Hb results: CI brain development

model codes and ouput

2023.7.6

# Anterior Temporal Lobe (ATL)

# M1:Random-intercept-with-poly1  
ModelT.condition.interp.Times1 <- lmer(TValues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Tchannel + (1|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M2:Random-intercept-and-slope-with-poly1  
ModelT.condition.slopeinterp.Times1 <-lmer(TValues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Tchannel + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
   
# M3:Random-intercept-with-poly2  
ModelT.condition.interp.Times2 <- lmer(TValues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Tchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M4:Random-intercept-slope-with-poly2  
ModelT.condition.slopeinterp.Times2 <- lmer(TValues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Tchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M5:Random-intercept-with-poly3  
ModelT.condition.interp.Times3 <- lmer(TValues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Tchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M6:Random-intercept-and-slope-with-poly3  
ModelT.condition.slopeinterp.Times3 <- lmer(TValues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Tchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# model contrast  
anova(ModelT.condition.interp.Times1,ModelT.condition.interp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.interp.Times1: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times1: TimesDur + Tchannel + (1 | sub\_ID)  
## ModelT.condition.interp.Times2: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times2: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance Chisq  
## ModelT.condition.interp.Times1 11 -779.87 -716.32 400.93 -801.87   
## ModelT.condition.interp.Times2 14 -777.14 -696.27 402.57 -805.14 3.273  
## Df Pr(>Chisq)  
## ModelT.condition.interp.Times1   
## ModelT.condition.interp.Times2 3 0.3514

anova(ModelT.condition.interp.Times2,ModelT.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.interp.Times2: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times2: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelT.condition.interp.Times3: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times3: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelT.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance Chisq  
## ModelT.condition.interp.Times2 14 -777.14 -696.27 402.57 -805.14   
## ModelT.condition.interp.Times3 17 -772.13 -673.93 403.07 -806.13 0.9927  
## Df Pr(>Chisq)  
## ModelT.condition.interp.Times2   
## ModelT.condition.interp.Times3 3 0.803

anova(ModelT.condition.interp.Times1,ModelT.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.interp.Times1: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times1: TimesDur + Tchannel + (1 | sub\_ID)  
## ModelT.condition.interp.Times3: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times3: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelT.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance Chisq  
## ModelT.condition.interp.Times1 11 -779.87 -716.32 400.93 -801.87   
## ModelT.condition.interp.Times3 17 -772.13 -673.93 403.07 -806.13 4.2657  
## Df Pr(>Chisq)  
## ModelT.condition.interp.Times1   
## ModelT.condition.interp.Times3 6 0.6408

anova(ModelT.condition.slopeinterp.Times1,ModelT.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.slopeinterp.Times1: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times1: TimesDur + Tchannel + (1 + TimesDur | sub\_ID)  
## ModelT.condition.slopeinterp.Times2: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times2: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelT.condition.slopeinterp.Times1 13 -779.14 -704.05 402.57 -805.14  
## ModelT.condition.slopeinterp.Times2 16 -775.38 -682.95 403.69 -807.38  
## Chisq Df Pr(>Chisq)  
## ModelT.condition.slopeinterp.Times1   
## ModelT.condition.slopeinterp.Times2 2.238 3 0.5245

anova(ModelT.condition.slopeinterp.Times2,ModelT.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.slopeinterp.Times2: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times2: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## ModelT.condition.slopeinterp.Times3: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelT.condition.slopeinterp.Times2 16 -775.38 -682.95 403.69 -807.38  
## ModelT.condition.slopeinterp.Times3 19 -770.38 -660.63 404.19 -808.38  
## Chisq Df Pr(>Chisq)  
## ModelT.condition.slopeinterp.Times2   
## ModelT.condition.slopeinterp.Times3 1.0006 3 0.8011

anova(ModelT.condition.slopeinterp.Times1,ModelT.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.slopeinterp.Times1: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times1: TimesDur + Tchannel + (1 + TimesDur | sub\_ID)  
## ModelT.condition.slopeinterp.Times3: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelT.condition.slopeinterp.Times1 13 -779.14 -704.05 402.57 -805.14  
## ModelT.condition.slopeinterp.Times3 19 -770.38 -660.63 404.19 -808.38  
## Chisq Df Pr(>Chisq)  
## ModelT.condition.slopeinterp.Times1   
## ModelT.condition.slopeinterp.Times3 3.2387 6 0.7784

anova(ModelT.condition.interp.Times1,ModelT.condition.slopeinterp.Times1)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.interp.Times1: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times1: TimesDur + Tchannel + (1 | sub\_ID)  
## ModelT.condition.slopeinterp.Times1: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times1: TimesDur + Tchannel + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelT.condition.interp.Times1 11 -779.87 -716.32 400.93 -801.87  
## ModelT.condition.slopeinterp.Times1 13 -779.14 -704.05 402.57 -805.14  
## Chisq Df Pr(>Chisq)  
## ModelT.condition.interp.Times1   
## ModelT.condition.slopeinterp.Times1 3.2754 2 0.1944

anova(ModelT.condition.interp.Times2,ModelT.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.interp.Times2: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times2: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelT.condition.slopeinterp.Times2: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times2: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelT.condition.interp.Times2 14 -777.14 -696.27 402.57 -805.14  
## ModelT.condition.slopeinterp.Times2 16 -775.38 -682.95 403.69 -807.38  
## Chisq Df Pr(>Chisq)  
## ModelT.condition.interp.Times2   
## ModelT.condition.slopeinterp.Times2 2.2404 2 0.3262

anova(ModelT.condition.interp.Times3,ModelT.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelT.condition.interp.Times3: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.interp.Times3: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelT.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## ModelT.condition.slopeinterp.Times3: TValues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: TimesDur + Tchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelT.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelT.condition.interp.Times3 17 -772.13 -673.93 403.07 -806.13  
## ModelT.condition.slopeinterp.Times3 19 -770.38 -660.63 404.19 -808.38  
## Chisq Df Pr(>Chisq)  
## ModelT.condition.interp.Times3   
## ModelT.condition.slopeinterp.Times3 2.2484 2 0.3249

# best fit  
ModelT.condition.interp.Times1.N <- lmer(TValues ~ Conditions + Hemisphere + TimesDur + Tchannel + (1|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelT.condition.interp.Times1.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: TValues ~ Conditions + Hemisphere + TimesDur + Tchannel + (1 |   
## sub\_ID)  
## Data: Rawdata\_activity  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -781.7 -735.4 398.8 -797.7 2376   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -8.9922 -0.4586 0.0190 0.5032 8.8592   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.000828 0.02877   
## Residual 0.041307 0.20324   
## Number of obs: 2384, groups: sub\_ID, 57  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) -2.040e-02 1.048e-02 5.191e+02 -1.947 0.0521 .  
## Conditionsbabble 1.355e-02 8.325e-03 2.328e+03 1.627 0.1039   
## HemisphereR 2.715e-03 8.339e-03 2.338e+03 0.326 0.7448   
## TimesDur 1.750e-04 5.986e-04 1.111e+03 0.292 0.7701   
## TchannelCH5 -2.105e-02 1.005e-02 2.332e+03 -2.095 0.0363 \*  
## TchannelCH8 -1.476e-02 1.029e-02 2.338e+03 -1.435 0.1516   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) Cndtns HmsphR TimsDr TchCH5  
## Condtnsbbbl -0.397   
## HemisphereR -0.400 0.000   
## TimesDur -0.297 0.000 0.014   
## TchannelCH5 -0.476 0.000 0.001 -0.002   
## TchannelCH8 -0.447 0.000 -0.028 -0.021 0.486

anova(ModelT.condition.interp.Times1.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Conditions 0.109349 0.109349 1 2328.2 2.6472 0.10387   
## Hemisphere 0.004379 0.004379 1 2337.7 0.1060 0.74476   
## TimesDur 0.003531 0.003531 1 1111.0 0.0855 0.77007   
## Tchannel 0.190675 0.095338 2 2335.5 2.3080 0.09969 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# Sylvian parieto-temporal areas(Spt)

# M1:Random-intercept-with-poly1  
ModelSpt.condition.interp.Times1 <- lmer(Sptvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Sptchannel + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M2:Random-intercept-and-slope-with-poly1  
ModelSpt.condition.slopeinterp.Times1 <-lmer(Sptvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Sptchannel + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M3:Random-intercept-with-poly2  
ModelSpt.condition.interp.Times2 <- lmer(Sptvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Sptchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M4:Random-intercept-slope-with-poly2  
ModelSpt.condition.slopeinterp.Times2 <- lmer(Sptvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Sptchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M5:Random-intercept-with-poly3  
ModelSpt.condition.interp.Times3 <- lmer(Sptvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Sptchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M6:Random-intercept-and-slope-with-poly3  
ModelSpt.condition.slopeinterp.Times3 <- lmer(Sptvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Sptchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# model contrast  
anova(ModelSpt.condition.interp.Times1,ModelSpt.condition.interp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.interp.Times1: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times1: Hemisphere \* TimesDur + Sptchannel + (1 | sub\_ID)  
## ModelSpt.condition.interp.Times2: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times2: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.interp.Times2: Hemisphere \* I(TimesDur^2) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSpt.condition.interp.Times1 10 -1070.3 -1016.5 545.13 -1090.3  
## ModelSpt.condition.interp.Times2 13 -1070.6 -1000.6 548.30 -1096.6  
## Chisq Df Pr(>Chisq)   
## ModelSpt.condition.interp.Times1   
## ModelSpt.condition.interp.Times2 6.3404 3 0.09618 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

anova(ModelSpt.condition.interp.Times2,ModelSpt.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.interp.Times2: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times2: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.interp.Times2: Hemisphere \* I(TimesDur^2) + (1 | sub\_ID)  
## ModelSpt.condition.interp.Times3: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times3: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.interp.Times3: Hemisphere \* I(TimesDur^2) + Conditions \* I(TimesDur^3) +   
## ModelSpt.condition.interp.Times3: Hemisphere \* I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSpt.condition.interp.Times2 13 -1070.6 -1000.65 548.30 -1096.6  
## ModelSpt.condition.interp.Times3 16 -1067.1 -981.01 549.56 -1099.1  
## Chisq Df Pr(>Chisq)  
## ModelSpt.condition.interp.Times2   
## ModelSpt.condition.interp.Times3 2.5074 3 0.474

anova(ModelSpt.condition.interp.Times1,ModelSpt.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.interp.Times1: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times1: Hemisphere \* TimesDur + Sptchannel + (1 | sub\_ID)  
## ModelSpt.condition.interp.Times3: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times3: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.interp.Times3: Hemisphere \* I(TimesDur^2) + Conditions \* I(TimesDur^3) +   
## ModelSpt.condition.interp.Times3: Hemisphere \* I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSpt.condition.interp.Times1 10 -1070.3 -1016.45 545.13 -1090.3  
## ModelSpt.condition.interp.Times3 16 -1067.1 -981.01 549.56 -1099.1  
## Chisq Df Pr(>Chisq)  
## ModelSpt.condition.interp.Times1   
## ModelSpt.condition.interp.Times3 8.8478 6 0.1823

anova(ModelSpt.condition.slopeinterp.Times1,ModelSpt.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.slopeinterp.Times1: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times1: Hemisphere \* TimesDur + Sptchannel + (1 + TimesDur | sub\_ID)  
## ModelSpt.condition.slopeinterp.Times2: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.slopeinterp.Times2: Hemisphere \* I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik  
## ModelSpt.condition.slopeinterp.Times1 12 -1066.3 -1001.73 545.15  
## ModelSpt.condition.slopeinterp.Times2 15 -1067.0 -986.22 548.47  
## deviance Chisq Df Pr(>Chisq)   
## ModelSpt.condition.slopeinterp.Times1 -1090.3   
## ModelSpt.condition.slopeinterp.Times2 -1097.0 6.641 3 0.08426 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

anova(ModelSpt.condition.slopeinterp.Times2,ModelSpt.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.slopeinterp.Times2: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.slopeinterp.Times2: Hemisphere \* I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## ModelSpt.condition.slopeinterp.Times3: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* I(TimesDur^2) + Conditions \* I(TimesDur^3) +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSpt.condition.slopeinterp.Times2 15 -1067.0 -986.22 548.47 -1097.0  
## ModelSpt.condition.slopeinterp.Times3 18 -1063.2 -966.31 549.59 -1099.2  
## Chisq Df Pr(>Chisq)  
## ModelSpt.condition.slopeinterp.Times2   
## ModelSpt.condition.slopeinterp.Times3 2.2356 3 0.525

anova(ModelSpt.condition.slopeinterp.Times1,ModelSpt.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.slopeinterp.Times1: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times1: Hemisphere \* TimesDur + Sptchannel + (1 + TimesDur | sub\_ID)  
## ModelSpt.condition.slopeinterp.Times3: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* I(TimesDur^2) + Conditions \* I(TimesDur^3) +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik  
## ModelSpt.condition.slopeinterp.Times1 12 -1066.3 -1001.73 545.15  
## ModelSpt.condition.slopeinterp.Times3 18 -1063.2 -966.31 549.59  
## deviance Chisq Df Pr(>Chisq)  
## ModelSpt.condition.slopeinterp.Times1 -1090.3   
## ModelSpt.condition.slopeinterp.Times3 -1099.2 8.8766 6 0.1806

anova(ModelSpt.condition.interp.Times1,ModelSpt.condition.slopeinterp.Times1)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.interp.Times1: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times1: Hemisphere \* TimesDur + Sptchannel + (1 | sub\_ID)  
## ModelSpt.condition.slopeinterp.Times1: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times1: Hemisphere \* TimesDur + Sptchannel + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSpt.condition.interp.Times1 10 -1070.3 -1016.5 545.13 -1090.3  
## ModelSpt.condition.slopeinterp.Times1 12 -1066.3 -1001.7 545.15 -1090.3  
## Chisq Df Pr(>Chisq)  
## ModelSpt.condition.interp.Times1   
## ModelSpt.condition.slopeinterp.Times1 0.0393 2 0.9805

anova(ModelSpt.condition.interp.Times2,ModelSpt.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.interp.Times2: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times2: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.interp.Times2: Hemisphere \* I(TimesDur^2) + (1 | sub\_ID)  
## ModelSpt.condition.slopeinterp.Times2: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.slopeinterp.Times2: Hemisphere \* I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik  
## ModelSpt.condition.interp.Times2 13 -1070.6 -1000.65 548.30  
## ModelSpt.condition.slopeinterp.Times2 15 -1067.0 -986.22 548.47  
## deviance Chisq Df Pr(>Chisq)  
## ModelSpt.condition.interp.Times2 -1096.6   
## ModelSpt.condition.slopeinterp.Times2 -1097.0 0.34 2 0.8437

anova(ModelSpt.condition.interp.Times3,ModelSpt.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSpt.condition.interp.Times3: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.interp.Times3: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.interp.Times3: Hemisphere \* I(TimesDur^2) + Conditions \* I(TimesDur^3) +   
## ModelSpt.condition.interp.Times3: Hemisphere \* I(TimesDur^3) + (1 | sub\_ID)  
## ModelSpt.condition.slopeinterp.Times3: Sptvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Sptchannel + Conditions \* I(TimesDur^2) +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* I(TimesDur^2) + Conditions \* I(TimesDur^3) +   
## ModelSpt.condition.slopeinterp.Times3: Hemisphere \* I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSpt.condition.interp.Times3 16 -1067.1 -981.01 549.56 -1099.1  
## ModelSpt.condition.slopeinterp.Times3 18 -1063.2 -966.31 549.59 -1099.2  
## Chisq Df Pr(>Chisq)  
## ModelSpt.condition.interp.Times3   
## ModelSpt.condition.slopeinterp.Times3 0.0681 2 0.9665

# best fit  
ModelSpt.condition.slopeinterp.Times1.N <- lmer(Sptvalues ~ TimesDur + Conditions + Hemisphere + Sptchannel + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelSpt.condition.slopeinterp.Times1.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Sptvalues ~ TimesDur + Conditions + Hemisphere + Sptchannel +   
## (1 | sub\_ID)  
## Data: Rawdata\_activity  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -1073.0 -1035.3 543.5 -1087.0 1599   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -6.6967 -0.5178 -0.0107 0.4591 9.6395   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.001196 0.03458   
## Residual 0.028970 0.17021   
## Number of obs: 1606, groups: sub\_ID, 57  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) 8.794e-03 1.020e-02 3.379e+02 0.862 0.3890   
## TimesDur 2.183e-04 6.285e-04 1.069e+03 0.347 0.7284   
## Conditionsbabble 3.051e-03 8.494e-03 1.552e+03 0.359 0.7195   
## HemisphereR 9.710e-04 8.502e-03 1.556e+03 0.114 0.9091   
## SptchannelCH9 -1.413e-02 8.503e-03 1.557e+03 -1.662 0.0967 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) TimsDr Cndtns HmsphR  
## TimesDur -0.304   
## Condtnsbbbl -0.417 0.000   
## HemisphereR -0.413 -0.005 0.000   
## SptchnnlCH9 -0.417 -0.009 0.000 0.004

anova(ModelSpt.condition.slopeinterp.Times1.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## TimesDur 0.003495 0.003495 1 1069.0 0.1206 0.72840   
## Conditions 0.003737 0.003737 1 1551.7 0.1290 0.71952   
## Hemisphere 0.000378 0.000378 1 1556.3 0.0130 0.90909   
## Sptchannel 0.080007 0.080007 1 1556.7 2.7617 0.09675 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# Supramarginal gyrus(SMG)

# M1:Random-intercept-with-poly1  
ModelSMG.condition.interp.Times1 <- lmer(SMGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M2:Random-intercept-and-slope-with-poly1  
ModelSMG.condition.slopeinterp.Times1 <-lmer(SMGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M3:Random-intercept-with-poly2  
ModelSMG.condition.interp.Times2 <- lmer(SMGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M4:Random-intercept-slope-with-poly2  
ModelSMG.condition.slopeinterp.Times2 <- lmer(SMGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M5:Random-intercept-with-poly3  
ModelSMG.condition.interp.Times3 <- lmer(SMGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M6:Random-intercept-and-slope-with-poly3  
ModelSMG.condition.slopeinterp.Times3 <- lmer(SMGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# model contrast  
anova(ModelSMG.condition.interp.Times1,ModelSMG.condition.interp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.interp.Times1: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelSMG.condition.interp.Times2: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.interp.Times1 9 -582.53 -540.30 300.27 -600.53  
## ModelSMG.condition.interp.Times2 12 -581.82 -525.51 302.91 -605.82  
## Chisq Df Pr(>Chisq)  
## ModelSMG.condition.interp.Times1   
## ModelSMG.condition.interp.Times2 5.2862 3 0.152

anova(ModelSMG.condition.interp.Times2,ModelSMG.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.interp.Times2: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelSMG.condition.interp.Times3: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelSMG.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.interp.Times2 12 -581.82 -525.51 302.91 -605.82  
## ModelSMG.condition.interp.Times3 15 -581.40 -511.02 305.70 -611.40  
## Chisq Df Pr(>Chisq)  
## ModelSMG.condition.interp.Times2   
## ModelSMG.condition.interp.Times3 5.5795 3 0.134

anova(ModelSMG.condition.interp.Times1,ModelSMG.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.interp.Times1: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelSMG.condition.interp.Times3: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelSMG.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.interp.Times1 9 -582.53 -540.30 300.27 -600.53  
## ModelSMG.condition.interp.Times3 15 -581.40 -511.02 305.70 -611.40  
## Chisq Df Pr(>Chisq)   
## ModelSMG.condition.interp.Times1   
## ModelSMG.condition.interp.Times3 10.866 6 0.09262 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

anova(ModelSMG.condition.slopeinterp.Times1,ModelSMG.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.slopeinterp.Times1: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## ModelSMG.condition.slopeinterp.Times2: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.slopeinterp.Times1 11 -578.58 -526.96 300.29 -600.58  
## ModelSMG.condition.slopeinterp.Times2 14 -578.05 -512.36 303.02 -606.05  
## Chisq Df Pr(>Chisq)  
## ModelSMG.condition.slopeinterp.Times1   
## ModelSMG.condition.slopeinterp.Times2 5.4687 3 0.1405

anova(ModelSMG.condition.slopeinterp.Times2,ModelSMG.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.slopeinterp.Times2: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## ModelSMG.condition.slopeinterp.Times3: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.slopeinterp.Times2 14 -578.05 -512.36 303.02 -606.05  
## ModelSMG.condition.slopeinterp.Times3 17 -577.46 -497.69 305.73 -611.46  
## Chisq Df Pr(>Chisq)  
## ModelSMG.condition.slopeinterp.Times2   
## ModelSMG.condition.slopeinterp.Times3 5.4114 3 0.144

anova(ModelSMG.condition.slopeinterp.Times1,ModelSMG.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.slopeinterp.Times1: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## ModelSMG.condition.slopeinterp.Times3: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.slopeinterp.Times1 11 -578.58 -526.96 300.29 -600.58  
## ModelSMG.condition.slopeinterp.Times3 17 -577.46 -497.69 305.73 -611.46  
## Chisq Df Pr(>Chisq)   
## ModelSMG.condition.slopeinterp.Times1   
## ModelSMG.condition.slopeinterp.Times3 10.88 6 0.09215 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

anova(ModelSMG.condition.interp.Times1,ModelSMG.condition.slopeinterp.Times1)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.interp.Times1: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelSMG.condition.slopeinterp.Times1: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.interp.Times1 9 -582.53 -540.30 300.27 -600.53  
## ModelSMG.condition.slopeinterp.Times1 11 -578.58 -526.96 300.29 -600.58  
## Chisq Df Pr(>Chisq)  
## ModelSMG.condition.interp.Times1   
## ModelSMG.condition.slopeinterp.Times1 0.046 2 0.9773

anova(ModelSMG.condition.interp.Times2,ModelSMG.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.interp.Times2: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelSMG.condition.slopeinterp.Times2: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.interp.Times2 12 -581.82 -525.51 302.91 -605.82  
## ModelSMG.condition.slopeinterp.Times2 14 -578.05 -512.36 303.02 -606.05  
## Chisq Df Pr(>Chisq)  
## ModelSMG.condition.interp.Times2   
## ModelSMG.condition.slopeinterp.Times2 0.2285 2 0.892

anova(ModelSMG.condition.interp.Times3,ModelSMG.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelSMG.condition.interp.Times3: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelSMG.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## ModelSMG.condition.slopeinterp.Times3: SMGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelSMG.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelSMG.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelSMG.condition.interp.Times3 15 -581.40 -511.02 305.70 -611.40  
## ModelSMG.condition.slopeinterp.Times3 17 -577.46 -497.69 305.73 -611.46  
## Chisq Df Pr(>Chisq)  
## ModelSMG.condition.interp.Times3   
## ModelSMG.condition.slopeinterp.Times3 0.0604 2 0.9703

# best fit  
ModelSMG.condition.interp.Times1.N <- lmer(SMGvalues ~ Conditions + TimesDur + Hemisphere + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelSMG.condition.interp.Times1.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: SMGvalues ~ Conditions + TimesDur + Hemisphere + (1 | sub\_ID)  
## Data: Rawdata\_activity  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -584.7 -556.5 298.3 -596.7 800   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -5.0719 -0.5907 -0.0103 0.5778 5.0186   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.0007891 0.02809   
## Residual 0.0272675 0.16513   
## Number of obs: 806, groups: sub\_ID, 57  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)  
## (Intercept) 8.651e-05 1.159e-02 3.248e+02 0.007 0.994  
## Conditionsbabble 1.389e-02 1.163e-02 7.559e+02 1.194 0.233  
## TimesDur 9.051e-05 8.256e-04 5.821e+02 0.110 0.913  
## HemisphereR 5.678e-03 1.164e-02 7.619e+02 0.488 0.626  
##   
## Correlation of Fixed Effects:  
## (Intr) Cndtns TimsDr  
## Condtnsbbbl -0.502   
## TimesDur -0.364 0.000   
## HemisphereR -0.496 0.000 -0.014

anova(ModelSMG.condition.interp.Times1.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)  
## Conditions 0.038857 0.038857 1 755.87 1.4250 0.2330  
## TimesDur 0.000328 0.000328 1 582.06 0.0120 0.9127  
## Hemisphere 0.006483 0.006483 1 761.94 0.2378 0.6260

# Inferior Frontal Gyrus (IFG)

# M1:Random-intercept-with-poly1  
ModelF.condition.interp.Times1 <- lmer(Fvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Fchannel + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M2:Random-intercept-and-slope-with-poly1  
ModelF.condition.slopeinterp.Times1 <-lmer(Fvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Fchannel + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M3:Random-intercept-with-poly2  
ModelF.condition.interp.Times2 <- lmer(Fvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Fchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M4:Random-intercept-slope-with-poly2  
ModelF.condition.slopeinterp.Times2 <- lmer(Fvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Fchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M5:Random-intercept-with-poly3  
ModelF.condition.interp.Times3 <- lmer(Fvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Fchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M6:Random-intercept-and-slope-with-poly3  
ModelF.condition.slopeinterp.Times3 <- lmer(Fvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Fchannel + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# model contrast  
anova(ModelF.condition.interp.Times1,ModelF.condition.interp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.interp.Times1: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times1: TimesDur + Fchannel + (1 | sub\_ID)  
## ModelF.condition.interp.Times2: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times2: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance Chisq  
## ModelF.condition.interp.Times1 10 -804.95 -751.47 412.47 -824.95   
## ModelF.condition.interp.Times2 13 -801.74 -732.22 413.87 -827.74 2.7883  
## Df Pr(>Chisq)  
## ModelF.condition.interp.Times1   
## ModelF.condition.interp.Times2 3 0.4254

anova(ModelF.condition.interp.Times2,ModelF.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.interp.Times2: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times2: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelF.condition.interp.Times3: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times3: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelF.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance Chisq  
## ModelF.condition.interp.Times2 13 -801.74 -732.22 413.87 -827.74   
## ModelF.condition.interp.Times3 16 -797.72 -712.16 414.86 -829.72 1.9804  
## Df Pr(>Chisq)  
## ModelF.condition.interp.Times2   
## ModelF.condition.interp.Times3 3 0.5765

anova(ModelF.condition.interp.Times1,ModelF.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.interp.Times1: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times1: TimesDur + Fchannel + (1 | sub\_ID)  
## ModelF.condition.interp.Times3: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times3: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelF.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance Chisq  
## ModelF.condition.interp.Times1 10 -804.95 -751.47 412.47 -824.95   
## ModelF.condition.interp.Times3 16 -797.72 -712.16 414.86 -829.72 4.7687  
## Df Pr(>Chisq)  
## ModelF.condition.interp.Times1   
## ModelF.condition.interp.Times3 6 0.5738

anova(ModelF.condition.slopeinterp.Times1,ModelF.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.slopeinterp.Times1: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times1: TimesDur + Fchannel + (1 + TimesDur | sub\_ID)  
## ModelF.condition.slopeinterp.Times2: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times2: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelF.condition.slopeinterp.Times1 12 -803.11 -738.94 413.56 -827.11  
## ModelF.condition.slopeinterp.Times2 15 -799.24 -719.03 414.62 -829.24  
## Chisq Df Pr(>Chisq)  
## ModelF.condition.slopeinterp.Times1   
## ModelF.condition.slopeinterp.Times2 2.1288 3 0.5461

anova(ModelF.condition.slopeinterp.Times2,ModelF.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.slopeinterp.Times2: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times2: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## ModelF.condition.slopeinterp.Times3: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelF.condition.slopeinterp.Times2 15 -799.24 -719.03 414.62 -829.24  
## ModelF.condition.slopeinterp.Times3 18 -795.70 -699.44 415.85 -831.70  
## Chisq Df Pr(>Chisq)  
## ModelF.condition.slopeinterp.Times2   
## ModelF.condition.slopeinterp.Times3 2.4562 3 0.4833

anova(ModelF.condition.slopeinterp.Times1,ModelF.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.slopeinterp.Times1: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times1: TimesDur + Fchannel + (1 + TimesDur | sub\_ID)  
## ModelF.condition.slopeinterp.Times3: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelF.condition.slopeinterp.Times1 12 -803.11 -738.94 413.56 -827.11  
## ModelF.condition.slopeinterp.Times3 18 -795.70 -699.44 415.85 -831.70  
## Chisq Df Pr(>Chisq)  
## ModelF.condition.slopeinterp.Times1   
## ModelF.condition.slopeinterp.Times3 4.585 6 0.598

anova(ModelF.condition.interp.Times1,ModelF.condition.slopeinterp.Times1)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.interp.Times1: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times1: TimesDur + Fchannel + (1 | sub\_ID)  
## ModelF.condition.slopeinterp.Times1: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times1: TimesDur + Fchannel + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelF.condition.interp.Times1 10 -804.95 -751.47 412.47 -824.95  
## ModelF.condition.slopeinterp.Times1 12 -803.11 -738.94 413.56 -827.11  
## Chisq Df Pr(>Chisq)  
## ModelF.condition.interp.Times1   
## ModelF.condition.slopeinterp.Times1 2.1633 2 0.339

anova(ModelF.condition.interp.Times2,ModelF.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.interp.Times2: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times2: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelF.condition.slopeinterp.Times2: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times2: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelF.condition.interp.Times2 13 -801.74 -732.22 413.87 -827.74  
## ModelF.condition.slopeinterp.Times2 15 -799.24 -719.03 414.62 -829.24  
## Chisq Df Pr(>Chisq)  
## ModelF.condition.interp.Times2   
## ModelF.condition.slopeinterp.Times2 1.5038 2 0.4715

anova(ModelF.condition.interp.Times3,ModelF.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelF.condition.interp.Times3: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.interp.Times3: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelF.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## ModelF.condition.slopeinterp.Times3: Fvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: TimesDur + Fchannel + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelF.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelF.condition.interp.Times3 16 -797.72 -712.16 414.86 -829.72  
## ModelF.condition.slopeinterp.Times3 18 -795.70 -699.44 415.85 -831.70  
## Chisq Df Pr(>Chisq)  
## ModelF.condition.interp.Times3   
## ModelF.condition.slopeinterp.Times3 1.9796 2 0.3716

# best fit  
ModelF.condition.interp.Times1.N <- lmer(Fvalues ~ Hemisphere + Fchannel + Conditions \* TimesDur + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelF.condition.interp.Times1.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Fvalues ~ Hemisphere + Fchannel + Conditions \* TimesDur + (1 |   
## sub\_ID)  
## Data: Rawdata\_activity  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -803.9 -761.1 410.0 -819.9 1544   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -4.1009 -0.5802 -0.0085 0.5739 6.1206   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.001244 0.03526   
## Residual 0.033668 0.18349   
## Number of obs: 1552, groups: sub\_ID, 57  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) 3.996e-04 1.170e-02 4.157e+02 0.034  
## HemisphereR 6.970e-03 9.348e-03 1.508e+03 0.746  
## FchannelCH4 -1.749e-03 9.322e-03 1.500e+03 -0.188  
## Conditionsbabble -1.229e-02 1.152e-02 1.495e+03 -1.067  
## TimesDur -1.323e-04 9.147e-04 1.362e+03 -0.145  
## Conditionsbabble:TimesDur 1.416e-03 1.233e-03 1.495e+03 1.148  
## Pr(>|t|)  
## (Intercept) 0.973  
## HemisphereR 0.456  
## FchannelCH4 0.851  
## Conditionsbabble 0.286  
## TimesDur 0.885  
## Conditionsbabble:TimesDur 0.251  
##   
## Correlation of Fixed Effects:  
## (Intr) HmsphR FchCH4 Cndtns TimsDr  
## HemisphereR -0.428   
## FchannelCH4 -0.395 0.000   
## Condtnsbbbl -0.492 0.000 0.000   
## TimesDur -0.427 0.023 -0.003 0.396   
## Cndtnsbb:TD 0.289 0.000 0.000 -0.588 -0.674

anova(ModelF.condition.interp.Times1.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)  
## Hemisphere 0.018717 0.018717 1 1508.27 0.5559 0.4560  
## Fchannel 0.001186 0.001186 1 1499.81 0.0352 0.8512  
## Conditions 0.038357 0.038357 1 1495.48 1.1393 0.2860  
## TimesDur 0.024430 0.024430 1 903.92 0.7256 0.3945  
## Conditions:TimesDur 0.044381 0.044381 1 1495.48 1.3182 0.2511

# AG

# M1:Random-intercept-with-poly1  
ModelAG.condition.interp.Times1 <- lmer(AGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M2:Random-intercept-and-slope-with-poly1  
ModelAG.condition.slopeinterp.Times1 <-lmer(AGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M3:Random-intercept-with-poly2  
ModelAG.condition.interp.Times2 <- lmer(AGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M4:Random-intercept-slope-with-poly2  
ModelAG.condition.slopeinterp.Times2 <- lmer(AGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M5:Random-intercept-with-poly3  
ModelAG.condition.interp.Times3 <- lmer(AGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M6:Random-intercept-and-slope-with-poly3  
ModelAG.condition.slopeinterp.Times3 <- lmer(AGvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# model contrast  
anova(ModelAG.condition.interp.Times1,ModelAG.condition.interp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.interp.Times1: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelAG.condition.interp.Times2: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.interp.Times1 9 -355.70 -313.95 186.85 -373.70  
## ModelAG.condition.interp.Times2 12 -355.55 -299.88 189.77 -379.55  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.interp.Times1   
## ModelAG.condition.interp.Times2 5.8494 3 0.1192

anova(ModelAG.condition.interp.Times2,ModelAG.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.interp.Times2: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelAG.condition.interp.Times3: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelAG.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.interp.Times2 12 -355.55 -299.88 189.77 -379.55  
## ModelAG.condition.interp.Times3 15 -351.31 -281.73 190.66 -381.31  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.interp.Times2   
## ModelAG.condition.interp.Times3 1.7668 3 0.6222

anova(ModelAG.condition.interp.Times1,ModelAG.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.interp.Times1: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelAG.condition.interp.Times3: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelAG.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.interp.Times1 9 -355.70 -313.95 186.85 -373.70  
## ModelAG.condition.interp.Times3 15 -351.31 -281.73 190.66 -381.31  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.interp.Times1   
## ModelAG.condition.interp.Times3 7.6162 6 0.2676

anova(ModelAG.condition.slopeinterp.Times1,ModelAG.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.slopeinterp.Times1: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## ModelAG.condition.slopeinterp.Times2: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.slopeinterp.Times1 11 -351.72 -300.69 186.86 -373.72  
## ModelAG.condition.slopeinterp.Times2 14 -351.55 -286.61 189.77 -379.55  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.slopeinterp.Times1   
## ModelAG.condition.slopeinterp.Times2 5.8305 3 0.1202

anova(ModelAG.condition.slopeinterp.Times2,ModelAG.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.slopeinterp.Times2: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## ModelAG.condition.slopeinterp.Times3: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.slopeinterp.Times2 14 -351.55 -286.61 189.77 -379.55  
## ModelAG.condition.slopeinterp.Times3 17 -347.31 -268.46 190.66 -381.31  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.slopeinterp.Times2   
## ModelAG.condition.slopeinterp.Times3 1.7649 3 0.6226

anova(ModelAG.condition.slopeinterp.Times1,ModelAG.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.slopeinterp.Times1: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## ModelAG.condition.slopeinterp.Times3: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.slopeinterp.Times1 11 -351.72 -300.69 186.86 -373.72  
## ModelAG.condition.slopeinterp.Times3 17 -347.31 -268.46 190.66 -381.31  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.slopeinterp.Times1   
## ModelAG.condition.slopeinterp.Times3 7.5954 6 0.2693

anova(ModelAG.condition.interp.Times1,ModelAG.condition.slopeinterp.Times1)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.interp.Times1: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelAG.condition.slopeinterp.Times1: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.interp.Times1 9 -355.70 -313.95 186.85 -373.70  
## ModelAG.condition.slopeinterp.Times1 11 -351.72 -300.69 186.86 -373.72  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.interp.Times1   
## ModelAG.condition.slopeinterp.Times1 0.0214 2 0.9894

anova(ModelAG.condition.interp.Times2,ModelAG.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.interp.Times2: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelAG.condition.slopeinterp.Times2: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.interp.Times2 12 -355.55 -299.88 189.77 -379.55  
## ModelAG.condition.slopeinterp.Times2 14 -351.55 -286.61 189.77 -379.55  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.interp.Times2   
## ModelAG.condition.slopeinterp.Times2 0.0025 2 0.9988

anova(ModelAG.condition.interp.Times3,ModelAG.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelAG.condition.interp.Times3: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelAG.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## ModelAG.condition.slopeinterp.Times3: AGvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelAG.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelAG.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelAG.condition.interp.Times3 15 -351.31 -281.73 190.66 -381.31  
## ModelAG.condition.slopeinterp.Times3 17 -347.31 -268.46 190.66 -381.31  
## Chisq Df Pr(>Chisq)  
## ModelAG.condition.interp.Times3   
## ModelAG.condition.slopeinterp.Times3 6e-04 2 0.9997

# best fit  
ModelAG.condition.interp.Times1.N <- lmer(AGvalues ~ Hemisphere + Conditions + TimesDur + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelAG.condition.interp.Times1.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: AGvalues ~ Hemisphere + Conditions + TimesDur + (1 | sub\_ID)  
## Data: Rawdata\_activity  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -359.7 -331.8 185.8 -371.7 758   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -4.0058 -0.5016 -0.0288 0.5041 5.5432   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.0007458 0.02731   
## Residual 0.0353417 0.18799   
## Number of obs: 764, groups: sub\_ID, 57  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)  
## (Intercept) 2.408e-03 1.311e-02 3.386e+02 0.184 0.854  
## HemisphereR 1.244e-02 1.364e-02 7.292e+02 0.912 0.362  
## Conditionsbabble -1.093e-02 1.360e-02 7.158e+02 -0.804 0.422  
## TimesDur -5.872e-04 9.539e-04 4.813e+02 -0.616 0.538  
##   
## Correlation of Fixed Effects:  
## (Intr) HmsphR Cndtns  
## HemisphereR -0.489   
## Condtnsbbbl -0.519 0.000   
## TimesDur -0.368 -0.009 0.000

anova(ModelAG.condition.interp.Times1.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)  
## Hemisphere 0.029375 0.029375 1 729.22 0.8312 0.3622  
## Conditions 0.022837 0.022837 1 715.83 0.6462 0.4218  
## TimesDur 0.013392 0.013392 1 481.34 0.3789 0.5385

# FA

# M1:Random-intercept-with-poly1  
ModelFA.condition.interp.Times1 <- lmer(FAvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M2:Random-intercept-and-slope-with-poly1  
ModelFA.condition.slopeinterp.Times1 <-lmer(FAvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M3:Random-intercept-with-poly2  
ModelFA.condition.interp.Times2 <- lmer(FAvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M4:Random-intercept-slope-with-poly2  
ModelFA.condition.slopeinterp.Times2 <- lmer(FAvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + (1+TimesDur|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M5:Random-intercept-with-poly3  
ModelFA.condition.interp.Times3 <- lmer(FAvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1|sub\_ID), Rawdata\_activity, REML = FALSE,control = ctrl,na.action=na.omit)  
  
# M6:Random-intercept-and-slope-with-poly3  
ModelFA.condition.slopeinterp.Times3 <- lmer(FAvalues ~ Conditions\*Hemisphere + Conditions\*TimesDur + Hemisphere\*TimesDur + Conditions\*I(TimesDur^2) + Hemisphere\*I(TimesDur^2) + Conditions\*I(TimesDur^3) + Hemisphere\*I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
# model contrast  
anova(ModelFA.condition.interp.Times1,ModelFA.condition.interp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.interp.Times1: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelFA.condition.interp.Times2: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.interp.Times1 9 -46.686 -5.2502 32.343 -64.686  
## ModelFA.condition.interp.Times2 12 -42.883 12.3638 33.442 -66.883  
## Chisq Df Pr(>Chisq)  
## ModelFA.condition.interp.Times1   
## ModelFA.condition.interp.Times2 2.1978 3 0.5324

anova(ModelFA.condition.interp.Times2,ModelFA.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.interp.Times2: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelFA.condition.interp.Times3: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelFA.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance Chisq  
## ModelFA.condition.interp.Times2 12 -42.883 12.364 33.442 -66.883   
## ModelFA.condition.interp.Times3 15 -44.710 24.349 37.355 -74.710 7.8269  
## Df Pr(>Chisq)   
## ModelFA.condition.interp.Times2   
## ModelFA.condition.interp.Times3 3 0.04973 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

anova(ModelFA.condition.interp.Times1,ModelFA.condition.interp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.interp.Times1: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelFA.condition.interp.Times3: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelFA.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.interp.Times1 9 -46.686 -5.2502 32.343 -64.686  
## ModelFA.condition.interp.Times3 15 -44.710 24.3487 37.355 -74.710  
## Chisq Df Pr(>Chisq)  
## ModelFA.condition.interp.Times1   
## ModelFA.condition.interp.Times3 10.025 6 0.1236

anova(ModelFA.condition.slopeinterp.Times1,ModelFA.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.slopeinterp.Times1: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## ModelFA.condition.slopeinterp.Times2: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.slopeinterp.Times1 11 -43.190 7.4536 32.595 -65.190  
## ModelFA.condition.slopeinterp.Times2 14 -39.269 25.1865 33.634 -67.269  
## Chisq Df Pr(>Chisq)  
## ModelFA.condition.slopeinterp.Times1   
## ModelFA.condition.slopeinterp.Times2 2.079 3 0.5562

anova(ModelFA.condition.slopeinterp.Times2,ModelFA.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.slopeinterp.Times2: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## ModelFA.condition.slopeinterp.Times3: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.slopeinterp.Times2 14 -39.269 25.187 33.634 -67.269  
## ModelFA.condition.slopeinterp.Times3 17 -41.542 36.725 37.771 -75.542  
## Chisq Df Pr(>Chisq)   
## ModelFA.condition.slopeinterp.Times2   
## ModelFA.condition.slopeinterp.Times3 8.2735 3 0.04069 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

anova(ModelFA.condition.slopeinterp.Times1,ModelFA.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.slopeinterp.Times1: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## ModelFA.condition.slopeinterp.Times3: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.slopeinterp.Times1 11 -43.190 7.454 32.595 -65.190  
## ModelFA.condition.slopeinterp.Times3 17 -41.542 36.725 37.771 -75.542  
## Chisq Df Pr(>Chisq)  
## ModelFA.condition.slopeinterp.Times1   
## ModelFA.condition.slopeinterp.Times3 10.352 6 0.1106

anova(ModelFA.condition.interp.Times1,ModelFA.condition.slopeinterp.Times1)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.interp.Times1: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times1: Hemisphere \* TimesDur + (1 | sub\_ID)  
## ModelFA.condition.slopeinterp.Times1: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times1: Hemisphere \* TimesDur + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.interp.Times1 9 -46.686 -5.2502 32.343 -64.686  
## ModelFA.condition.slopeinterp.Times1 11 -43.190 7.4536 32.595 -65.190  
## Chisq Df Pr(>Chisq)  
## ModelFA.condition.interp.Times1   
## ModelFA.condition.slopeinterp.Times1 0.5041 2 0.7772

anova(ModelFA.condition.interp.Times2,ModelFA.condition.slopeinterp.Times2)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.interp.Times2: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.interp.Times2: I(TimesDur^2) + (1 | sub\_ID)  
## ModelFA.condition.slopeinterp.Times2: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times2: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times2: I(TimesDur^2) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.interp.Times2 12 -42.883 12.364 33.442 -66.883  
## ModelFA.condition.slopeinterp.Times2 14 -39.269 25.186 33.634 -67.269  
## Chisq Df Pr(>Chisq)  
## ModelFA.condition.interp.Times2   
## ModelFA.condition.slopeinterp.Times2 0.3852 2 0.8248

anova(ModelFA.condition.interp.Times3,ModelFA.condition.slopeinterp.Times3)

## Data: Rawdata\_activity  
## Models:  
## ModelFA.condition.interp.Times3: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.interp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.interp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelFA.condition.interp.Times3: I(TimesDur^3) + (1 | sub\_ID)  
## ModelFA.condition.slopeinterp.Times3: FAvalues ~ Conditions \* Hemisphere + Conditions \* TimesDur +   
## ModelFA.condition.slopeinterp.Times3: Hemisphere \* TimesDur + Conditions \* I(TimesDur^2) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times3: I(TimesDur^2) + Conditions \* I(TimesDur^3) + Hemisphere \*   
## ModelFA.condition.slopeinterp.Times3: I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## npar AIC BIC logLik deviance  
## ModelFA.condition.interp.Times3 15 -44.710 24.349 37.355 -74.710  
## ModelFA.condition.slopeinterp.Times3 17 -41.542 36.725 37.771 -75.542  
## Chisq Df Pr(>Chisq)  
## ModelFA.condition.interp.Times3   
## ModelFA.condition.slopeinterp.Times3 0.8318 2 0.6598

# best fit  
ModelFA.condition.slopeinterp.Times3.N <- lmer(FAvalues ~ Conditions+TimesDur + Hemisphere + I(TimesDur^2) + I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity,REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelFA.condition.slopeinterp.Times3.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: FAvalues ~ Conditions + TimesDur + Hemisphere + I(TimesDur^2) +   
## I(TimesDur^3) + (1 + TimesDur | sub\_ID)  
## Data: Rawdata\_activity  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -49.3 -3.3 34.7 -69.3 728   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -6.4529 -0.4719 -0.0165 0.4509 7.0635   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## sub\_ID (Intercept) 1.062e-03 0.032584   
## TimesDur 1.966e-06 0.001402 -1.00  
## Residual 5.262e-02 0.229399   
## Number of obs: 738, groups: sub\_ID, 57  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) -1.388e-02 1.853e-02 2.719e+02 -0.749 0.45462   
## Conditionsbabble -5.755e-03 1.689e-02 6.896e+02 -0.341 0.73339   
## TimesDur 2.319e-02 7.368e-03 6.626e+02 3.147 0.00173 \*\*  
## HemisphereR -4.181e-02 1.694e-02 7.131e+02 -2.468 0.01381 \*   
## I(TimesDur^2) -1.925e-03 6.737e-04 7.164e+02 -2.858 0.00439 \*\*  
## I(TimesDur^3) 4.097e-05 1.540e-05 7.352e+02 2.661 0.00796 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) Cndtns TimsDr HmsphR I(TD^2  
## Condtnsbbbl -0.456   
## TimesDur -0.513 0.000   
## HemisphereR -0.429 0.000 -0.013   
## I(TimsDr^2) 0.414 0.000 -0.954 0.012   
## I(TimsDr^3) -0.358 0.000 0.886 -0.013 -0.981  
## fit warnings:  
## Some predictor variables are on very different scales: consider rescaling  
## optimizer (bobyqa) convergence code: 0 (OK)  
## boundary (singular) fit: see ?isSingular

anova(ModelFA.condition.slopeinterp.Times3.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Conditions 0.00611 0.00611 1 689.56 0.1161 0.733390   
## TimesDur 0.52104 0.52104 1 662.61 9.9012 0.001726 \*\*  
## Hemisphere 0.32064 0.32064 1 713.12 6.0930 0.013805 \*   
## I(TimesDur^2) 0.42982 0.42982 1 716.43 8.1678 0.004388 \*\*  
## I(TimesDur^3) 0.37262 0.37262 1 735.19 7.0808 0.007962 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# FA- LH

Rawdata\_activity\_FAL <- Rawdata\_activity %>% filter(Hemisphere=='L')  
# best fit  
ModelFA.condition.slopeinterp.Times3.N <- lmer(FAvalues ~ Conditions+TimesDur + I(TimesDur^2) + I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity\_FAL,REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelFA.condition.slopeinterp.Times3.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula:   
## FAvalues ~ Conditions + TimesDur + I(TimesDur^2) + I(TimesDur^3) +   
## (1 + TimesDur | sub\_ID)  
## Data: Rawdata\_activity\_FAL  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -19.7 15.9 18.8 -37.7 375   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.5649 -0.5300 -0.0682 0.4894 7.0891   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## sub\_ID (Intercept) 1.569e-13 3.961e-07   
## TimesDur 1.915e-16 1.384e-08 -1.00  
## Residual 5.308e-02 2.304e-01   
## Number of obs: 384, groups: sub\_ID, 57  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) -1.183e-02 2.210e-02 3.840e+02 -0.535 0.5928   
## Conditionsbabble 6.696e-03 2.351e-02 3.840e+02 0.285 0.7760   
## TimesDur 2.117e-02 1.017e-02 3.840e+02 2.082 0.0380 \*  
## I(TimesDur^2) -1.802e-03 9.404e-04 3.840e+02 -1.916 0.0561 .  
## I(TimesDur^3) 3.654e-05 2.158e-05 3.840e+02 1.693 0.0912 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) Cndtns TimsDr I(TD^2  
## Condtnsbbbl -0.532   
## TimesDur -0.574 0.000   
## I(TimsDr^2) 0.468 0.000 -0.955   
## I(TimsDr^3) -0.407 0.000 0.888 -0.981  
## fit warnings:  
## Some predictor variables are on very different scales: consider rescaling  
## optimizer (bobyqa) convergence code: 0 (OK)  
## boundary (singular) fit: see ?isSingular

anova(ModelFA.condition.slopeinterp.Times3.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Conditions 0.004304 0.004304 1 384 0.0811 0.77598   
## TimesDur 0.229970 0.229970 1 384 4.3328 0.03805 \*  
## I(TimesDur^2) 0.194787 0.194787 1 384 3.6699 0.05614 .  
## I(TimesDur^3) 0.152169 0.152169 1 384 2.8670 0.09123 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# FA- RH

Rawdata\_activity\_FAR <- Rawdata\_activity %>% filter(Hemisphere=='R')  
# best fit  
ModelFA.condition.slopeinterp.Times3.N <- lmer(FAvalues ~ Conditions+TimesDur + I(TimesDur^2) + I(TimesDur^3) + (1+TimesDur|sub\_ID),Rawdata\_activity\_FAR,REML = FALSE,control = ctrl,na.action=na.omit)  
  
summary(ModelFA.condition.slopeinterp.Times3.N)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula:   
## FAvalues ~ Conditions + TimesDur + I(TimesDur^2) + I(TimesDur^3) +   
## (1 + TimesDur | sub\_ID)  
## Data: Rawdata\_activity\_FAR  
## Control: ctrl  
##   
## AIC BIC logLik deviance df.resid   
## -25.1 9.7 21.5 -43.1 345   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -5.8201 -0.4067 0.0218 0.4399 3.5725   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## sub\_ID (Intercept) 8.069e-03 0.089829   
## TimesDur 2.162e-05 0.004649 -1.00  
## Residual 4.770e-02 0.218406   
## Number of obs: 354, groups: sub\_ID, 56  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) -5.404e-02 2.607e-02 1.383e+02 -2.073 0.0400 \*  
## Conditionsbabble -1.926e-02 2.322e-02 3.043e+02 -0.830 0.4074   
## TimesDur 2.428e-02 1.041e-02 3.540e+02 2.332 0.0202 \*  
## I(TimesDur^2) -1.998e-03 9.365e-04 3.467e+02 -2.133 0.0336 \*  
## I(TimesDur^3) 4.480e-05 2.129e-05 3.288e+02 2.105 0.0361 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) Cndtns TimsDr I(TD^2  
## Condtnsbbbl -0.445   
## TimesDur -0.569 0.000   
## I(TimsDr^2) 0.446 0.000 -0.953   
## I(TimsDr^3) -0.384 0.000 0.882 -0.980  
## fit warnings:  
## Some predictor variables are on very different scales: consider rescaling  
## optimizer (bobyqa) convergence code: 0 (OK)  
## boundary (singular) fit: see ?isSingular

anova(ModelFA.condition.slopeinterp.Times3.N)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Conditions 0.032831 0.032831 1 304.26 0.6883 0.40741   
## TimesDur 0.259504 0.259504 1 353.97 5.4402 0.02024 \*  
## I(TimesDur^2) 0.217068 0.217068 1 346.69 4.5506 0.03361 \*  
## I(TimesDur^3) 0.211347 0.211347 1 328.81 4.4306 0.03606 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# \*\* NH Adults vs. CI child(average times)\*\*

# ATL-LH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_LH <- Rawdata\_NHCI %>% filter(Hemisphere=='L')  
ModelLT.condition.interp.Times <- lmer(Tvalues ~ Tchannel + GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_LH,REML = FALSE,na.action=na.omit)   
summary(ModelLT.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Tvalues ~ Tchannel + GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_LH  
##   
## AIC BIC logLik deviance df.resid   
## -953.5 -919.1 484.8 -969.5 542   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -4.7945 -0.4615 0.0038 0.4739 4.1078   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.002063 0.04542   
## Residual 0.008663 0.09307   
## Number of obs: 550, groups: sub\_ID, 92  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) -0.017462 0.010882 290.603450 -1.605  
## TchannelCH5 -0.013900 0.009704 458.283348 -1.432  
## TchannelCH8 -0.019826 0.009737 459.338318 -2.036  
## GROUPNH\_adult 0.016170 0.015120 177.580355 1.069  
## Conditionsbabble 0.012974 0.010095 458.283348 1.285  
## GROUPNH\_adult:Conditionsbabble -0.007229 0.016338 458.283348 -0.442  
## Pr(>|t|)   
## (Intercept) 0.1096   
## TchannelCH5 0.1527   
## TchannelCH8 0.0423 \*  
## GROUPNH\_adult 0.2863   
## Conditionsbabble 0.1994   
## GROUPNH\_adult:Conditionsbabble 0.6583   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) TchCH5 TchCH8 GROUPNH\_d Cndtns  
## TchannelCH5 -0.446   
## TchannelCH8 -0.443 0.498   
## GROUPNH\_dlt -0.529 0.000 -0.002   
## Condtnsbbbl -0.464 0.000 0.000 0.334   
## GROUPNH\_d:C 0.287 0.000 0.000 -0.540 -0.618

anova(ModelLT.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)  
## Tchannel 0.037927 0.0189633 2 458.98 2.1891 0.1132  
## GROUP 0.008436 0.0084358 1 92.12 0.9738 0.3263  
## Conditions 0.011372 0.0113721 1 458.28 1.3128 0.2525  
## GROUP:Conditions 0.001696 0.0016961 1 458.28 0.1958 0.6583

# ATL-RH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_RH <- Rawdata\_NHCI %>% filter(Hemisphere=='R')  
ModelRT.condition.interp.Times <- lmer(Tvalues ~ Tchannel + GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_RH,REML = FALSE,na.action=na.omit)   
summary(ModelRT.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Tvalues ~ Tchannel + GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_RH  
##   
## AIC BIC logLik deviance df.resid   
## -895.1 -860.6 455.5 -911.1 544   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -4.4166 -0.5372 0.0229 0.5297 3.3264   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.003071 0.05541   
## Residual 0.009377 0.09683   
## Number of obs: 552, groups: sub\_ID, 92  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) -0.02256 0.01194 254.40651 -1.889  
## TchannelCH5 -0.01448 0.01010 460.00000 -1.434  
## TchannelCH8 -0.01605 0.01010 460.00000 -1.589  
## GROUPNH\_adult 0.02010 0.01690 160.86338 1.189  
## Conditionsbabble 0.01521 0.01047 460.00000 1.453  
## GROUPNH\_adult:Conditionsbabble -0.03479 0.01698 460.00000 -2.049  
## Pr(>|t|)   
## (Intercept) 0.0601 .  
## TchannelCH5 0.1523   
## TchannelCH8 0.1126   
## GROUPNH\_adult 0.2363   
## Conditionsbabble 0.1470   
## GROUPNH\_adult:Conditionsbabble 0.0410 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) TchCH5 TchCH8 GROUPNH\_d Cndtns  
## TchannelCH5 -0.423   
## TchannelCH8 -0.423 0.500   
## GROUPNH\_dlt -0.538 0.000 0.000   
## Condtnsbbbl -0.438 0.000 0.000 0.310   
## GROUPNH\_d:C 0.270 0.000 0.000 -0.502 -0.617

anova(ModelRT.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Tchannel 0.028796 0.014398 2 460 1.5355 0.21645   
## GROUP 0.000321 0.000321 1 92 0.0342 0.85372   
## Conditions 0.000619 0.000619 1 460 0.0660 0.79734   
## GROUP:Conditions 0.039361 0.039361 1 460 4.1978 0.04104 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## CI children(averaged)-ATL-RH

Rawdata\_NHCI\_CI\_RT <- Rawdata\_NHCI\_RH %>% filter(GROUP=='CI\_child')

# best fit  
# M1:Random-intercept-with-poly1  
ModelRT.condition.interp.Times\_CI <- lmer(Tvalues ~ Tchannel + Conditions + (1|sub\_ID),Rawdata\_NHCI\_CI\_RT,REML = FALSE,na.action=na.omit)   
summary(ModelRT.condition.interp.Times\_CI)  
anova(ModelRT.condition.interp.Times\_CI)

## NH adult-ATL-RH

Rawdata\_NHCI\_NH\_RT<- Rawdata\_NHCI\_RH %>% filter(GROUP=='NH\_adult')

# best fit  
# M1:Random-intercept-with-poly1  
ModelRT.condition.interp.Times\_NH <- lmer(Tvalues ~ Tchannel + Conditions + (1|sub\_ID),Rawdata\_NHCI\_NH\_RT,REML = FALSE,na.action=na.omit)   
summary(ModelRT.condition.interp.Times\_NH)  
anova(ModelRT.condition.interp.Times\_NH)

## speech(averaged)-ATL-RH

Rawdata\_NHCI\_SP\_RT <- Rawdata\_NHCI\_RH %>% filter(Conditions=='aspeech')

# best fit  
# M1:Random-intercept-with-poly1  
ModelRT.condition.interp.Times\_CI <- lmer(Tvalues ~ Tchannel + GROUP + (1|sub\_ID),Rawdata\_NHCI\_SP\_RT,REML = FALSE,na.action=na.omit)   
summary(ModelRT.condition.interp.Times\_CI)  
anova(ModelRT.condition.interp.Times\_CI)

## babble-ATL-RH

Rawdata\_NHCI\_BA\_RT<- Rawdata\_NHCI\_RH %>% filter(Conditions=='babble')

# best fit  
# M1:Random-intercept-with-poly1  
ModelRT.condition.interp.Times\_NH <- lmer(Tvalues ~ Tchannel + GROUP + (1|sub\_ID),Rawdata\_NHCI\_BA\_RT,REML = FALSE,na.action=na.omit)   
summary(ModelRT.condition.interp.Times\_NH)  
anova(ModelRT.condition.interp.Times\_NH)

# Spt-LH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_LH <- Rawdata\_NHCI %>% filter(Hemisphere=='L')  
ModelSptLH.condition.interp.Times <- lmer(Sptvalues ~ Sptchannel + GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_LH,REML = FALSE,na.action=na.omit)   
summary(ModelSptLH.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Sptvalues ~ Sptchannel + GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_LH  
##   
## AIC BIC logLik deviance df.resid   
## -802.0 -774.7 408.0 -816.0 361   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -4.4675 -0.5204 0.0350 0.5307 4.8979   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.001219 0.03492   
## Residual 0.005431 0.07370   
## Number of obs: 368, groups: sub\_ID, 92  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) 4.565e-03 9.154e-03 2.543e+02 0.499  
## SptchannelCH9 2.914e-05 7.684e-03 2.760e+02 0.004  
## GROUPNH\_adult -1.154e-02 1.347e-02 1.963e+02 -0.856  
## Conditionsbabble -1.469e-04 9.762e-03 2.760e+02 -0.015  
## GROUPNH\_adult:Conditionsbabble -6.729e-03 1.583e-02 2.760e+02 -0.425  
## Pr(>|t|)  
## (Intercept) 0.618  
## SptchannelCH9 0.997  
## GROUPNH\_adult 0.393  
## Conditionsbabble 0.988  
## GROUPNH\_adult:Conditionsbabble 0.671  
##   
## Correlation of Fixed Effects:  
## (Intr) SptCH9 GROUPNH\_d Cndtns  
## SptchnnlCH9 -0.420   
## GROUPNH\_dlt -0.560 0.000   
## Condtnsbbbl -0.533 0.000 0.362   
## GROUPNH\_d:C 0.329 0.000 -0.587 -0.617

anova(ModelSptLH.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)  
## Sptchannel 0.0000001 0.0000001 1 276 0.0000 0.9970  
## GROUP 0.0101486 0.0101486 1 92 1.8685 0.1750  
## Conditions 0.0010696 0.0010696 1 276 0.1969 0.6576  
## GROUP:Conditions 0.0009820 0.0009820 1 276 0.1808 0.6710

# Spt-RH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_RH <- Rawdata\_NHCI %>% filter(Hemisphere=='R')  
ModelSptRH.condition.interp.Times <- lmer(Sptvalues ~ Sptchannel + GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_RH,REML = FALSE,na.action=na.omit)   
summary(ModelSptRH.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Sptvalues ~ Sptchannel + GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_RH  
##   
## AIC BIC logLik deviance df.resid   
## -858.4 -831.0 436.2 -872.4 361   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.7559 -0.4437 0.0018 0.4777 3.8735   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.0009579 0.03095   
## Residual 0.0047145 0.06866   
## Number of obs: 368, groups: sub\_ID, 92  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) 0.010654 0.008425 260.512152 1.265  
## SptchannelCH9 -0.014001 0.007159 276.000003 -1.956  
## GROUPNH\_adult -0.003378 0.012364 201.100984 -0.273  
## Conditionsbabble 0.001328 0.009095 276.000003 0.146  
## GROUPNH\_adult:Conditionsbabble -0.026804 0.014745 276.000003 -1.818  
## Pr(>|t|)   
## (Intercept) 0.2071   
## SptchannelCH9 0.0515 .  
## GROUPNH\_adult 0.7850   
## Conditionsbabble 0.8840   
## GROUPNH\_adult:Conditionsbabble 0.0702 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) SptCH9 GROUPNH\_d Cndtns  
## SptchnnlCH9 -0.425   
## GROUPNH\_dlt -0.558 0.000   
## Condtnsbbbl -0.540 0.000 0.368   
## GROUPNH\_d:C 0.333 0.000 -0.596 -0.617

anova(ModelSptRH.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Sptchannel 0.018035 0.018035 1 276 3.8255 0.05149 .  
## GROUP 0.013473 0.013473 1 92 2.8578 0.09432 .  
## Conditions 0.012644 0.012644 1 276 2.6819 0.10263   
## GROUP:Conditions 0.015579 0.015579 1 276 3.3046 0.07017 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# SMG-LH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_LH <- Rawdata\_NHCI %>% filter(Hemisphere=='L')  
ModelSMGLH.condition.interp.Times <- lmer(SMGvalues ~ GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_LH,REML = FALSE,na.action=na.omit)   
summary(ModelSMGLH.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: SMGvalues ~ GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_LH  
##   
## AIC BIC logLik deviance df.resid   
## -410.8 -391.5 211.4 -422.8 178   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.10334 -0.63620 -0.02751 0.59446 2.53958   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.0004367 0.02090   
## Residual 0.0054622 0.07391   
## Number of obs: 184, groups: sub\_ID, 92  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) 0.002179 0.010173 182.996968 0.214  
## GROUPNH\_adult -0.014028 0.016493 182.996968 -0.851  
## Conditionsbabble 0.011809 0.013844 91.999984 0.853  
## GROUPNH\_adult:Conditionsbabble -0.011949 0.022445 91.999984 -0.532  
## Pr(>|t|)  
## (Intercept) 0.831  
## GROUPNH\_adult 0.396  
## Conditionsbabble 0.396  
## GROUPNH\_adult:Conditionsbabble 0.596  
##   
## Correlation of Fixed Effects:  
## (Intr) GROUPNH\_d Cndtns  
## GROUPNH\_dlt -0.617   
## Condtnsbbbl -0.680 0.420   
## GROUPNH\_d:C 0.420 -0.680 -0.617

anova(ModelSMGLH.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)  
## GROUP 0.0149599 0.0149599 1 92 2.7388 0.1013  
## Conditions 0.0014765 0.0014765 1 92 0.2703 0.6044  
## GROUP:Conditions 0.0015481 0.0015481 1 92 0.2834 0.5958

# SMG-RH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_RH <- Rawdata\_NHCI %>% filter(Hemisphere=='R')  
ModelSMGRH.condition.interp.Times <- lmer(SMGvalues ~ GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_RH,REML = FALSE,na.action=na.omit)   
summary(ModelSMGRH.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: SMGvalues ~ GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_RH  
##   
## AIC BIC logLik deviance df.resid   
## -392.0 -372.7 202.0 -404.0 178   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.6834 -0.5433 0.0604 0.5182 2.1963   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.001673 0.04090   
## Residual 0.005054 0.07109   
## Number of obs: 184, groups: sub\_ID, 92  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) -6.601e-04 1.086e-02 1.733e+02 -0.061  
## GROUPNH\_adult -2.770e-02 1.761e-02 1.733e+02 -1.573  
## Conditionsbabble 1.669e-02 1.332e-02 9.200e+01 1.254  
## GROUPNH\_adult:Conditionsbabble -1.896e-02 2.159e-02 9.200e+01 -0.878  
## Pr(>|t|)  
## (Intercept) 0.952  
## GROUPNH\_adult 0.118  
## Conditionsbabble 0.213  
## GROUPNH\_adult:Conditionsbabble 0.382  
##   
## Correlation of Fixed Effects:  
## (Intr) GROUPNH\_d Cndtns  
## GROUPNH\_dlt -0.617   
## Condtnsbbbl -0.613 0.378   
## GROUPNH\_d:C 0.378 -0.613 -0.617

anova(ModelSMGRH.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## GROUP 0.036066 0.036066 1 92 7.1364 0.008933 \*\*  
## Conditions 0.002256 0.002256 1 92 0.4463 0.505764   
## GROUP:Conditions 0.003899 0.003899 1 92 0.7714 0.382067   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# IFG-LH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_LH <- Rawdata\_NHCI %>% filter(Hemisphere=='L')  
ModelLF.condition.interp.Times <- lmer(Fvalues ~ Fchannel + GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_LH,REML = FALSE,na.action=na.omit)   
summary(ModelLF.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Fvalues ~ Fchannel + GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_LH  
##   
## AIC BIC logLik deviance df.resid   
## -453.8 -426.7 233.9 -467.8 351   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -5.1387 -0.5612 0.0198 0.5273 5.6160   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.002564 0.05063   
## Residual 0.013791 0.11744   
## Number of obs: 358, groups: sub\_ID, 90  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) 0.002126 0.014302 259.493058 0.149  
## FchannelCH4 -0.005153 0.012423 269.147849 -0.415  
## GROUPNH\_adult 0.021049 0.021360 200.778765 0.985  
## Conditionsbabble -0.004355 0.015555 267.762199 -0.280  
## GROUPNH\_adult:Conditionsbabble 0.015654 0.025813 267.762199 0.606  
## Pr(>|t|)  
## (Intercept) 0.882  
## FchannelCH4 0.679  
## GROUPNH\_adult 0.326  
## Conditionsbabble 0.780  
## GROUPNH\_adult:Conditionsbabble 0.545  
##   
## Correlation of Fixed Effects:  
## (Intr) FchCH4 GROUPNH\_d Cndtns  
## FchannelCH4 -0.434   
## GROUPNH\_dlt -0.546 0.006   
## Condtnsbbbl -0.544 0.000 0.364   
## GROUPNH\_d:C 0.328 0.000 -0.604 -0.603

anova(ModelLF.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Fchannel 0.002373 0.002373 1 269.148 0.1721 0.67861   
## GROUP 0.039697 0.039697 1 89.849 2.8784 0.09324 .  
## Conditions 0.000998 0.000998 1 267.762 0.0724 0.78813   
## GROUP:Conditions 0.005072 0.005072 1 267.762 0.3678 0.54475   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# IFG-RH

# best fit  
# M1:Random-intercept-with-poly1  
Rawdata\_NHCI\_RH <- Rawdata\_NHCI %>% filter(Hemisphere=='R')  
ModelRF.condition.interp.Times <- lmer(Fvalues ~ Fchannel + GROUP\*Conditions + (1|sub\_ID),Rawdata\_NHCI\_RH,REML = FALSE,na.action=na.omit)   
summary(ModelRF.condition.interp.Times)

## Linear mixed model fit by maximum likelihood . t-tests use  
## Satterthwaite's method [lmerModLmerTest]  
## Formula: Fvalues ~ Fchannel + GROUP \* Conditions + (1 | sub\_ID)  
## Data: Rawdata\_NHCI\_RH  
##   
## AIC BIC logLik deviance df.resid   
## -578.2 -550.9 296.1 -592.2 361   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.6941 -0.5632 -0.0307 0.5046 4.2167   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## sub\_ID (Intercept) 0.002102 0.04585   
## Residual 0.010061 0.10030   
## Number of obs: 368, groups: sub\_ID, 92  
##   
## Fixed effects:  
## Estimate Std. Error df t value  
## (Intercept) -0.011303 0.012348 258.797798 -0.915  
## FchannelCH4 0.018480 0.010457 276.000000 1.767  
## GROUPNH\_adult 0.007950 0.018136 199.773477 0.438  
## Conditionsbabble 0.005458 0.013286 276.000000 0.411  
## GROUPNH\_adult:Conditionsbabble -0.025355 0.021540 276.000000 -1.177  
## Pr(>|t|)   
## (Intercept) 0.3608   
## FchannelCH4 0.0783 .  
## GROUPNH\_adult 0.6616   
## Conditionsbabble 0.6815   
## GROUPNH\_adult:Conditionsbabble 0.2402   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) FchCH4 GROUPNH\_d Cndtns  
## FchannelCH4 -0.423   
## GROUPNH\_dlt -0.559 0.000   
## Condtnsbbbl -0.538 0.000 0.366   
## GROUPNH\_d:C 0.332 0.000 -0.594 -0.617

anova(ModelRF.condition.interp.Times)

## Type III Analysis of Variance Table with Satterthwaite's method  
## Sum Sq Mean Sq NumDF DenDF F value Pr(>F)   
## Fchannel 0.0314185 0.0314185 1 276 3.1228 0.07831 .  
## GROUP 0.0010559 0.0010559 1 92 0.1050 0.74670   
## Conditions 0.0045209 0.0045209 1 276 0.4494 0.50320   
## GROUP:Conditions 0.0139407 0.0139407 1 276 1.3856 0.24016   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1