Non-Parametric Tests

One	Goodness of Fit	`chisq.test(x, y = NULL,p)`
	Independence Test	`chisq.test(table)` `cramer_v(table)`
	Binomial Test	`binom.test(x, n, p = 0.5)`
	Runs Test	`RunsTest(vector)`
	KS Test	`ks.test(x,dist)`
	Kendall's Tau	`cor.test(x,y,method = 'kendall')`
	Kendall's W	`kendall(df)`
Two Dep	Wilcoxon Signed Ranks	`wilcox.test(x,y,paired=T)`
	McNemar Test	`mcnemar.test(matrix)`
	Sign Test	`binom.test(condition, n, p)`
Two Indep	Mann-Whitney U	`wilcox.test(x,y,paired=F)`
	KS Z Test	`ks.test(x,y)`
	Moses Extreme Reaction	`MosesTest(x,y)`
	Wald-Wolfowitz Runs	`RunsTest(x,y)`
K Dep	Friedman Test	`kendall(df)`
	Cochran's Q Test	`cochran_qtest (data,DV~Group|Subj)`
K Indep	Kruskal–Wallis	`kruskal.test(x,g)`
	Jonckheere-Terpstra Trend Test	`JonckheereTerpstraTest(x,g)`
	Median Test	`Median.test(x.g)`

Non-parametric tests: distribution-free, less powerful
Data: skewness, outliers, tiny samples, nominal & ordinal
Chi-square: df=category-1, cell sample>5
Kendall's W: concordance-W, difference-χ^2
Wilcoxon: **less** than critical, **swap** and **smaller**

ANCOVA

Equal Variance	`levene_test(y~g)`
Independence	`anova(aov(Cov~IV,data))`
Equal Slope	`anova(aov(DV~Cov*IV,data))`
ANCOVA	`aov(DV~Cov+IV,data);` `Anova(model, type = '3')`
Effect Size	`partial_eta_squared(model)`
Post-Hoc	`summary(glht(cfit, linfct=mcp(time='Tukey')))`

If more grouping variable, say a &b
- equal variance: levene_test(y~a*b)
- independence: anova(aov(cov~a*b))
- equal slope: anova(aov(y~c*a*b))
- ANCOVA: anova(aov(y~c+a+b+a*b))

Covariate: continuous, not manipulated
Latin Square: less error; more power; major & minor with same level & one-time cross; no need for interaction check

Nested ANOVA

Fit Model	`aov(DV~group/subgroup,data)` `aov(DV~group+Error(group:subgroup,data)`

Subgroup's effect isn't care-worthy.

MANOVA

Normality	`select(DV) |> mshapiro_test()`
Var & Cov	`select(DV) |>` `box_m(group)+leveneTests(group)`
Correlation	`Corr(DV)`
MANOVA	`manova(DV~group),summary(model)`
Effect Size	`rstatix::eta_squared(model)`
Univariate ANOVA	`summary.aov(model)`

Post-Hoc	`gather(key='var',value='value',DVs) |>`
	`group_by(var) |>`
	`games_howell_test(value~group)`

Report:
- ANOVA table: F, p, eta-squared
- Post-Hoc test: MD, p

Wilk's Lambda: residuals' proportion in variance
MANOVA: less powerful, contain inflation of α

Logistic Regression

Fit Model	`lm(DV~IV+IV,data, family = binomial('logit'))`
Effect Size	`exp(cbind(coef(fit),confint(fit))`
Predictor Test	`wald.test(Sigma = vcov(fit),b = coef(fit),Terms = i:j)`
Forward Test	`anova(fit,test='Chisq')`
Null Test	`anova(fit,null,test='Chisq'),null-DV~1`
Model Fitting	`hoslem.test(x = actual, y=fitted, g)`
R Square	`pscl::pR2(fit), `r2CU`-Nagelkerke R2`
Model Comparison	`anova(fit1,fit2,test='Chisq')`
Classification Table	`confusionMatrix(round(fitted),actual)`

Rate the Model:
- Nagelkerke R^2: variation accounted for
- HL test: goodness of fit

Report:
- Analysis method + brief model intro.
- Comparison against null
- R squared
- Classification table
- Wald test of coefficients
- Effect size (odds ratio)

Predicted \ Actual	1	0
1	True positive	False positive
0	False negative	True negative

$$Acc = \frac{TP + TN}{ALL}, Prec = \frac{TP}{pred\ P}, Sen = \frac{TP}{real\ P}, Spe = \frac{TN}{actual\ N}$$

MLR

Linear Correlation	`Corr(),vif(model)`
Fit Model	`lm(DV~IV+IV,data)`
Standardized	`lm(DV~scale(IV1)+scale(IV2),data)`
Part & Partial Corr.	`select(DV,IV) |> pcor()/spcor()`
Model's info: coefficients, confint, residuals, fitted, deviance		

Rate the Model:
- R^2_{adj}
- F & p: predicted & actual

Hypothesis Testing:
- Null and Alternative hypothesis
- Statistics (comparison if necessary)
- Conclusion (whether or not to reject)

Attention:
matrix(data, nrow, byrow, dimnames = list(row,column))
Range for continuous variables
Factor: Grouping variables

Library: tidyverse, rstatix, DescTools, car, effectsize, irr, bruceR, aod, ggplot2, ResourceSelection, heplots, pscl , ppcor, HH, agricolae, multicomp, caret