VR5-KET Image Data ANOVA, Mean Cell Ns

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```
library(ggplot2)
library(ggpubr)
library(car) # For levene.test() function

## Loading required package: carData

library(emmeans)
```

Stats in Python were weird

Yesterday I did all the ANOVAs and post hoc tests for the standard stain types (normalized intensity, mean cell counts). I spot checked a few in prism and found that all the main effect F values were slightly different. The interaction effects all agree. Looking into this issue a little deeper, it seems that R agrees with SPSS which agrees with Prism and so I will just have to repeat these in R.

EDA and ANOVA function

This function performs the same type of ANOVA as performed in graphpad prism. In addition, performs some exploratory data analysis to assess normality and homogeneity of variances (both quantitatively and qualitatively)

```
Sidak <- function(pvals)
  # takes a vector of p-values and corrects p-values according to
  # Sidaks method for multiple comparisons (1967)
  #
  # Jonathan Ramos 3/12/2024
  {
  adjusted <- c()
  j <- length(pvals)

  for (i in 1:j){
    adj_p <- 1-(1-pvals[i])^j
    adjusted <- c(adjusted, adj_p)
  }
  return(adjusted)

}


eda_anova <- function(fname)
  # takes a filname, loads data from csv; data 4 columns:
  # react_treat, react, treat, and mean_cell_n (response var)
  # react_treat is just react and treat in one string separated by "_"
```

```r
# builds factor cols for categorical cols (mean_cell_n is numeric, all others are categorical)
# then performs the following tasks:
# checks assumptions of normality with qqplot and shapiro wilk tests
# checks assumptions of equal variances with box plot and levene test
# performs 2way ANOVA (2 by 2, react by treat)
# performs post hoc pairwise comparisons (emmeans of levels of react by treat
# and emmeans of levels of treat by react)
# prints out all statistical test results and returns plot objects
# for the two plots: the qqplots and the box plots
#
# Jonathan Ramos 3/12/2024


{
df <- read.csv(fname, header=TRUE, sep=",")
df$react_treat_factor <- as.factor(df$react_treat)
df$react_factor <- as.factor(df$react)
df$treat_factor <- as.factor(df$treat)

### check assumption of normality
# quantitative assessment
print(tapply(df$mean_cell_n, df$react_treat_factor, shapiro.test))

# qualitative assessment
g <- ggqqplot(df, x="mean_cell_n", facet.by=c("treat_factor", "react_factor"))

### check assumption of equal variances
# quantitative assessment
print(leveneTest(y = df$mean_cell_n, group=df$react_treat_factor, center='mean'))

# qualitative assessment
f <- ggplot(df, aes(x=treat_factor, y=mean_cell_n)) + geom_boxplot(aes(fill=treat_factor), alpha=0.5)
  #geom_dotplot(binaxis = "y", stackdir = "center", dotsize=0.5) +
  facet_wrap(~react_factor) +
  theme(axis.text.x = element_text(angle = 45, vjust = 1, hjust=1))

# run the ANOVA, display summary
df.lm <- lm(mean_cell_n ~ treat_factor + react_factor + treat_factor*react_factor, contrasts=list(trea
df.III.aov <- car::Anova(df.lm, type = 3)
print(df.III.aov)

# post hoc pairwise comparisons
emm <- emmeans(df.lm, ~ treat_factor * react_factor)
p1 <- pairs(emm, simple="treat_factor", adjust="tukey")
p2 <- pairs(emm, simple="react_factor", adjust="tukey")

# add col to summary dataframe containing sidak adjusted p-values
adjusted_p.value1 <- Sidak(summary(p1, adjust="tukey")$p.value)
s1 <- summary(p1)
s1['adjusted_p.value'] <- adjusted_p.value1

adjusted_p.value2 <- Sidak(summary(p2, adjust="tukey")$p.value)
s2 <- summary(p2)
s2['adjusted_p.value'] <- adjusted_p.value2
```

```
  # display results
  print(s1)
  print(s2)

  return(list(g, f))
}
```

pulling out filenames

```
singles = list.files(pattern="KET-VR5_single")
quads = list.files(pattern="KET-VR5_quad")
pv = list.files(pattern="PV_coloc")
cfos = list.files(pattern="cFos_coloc")
npas4 = list.files(pattern="Npas4_coloc")
wfa = list.files(pattern="WFA_coloc")
```

Single cFos

```
fname = singles[1]

print(fname)
```
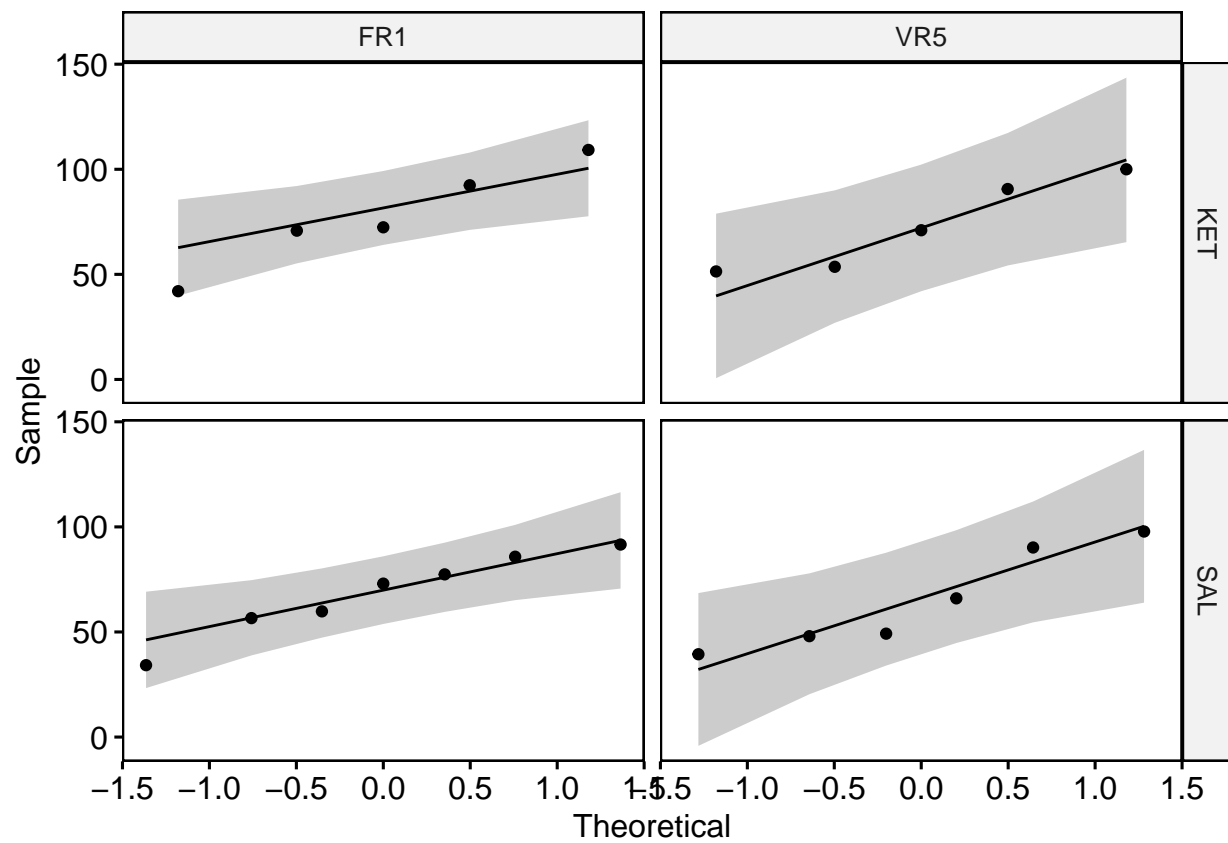
```
## [1] "KET-VR5_single_cFos_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.97255, p-value = 0.8913
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.95369, p-value = 0.7631
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90181, p-value = 0.42
##
##
## $VR5_SAL
##
```

```
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.89083, p-value = 0.3226
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.1564 0.9242
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)              113775  1 223.4353 5.852e-12 ***
## treat_factor                419  1   0.8224    0.3758
## react_factor                 75  1   0.1468    0.7059
## treat_factor:react_factor     1  1   0.0018    0.9670
## Residuals                  9675 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL     9.02 13.2 19   0.682  0.5032            0.753
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL     8.22 13.7 19   0.602  0.5546            0.802
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     4.04 14.3 19   0.283  0.7802            0.952
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     3.24 12.6 19   0.258  0.7989            0.960
# display qq plot to assess normality
figs[[1]]
```

```r
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```
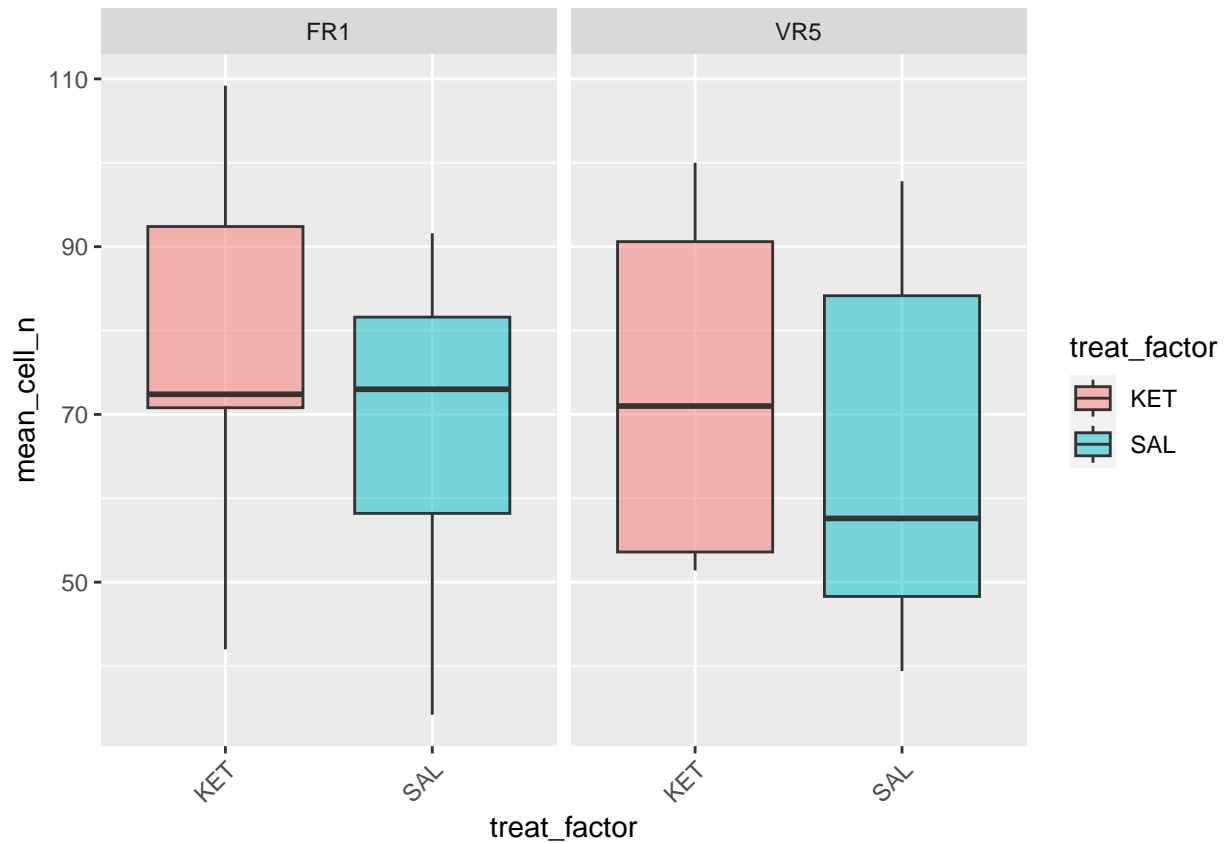
```
## [1] "KET-VR5_single_cFos_mean_cell_ns_Rsubset.csv"
```

Single Npas4

```
fname = singles[2]
```

```
print(fname)
```

```
## [1] "KET-VR5_single_Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.82603, p-value = 0.1299
##
##
## $FR1_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
```
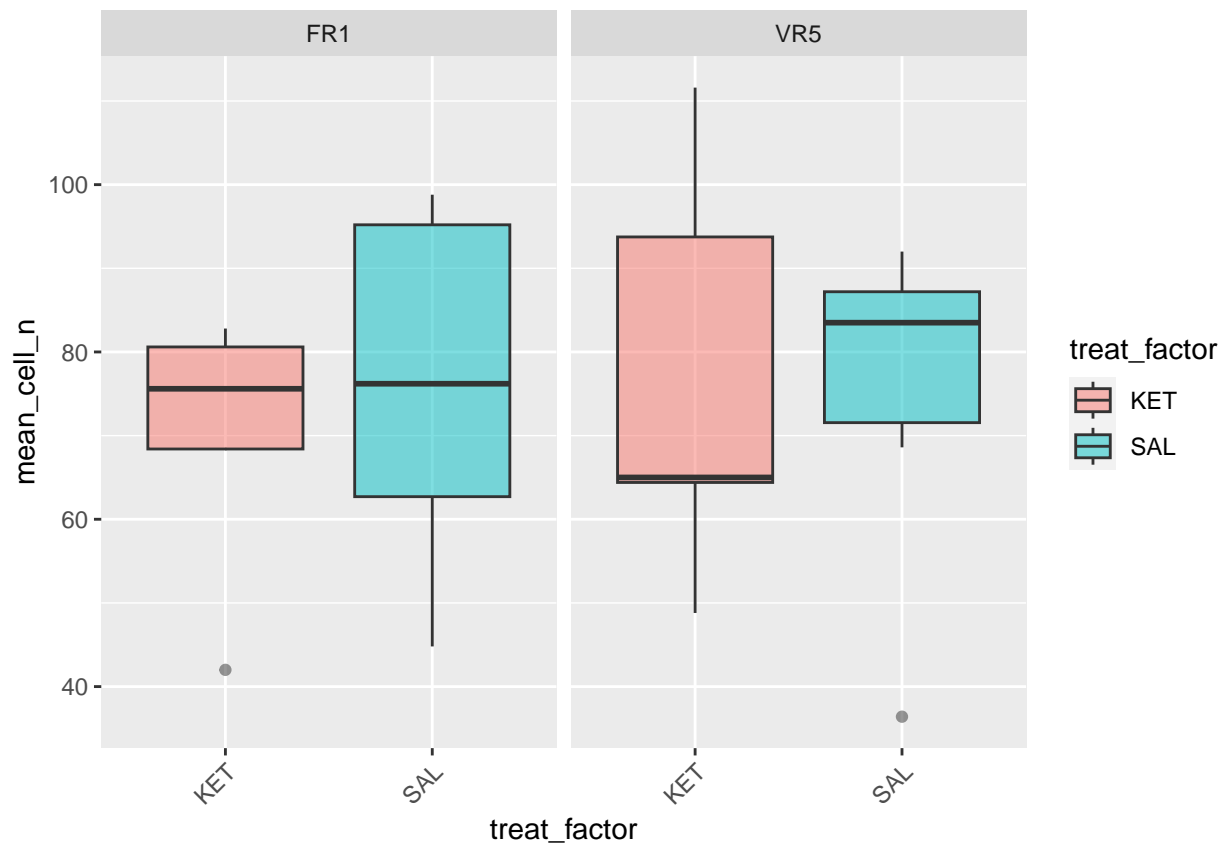
```
## W = 0.91196, p-value = 0.4096
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9256, p-value = 0.5667
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.80876, p-value = 0.07036
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.6164 0.6128
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value    Pr(>F)
## (Intercept)              125444  1 281.3566 7.59e-13 ***
## treat_factor                 37  1   0.0841   0.7750
## react_factor                 43  1   0.0973   0.7584
## treat_factor:react_factor    93  1   0.2080   0.6535
## Residuals                  8471 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    -6.63 12.4 19  -0.537  0.5978            0.838
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL     1.48 12.8 19   0.115  0.9093            0.992
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    -6.83 13.4 19  -0.511  0.6149            0.852
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     1.28 11.7 19   0.109  0.9143            0.993
# display qq plot to assess normality
figs[[1]]
```
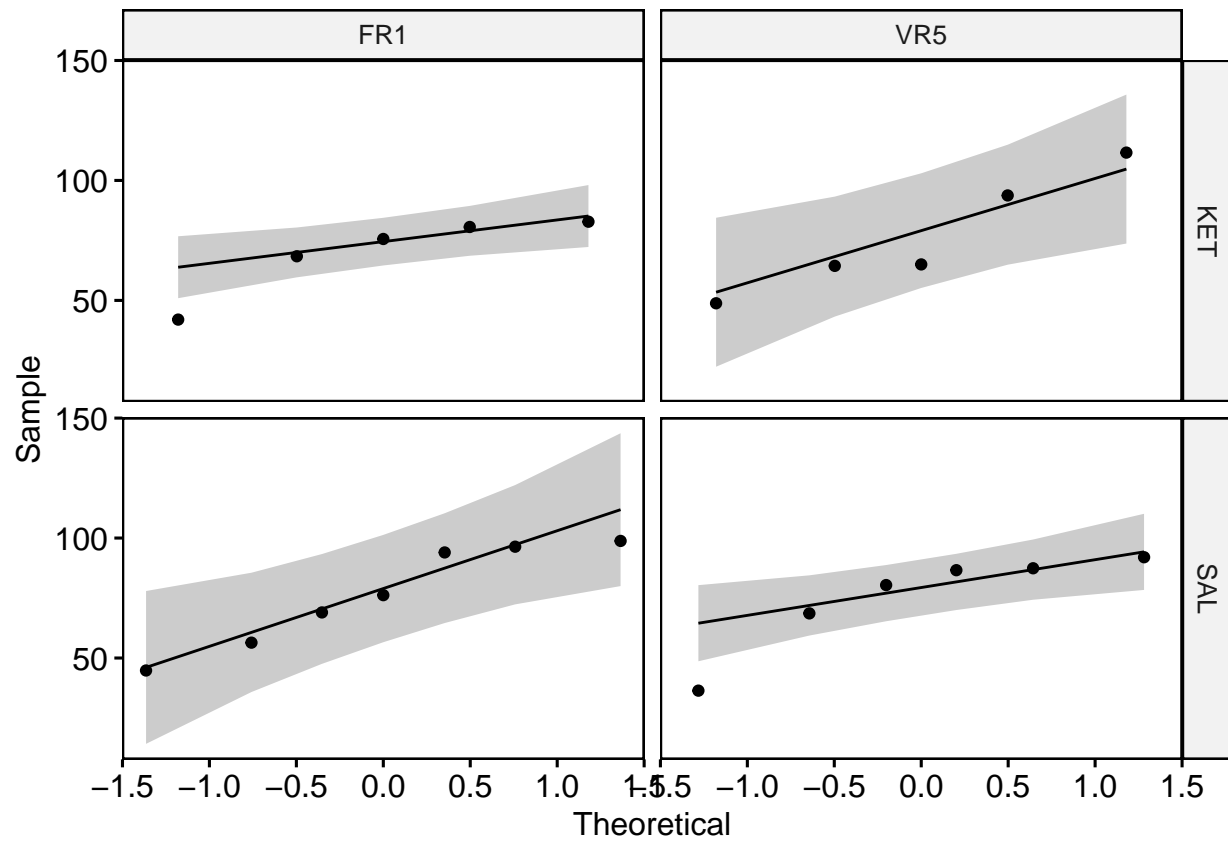
```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_single_Npas4_mean_cell_ns_Rsubset.csv"
```

Single PV

```
fname = singles[3]
```

```
print(fname)
```

```
## [1] "KET-VR5_single_PV_mean_cell_ns_Rsubset.csv"
```
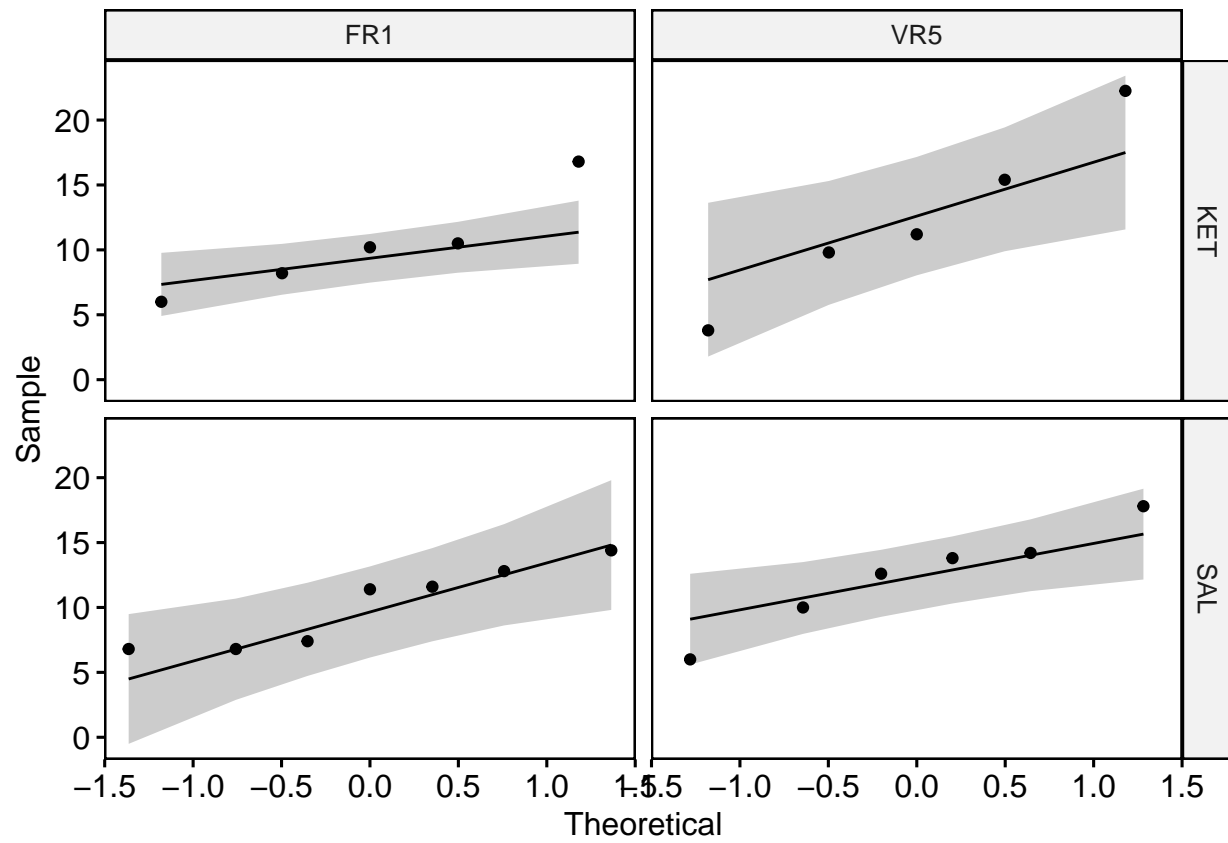
```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.91733, p-value = 0.5129
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
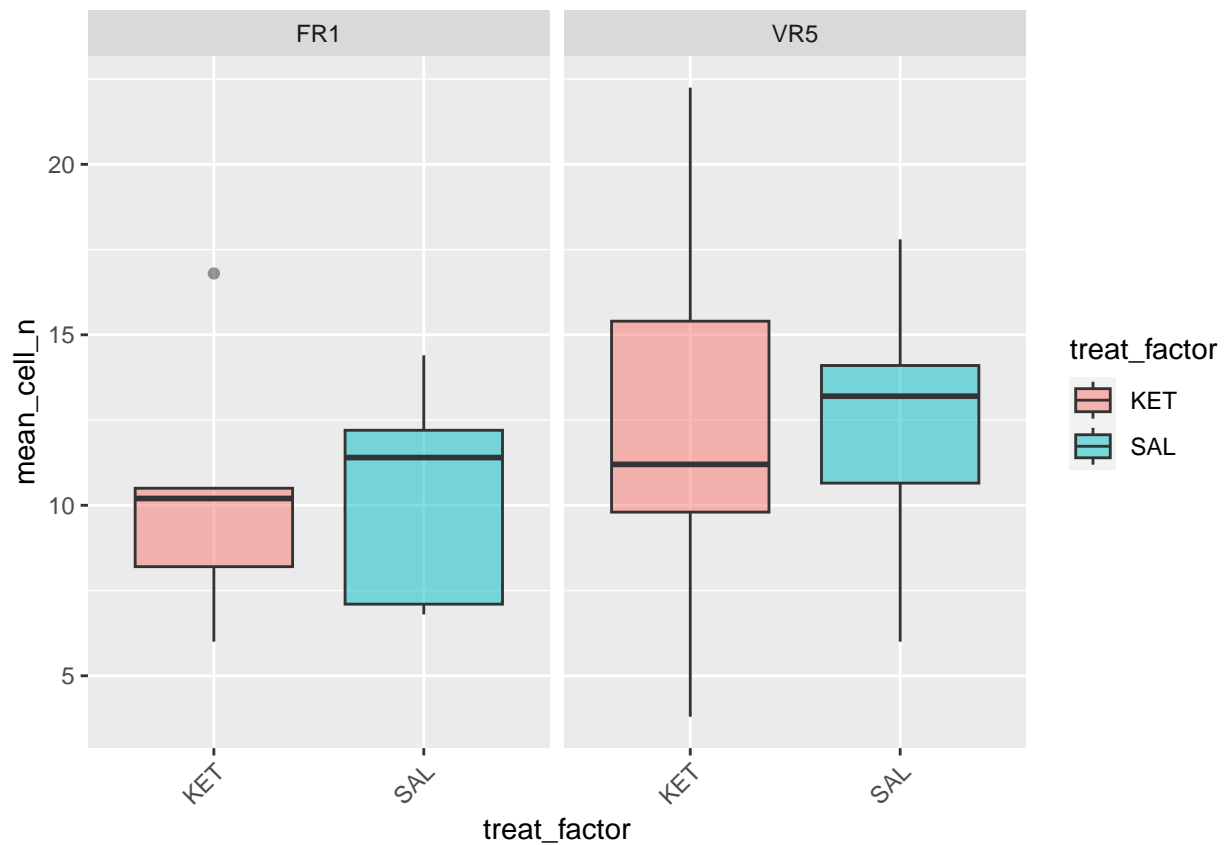
9

```
## W = 0.86925, p-value = 0.1828
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.98514, p-value = 0.9601
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.97031, p-value = 0.8945
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##        Df F value Pr(>F)
## group  3  1.0479 0.3943
##        19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)             2905.17  1 140.3793 3.212e-10 ***
## treat_factor               0.09  1   0.0046    0.9469
## react_factor              27.02  1   1.3057    0.2674
## treat_factor:react_factor  0.01  1   0.0004    0.9839
## Residuals                393.21 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.169 2.66 19   0.063  0.9502            0.998
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.090 2.75 19   0.033  0.9743            0.999
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    -2.15 2.88 19  -0.747  0.4641            0.713
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    -2.23 2.53 19  -0.881  0.3896            0.627
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_single_PV_mean_cell_ns_Rsubset.csv"
```

Single WFA

```
fname = singles[4]
```

```
print(fname)
```

```
## [1] "KET-VR5_single_WFA_mean_cell_ns_Rsubset.csv"
```
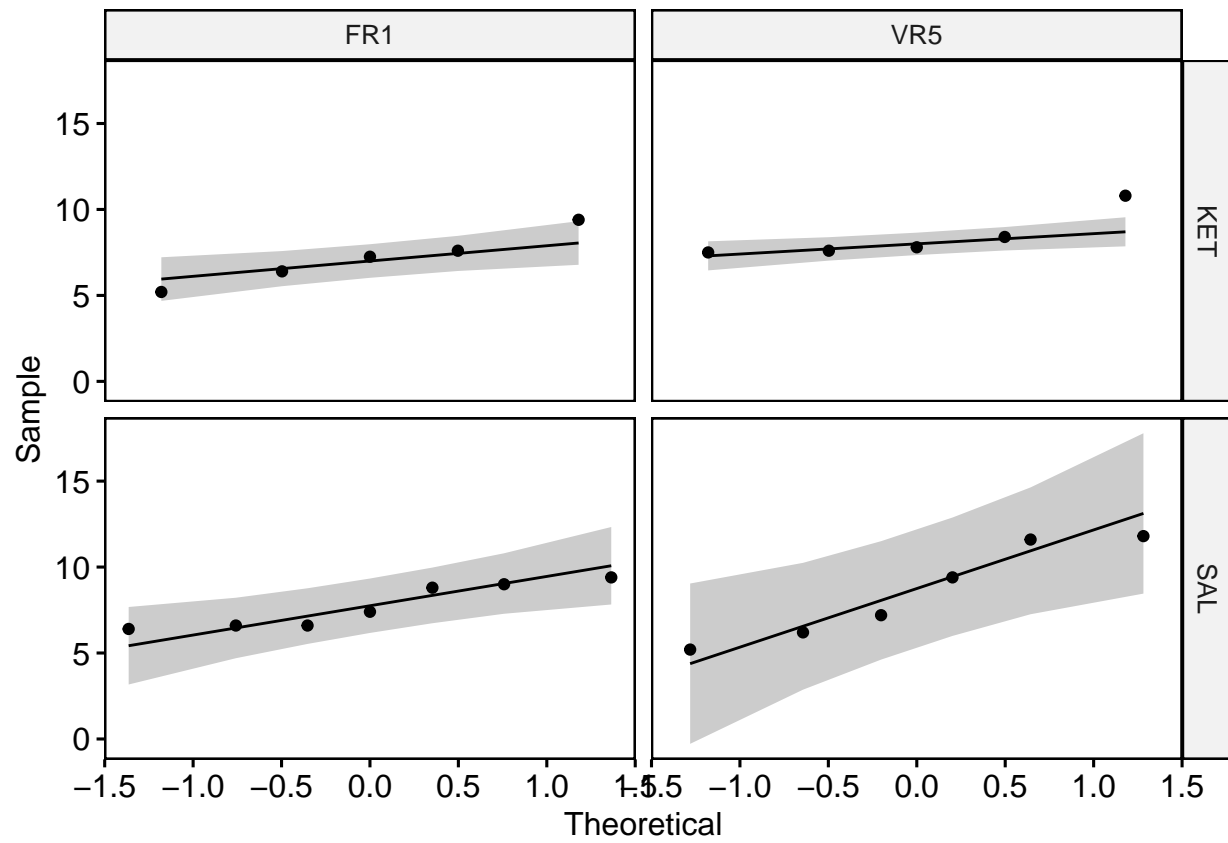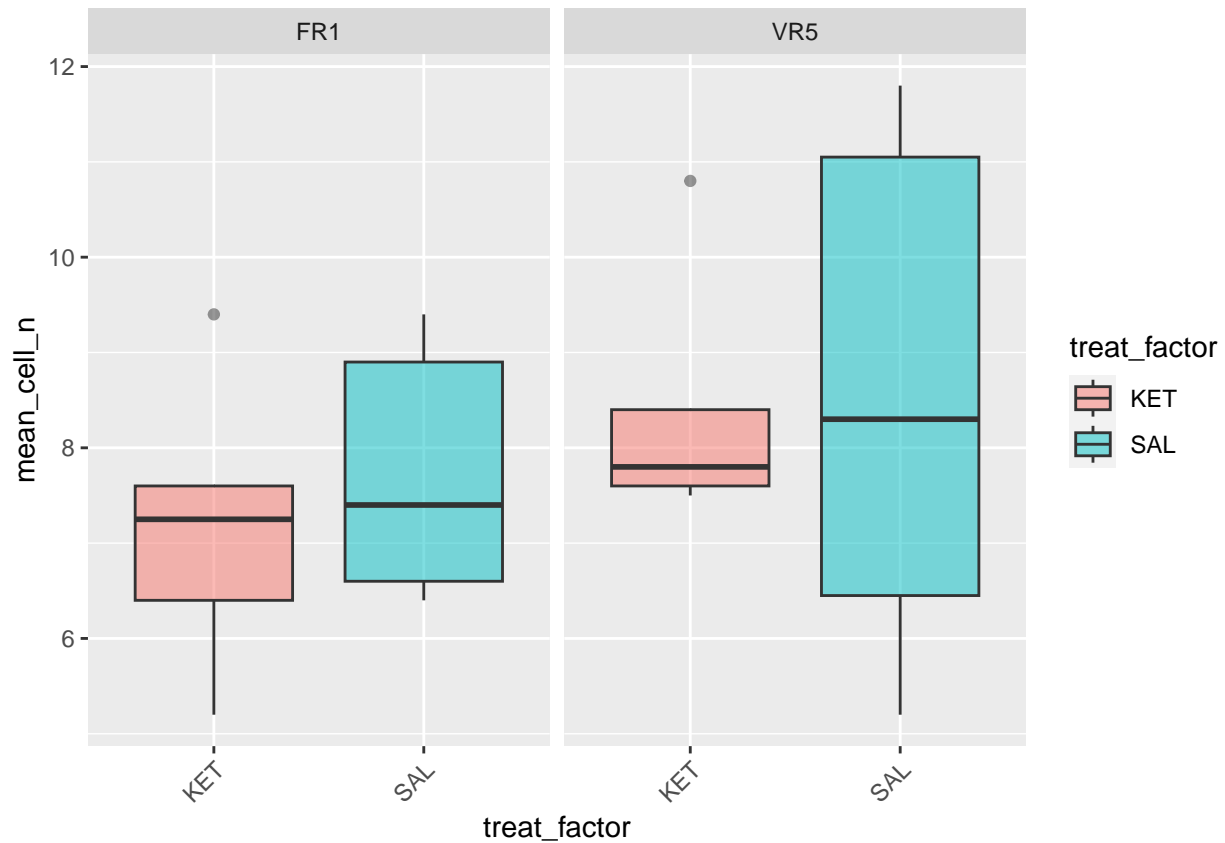
```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.98498, p-value = 0.9594
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
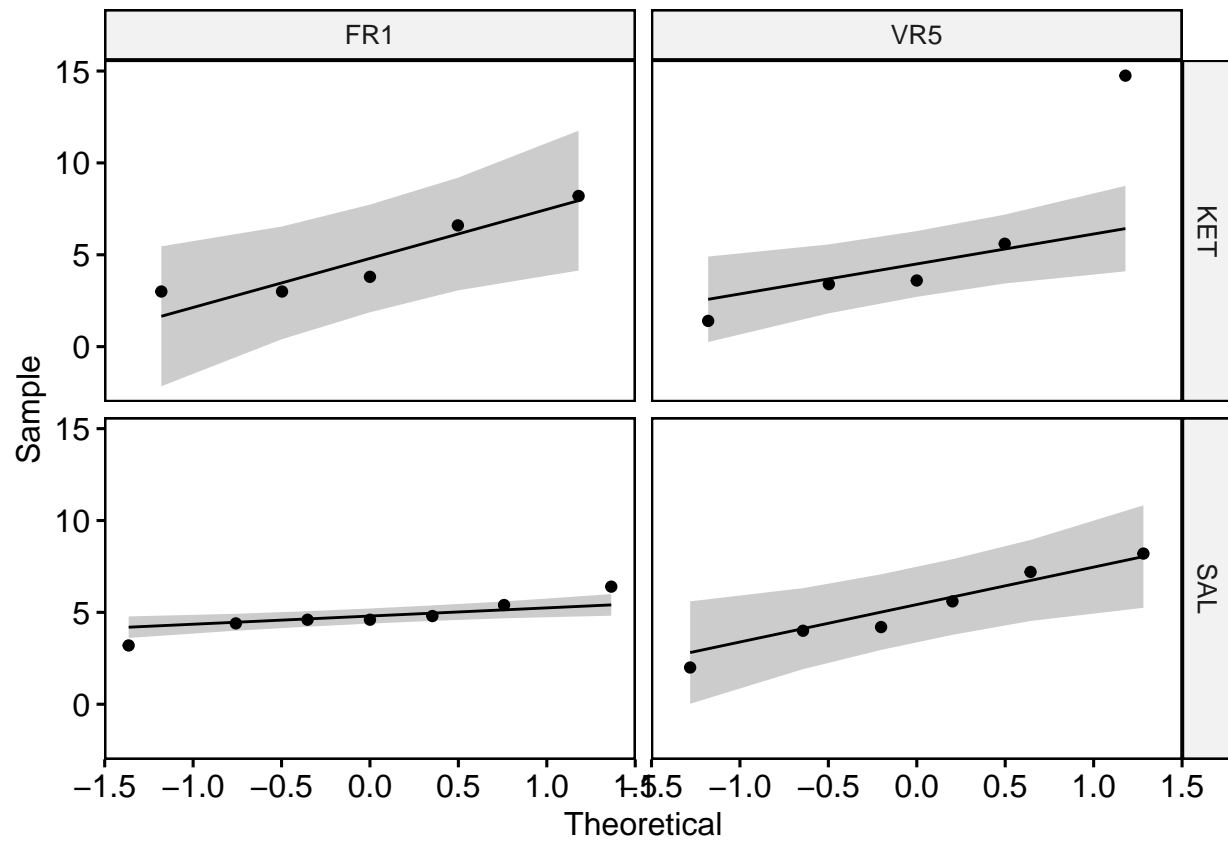
```
## W = 0.84703, p-value = 0.1154
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.7525, p-value = 0.03139
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9053, p-value = 0.4062
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value  Pr(>F)
## group  3  3.6346 0.03163 *
##       19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)             1434.17  1 410.7737 2.501e-14 ***
## treat_factor               0.73  1   0.2090    0.6527
## react_factor               6.06  1   1.7361    0.2033
## treat_factor:react_factor  0.26  1   0.0733    0.7895
## Residuals                 66.34 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.573 1.09 19  -0.524  0.6066            0.845
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.147 1.13 19  -0.130  0.8982            0.990
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -1.250 1.18 19  -1.058  0.3034            0.515
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.824 1.04 19  -0.792  0.4379            0.684
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_single_WFA_mean_cell_ns_Rsubset.csv"
```

PV coloc w cFos

```
fname = pv[1]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_cFos_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8423, p-value = 0.1714
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
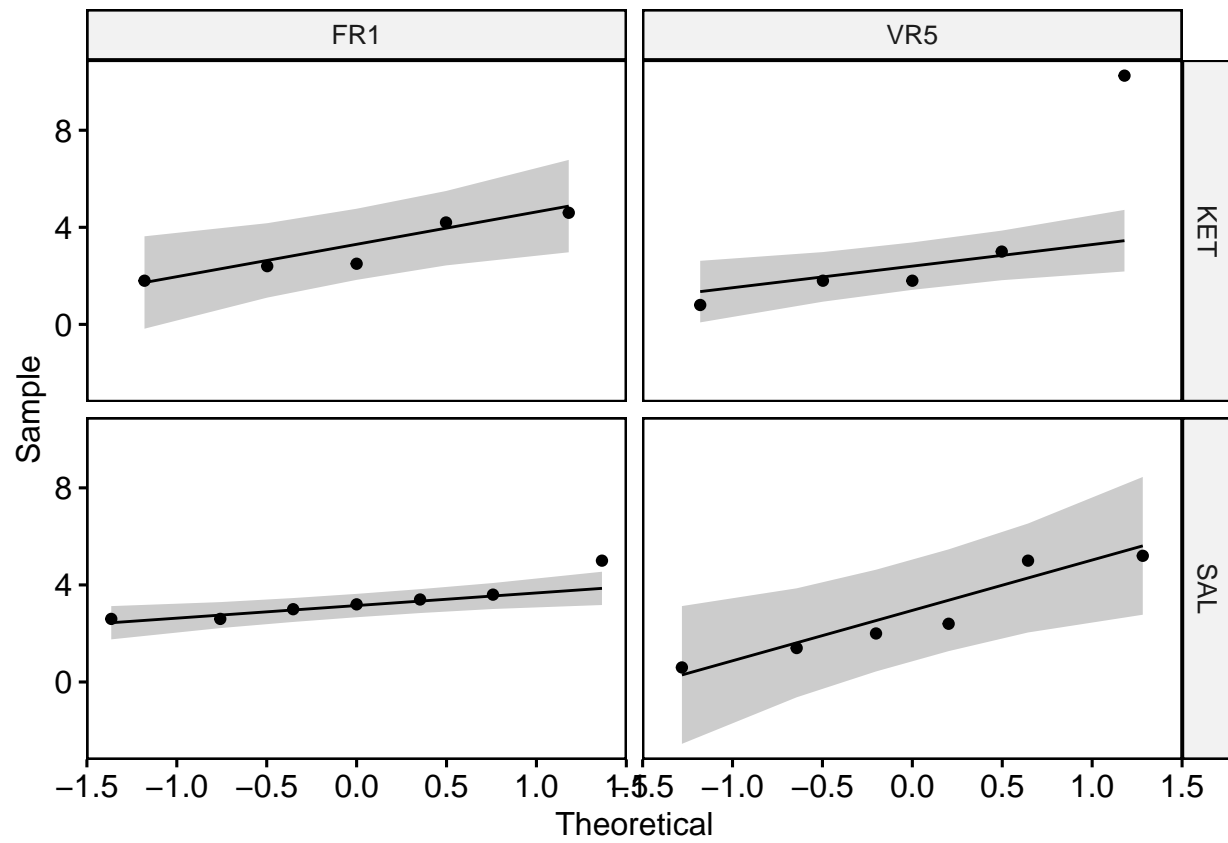
```
## W = 0.94614, p-value = 0.6944
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.80329, p-value = 0.08617
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.97069, p-value = 0.897
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value  Pr(>F)
## group  3  2.8274 0.06615 .
##       19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df F value    Pr(>F)
## (Intercept)              600.50  1 69.6328 8.908e-08 ***
## treat_factor               0.69  1  0.0798    0.7807
## react_factor               2.23  1  0.2589    0.6168
## treat_factor:react_factor  0.23  1  0.0263    0.8728
## Residuals                163.85 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.149 1.72 19   0.086  0.9321            0.995
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.550 1.78 19   0.309  0.7605            0.943
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.830 1.86 19  -0.447  0.6600            0.884
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.429 1.63 19  -0.262  0.7959            0.958
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_cFos_mean_cell_ns_Rsubset.csv"
```

PV coloc w cFos, Npas4

```
fname = pv[2]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_cFos,Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87817, p-value = 0.3011
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```

```
## W = 0.84807, p-value = 0.118
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.73323, p-value = 0.02066
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.881, p-value = 0.2737
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##        Df F value  Pr(>F)
## group   3  3.0697 0.05274 .
##        19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df F value    Pr(>F)
## (Intercept)             228.739  1 49.8807 1.013e-06 ***
## treat_factor              0.382  1  0.0833    0.7761
## react_factor              0.030  1  0.0066    0.9363
## treat_factor:react_factor 1.427  1  0.3112    0.5835
## Residuals                87.128 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.243 1.25 19  -0.194  0.8485            0.977
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.763 1.30 19   0.589  0.5630            0.809
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.430 1.35 19  -0.317  0.7543            0.940
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.576 1.19 19   0.484  0.6342            0.866
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_cFos,Npas4_mean_cell_ns_Rsubset.csv"
```

PV coloc w cFos, WFA

```
fname = pv[3]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_cFos,WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.68403, p-value = 0.00647
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```

```
## W = 0.89892, p-value = 0.3245
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.98292, p-value = 0.9496
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90208, p-value = 0.3863
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  1.6158 0.2189
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                        Sum Sq Df  F value     Pr(>F)
## (Intercept)           132.897  1 158.9025 1.123e-10 ***
## treat_factor            0.750  1   0.8969    0.3555
## react_factor            0.010  1   0.0118    0.9145
## treat_factor:react_factor  0.002  1   0.0022    0.9630
## Residuals              15.890 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.383 0.535 19   0.715  0.4833            0.733
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.347 0.554 19   0.626  0.5388            0.787
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   0.0600 0.578 19   0.104  0.9185            0.993
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   0.0238 0.509 19   0.047  0.9632            0.999
# display qq plot to assess normality
figs[[1]]
```
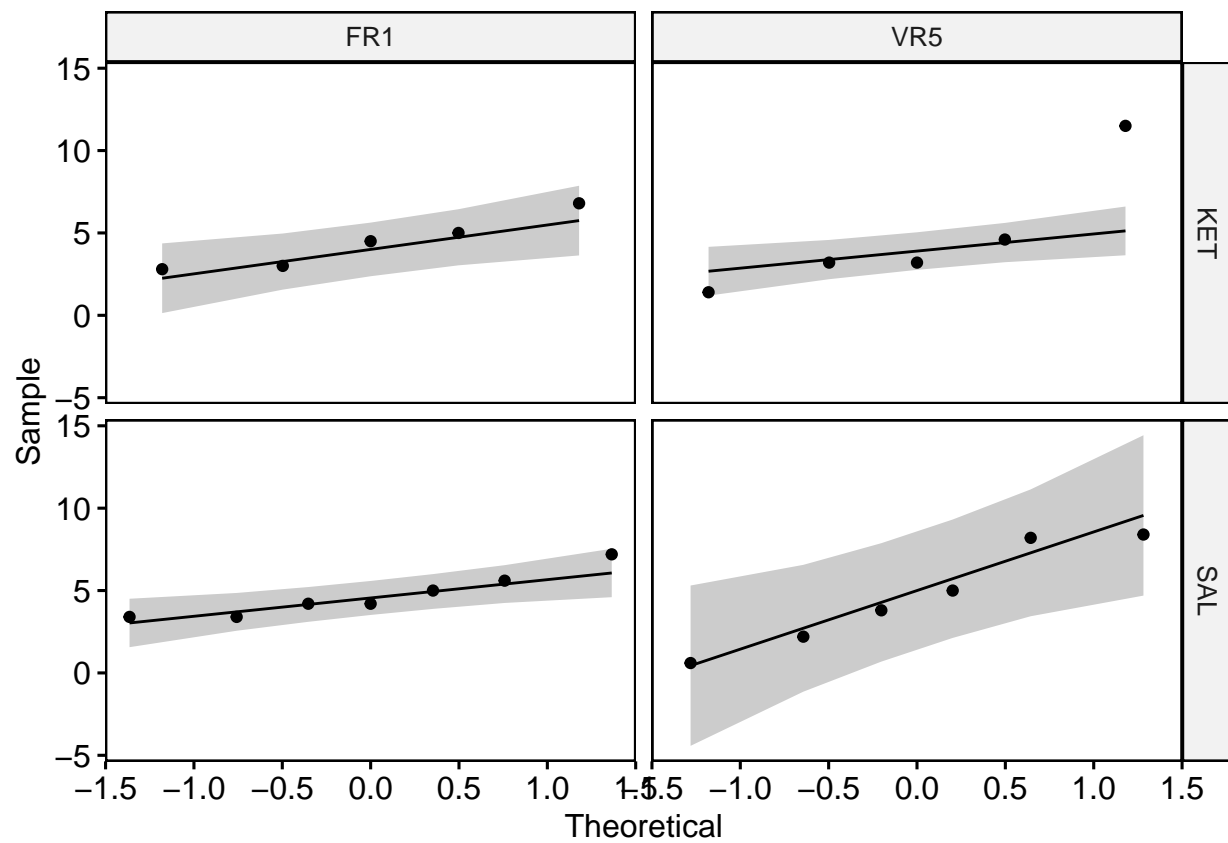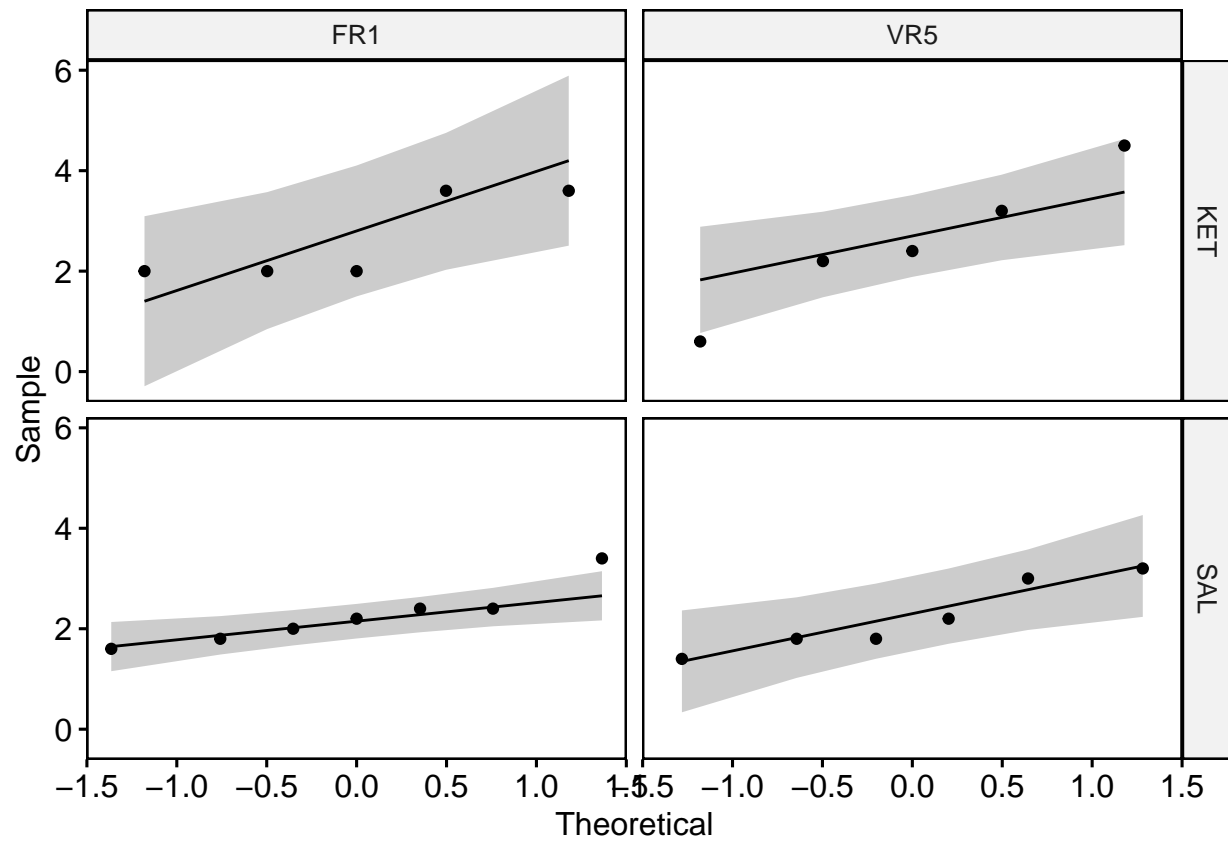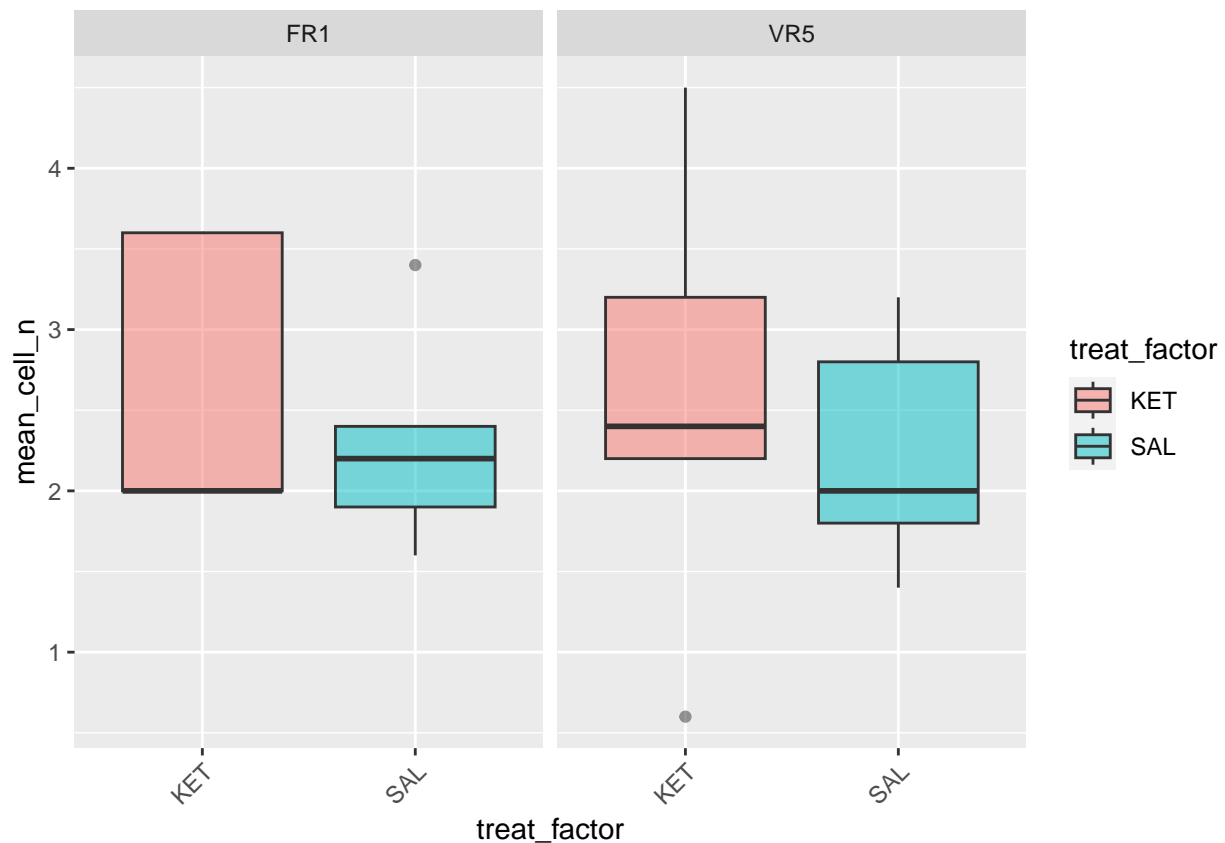
```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_cFos,WFA_mean_cell_ns_Rsubset.csv"
```

PV coloc w Npas4

```
fname = pv[4]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92671, p-value = 0.5741
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
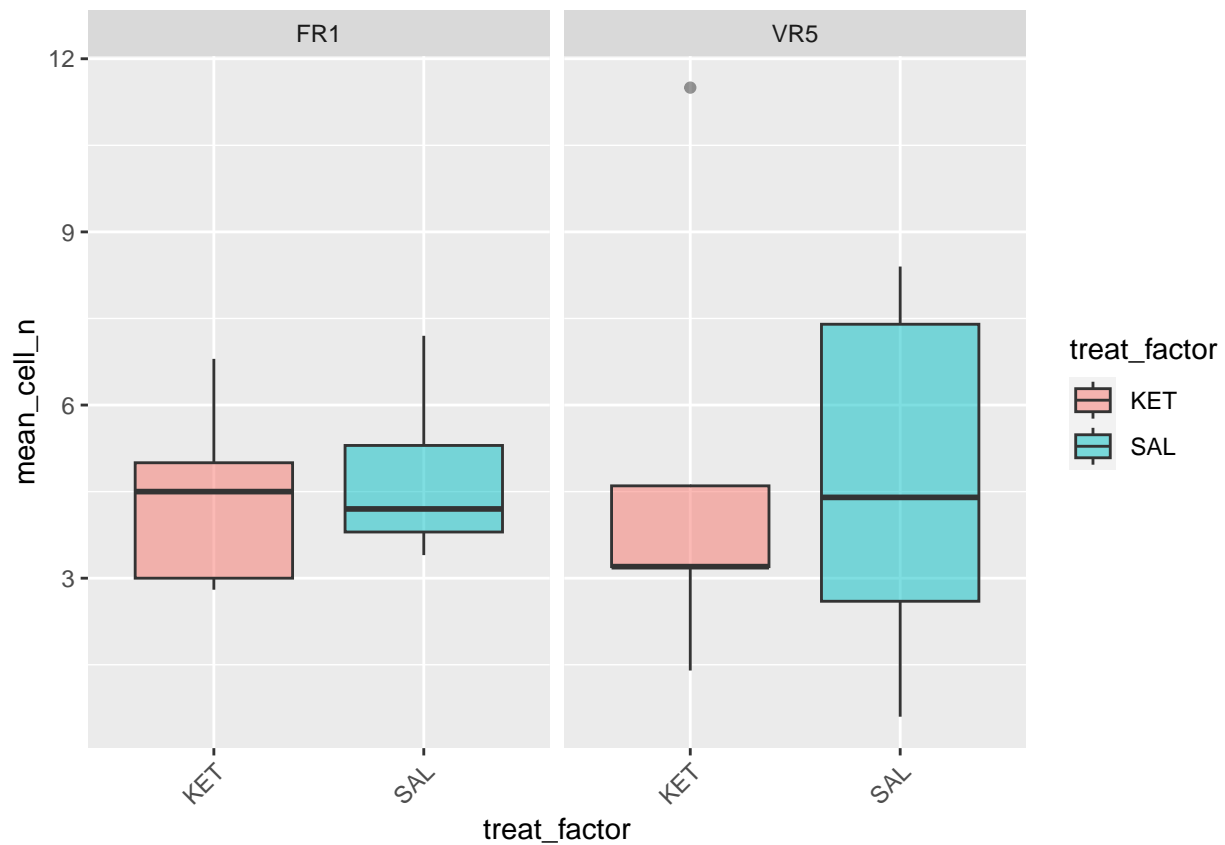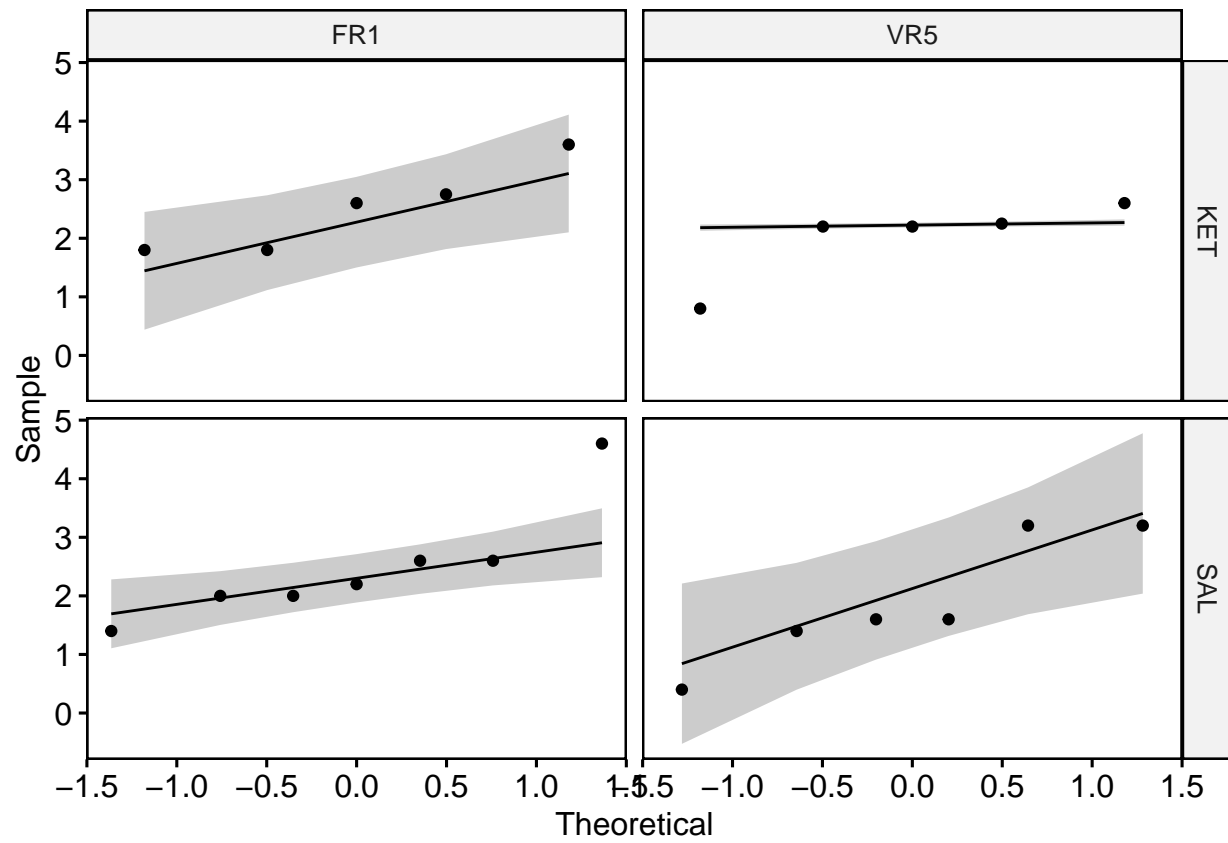
```
## W = 0.8982, p-value = 0.3202
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.80693, p-value = 0.09217
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92811, p-value = 0.5656
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  1.7883 0.1836
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df F value     Pr(>F)
## (Intercept)              488.34  1 69.6667 8.875e-08 ***
## treat_factor               0.06  1  0.0092    0.9245
## react_factor               0.17  1  0.0240    0.8784
## treat_factor:react_factor  0.20  1  0.0282    0.8685
## Residuals                133.18 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.294 1.55 19  -0.190  0.8515            0.978
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.080 1.60 19   0.050  0.9607            0.998
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5  -0.3600 1.67 19  -0.215  0.8321            0.972
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   0.0143 1.47 19   0.010  0.9924            1.000
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_Npas4_mean_cell_ns_Rsubset.csv"
```

PV coloc w Npas4, WFA

```
fname = pv[5]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_Npas4,WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.89852, p-value = 0.4018
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
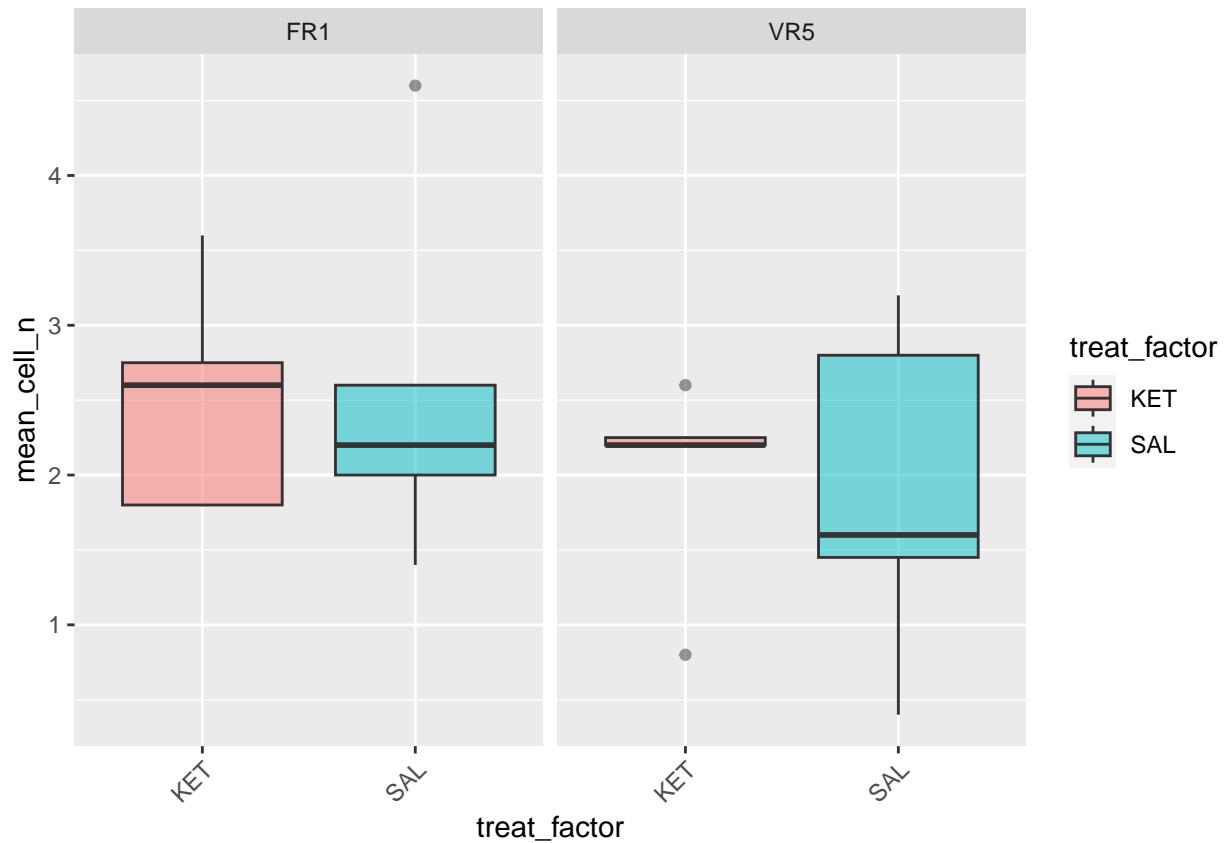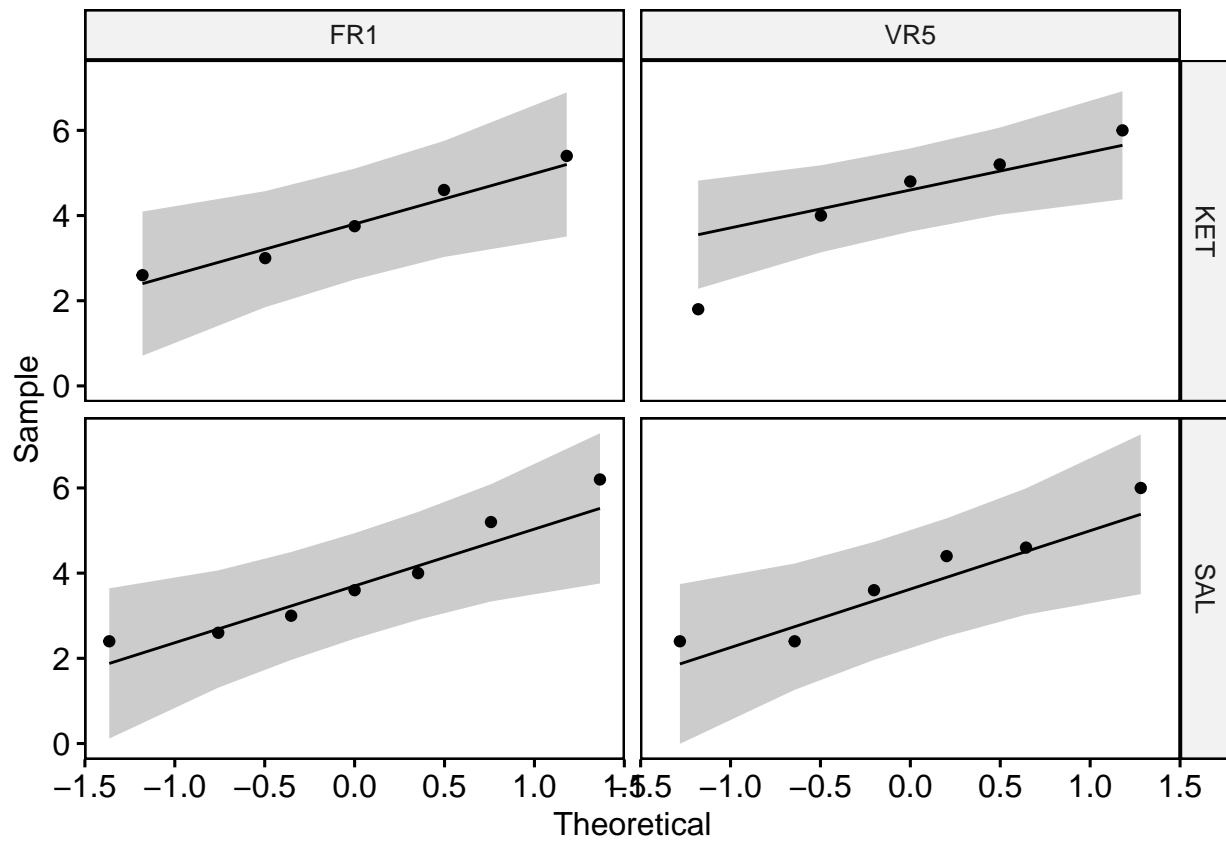
```
## W = 0.82034, p-value = 0.0647
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.75194, p-value = 0.03102
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87719, p-value = 0.2564
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.4741  0.704
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value    Pr(>F)
## (Intercept)             111.782  1 128.7762 6.617e-10 ***
## treat_factor              0.025  1   0.0293    0.8659
## react_factor              1.661  1   1.9139    0.1826
## treat_factor:react_factor 0.010  1   0.0119    0.9142
## Residuals                16.493 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate     SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.0243 0.546 19   0.045  0.9650            0.999
##
## react_factor = VR5:
##  contrast  estimate     SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.1100 0.564 19   0.195  0.8475            0.977
##
## treat_factor = KET:
##  contrast  estimate     SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.500 0.589 19   0.849  0.4067            0.648
##
## treat_factor = SAL:
##  contrast  estimate     SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.586 0.518 19   1.130  0.2725            0.471
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_Npas4,WFA_mean_cell_ns_Rsubset.csv"
```

PV coloc w WFA

```
fname = pv[6]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.96039, p-value = 0.8107
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
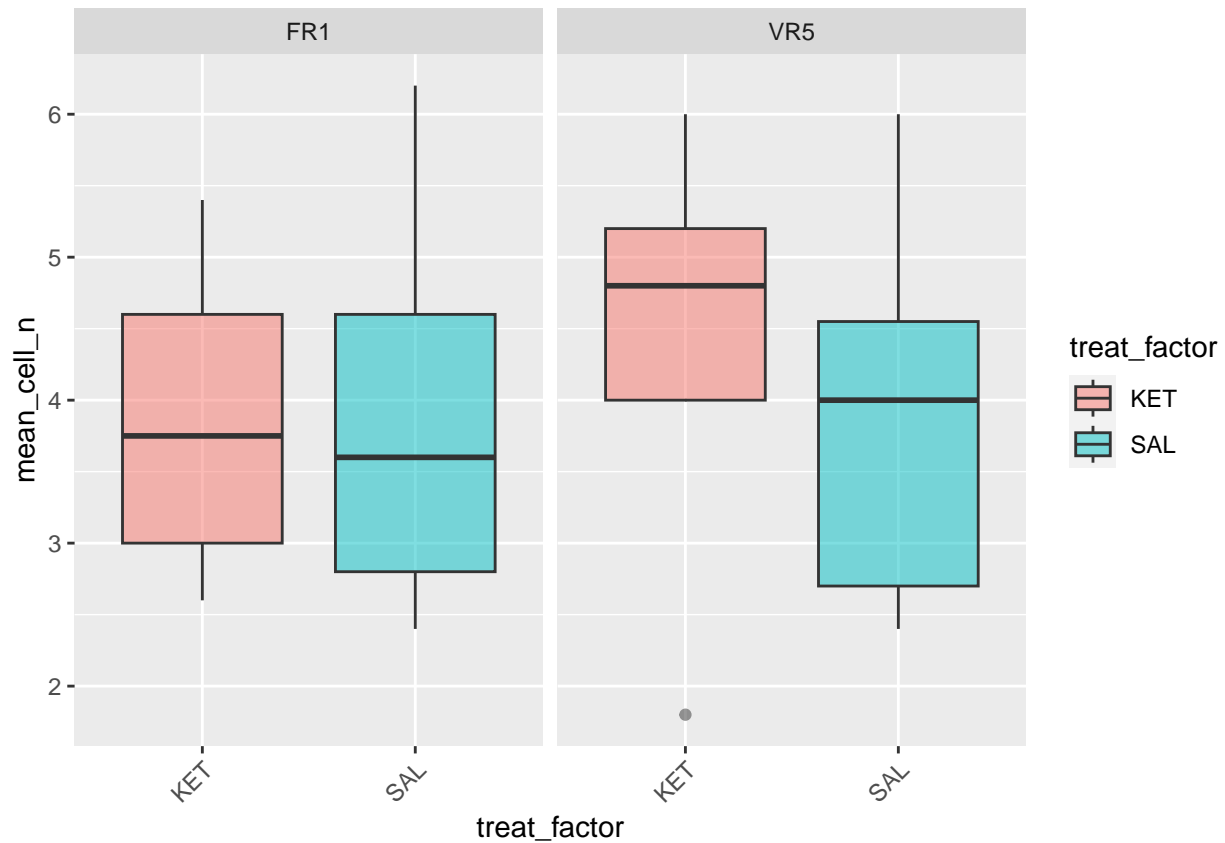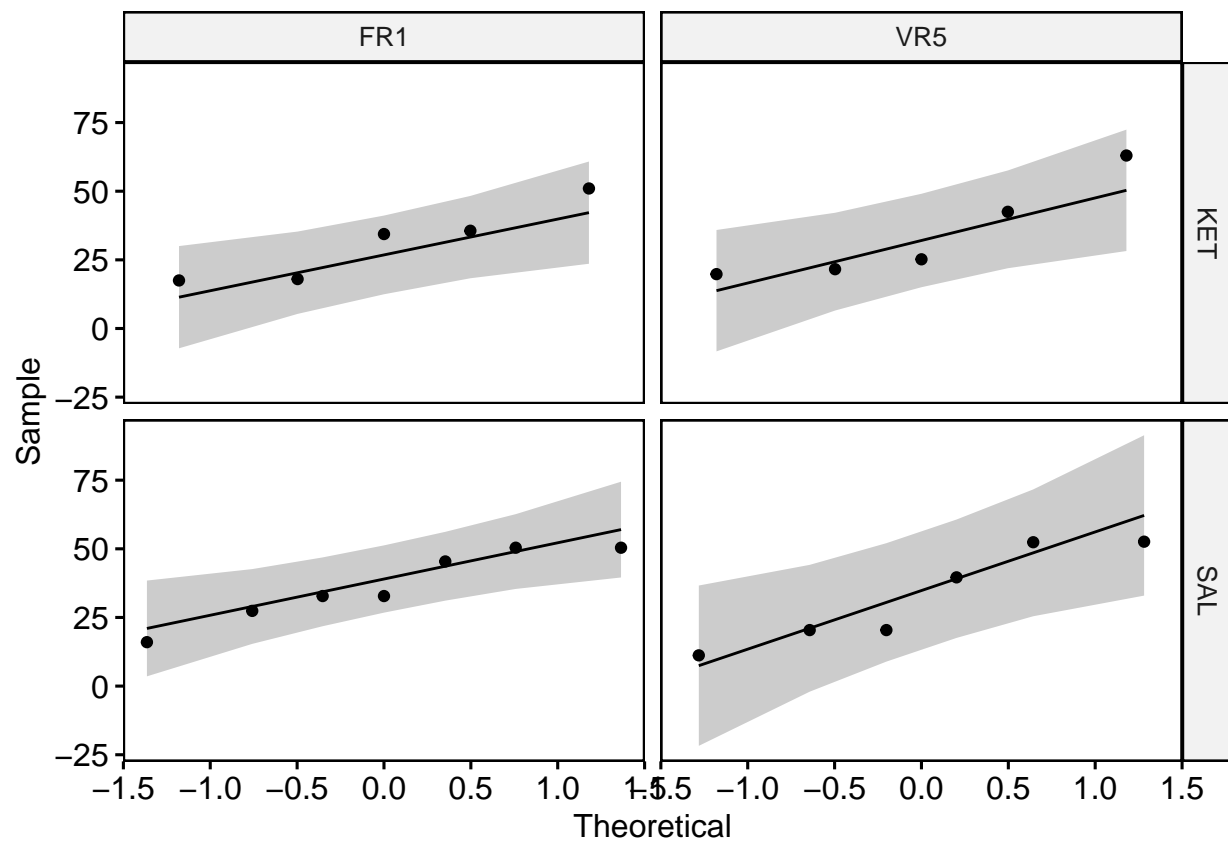
```
## W = 0.91975, p-value = 0.4674
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92419, p-value = 0.5573
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92579, p-value = 0.548
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.1172 0.9489
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                           Sum Sq Df  F value     Pr(>F)
## (Intercept)               360.23  1 184.5461 3.104e-11 ***
## treat_factor                0.32  1   0.1614    0.6923
## react_factor                0.40  1   0.2050    0.6558
## treat_factor:react_factor   0.28  1   0.1444    0.7082
## Residuals                  37.09 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.0129 0.818 19   0.016  0.9876            1.000
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.4600 0.846 19   0.544  0.5929            0.834
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5  -0.4900 0.884 19  -0.555  0.5857            0.828
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5  -0.0429 0.777 19  -0.055  0.9566            0.998
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_PV_coloc_w_WFA_mean_cell_ns_Rsubset.csv"
```

cFos coloc w Npas4

```
fname = cfos[1]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.89718, p-value = 0.3945
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
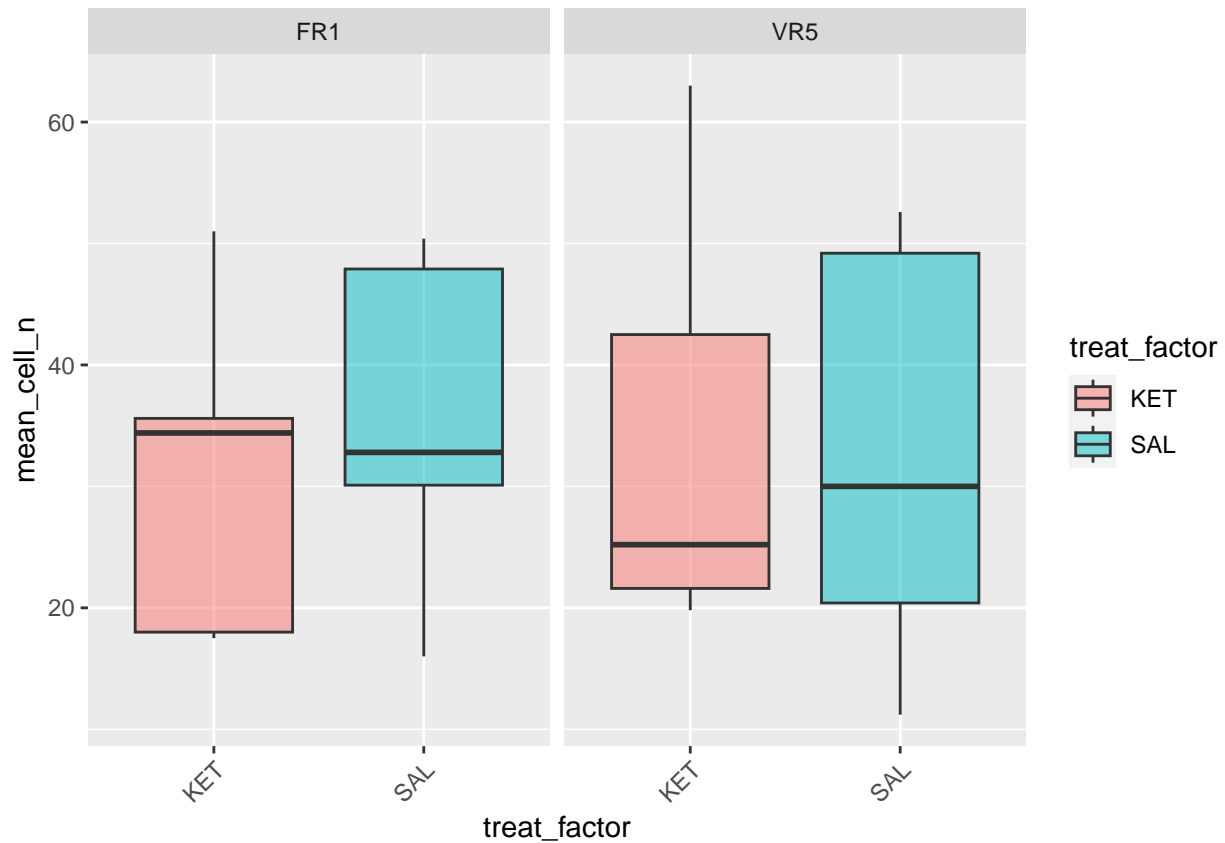
```
## W = 0.91459, p-value = 0.4286
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8471, p-value = 0.1855
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87128, p-value = 0.2314
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.8486 0.4844
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                           Sum Sq Df  F value     Pr(>F)
## (Intercept)              25664.9  1 103.2835 4.055e-09 ***
## treat_factor                17.3  1   0.0696    0.7947
## react_factor                 0.5  1   0.0018    0.9662
## treat_factor:react_factor   65.4  1   0.2631    0.6139
## Residuals                 4721.3 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    -5.16 9.23 19  -0.559  0.5829            0.826
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL     1.65 9.55 19   0.173  0.8643            0.982
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    -3.12 9.97 19  -0.313  0.7577            0.941
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     3.69 8.77 19   0.421  0.6786            0.897
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_Npas4_mean_cell_ns_Rsubset.csv"
```

cFos coloc w Npas4, WFA

```
fname = cfos[2]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_Npas4,WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9689, p-value = 0.8681
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
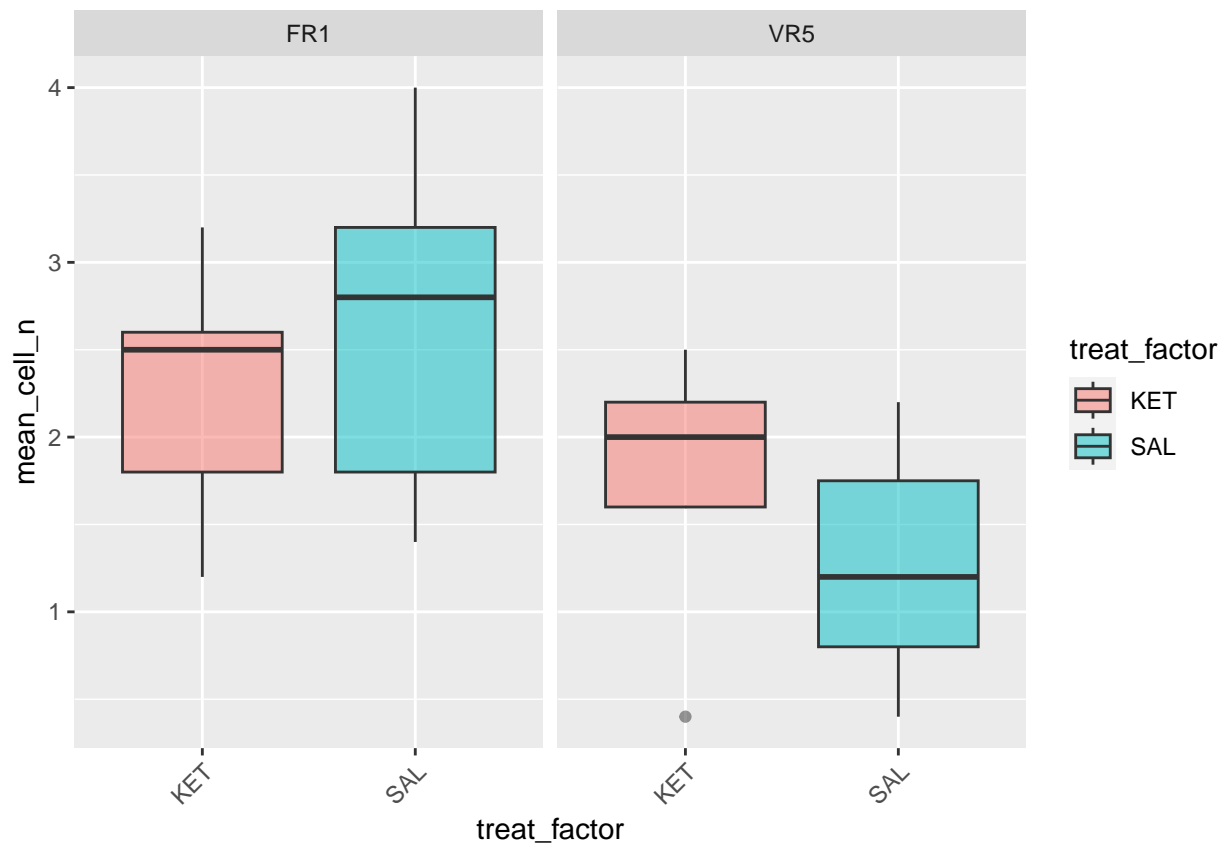
```
## W = 0.95011, p-value = 0.7307
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.88822, p-value = 0.3482
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92774, p-value = 0.5628
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.4302 0.7337
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value    Pr(>F)
## (Intercept)              87.220  1 126.3347 7.76e-10 ***
## treat_factor              0.025  1   0.0363  0.85093
## react_factor              4.841  1   7.0121  0.01587 *
## treat_factor:react_factor 0.932  1   1.3504  0.25959
## Residuals                13.117 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.340 0.487 19  -0.699  0.4931            0.743
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.473 0.503 19   0.941  0.3586            0.589
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.52 0.526 19   0.990  0.3348           0.5576
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    1.33 0.462 19   2.884  0.0095           0.0189
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_Npas4,WFA_mean_cell_ns_Rsubset.csv"
```

cFos coloc w PV

```
fname = cfos[3]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_PV_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8423, p-value = 0.1714
##
##
## $FR1_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
```
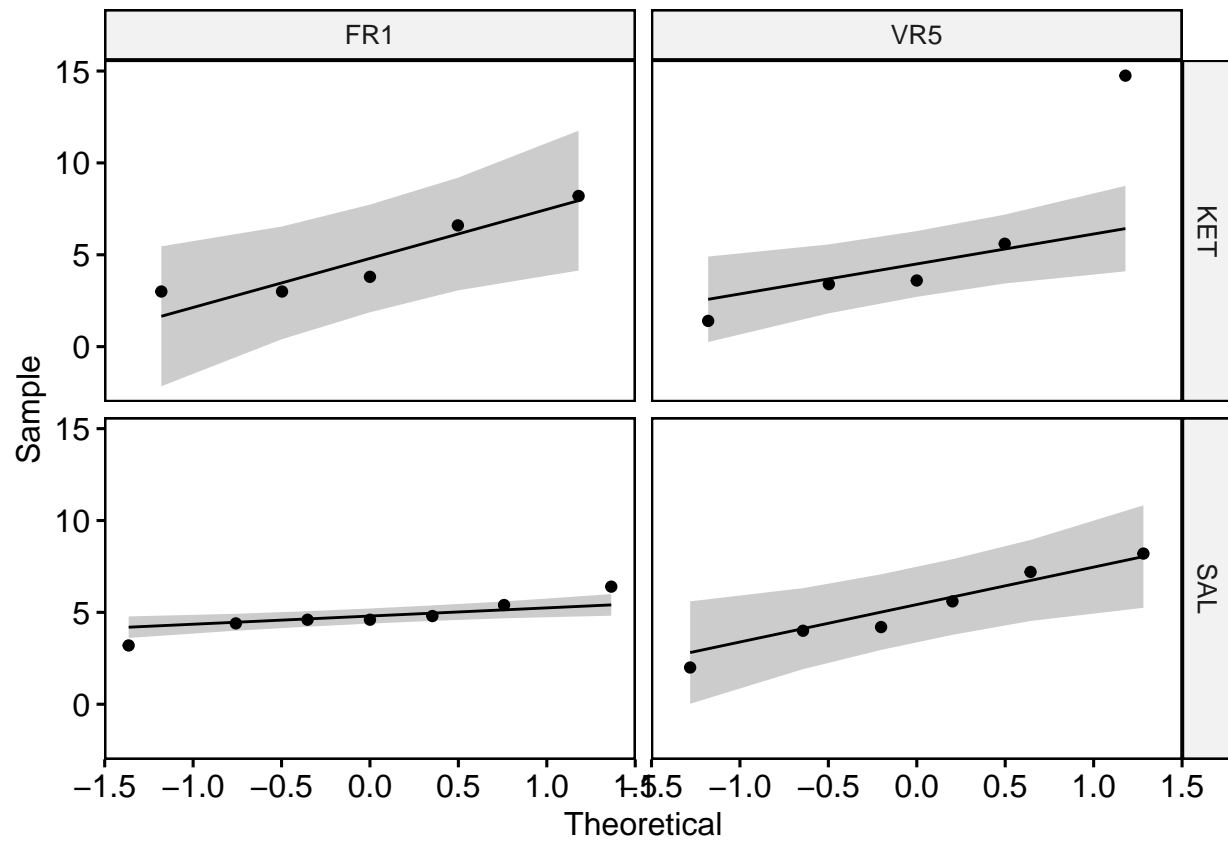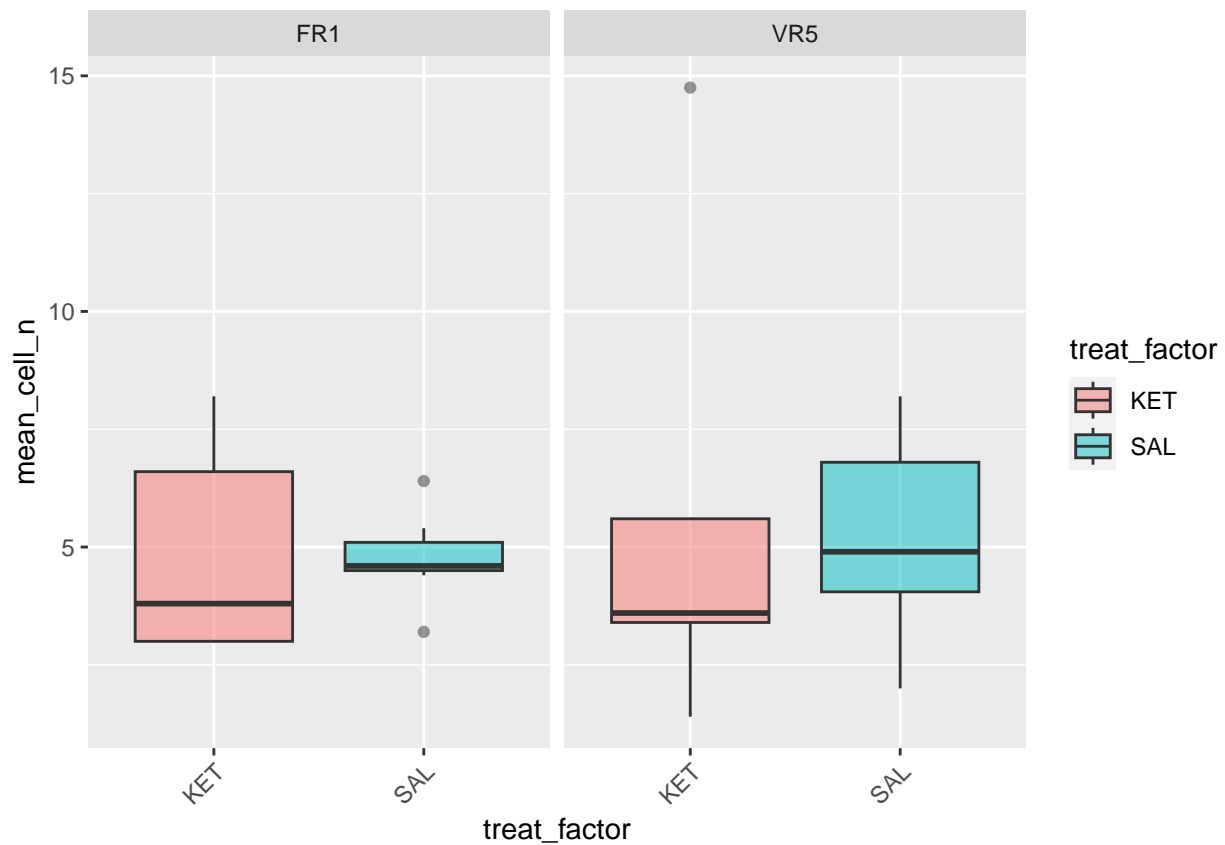
```
## W = 0.94614, p-value = 0.6944
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.80329, p-value = 0.08617
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.97069, p-value = 0.897
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value  Pr(>F)
## group  3  2.8274 0.06615 .
##       19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df F value    Pr(>F)
## (Intercept)              600.50  1 69.6328 8.908e-08 ***
## treat_factor               0.69  1  0.0798    0.7807
## react_factor               2.23  1  0.2589    0.6168
## treat_factor:react_factor  0.23  1  0.0263    0.8728
## Residuals                163.85 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.149 1.72 19   0.086  0.9321            0.995
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.550 1.78 19   0.309  0.7605            0.943
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.830 1.86 19  -0.447  0.6600            0.884
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.429 1.63 19  -0.262  0.7959            0.958
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_PV_mean_cell_ns_Rsubset.csv"
```

cFos coloc w PV, Npas4

```
fname = cfos[4]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_PV,Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87817, p-value = 0.3011
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
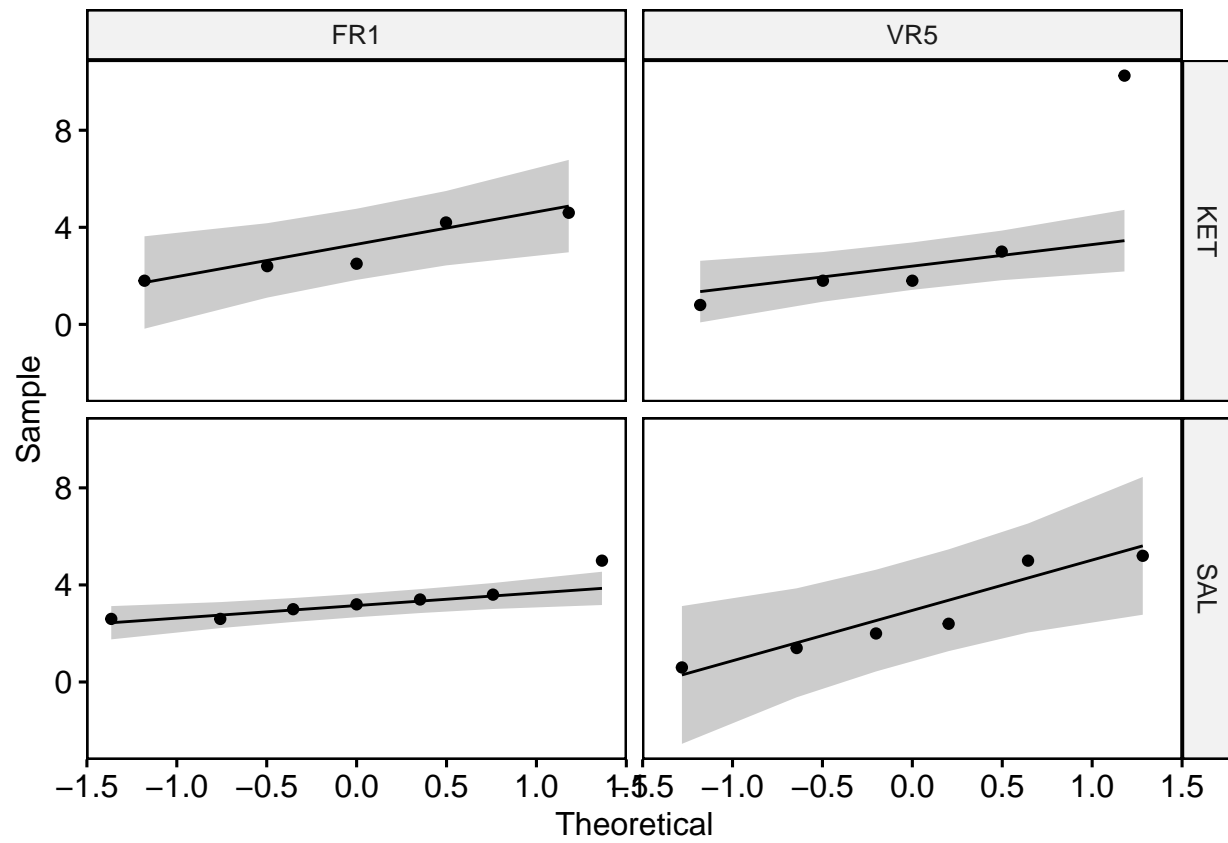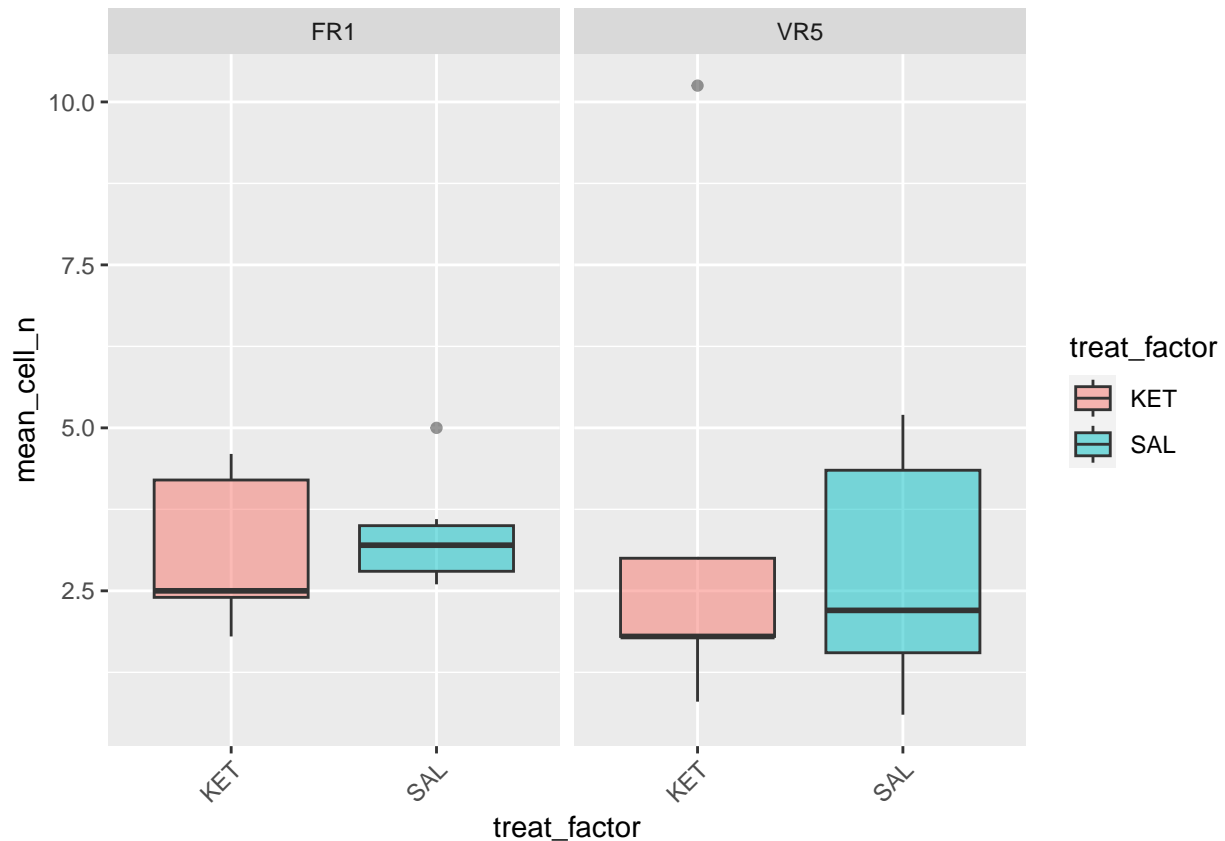
```
## W = 0.84807, p-value = 0.118
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.73323, p-value = 0.02066
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.881, p-value = 0.2737
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##        Df F value  Pr(>F)
## group   3  3.0697 0.05274 .
##        19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df F value    Pr(>F)
## (Intercept)            228.739  1 49.8807 1.013e-06 ***
## treat_factor             0.382  1  0.0833    0.7761
## react_factor             0.030  1  0.0066    0.9363
## treat_factor:react_factor  1.427  1  0.3112    0.5835
## Residuals               87.128 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.243 1.25 19  -0.194  0.8485           0.977
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.763 1.30 19   0.589  0.5630           0.809
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.430 1.35 19  -0.317  0.7543           0.940
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.576 1.19 19   0.484  0.6342           0.866
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_PV,Npas4_mean_cell_ns_Rsubset.csv"
```

cFos coloc w PV, WFA

```
fname = cfos[5]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_PV,WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.68403, p-value = 0.00647
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```

```
## W = 0.89892, p-value = 0.3245
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.98292, p-value = 0.9496
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90208, p-value = 0.3863
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  1.6158 0.2189
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)             132.897  1 158.9025 1.123e-10 ***
## treat_factor              0.750  1   0.8969    0.3555
## react_factor              0.010  1   0.0118    0.9145
## treat_factor:react_factor 0.002  1   0.0022    0.9630
## Residuals                15.890 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.383 0.535 19   0.715  0.4833            0.733
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.347 0.554 19   0.626  0.5388            0.787
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   0.0600 0.578 19   0.104  0.9185            0.993
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   0.0238 0.509 19   0.047  0.9632            0.999
# display qq plot to assess normality
figs[[1]]
```
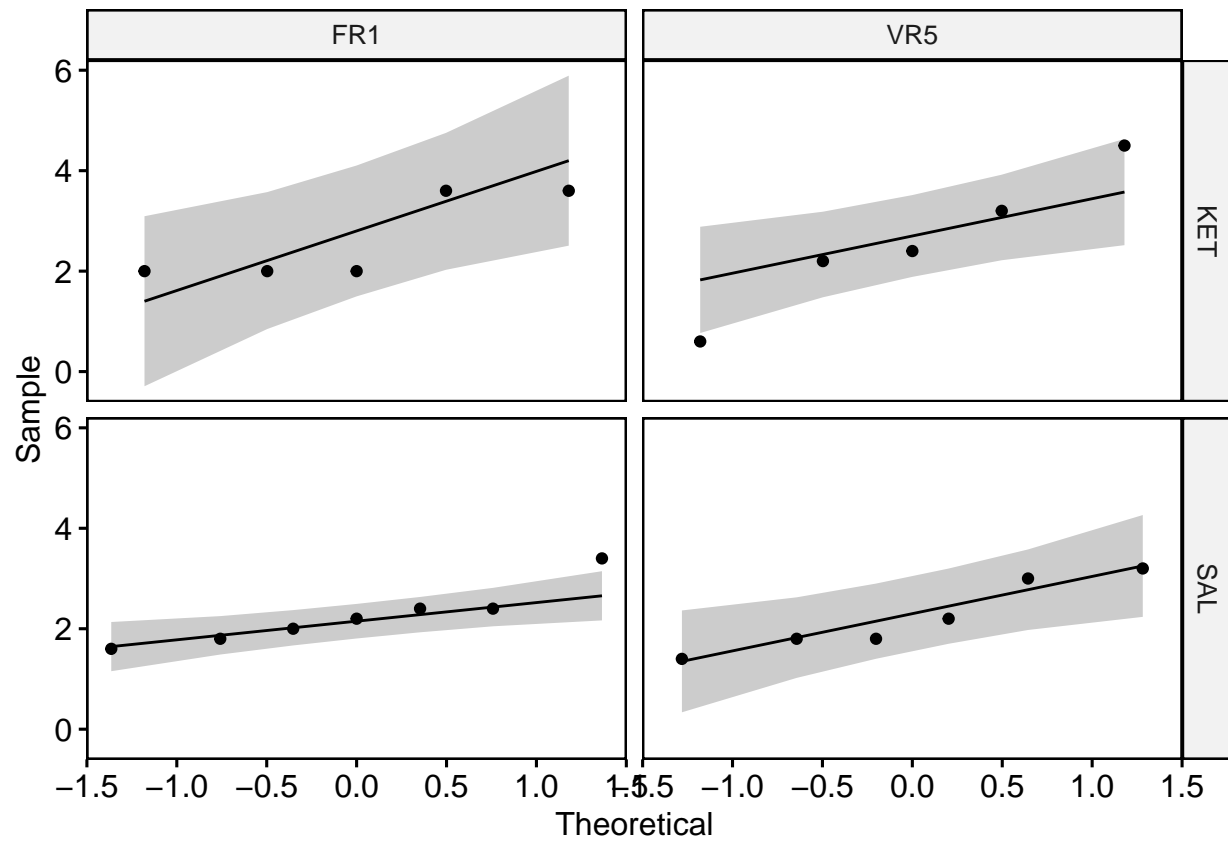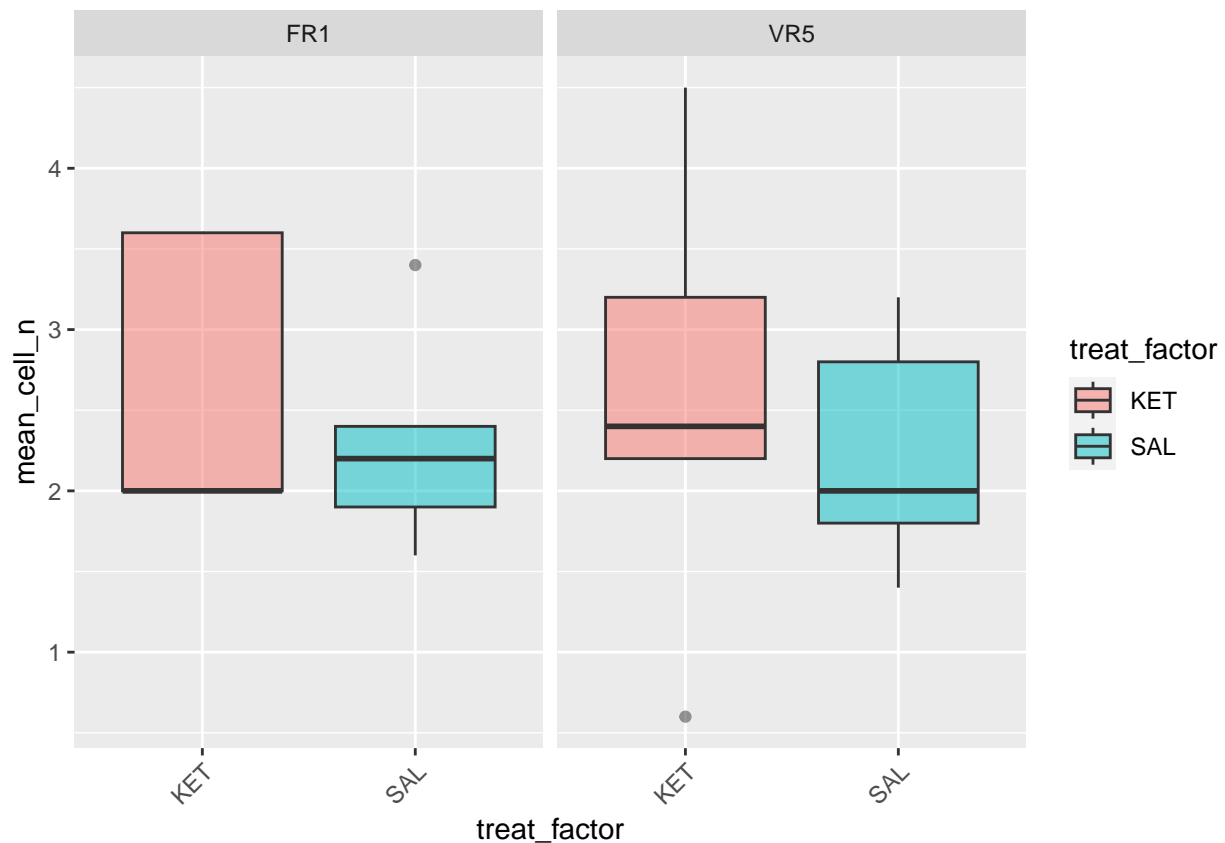
```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_PV,WFA_mean_cell_ns_Rsubset.csv"
```

cFos coloc w WFA

```
fname = cfos[6]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8234, p-value = 0.124
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
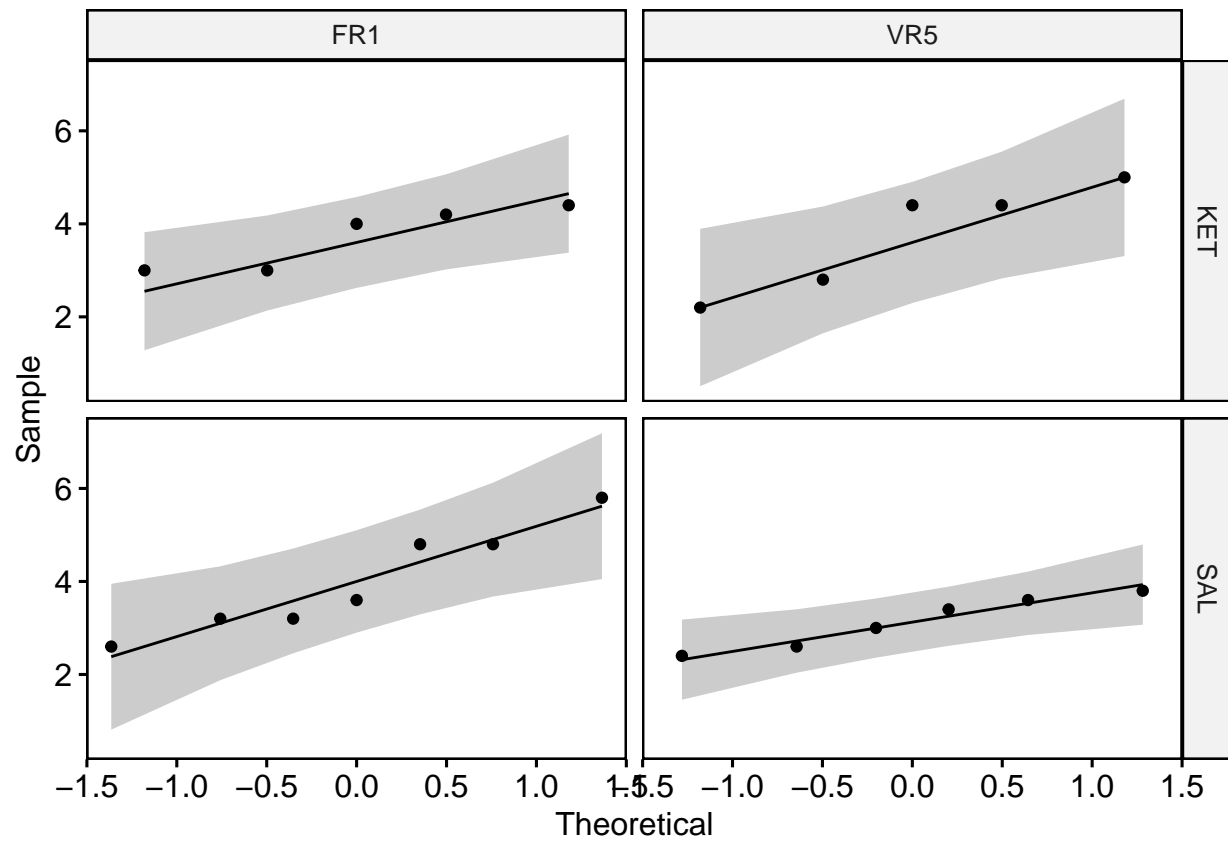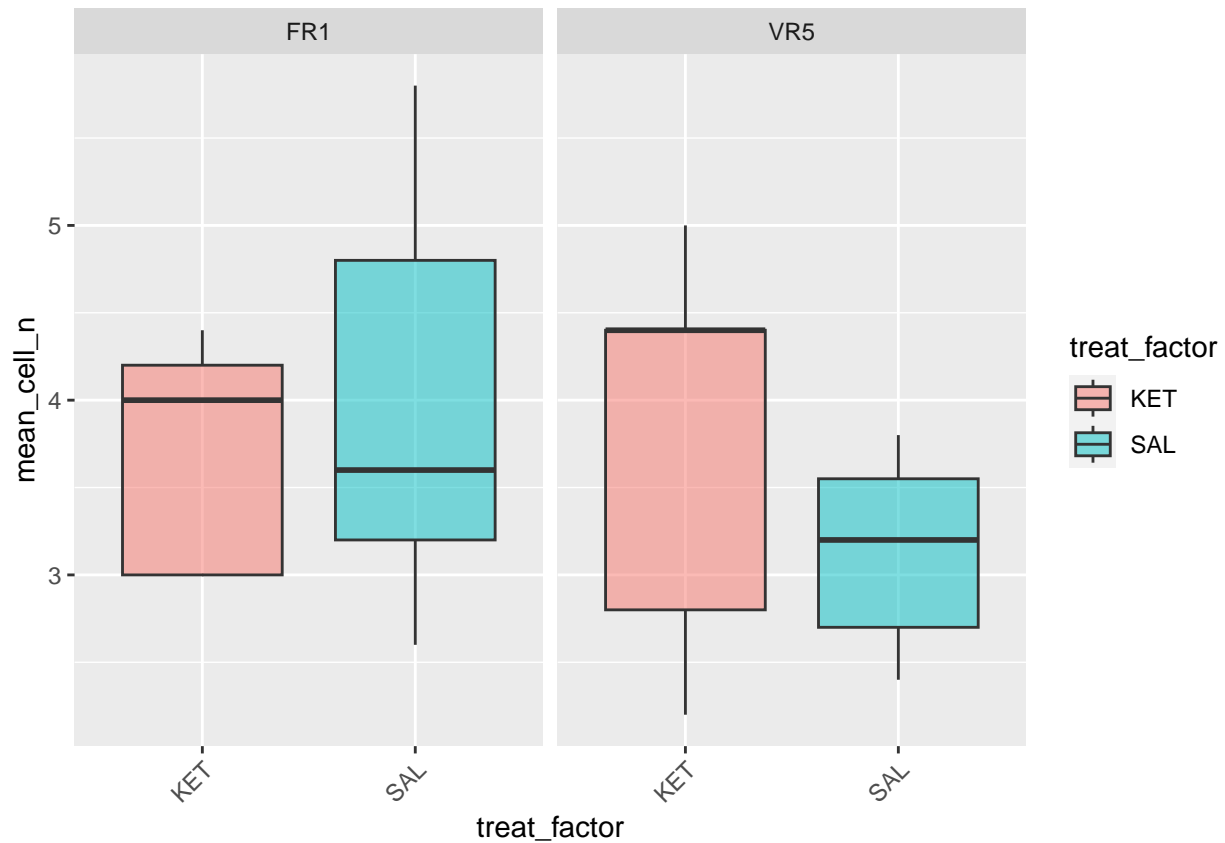
```
## W = 0.92358, p-value = 0.4977
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.88406, p-value = 0.3281
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.94009, p-value = 0.6599
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value  Pr(>F)
## group  3   3.502 0.03559 *
##       19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value    Pr(>F)
## (Intercept)             300.976  1 336.1211 1.539e-13 ***
## treat_factor              0.169  1   0.1892    0.6685
## react_factor              0.963  1   1.0756    0.3127
## treat_factor:react_factor 1.159  1   1.2939    0.2695
## Residuals                17.013 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.280 0.554 19  -0.505  0.6191            0.855
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.627 0.573 19   1.094  0.2878            0.493
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.040 0.598 19  -0.067  0.9474            0.997
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.867 0.526 19   1.646  0.1162            0.219
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_cFos_coloc_w_WFA_mean_cell_ns_Rsubset.csv"
```

Npas4 coloc w cFos

```
fname = npas4[1]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_cFos_mean_cell_ns_Rsubset.csv"
```
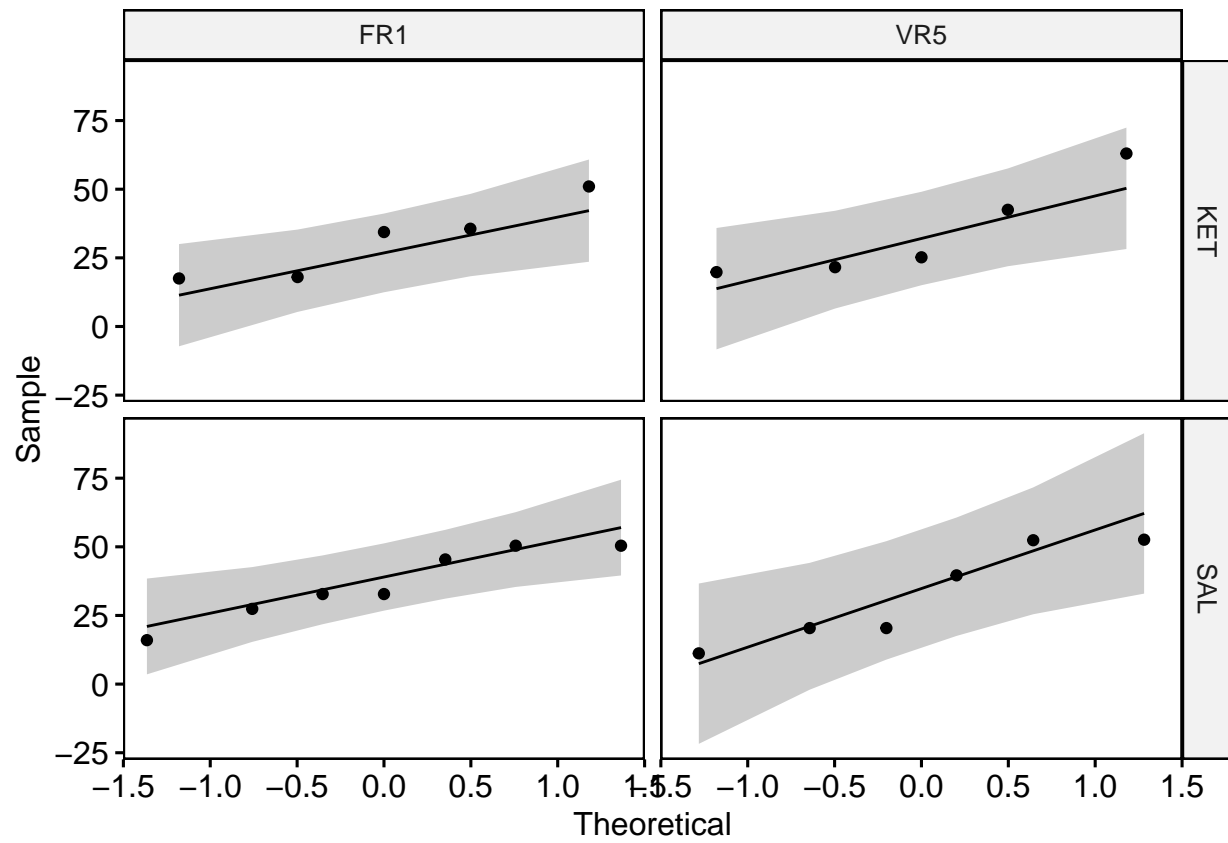
```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.89718, p-value = 0.3945
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
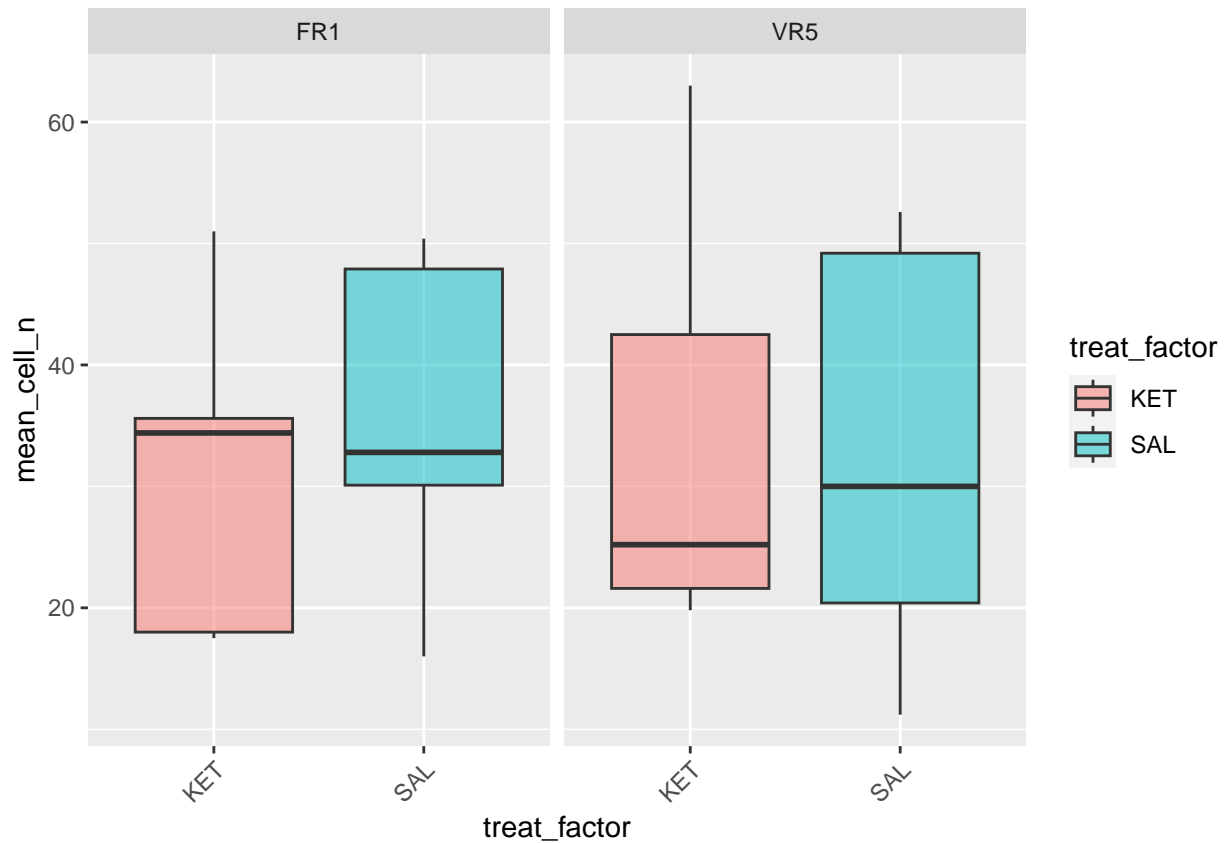
```
## W = 0.91459, p-value = 0.4286
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8471, p-value = 0.1855
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87128, p-value = 0.2314
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.8486 0.4844
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df  F value     Pr(>F)
## (Intercept)             25664.9  1 103.2835 4.055e-09 ***
## treat_factor               17.3  1   0.0696    0.7947
## react_factor                0.5  1   0.0018    0.9662
## treat_factor:react_factor  65.4  1   0.2631    0.6139
## Residuals                4721.3 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    -5.16 9.23 19  -0.559  0.5829            0.826
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL     1.65 9.55 19   0.173  0.8643            0.982
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    -3.12 9.97 19  -0.313  0.7577            0.941
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     3.69 8.77 19   0.421  0.6786            0.897
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_cFos_mean_cell_ns_Rsubset.csv"
```

Npas4 coloc w cFos, WFA

```
fname = npas4[2]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_cFos,WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9689, p-value = 0.8681
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
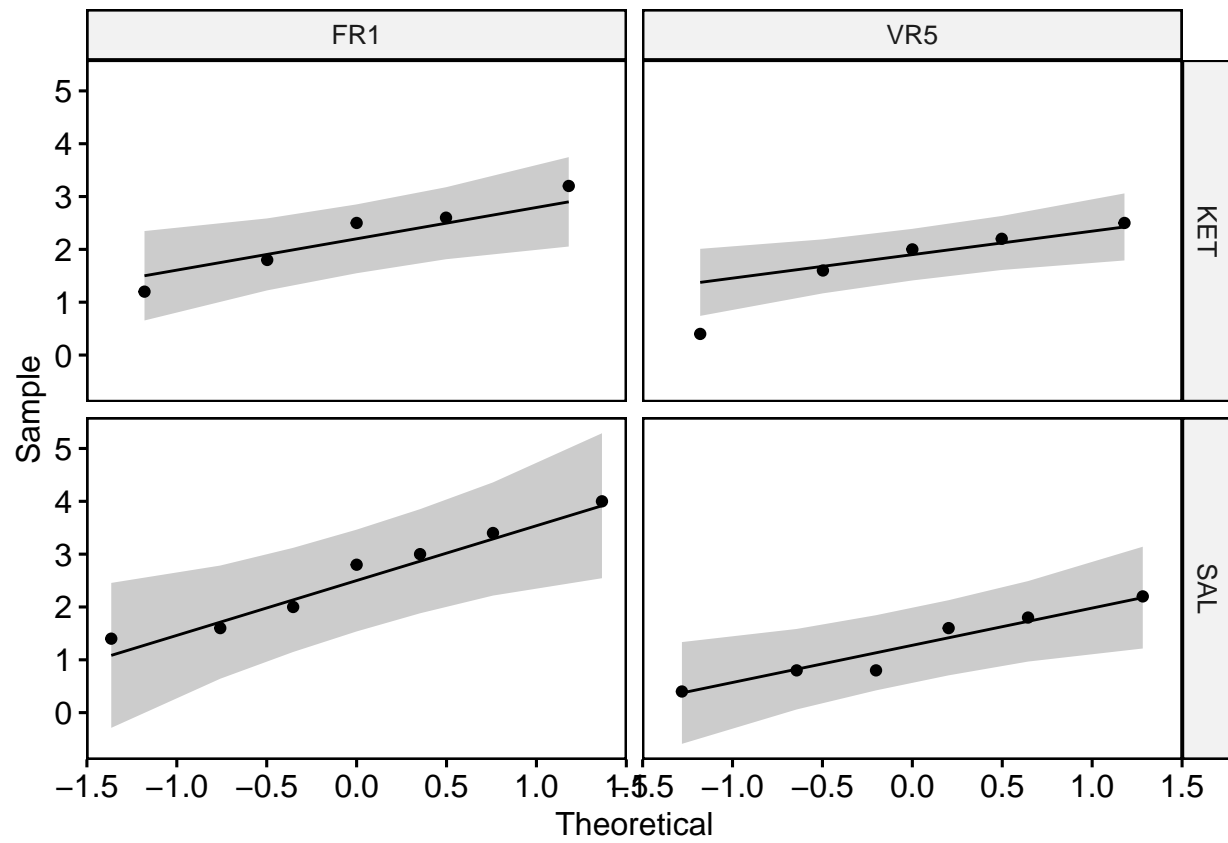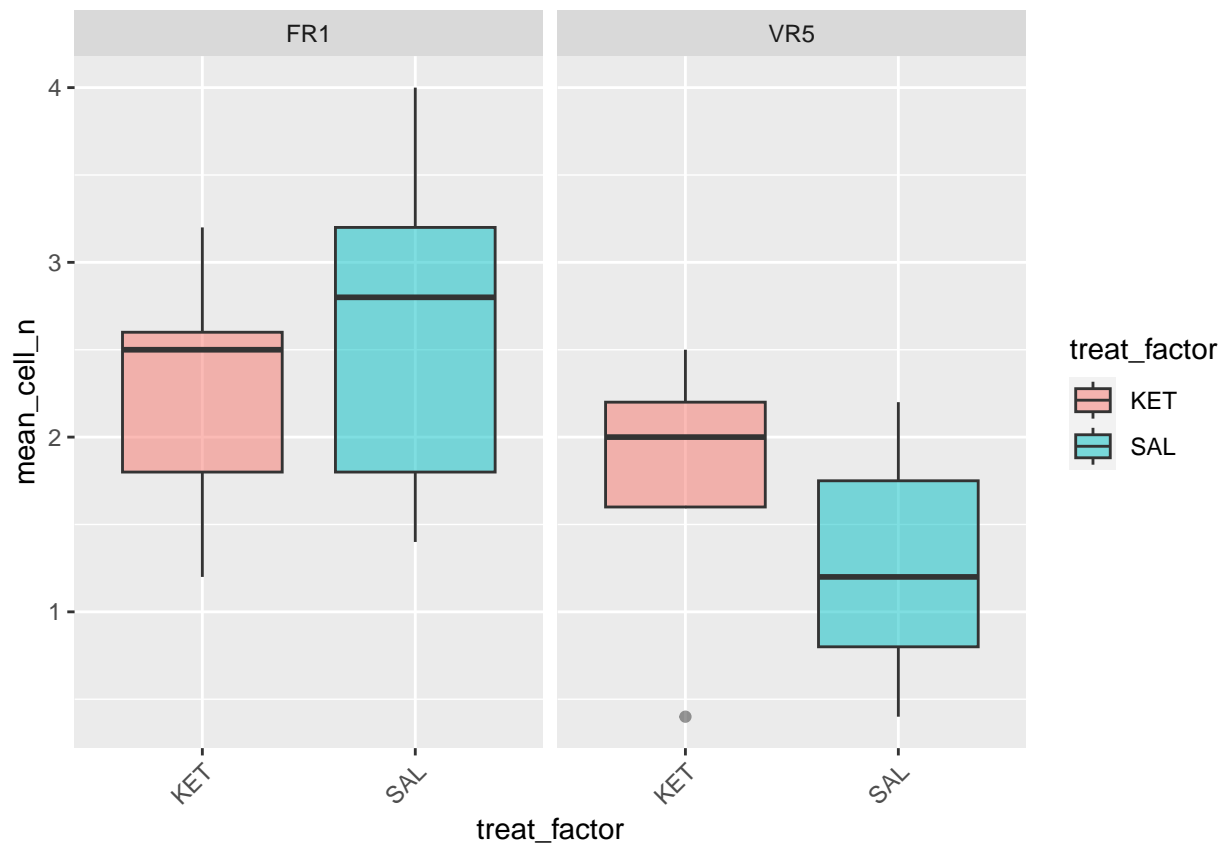
```
## W = 0.95011, p-value = 0.7307
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.88822, p-value = 0.3482
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92774, p-value = 0.5628
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.4302 0.7337
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df  F value    Pr(>F)
## (Intercept)             87.220  1 126.3347 7.76e-10 ***
## treat_factor             0.025  1   0.0363  0.85093
## react_factor             4.841  1   7.0121  0.01587 *
## treat_factor:react_factor 0.932  1   1.3504  0.25959
## Residuals               13.117 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.340 0.487 19  -0.699  0.4931            0.743
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.473 0.503 19   0.941  0.3586            0.589
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.52 0.526 19   0.990  0.3348           0.5576
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    1.33 0.462 19   2.884  0.0095           0.0189
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_cFos,WFA_mean_cell_ns_Rsubset.csv"
```

Npas4 coloc w PV

```
fname = npas4[3]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_PV_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92671, p-value = 0.5741
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
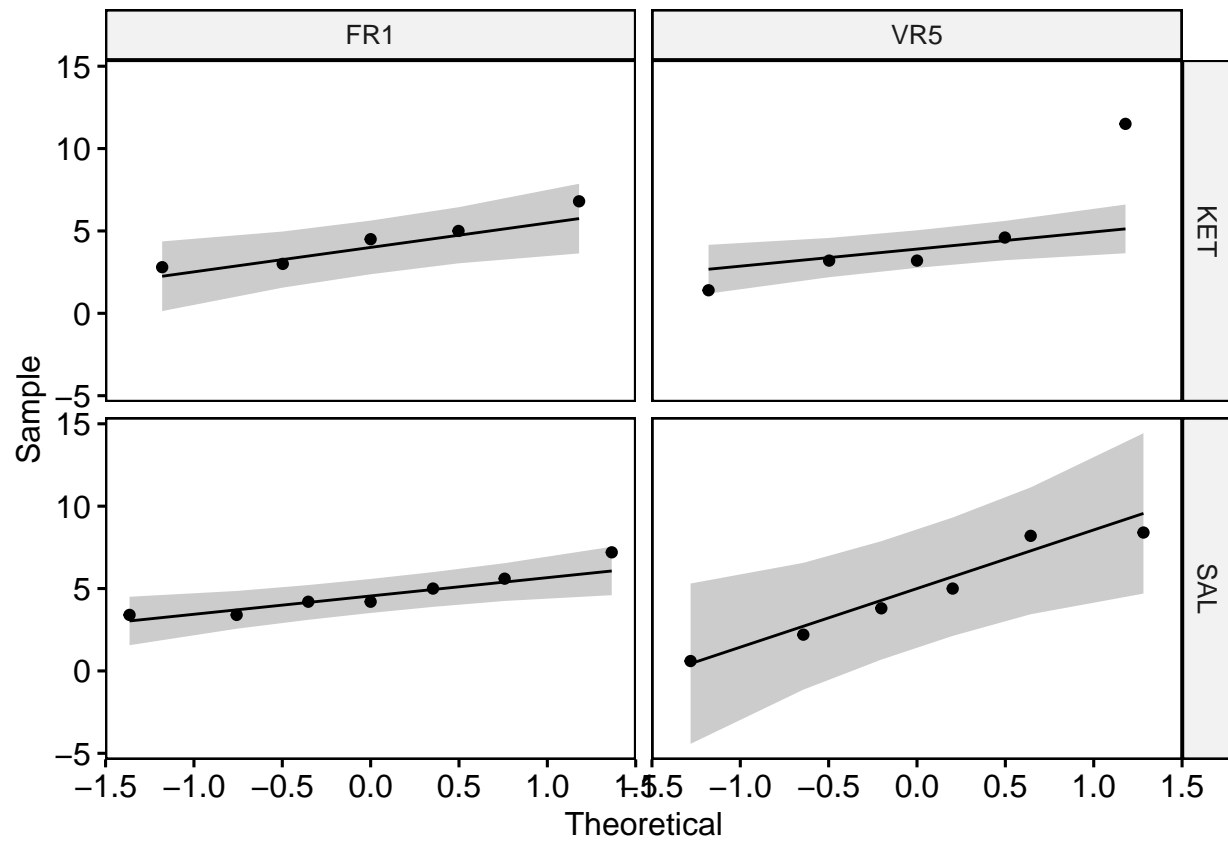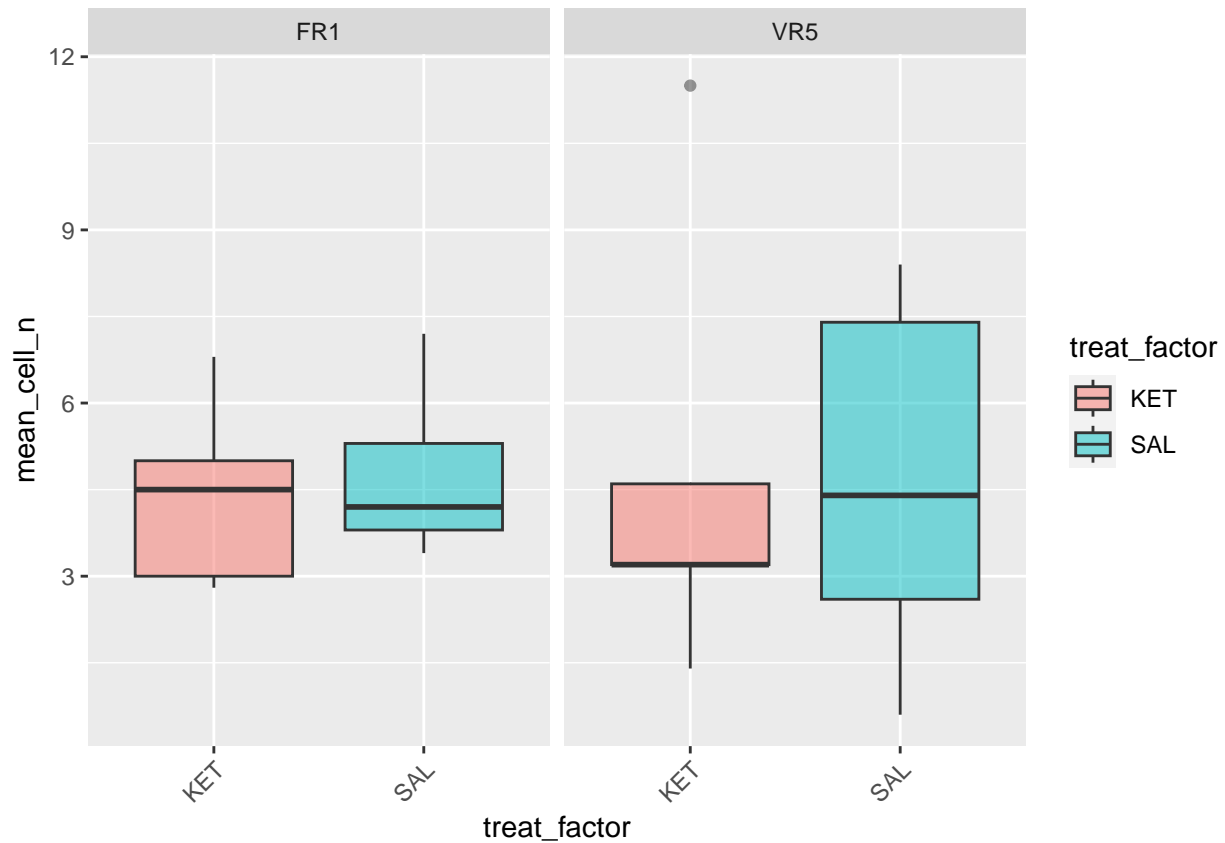
```
## W = 0.8982, p-value = 0.3202
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.80693, p-value = 0.09217
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92811, p-value = 0.5656
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  1.7883 0.1836
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df F value    Pr(>F)
## (Intercept)             488.34  1 69.6667 8.875e-08 ***
## treat_factor              0.06  1  0.0092    0.9245
## react_factor              0.17  1  0.0240    0.8784
## treat_factor:react_factor 0.20  1  0.0282    0.8685
## Residuals               133.18 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.294 1.55 19  -0.190  0.8515            0.978
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.080 1.60 19   0.050  0.9607            0.998
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5 -0.3600 1.67 19  -0.215  0.8321            0.972
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5  0.0143 1.47 19   0.010  0.9924            1.000
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_PV_mean_cell_ns_Rsubset.csv"
```

Npas4 coloc w PV, cFos

```
fname = npas4[4]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_PV,cFos_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87817, p-value = 0.3011
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
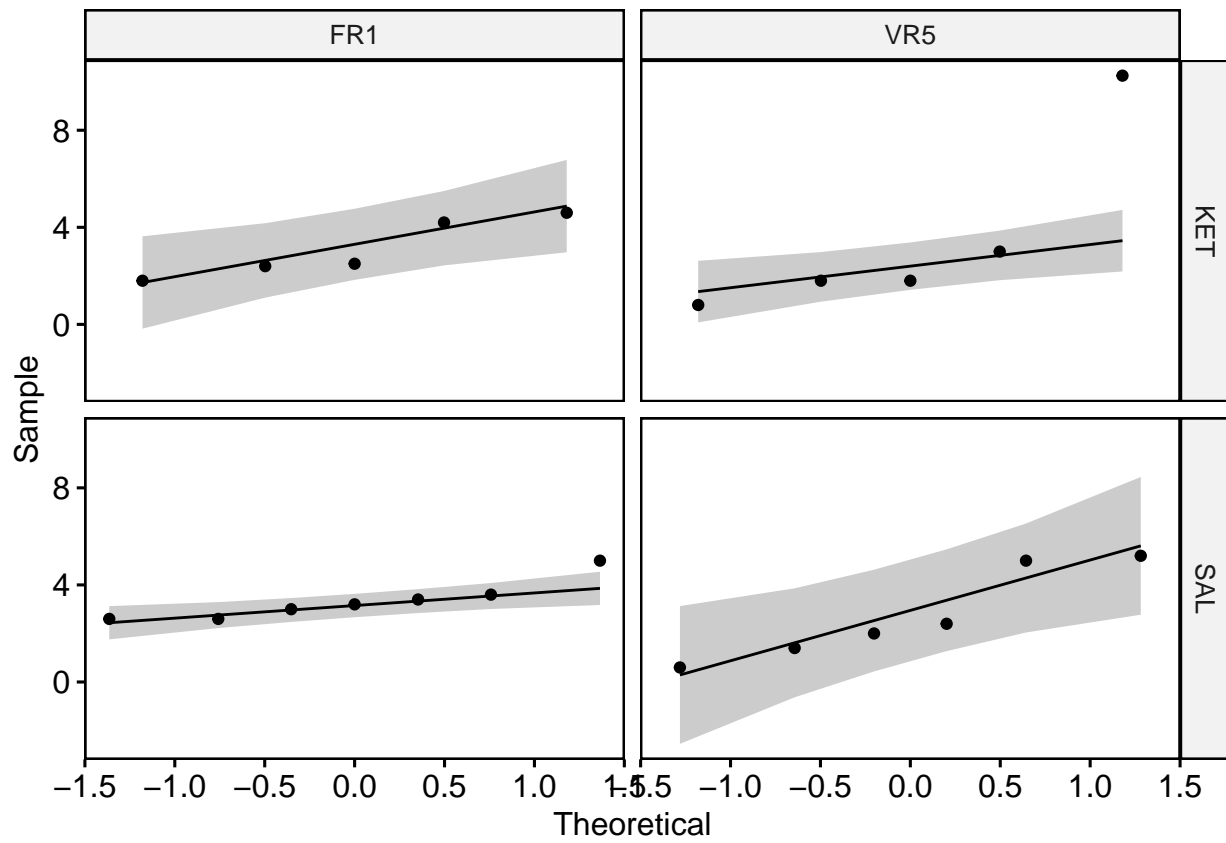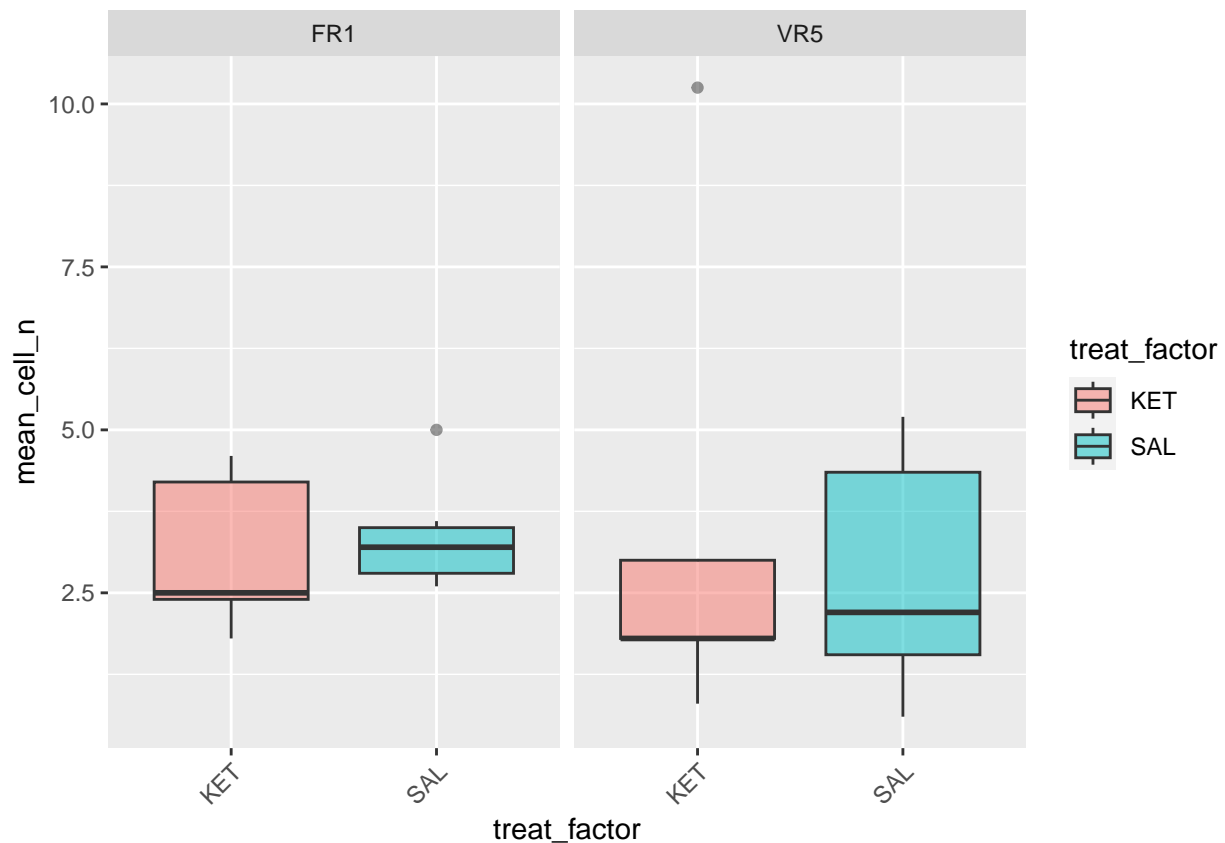
```
## W = 0.84807, p-value = 0.118
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.73323, p-value = 0.02066
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.881, p-value = 0.2737
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value  Pr(>F)
## group  3  3.0697 0.05274 .
##       19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df F value    Pr(>F)
## (Intercept)             228.739  1 49.8807 1.013e-06 ***
## treat_factor              0.382  1  0.0833    0.7761
## react_factor              0.030  1  0.0066    0.9363
## treat_factor:react_factor 1.427  1  0.3112    0.5835
## Residuals                87.128 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.243 1.25 19  -0.194  0.8485            0.977
##
## react_factor = VR5:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.763 1.30 19   0.589  0.5630            0.809
##
## treat_factor = KET:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.430 1.35 19  -0.317  0.7543            0.940
##
## treat_factor = SAL:
##  contrast  estimate   SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.576 1.19 19   0.484  0.6342            0.866
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_PV,cFos_mean_cell_ns_Rsubset.csv"
```

Npas4 coloc w PV, WFA

```
fname = npas4[5]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_PV,WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.89852, p-value = 0.4018
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
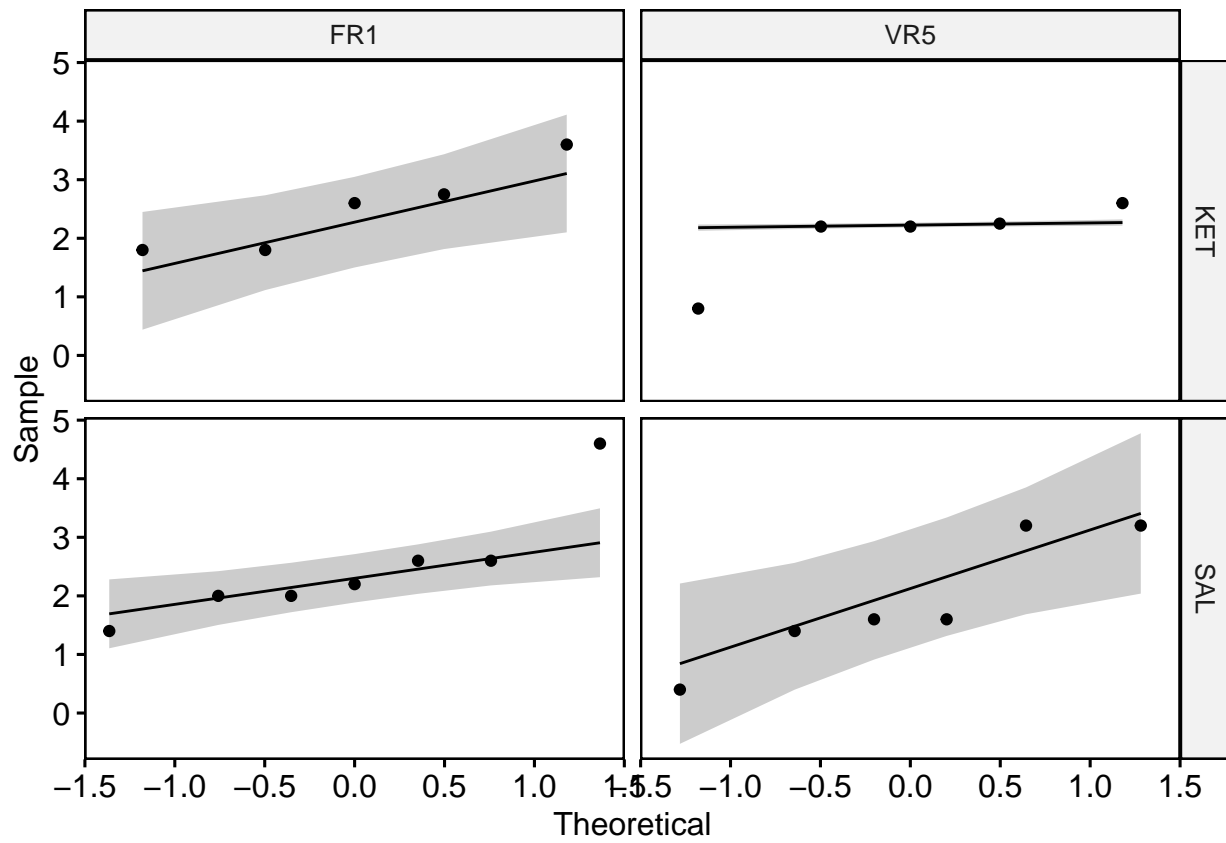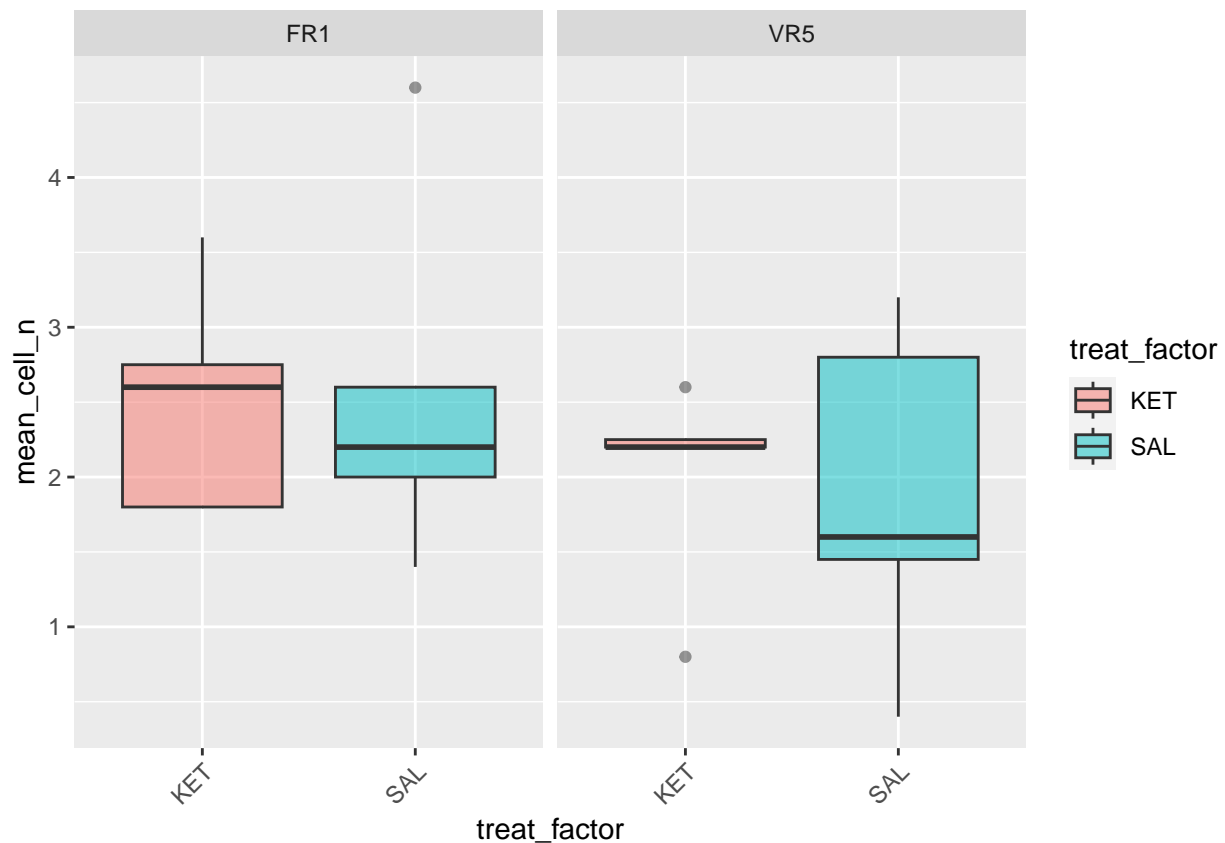
```
## W = 0.82034, p-value = 0.0647
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.75194, p-value = 0.03102
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87719, p-value = 0.2564
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.4741  0.704
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)             111.782  1 128.7762 6.617e-10 ***
## treat_factor              0.025  1   0.0293    0.8659
## react_factor              1.661  1   1.9139    0.1826
## treat_factor:react_factor 0.010  1   0.0119    0.9142
## Residuals                16.493 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.0243 0.546 19   0.045  0.9650            0.999
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.1100 0.564 19   0.195  0.8475            0.977
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.500 0.589 19   0.849  0.4067            0.648
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.586 0.518 19   1.130  0.2725            0.471
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_PV,WFA_mean_cell_ns_Rsubset.csv"
```

Npas4 coloc w WFA

```
fname = npas4[6]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_WFA_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.86688, p-value = 0.254
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
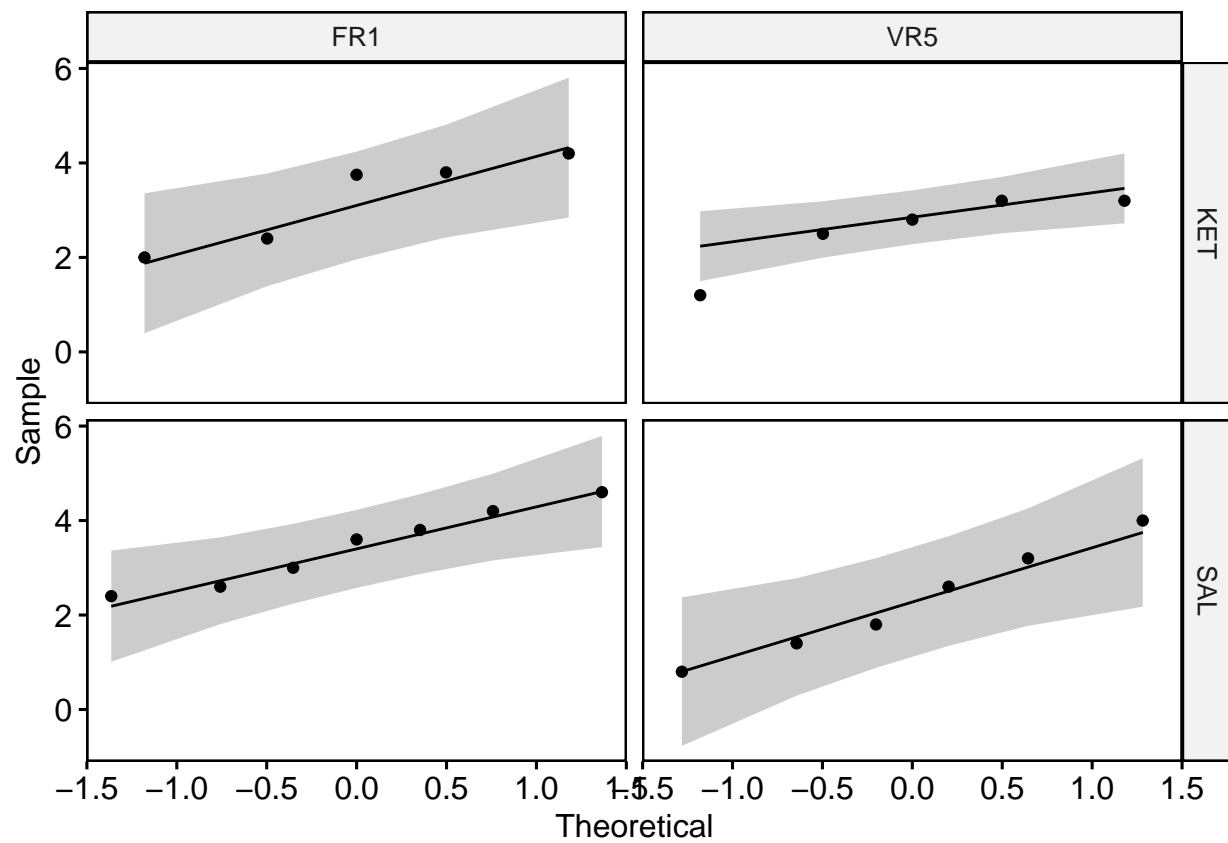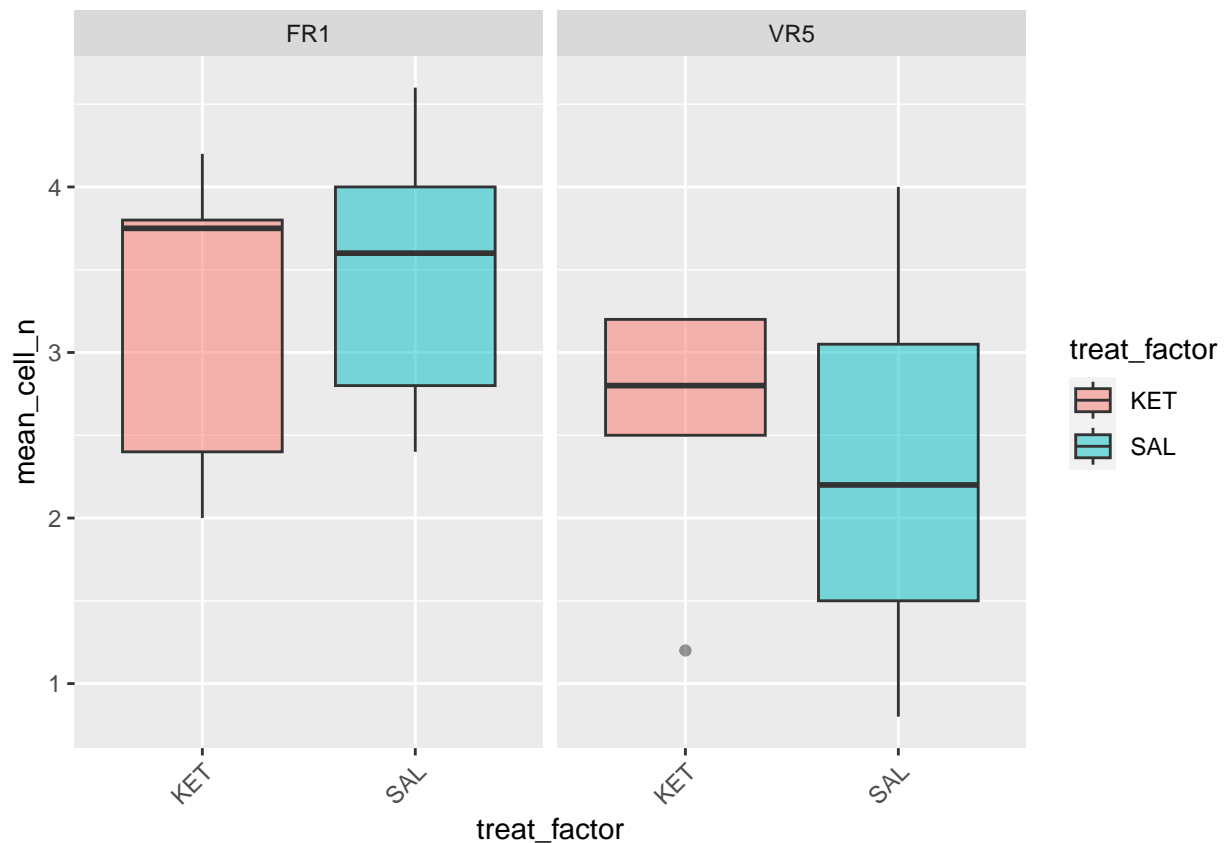
```
## W = 0.95517, p-value = 0.7764
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.82284, p-value = 0.1228
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.97673, p-value = 0.9342
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.8189 0.4994
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)             188.575  1 203.3085 1.338e-11 ***
## treat_factor              0.004  1   0.0042   0.94873
## react_factor              4.603  1   4.9624   0.03819 *
## treat_factor:react_factor 0.362  1   0.3908   0.53931
## Residuals                17.623 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.227 0.564 19  -0.403  0.6916            0.905
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.280 0.583 19   0.480  0.6366            0.868
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     0.65 0.609 19   1.067  0.2993           0.5090
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     1.16 0.536 19   2.160  0.0438           0.0857
# display qq plot to assess normality
figs[[1]]
```

```r
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_Npas4_coloc_w_WFA_mean_cell_ns_Rsubset.csv"
```

WFA coloc w cFos

```
fname = wfa[1]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_cFos_mean_cell_ns_Rsubset.csv"
```
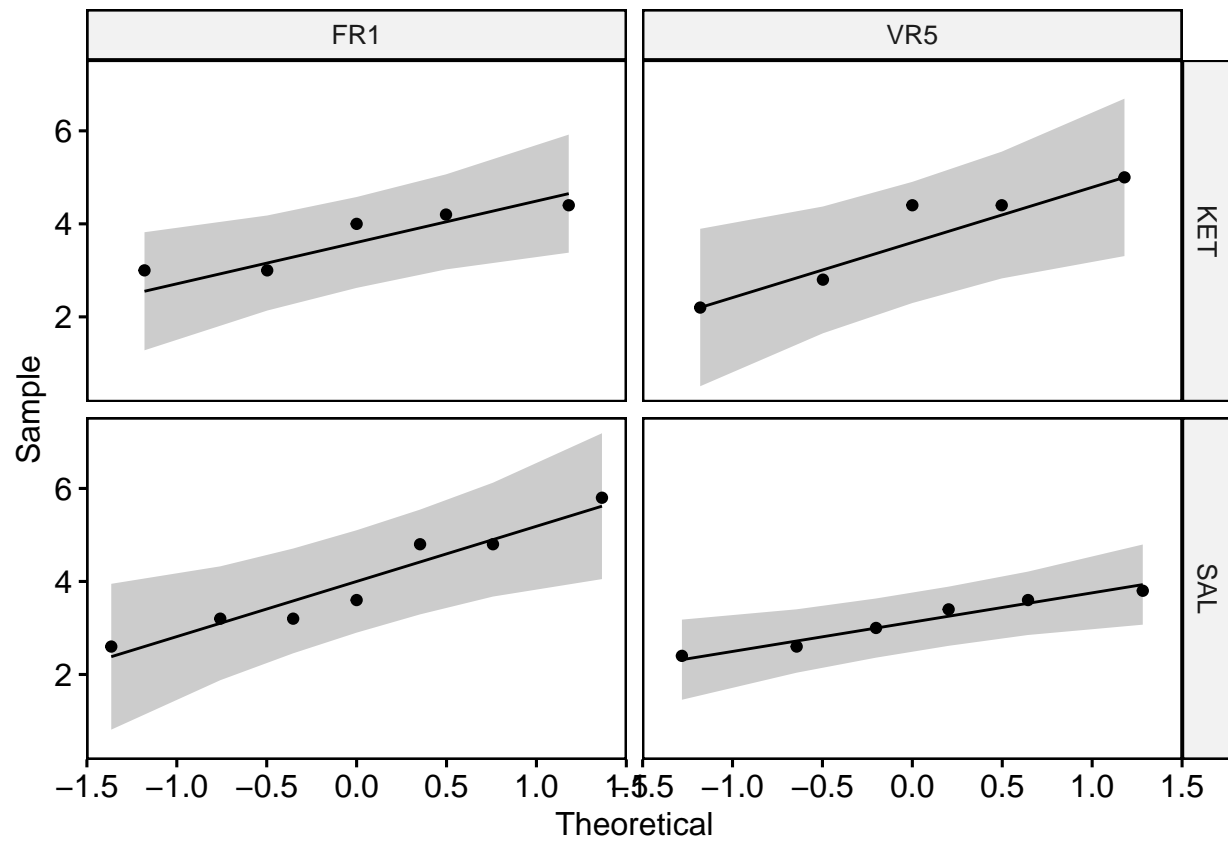
```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8234, p-value = 0.124
##
##
## $FR1_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
```
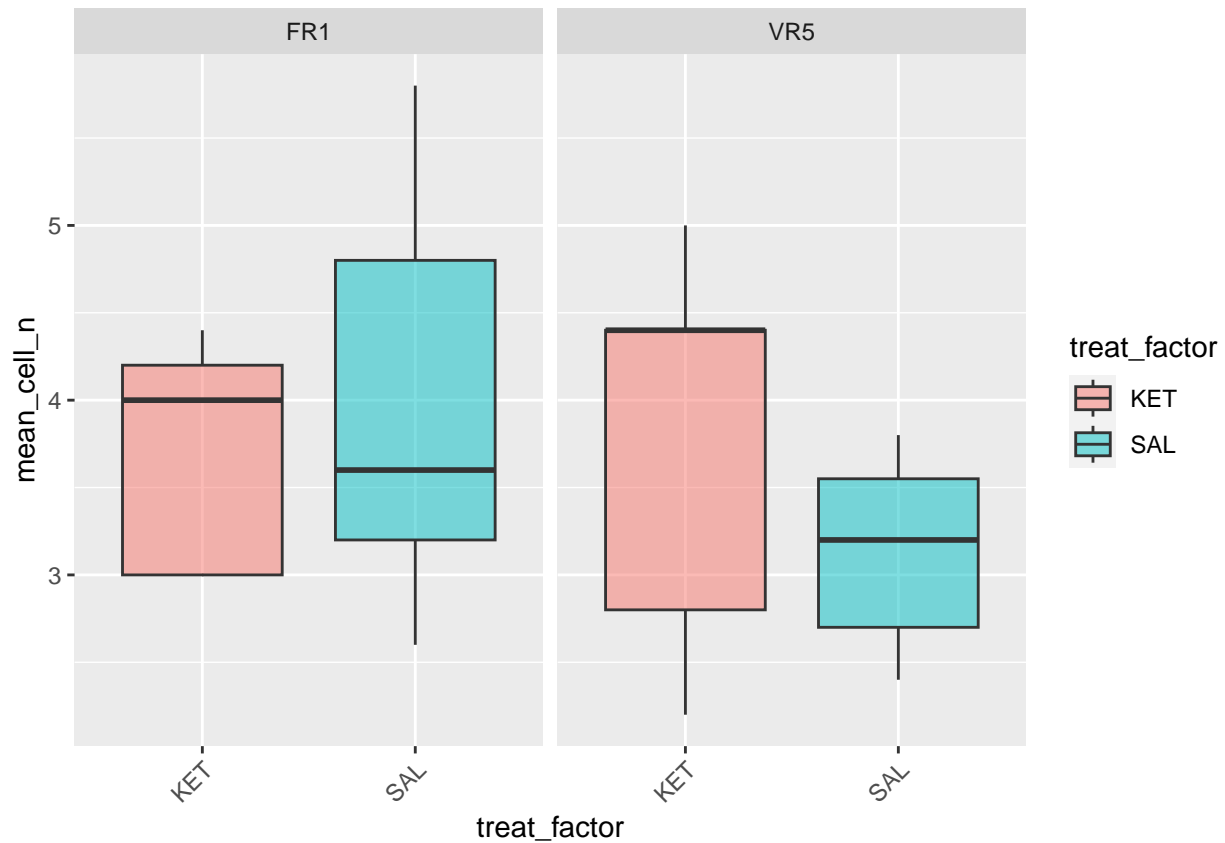
```
## W = 0.92358, p-value = 0.4977
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.88406, p-value = 0.3281
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.94009, p-value = 0.6599
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value  Pr(>F)
## group  3   3.502 0.03559 *
##       19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df  F value     Pr(>F)
## (Intercept)            300.976  1 336.1211 1.539e-13 ***
## treat_factor             0.169  1   0.1892    0.6685
## react_factor             0.963  1   1.0756    0.3127
## treat_factor:react_factor  1.159  1   1.2939    0.2695
## Residuals               17.013 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.280 0.554 19  -0.505  0.6191            0.855
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.627 0.573 19   1.094  0.2878            0.493
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   -0.040 0.598 19  -0.067  0.9474            0.997
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.867 0.526 19   1.646  0.1162            0.219
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_cFos_mean_cell_ns_Rsubset.csv"
```

WFA coloc w cFos, Npas4

```
fname = wfa[2]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_cFos,Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9689, p-value = 0.8681
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
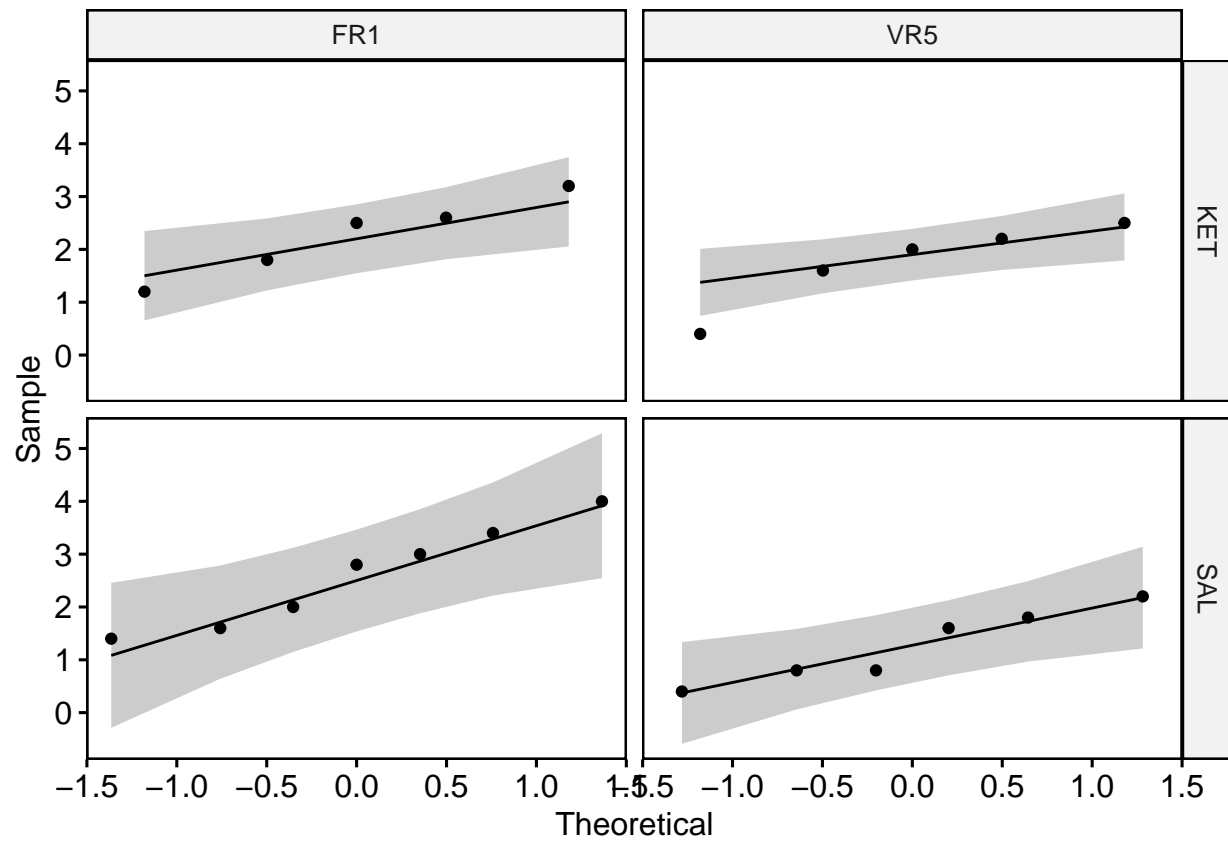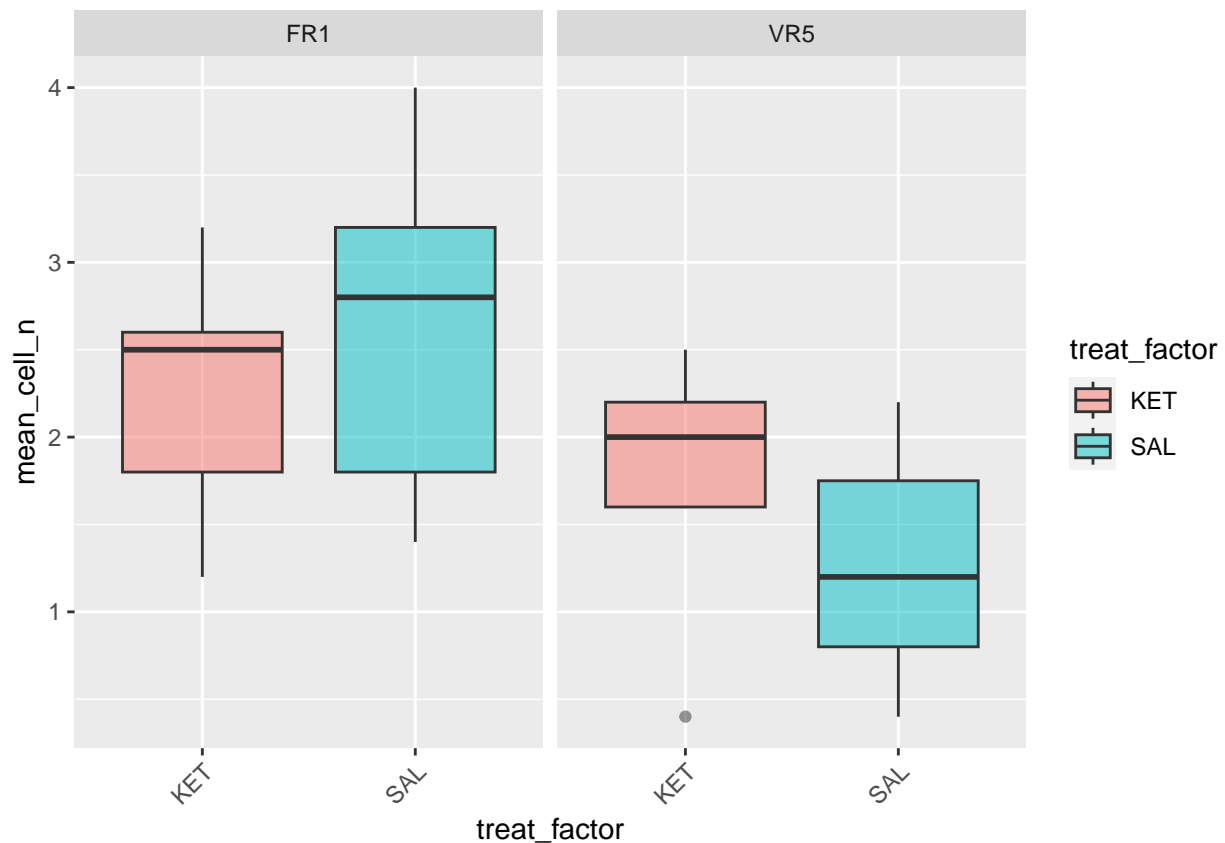
```
## W = 0.95011, p-value = 0.7307
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.88822, p-value = 0.3482
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92774, p-value = 0.5628
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.4302 0.7337
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                        Sum Sq Df  F value    Pr(>F)
## (Intercept)            87.220  1 126.3347 7.76e-10 ***
## treat_factor            0.025  1   0.0363  0.85093
## react_factor            4.841  1   7.0121  0.01587 *
## treat_factor:react_factor  0.932  1   1.3504  0.25959
## Residuals              13.117 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.340 0.487 19  -0.699  0.4931            0.743
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.473 0.503 19   0.941  0.3586            0.589
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     0.52 0.526 19   0.990  0.3348           0.5576
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     1.33 0.462 19   2.884  0.0095           0.0189
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_cFos,Npas4_mean_cell_ns_Rsubset.csv"
```

WFA coloc w Npas4

```
fname = wfa[3]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.86688, p-value = 0.254
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
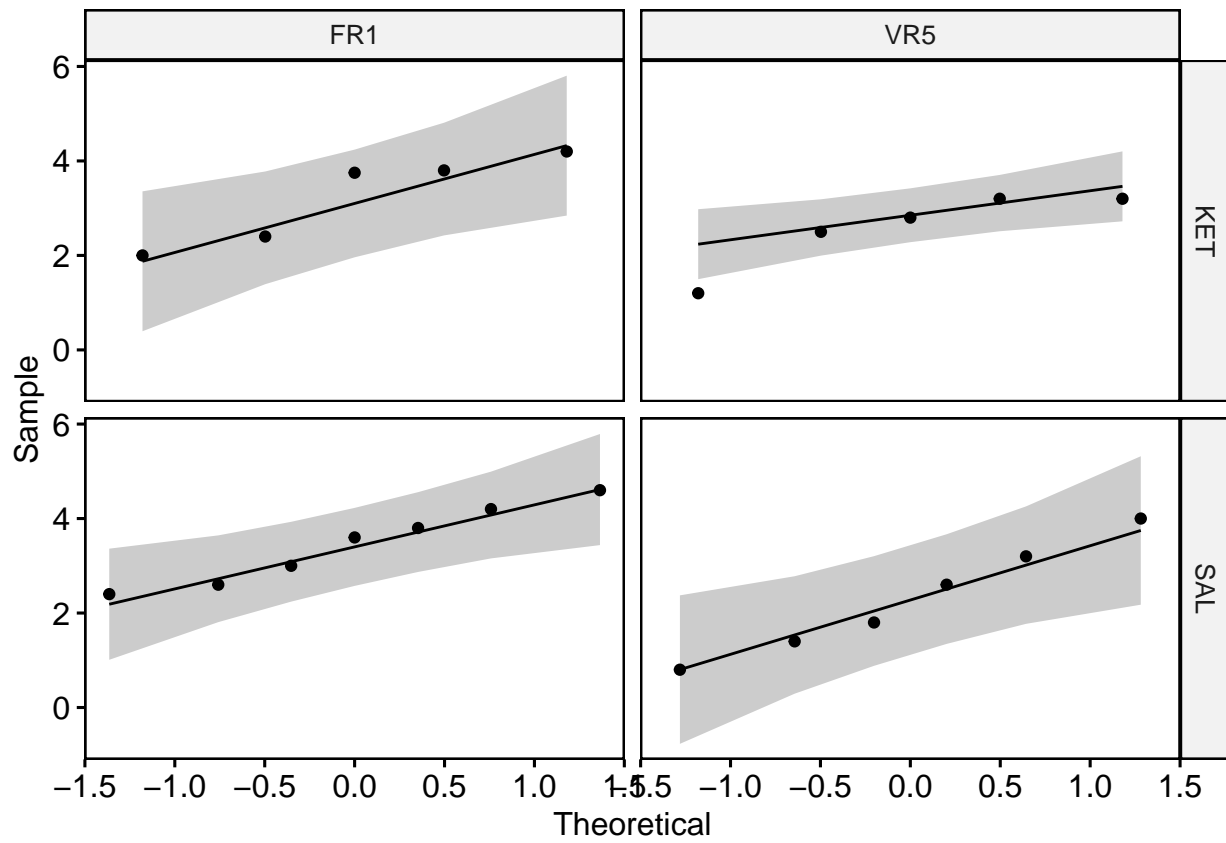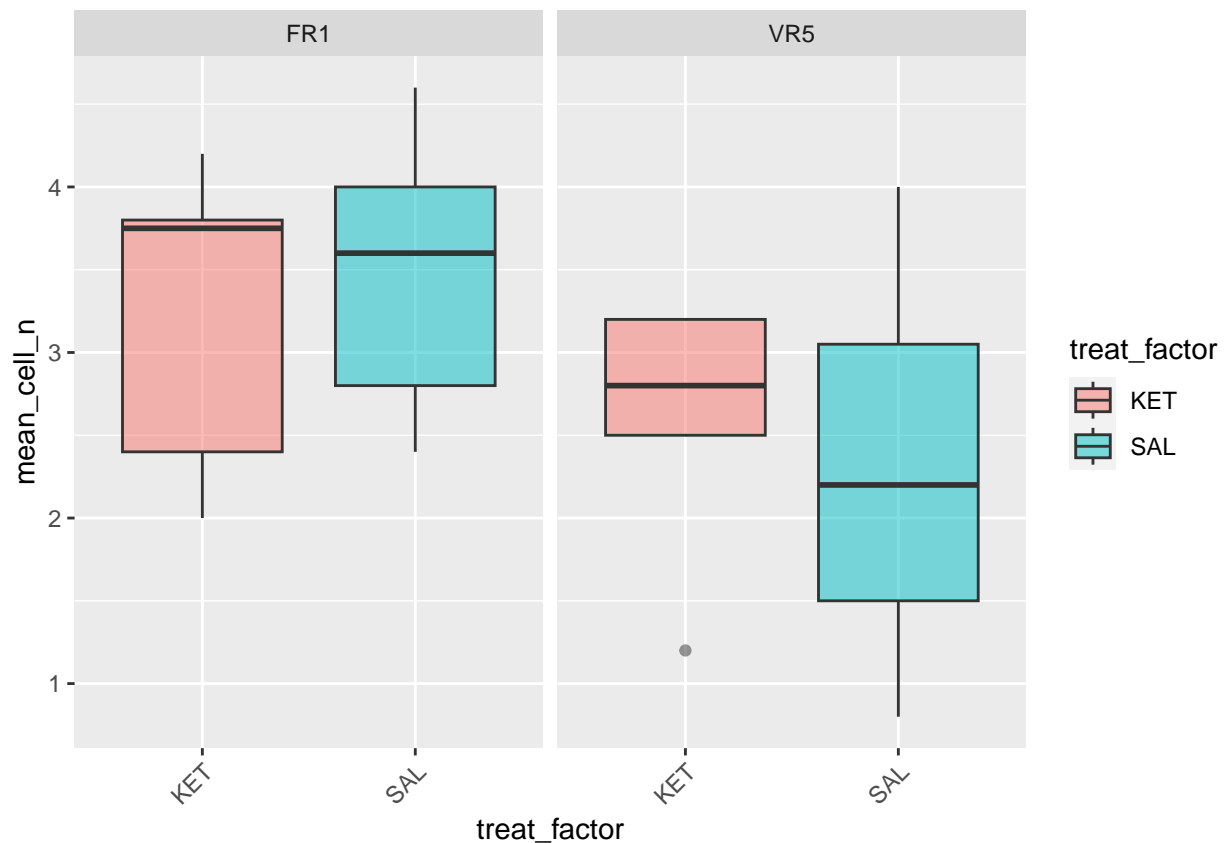
```
## W = 0.95517, p-value = 0.7764
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.82284, p-value = 0.1228
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.97673, p-value = 0.9342
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.8189 0.4994
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                            Sum Sq Df  F value     Pr(>F)
## (Intercept)               188.575  1 203.3085 1.338e-11 ***
## treat_factor                0.004  1   0.0042   0.94873
## react_factor                4.603  1   4.9624   0.03819 *
## treat_factor:react_factor   0.362  1   0.3908   0.53931
## Residuals                  17.623 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   -0.227 0.564 19  -0.403  0.6916            0.905
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.280 0.583 19   0.480  0.6366            0.868
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     0.65 0.609 19   1.067  0.2993           0.5090
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5     1.16 0.536 19   2.160  0.0438           0.0857
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_Npas4_mean_cell_ns_Rsubset.csv"
```

WFA coloc w PV

```
fname = wfa[4]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_PV_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.96039, p-value = 0.8107
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
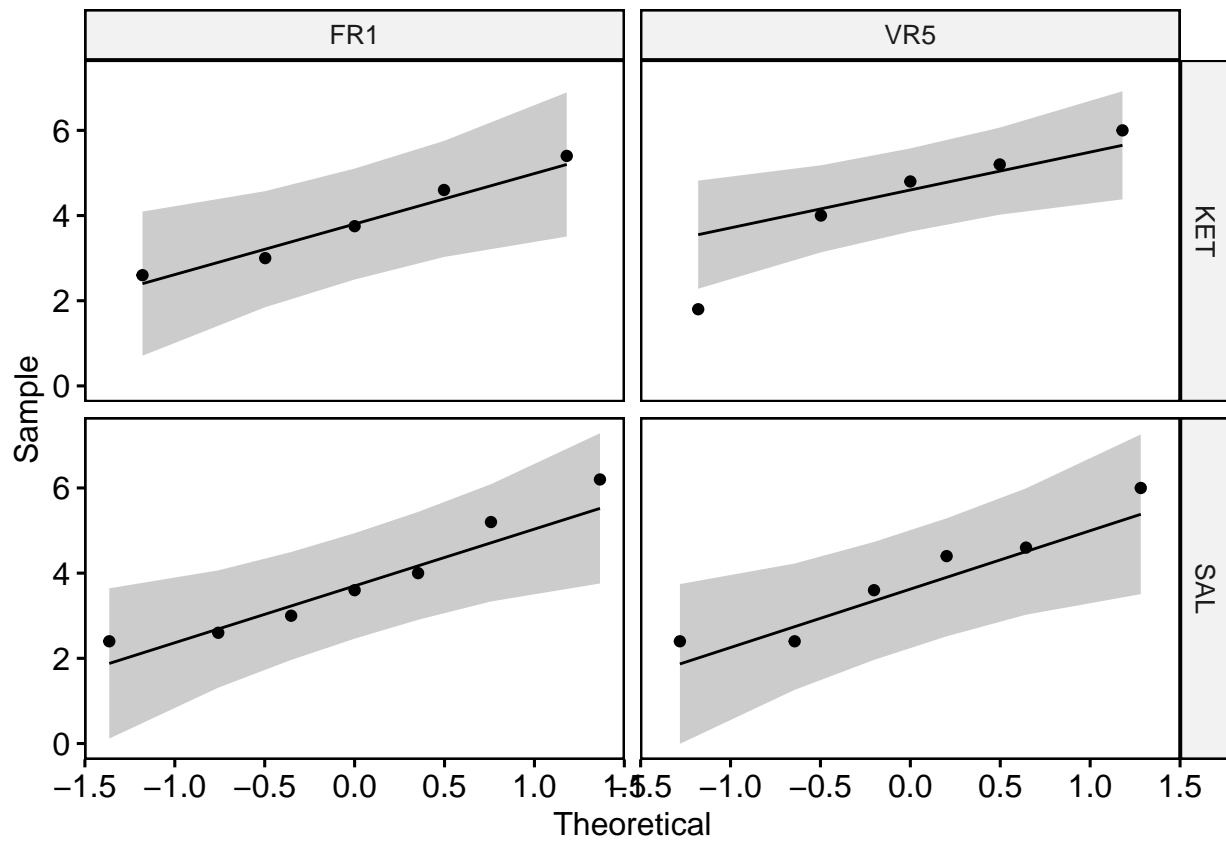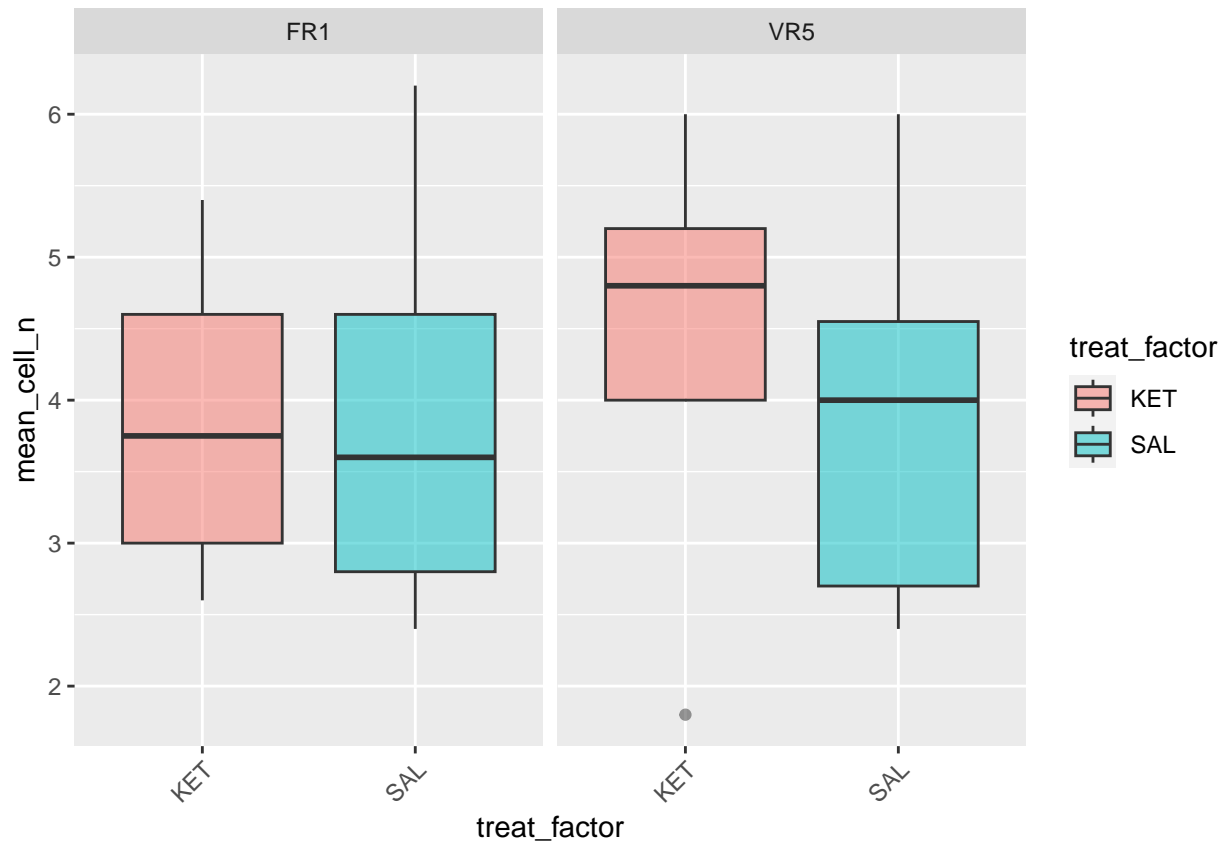
```
## W = 0.91975, p-value = 0.4674
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92419, p-value = 0.5573
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.92579, p-value = 0.548
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.1172 0.9489
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value      Pr(>F)
## (Intercept)              360.23  1 184.5461 3.104e-11 ***
## treat_factor               0.32  1   0.1614    0.6923
## react_factor               0.40  1   0.2050    0.6558
## treat_factor:react_factor  0.28  1   0.1444    0.7082
## Residuals                 37.09 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.0129 0.818 19   0.016  0.9876            1.000
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.4600 0.846 19   0.544  0.5929            0.834
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5  -0.4900 0.884 19  -0.555  0.5857            0.828
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5  -0.0429 0.777 19  -0.055  0.9566            0.998
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_PV_mean_cell_ns_Rsubset.csv"
```

WFA coloc w PV, cFos

```
fname = wfa[5]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_PV,cFos_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.68403, p-value = 0.00647
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
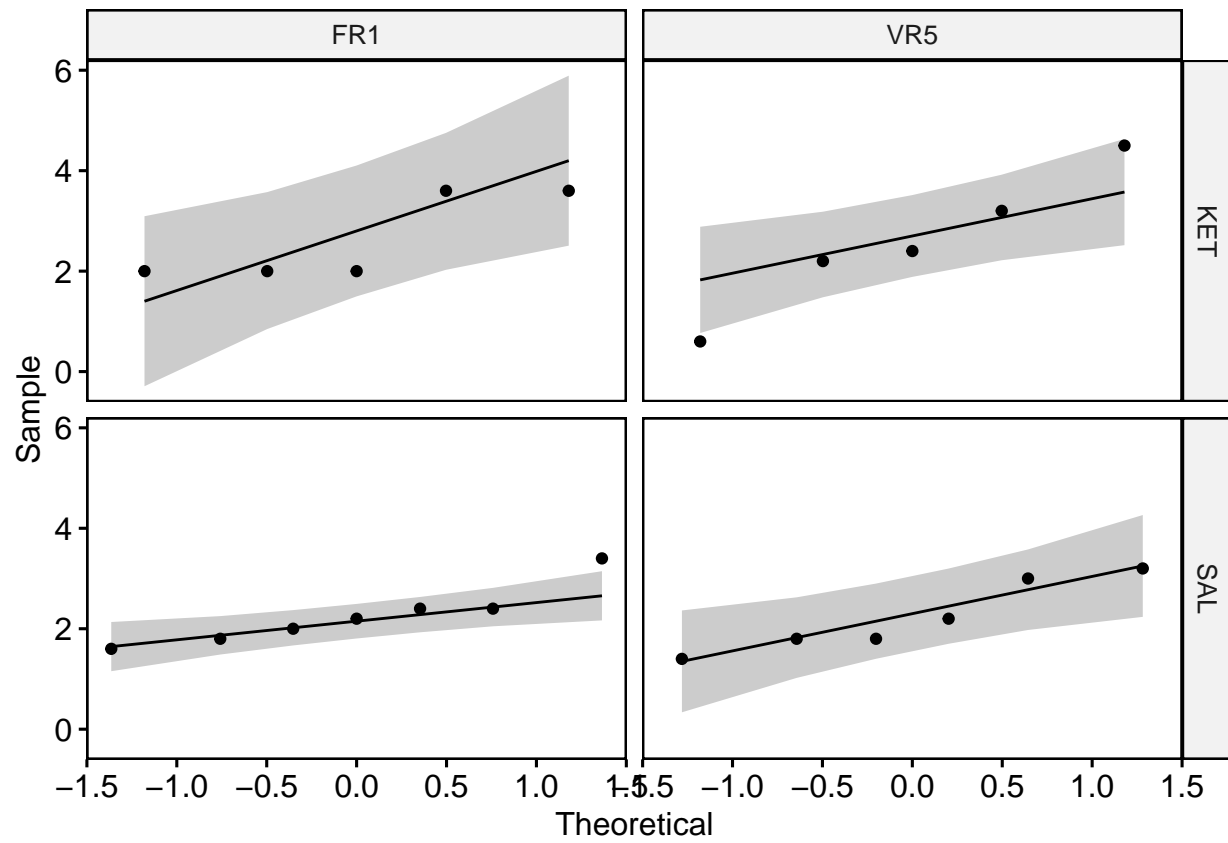
```
## W = 0.89892, p-value = 0.3245
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.98292, p-value = 0.9496
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90208, p-value = 0.3863
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  1.6158 0.2189
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df  F value    Pr(>F)
## (Intercept)            132.897  1 158.9025 1.123e-10 ***
## treat_factor             0.750  1   0.8969    0.3555
## react_factor             0.010  1   0.0118    0.9145
## treat_factor:react_factor 0.002  1   0.0022    0.9630
## Residuals               15.890 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.383 0.535 19   0.715  0.4833            0.733
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.347 0.554 19   0.626  0.5388            0.787
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   0.0600 0.578 19   0.104  0.9185            0.993
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5   0.0238 0.509 19   0.047  0.9632            0.999
# display qq plot to assess normality
figs[[1]]
```
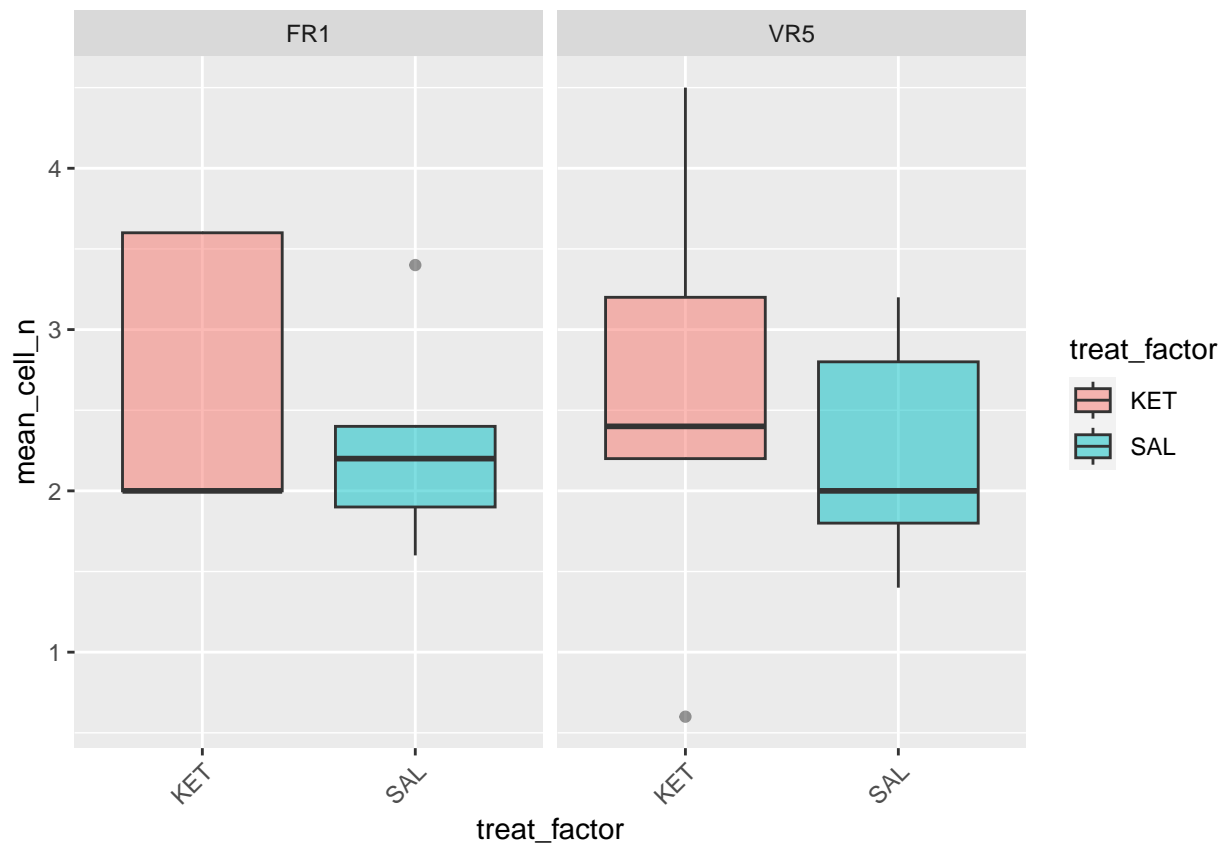
```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_PV,cFos_mean_cell_ns_Rsubset.csv"
```

WFA coloc w PV, Npas4

```
fname = wfa[6]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_PV,Npas4_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.89852, p-value = 0.4018
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
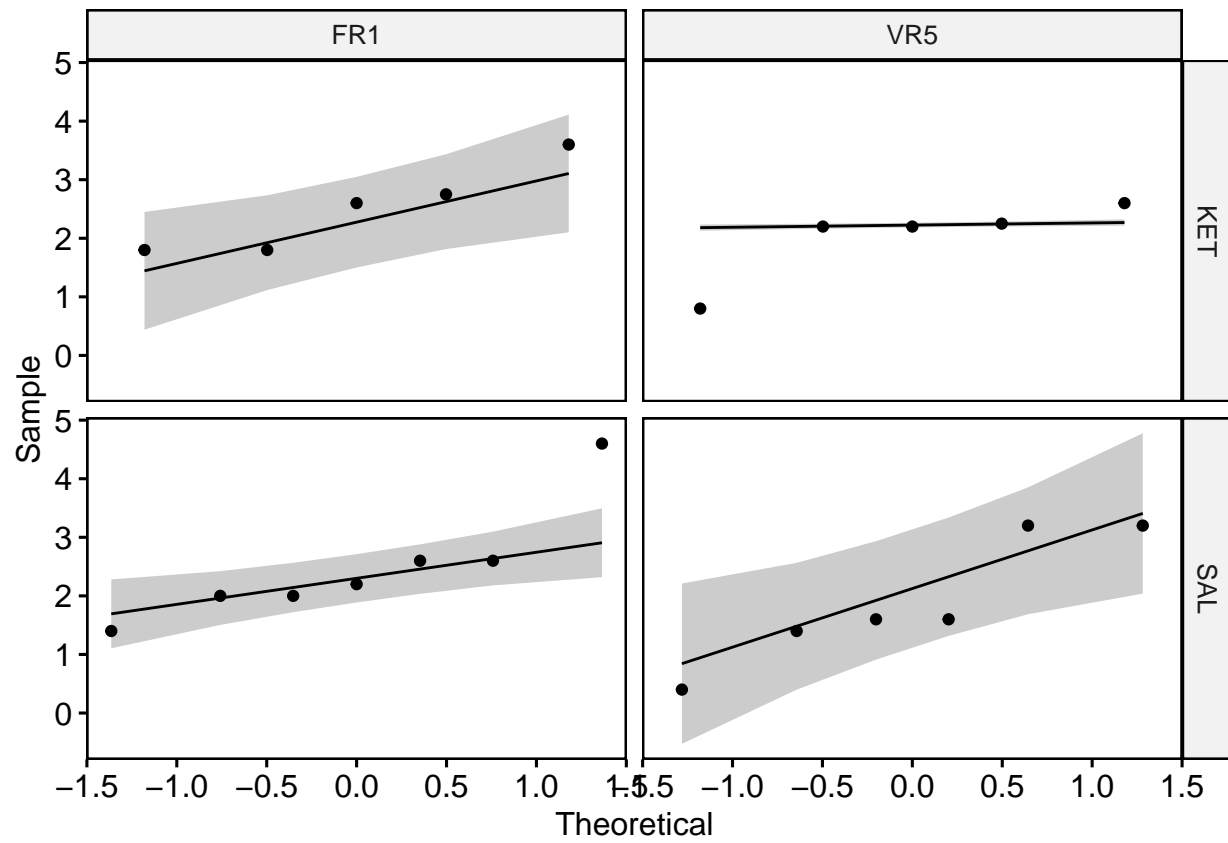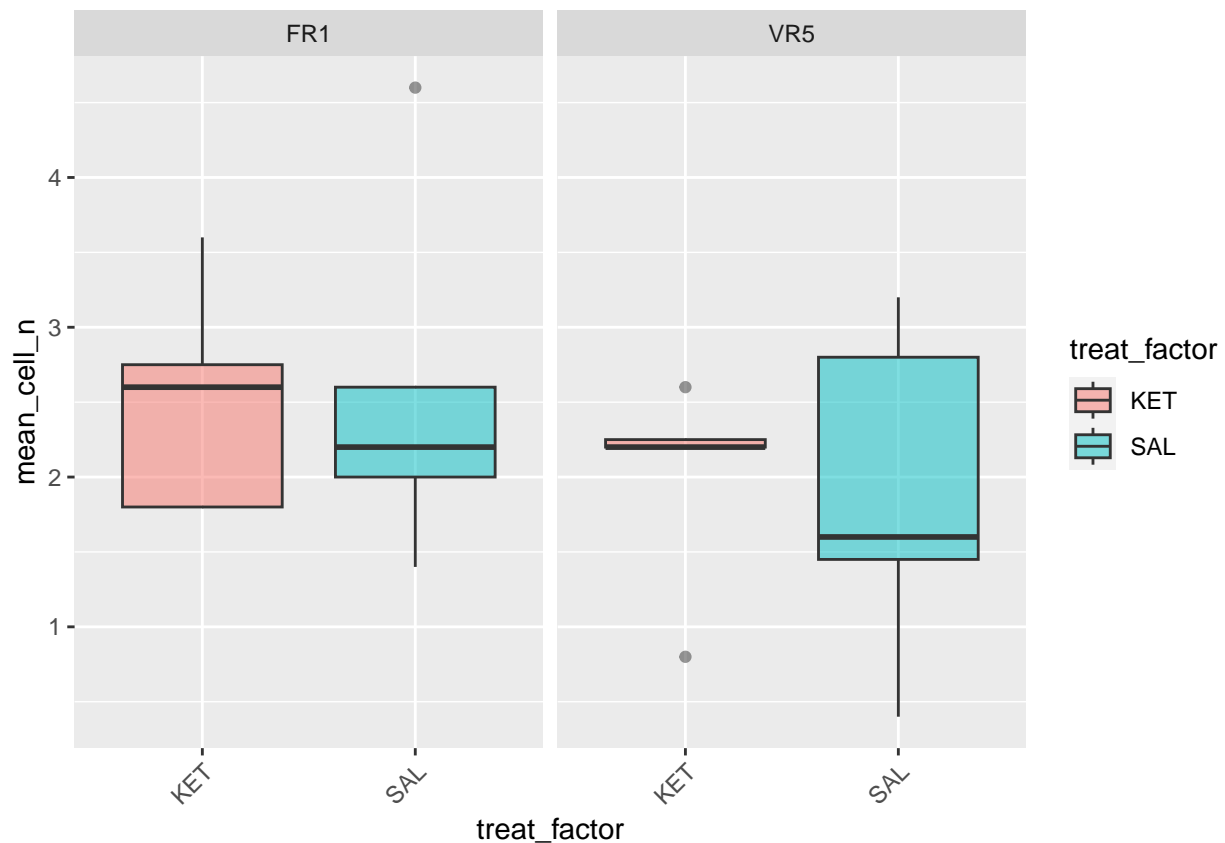
```
## W = 0.82034, p-value = 0.0647
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.75194, p-value = 0.03102
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.87719, p-value = 0.2564
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.4741  0.704
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df  F value    Pr(>F)
## (Intercept)            111.782  1 128.7762 6.617e-10 ***
## treat_factor             0.025  1   0.0293    0.8659
## react_factor             1.661  1   1.9139    0.1826
## treat_factor:react_factor 0.010  1   0.0119    0.9142
## Residuals               16.493 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.0243 0.546 19   0.045  0.9650            0.999
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL   0.1100 0.564 19   0.195  0.8475            0.977
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.500 0.589 19   0.849  0.4067            0.648
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.586 0.518 19   1.130  0.2725            0.471
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_WFA_coloc_w_PV,Npas4_mean_cell_ns_Rsubset.csv"
```

quad cFos

```
fname = quads[1]
```

```
print(fname)
```

```
## [1] "KET-VR5_quad_cFos_mean_cell_ns_Rsubset.csv"
```

```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8938, p-value = 0.3766
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
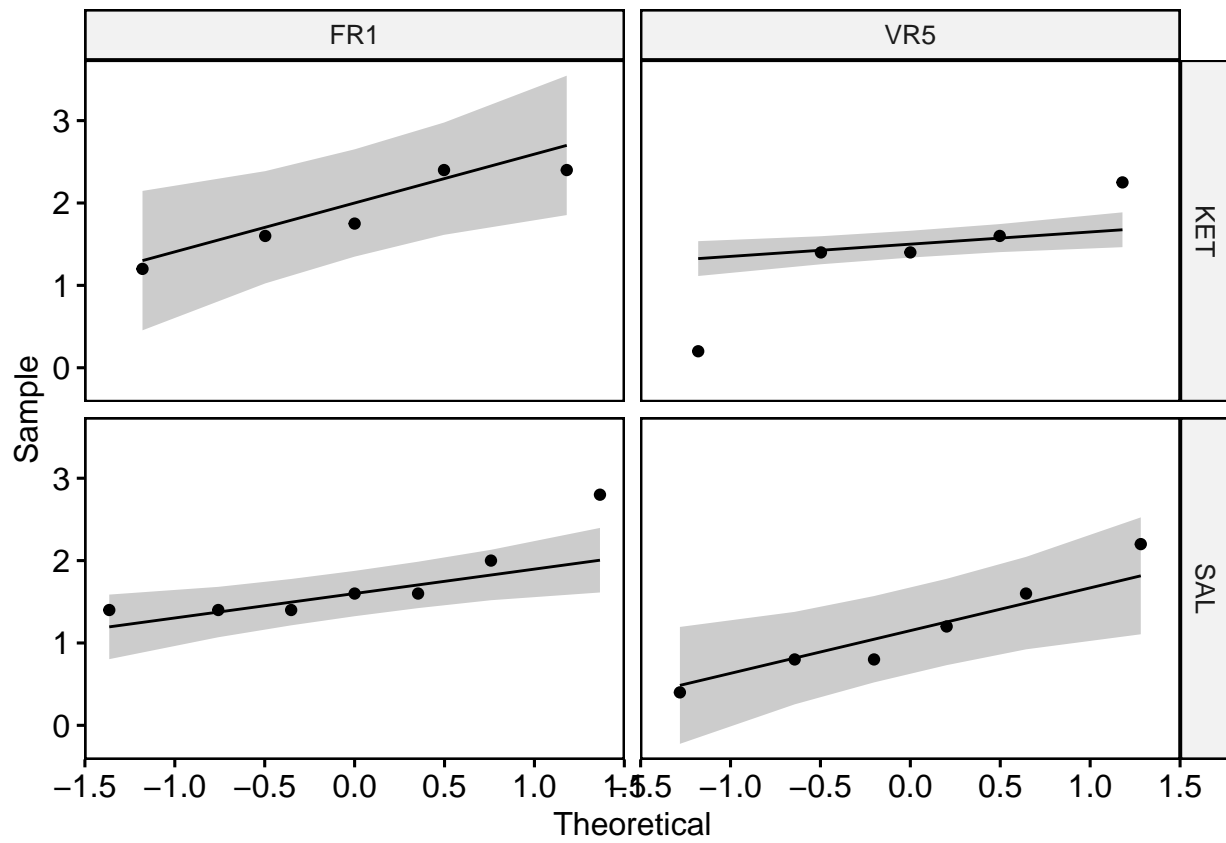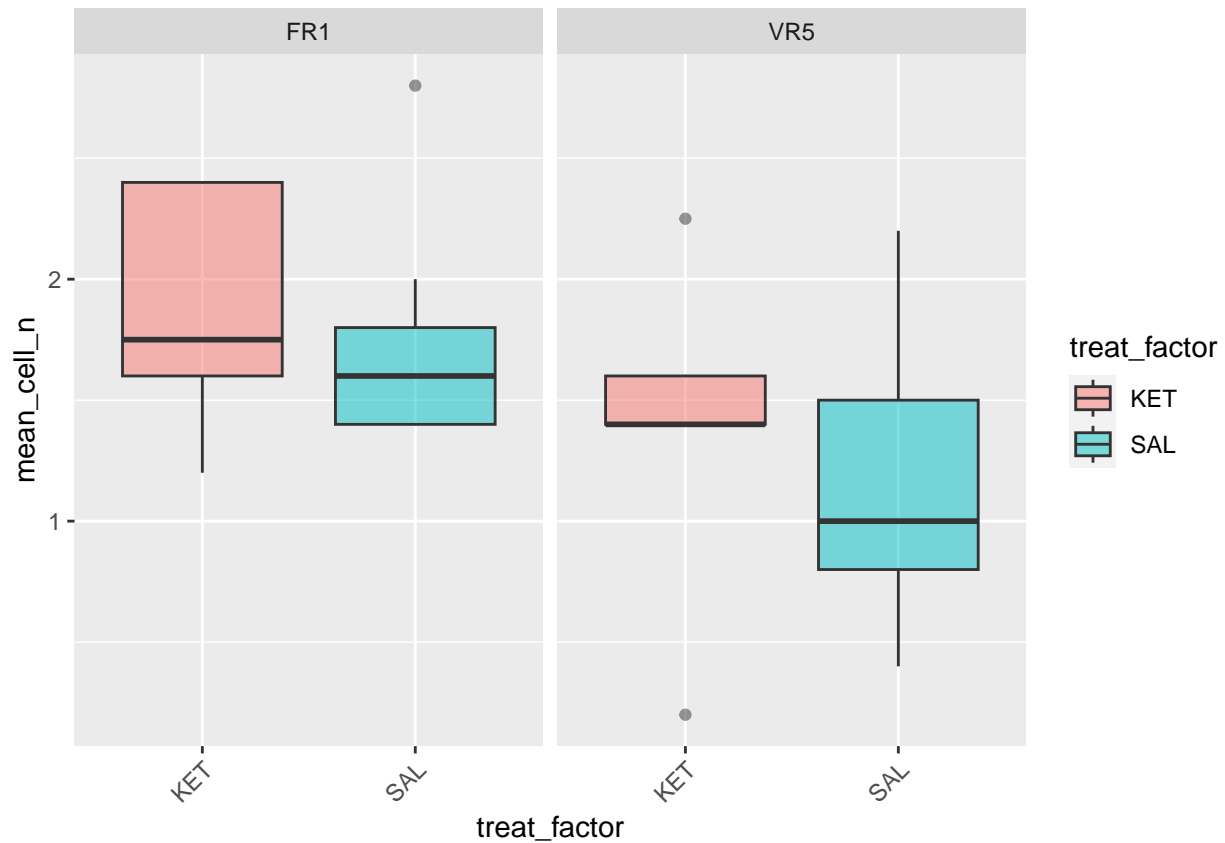
```
## W = 0.74284, p-value = 0.01067
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90551, p-value = 0.4411
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9504, p-value = 0.7435
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.1412  0.934
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                         Sum Sq Df  F value     Pr(>F)
## (Intercept)             53.299  1 144.9477 2.451e-10 ***
## treat_factor             0.154  1   0.4186   0.52537
## react_factor             1.632  1   4.4392   0.04864 *
## treat_factor:react_factor 0.008  1   0.0222   0.88300
## Residuals                6.986 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.127 0.355 19   0.358  0.7242            0.924
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.203 0.367 19   0.554  0.5862            0.829
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.500 0.384 19   1.304  0.2079            0.373
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.576 0.337 19   1.708  0.1039            0.197
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_quad_cFos_mean_cell_ns_Rsubset.csv"
```

quad Npas4

```
fname = quads[2]
```

```
print(fname)
```

```
## [1] "KET-VR5_quad_Npas4_mean_cell_ns_Rsubset.csv"
```
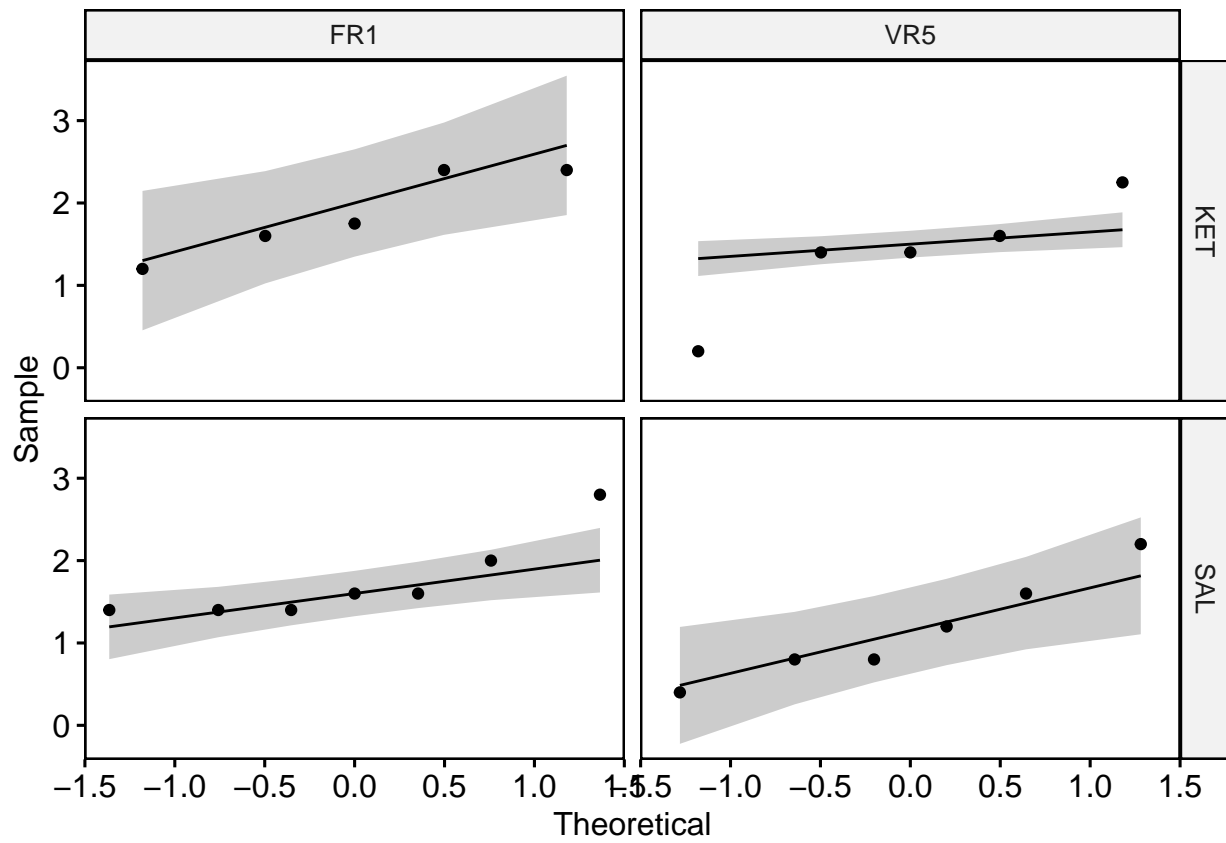
```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8938, p-value = 0.3766
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
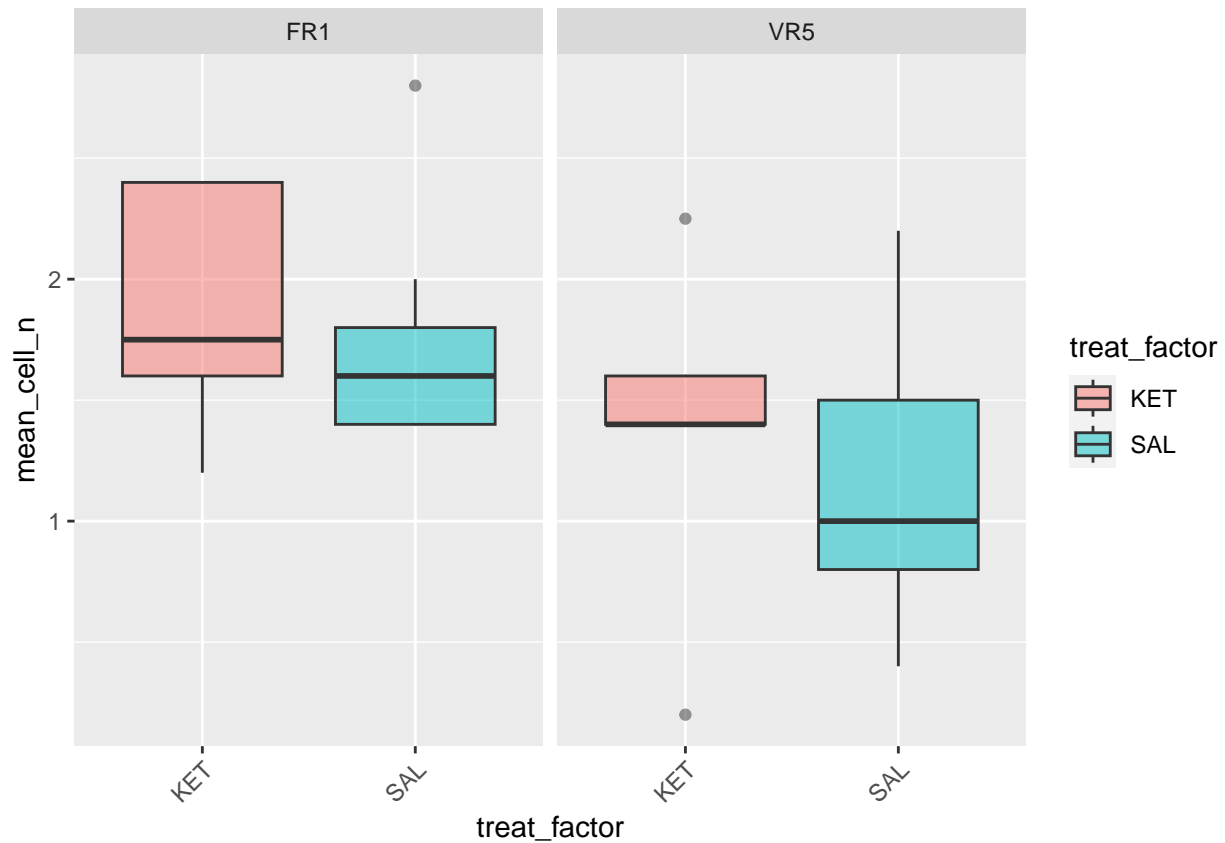
```
## W = 0.74284, p-value = 0.01067
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90551, p-value = 0.4411
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9504, p-value = 0.7435
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.1412  0.934
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)              53.299  1 144.9477 2.451e-10 ***
## treat_factor              0.154  1   0.4186   0.52537
## react_factor              1.632  1   4.4392   0.04864 *
## treat_factor:react_factor 0.008  1   0.0222   0.88300
## Residuals                 6.986 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.127 0.355 19   0.358  0.7242            0.924
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.203 0.367 19   0.554  0.5862            0.829
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.500 0.384 19   1.304  0.2079            0.373
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.576 0.337 19   1.708  0.1039            0.197
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_quad_Npas4_mean_cell_ns_Rsubset.csv"
```

quad PV

```
fname = quads[3]
```

```
print(fname)
```

```
## [1] "KET-VR5_quad_PV_mean_cell_ns_Rsubset.csv"
```
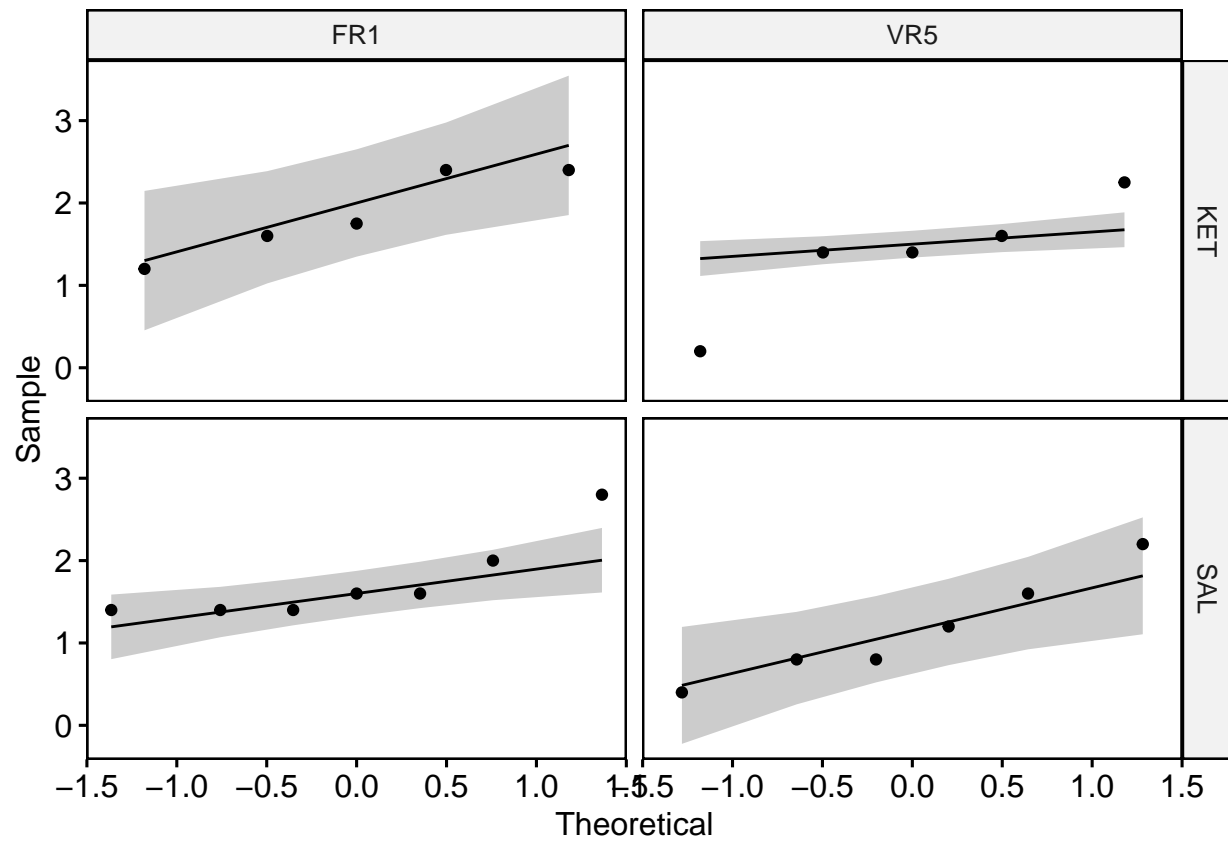
```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8938, p-value = 0.3766
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
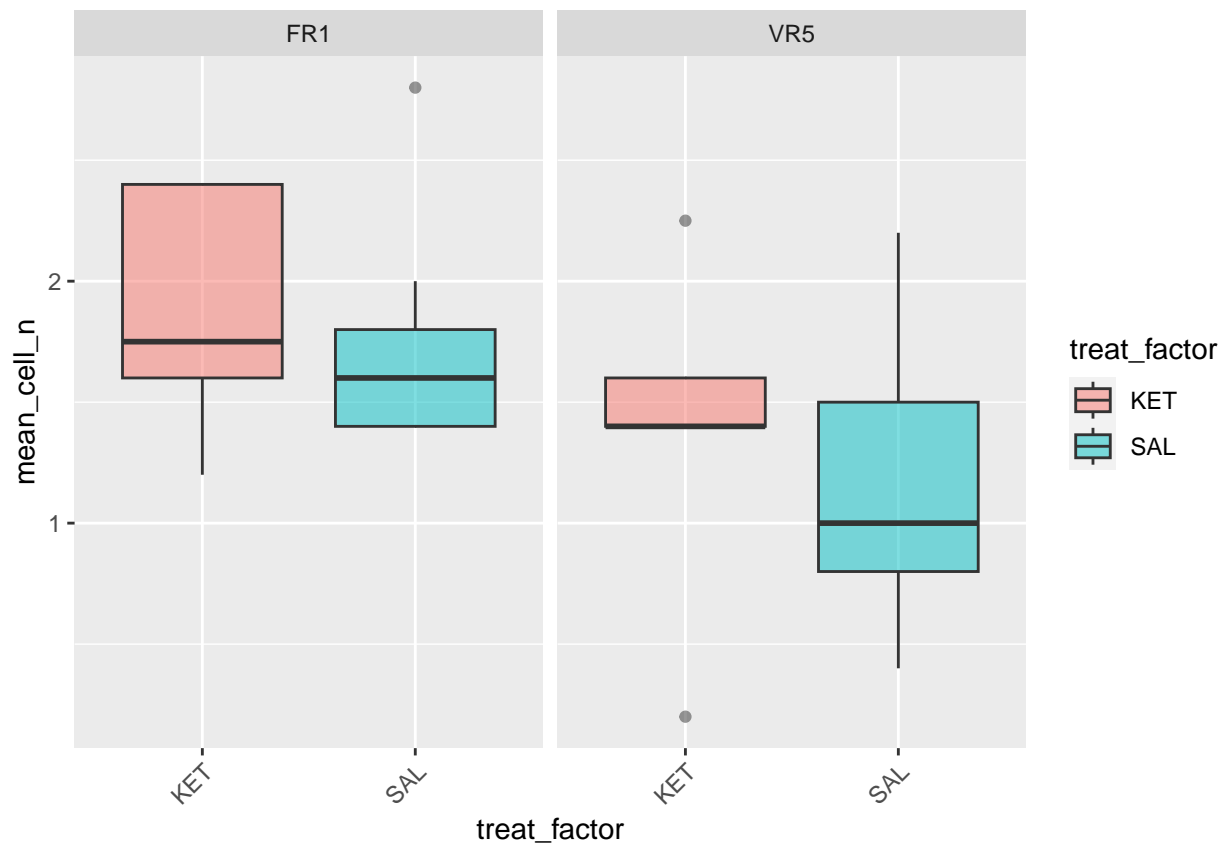
```
## W = 0.74284, p-value = 0.01067
##
##
## $VR5_KET
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90551, p-value = 0.4411
##
##
## $VR5_SAL
##
##   Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9504, p-value = 0.7435
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.1412  0.934
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)              53.299  1 144.9477 2.451e-10 ***
## treat_factor              0.154  1   0.4186   0.52537
## react_factor              1.632  1   4.4392   0.04864 *
## treat_factor:react_factor 0.008  1   0.0222   0.88300
## Residuals                 6.986 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.127 0.355 19   0.358  0.7242            0.924
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.203 0.367 19   0.554  0.5862            0.829
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.500 0.384 19   1.304  0.2079            0.373
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.576 0.337 19   1.708  0.1039            0.197
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

```
## [1] "KET-VR5_quad_PV_mean_cell_ns_Rsubset.csv"
```

quad WFA

```
fname = quads[4]
```

```
print(fname)
```

```
## [1] "KET-VR5_quad_WFA_mean_cell_ns_Rsubset.csv"
```
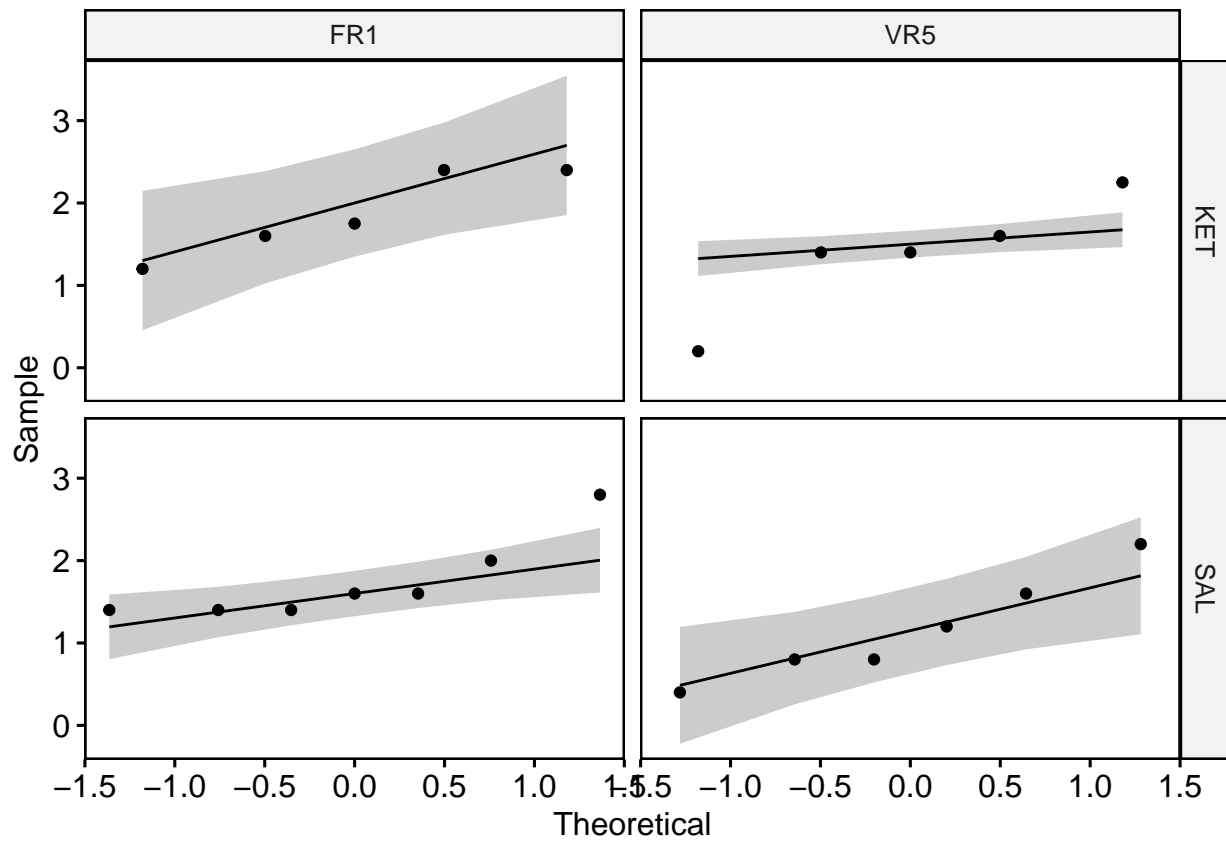
```
figs = eda_anova(fname)
```

```
## $FR1_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.8938, p-value = 0.3766
##
##
## $FR1_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
```
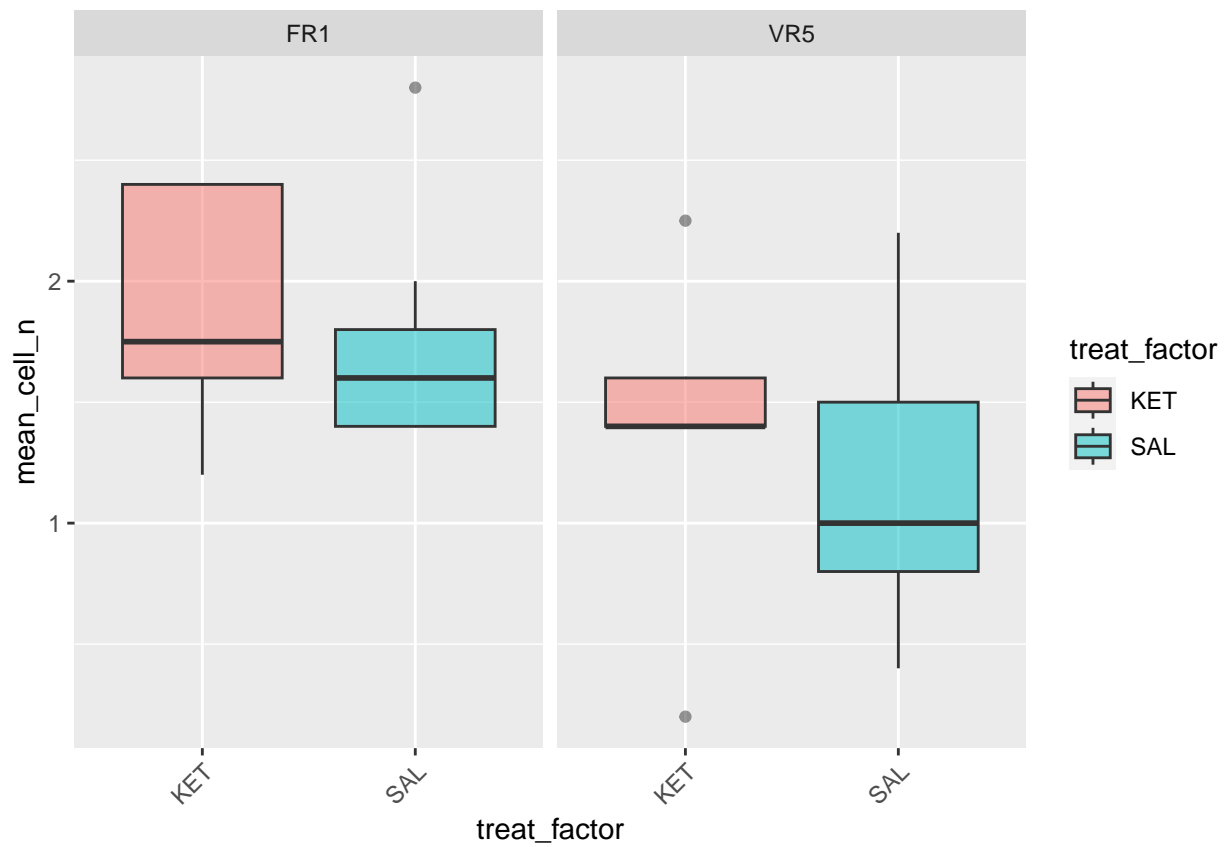
```
## W = 0.74284, p-value = 0.01067
##
##
## $VR5_KET
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90551, p-value = 0.4411
##
##
## $VR5_SAL
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9504, p-value = 0.7435
##
##
## Levene's Test for Homogeneity of Variance (center = "mean")
##       Df F value Pr(>F)
## group  3  0.1412  0.934
##       19
## Anova Table (Type III tests)
##
## Response: mean_cell_n
##                          Sum Sq Df  F value     Pr(>F)
## (Intercept)              53.299  1 144.9477 2.451e-10 ***
## treat_factor              0.154  1   0.4186   0.52537
## react_factor              1.632  1   4.4392   0.04864 *
## treat_factor:react_factor 0.008  1   0.0222   0.88300
## Residuals                 6.986 19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## react_factor = FR1:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.127 0.355 19   0.358  0.7242            0.924
##
## react_factor = VR5:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  KET - SAL    0.203 0.367 19   0.554  0.5862            0.829
##
## treat_factor = KET:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.500 0.384 19   1.304  0.2079            0.373
##
## treat_factor = SAL:
##  contrast  estimate    SE df t.ratio p.value adjusted_p.value
##  FR1 - VR5    0.576 0.337 19   1.708  0.1039            0.197
# display qq plot to assess normality
figs[[1]]
```

```
# display box plot to assess homogeneity of variances
figs[[2]]
```

```
print(fname)
```

[1] "KET-VR5_quad_WFA_mean_cell_ns_Rsubset.csv"