###Chimpanzee Facial/Gestural Signaling Methods Analysis

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###In R Programming Language 3.6.2

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#ABBREVIATIONS EXPLAINED

#FE stands for facial signal

#GE stands for bodily gesture

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#PART 1: Create tables for running analyses

#Tables come from the publication, which were constructed using the METHODS dataset.

#Left column is 2017, right column is 2018

FESignalType2 = matrix(

 c(18,10,33,3,47,17,1,27,8,0,60,31,49,24,176,56,4,19,78,1),

 nrow=10,

 ncol=2)

FESignalType2<-as.data.frame(FESignalType2) #Facial Signal Type

FESignalerID2 = matrix(

 c(25,8,14,19,6,10,10,9,9,43,9,2,64,49,19,63,72,8,31,38,63,49,29,13),

 nrow=12,

 ncol=2)

FESignalerID2<-as.data.frame(FESignalerID2) #Facial Signal ID

GESignalerID2 = matrix(

 c(36,34,31,8,9,32,97,6,13,24,14,9,84,133,97,37,73,46,94,26,44,72,42,16),

 nrow=12,

 ncol=2)

GESignalerID2<-as.data.frame(GESignalerID2) #Gesture Signaler ID

GESignalType2 = matrix(

 c(101,7,0,2,0,12,2,4,31,0,6,4,1,0,0,15,1,1,0,1,0,8,6,1,4,2,5,19,15,3,3,1,0,1,53,0,2,2,0,0,0,222,30,1,2,4,77,10,5,44,1,27,0,1,7,3,40,0,4,2,1,1,39,4,3,14,0,8,34,38,1,22,3,1,1,72,3,24,6,3,2,4),

 nrow=41,

 ncol=2)

GESignalType2<-as.data.frame(GESignalType2) #Gesture Signal Type

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#PART 2: Running Statistical Tests

#Chi-Squared Tests

chisq.test(FESignalType2) #Facial Signal Type

chisq.test(FESignalerID2) #Facial Signal ID

chisq.test(GESignalerID2) #Gesture Signal ID

chisq.test(GESignalType2) #Gesture Signal Type

#Fisher Test when cell value(s) n<5

fisher.test(FESignalType2, simulate.p.value=TRUE) #Facial Signal Type

fisher.test(FESignalerID2, simulate.p.value=TRUE) #Facial Signal ID

fisher.test(GESignalerID2, simulate.p.value=TRUE) #Gesture Signal ID

fisher.test(GESignalType2, simulate.p.value=TRUE) #Gesture Signal Type

#Sum of observations for Chi-Squared/Fisher Test reports

sum(FESignalType2) #Facial Signal Type

sum(FESignalerID2) #Facial Signal ID

sum(GESignalerID2) #Gesture Signal ID

sum(GESignalType2) #Gesture Signal Type

#Spearman Rank Correlations

corr5 <- cor.test(x=FESignalType2$V1, y=FESignalType2$V2, method = 'spearman')

corr6 <- cor.test(x=FESignalerID2$V1, y=FESignalerID2$V2, method = 'spearman')

corr7 <- cor.test(x=GESignalerID2$V1, y=GESignalerID2$V2, method = 'spearman')

corr8 <- cor.test(x=GESignalType2$V1, y=GESignalType2$V2, method = 'spearman')

corr5 #Facial Signal Type

corr6 #Facial Signal ID

corr7 #Gesture Signal ID

corr8 #Gesture Signal Type

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#PART 3: Comparing SD's with F-Tests

#Run F-Tests

var.test(FESignalerID2$V1, FESignalerID2$V2, alternative = "two.sided") #FE Signaler ID

var.test(FESignalType2$V1, FESignalType2$V2, alternative = "two.sided") #FE Signal Type

var.test(GESignalerID2$V1, GESignalerID2$V2, alternative = "two.sided") #GE Signaler ID

var.test(GESignalType2$V1, GESignalType2$V2, alternative = "two.sided") #GE Signal Type

#Effect sizes calculated using online calculator:

#https://lbecker.uccs.edu/

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#PART 4: Comparing number of signals observed each year with Chi-Squared Test

SignalCount = matrix(

 c(164,313,498,764),

 nrow=2,

 ncol=2)

SignalCount<-as.data.frame(SignalCount) #No. FE (row 1) / GE (row 2) Signals Observed 2017 (column 1) vs. 2018 (column 2)

chisq.test(SignalCount)

sum(SignalCount) #Sum of Observations for Chi-Squared Test

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