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Academic Skills II – Lecture 5

Additional slides on testing for normal distribution in SPSS

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How can I test for normal distribution in SPSS?

Testing normal distribution

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Why?

- Certain statistical testing procedures require normal distribution of the data in your variable(s).
- In SPSS you can compute the Kolmogorov-Smirnov-Test (KS-Test) and the Shapiro-Wilk-Test.
- We recommend to generally use the Shapiro-Wilk-Test, as it is considered more powerful than the KS-Test.
- However, both tests are sensitive to large samples in the sense that they will quickly show a significant deviation from the normal distribution when the sample size is > 200, even though the data does approximate a normal distribution. Therefore, look at the normality plots first, when you have a large data set and decide whether or not you need a normality test.

(see e.g. https://www.nrc.gov/docs/ML1714/ML17143A100.pdf)

Normal distribution test

- Regardless of which normality test you choose, they basically function as follows:
  - They test a pair of hypotheses: the alternative hypothesis states that the data for a given variable significantly deviates from the normal distribution
  - The null hypothesis states that the data for a given variable does not significantly deviate from the normal distribution (and can therefore be considered normally distributed).
  - We want our scores of the two variables to be normally distributed, so we want a p-value for both variables which is above the threshold value of 5% (remember – a hypothesis test is about the null hpyothesis, not about the alternative hypothesis)!!

Normal distribution test

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- Let‘s have a look at the normality test for our two dimensions Extraversion and Agreeableness (in this case I will rely on the p-values of the Shapiro-Wilk-Test)

- **The relevant SPSS command is: Analyze → Descriptive Statistics → Explore…**

Normal distribution test

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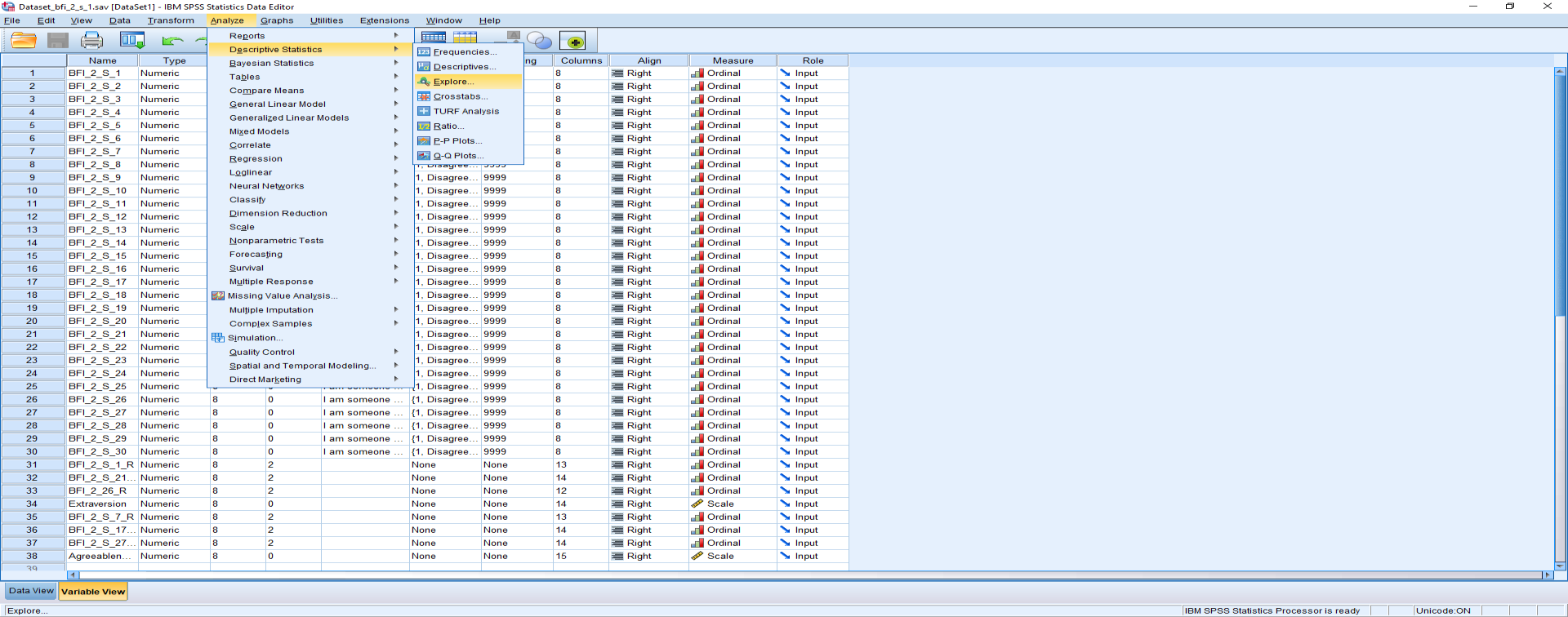

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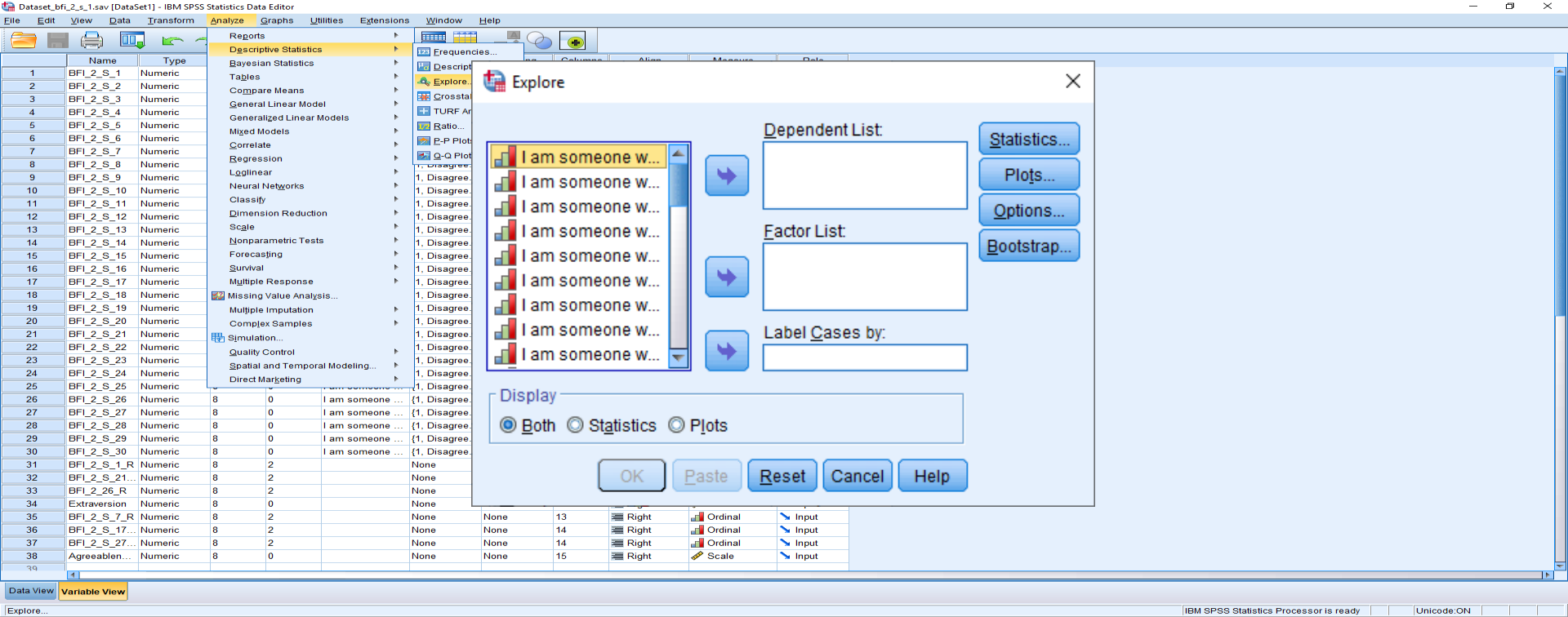

Normal distribution test

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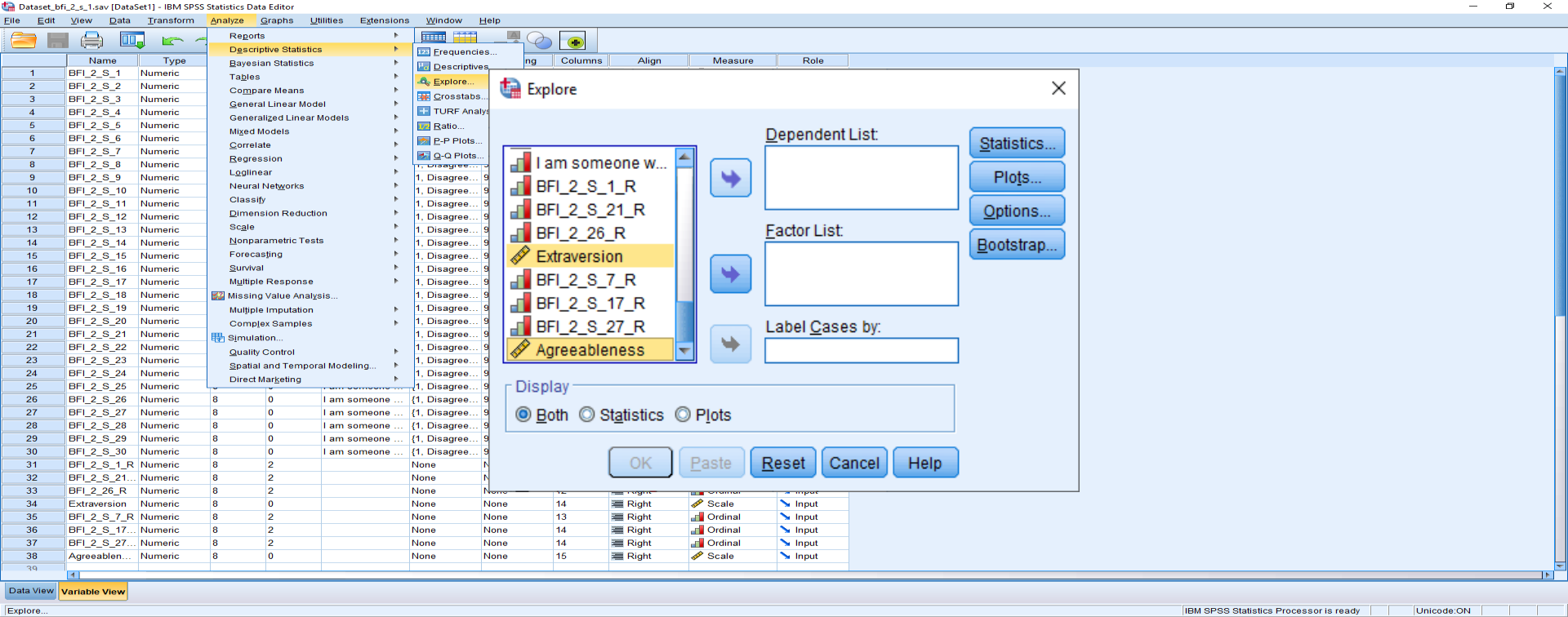

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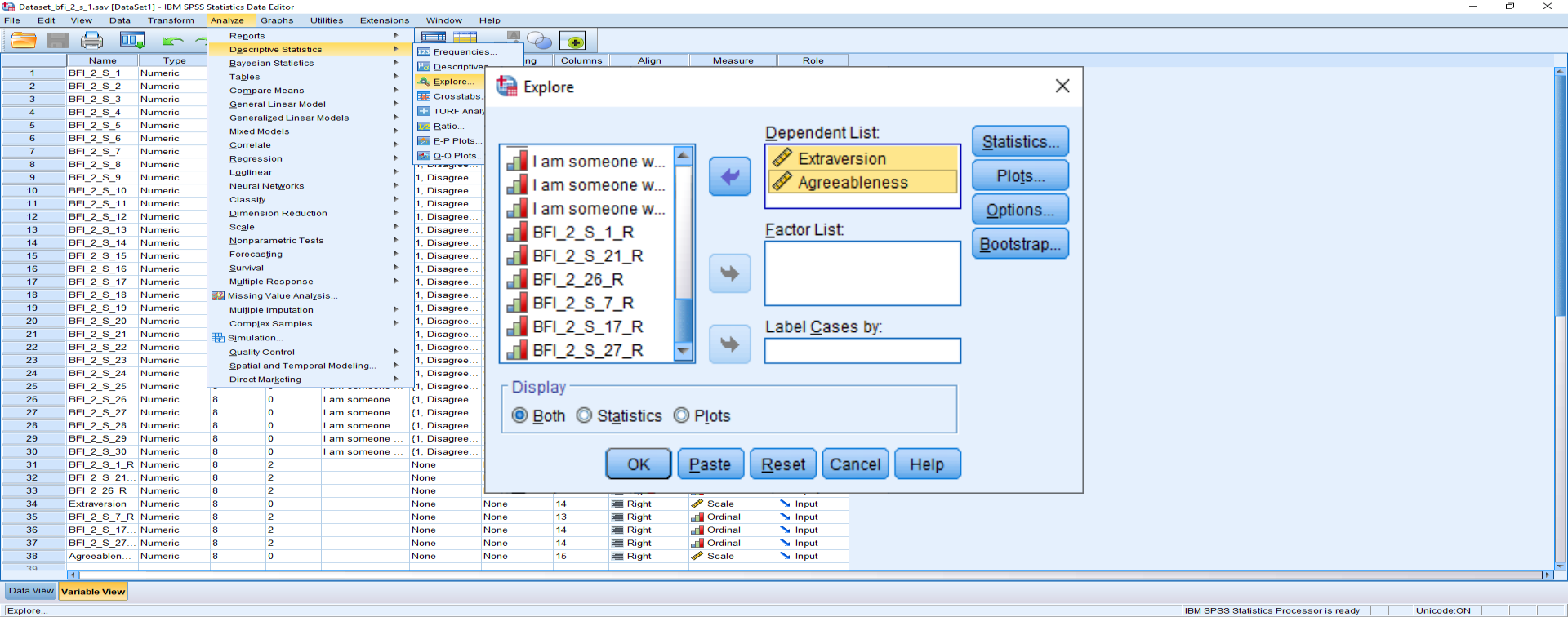

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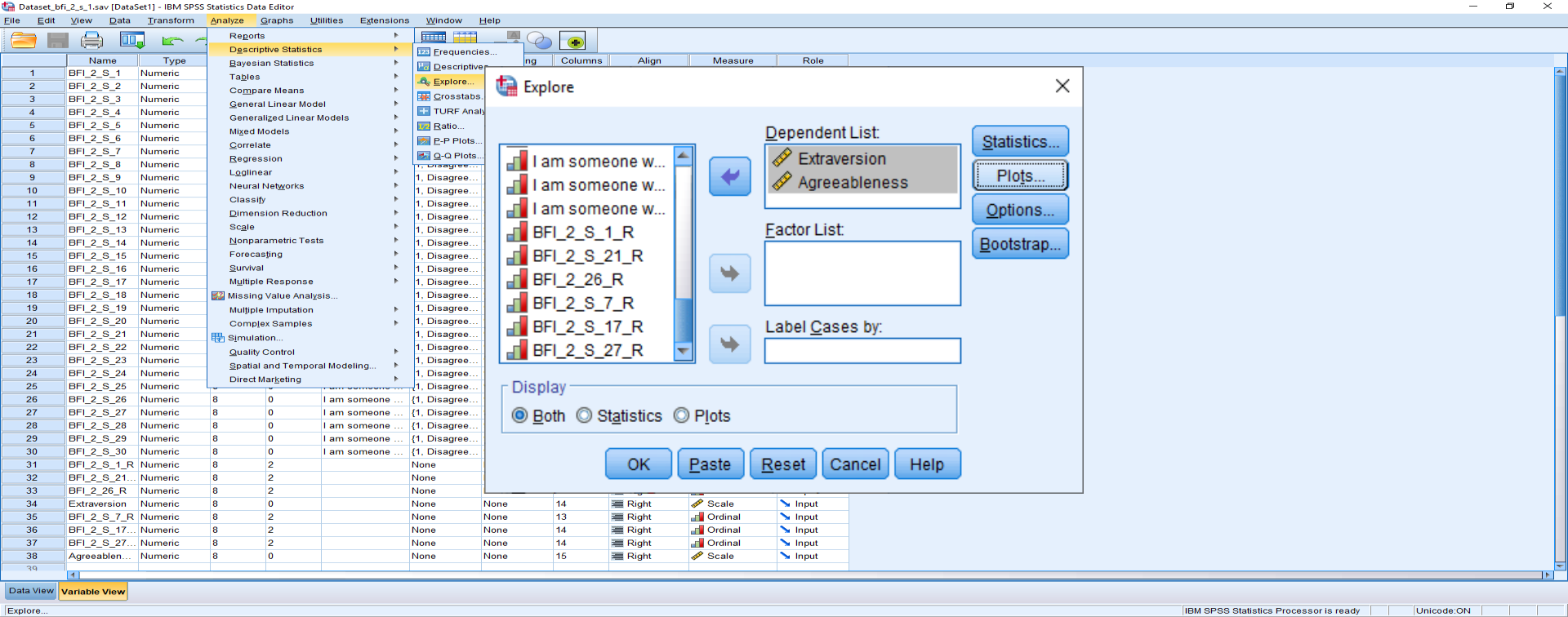

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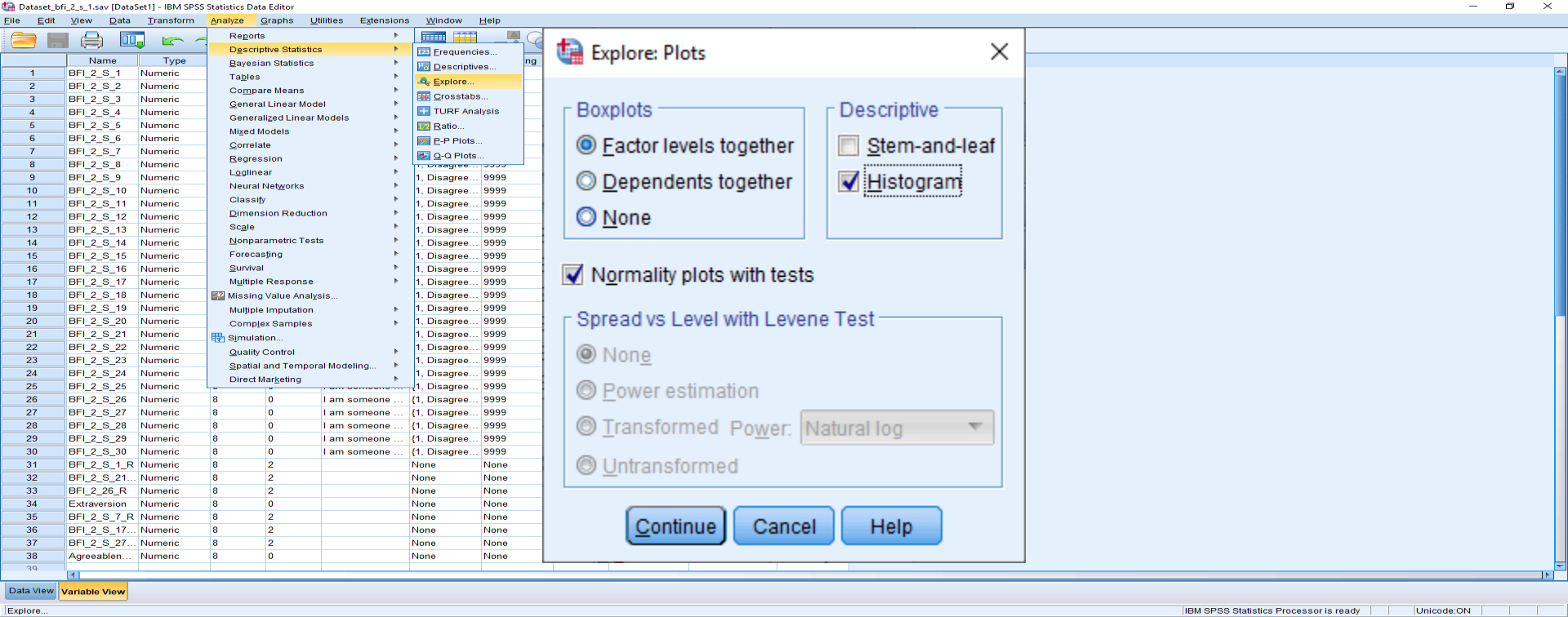

Normal distribution test

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*Output1 [Document1] - IBM SPSS Statistics Viewer

File Edit View Data Transform Insert Format Analyze Graphs Utilities Extensions Window Help

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    - Agreeableness
      - Title
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      - Normal Q-Q
      - Detrended N
      - Boxplot

Explore

[DataSet1] \\lara\angestellte\smaurer\Desktop\AcSII_spss\Dataset_bfi_2_s_1.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Extraversion	50	100,0%	0	0,0%	50	100,0%
Agreeableness	50	100,0%	0	0,0%	50	100,0%

Descriptives

			Statistic	Std. Error
Extraversion	Mean		17,84	,522
	95% Confidence Interval for Mean	Lower Bound	16,79	
		Upper Bound	18,89	
	5% Trimmed Mean		17,90	
	Median		18,00	
	Variance		13,607	
	Std. Deviation		3,689	
	Minimum		10	
	Maximum		25	
	Range		15	
	Interquartile Range		5	
	Skewness		-,269	,337
	Kurtosis		-,344	,662
Agreeableness	Mean		18,52	,497
	95% Confidence Interval for Mean	Lower Bound	17,52	
		Upper Bound	19,52	
	5% Trimmed Mean		18,50	
	Median		18,00	
	Variance		12,336	
	Std. Deviation		3,512	
	Minimum		9	
	Maximum		27	
	Range		18	
	Interquartile Range		5	
	Skewness		,109	,337
	Kurtosis		,336	,662

IBM SPSS Statistics Processor is ready Unicode:ON

Normal distribution test

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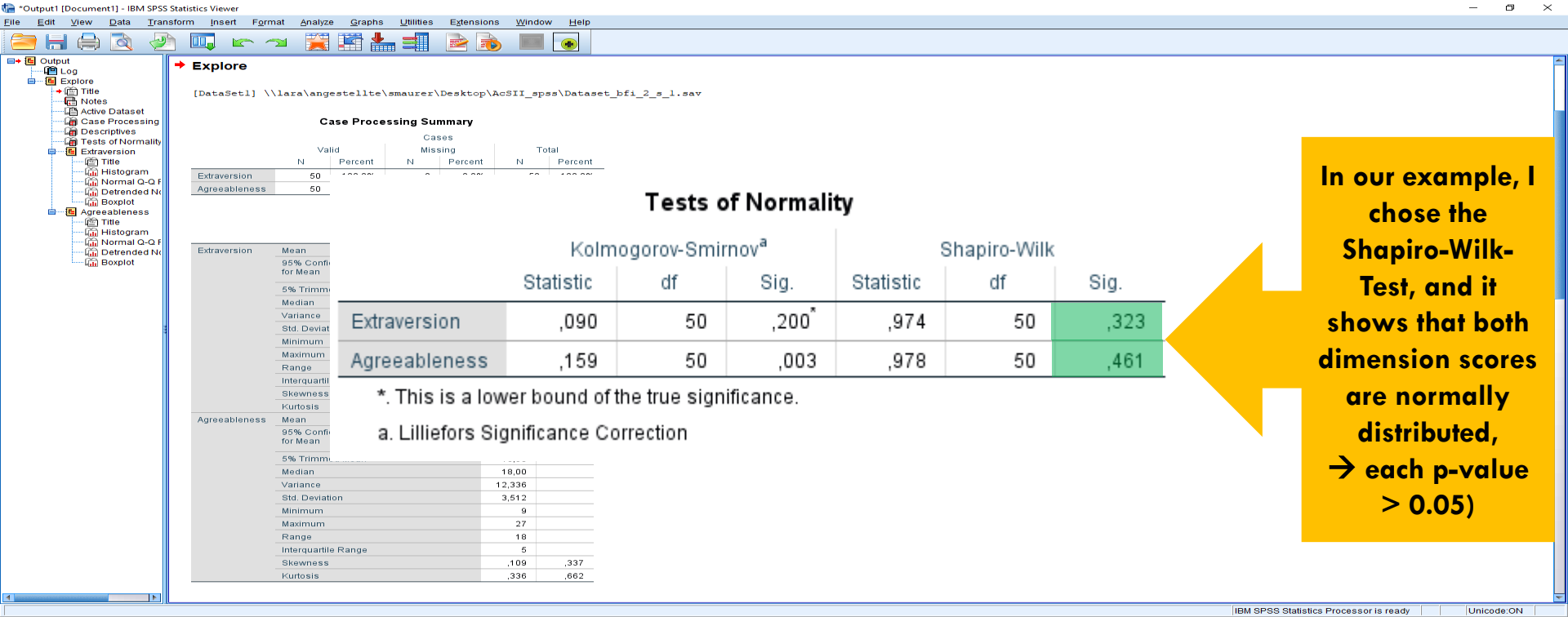

In our example, I chose the Shapiro-Wilk-Test, and it shows that both dimension scores are normally distributed, → each p-value > 0.05)

Normal distribution test

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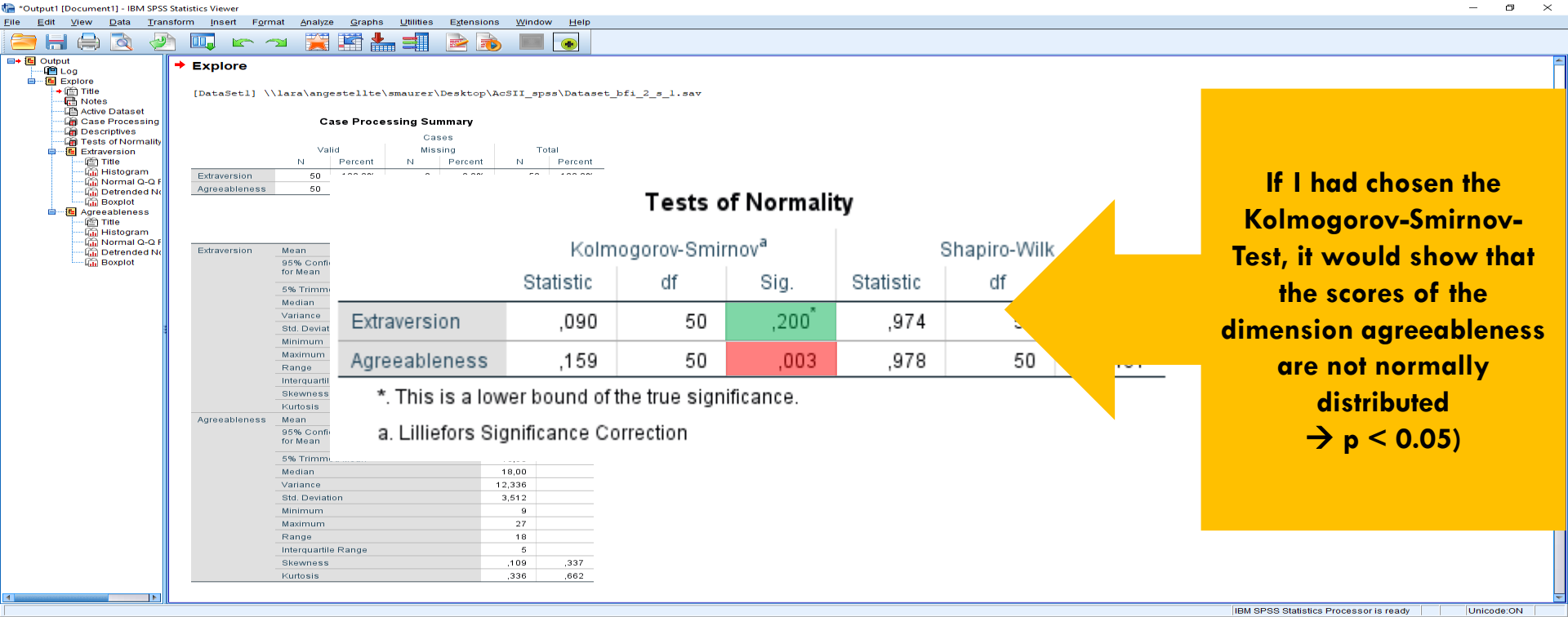

If I had chosen the Kolmogorov-Smirnov-Test, it would show that the scores of the dimension agreeableness are not normally distributed
→ $p < 0.05$)

Normal distribution test

- According to the Shapiro-Wilk-Test, I conclude that the data does not significantly deviate from the normal distribution. I consider the data normally distributed.

- However, if I had chosen the Kolmogorov-Smirnov-Test, the scores of the dimension agreeableness would not be considered normally distributed.