SPSS

FREE WEBINAR

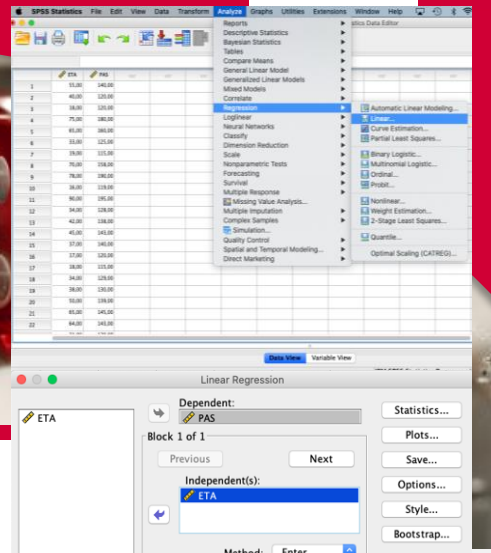
Chi Square with Statistics for Data Analysis

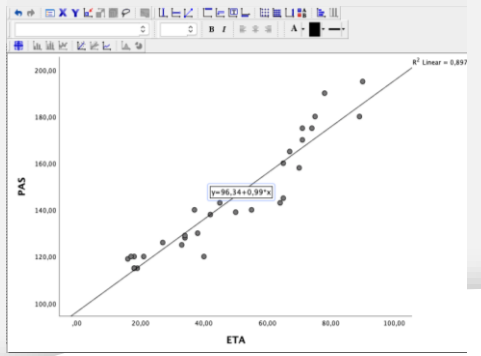
OCTOBER 1st

10.30 am

Statistics for Data Analysis

WEBINAR AGENDA





About Us

30 years of history… in brief

Statistics for Data Analysis

Services included in the solution (LaunchBox, Add-On, APP, webinar, Support, …)

Chi-Square with Statistics for Data Analysis

- Introduction
- Chi-Square Test: theory
- Examples with Statistics for Data Analysis
- Q&A
- Aknoledgemnt

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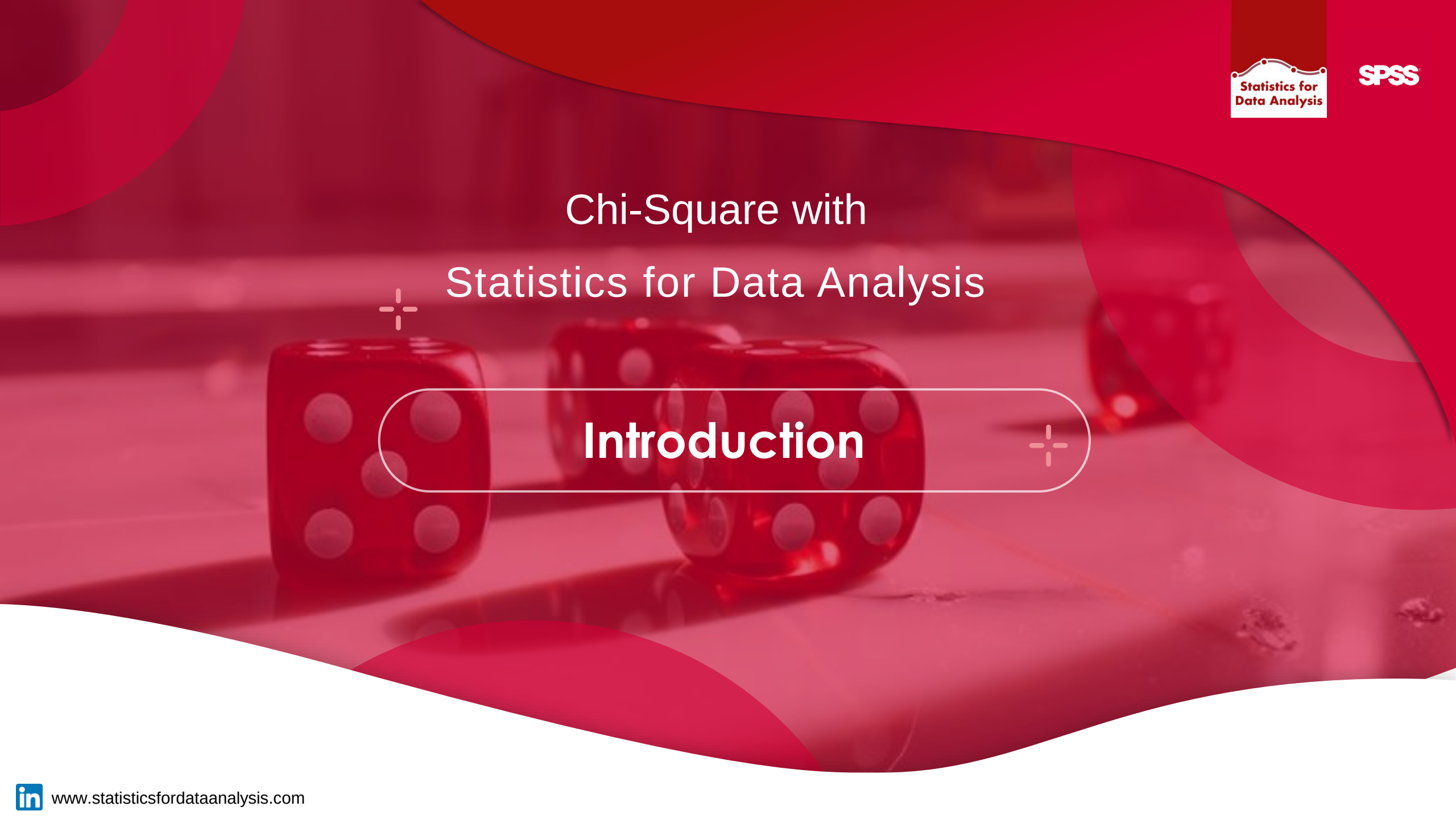
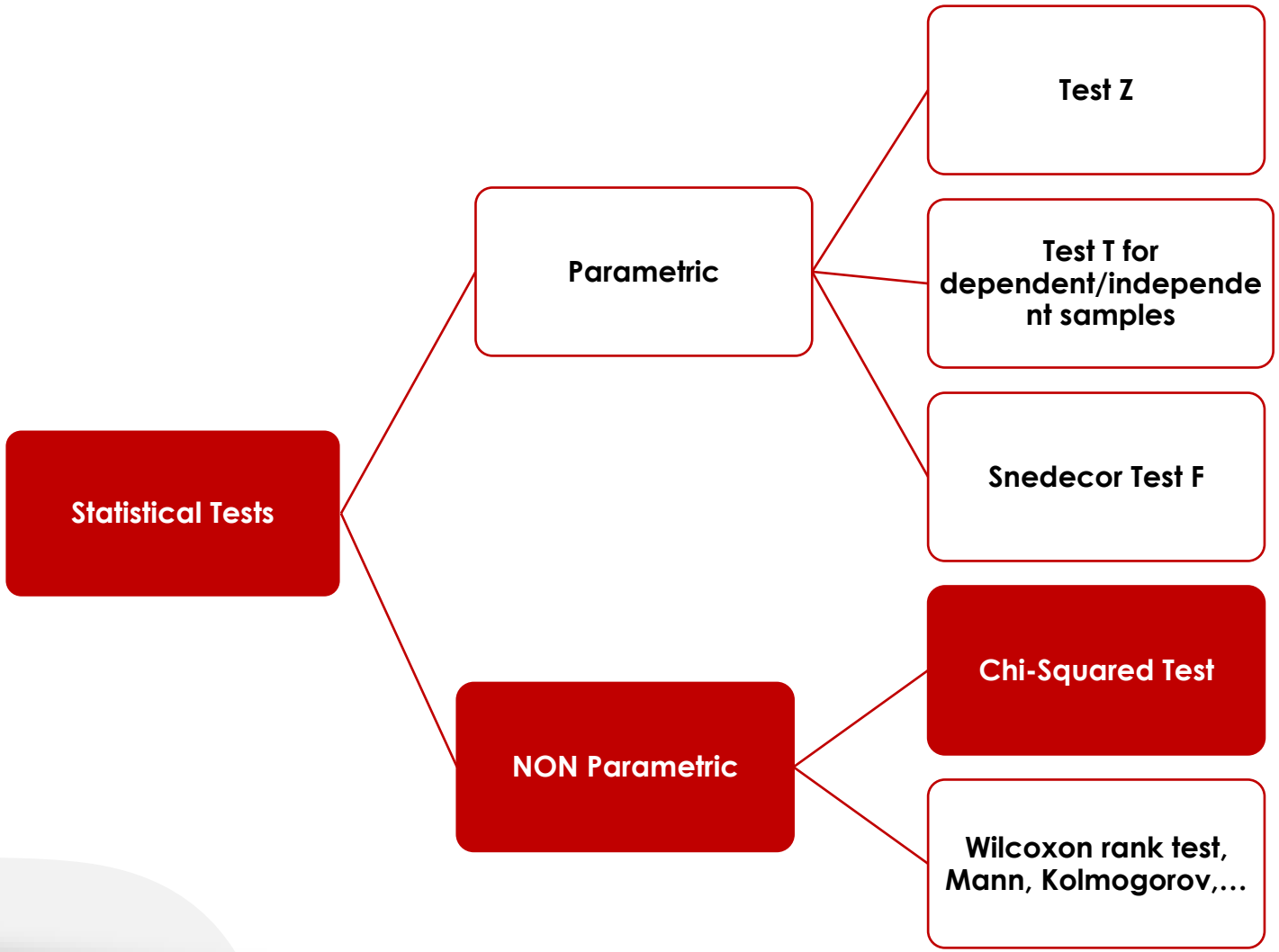


Chi-Square with Statistics for Data Analysis

Introduction

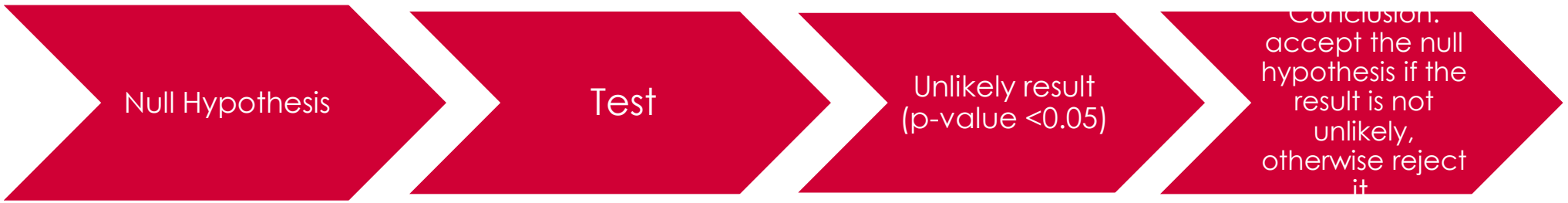

Statistical Tests
Parametric
Test Z
Test T for dependent/independent samples
Snedecor Test F
NON Parametric
Chi-Squared Test
Wilcoxon rank test, Mann, Kolmogorov,…

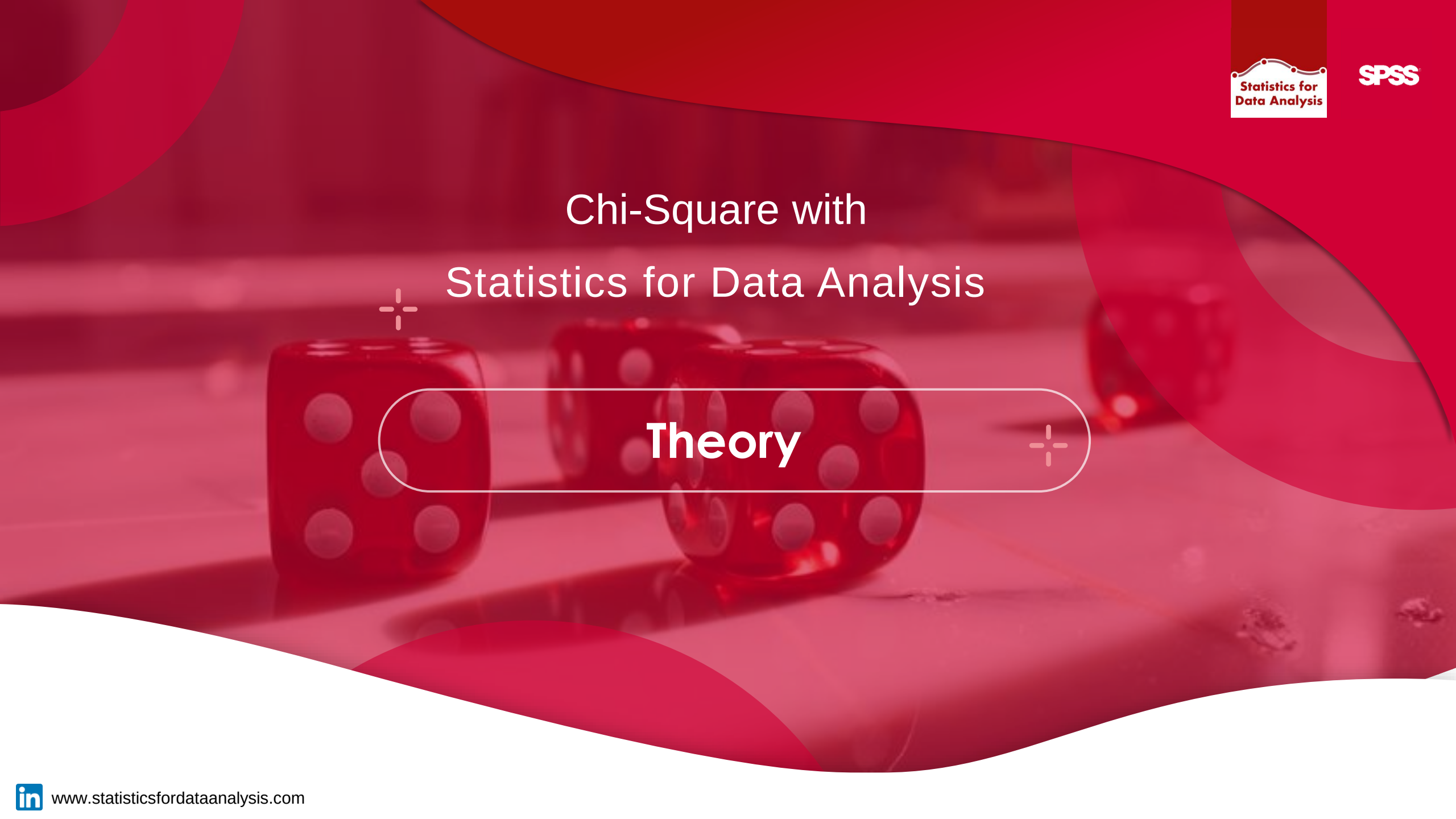
1)Contingency tables: what about?

Contingency tables are a particular type of cross-tabulations used in statistics to represent and analyze the relationships between two or more variables. They show the joint frequencies of the variables.

X \ Y	y_1	y_2	$\dots$	y_j	$\dots$	y_k	Totale
x_1	$n_{1,1}$	$n_{1,2}$	$\dots$	$n_{1,j}$	$\dots$	$n_{1,k}$	$n_{1,\cdot}$
x_2	$n_{2,1}$	$n_{2,2}$	$\dots$	$n_{2,j}$	$\dots$	$n_{2,k}$	$n_{2,\cdot}$
$\dots$	$\dots$	$\dots$	$\ddots$	$\dots$	$\dots$	$\dots$	$\dots$
x_i	$n_{i,1}$	$n_{i,2}$	$\dots$	$n_{i,j}$	$\dots$	$n_{i,k}$	$n_{i,\cdot}$
$\dots$	$\dots$	$\dots$	$\dots$	$\dots$	$\ddots$	$\dots$	$\dots$
x_h	$n_{h,1}$	$n_{h,2}$	$\dots$	$n_{h,j}$	$\dots$	$n_{h,k}$	$n_{h,\cdot}$
Totale	$n_{\cdot,1}$	$n_{\cdot,2}$	$\dots$	$n_{\cdot,j}$	$\dots$	$n_{\cdot,k}$	n

2) Hypothesis structure in a statistical test:





Chi-Square with Statistics for Data Analysis

Theory

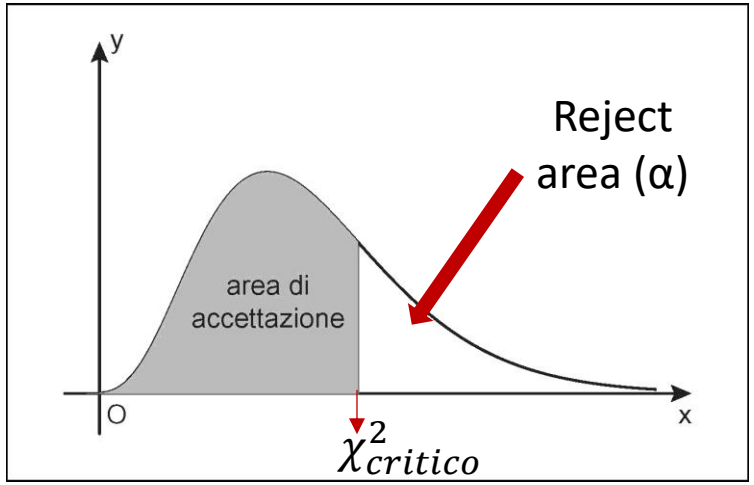
$$H_0: n_{ij} = n^*_{ij} \forall\ i,j$$
$H_1: n_{ij} \neq n^*_{ij}$ for at least one couple of i,j

$$H_0: variables\ NOT\ connected\ (independent)$$
$$H_1: connection\ between\ variables$$

$$n^*_{ij}(theoretical) = \frac{n_{i.}\ n_{.j}}{n}$$

$$\chi^2 = \sum_i \sum_j \frac{\left(n_{ij} - n^*_{ij}\right)^2}{n^*_{ij}} \approx (I-1) * (J-1)\ gdl$$

- Accept H_0 if p-value > 0.05
- Reject H_0 if p-value ≤ 0.05



	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7989,91[a]	2	<,001
Likelihood Ratio	9183,186	2	<,001
N of Valid Cases	25976		

Significant Test (reject Ho)

	Smoke	No Smoke	TOT
M	5	5	10
F	10	10	20
TOT	15	15	30

Gender and Smoke are independent! (equal proportions)

	Smoke	No Smoke	TOT
M	7	3	10
F	2	8	10
TOT	9	11	20

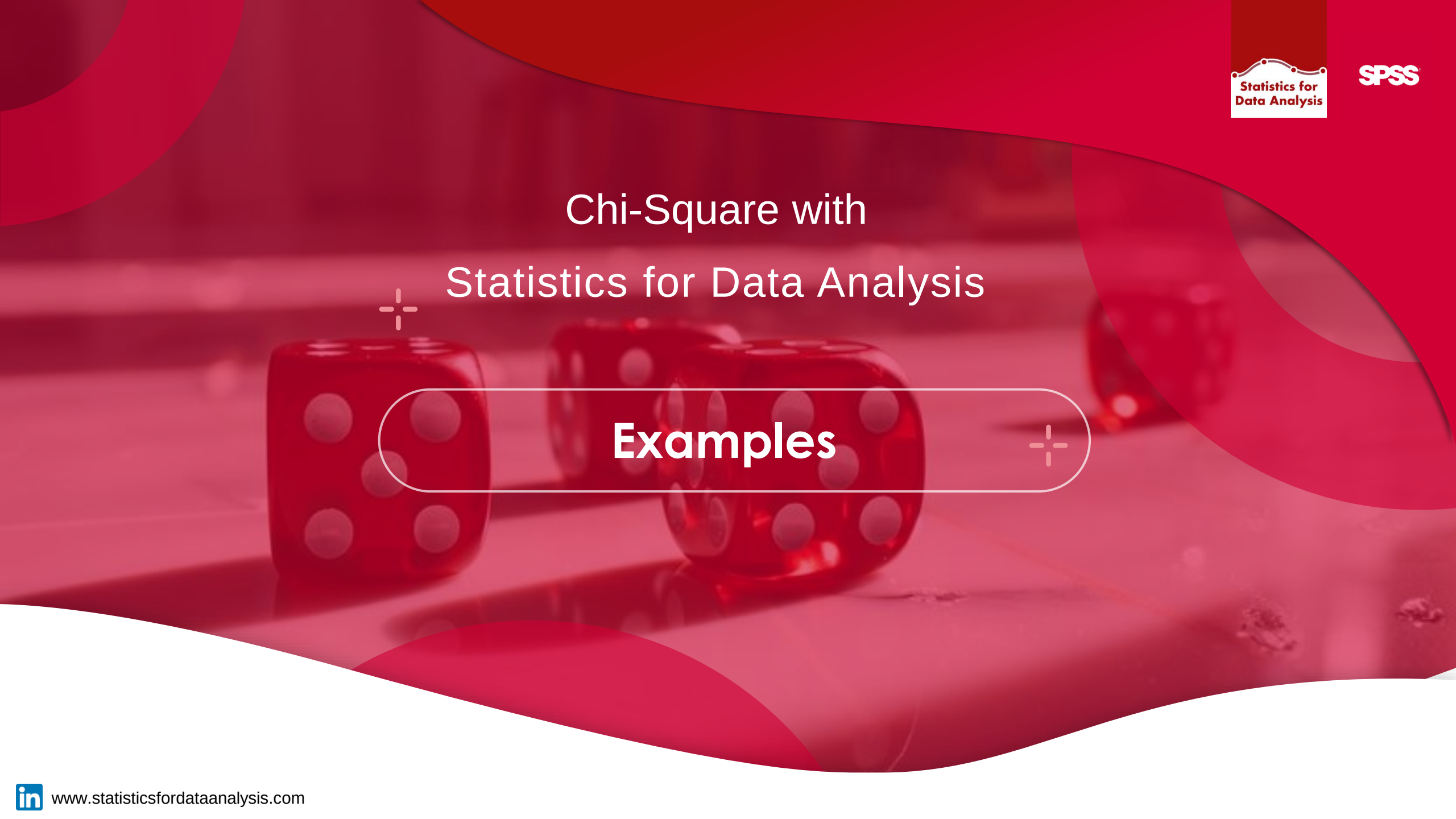
Gender and Smoke are dependent! (yes connection)

McNemar test: used to determine if there is a difference between proportions of paired samples! (for example, when proportions concerning the same individuals are evaluated with different tests or with the same test but at different times).

		Test 1post	
		Negative	**Positive**
Test 1 pre	**Negative**	a	b
	Positive	c	d

$$\chi^2_M = \frac{(|b-c|-1)^2}{b+c} \approx 1\ gdl$$

If significant → there is a significant difference between the 2 tests, meaning there is a significant deviation on the secondary diagonal! (Note: the McNemar test needs a 2x2 square matrix to be applied).



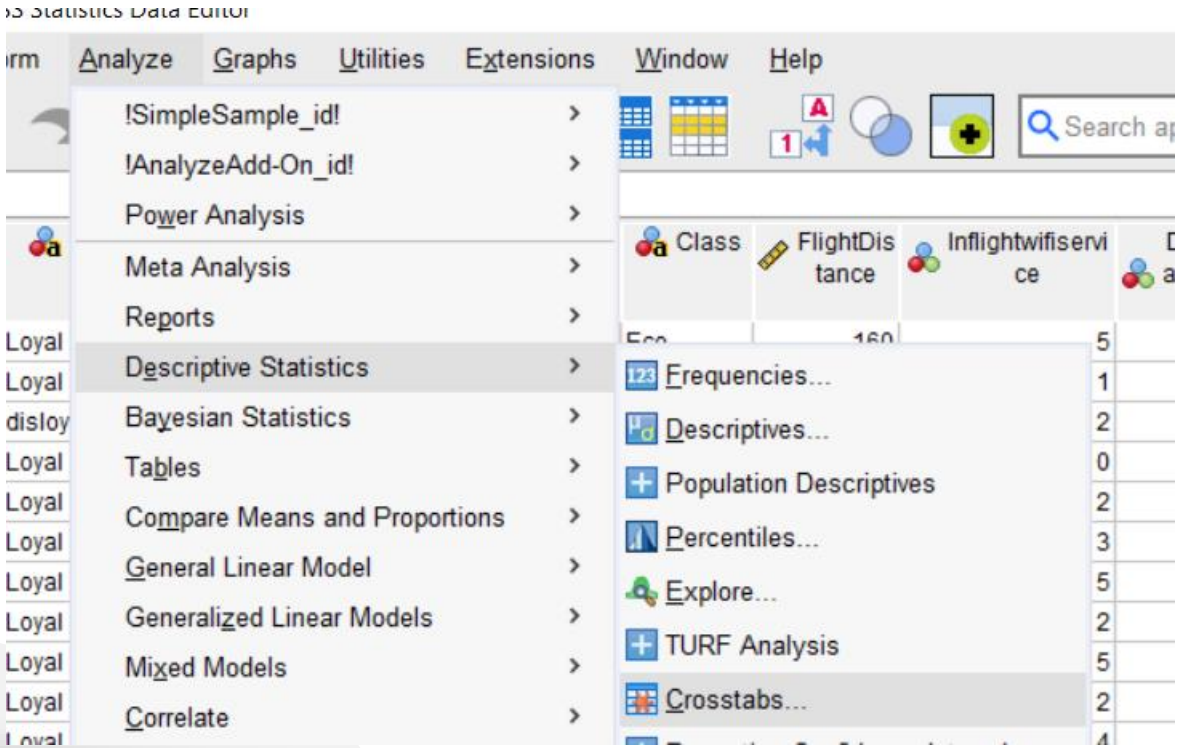
Chi-Square with Statistics for Data Analysis

Examples

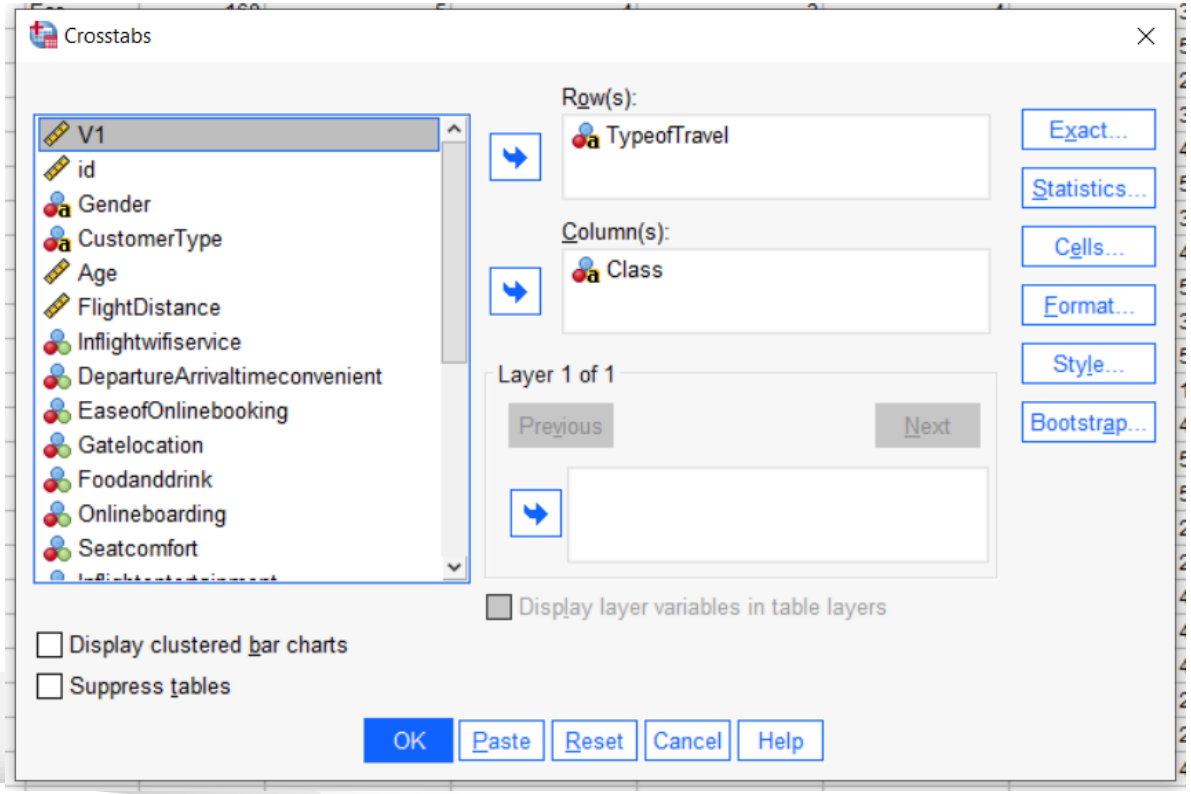
Statistics for Data Analysis

SPSS

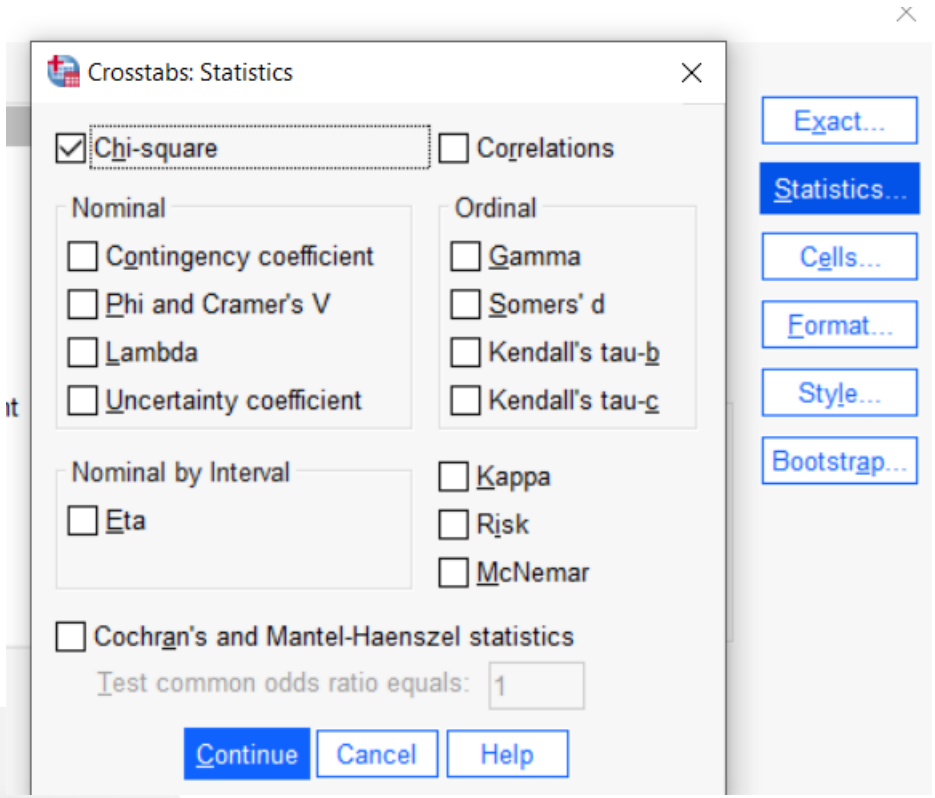
1)Analyze→ Descriptive Statistics → Crosstabs



2)Crosstabs menu



2.1) Click on «Statistics» button and check «Chi-square»

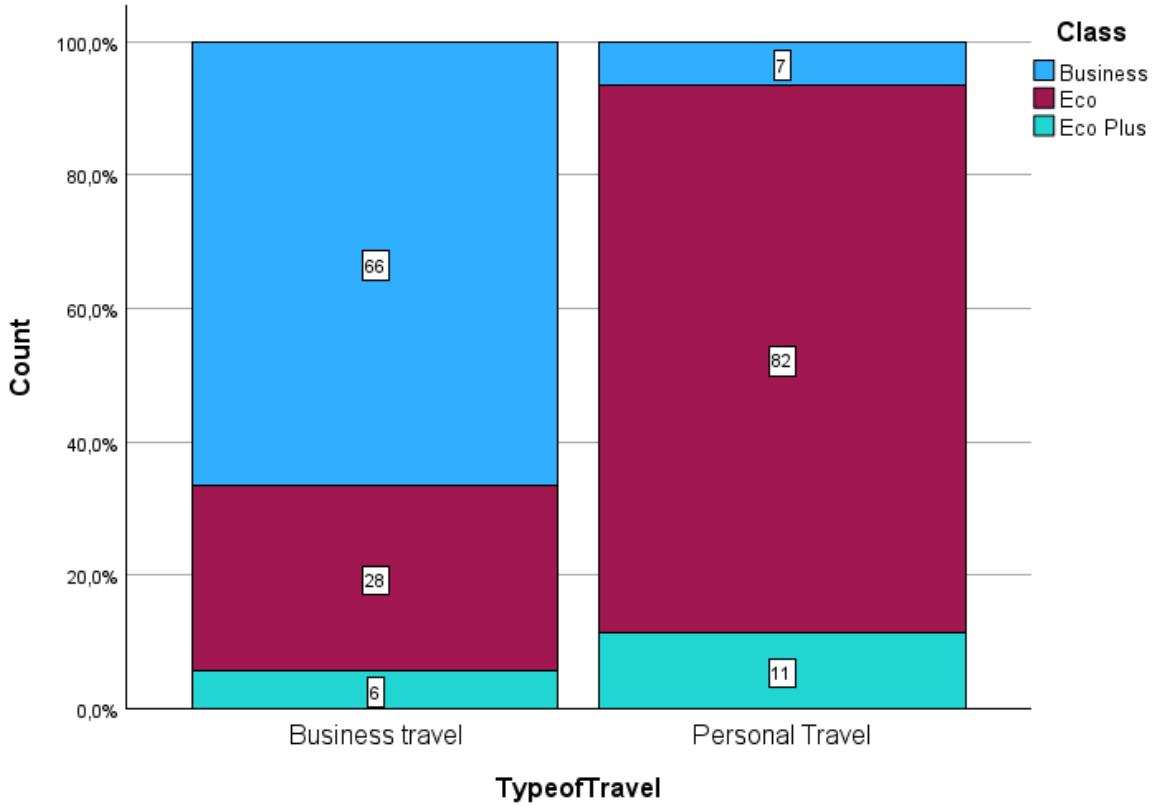


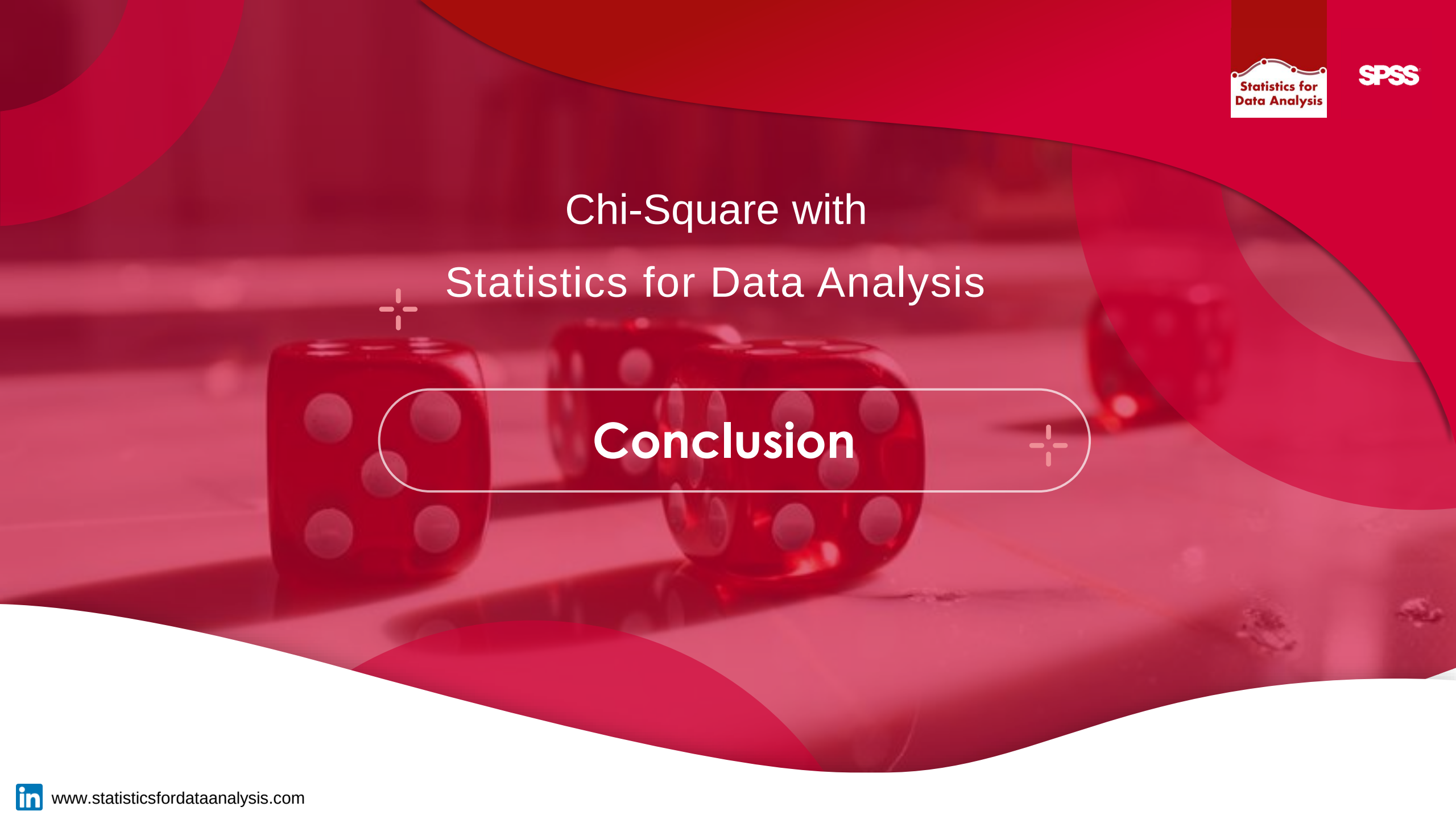
3.1)Output

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7989,91[a]	2	<,001
Likelihood Ratio	9183,186	2	<,001
N of Valid Cases	25976		

Significant Test (reject Ho)

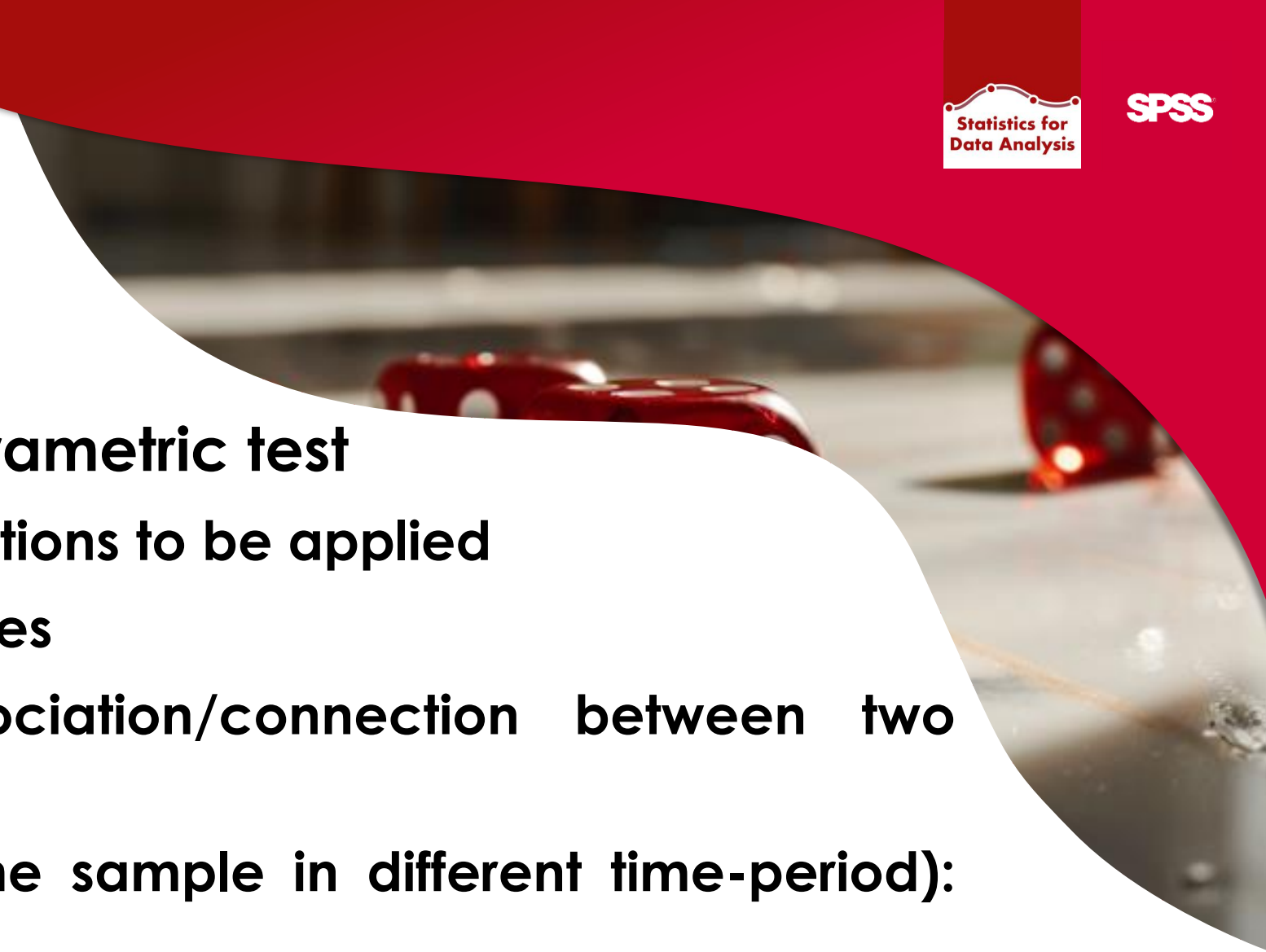
3.2)Output: stacked barplot





Chi-Square with Statistics for Data Analysis

Conclusion



- ✓ Chi-square is a non-parametric test
- ✓ It does not require assumptions to be applied
- ✓ OK with qualitative variables
- ✓ OK for evaluating association/connection between two variables
- ✓ For paired data (the same sample in different time-period): McNemar test