SiblingsStudy_SupplementaryData

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Correlations with maternal factors

```r
# Maternal age and number of siblings

cor.age <- cor.test(
  x = subset(SiblingsData, month == 18)$Siblings18
  , y = subset(SiblingsData, month == 18)$age_mom
  , method = "spearman"
)

# Maternal education and number of siblings

cor.edu <- cor.test(
  x = subset(SiblingsData, month == 18)$Siblings18
  , y = subset(SiblingsData, month == 18)$MOTedulevel
  , method = "spearman"
)

# Maternal education and infant vocabulary at 18 months

cor.edu.vocab <- cor.test(
  x = subset(SiblingsData, month == 18)$Total.words
  , y = subset(SiblingsData, month == 18)$MOTedulevel
  , method = "spearman"
)

# Maternal age and infant vocabulary at 18 months

cor.age.vocab <- cor.test(
  x = subset(SiblingsData, month == 18)$Total.words
  , y = subset(SiblingsData, month == 18)$age_mom
  , method = "spearman"
)
```

Effect of siblings on infants' input - audio recordings

Parental Input

```r
#shapiro.test(speaker.type$n) # not normal

speaker.type.model_audio <- lmerTest::lmer(Log.n ~ SibGroup + Speaker + (1|subj), data=subset(speaker.ty
                                                                                           Speaker != "
speaker.type.model.null_audio <- lmerTest::lmer(Log.n ~ Speaker + (1|subj), data=subset(speaker.type, au
                                                                                           Speaker != "

anova(speaker.type.model_audio, speaker.type.model.null_audio) # p<.001

## Data: subset(speaker.type, audio_video == "audio" & Speaker != "Family.input")
## Models:
## speaker.type.model.null_audio: Log.n ~ Speaker + (1 | subj)
## speaker.type.model_audio: Log.n ~ SibGroup + Speaker + (1 | subj)
##                                 npar    AIC    BIC  logLik deviance  Chisq Df
## speaker.type.model.null_audio     5 5807.4 5834.3 -2898.7   5797.4
## speaker.type.model_audio          7 5790.2 5827.7 -2888.1   5776.2 21.274  2
##                               Pr(>Chisq)
## speaker.type.model.null_audio
## speaker.type.model_audio        2.401e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

speaker.type.mean_audio <- speaker.type %>%
  filter(audio_video == "audio" & Speaker == "Family.input") %>%
  group_by(subj) %>%
  mutate(MeanN = mean(n)) %>%
  filter(month == 17)

speaker.type_wilcox_none_one_audio <- wilcox.test(
  x = subset(speaker.type.mean_audio, SibGroup == "None" & audio_video == "audio")$MeanN
  , y = subset(speaker.type.mean_audio, SibGroup == "One"  & audio_video == "audio")$MeanN
  , paired = FALSE
) # NS

speaker.type_wilcox_one_two_audio <- wilcox.test(
  x = subset(speaker.type.mean_audio, SibGroup == "2+" & audio_video == "audio")$MeanN
  , y = subset(speaker.type.mean_audio, SibGroup == "One" & audio_video == "audio")$MeanN
  , paired = FALSE
) # p=.02

# Difference in amount of input from siblings

speaker.type.SIB_audio <- speaker.type %>% group_by(subj) %>%
  filter(Speaker == "SIBLING" & audio_video == "audio") %>%
  mutate(MeanN = mean(n),
         TotalN = sum(n)) %>%
  filter(month == 17)

wilcox.test(
  x = subset(speaker.type.SIB_audio, SibGroup == "2+")$MeanN
  , y = subset(speaker.type.SIB_audio, SibGroup == "One")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.SIB_audio, SibGroup == "2+")$MeanN and subset(speaker.type.SIB_audio, SibG
## W = 71, p-value = 0.6433
## alternative hypothesis: true location shift is not equal to 0
```

```
# Difference in amount of input from mothers

speaker.type.MOT_audio <- speaker.type %>% group_by(subj) %>%
  filter(Speaker == "MOT" & audio_video == "video") %>%
  mutate(MeanN = mean(n))  %>%
  filter(month == 17)

wilcox.test(
  x = subset(speaker.type.MOT_audio, SibGroup == "None")$MeanN
  , y = subset(speaker.type.MOT_audio, SibGroup == "One")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT_audio, SibGroup == "None")$MeanN and subset(speaker.type.MOT_audio, Si
## W = 130, p-value = 0.5832
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.MOT_audio, SibGroup == "2+")$MeanN
  , y = subset(speaker.type.MOT_audio, SibGroup == "One")$MeanN
  , paired = FALSE
) # p<.001
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT_audio, SibGroup == "2+")$MeanN and subset(speaker.type.MOT_audio, SibG
## W = 12, p-value = 0.0006486
## alternative hypothesis: true location shift is not equal to 0
```

Object presence

```
object.presence.summary_audio <- object.presence %>%
  filter(audio_video == "audio") %>%
  group_by(subj, SibGroup) %>%
  summarise(mean.object = mean(PC),
            sd.object = sd(PC),
            med.object = median(PC))
```

```
## 'summarise()' has grouped output by 'subj'. You can override using the '.groups' argument.
```

```r
object.presence.model_audio <- lmerTest::lmer(PC ~ SibGroup + month + (1|subj), data=subset(object.prese
object.presence.model.null_audio <- lmerTest::lmer(PC ~ month + (1|subj), data=subset(object.presence, a
anova(object.presence.model_audio, object.presence.model.null_audio) # p<.001
```

```
## Data: subset(object.presence, audio_video == "audio")
## Models:
## object.presence.model.null_audio: PC ~ month + (1 | subj)
## object.presence.model_audio: PC ~ SibGroup + month + (1 | subj)
##                                   npar     AIC     BIC logLik deviance  Chisq Df
## object.presence.model.null_audio    4 -520.52 -503.46 264.26  -528.52
## object.presence.model_audio         6 -540.15 -514.56 276.07  -552.15 23.628  2
##                                   Pr(>Chisq)
## object.presence.model.null_audio
## object.presence.model_audio        7.402e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
# Posthoc tests

wilcox.test(
  x = subset(object.presence.summary_audio, SibGroup == "None")$mean.object
  , y = subset(object.presence.summary_audio, SibGroup == "One")$mean.object
  , paired = FALSE
) # p<.05
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_audio, SibGroup == "None")$mean.object and subset(object.presen
## W = 221, p-value = 0.01192
## alternative hypothesis: true location shift is not equal to 0
```

```r
wilcox.test(
  x = subset(object.presence.summary_audio, SibGroup == "2+")$mean.object
  , y = subset(object.presence.summary_audio, SibGroup == "One")$mean.object
  , paired = FALSE
) # p<.01
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_audio, SibGroup == "2+")$mean.object and subset(object.presence
## W = 21, p-value = 0.006887
## alternative hypothesis: true location shift is not equal to 0
```

Running all analyses with one twin removed

```r
SiblingsData_twin <- SiblingsData %>% filter(!subj %in% c(351, 794) & !month %in% c("06", "07", "08", "0
CDI_twin <- CDI %>% filter(!subj %in% c(424, 351, 794) )
speaker.type_twin <- speaker.type %>% filter(!subj %in% c(351, 794) & !month %in% c("06", "07", "08", "0
object.presence_twin <- object.presence %>% filter(!subj %in% c(351, 794) & !month %in% c("06", "07", "0
```

```r
# SibGroup: Does having more vs. fewer vs. no siblings affect language development over time?
```

```r
sibgroup.model_twin <- lmerTest::lmer(Log.Totalwords ~ SibGroup + month + (1|subj), data = SiblingsData
sibgroup.model.null_twin <- lmerTest::lmer(Log.Totalwords ~ month + (1|subj), data = SiblingsData_twin,
anova(sibgroup.model_twin, sibgroup.model.null_twin) %>%  # p<.05
  rename("pval" = `Pr(>Chisq)`)
```

```
## Data: SiblingsData_twin
## Models:
## sibgroup.model.null_twin: Log.Totalwords ~ month + (1 | subj)
## sibgroup.model_twin: Log.Totalwords ~ SibGroup + month + (1 | subj)
##                          npar  AIC    BIC  logLik deviance  Chisq Df     pval
## sibgroup.model.null_twin    4 1215 1232.0 -603.49     1207
## sibgroup.model_twin         6 1212 1237.5 -599.97     1200 7.0272  2 0.029789
```

Parental Input

```r
#shapiro.test(speaker.type$n) # not normal
```

```r
speaker.type.model_twin <- lmerTest::lmer(Log.n ~ SibGroup + Speaker + (1|subj), data=subset(speaker.typ
speaker.type.model.null_twin <- lmerTest::lmer(Log.n ~ Speaker + (1|subj), data=subset(speaker.type_twin

anova(speaker.type.model_twin, speaker.type.model.null_twin) %>%
  rename("pval" = `Pr(>Chisq)`) # p<.01
```

```
## Data: subset(speaker.type_twin, audio_video == "video")
## Models:
## speaker.type.model.null_twin: Log.n ~ Speaker + (1 | subj)
## speaker.type.model_twin: Log.n ~ SibGroup + Speaker + (1 | subj)
##                               npar    AIC    BIC  logLik deviance  Chisq Df
## speaker.type.model.null_twin     6 7395.4 7429.1 -3691.7   7383.4
## speaker.type.model_twin          8 7389.9 7434.8 -3687.0   7373.9 9.5084  2
##                                  pval
## speaker.type.model.null_twin
## speaker.type.model_twin      0.0086153
```

```r
# post hoc comparisons
```

```r
speaker.type.mean_twin <- speaker.type_twin %>%
  filter(audio_video == "video" & Speaker == "Family.input") %>%
  group_by(subj) %>%
  mutate(MeanN = mean(n)) %>%
  filter(month == 17)

wilcox.test(
```

```
    x = subset(speaker.type.mean_twin, SibGroup == "None" & audio_video == "video")$MeanN
  , y = subset(speaker.type.mean_twin, SibGroup == "One"  & audio_video == "video")$MeanN
  , paired = FALSE
)  # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.mean_twin, SibGroup == "None" & audio_video == "video")$MeanN and subset(s
## W = 110, p-value = 0.5672
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.mean_twin, SibGroup == "2+" & audio_video == "video")$MeanN
  , y = subset(speaker.type.mean_twin, SibGroup == "One" & audio_video == "video")$MeanN
  , paired = FALSE
)  # p < .001
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.mean_twin, SibGroup == "2+" & audio_video == "video")$MeanN and subset(sp
## W = 4, p-value = 8.165e-05
## alternative hypothesis: true location shift is not equal to 0
```

```
# Difference in amount of input from siblings

speaker.type.SIB_twin <- speaker.type_twin %>% group_by(subj) %>%
  filter(Speaker == "SIBLING" & audio_video == "video") %>%
  mutate(MeanN = mean(n),
         TotalN = sum(n)) %>%
  filter(month == 17)

wilcox.test(
  x = subset(speaker.type.SIB_twin, SibGroup == "2+" & audio_video == "video")$MeanN
  , y = subset(speaker.type.SIB_twin, SibGroup == "One" & audio_video == "video")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  subset(speaker.type.SIB_twin, SibGroup == "2+" & audio_video == "video")$MeanN and subset(spe
## W = 40, p-value = 0.3372
## alternative hypothesis: true location shift is not equal to 0
```

```
# Difference in amount of input from mothers

speaker.type.MOT_twin <- speaker.type_twin %>% group_by(subj) %>%
  filter(Speaker == "MOT" & audio_video == "video") %>%
  mutate(MeanN = mean(n))  %>%
```

```
  filter(month == 17)

wilcox.test(
  x = subset(speaker.type.MOT_twin, SibGroup == "None" & audio_video == "video")$MeanN
  , y = subset(speaker.type.MOT_twin, SibGroup == "One" & audio_video == "video")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT_twin, SibGroup == "None" & audio_video == "video")$MeanN and subset(sp
## W = 120, p-value = 0.8393
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.MOT_twin, SibGroup == "2+" & audio_video == "video")$MeanN
  , y = subset(speaker.type.MOT_twin, SibGroup == "One" & audio_video == "video")$MeanN
  , paired = FALSE
) # p<.01
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT_twin, SibGroup == "2+" & audio_video == "video")$MeanN and subset(spea
## W = 12, p-value = 0.001803
## alternative hypothesis: true location shift is not equal to 0
```

```
# Difference in amount of input from fathers

speaker.type.FAT_twin <- speaker.type_twin %>% group_by(subj) %>%
  filter(Speaker == "FAT" & audio_video == "video") %>%
  mutate(MeanN = mean(n))  %>%
  filter(month == 17)

wilcox.test(
  x = subset(speaker.type.FAT_twin, SibGroup == "None" & audio_video == "video")$MeanN
  , y = subset(speaker.type.FAT_twin, SibGroup == "One" & audio_video == "video")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  subset(speaker.type.FAT_twin, SibGroup == "None" & audio_video == "video")$MeanN and subset(sp
## W = 144, p-value = 0.5121
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.FAT_twin, SibGroup == "2+" & audio_video == "video")$MeanN
  , y = subset(speaker.type.FAT_twin, SibGroup == "One" & audio_video == "video")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  subset(speaker.type.FAT_twin, SibGroup == "2+" & audio_video == "video")$MeanN and subset(spea
## W = 42, p-value = 0.4106
## alternative hypothesis: true location shift is not equal to 0
```

Object presence

```
object.presence.model_twin <- lmerTest::lmer(PC ~ SibGroup + month + (1|subj), data=subset(object.presen
object.presence.model.null_twin <- lmerTest::lmer(PC ~ month + (1|subj), data=subset(object.presence_twi
anova(object.presence.model_twin, object.presence.model.null_twin) # p<.001
```

```
## Data: subset(object.presence_twin, audio_video == "video")
## Models:
## object.presence.model.null_twin: PC ~ month + (1 | subj)
## object.presence.model_twin: PC ~ SibGroup + month + (1 | subj)
##                                 npar     AIC     BIC logLik deviance  Chisq Df
## object.presence.model.null_twin    4 -440.15 -423.44 224.08  -448.15
## object.presence.model_twin         6 -460.47 -435.40 236.23  -472.47 24.316  2
##                                 Pr(>Chisq)
## object.presence.model.null_twin
## object.presence.model_twin        5.246e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# Posthoc tests


object.presence.summary_twin <- object.presence_twin %>%
  filter(audio_video == "video") %>%
  group_by(subj, SibGroup) %>%
  summarise(mean.object = mean(PC),
            sd.object = sd(PC),
            med.object = median(PC))
```

```
## 'summarise()' has grouped output by 'subj'. You can override using the '.groups' argument.
```

```
wilcox.test(
  x = subset(object.presence.summary_twin, SibGroup == "None")$mean.object
  , y = subset(object.presence.summary_twin, SibGroup == "One")$mean.object
  , paired = FALSE)
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_twin, SibGroup == "None")$mean.object and subset(object.presenc
## W = 204, p-value = 0.002729
## alternative hypothesis: true location shift is not equal to 0
```

```
 # p<.001

wilcox.test(
  x = subset(object.presence.summary_twin, SibGroup == "2+")$mean.object
  , y = subset(object.presence.summary_twin, SibGroup == "One")$mean.object
  , paired = FALSE
) # p<.05
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_twin, SibGroup == "2+")$mean.object and subset(object.presence
## W = 20, p-value = 0.01477
## alternative hypothesis: true location shift is not equal to 0
```

Discrete sibling number

```
# Sibling number: Does number of siblings affect language development over time?

sibnumber.model <- lmerTest::lmer(Log.Totalwords ~ Siblings6 + month + (1|subj), data=SiblingsData, REM
sibnumber.model.null <- lmerTest::lmer(Log.Totalwords ~ month + (1|subj), data=SiblingsData, REML=FALSE
anova(sibnumber.model, sibnumber.model.null) # significant
```

```
## Data: SiblingsData
## Models:
## sibnumber.model.null: Log.Totalwords ~ month + (1 | subj)
## sibnumber.model: Log.Totalwords ~ Siblings6 + month + (1 | subj)
##                      npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## sibnumber.model.null    4 1316.9 1334.1 -654.43   1308.9
## sibnumber.model         5 1314.2 1335.7 -652.08   1304.2 4.7076  1    0.03003 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# summary(sibnumber.model) # for each increasing sibling, infants know 30% fewer words at 18m
```

Parental Input

```
speaker.type.model_siblings <- lmerTest::lmer(Log.n ~ Siblings6 + Speaker + (1|subj),
                                    data=subset(speaker.type, audio_video == "video"), REML=F

speaker.type.model.null_siblings <- lmerTest::lmer(Log.n ~ Speaker + (1|subj),
                                    data=subset(speaker.type, audio_video == "video"), R

anova(speaker.type.model_siblings, speaker.type.model.null_siblings) # ns
```

```
## Data: subset(speaker.type, audio_video == "video")
## Models:
```

```
## speaker.type.model.null_siblings: Log.n ~ Speaker + (1 | subj)
## speaker.type.model_siblings: Log.n ~ Siblings6 + Speaker + (1 | subj)
##                                    npar    AIC    BIC  logLik deviance  Chisq Df
## speaker.type.model.null_siblings     6 7706.8 7740.7 -3847.4   7694.8
## speaker.type.model_siblings          7 7708.1 7747.6 -3847.0   7694.1 0.7281  1
##                                    Pr(>Chisq)
## speaker.type.model.null_siblings
## speaker.type.model_siblings            0.3935
```

```r
# Difference in amount of input from siblings

speaker.type.SIB <- speaker.type %>% group_by(subj) %>%
  filter(Speaker == "SIBLING" & audio_video == "video") %>%
  mutate(MeanN = mean(n),
         TotalN = sum(n)) %>%
  filter(month == 17)

wilcox.test(
  x = subset(speaker.type.SIB, Siblings6 == "0")$MeanN
  , y = subset(speaker.type.SIB, Siblings6 == "1")$MeanN
  , paired = FALSE
) # p<.001
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  subset(speaker.type.SIB, Siblings6 == "0")$MeanN and subset(speaker.type.SIB, Siblings6 == "1
## W = 0, p-value = 2.54e-08
## alternative hypothesis: true location shift is not equal to 0
```

```r
wilcox.test(
  x = subset(speaker.type.SIB, Siblings6 == "2")$MeanN
  , y = subset(speaker.type.SIB, Siblings6 == "1")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  subset(speaker.type.SIB, Siblings6 == "2")$MeanN and subset(speaker.type.SIB, Siblings6 == "1
## W = 21, p-value = 0.2112
## alternative hypothesis: true location shift is not equal to 0
```

```r
wilcox.test(
  x = subset(speaker.type.SIB, Siblings6 == "2")$MeanN
  , y = subset(speaker.type.SIB, Siblings6 == "3")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
```

```
## data:  subset(speaker.type.SIB, Siblings6 == "2")$MeanN and subset(speaker.type.SIB, Siblings6 == "3
## W = 2, p-value = 0.381
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.SIB, Siblings6 == "3")$MeanN
  , y = subset(speaker.type.SIB, Siblings6 == "4")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.SIB, Siblings6 == "3")$MeanN and subset(speaker.type.SIB, Siblings6 == "4
## W = 2, p-value = 1
## alternative hypothesis: true location shift is not equal to 0
```

```
# Difference in amount of input from mothers

speaker.type.MOT <- speaker.type %>% group_by(subj) %>%
  filter(Speaker == "MOT" & audio_video == "video") %>%
  mutate(MeanN = mean(n))  %>%
  filter(month == 17)

wilcox.test(
  x = subset(speaker.type.MOT, Siblings6 == "0")$MeanN
  , y = subset(speaker.type.MOT, Siblings6 == "1")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT, Siblings6 == "0")$MeanN and subset(speaker.type.MOT, Siblings6 == "1
## W = 130, p-value = 0.5832
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.MOT, Siblings6 == "2")$MeanN
  , y = subset(speaker.type.MOT, Siblings6 == "1")$MeanN
  , paired = FALSE
) # p<.01
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT, Siblings6 == "2")$MeanN and subset(speaker.type.MOT, Siblings6 == "1
## W = 8, p-value = 0.01032
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.MOT, Siblings6 == "2")$MeanN
  , y = subset(speaker.type.MOT, Siblings6 == "3")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT, Siblings6 == "2")$MeanN and subset(speaker.type.MOT, Siblings6 == "3
## W = 6, p-value = 0.8571
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(speaker.type.MOT, Siblings6 == "3")$MeanN
  , y = subset(speaker.type.MOT, Siblings6 == "4")$MeanN
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(speaker.type.MOT, Siblings6 == "3")$MeanN and subset(speaker.type.MOT, Siblings6 == "4
## W = 2, p-value = 1
## alternative hypothesis: true location shift is not equal to 0
```

Object presence

```
object.presence.summary_siblings <- object.presence %>%
  filter(audio_video == "video") %>%
  group_by(subj, Siblings6) %>%
  summarise(mean.object = mean(PC),
            sd.object = sd(PC),
            med.object = median(PC))
```

```
## `summarise()` has grouped output by 'subj'. You can override using the `.groups` argument.
```

```
object.presence.model_siblings <- lmerTest::lmer(PC ~ Siblings6 + month + (1|subj),
                                              data=subset(object.presence, audio_video == "video"), 

object.presence.model.null_siblings <- lmerTest::lmer(PC ~ month + (1|subj),
                                              data=subset(object.presence, audio_video == "vide

anova(object.presence.model_siblings, object.presence.model.null_siblings) # p<.001
```

```
## Data: subset(object.presence, audio_video == "video")
## Models:
## object.presence.model.null_siblings: PC ~ month + (1 | subj)
## object.presence.model_siblings: PC ~ Siblings6 + month + (1 | subj)
```

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```
##                                     npar    AIC     BIC logLik deviance  Chisq
## object.presence.model.null_siblings    4 -470.08 -453.17 239.04  -478.08
## object.presence.model_siblings         5 -487.34 -466.20 248.67  -497.34 19.261
##                                     Df Pr(>Chisq)
## object.presence.model.null_siblings
## object.presence.model_siblings        1    1.14e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# Posthoc tests

wilcox.test(
  x = subset(object.presence.summary_siblings, Siblings6 == "0")$mean.object
  , y = subset(object.presence.summary_siblings, Siblings6 == "1")$mean.object
  , paired = FALSE
) # p<.001
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_siblings, Siblings6 == "0")$mean.object and subset(object.pres
## W = 244, p-value = 0.0007021
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(object.presence.summary_siblings, Siblings6 == "2")$mean.object
  , y = subset(object.presence.summary_siblings, Siblings6 == "1")$mean.object
  , paired = FALSE
) # p<.05
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_siblings, Siblings6 == "2")$mean.object and subset(object.pres
## W = 12, p-value = 0.03388
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(object.presence.summary_siblings, Siblings6 == "2")$mean.object
  , y = subset(object.presence.summary_siblings, Siblings6 == "3")$mean.object
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_siblings, Siblings6 == "2")$mean.object and subset(object.pres
## W = 7, p-value = 0.5714
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(
  x = subset(object.presence.summary_siblings, Siblings6 == "3")$mean.object
  , y = subset(object.presence.summary_siblings, Siblings6 == "4")$mean.object
  , paired = FALSE
) # NS
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  subset(object.presence.summary_siblings, Siblings6 == "3")$mean.object and subset(object.pres
## W = 0, p-value = 0.3333
## alternative hypothesis: true location shift is not equal to 0
```