Permutation test and t test

# Simulation study to compare t.test and wilcox.test
# Variables:
# nNB = Number of No blink;
# nBR = Number of Blink removed;
# Restriction: n > nNB > nBR;
# To performed the t test whether the mean locations of NB and BR are same,
# the restriction is only that the number of the sample size for BR, nBR is
# greater than 20 since always the sample size for NB, nNB is greater than
# nBR (nNB > nBR). If nBR is less than 20, we need to perform the nonparametric
# test, which is called Mann-Whitney U test, also known as wilcox rank test.

nSim <- 1000 ; mypvalue <- 0.05 ; nNB <- 200 ;
nBR <- 20;  # nNB > nBR
Out <- NULL ;
for(j in 2:20){
  ct <- 0 ;
  for(i in 1:nSim){
    NB <- rnorm(nNB); BR <- rnorm(j);
    ttest <- t.test(BR, NB, paired=F);
    wtest <- wilcox.test(BR, NB, paired=F, conf.int=T);
    ct <- ct+ifelse((ttest$p.value < mypvalue)!=(wtest$p.value < mypvalue), 1, 0);
  }
  Out <- rbind(Out , c(j, ct/nSim)) ;
}
Out

# [1] 0.050 200 2 0.093
# [1] 0.050 200 3 0.068
# [1] 0.050 200 4 0.051
# [1] 0.050 200 5 0.042
# [1] 0.050 200 6 0.040
# [1] 0.050 200 7 0.031
# [1] 0.050 200 8 0.023
# [1] 0.050 200 9 0.028
# [1] 0.050 200 10 0.023
# [1] 0.050 200 11 0.030
# [1] 0.050 200 12 0.022
# [1] 0.050 200 13 0.018
# [1] 0.050 200 14 0.021
# [1] 0.050 200 15 0.032
# One example of ttest and permutation test
NB <- rnorm(nNB) ; BR <- rnorm(nBR) ;
summary(NB) ; summary(BR) ;
ttest <- t.test(BR, NB, paired=F) ;
wtest <- wilcox.test(BR, NB, paired=F, conf.int=T) ;
ttest ; wtest ;

Welch Two Sample t-test

data:  BR and NB
t = -0.8663, df = 21.63, p-value = 0.3959
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.8142807  0.3347911
sample estimates:
mean of x  mean of y
-0.25965859 -0.01991379

Wilcoxon rank sum test with continuity correction

data:  BR and NB
W = 1732, p-value = 0.3243
alternative hypothesis: true location shift is not equal to 0
95 percent confidence interval:
 -0.8405639  0.2438865
sample estimates:
difference in location
-0.2620736

# One graphical comparisions
denNB <- density(NB) ; denBR <- density(BR) ;
par(mfrow=c(1,2))
boxplot(NB, BR, names=c("NB", "BR"), add=F, col=2:3 ) ;
plot(denNB, main="NB(red) and BR(green) ", ylim=c(0, max(denBR$y, denNB$y)),
   col=2, xlab="") ;
lines(denBR, col=3)