

The Melody of STATISTICS.

2nd
Edition

SPSS
Edition

A practical guide on how to conduct and interpret statistical tests like a rockstar using IBM **SPSS**.

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LIVEINNOVATION.ORG

This book is dedicated to all students with curious minds.
Or to anyone who has banged their heads in rock concerts
and while trying to learn statistics.

Francisco and Silke.

LiveInnovation.org is an independent academic initiative. The mission is to develop and share research and educational content. The main areas of interest involve marketing, creativity and technology experiences, mostly applied to contexts of live experiences.

MAIN SETLIST

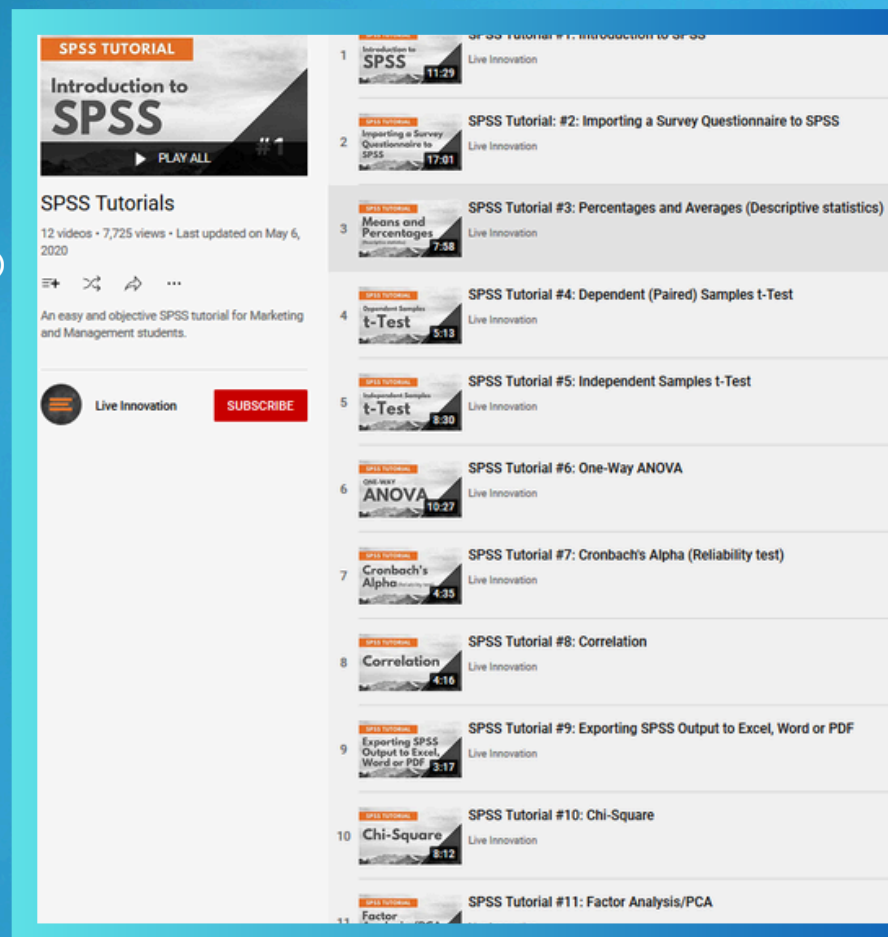
THE SOUNDTRACK TO BEAUTIFUL NUMBERS

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Ah... Follow and watch the 18 video **SPSS** tutorial series on the Live Innovation **YouTube** channel.

What will you find?

1. Introduction to SPSS
2. Importing a questionnaire to SPSS
3. Percentages and averages
4. Dependent (Paired) samples t-test
5. Independent samples t-test
6. One-Way ANOVA
7. Cronbach's Alpha (reliability test)
8. Correlation
9. Exporting SPSS output to Excel
10. Chi-Square
11. Factor Analysis / PCA
12. MANOVA
13. Levene's test
14. Importing from Excel to SPSS
15. How to identify outliers
16. Test for normality
17. Kolmogorov-Smirnov (KS test)
18. Shapiro-Wilk



DISCLAIMER!

Hello my friend, how are you? We are really glad you are here.

So if you reached this e-book we can only assume one thing: **for some weird or unfortunate reason in life, you have to conduct a few statistical tests on IBM SPSS, but you have no idea how to do them.** And this is freaking you out.

Is this a fairly accurate description?

Well, well, well... Isn't this your lucky day? Do not worry, my dear friend. We hope to help you out. We are going to explain to you how to conduct a few tests on **IBM SPSS Statistics** and also how to interpret them.

But before we start, let us make something very clear:

**This
is not a
statistics book.**

**This e-book is a quick guide to help you conduct a few tests.
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It will surely be enough for you, depending on what your needs are and the level of the project you are involved in.

**For a more in-depth understanding,
you will need statistics books.**

Alright, now that we are clear and on the same page, we feel like we can get the music going. Shall we rock on to the introduction stage?

STOP CRYING YOUR HEART OUT

Artist: Oasis

WELCOME!

My friend, do you play guitar? No? (Honestly, what is happening to humanity...) Ok, but have you ever tried to learn? If you haven't, let us tell you how it goes: The first six months are terrible!

You will feel like the dumbest person on the planet as you try to move from a simple "G major" chord to an "A major" chord, then to a "D major" chord (with these three chords you can play 1,267 songs from the "Ramones") and it will sound horrible! That's when many people simply give up...

But... If you persist you will eventually learn and develop the amazing ability to play an instrument and carry that ability for the rest of your life.

STATISTICS IS EXACTLY THE SAME!

If you hang on, we can guarantee you that statistics is pretty amazing! (Ok, maybe not enough to impress someone during a date and it may ruin your social skills. But other than that, it's great!) So our job here is to show you an initial view of statistics and how it can be EASY and pretty FUN!

Hopefully, by the end you will have fallen in love with numbers!

BUT PLEASE KEEP IN MIND: This e-book is only a quick guide to support students during research courses or while conducting their own research. For a more in-depth understanding of tests, we highly recommend you to complement it with statistics and research methods books!



So for further explanations and more in-depth understanding of the topics, we would personally recommend the following amazing literature:

Especially this one!

- Field, A. & Miles, J. Discovering Statistics Using SAS. Sage.
- Field, A. & Hole, G. How to Design and Report Experiments. Sage.
- Field, A. An Adventure in Statistics: The Reality Enigma. Sage.

As you can see, we only recommend books from **Andy Field**.

Why? Well, simply because, in our modest opinion, he is by far the best author on the topic. And... like us, he is also a huge music fan and tries to use musical examples in almost all of his publications as well.

Sounds pretty good, right?

So yeah, welcome to the show, we hope that this publication will make your life a bit easier, facilitate your analysis and preserve your sanity! Oh, we also hope you like the music!

And... you can try for yourself every example shown in this e-guide!
Download the data sets at **LiveInnovation.org** and the stage is yours.

**Are
you ready to
start listening to...**

**The
Melody of
STATISTICS?**



ONES AND ZEROS

Artist: Jack Johnson

Types of quantitative variables.

And how to insert them on **IBM SPSS**.



Before we start having a great time analyzing data (please don't judge us for saying this- and yes, we do have friends), one must understand what type of data we have in hands. For one main purpose: the type of data influences the type of analysis that can be conducted. And this is VERY important! VERY important (It's like bass players. You may not like them, but they are VERY IMPORTANT, know what we mean?).

Look at these numbers: 1, 2, 3, 4, 5, 6... They are just **numbers**, right? Yup. Good!

But from now on we will call them by a different name: DATA. And look how interesting: **they can represent many different things.**

And how are they different?

Well, the type of data depends on two main factors: **THEIR PURPOSE** and **HOW THEY WERE MEASURED**. Do not forget this, so we are going to repeat, ok? The type of data will depend on THEIR PURPOSE and HOW THEY WERE MEASURED.

Ok, now we will repeat, but in bold, all caps, italics and in orange (again) hoping that the incredible visual effect will help you memorize: **THE TYPE OF DATA WILL DEPEND ON THEIR PURPOSE AND HOW THEY WERE MEASURED.**

And what are the different types? Let's have a look at the four main types of VARIABLES and the main things you need to know:

What are the types of variables?

Categorical Variables

Nominal data

Description: A number which simply represents or indicates an object of investigation. It does NOT represent the magnitude of what is being measured (e.g. Types of music, with 1=jazz, 2=pop, 3=hip hop, etc.). You CANNOT calculate with these numbers. (Honestly: $1 (\text{jazz}) + 2 (\text{pop}) = 3 (\text{hip hop})$?! Surely not!)

Ordinal data

Description: Data which provides information regarding the order in which a phenomenon has occurred. However, it does not inform about the distance between the measured values (e.g. 1=soprano, 2=alto, 3=tenor, 4=bass, which are ordered by the pitch of the voices). You still CANNOT calculate with these numbers.

Quantitative Variables

Interval data

Description: Similar to ordinal except the intervals between each value are equally divided. Most importantly, the values do represent the magnitude of what is being measured (and hence, we are now allowed to add and subtract values). However, the 0 point of scales, in theory, is unknown (e.g. **Likert-type scales**).

Ratio data

Description: It has the same properties as interval data, but there is an absolute 0 (e.g. Length of a song in minutes and seconds). As a consequence, you can now also calculate ratios (e.g. one song being 20% longer than another one).



Likert-type Scale Alert!

Ok, ok, ok...

We know we told you in the beginning that this is NOT A STATISTICS BOOK. And it is not. However, we feel like we need to give you a bit more information on the incredible **Likert-type scales**.

So...

Essentially, **Likert-type scales** are rating scales which contain a series of "anchors" (displayed numerically or in words) that allow numerical measurements of an item or question. **For example:**

Fully disagree - Disagree - Indifferent - Agree - Fully agree

1 Never - 2 Rarely - 3 Sometimes - 4 Often - 5 Always

And normally we classify Likert-type scales as interval scales!

HOWEVER...



Strictly speaking, for **Likert-scale data** to be considered interval data, we have to add a numeric scale to the textual descriptions of the scale. E.g. "fully agree = 100%, agree = 80%, rather agree = 60%", etc. Otherwise, we cannot be sure the difference between e.g. "fully agree" and "agree" is the same as between "agree" and "rather agree" for all participants of a survey...

And let me tell you: in the world of statistics, this discussion creates a massive debate!

In case you are curious to know more about this intriguing discussion and gossip in the world of statistics, I suggest reading the following articles:

- Bishop, P. A., & Herron, R. L. (2015). Use and misuse of the Likert item responses and other ordinal measures. *International journal of exercise science*, 8(3), 297.
- Carifio, J., & Perla, R. (2008). Resolving the 50-year debate around using and misusing Likert scales. *Medical education*, 42(12), 1150-1152.

HOW SATISFIED ARE YOU WITH THIS EXPLANATION ON LIKERT-TYPE SCALES?

1 Very dissatisfied - 2 Dissatisfied - 3 Indifferent - 4 Satisfied - 5 Very satisfied



NOW THAT YOU ARE THE MASTER OF VARIABLES, LET ME ASK YOU A QUESTION:

What is the first thing you do when you grab a guitar to play a song? You check to see if it is in tune, right? If it isn't, you tune it. In other words, don't ever just start playing the guitar without having it tuned. It will sound horrible. So you do your preparation first, then the fun begins.

In statistics we do exactly the same.

Before any analysis, the first step is always to format and organize your data.

And what is that exactly? Well, you need to create all variables from your questionnaire on the software you are using. You tell the software all the information it needs and insert the data properly.

This is "fine tuning before playing a song" in statistics. Got it?

In the case of **IBM SPSS**, the very first thing you should do when you have all your data and conduct any type of analysis is to **PREPARE THE VARIABLE SHEET**.

This is an extremely important step, so that your tests can run properly and you can interpret your findings later on accurately. Another way to take it, is as if you are preparing a house before receiving guests (weird analogy, but we hope you get it).

So every time you have all your data, play some good music in the background, pour yourself a nice drink and sit cozy somewhere. Then... prepare the variable sheet on your software with all details you need.



HERE IS HOW
TO DO IT!



1

Once you start the SPSS software, click in the bottom at **“Variable View”**. This is where you will “prepare the variable sheet”.

A) Name of variable **B) Label of values** **C) Define the measure**

Variable view

2

Once you are on the **“variable view”**, the most important elements to edit here are: “name of variable”, “values” and “measure”.

A)

Name the variable: Here you should label the variable that you have measured.



IMPORTANT: SPSS does NOT allow spaces between words here (Not sure why...). So variables should be labeled, for example, with underlines.

Example: Favorite Music Genre = “Favorite_Music_Genre”.



IMPORTANT 2: After you finish your analysis and you will write your paper and report your results, remember to write clearly the name of the variables. Do not use codes or underlines, otherwise your client or reader may not understand.

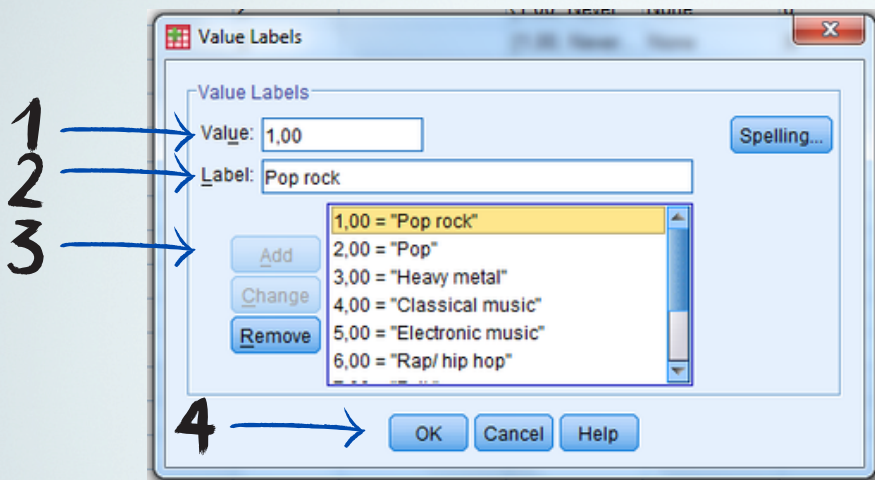
Example: change back from “Favorite_Music_Genre” to Favorite Music Genre.



- B)** **Label the values:** Here you will define the value of each number. Once you click on the white box, the window below will simply pop up. Simply write the value and the desired label and "add". Once you are done, click on "ok".



1. **You add the value**
2. **You write the label of the value**
3. **Click "add".**
4. **Once all values are inserted, click on "ok".**

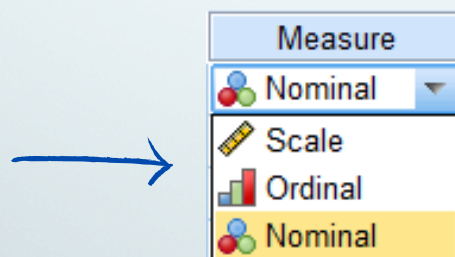


ATTENTION!

In case your variables are **quantitative**, and therefore your measure is "**scale**", I suggest the following:

- **If using Likert-type scales**, include the label and value of each anchor (e.g. 1 = Fully disagree, 2= Disagree).
- If you have **ratio variables** (total number of something), there is no need to insert labels.

- C)** **Define measure:** For each variable, you should define what type of data it is. So once you click on "Measure", SPSS will give you three options: Nominal, ordinal or scale (Interval or ratio) .



Now, you might ask yourself, which measure is my variable?

Well, generally:

- All your **multiple choice** questions will be "**Nominal**".
- All your **ranking** questions will be "**Ordinal**".
- All your **Likert-Type scales** will be "**Scale**".



Alright, great stuff!

So by now you should have understood:



- 1** The different types of variables.
- 2** The importance of always preparing the software prior to an analysis.
- 3** How to insert variables and all your data into SPSS.



SPSS Tutorial playlist series.

In case you feel like you still need some further support on **how to insert your data into SPSS**, do not forget to watch the tutorial video with Francisco Tigre Moura on the SPSS playlist on the YouTube channel of [LiveInnovation.org](https://www.LiveInnovation.org).



HOW OFTEN

Artist: Ben E. King

Descriptive statistics.

And how to conduct it on **IBM SPSS**.



Thinking Out Loud, during music festivals.

I am not going to lie: I love "people watching". My friend, don't judge. It's just that observing the weird behaviors of others can be much more entertaining than watching a movie, traveling or doing underwater camping.


I don't know, it's just that sometimes people are simply so interestingly strange. And hey, there is no better place to go people watching than music festivals. I think it is the mixture of a sense of freedom, combined with music, alcohol and other questionable substances. It all simply makes people go wild!

I remember the last time I visited a festival, there was so much to see: people fighting, couples breaking up, others vomiting, some falling on the dirt, others clearly having sex in tents (we could all tell by the noises), some being taken by the medical team...

And I haven't even mentioned the music. Clearly the fans of the different genres had opposite tastes. They dressed differently and the songs contained very different words. I had never heard so often the work F**** being sung on songs. Is this a new trend? Crazy.

I mean, I will tell you: for someone like me that enjoys "people watching", attending music festivals is a treat!

But all those crazy scenes made me wonder if I could actually calculate those behaviors, and understand how frequently they happened on that festival. For example:

- 
- Q1. Which percentage of visitors vomited during the festival?**
 - Q2. Which percentage of couples broke up during the festival?**
 - Q3. What was the average time of sex in the tents?**
 - Q4. On average, how often did bands say the word F*** on their songs?**

These questions were way too interesting to be left alone. I had to find a way to answer them. So I started wondering if there are any descriptive statistics tests that could provide me with a general overview of the audience...



Wait... What is Descriptive Statistics?

Another disclaimer: Dear friend, we made it quite clear at the start: this is not a statistics book. So, again, we will not provide a detailed explanation of the mathematical rationale of the tests. Here, we will only provide a brief explanation, enough for you to remember what the test is all about. And importantly, how to conduct and interpret it on SPSS.

Hope we are still friends?

Great! Glad to know we are clear and still friends. So then let us us get back to it.

So... In general terms, descriptive statistics are analyses, which (as the name "surprisingly" suggests) allow us to describe, or summarize, patterns from a data set we have collected. It is pretty simple tests, nothing too fancy.

Some examples of descriptive statistics tests are: frequency distributions (percentages), averages (means), mode and median.

Perfect! Now that we got that clear, shall we look at how to answer those four questions about crazy behaviors during music festivals?



Frequency distribution (percentage)

The first two questions regarding the festival that we would like to answer are:

Q1. Which percentage of visitors vomited during the festival?

Q2. Which percentage of couples broke up during the festival?

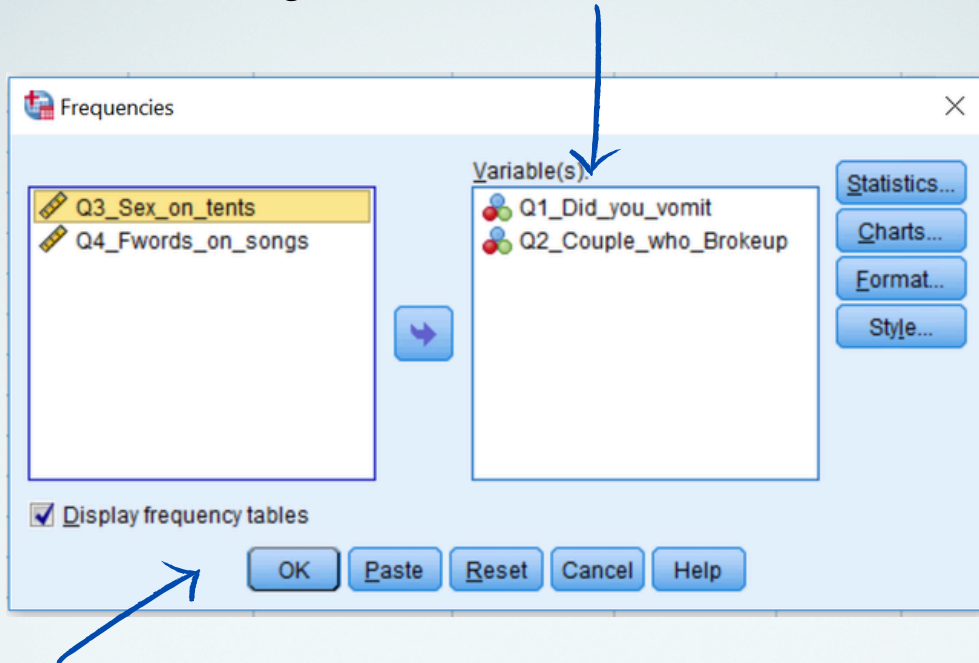
And how will we answer them? by running frequencies (percentages).

And here is how to do it:



1

On the top menu of SPSS, you must click on **"Analyze"**, then **"Descriptive Statistics"**, then **"Frequencies"**. The window shown below will appear, then, simply choose the variables that you wish to analyze ("Did you vomit" and "Couple who broke up"), drag them to the box on the right and click on "ok".



Results

So the first window we see gives an overview of all responses. **N** always refers to the sample size. In this case, for both questions, there were 75 respondents (75 people that were at the festival).

		Statistics	
		Q1_Did_you_vomit	Q2_Couple_who_Brokeup
N	Valid	75	75
	Missing	0	0

The second table shows the frequency of respondents (the total number of answers per category) and the percent (the percentage of respondents from each category in relation to the total of respondents). Ex: out of the 75 respondents, 48 (or 64%) had vomited during the festival. On the positive note, only 2 respondents (or 2.7%) broke up after the festival.

		Q1_Did_you_vomit		
		Frequency	Percent	Valid Percent
Valid	Yes, vomited	48	64,0	64,0
	Nope, no vomit	27	36,0	36,0
Total		75	100,0	100,0

		Q2_Couple_who_Brokeup		
		Frequency	Percent	Valid Percent
Valid	We are still together	73	97,3	97,3
	We broke up	2	2,7	2,7
Total		75	100,0	100,0

THIS IS JUST THE START.

The full e-book walks you through every major statistical test you'll need for your thesis, step by step, with real data, screenshots, and zero formulas to memorize: *Descriptive Statistics, Chi-Square, Correlation, Independent Samples t-Test, Paired Samples t-Test, ANOVA, and Cronbach's Alpha.*

Each one explained through music analogies and plain English. No prior SPSS experience needed.

€4,99. Less than a coffee.

The Melody of **STATISTICS.**



GET THE FULL E-BOOK

