------
                                                Coef.  Std.Err.    z    P>|z| [0.025 0.975]
         ----------------------------------------------------------------------------------------
         Intercept                              -1.107    0.139 -7.955 0.000 -1.380 -0.835
         condition[T.unambiguous]                2.272    0.187 12.159 0.000  1.905  2.638
         task[T.gain]                           -0.245    0.187 -1.314 0.189 -0.612  0.121
         task[T.gain]:condition[T.unambiguous] -1.439    0.264 -5.448 0.000 -1.957 -0.922
         task[T.loss]                            0.737    0.187  3.945 0.000  0.371  1.103
         task[T.loss]:condition[T.unambiguous] -1.478    0.264 -5.596 0.000 -1.996 -0.961
         Intercept RE                            0.035    0.061
```

```
==============================================================================

"""
```

9.4 Risk Preference Differences Across Tasks

9.4.1 Magnitude



Gain as reference

Out[84]:
```
<class 'statsmodels.iolib.summary2.Summary'>
"""
                     Mixed Linear Model Regression Results
==============================================================================
Model:                     MixedLM         Dependent Variable:         beta
No. Observations:          108             Method:                     REML
No. Groups:                18              Scale:                      0.7957
Min. group size:           6               Likelihood:                 -149.8812
Max. group size:           6               Converged:                  Yes
Mean group size:           6.0
------------------------------------------------------------------------------
                                  Coef.  Std.Err.   z    P>|z| [0.025 0.975]
------------------------------------------------------------------------------
Intercept                          0.790    0.237  3.339 0.001  0.326  1.254
task[T.loss]                      -0.053    0.297 -0.177 0.859 -0.636  0.530
task[T.shock]                     -0.079    0.297 -0.265 0.791 -0.662  0.504
```

```
condition[T.unambiguous]                0.431    0.297  1.449 0.147 -0.152  1.014
task[T.loss]:condition[T.unambiguous]   0.326    0.420  0.776 0.438 -0.498  1.150
task[T.shock]:condition[T.unambiguous]  0.841    0.420  1.999 0.046  0.016  1.665
Intercept RE                            0.213    0.151
================================================================================

"""
```

Loss as reference

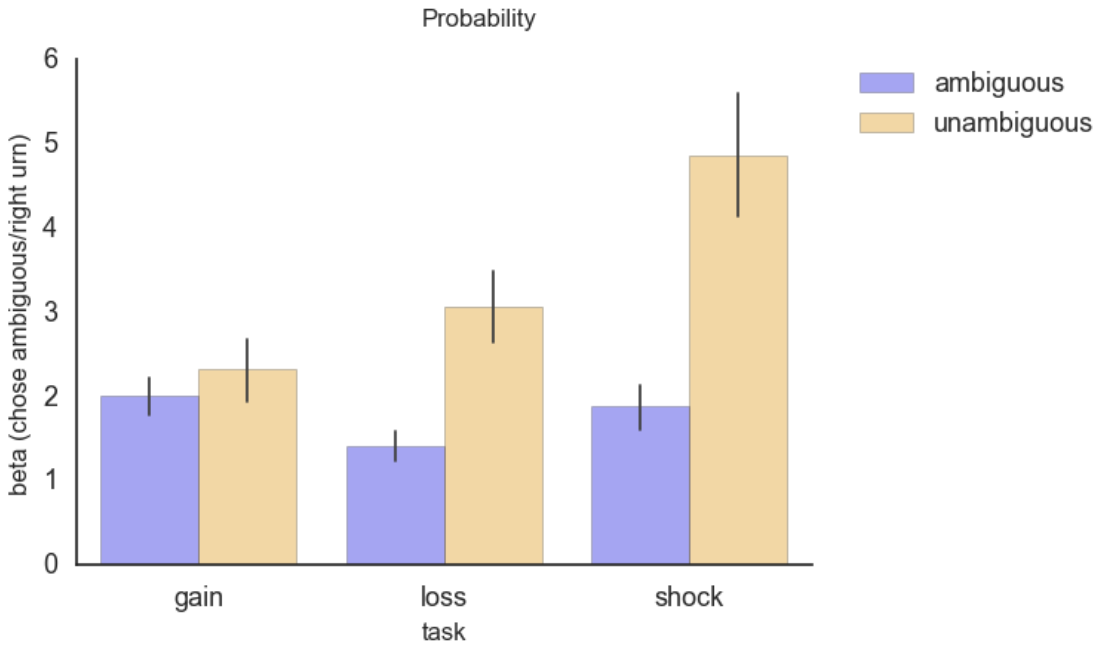
Out[86]:
```
<class 'statsmodels.iolib.summary2.Summary'>
"""
                      Mixed Linear Model Regression Results
================================================================================
Model:                      MixedLM         Dependent Variable:         beta
No. Observations:           108             Method:                     REML
No. Groups:                 18              Scale:                      0.7957
Min. group size:            6               Likelihood:                 -149.8812
Max. group size:            6               Converged:                  Yes
Mean group size:            6.0
--------------------------------------------------------------------------------
                                       Coef.  Std.Err.   z    P>|z| [0.025 0.975]
--------------------------------------------------------------------------------
Intercept                               0.737    0.237  3.116 0.002  0.274  1.201
task[T.shock]                          -0.026    0.297 -0.088 0.930 -0.609  0.557
condition[T.unambiguous]                0.757    0.297  2.547 0.011  0.175  1.340
task[T.shock]:condition[T.unambiguous]  0.514    0.420  1.223 0.221 -0.310  1.338
task[T.gain]                            0.053    0.297  0.177 0.859 -0.530  0.636
task[T.gain]:condition[T.unambiguous]  -0.326    0.420 -0.776 0.438 -1.150  0.498
Intercept RE                            0.213    0.151
================================================================================

"""
```

Shock as Reference

Out[88]:
```
<class 'statsmodels.iolib.summary2.Summary'>
"""
                      Mixed Linear Model Regression Results
================================================================================
Model:                      MixedLM         Dependent Variable:         beta
No. Observations:           108             Method:                     REML
No. Groups:                 18              Scale:                      0.7957
Min. group size:            6               Likelihood:                 -149.8812
Max. group size:            6               Converged:                  Yes
Mean group size:            6.0
--------------------------------------------------------------------------------
                                       Coef.  Std.Err.   z    P>|z| [0.025 0.975]
```

```
-------------------------------------------------------------------------------
Intercept                                0.711    0.237  3.006 0.003  0.248  1.175
condition[T.unambiguous]                 1.272    0.297  4.276 0.000  0.689  1.854
task[T.gain]                             0.079    0.297  0.265 0.791 -0.504  0.662
task[T.gain]:condition[T.unambiguous]   -0.841    0.420 -1.999 0.046 -1.665 -0.016
task[T.loss]                             0.026    0.297  0.088 0.930 -0.557  0.609
task[T.loss]:condition[T.unambiguous]   -0.514    0.420 -1.223 0.221 -1.338  0.310
Intercept RE                             0.213    0.151
===============================================================================

"""
```

9.4.2 Probability



Gain as Reference

Out[90]:
```
<class 'statsmodels.iolib.summary2.Summary'>
"""
                     Mixed Linear Model Regression Results
===============================================================================
Model:                     MixedLM         Dependent Variable:         beta
No. Observations:          108             Method:                     REML
No. Groups:                18              Scale:                      2.7524
Min. group size:           6               Likelihood:                 -211.9721
Max. group size:           6               Converged:                  Yes
Mean group size:           6.0
```

```
------------------------------------------------------------------------------
                                    Coef.  Std.Err.    z    P>|z| [0.025 0.975]
------------------------------------------------------------------------------
Intercept                           2.005    0.430  4.661 0.000  1.162  2.848
task[T.loss]                       -0.582    0.553 -1.052 0.293 -1.666  0.502
task[T.shock]                      -0.117    0.553 -0.211 0.833 -1.201  0.967
condition[T.unambiguous]            0.321    0.553  0.580 0.562 -0.763  1.405
task[T.loss]:condition[T.unambiguous]   1.328    0.782  1.699 0.089 -0.204  2.861
task[T.shock]:condition[T.unambiguous]  2.652    0.782  3.391 0.001  1.119  4.184
Intercept RE                        0.578    0.244
==============================================================================

"""
```

Loss as Reference

Out[92]:
```
<class 'statsmodels.iolib.summary2.Summary'>
"""
                     Mixed Linear Model Regression Results
==============================================================================
Model:                     MixedLM         Dependent Variable:         beta
No. Observations:          108             Method:                     REML
No. Groups:                18              Scale:                      2.7524
Min. group size:           6               Likelihood:                 -211.9721
Max. group size:           6               Converged:                  Yes
Mean group size:           6.0
------------------------------------------------------------------------------
                                    Coef.  Std.Err.    z    P>|z| [0.025 0.975]
------------------------------------------------------------------------------
Intercept                           1.423    0.430  3.309 0.001  0.580  2.266
task[T.shock]                       0.465    0.553  0.841 0.401 -0.619  1.549
condition[T.unambiguous]            1.649    0.553  2.983 0.003  0.565  2.733
task[T.shock]:condition[T.unambiguous]  1.323    0.782  1.692 0.091 -0.210  2.856
task[T.gain]                        0.582    0.553  1.052 0.293 -0.502  1.666
task[T.gain]:condition[T.unambiguous]  -1.328    0.782 -1.699 0.089 -2.861  0.204
Intercept RE                        0.578    0.244
==============================================================================

"""
```

Shock as Reference

Out[94]:
```
<class 'statsmodels.iolib.summary2.Summary'>
"""
                     Mixed Linear Model Regression Results
==============================================================================
Model:                     MixedLM         Dependent Variable:         beta
No. Observations:          108             Method:                     REML
```

```
No. Groups:                 18              Scale:                      2.7524
Min. group size:            6               Likelihood:                 -211.9721
Max. group size:            6               Converged:                  Yes
Mean group size:            6.0
------------------------------------------------------------------------------
                                    Coef.  Std.Err.   z    P>|z| [0.025 0.975]
------------------------------------------------------------------------------
Intercept                            1.888    0.430  4.390 0.000  1.045  2.731
condition[T.unambiguous]             2.973    0.553  5.375 0.000  1.889  4.057
task[T.gain]                         0.117    0.553  0.211 0.833 -0.967  1.201
task[T.gain]:condition[T.unambiguous] -2.652   0.782 -3.391 0.001 -4.184 -1.119
task[T.loss]                        -0.465    0.553 -0.841 0.401 -1.549  0.619
task[T.loss]:condition[T.unambiguous] -1.323   0.782 -1.692 0.091 -2.856  0.210
Intercept RE                         0.578    0.244
==============================================================================

"""
```