Analysis_Revision

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Contents

Experiment 1

Theme used for every small multiple created

Demographics

There were 141 participants in Experiments 1. There were 71 participants who selected Male, 65 participants who selected Female, 4 participants who selected Non-binary / third gender, and 1 who selected Prefer not to say.

the mean age is 33.62 (SD = 11.79).

Identify

Identify 1 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfaccID1
##
##      AIC      BIC   logLik deviance df.resid
##   5435.4   5463.0  -2713.7   5427.4      7196
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -9.0805  0.1872  0.3013  0.4392  1.7572
##
## Random effects:
##  Groups     Name         Variance Std.Dev.
##  Trial      (Intercept) 0.1257   0.3545
##  ResponseId (Intercept) 0.6604   0.8126
## Number of obs: 7200, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)      2.978545   0.216501    13.76   <2e-16 ***
## Frame_Quantity  -0.025610   0.001765   -14.51   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## Frame_Qntty -0.354
```
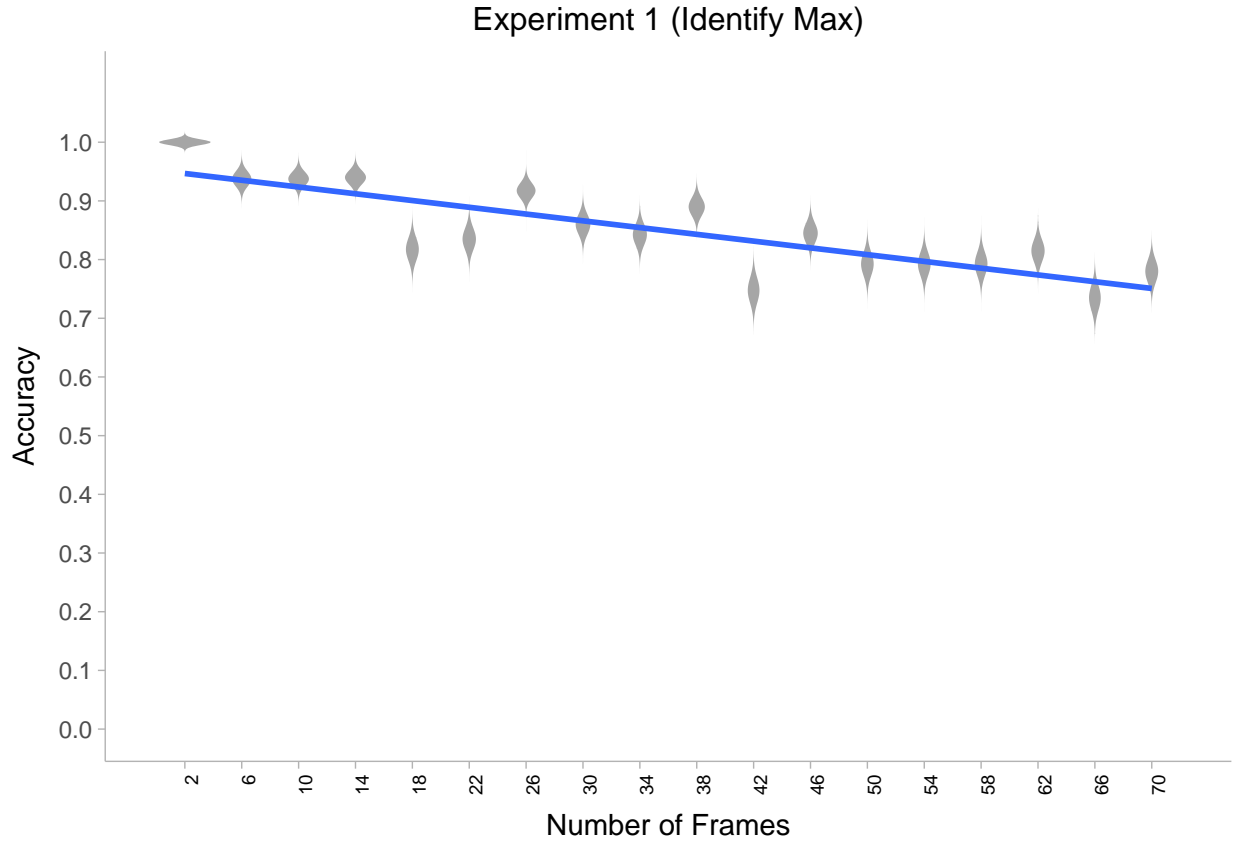
Experiment 1 (Identify Max)
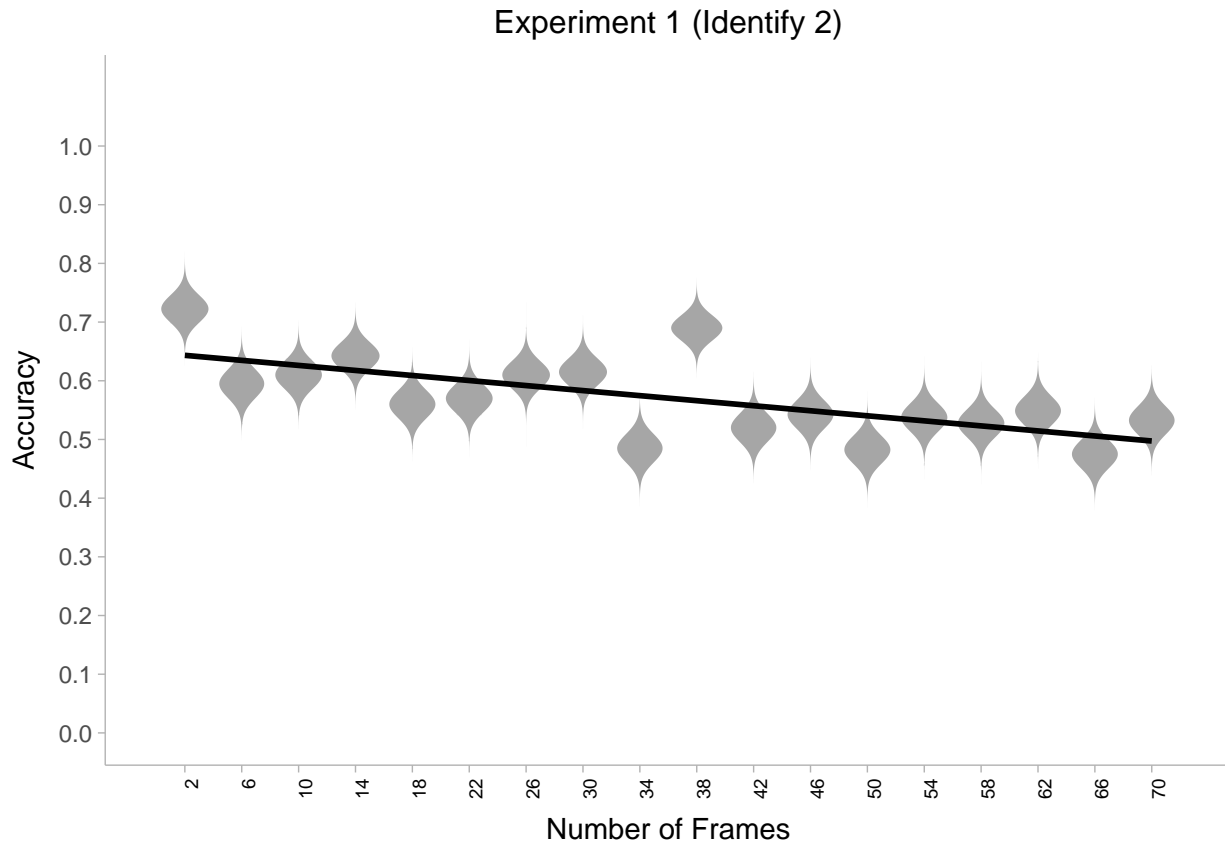

Identify 2 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##     Data: dfaccID2
##
##      AIC      BIC   logLik deviance df.resid
##   8946.3   8973.9  -4469.2   8938.3     7195
##
## Scaled residuals:
##     Min      1Q   Median      3Q      Max
## -2.4002 -1.0219   0.5581   0.7840   5.0077
##
## Random effects:
##  Groups     Name         Variance Std.Dev.
##  Trial      (Intercept) 0.08608  0.2934
##  ResponseId (Intercept) 0.73647  0.8582
## Number of obs: 7199, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)      0.621800   0.209498   2.968    0.003 **
## Frame_Quantity -0.010049   0.001236  -8.128 4.35e-16 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr)
## Frame_Qntty -0.216
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Experiment 1 (Identify 2)

Identify 2 Secondary Analysis (MeanRange vs Range vs Mean)   Identify 2 Mean Accuracy

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
## Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfacc
##
##     AIC       BIC    logLik deviance df.resid
##   8962.1    8989.6   -4477.0   8954.1     7195
##
## Scaled residuals:
##    Min      1Q  Median      3Q     Max
## -2.7411 -0.9203  0.4836  0.8070  4.8492
##
```

```
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  Trial       (Intercept) 0.1318    0.3631
##  ResponseId  (Intercept) 0.5506    0.7420
## Number of obs: 7199, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)       0.855632   0.192121    4.454 8.44e-06 ***
## Frame_Quantity   -0.019823   0.001254  -15.806  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr)
## Frame_Qntty -0.239
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```
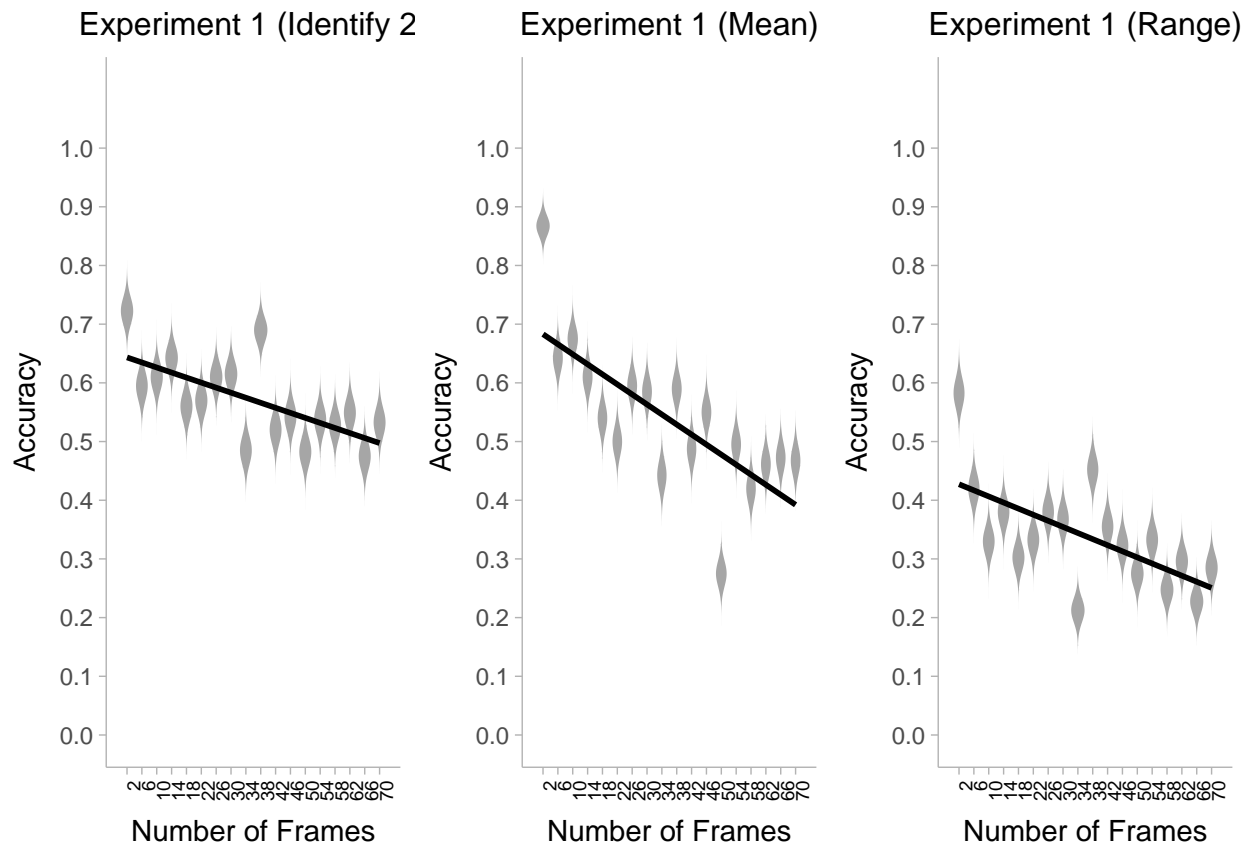
Identify 2 Range Accuracy

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfacc
##
##      AIC       BIC    logLik deviance df.resid
##   8503.5    8531.0   -4247.7   8495.5     7195
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## -1.8554  -0.7200  -0.4952   0.9845   4.9350
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  Trial       (Intercept) 0.2768    0.5261
##  ResponseId  (Intercept) 0.4440    0.6663
## Number of obs: 7199, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      -0.326442   0.196937   -1.658   0.0974 .
## Frame_Quantity   -0.012962   0.001282  -10.109  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr)
## Frame_Qntty -0.222
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Plots side-by-side

| Experiment 1 (Identify 2 | Experiment 1 (Mean) | Experiment 1 (Range) |

Identify 3 Accuracy Analysis

We have a problem Trial for 18 frames - trial 12 (letter N) frame 14 is visually not over the dotted line at 79.5, but the value is 79.507. We are marking this as not a correct response.

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfaccID3
##
##      AIC       BIC    logLik  deviance  df.resid
##   4231.1    4258.7   -2111.6    4223.1      7196
##
## Scaled residuals:
##     Min      1Q   Median      3Q      Max
## -7.5642  0.1691   0.2344  0.3401   1.8523
##
## Random effects:
##  Groups     Name          Variance  Std.Dev.
##  Trial      (Intercept)   0.1315    0.3626
##  ResponseId (Intercept)   0.9624    0.9810
## Number of obs: 7200, groups:  Trial, 20; ResponseId, 20
```

```
## 
## Fixed effects:
##                 Estimate Std. Error z value Pr(>|z|)
## (Intercept)     3.083477   0.253215  12.177  < 2e-16 ***
## Frame_Quantity -0.015580   0.002004  -7.776 7.49e-15 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Correlation of Fixed Effects:
##            (Intr)
## Frame_Qntty -0.326
```
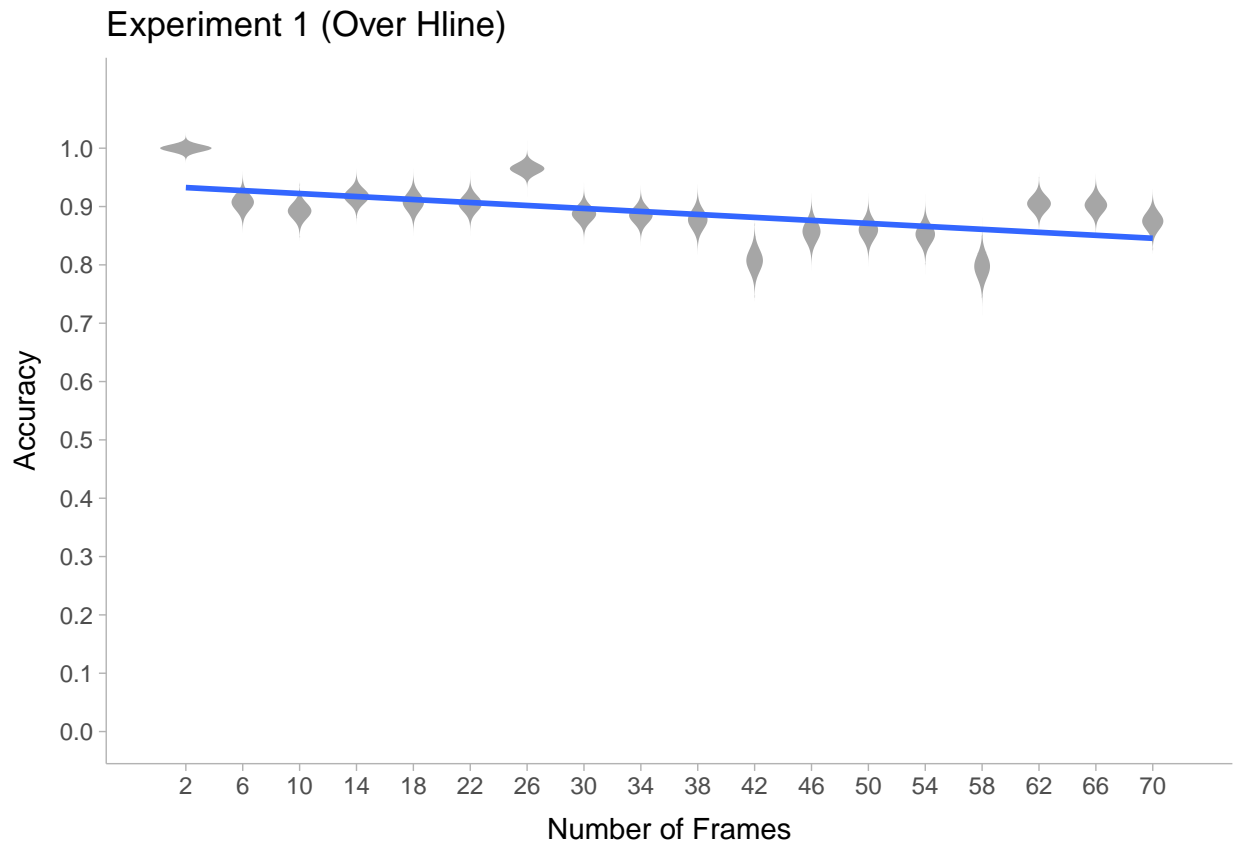

Experiment 1 (Over Hline) — scatter/violin plot of Accuracy vs Number of Frames
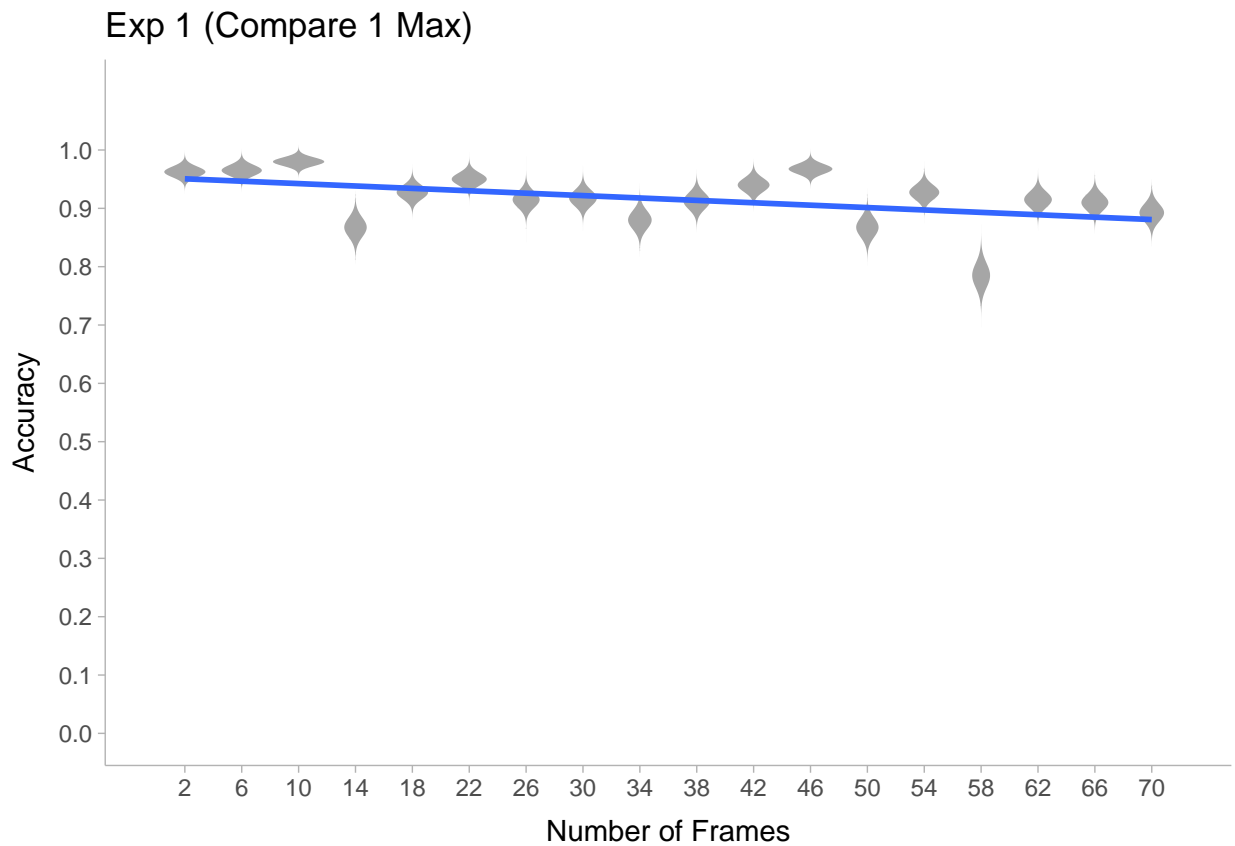
Compare

Compare 1 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfaccC1
## 
##      AIC      BIC   logLik deviance df.resid
##   3736.7   3764.2  -1864.3   3728.7     7196
```

```
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## -7.5995   0.1668   0.2247   0.3047   1.3897
##
## Random effects:
##  Groups      Name          Variance  Std.Dev.
##  Trial       (Intercept)   0.2774    0.5267
##  ResponseId  (Intercept)   0.5393    0.7343
## Number of obs: 7200, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                 Estimate  Std. Error  z value  Pr(>|z|)
## (Intercept)      3.29076    0.22765    14.455  < 2e-16 ***
## Frame_Quantity  -0.01481    0.00217    -6.824  8.86e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## Frame_Qntty -0.394
```
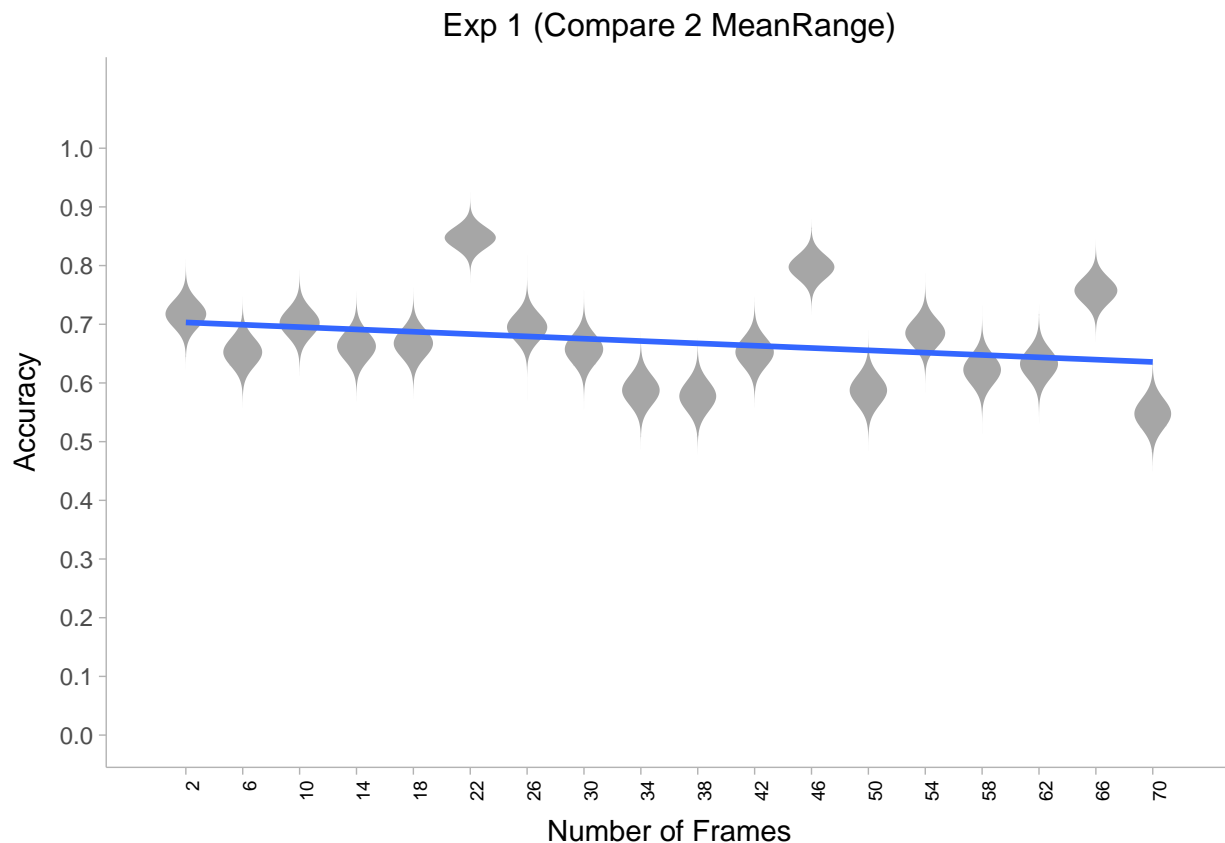
Exp 1 (Compare 1 Max)

Compare 2 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfaccC2
##
##      AIC       BIC    logLik deviance df.resid
##   8976.4    9003.9   -4484.2   8968.4      7196
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.4039 -1.2057  0.5978  0.7196  1.2085
##
## Random effects:
##  Groups     Name        Variance Std.Dev.
##  Trial      (Intercept) 0.10190  0.3192
##  ResponseId (Intercept) 0.05453  0.2335
## Number of obs: 7200, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)      0.899303   0.102535   8.771  < 2e-16 ***
## Frame_Quantity  -0.004630   0.001229  -3.768 0.000164 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr)
## Frame_Qntty -0.439
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Exp 1 (Compare 2 MeanRange)

Compare 2 Secondary Analysis (MeanRange vs Range vs Mean) Compare 2 Mean Accuracy

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##   Data: dfacc
##
##      AIC       BIC    logLik deviance df.resid
##   5713.7    5741.2   −2852.8    5705.7     7196
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## −5.3483   0.2819   0.3506   0.4224   1.5838
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  Trial       (Intercept)  0.1558    0.3948
##  ResponseId  (Intercept)  0.2572    0.5072
## Number of obs: 7200, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)      2.242099   0.161865  13.852  < 2e−16 ***
## Frame_Quantity  −0.009852   0.001662  −5.926  3.1e−09 ***
## ——
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## Frame_Qntty −0.400
```

Compare 2 Range Accuracy

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
## Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfacc
##
##      AIC      BIC   logLik deviance df.resid
## 179328.0 179367.1 −89660.0 179320.0   129596
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## −1.1752 −0.9982 −0.8981  1.0005  1.1142
##
## Random effects:
##  Groups     Name         Variance Std.Dev.
##  Trial      (Intercept) 0.01244  0.1115
##  ResponseId (Intercept) 0.00000  0.0000
## Number of obs: 129600, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)      0.0009688  0.0272774   0.036    0.972
## Frame_Quantity  −0.0003051  0.0002681  −1.138    0.255
##
## Correlation of Fixed Effects:
##             (Intr)
## Frame_Qntty −0.353
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

Plots side-by-side
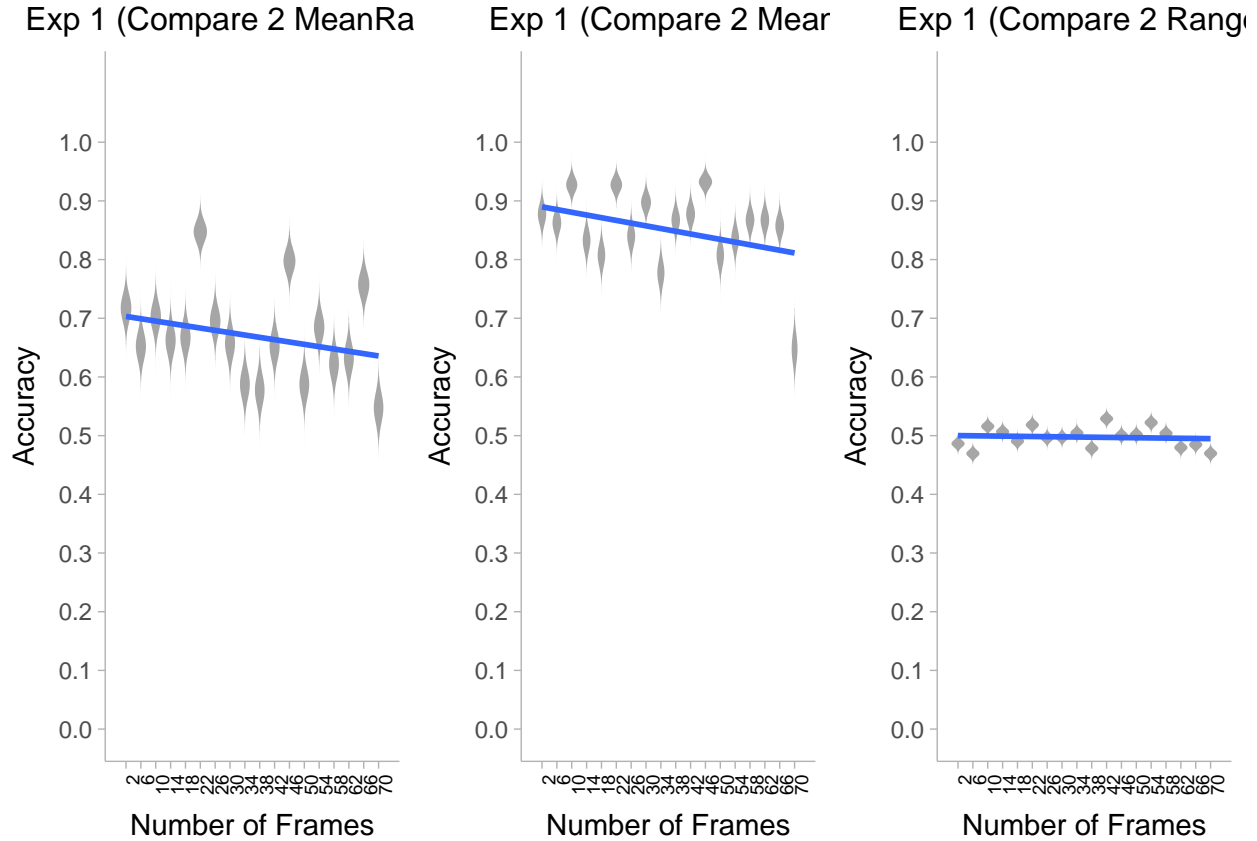
Exp 1 (Compare 2 MeanRa | Exp 1 (Compare 2 Mear | Exp 1 (Compare 2 Rang

Summarize

Summarize 1 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfaccS1
##
##      AIC      BIC    logLik  deviance  df.resid
##   9927.3   9955.0   -4959.6   9919.3      7556
##
## Scaled residuals:
##     Min      1Q   Median      3Q     Max
## -2.2132 -1.1414  0.6558  0.7954  1.4134
##
## Random effects:
##  Groups      Name          Variance  Std.Dev.
##  ResponseId (Intercept)  0.07272   0.2697
##  Trial      (Intercept)  0.04854   0.2203
## Number of obs: 7560, groups:  ResponseId, 21; Trial, 20
##
## Fixed effects:
##                  Estimate Std. Error z value Pr(>|z|)
```

```
## (Intercept)        0.740427     0.091000    8.137  4.07e−16 ***
## Frame_Quantity    −0.007375     0.001159   −6.362  2.00e−10 ***
## −−−
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr)
## Frame_Qntty  −0.468
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  − Rescale variables?
```


Experiment 1 (Summary 1)
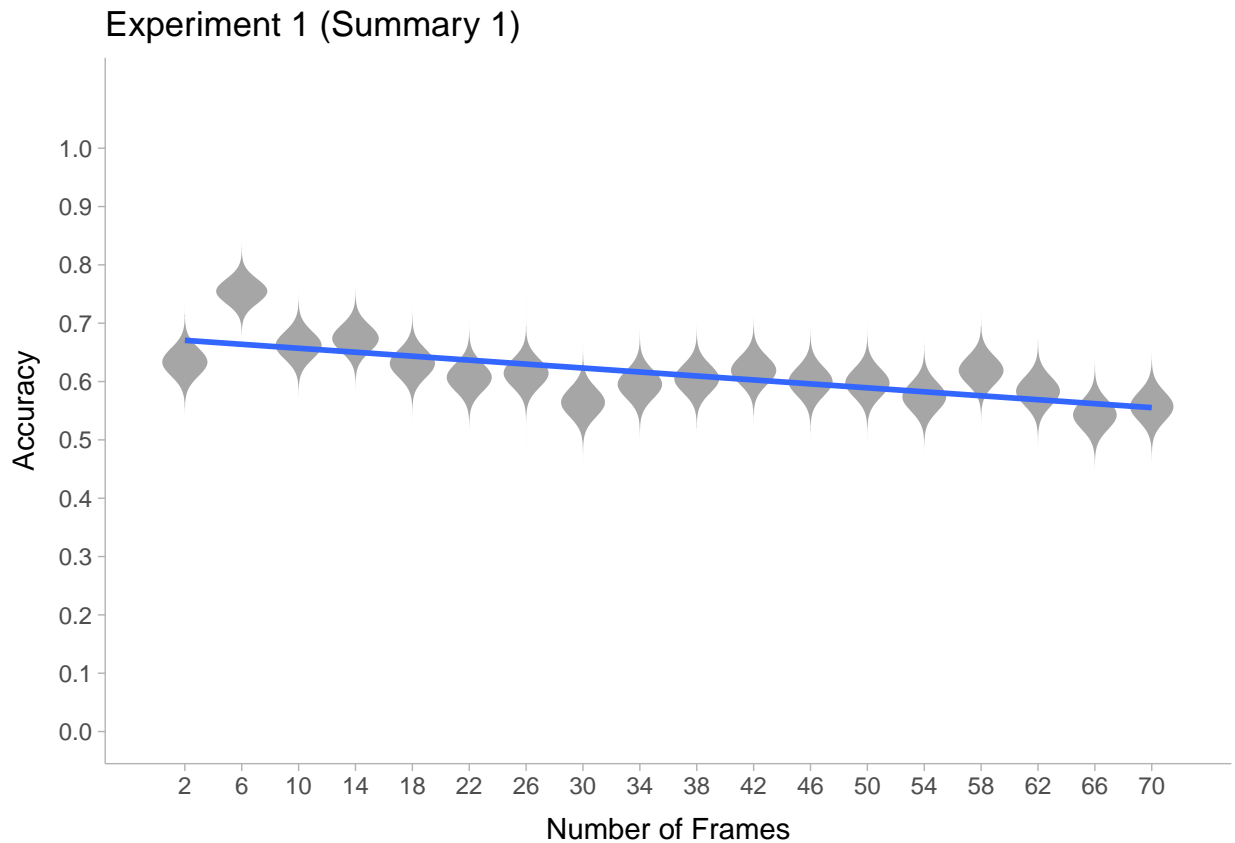
Summarize 2 Error Analysis

```
## Linear mixed model fit by REML. t−tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: error ~ Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: dfaccS2
##
## REML criterion at convergence: 210.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## −4.2895  −0.5816  −0.1634  0.3995  7.3860
```

```
##
## Random effects:
##  Groups      Name        Variance   Std.Dev.
##  Trial       (Intercept) 0.0006717  0.02592
##  ResponseId  (Intercept) 0.0730537  0.27028
##  Residual                0.0588751  0.24264
## Number of obs: 7144, groups:  Trial, 20; ResponseId, 20
##
## Fixed effects:
##                   Estimate  Std. Error         df  t value  Pr(>|t|)
## (Intercept)      2.241e-01   6.099e-02  1.960e+01    3.675   0.00154 **
## Frame_Quantity   2.507e-03   1.385e-04  7.104e+03   18.107  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## Frame_Qntty -0.082
```


Experiment 1 (Summary 2)
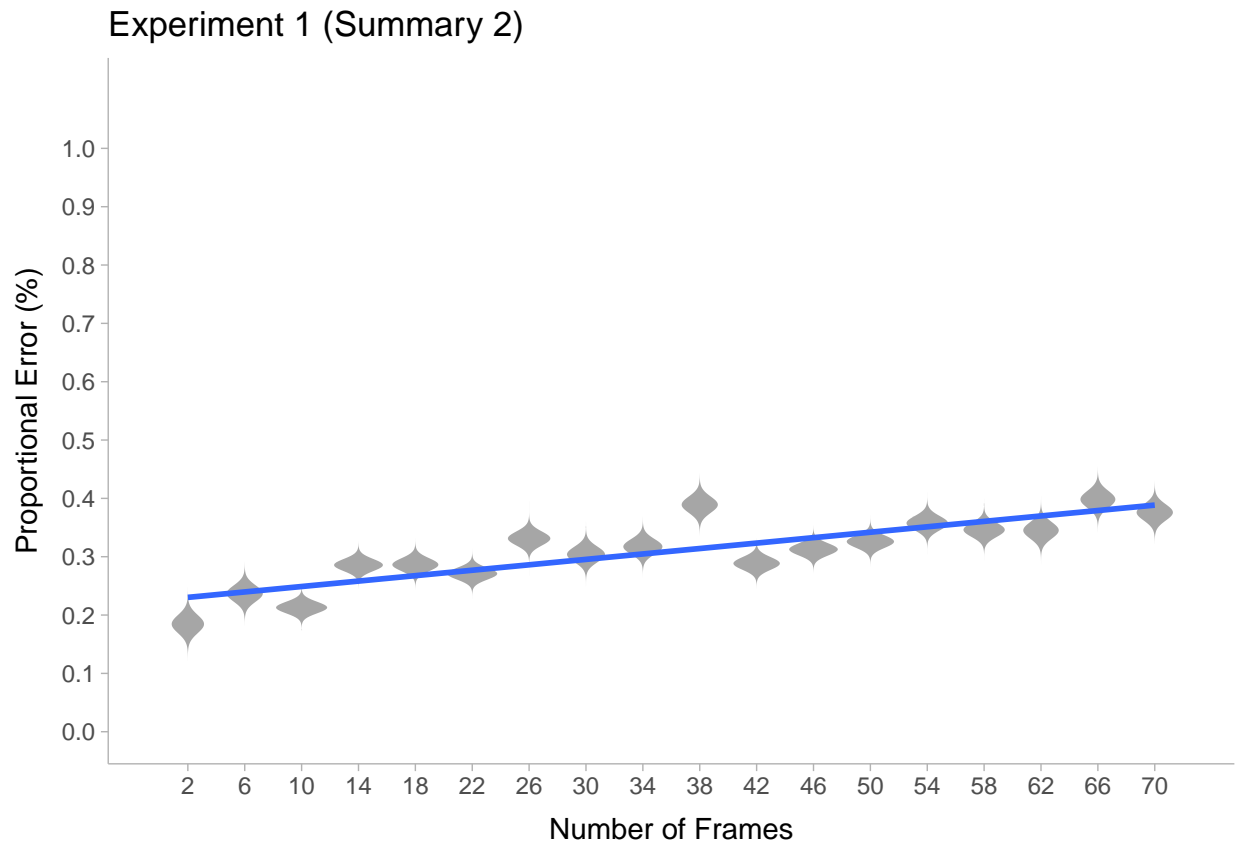
Experiment 1 - 6 Combined Tasks of Accuracy

Combine all of the main accuracy datasets

Changing the referent

Identify 1

(Spencer can you update the FullModels.RData with these interation models?)

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##     Data: df_full
##
##       AIC       BIC    logLik deviance df.resid
##   41537.5   41659.1  -20754.8  41509.5     43545
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## -7.4240  -0.2028   0.2946   0.6452   4.8237
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  ResponseId (Intercept) 0.4705   0.6859
##  Trial      (Intercept) 0.0371   0.1926
## Number of obs: 43559, groups:  ResponseId, 121; Trial, 20
##
## Fixed effects:
##                             Estimate Std. Error z value Pr(>|z|)
## (Intercept)                 2.926641   0.180509   16.213  < 2e-16 ***
## taskID2                    -2.309450   0.238835   -9.670  < 2e-16 ***
## taskID3                     0.088089   0.251002    0.351 0.725627
## taskComp1                   0.254216   0.253828    1.002 0.316570
## taskComp2                  -2.035927   0.238525   -8.535  < 2e-16 ***
## taskSumm1                  -2.184943   0.235676   -9.271  < 2e-16 ***
## Frame_Quantity             -0.025227   0.001751  -14.403  < 2e-16 ***
## taskID2:Frame_Quantity      0.015302   0.002139    7.153  8.5e-13 ***
## taskID3:Frame_Quantity      0.009926   0.002650    3.746 0.000180 ***
## taskComp1:Frame_Quantity    0.010761   0.002775    3.879 0.000105 ***
## taskComp2:Frame_Quantity    0.020638   0.002136    9.660  < 2e-16 ***
## taskSumm1:Frame_Quantity    0.017839   0.002101    8.491  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) tskID2 tskID3 tskCm1 tskCm2 tskSm1 Frm_Qn tID2:F tID3:F
## taskID2     -0.713
## taskID3     -0.676  0.511
## taskComp1   -0.670  0.506  0.480
## taskComp2   -0.714  0.540  0.512  0.507
## taskSumm1   -0.722  0.547  0.518  0.513  0.547
## Frame_Qntty -0.418  0.316  0.300  0.297  0.316  0.320
## tskID2:Fr_Q  0.342 -0.367 -0.246 -0.243 -0.259 -0.262 -0.819
## tskID3:Fr_Q  0.275 -0.208 -0.441 -0.196 -0.208 -0.211 -0.660  0.541
## tskCmp1:F_Q  0.264 -0.199 -0.189 -0.457 -0.199 -0.202 -0.631  0.517  0.417
## tskCmp2:F_Q  0.343 -0.259 -0.246 -0.243 -0.367 -0.263 -0.820  0.671  0.541
## tskSmm1:F_Q  0.349 -0.264 -0.250 -0.248 -0.264 -0.367 -0.834  0.682  0.551
```

```
##                 tC1:F_  tC2:F_
## taskID2
## taskID3
## taskComp1
## taskComp2
## taskSumm1
## Frame_Qntty
## tskID2:Fr_Q
## tskID3:Fr_Q
## tskCmp1:F_Q
## tskCmp2:F_Q   0.517
## tskSmm1:F_Q   0.526   0.683
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Identify 2

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: df_full
##
##      AIC       BIC   logLik deviance df.resid
##  41537.5  41659.1  -20754.8  41509.5    43545
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -7.4240 -0.2028  0.2946  0.6452  4.8235
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  ResponseId (Intercept) 0.47048  0.6859
##  Trial      (Intercept) 0.03709  0.1926
## Number of obs: 43559, groups:  ResponseId, 121; Trial, 20
##
## Fixed effects:
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)               0.617207   0.167590   3.683 0.000231 ***
## taskID1                   2.309442   0.238647   9.677  < 2e-16 ***
## taskID3                   2.397529   0.242511   9.886  < 2e-16 ***
## taskComp1                 2.563595   0.244978  10.465  < 2e-16 ***
## taskComp2                 0.273475   0.228933   1.195 0.232257
## taskSumm1                 0.124513   0.225900   0.551 0.581507
## Frame_Quantity           -0.009924   0.001229  -8.078 6.58e-16 ***
## taskID1:Frame_Quantity   -0.015303   0.002139  -7.153 8.46e-13 ***
## taskID3:Frame_Quantity   -0.005377   0.002339  -2.299 0.021497 *
## taskComp1:Frame_Quantity -0.004542   0.002478  -1.833 0.066852 .
## taskComp2:Frame_Quantity  0.005335   0.001734   3.077 0.002091 **
## taskSumm1:Frame_Quantity  0.002536   0.001690   1.501 0.133466
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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```
## 
## Correlation of Fixed Effects:
##              (Intr) tskID1 tskID3 tskCm1 tskCm2 tskSm1 Frm_Qn tID1:F tID3:F
## taskID1      −0.655
## taskID3      −0.646  0.454
## taskComp1    −0.639  0.449  0.442
## taskComp2    −0.684  0.480  0.473  0.468
## taskSumm1    −0.693  0.486  0.479  0.474  0.507
## Frame_Qntty  −0.268  0.188  0.185  0.183  0.196  0.199
## tskID1:Fr_Q   0.154 −0.367 −0.106 −0.105 −0.113 −0.114 −0.574
## tskID3:Fr_Q   0.141 −0.099 −0.384 −0.097 −0.103 −0.105 −0.525  0.302
## tskCmp1:F_Q   0.133 −0.093 −0.092 −0.404 −0.097 −0.098 −0.496  0.285  0.260
## tskCmp2:F_Q   0.190 −0.133 −0.131 −0.130 −0.277 −0.141 −0.709  0.407  0.372
## tskSmm1:F_Q   0.195 −0.137 −0.135 −0.133 −0.143 −0.274 −0.727  0.417  0.382
##              tC1:F_  tC2:F_
## taskID1
## taskID3
## taskComp1
## taskComp2
## taskSumm1
## Frame_Qntty
## tskID1:Fr_Q
## tskID3:Fr_Q
## tskCmp1:F_Q
## tskCmp2:F_Q   0.351
## tskSmm1:F_Q   0.360   0.515
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.00231823 (tol = 0.002,
    component 1)
## Model is nearly unidentifiable: very large eigenvalue
##  − Rescale variables?
```

Identify 3

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: df_full
##
##      AIC       BIC   logLik deviance df.resid
##  41537.5   41659.1 −20754.8  41509.5    43545
##
## Scaled residuals:
##     Min       1Q  Median       3Q      Max
## −7.4233  −0.2028  0.2946   0.6452   4.8228
##
## Random effects:
##  Groups     Name          Variance Std.Dev.
##  ResponseId (Intercept) 0.47035  0.6858
##  Trial      (Intercept) 0.03712  0.1927
## Number of obs: 43559, groups:  ResponseId, 121; Trial, 20
##
```

```
## Fixed effects:
##                            Estimate  Std. Error  z value  Pr(>|z|)
## (Intercept)              3.0153666   0.1844898   16.344   < 2e-16 ***
## taskID2                 -2.3976679   0.2416294   -9.923   < 2e-16 ***
## taskID1                 -0.0885235   0.2505179   -0.353  0.723817
## taskComp1                0.1666895   0.2564984    0.650  0.515779
## taskComp2               -2.1239708   0.2413664   -8.800   < 2e-16 ***
## taskSumm1               -2.2739871   0.2384072   -9.538   < 2e-16 ***
## Frame_Quantity          -0.0153273   0.0019883   -7.709  1.27e-14 ***
## taskID2:Frame_Quantity   0.0054103   0.0023370    2.315  0.020607 *
## taskID1:Frame_Quantity  -0.0098952   0.0026490   -3.735  0.000187 ***
## taskComp1:Frame_Quantity 0.0008612   0.0029294    0.294  0.768767
## taskComp2:Frame_Quantity 0.0107367   0.0023343    4.600  4.23e-06 ***
## taskSumm1:Frame_Quantity 0.0079384   0.0023018    3.449  0.000563 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) tskID2 tskID1 tskCm1 tskCm2 tskSm1 Frm_Qn tID2:F tID1:F
## taskID2     -0.722
## taskID1     -0.695  0.530
## taskComp1   -0.678  0.518  0.499
## taskComp2   -0.722  0.551  0.530  0.518
## taskSumm1   -0.730  0.558  0.537  0.524  0.558
## Frame_Qntty -0.438  0.335  0.322  0.315  0.335  0.339
## tskID2:Fr_Q  0.373 -0.382 -0.274 -0.268 -0.285 -0.288 -0.851
## tskID1:Fr_Q  0.328 -0.250 -0.440 -0.236 -0.251 -0.254 -0.750  0.638
## tskCmp1:F_Q  0.297 -0.227 -0.218 -0.466 -0.227 -0.229 -0.678  0.577  0.509
## tskCmp2:F_Q  0.373 -0.285 -0.274 -0.268 -0.382 -0.288 -0.852  0.725  0.639
## tskSmm1:F_Q  0.378 -0.289 -0.278 -0.272 -0.289 -0.382 -0.864  0.735  0.648
##             tC1:F_ tC2:F_
## taskID2
## taskID1
## taskComp1
## taskComp2
## taskSumm1
## Frame_Qntty
## tskID2:Fr_Q
## tskID1:Fr_Q
## tskCmp1:F_Q
## tskCmp2:F_Q  0.578
## tskSmm1:F_Q  0.586  0.736
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.084662 (tol = 0.002, component
   1)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Compare 1

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

```
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##     Data: df_fullComp1
##
##       AIC       BIC    logLik  deviance  df.resid
##   41537.5   41659.1  -20754.8   41509.5     43545
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## -7.4246  -0.2028   0.2946   0.6452   4.8234
##
## Random effects:
##  Groups      Name          Variance  Std.Dev.
##  ResponseId  (Intercept)   0.47052   0.6859
##  Trial       (Intercept)   0.03712   0.1927
## Number of obs: 43559, groups:  ResponseId, 121; Trial, 20
##
## Fixed effects:
##                            Estimate  Std. Error  z value  Pr(>|z|)
## (Intercept)                3.1810070   0.1890382   16.827  < 2e-16 ***
## taskID1                   -0.2538107   0.2542411   -0.998  0.318131
## taskID2                   -2.5639430   0.2453331  -10.451  < 2e-16 ***
## taskID3                   -0.1664023   0.2573577   -0.647  0.517904
## taskComp2                 -2.2901026   0.2452509   -9.338  < 2e-16 ***
## taskSumm1                 -2.4388968   0.2422743  -10.067  < 2e-16 ***
## Frame_Quantity            -0.0144732   0.0021529   -6.723  1.78e-11 ***
## taskID1:Frame_Quantity    -0.0107568   0.0027755   -3.876  0.000106 ***
## taskID2:Frame_Quantity     0.0045532   0.0024788    1.837  0.066232 .
## taskID3:Frame_Quantity    -0.0008266   0.0029312   -0.282  0.777937
## taskComp2:Frame_Quantity   0.0098860   0.0024764    3.992  6.55e-05 ***
## taskSumm1:Frame_Quantity   0.0070830   0.0024457    2.896  0.003778 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) tskID1 tskID2 tskID3 tskCm2 tskSm1 Frm_Qn tID1:F tID2:F
## taskID1     -0.705
## taskID2     -0.731  0.543
## taskID3     -0.695  0.517  0.536
## taskComp2   -0.732  0.544  0.564  0.536
## taskSumm1   -0.740  0.550  0.571  0.542  0.571
## Frame_Qntty -0.468  0.348  0.361  0.343  0.361  0.365
## tskID1:Fr_Q  0.363 -0.458 -0.280 -0.267 -0.280 -0.283 -0.776
## tskID2:Fr_Q  0.407 -0.302 -0.404 -0.298 -0.314 -0.317 -0.869  0.674
## tskID3:Fr_Q  0.343 -0.256 -0.265 -0.467 -0.265 -0.268 -0.734  0.570  0.638
## tskCmp2:F_Q  0.407 -0.303 -0.314 -0.299 -0.405 -0.318 -0.869  0.674  0.755
## tskSmm1:F_Q  0.412 -0.306 -0.318 -0.302 -0.318 -0.405 -0.880  0.683  0.765
##             tID3:F tC2:F_
## taskID1
## taskID2
## taskID3
## taskComp2
## taskSumm1
## Frame_Qntty
## tskID1:Fr_Q
```

```
## tskID2:Fr_Q
## tskID3:Fr_Q
## tskCmp2:F_Q   0.638
## tskSmm1:F_Q   0.646   0.765
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.0296081 (tol = 0.002, component
     1)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Compare 2

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##     Data: df_fullComp2
##
##       AIC       BIC    logLik deviance df.resid
##   41537.5   41659.1  −20754.8   41509.5      43545
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## −7.4239  −0.2028   0.2946   0.6452   4.8236
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  ResponseId (Intercept) 0.47049  0.6859
##  Trial       (Intercept) 0.03709  0.1926
## Number of obs: 43559, groups:  ResponseId, 121; Trial, 20
##
## Fixed effects:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)                0.890699   0.167414    5.320 1.04e−07 ***
## taskComp1                  2.290170   0.244947    9.350  < 2e−16 ***
## taskID1                    2.035940   0.238651    8.531  < 2e−16 ***
## taskID2                   −0.273509   0.228966   −1.195 0.232267
## taskID3                    2.124025   0.242176    8.771  < 2e−16 ***
## taskSumm1                 −0.148949   0.225642   −0.660 0.509181
## Frame_Quantity            −0.004590   0.001223   −3.752 0.000176 ***
## taskComp1:Frame_Quantity  −0.009877   0.002476   −3.989 6.62e−05 ***
## taskID1:Frame_Quantity    −0.020637   0.002137   −9.659  < 2e−16 ***
## taskID2:Frame_Quantity    −0.005334   0.001734   −3.077 0.002092 **
## taskID3:Frame_Quantity    −0.010711   0.002336   −4.585 4.53e−06 ***
## taskSumm1:Frame_Quantity  −0.002799   0.001686   −1.660 0.096870 .
## ───
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr) tskCm1 tskID1 tskID2 tskID3 tskSm1 Frm_Qn tC1:F_ tID1:F
## taskComp1  −0.639
## taskID1    −0.655  0.448
## taskID2    −0.683  0.467  0.479
```

```
## taskID3        −0.645   0.442   0.453   0.472
## taskSumm1      −0.692   0.473   0.485   0.506   0.478
## Frame_Qntty    −0.268   0.183   0.188   0.196   0.185   0.198
## tskCmp1:F_Q     0.132  −0.404  −0.093  −0.097  −0.092  −0.098  −0.494
## tskID1:Fr_Q     0.153  −0.105  −0.367  −0.112  −0.106  −0.114  −0.573   0.283
## tskID2:Fr_Q     0.189  −0.129  −0.133  −0.277  −0.131  −0.140  −0.706   0.349   0.404
## tskID3:Fr_Q     0.140  −0.096  −0.098  −0.102  −0.384  −0.104  −0.524   0.259   0.300
## tskSmm1:F_Q     0.194  −0.133  −0.136  −0.142  −0.134  −0.274  −0.726   0.359   0.415
##                 tID2:F  tID3:F
## taskComp1
## taskID1
## taskID2
## taskID3
## taskSumm1
## Frame_Qntty
## tskCmp1:F_Q
## tskID1:Fr_Q
## tskID2:Fr_Q
## tskID3:Fr_Q    0.370
## tskSmm1:F_Q    0.512   0.380
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  − Rescale variables?
```

Summarize 1

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##     Data: df_fullSumm1
##
##      AIC       BIC    logLik deviance df.resid
##   41537.5   41659.1  −20754.8   41509.5     43545
##
## Scaled residuals:
##     Min       1Q  Median       3Q      Max
## −7.4240  −0.2028   0.2946   0.6452   4.8236
##
## Random effects:
##  Groups      Name         Variance  Std.Dev.
##  ResponseId (Intercept) 0.4705    0.6859
##  Trial      (Intercept) 0.0371    0.1926
## Number of obs: 43559, groups:  ResponseId, 121; Trial, 20
##
## Fixed effects:
##                           Estimate  Std. Error  z value  Pr(>|z|)
## (Intercept)               0.741674    0.163324    4.541  5.60e−06 ***
## taskComp1                 2.439180    0.242014   10.079   < 2e−16 ***
## taskID1                   2.184915    0.235692    9.270   < 2e−16 ***
## taskID2                  −0.124482    0.226180   −0.550  0.582069
## taskID3                   2.273063    0.239353    9.497   < 2e−16 ***
## taskComp2                 0.149021    0.225788    0.660  0.509250
```

```
## Frame_Quantity              -0.007389    0.001160    -6.368  1.92e-10 ***
## taskComp1:Frame_Quantity    -0.007077    0.002445    -2.895  0.003796 **
## taskID1:Frame_Quantity      -0.017838    0.002101    -8.490  < 2e-16  ***
## taskID2:Frame_Quantity      -0.002536    0.001690    -1.501  0.133453
## taskID3:Frame_Quantity      -0.007913    0.002304    -3.435  0.000592 ***
## taskComp2:Frame_Quantity     0.002799    0.001686     1.660  0.096897 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr) tskCm1 tskID1 tskID2 tskID3 tskCm2 Frm_Qn tC1:F_ tID1:F
## taskComp1  -0.627
## taskID1    -0.644  0.435
## taskID2    -0.673  0.454  0.466
## taskID3    -0.635  0.429  0.440  0.459
## taskComp2  -0.673  0.454  0.466  0.486  0.459
## Frame_Qntty -0.261 0.176 0.181  0.189  0.178  0.189
## tskCmp1:F_Q  0.124 -0.404 -0.086 -0.089 -0.084 -0.089 -0.474
## tskID1:Fr_Q  0.144 -0.097 -0.367 -0.104 -0.098 -0.104 -0.552  0.262
## tskID2:Fr_Q  0.179 -0.121 -0.124 -0.274 -0.123 -0.130 -0.687  0.326  0.379
## tskID3:Fr_Q  0.131 -0.089 -0.091 -0.095 -0.384 -0.095 -0.504  0.239  0.278
## tskCmp2:F_Q  0.180 -0.121 -0.124 -0.130 -0.122 -0.274 -0.688  0.327  0.380
##            tID2:F tID3:F
## taskComp1
## taskID1
## taskID2
## taskID3
## taskComp2
## Frame_Qntty
## tskCmp1:F_Q
## tskID1:Fr_Q
## tskID2:Fr_Q
## tskID3:Fr_Q  0.346
## tskCmp2:F_Q  0.473  0.347
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.00422464 (tol = 0.002,
##    component 1)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Plot of 7 tasks

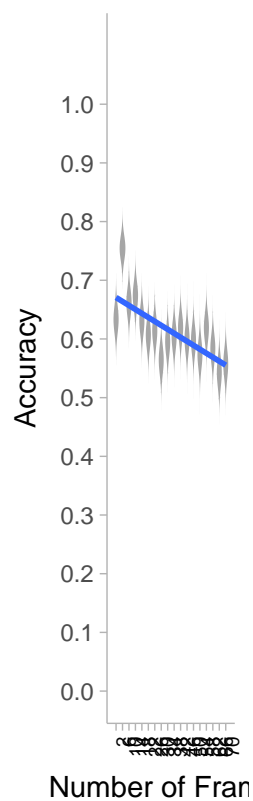**Final Plot (ID1 & IDComp1 in pane 1, ID2 & Comp2 in pane 2, ID3 in pane 3, Summ1 in pane 4)**
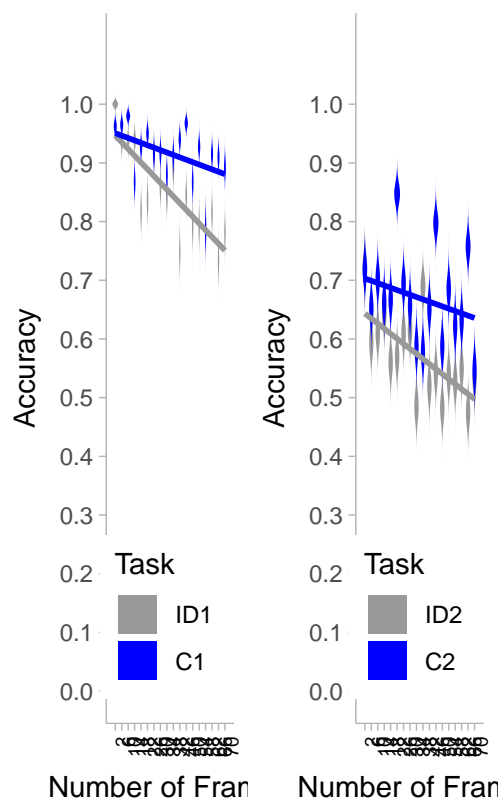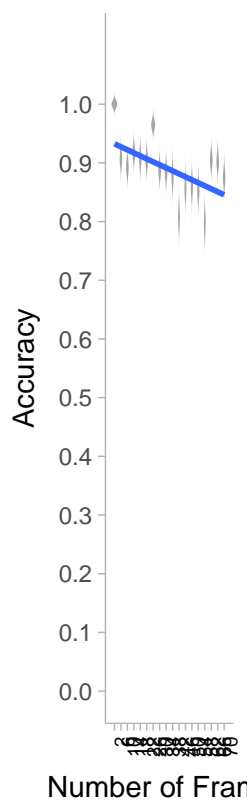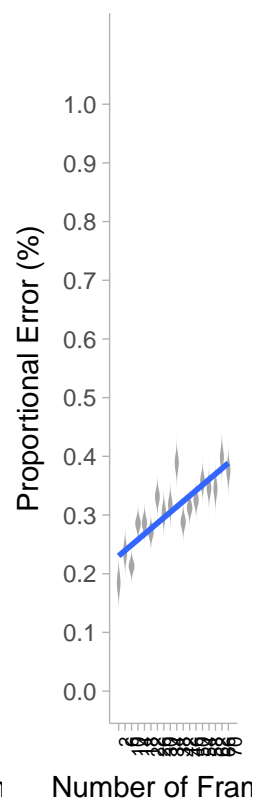
Means and SDs from df_full 6 tasks

```
## task
##   ID2    S1    C2   ID1   ID3    C1
## 0.57  0.61  0.67  0.85  0.89  0.92

## task
##    C1   ID3   ID1    C2    S1   ID2
## 0.28  0.31  0.36  0.47  0.49  0.50

## task
##   ID1   ID2   ID3    C1    C2    S1
## 0.85  0.57  0.89  0.92  0.67  0.61

## task
##   ID1   ID2   ID3    C1    C2    S1
## 0.36  0.50  0.31  0.28  0.47  0.49

## [1]  0.3091138

## [1]  0.357361
```

Means and SDs from df_full groups of Identify, Compare, and Summarize

```
## taskGroup
## Comp    ID Summ
## 0.79  0.77  0.61


## taskGroup
## Comp    ID Summ
## 0.41  0.42  0.49
```

Planned Comparison Groups (ID1 vs Comp1) - Testing for an Interaction

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: df_ID1C1
##
##      AIC       BIC    logLik deviance df.resid
##   9222.2    9267.6   -4605.1   9210.2     14394
##
## Scaled residuals:
##    Min      1Q   Median      3Q      Max
## -8.5461   0.1835   0.2545   0.3718   1.6123
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  ResponseId (Intercept) 0.5867    0.7660
##  Trial      (Intercept) 0.1096    0.3311
## Number of obs: 14400, groups:  ResponseId, 40; Trial, 20
##
## Fixed effects:
##                        Estimate Std. Error z value Pr(>|z|)
## (Intercept)           2.967874   0.205586   14.436  < 2e-16 ***
## taskC1                0.253019   0.276317    0.916      0.36
## Frame_Quantity       -0.025531   0.001762  -14.488  < 2e-16 ***
## taskC1:Frame_Quantity 0.010933   0.002786    3.924  8.7e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr) taskC1 Frm_Qn
## taskC1     -0.646
## Frame_Qntty -0.371  0.275
## tskC1:Frm_Q  0.234 -0.422 -0.632
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

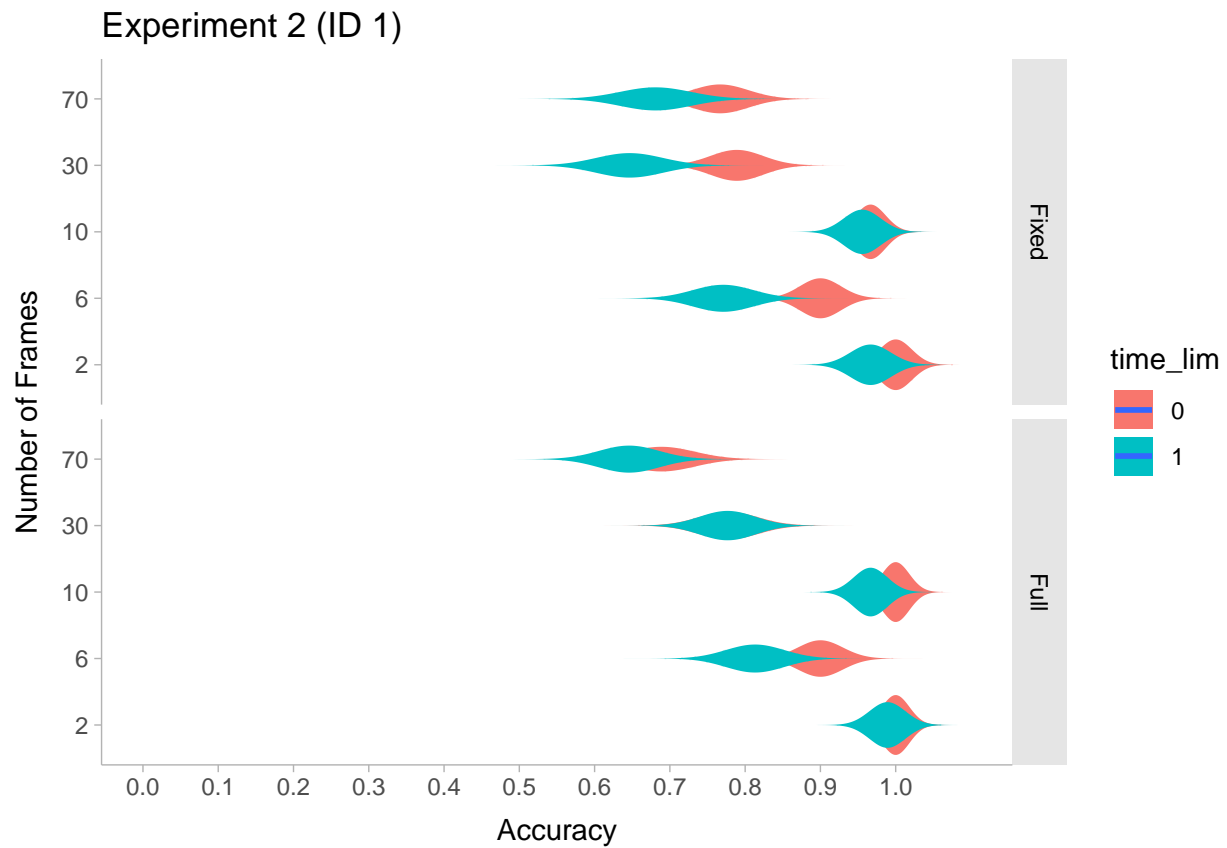**Planned Comparison Groups (ID2 vs Comp2) - Testing for an Interaction**

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

```
## Formula: acc ~ task * Frame_Quantity + (1 | Trial) + (1 | ResponseId)
##    Data: df_ID2C2
##
##       AIC       BIC    logLik  deviance  df.resid
##   18014.4   18059.8   -9001.2   18002.4     14393
##
## Scaled residuals:
##     Min      1Q   Median      3Q     Max
## -2.2492 -1.1198   0.5949  0.7465  4.5976
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  ResponseId (Intercept) 0.37314   0.6109
##  Trial      (Intercept) 0.05566   0.2359
## Number of obs: 14399, groups:  ResponseId, 40; Trial, 20
##
## Fixed effects:
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             0.621260   0.155443   3.997 6.42e-05 ***
## taskC2                  0.272793   0.206637   1.320   0.1868
## Frame_Quantity         -0.009947   0.001230  -8.087 6.13e-16 ***
## taskC2:Frame_Quantity   0.005340   0.001736   3.076   0.0021 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) taskC2 Frm_Qn
## taskC2      -0.665
## Frame_Qntty -0.289  0.218
## tskC2:Frm_Q  0.205 -0.308 -0.708
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?


##                            Est          LL          UL
## (Intercept)            2.926641302  2.572843265  3.28043934
## taskID2               -2.309449797 -2.777566648 -1.84133295
## taskID3                0.088088608 -0.403875084  0.58005230
## taskComp1              0.254216174 -0.243286002  0.75171835
## taskComp2             -2.035926893 -2.503436659 -1.56841713
## taskSumm1             -2.184942847 -2.646867995 -1.72301770
## Frame_Quantity        -0.025227165 -0.028660052 -0.02179428
## taskID2:Frame_Quantity 0.015302349  0.011109275  0.01949542
## taskID3:Frame_Quantity 0.009926002  0.004731854  0.01512015
## taskComp1:Frame_Quantity 0.010761169 0.005323149  0.01619919
## taskComp2:Frame_Quantity 0.020637618 0.016450361  0.02482487
## taskSumm1:Frame_Quantity 0.017838583 0.013720821  0.02195634

##                            Est          LL          UL
## (Intercept)           18.66483555 13.10302691 26.5874510
## taskID2                0.09931588  0.06218965  0.1586059
## taskID3                1.09208489  0.66772753  1.7861318
## taskComp1              1.28945052  0.78404724  2.1206409
```

```
## taskComp2                    0.13055941   0.08180338   0.2083748
## taskSumm1                    0.11248416   0.07087284   0.1785266
## Frame_Quantity              0.97508838   0.97174675   0.9784415
## taskID2:Frame_Quantity      1.01542003   1.01117121   1.0196867
## taskID3:Frame_Quantity      1.00997543   1.00474307   1.0152350
## taskComp1:Frame_Quantity    1.01081928   1.00533734   1.0163311
## taskComp2:Frame_Quantity    1.02085205   1.01658641   1.0251356
## taskSumm1:Frame_Quantity    1.01799864   1.01381538   1.0221992
```

Experiment 2

Demographics

There were 360 participants in Experiment 2. There were 171 participants who selected Male, 174 participants who selected Female, 10 participants who selected Non-binary/Third gender, and 2 who selected Prefer not to Say.

the mean age is 25.64 (SD = 15.4).

Identify

Identify 1 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + time_lim + scale + (1 | ResponseId)
##    Data: dfacc
##
##      AIC       BIC    logLik deviance df.resid
##   1401.3    1428.8    -695.6   1391.3     1826
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## -3.9443   0.1852   0.2570   0.3661   1.7518
##
## Random effects:
##  Groups     Name         Variance Std.Dev.
##  ResponseId (Intercept)  0.9756   0.9877
## Number of obs: 1831, groups:  ResponseId, 360
##
## Fixed effects:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)      3.202246   0.216989   14.758  < 2e-16 ***
## Frame_Quantity  -0.030608   0.002734  -11.197  < 2e-16 ***
```

```
## time_lim1          -0.556445      0.185541    -2.999    0.00271 **
## scaleFull           0.103310      0.183551     0.563    0.57354
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) Frm_Qn tm_lm1
## Frame_Qntty -0.562
## time_lim1   -0.537  0.066
## scaleFull   -0.415 -0.013  0.013


##                2.5 % 97.5 %
## .sig01            NA     NA
## (Intercept)     2.78   3.63
## Frame_Quantity -0.04  -0.03
## time_lim1      -0.92  -0.19
## scaleFull      -0.26   0.46
```
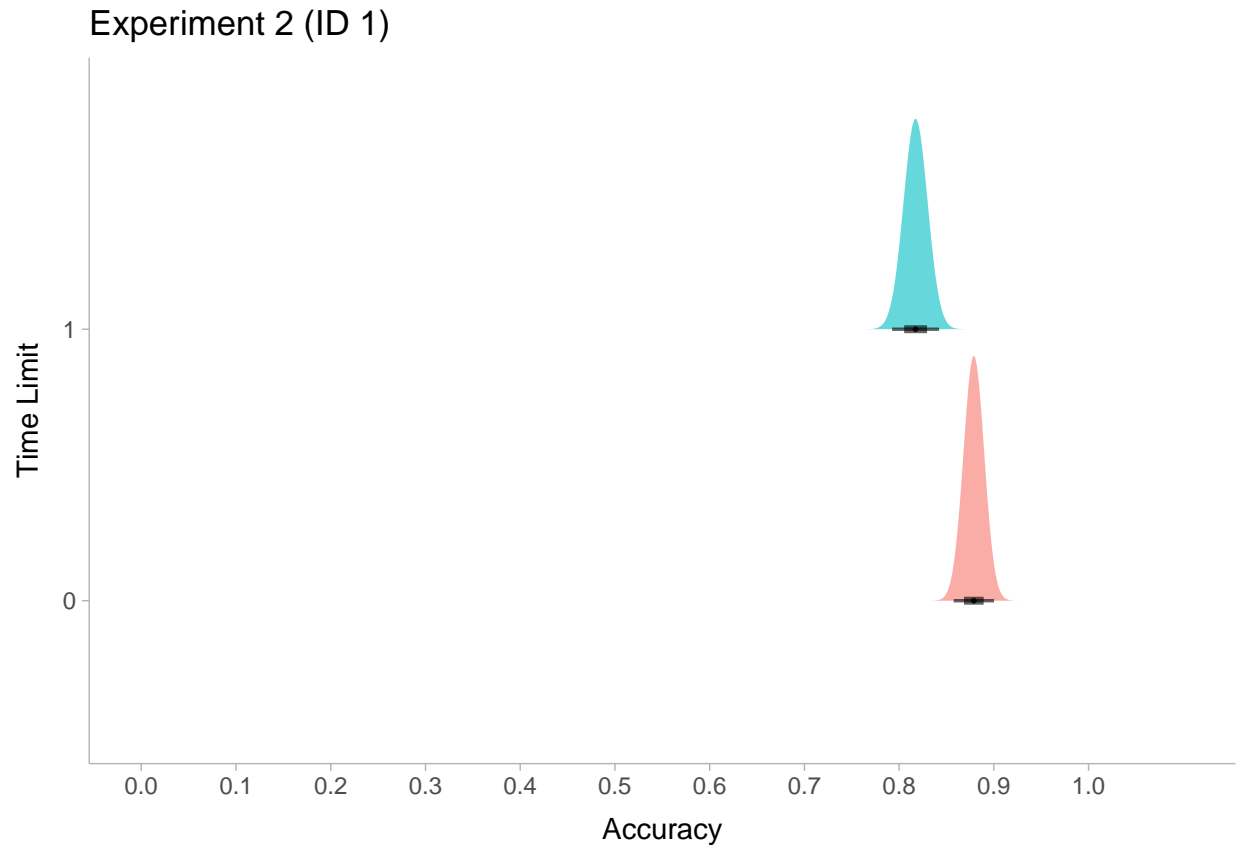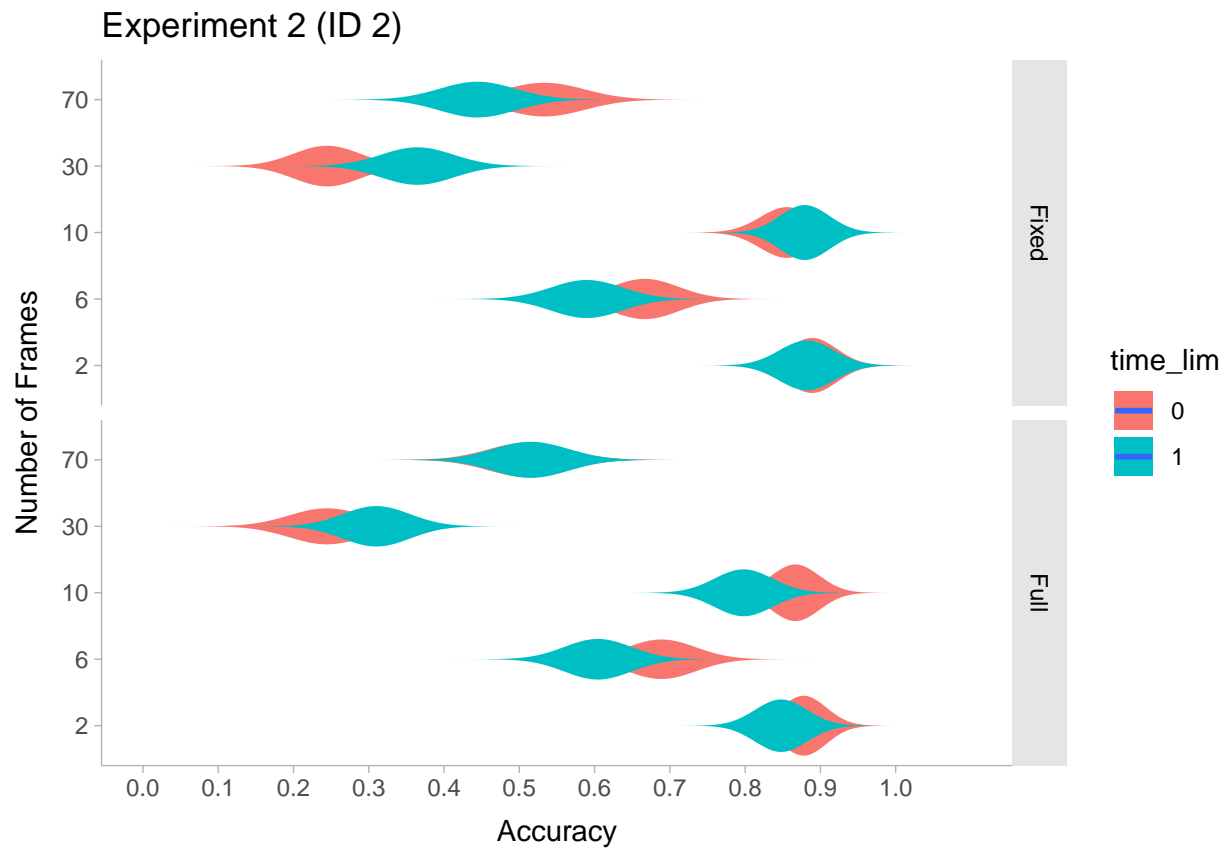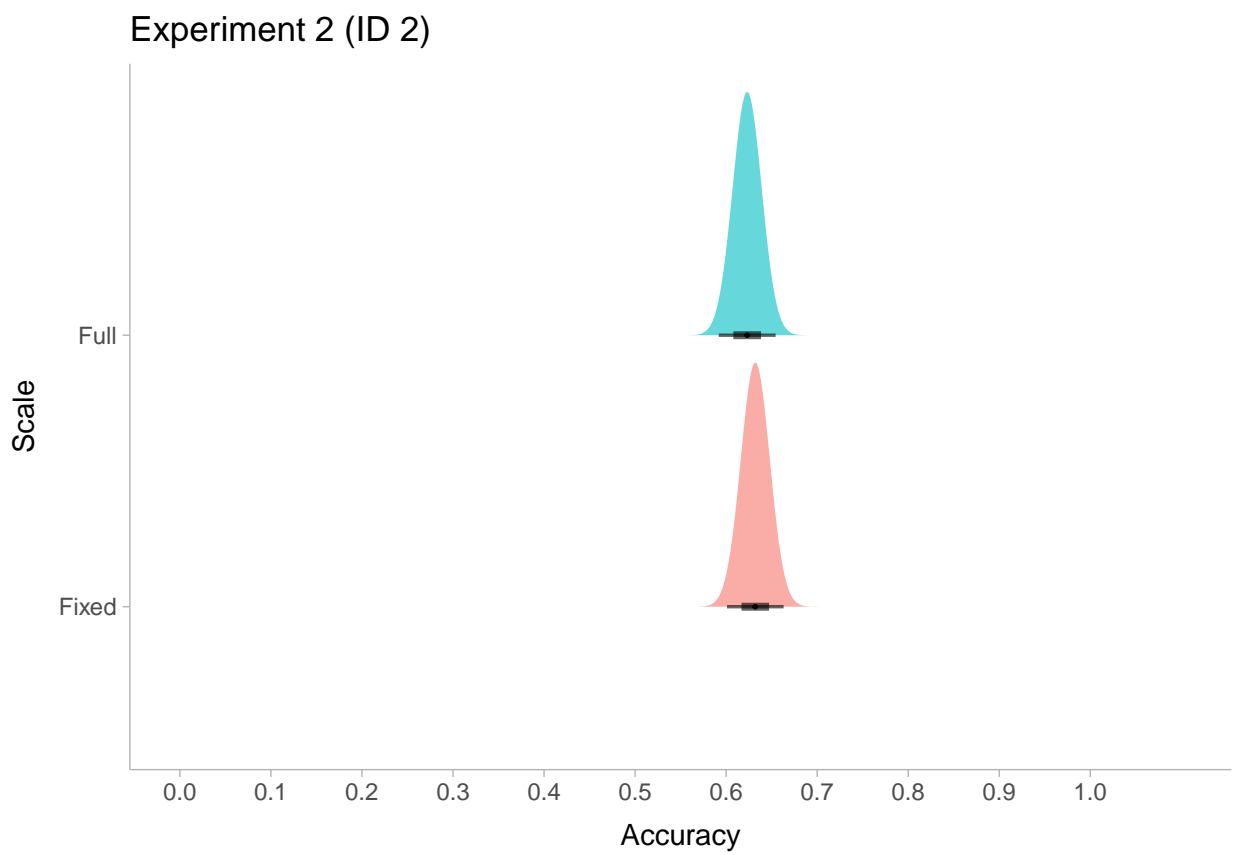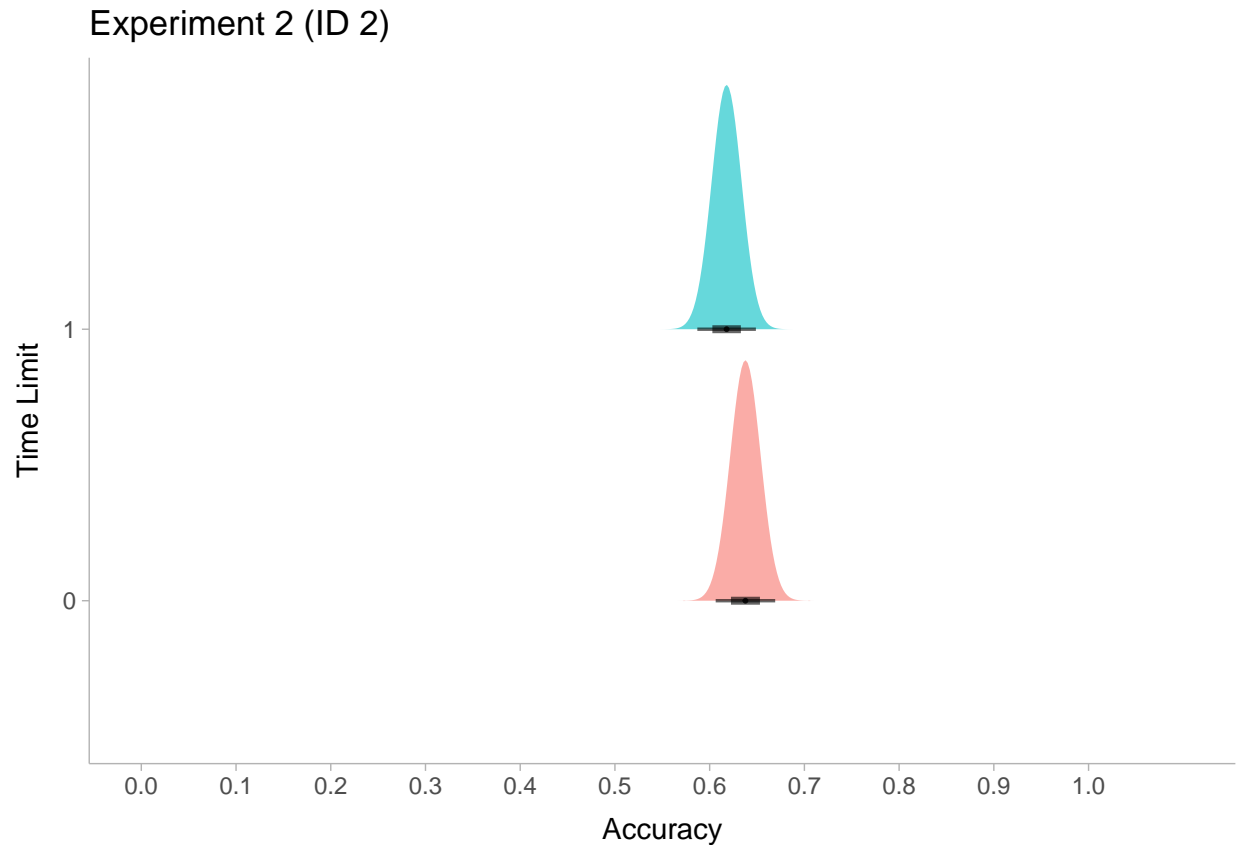

Experiment 2 (ID 1)
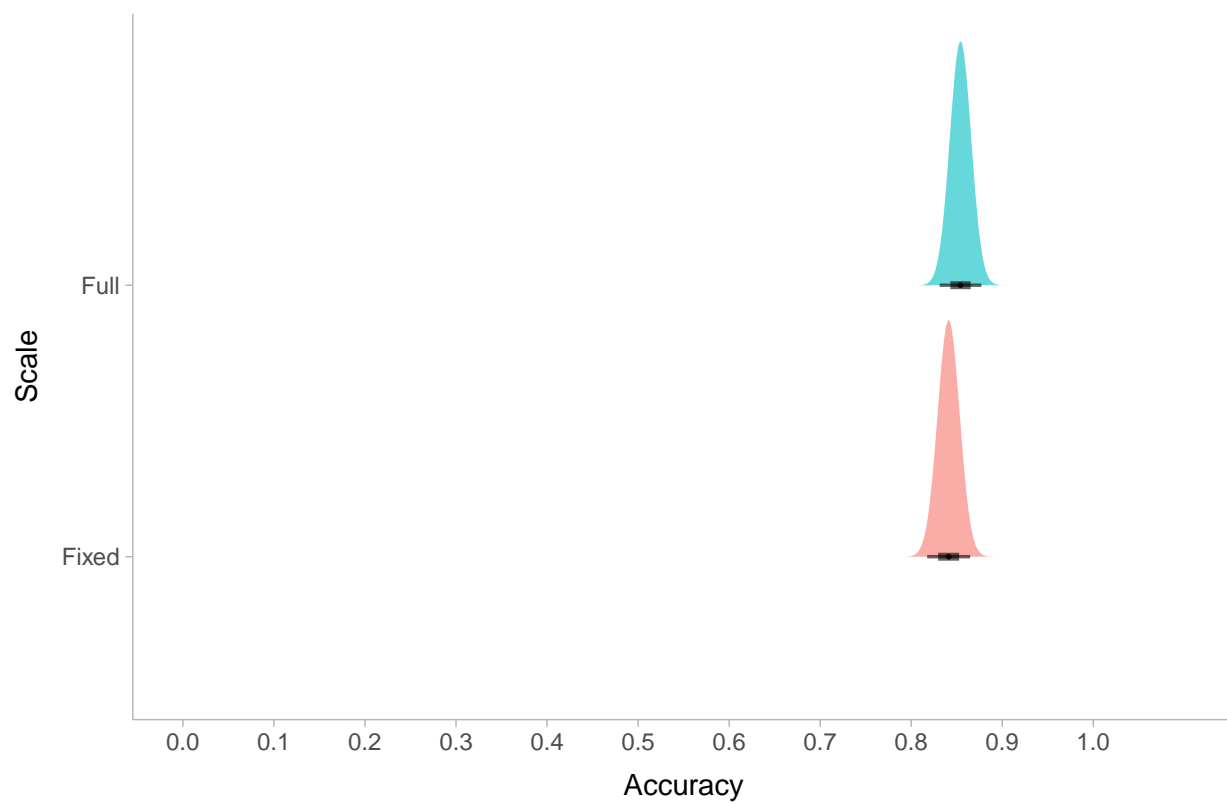
Experiment 2 (ID 1)

Experiment 2 (ID 1)

Identify 2 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + time_lim + scale + (1 | ResponseId)
##    Data: dfacc
##
##     AIC       BIC    logLik  deviance  df.resid
##   2313.6    2341.2   -1151.8   2303.6      1845
##
## Scaled residuals:
##    Min       1Q   Median       3Q      Max
## -1.7894  -1.1293   0.5777   0.6439   1.5127
##
## Random effects:
##  Groups      Name          Variance  Std.Dev.
##  ResponseId (Intercept)    0.1439    0.3794
## Number of obs: 1850, groups:  ResponseId, 360
##
## Fixed effects:
##                   Estimate  Std. Error  z value  Pr(>|z|)
## (Intercept)       1.171634    0.110223   10.630   <2e-16 ***
```

```
## Frame_Quantity    −0.022735    0.002017   −11.274    <2e−16 ***
## time_lim1         −0.067559    0.109362    −0.618     0.537
## scaleFull         −0.040458    0.109262    −0.370     0.711
## ——
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) Frm_Qn tm_lm1
## Frame_Qntty  −0.488
## time_lim1    −0.502 −0.009
## scaleFull    −0.500  0.004 −0.002
```


Experiment 2 (ID 2)

Experiment 2 (ID 2)

Experiment 2 (ID 2)

Identify 3 Accuracy Analysis

We have a problem Trial for 18 frames - trial 12 (letter N) frame 14 is visually not over the dotted line at 79.5, but the value is 79.507. We are marking this as not a correct response.

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + time_lim + scale + (1 | Trial) + (1 |
##      ResponseId)
##    Data: dfacc
##
##      AIC      BIC   logLik deviance df.resid
##   1272.9   1305.8   -630.4   1260.9     1794
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## -3.4827   0.0954   0.1911   0.3498   2.2059
##
## Random effects:
##  Groups     Name         Variance Std.Dev.
##  ResponseId (Intercept) 1.976    1.406
##  Trial      (Intercept) 6.501    2.550
## Number of obs: 1800, groups:  ResponseId, 360; Trial, 4
```
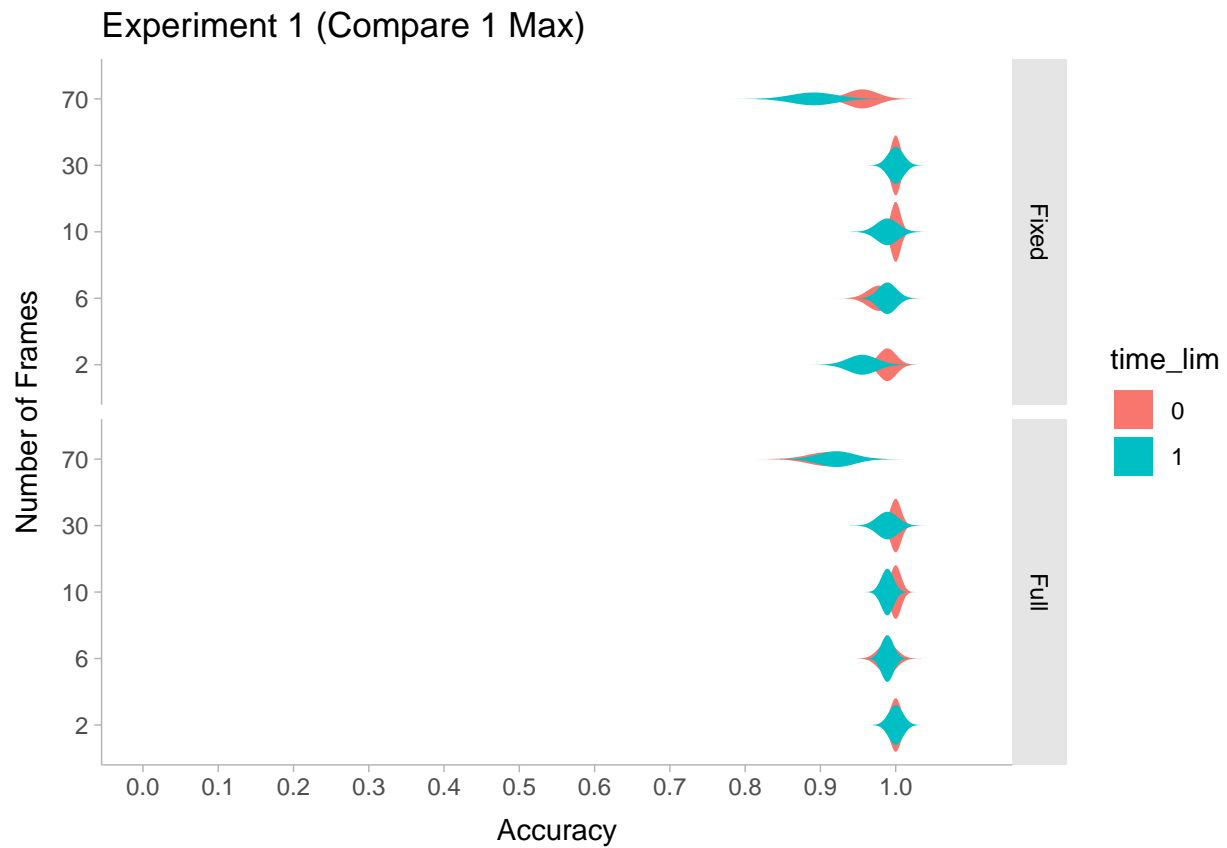
```
## 
## Fixed effects:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)        1.76474    1.32873   1.328 0.184131
## Frame_Quantity     0.04868    0.01251   3.890 0.000100 ***
## time_lim1         -1.36976    0.24667  -5.553 2.81e-08 ***
## scaleFull          0.83450    0.23210   3.595 0.000324 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Correlation of Fixed Effects:
##              (Intr) Frm_Qn tm_lm1
## Frame_Qntty  -0.208
## time_lim1    -0.113 -0.067
## scaleFull    -0.066  0.038 -0.095

##                 2.5 % 97.5 %
## .sig01            NA     NA
## .sig02            NA     NA
## (Intercept)    -0.84   4.37
## Frame_Quantity  0.02   0.07
## time_lim1      -1.85  -0.89
## scaleFull       0.38   1.29

## scale
##      Fixed      Full
## 0.8066667 0.8811111

## scale
##      Fixed      Full
## 0.3951317 0.3238377
```

Experiment 2 (Over Hline)
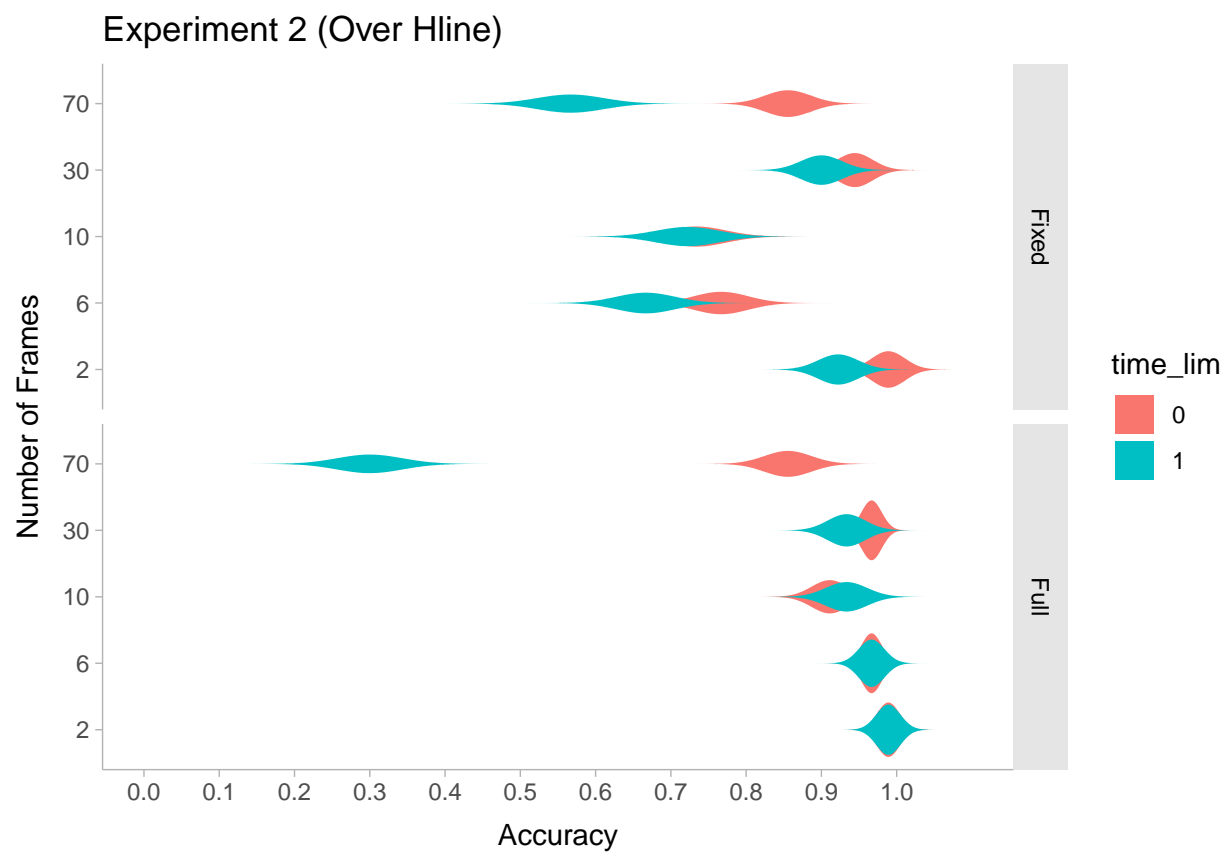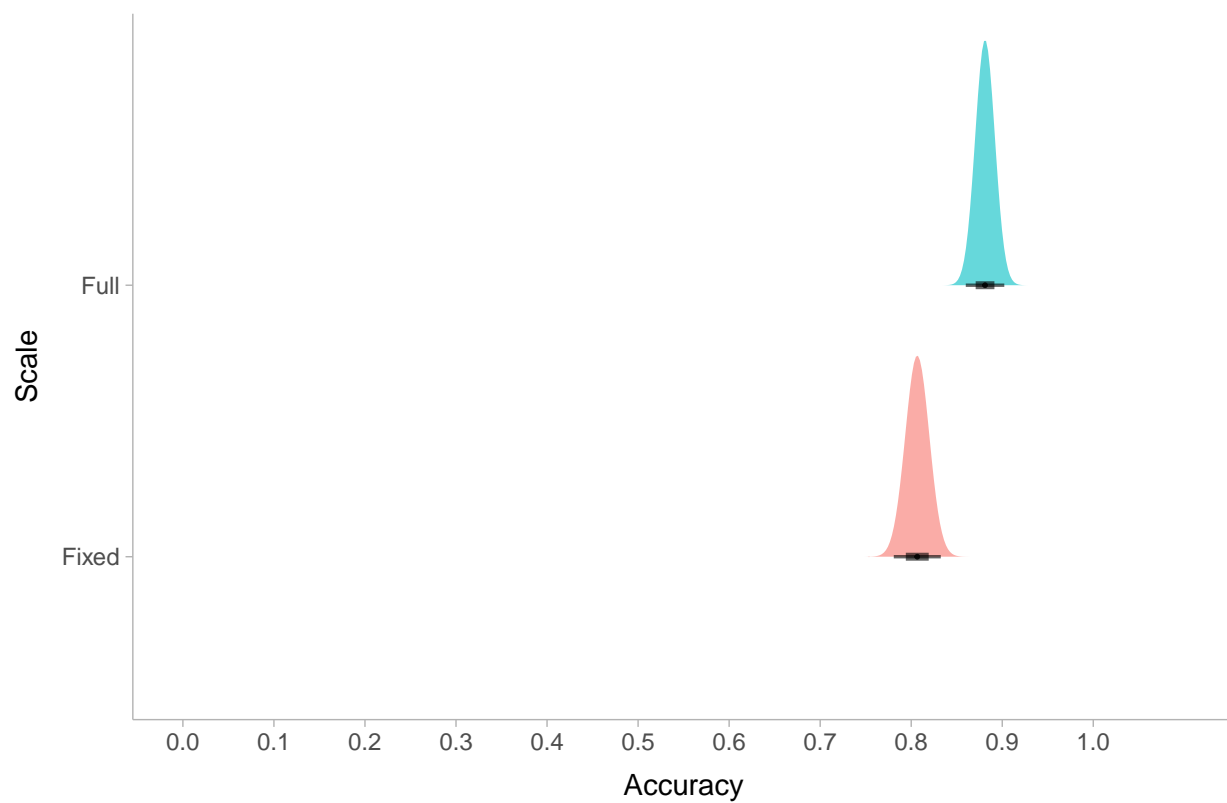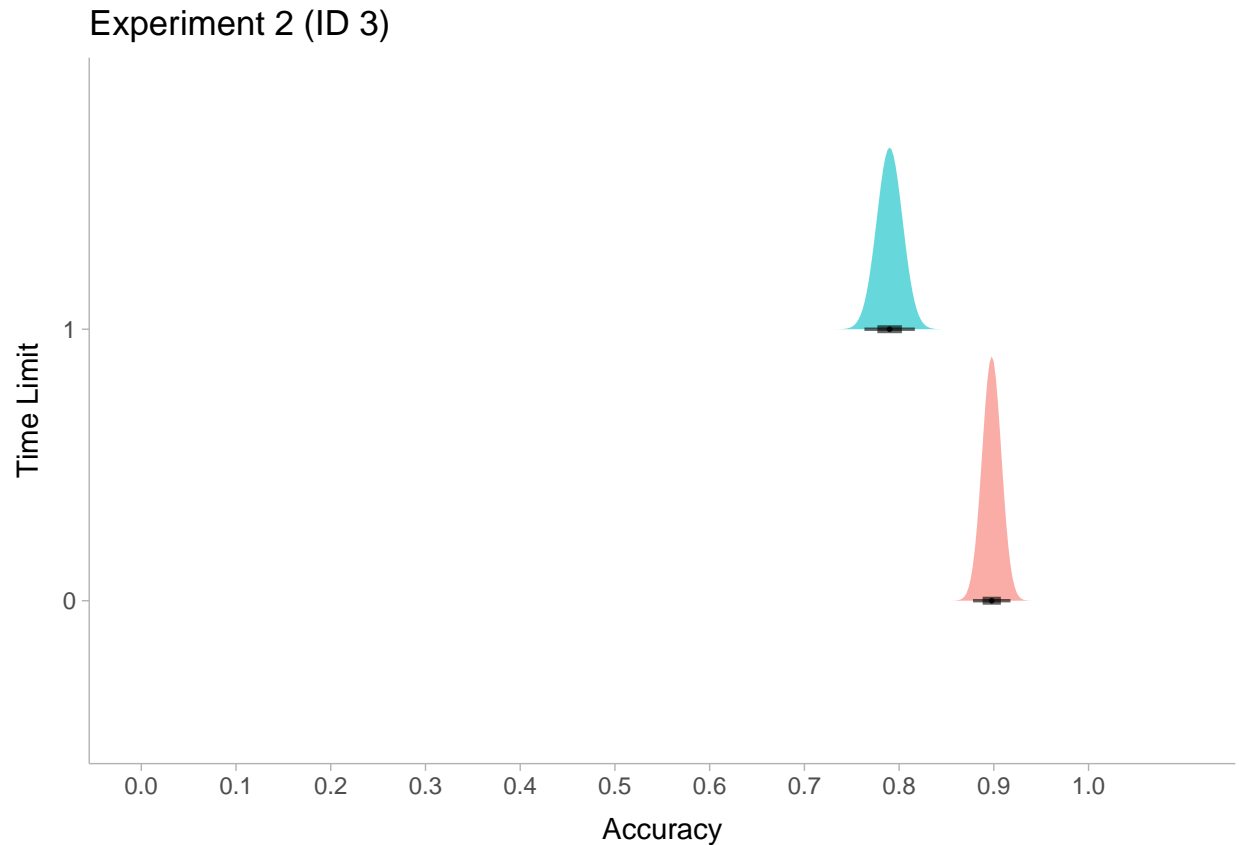
Experiment 2 (ID 3)
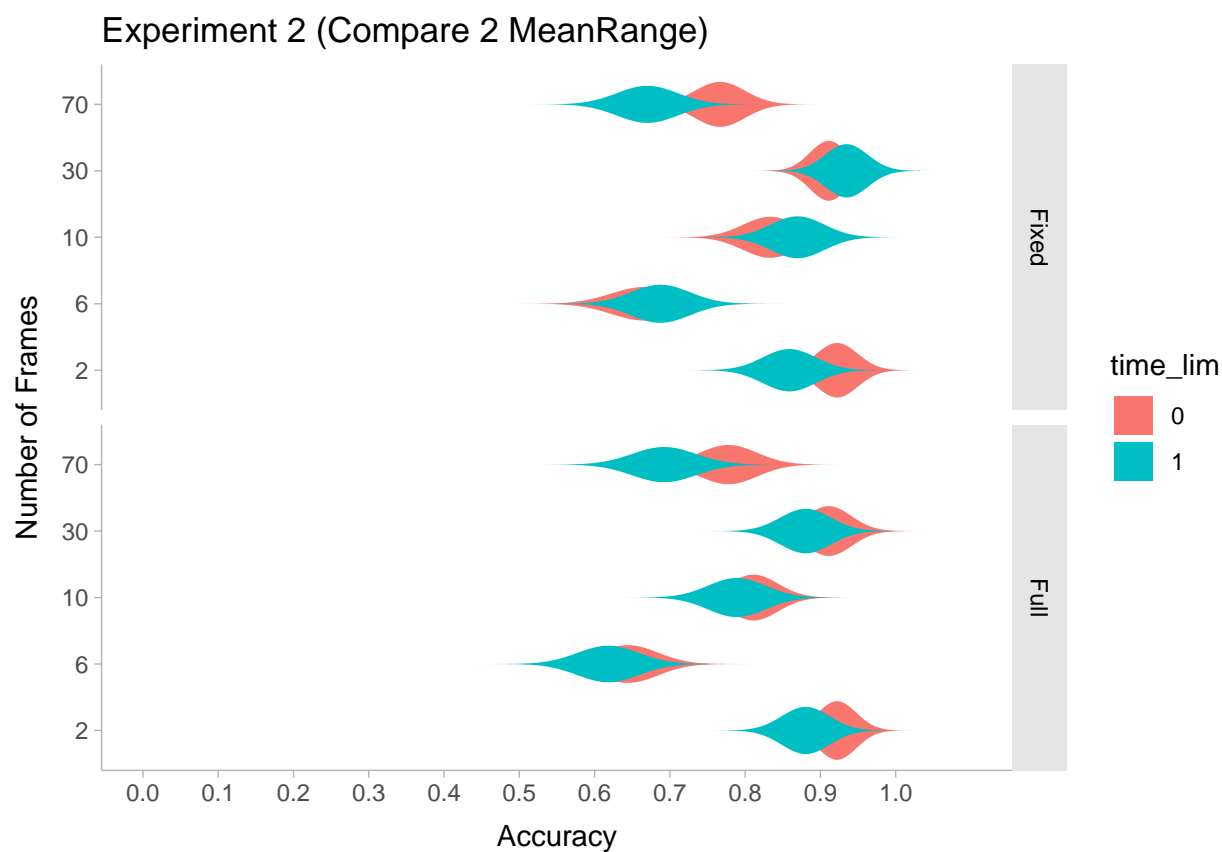
Experiment 2 (ID 3)
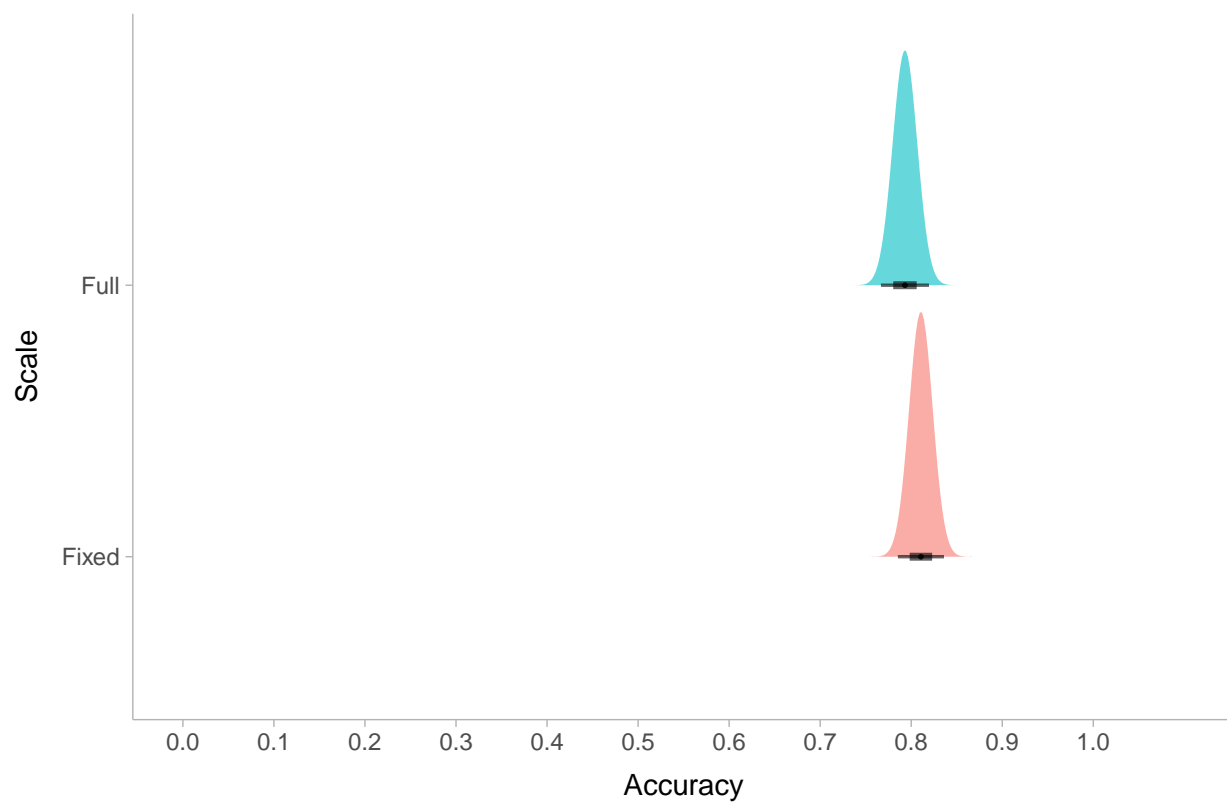

Compare

Compare 1 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##    Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + time_lim + scale + (1 | Trial) + (1 |
##      ResponseId)
##    Data: dfacc
##
##     AIC       BIC    logLik deviance df.resid
##    324.4     357.4    −156.2    312.4     1795
##
## Scaled residuals:
##    Min       1Q   Median       3Q      Max
## −6.2407   0.0021   0.0025   0.0177   4.8202
##
## Random effects:
##  Groups      Name          Variance Std.Dev.
##  ResponseId (Intercept) 72.1012   8.4912
```

```
##   Trial      (Intercept)  0.6371   0.7982
## Number of obs: 1801, groups:  ResponseId, 360; Trial, 4
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)   13.9147     1.4249   9.766  < 2e-16 ***
## Frame_Quantity  -0.0787    0.0140  -5.620 1.91e-08 ***
## time_lim1      -0.3832     0.9068  -0.423    0.673
## scaleFull       0.2101     0.9004   0.233    0.815
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) Frm_Qn tm_lm1
## Frame_Qntty -0.677
## time_lim1   -0.359  0.000
## scaleFull   -0.295  0.003 -0.005
```


Experiment 1 (Compare 1 Max)
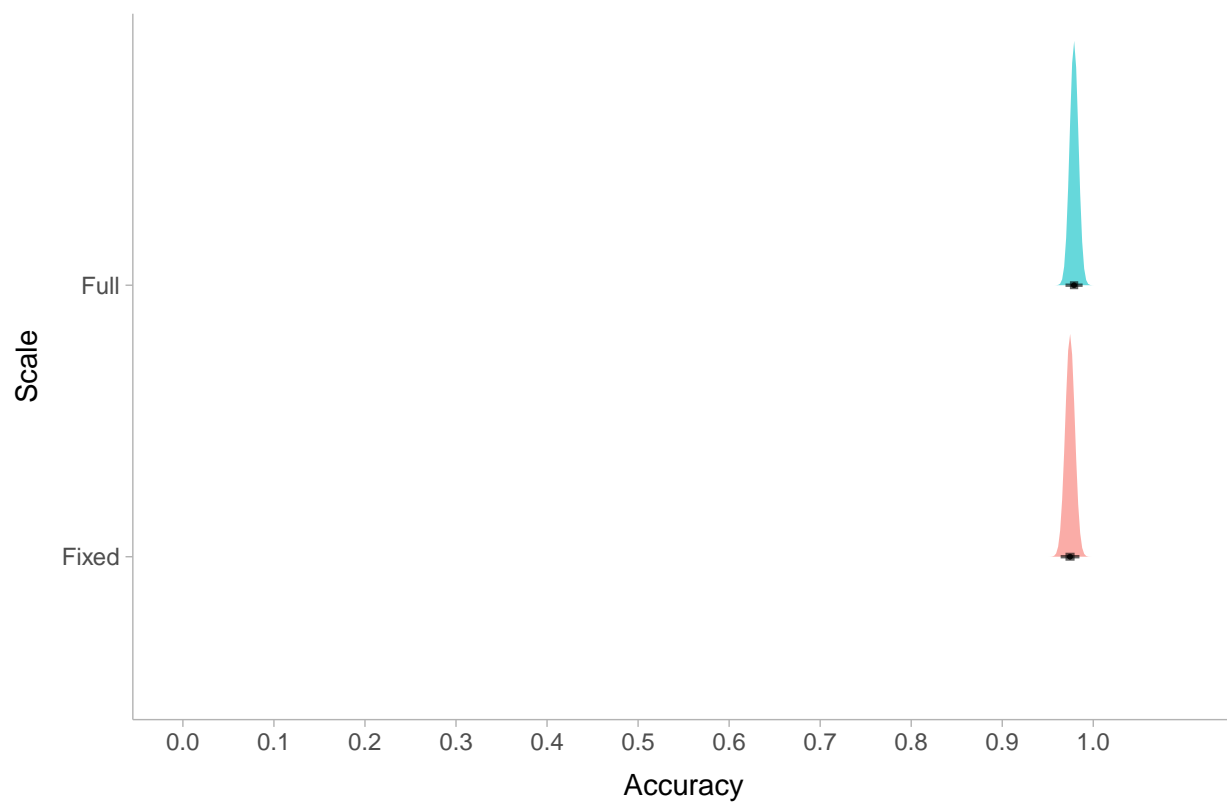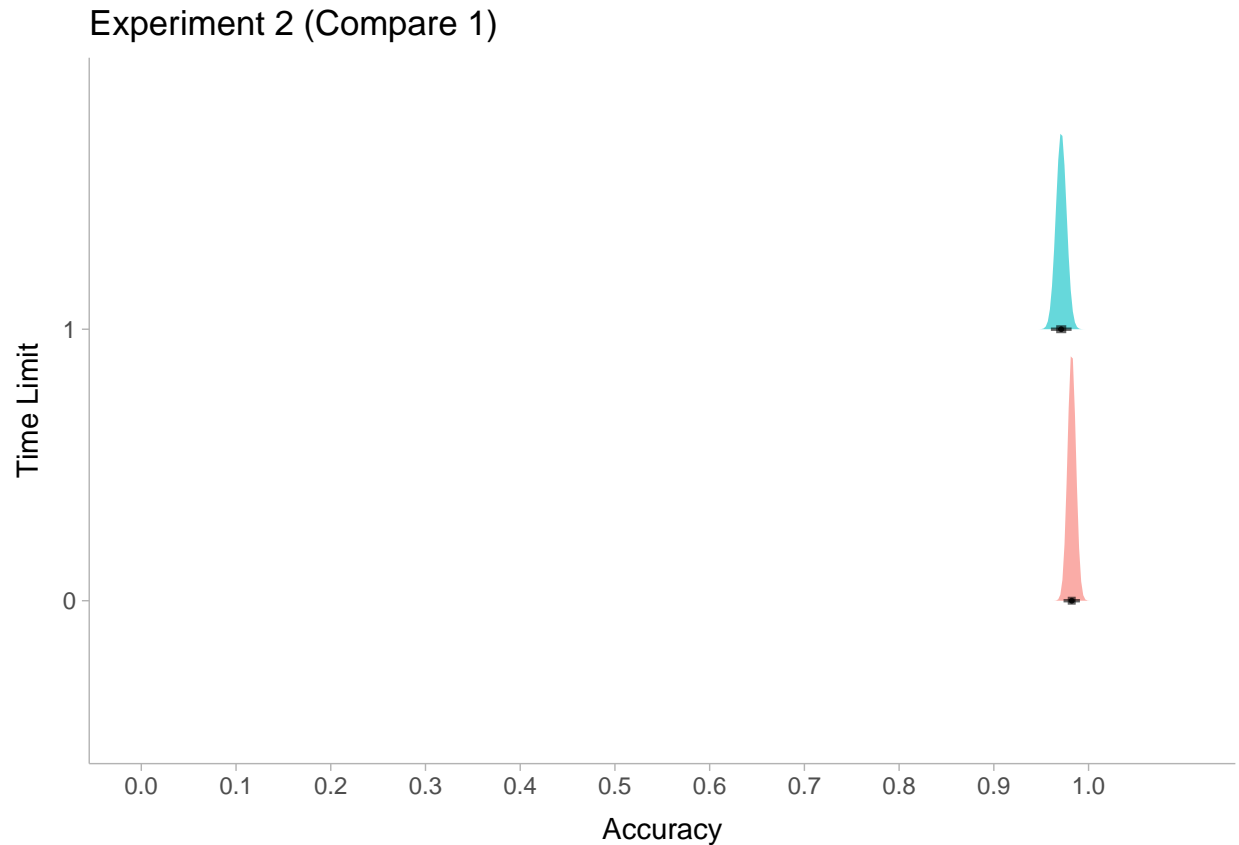
Experiment 2 (Comp 1)

Experiment 2 (Compare 1)

Compare 2 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + time_lim + scale + (1 | Trial) + (1 |
##      ResponseId)
##    Data: dfacc
##
##      AIC       BIC    logLik  deviance  df.resid
##   1600.7    1633.8    -794.4    1588.7      1817
##
## Scaled residuals:
##     Min       1Q   Median       3Q      Max
## -3.6522   0.1620   0.2645   0.4231   1.8475
##
## Random effects:
##  Groups     Name           Variance  Std.Dev.
##  ResponseId (Intercept)    2.3851    1.5444
##  Trial      (Intercept)    0.7794    0.8828
## Number of obs: 1823, groups:  ResponseId, 360; Trial, 4
##
## Fixed effects:
```
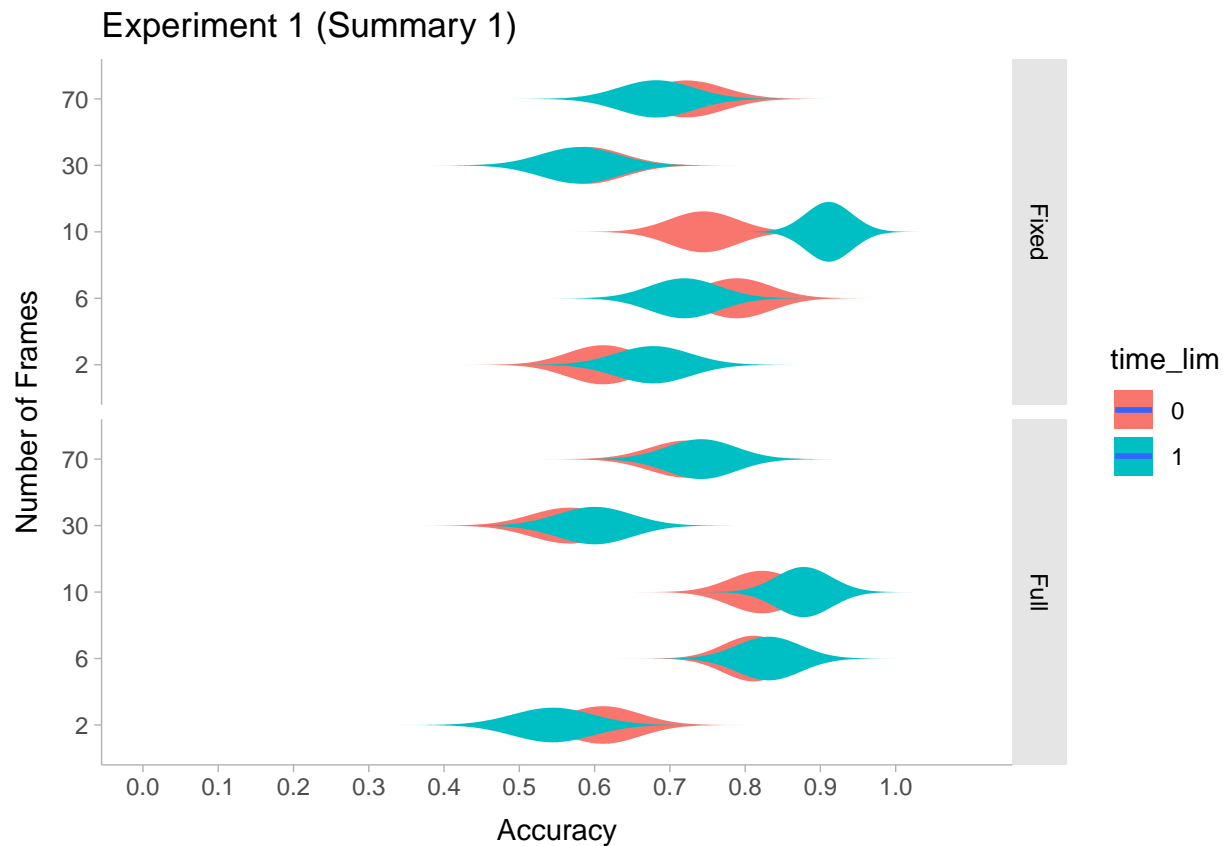
```
##                      Estimate  Std. Error  z value  Pr(>|z|)
## (Intercept)          2.691799    0.492686    5.464  4.67e-08  ***
## Frame_Quantity      -0.012656    0.003306   -3.828  0.000129  ***
## time_lim1           -0.253171    0.217055   -1.166  0.243457
## scaleFull           -0.180190    0.216952   -0.831  0.406229
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) Frm_Qn tm_lm1
## Frame_Qntty  -0.155
## time_lim1    -0.231  0.004
## scaleFull    -0.227  0.008  0.001
```


Experiment 2 (Compare 2 MeanRange)
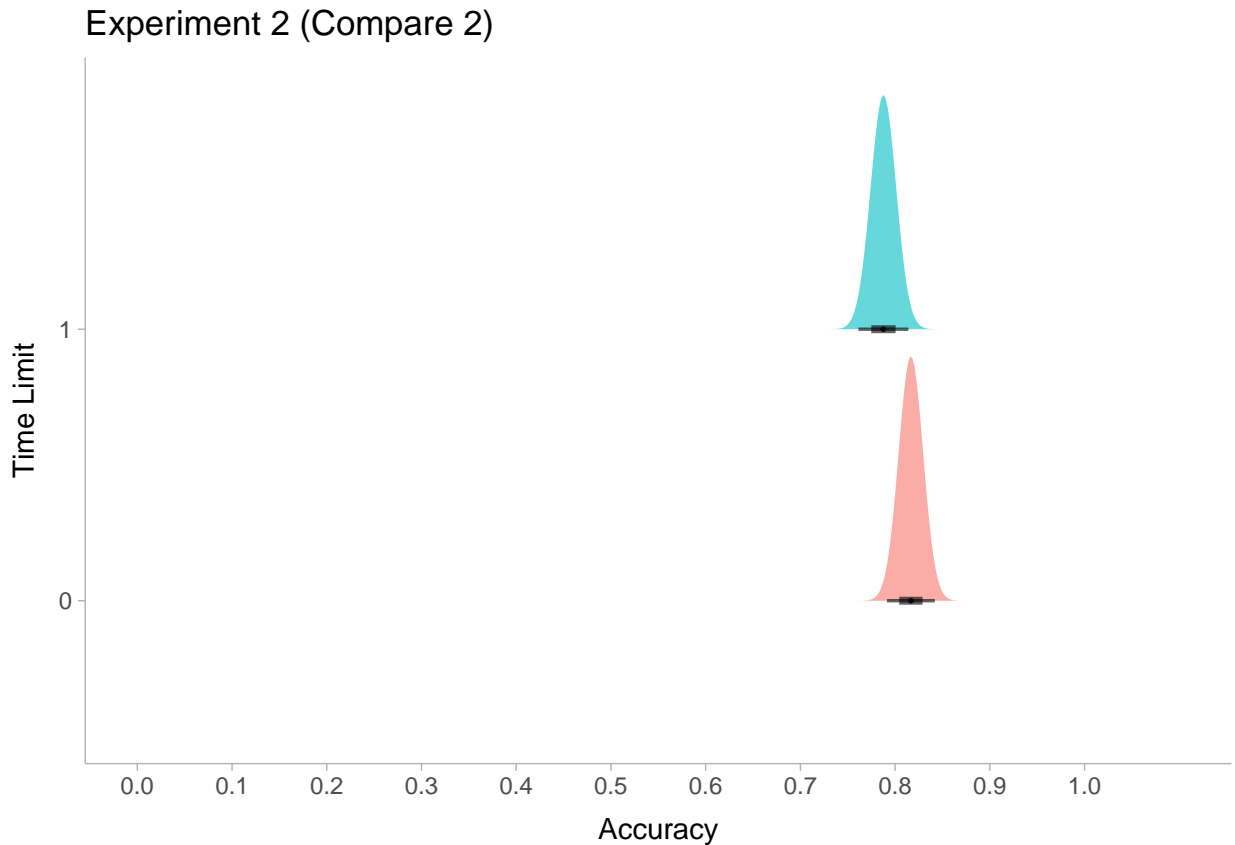
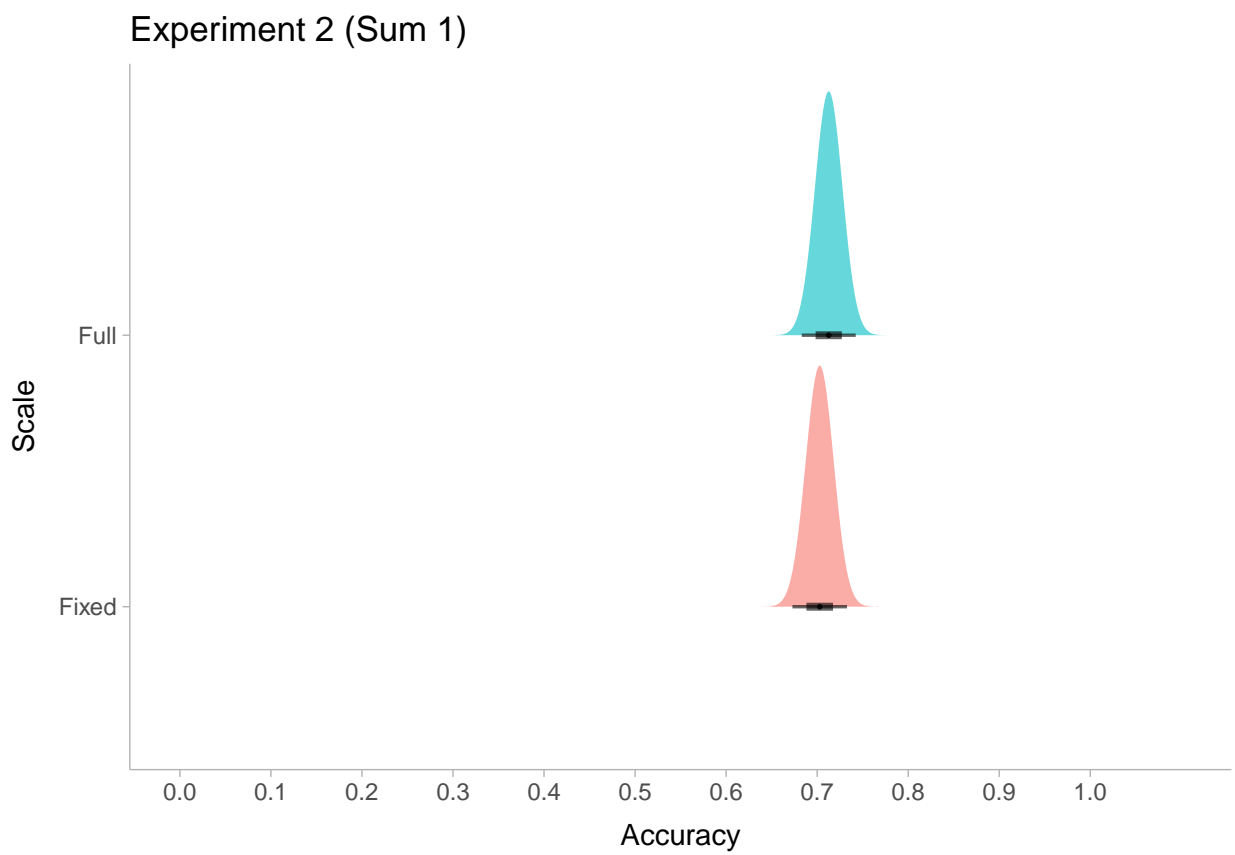Experiment 2 (Comp 2)

Experiment 2 (Compare 2)
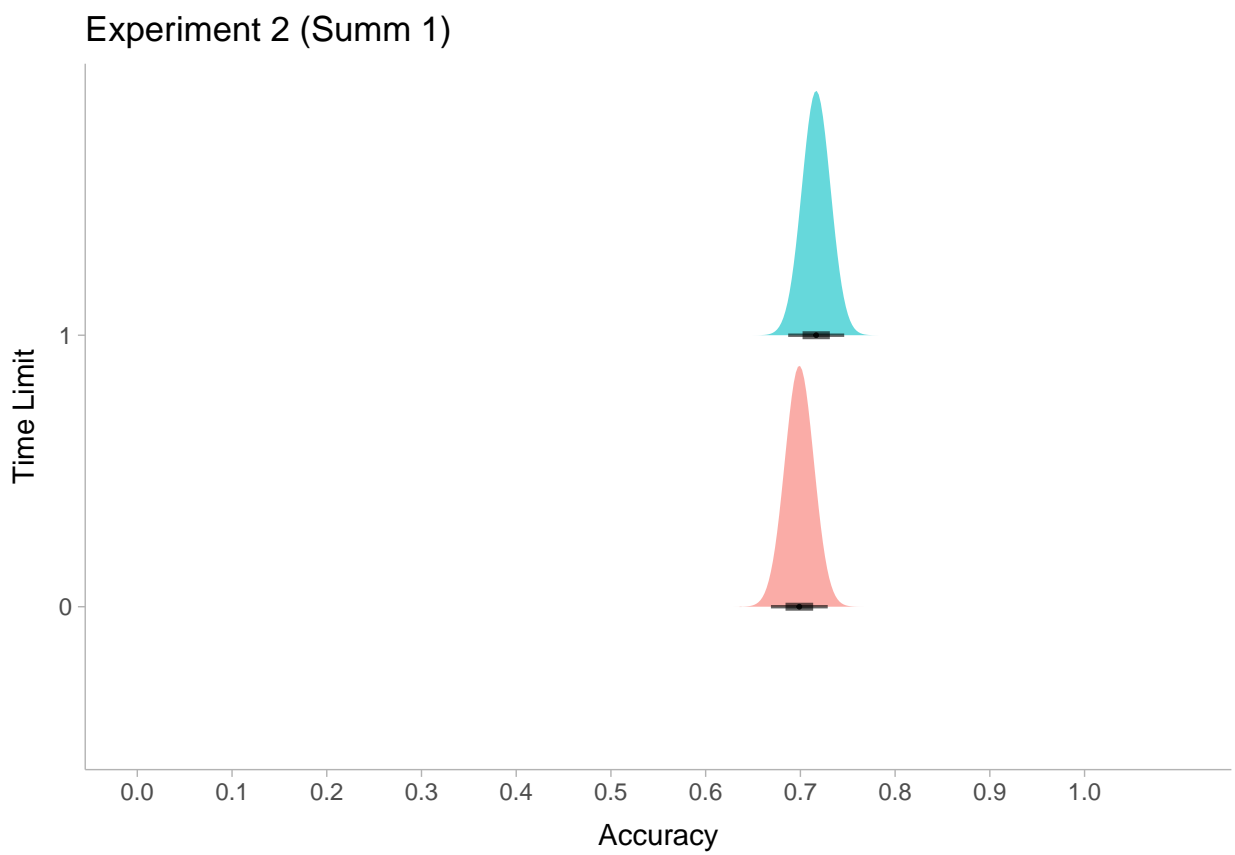

Summarize

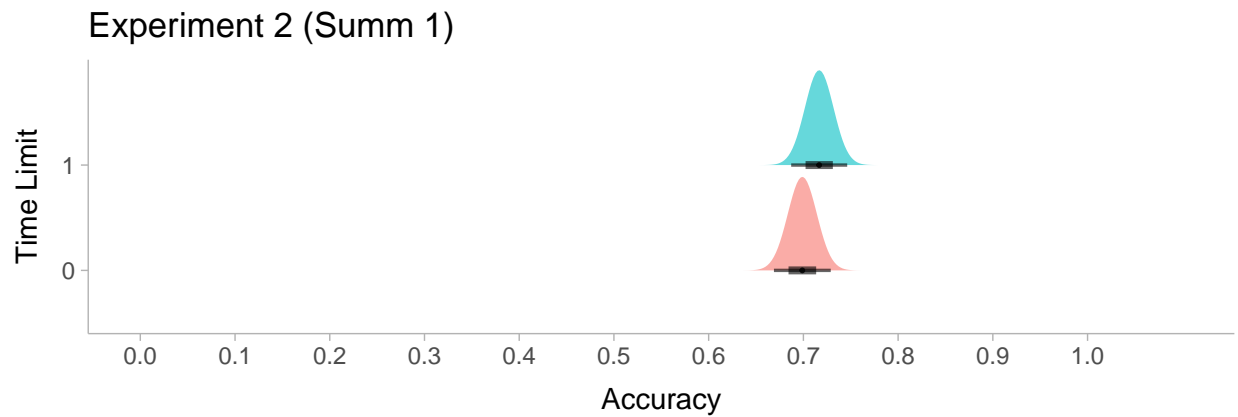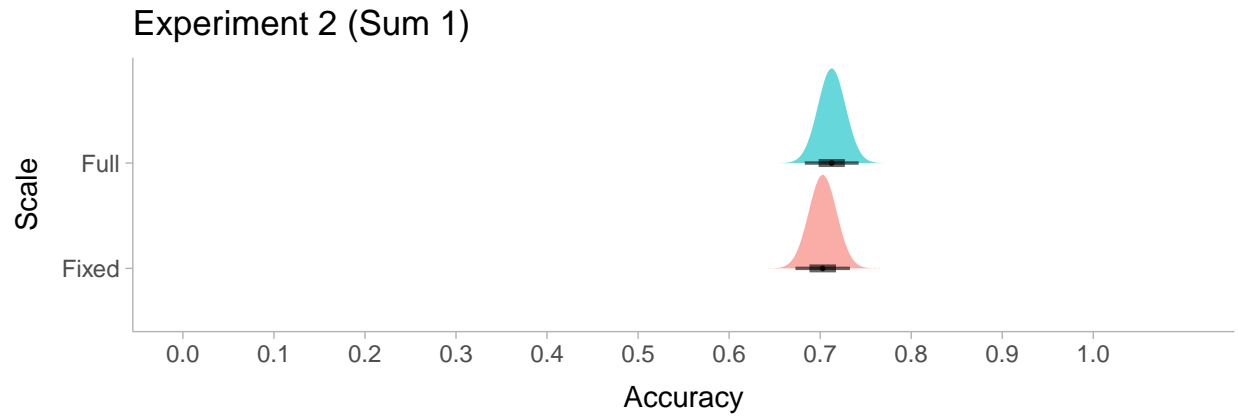### Summarize 1 Accuracy Analysis

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: acc ~ Frame_Quantity + time_lim + scale + (1 | ResponseId)
##    Data: dfacc
##
##      AIC      BIC   logLik deviance df.resid
##   2174.4   2201.9  -1082.2   2164.4     1788
##
## Scaled residuals:
##    Min      1Q  Median      3Q     Max
## -1.6490 -1.4931  0.6255  0.6512  0.6991
##
## Random effects:
##  Groups     Name        Variance Std.Dev.
##  ResponseId (Intercept) 4e-14    2e-07
## Number of obs: 1793, groups:  ResponseId, 360
```

```
## 
## Fixed effects:
##                 Estimate  Std. Error  z value  Pr(>|z|)
## (Intercept)     0.871067    0.101818    8.555    <2e-16  ***
## Frame_Quantity -0.002216    0.002047   -1.082    0.279
## time_lim1       0.085758    0.103939    0.825    0.409
## scaleFull       0.047924    0.103917    0.461    0.645
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Correlation of Fixed Effects:
##             (Intr) Frm_Qn tm_lm1
## Frame_Qntty -0.485
## time_lim1   -0.499  0.002
## scaleFull   -0.505 -0.002 -0.001
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```


Experiment 1 (Summary 1)

Experiment 2 (Sum 1)

Experiment 2 (Summ 1)

Experiment 2 (Sum 1)

Experiment 2 (Summ 1)

Summarize 2 Error Analysis

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: error ~ Frame_Quantity + time_lim + scale + (1 | Trial) + (1 |
##     ResponseId)
##    Data: dfacc
##
## REML criterion at convergence: 12614.2
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.1212 -0.4445 -0.0858  0.2524  7.8238
##
## Random effects:
##  Groups     Name        Variance Std.Dev.
##  ResponseId (Intercept) 15.165   3.894
##  Trial      (Intercept)  1.382   1.176
##  Residual               54.999   7.416
## Number of obs: 1796, groups:  ResponseId, 360; Trial, 3
##
## Fixed effects:
##                   Estimate Std. Error          df t value Pr(>|t|)
```
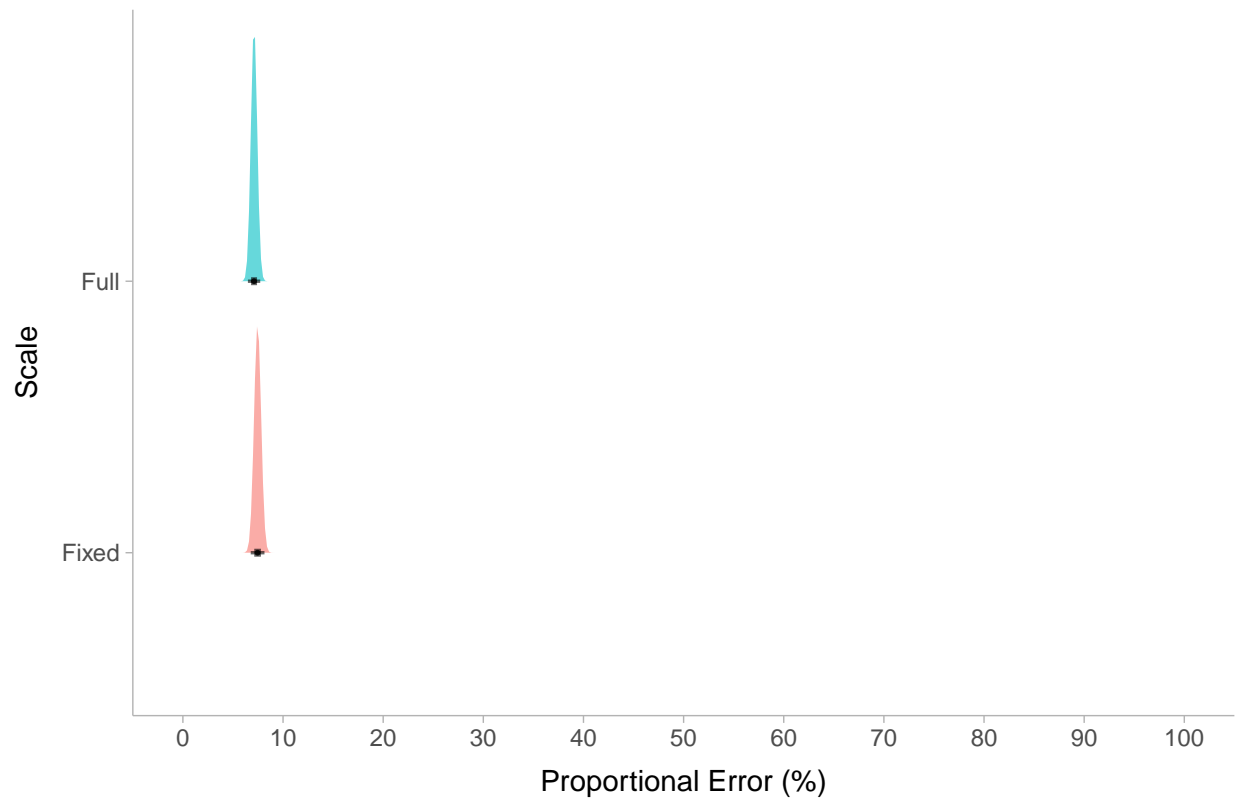
```
## (Intercept)        1.668e+00   8.492e-01   4.053e+00    1.965     0.120
## Frame_Quantity     2.178e-01   8.043e-03   1.154e+03   27.075    <2e-16 ***
## time_lim1          7.795e-01   5.395e-01   3.576e+02    1.445     0.149
## scaleFull         -3.375e-01   5.395e-01   3.576e+02   -0.626     0.532
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) Frm_Qn tm_lm1
## Frame_Qntty -0.233
## time_lim1   -0.317  0.001
## scaleFull   -0.318  0.001  0.000
```
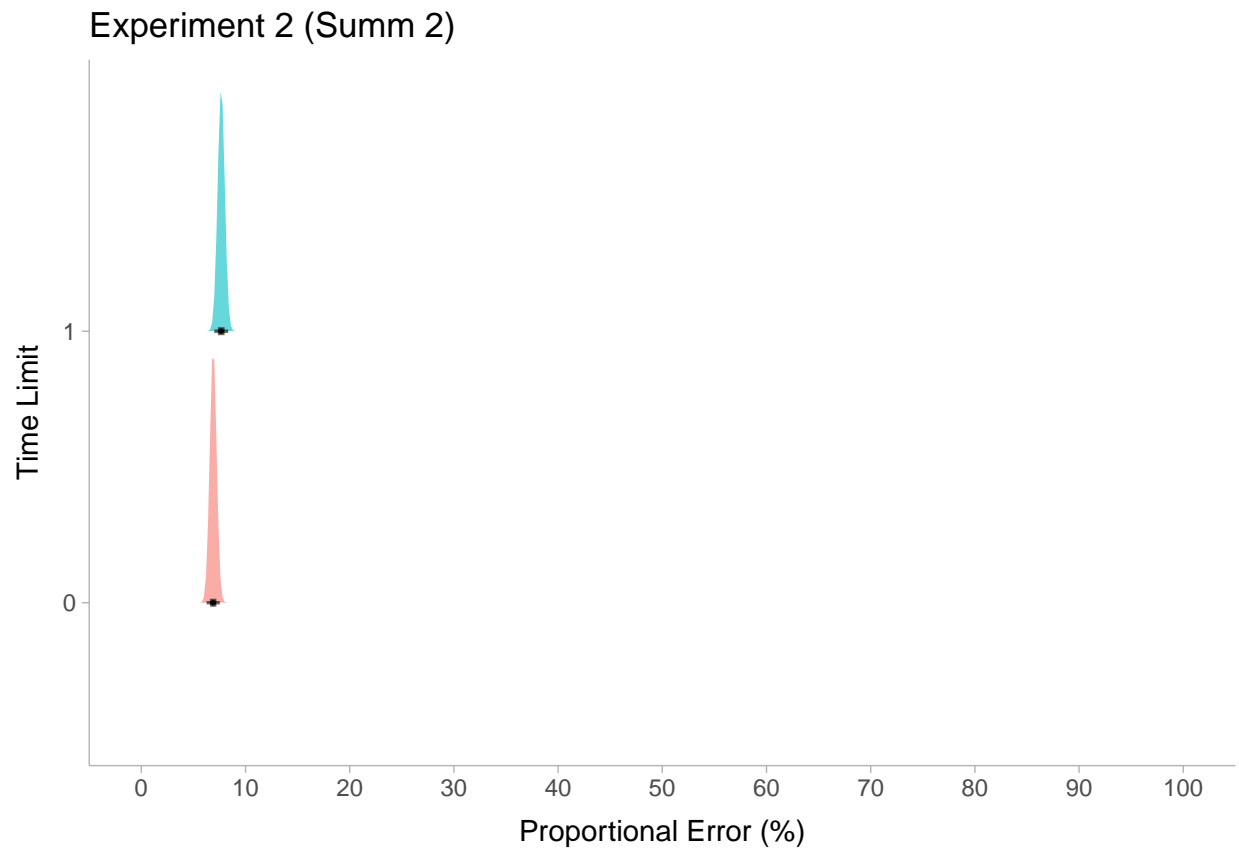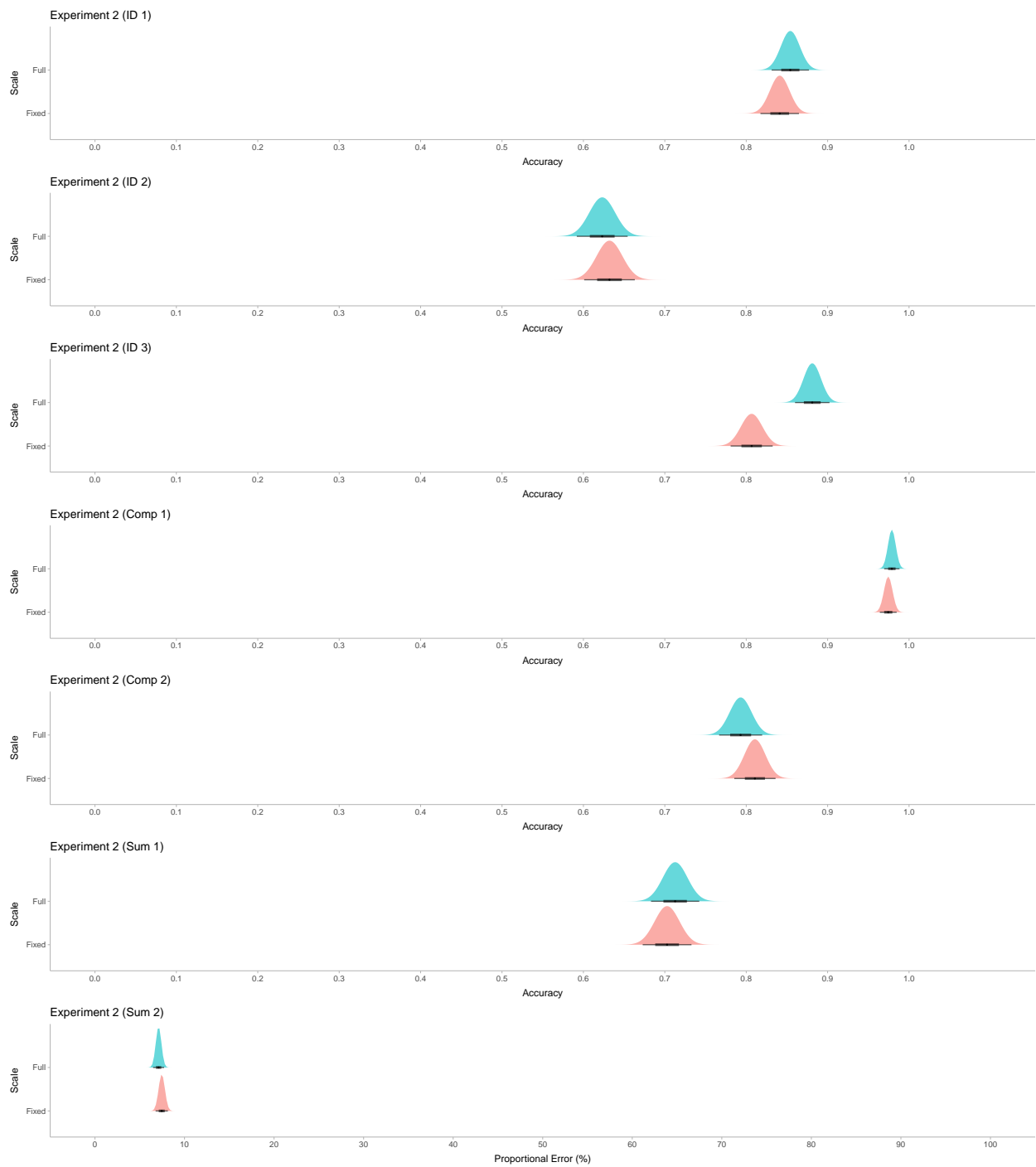

Experiment 1 (Summary 2)
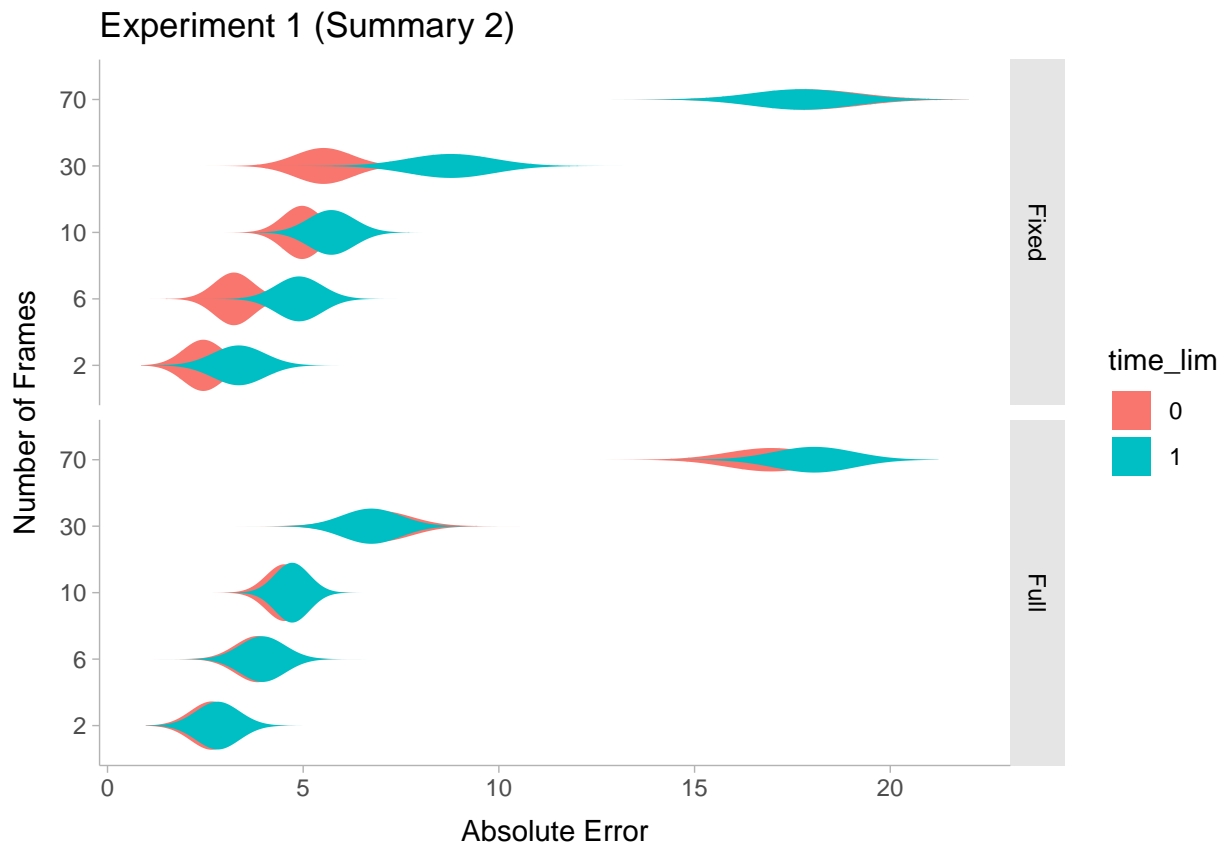
Experiment 2 (Sum 2)

Experiment 2 (Summ 2)

Experiment 2 - 7 Tasks

Fixed vs Full Scale

Experiment 2 (ID 1)

Experiment 2 (ID 2)

Experiment 2 (ID 3)

Experiment 2 (Comp 1)

Experiment 2 (Comp 2)

Experiment 2 (Sum 1)

Experiment 2 (Sum 2)

Time Limit vs No Time Limit

Experiment 2 (ID 1)

Experiment 2 (ID 2)

Experiment 2 (ID 3)

Experiment 2 (Compare 1)

Experiment 2 (Compare 2)

Experiment 2 (Summ 1)

Experiment 2 (Summ 2)