**TP3 – Inferential statistics (with R)**

**Open and read your datatable**

1. Open a data table

Data<-read.table("Path/Res.txt", header = TRUE, dec = ".", na.strings = "NaN")

head(Data)

1. Define your Independent variables (experimental factors):

Data$Group<-as.factor(as.character(Data$Group))

Data$Condition<-as.factor(as.character(Data$Condition))

Data$Participant<-as.factor(as.character(Data$Participant))

1. Filter a datatable to consider a subset of data le tableau de données pour en considérer un sous-ensemble

Data\_PeriodicAlong <- subset(Data, (Pattern==1))

Data\_PNS\_PeriodicAlong <- subset(Data, (Pattern==1)&(Group==0))

1. Detect outliers

VD <- Data\_subject$IRI

For each VD, subjet and condition (then eventually by group and condition) :

m<-mean(VD, na.rm=TRUE)

s<-sd(VD, na.rm=TRUE)

ind <- which((Data$RT>m+3\*s)|(Data$RT<m-3\*s))

VD[ind] 🡨 NaN

**1 – Generalized linear model with one factor: Effect of condition on RT, for a participant**

Data\_subject<-subset(Data,(Data$Participant=='S09'))

VD <- Data\_subject$RT

# Descriptive sats

boxplot(VD~Condition, data=Data\_subject)

# Model

M1<-lm(VD~Condition, data=Data\_subject, na.action=na.exclude)

summary(M1)

# Contrasts / Pairwise comparison

library(multcomp)

Contrast <- cbind(1, 0)

Contrast <- rbind(Contrast, cbind(1, 1))

Niveaux <- glht(M1, linfct=Contrast)

summary(Niveaux)

Contrast <- cbind(0, 1)

Niveaux <- glht(M1, linfct=Contrast)

summary(Niveaux)

**2 – Linear mixed model with one factor: Effect of condition on RT, for the PNS group**

Data\_PNS<-subset(Data,(Data$Group=='PNS'))

VD <- Data\_PNS$RT

# Descriptive stats

boxplot(VD~Condition, data=Data\_PNS)

# Model

library(nlme)

M1<-lme(VD~Condition, random=~1|Participant, data=Data\_PNS, method="ML", na.action=na.exclude)

summary(M1)

# Contrasts / Pairwise comparison

Contrast <- cbind(1, 0)

Contrast <- rbind(Contrast, cbind(1, 1))

Niveaux <- glht(M1, linfct=Contrast)

summary(Niveaux)

Contrast <- cbind(0, 1)

Niveaux <- glht(M1, linfct=Contrast)

summary(Niveaux)

**3 – Linear mixed model with two factors: Effect of condition on RT, for both groups (PNS et PWS)**

VD <- Data$RT

# Descriptive stats

boxplot(VD~Condition\*Group, data=Data)

# Model

library(nlme)

M1<-lme(VD~Condition\*Group, random=~1|Participant, data=Data, method="ML", na.action=na.exclude)

summary(M1)

# Exploration of the interaction between factors and model simplification

M2<-lme(VD~Condition+Group, random=~1|Participant, data=Data, method="ML", na.action=na.exclude)

anova(M1, M2)

BIC(M1)

BIC(M2)

M3<-lme(VD~Condition, random=~1|Participant, data=Data, method="ML", na.action=na.exclude)

M4<-lme(VD~Group, random=~1|Participant, data=Data, method="ML", na.action=na.exclude)

anova(M3, M2)

anova(M4, M2)

BIC(M2)

BIC(M3)

BIC(M4)

M5<-lme(VD~1, random=~1|Participant, data=Data, method="ML", na.action=na.exclude)

anova(M4, M5)

BIC(M4)

BIC(M5)

# Contrasts - Pairwise comparisions

# If significant interaction

Contrast <- cbind(1, 0, 0, 0) # PNS in Condition 1

Contrast <- rbind(Contrast, cbind(1, 1, 0, 0 )) # PNS in Condition 2

Contrast <- rbind(Contrast, cbind(1, 0, 1, 0)) # PWS in Condition 1

Contrast <- rbind(Contrast, cbind(1, 1, 1, 1)) # PWS in Condition 2

Niveaux <- glht(M1, linfct=Contrast)

summary(Niveaux)

Contrast <- cbind(0, 0, 1, 0) # Group effect (PWS-PNS) in condition 1

Contrast <- rbind(Contrast, cbind(0, 0, 1, 1 )) # Group effect (PWS-PNS) in condition 2

Niveaux <- glht(M1, linfct=Contrast)

summary(Niveaux)

Contrast <- cbind(0, 1, 0, 0) # Condition effect (Aperiodic-Periodic) in PNS

Contrast <- rbind(Contrast, cbind(0, 1, 0, 1 )) # Condition effect in PWS

Niveaux <- glht(M1, linfct=Contrast)

summary(Niveaux)

# If no significant interaction

Contrast <- cbind(1, 0, 0) # PNS in Condition 1

Contrast <- rbind(Contrast, cbind(1, 1, 0)) # PNS in Condition 2

Contrast <- rbind(Contrast, cbind(1, 0, 1)) # PWS in Condition 1

Contrast <- rbind(Contrast, cbind(1, 1, 1)) # PWS in Condition 2

Niveaux <- glht(M2, linfct=Contrast)

summary(Niveaux)

Contrast <- cbind(0, 0, 1) # Group effect (PWS-PNS)

Niveaux <- glht(M2, linfct=Contrast)

summary(Niveaux)

Contrast <- cbind(0, 1, 0) # Condition effect (Aperiodic-Periodic)

Niveaux <- glht(M2, linfct=Contrast)

summary(Niveaux)

**4 – Group difference of stdIRI**

Based on what was seen previously, and this time using the "ResWIC2022-StdIRI.txt" file, explore whether the two groups (PWS and PNS) have a significant difference in the variable stdIRI.

**5 – Conclusions**

Do PWS have difficulties in the initiation of movements, compared to PNS ?

Are PWS able to anticipate the apparition of a regular beat (in the Periodic Condition), like PNS ?

Are PWS able to sustain a regular rhythm with similar accuracy and consistency than PNS ?