

Emperical Methods for Marketing Research and Analytics Using

Prof. Dr. Martin Wetzels
Maastricht University



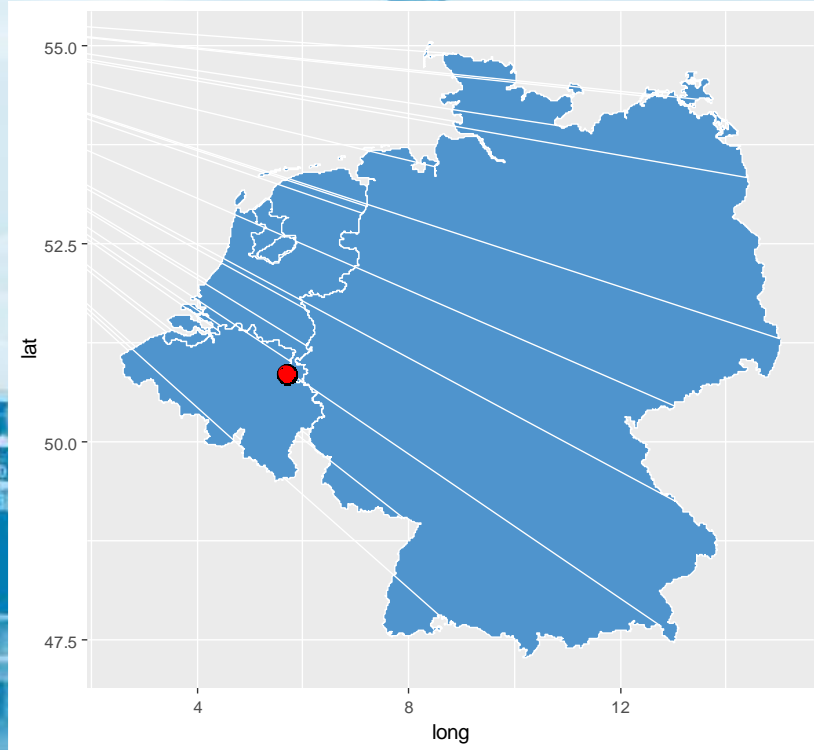
About Me



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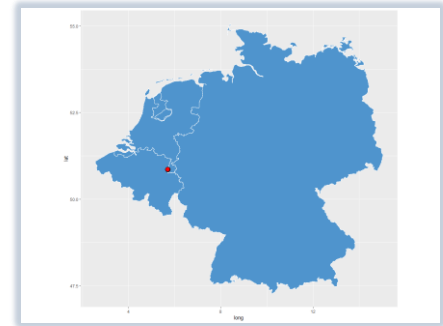
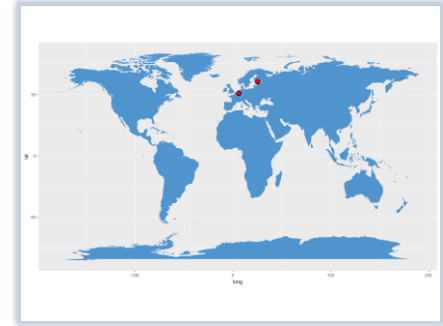


Maastricht



MAPS in R

```
1 library(ggplot2)
2 library(ggmap)
3 library(maps)
4 library(mapdata)
5
6 WORLD<-map_data("worldHires")
7 P1<-ggplot() + geom_polygon(data=WORLD, aes(x=long, y = lat, group = group), fill="steelblue3") +
8   coord_fixed(1.25)
9
10 PTS <- data.frame(
11   long = c(5.6910, 24.9458),
12   lat = c(50.8514, 60.1921),
13   names = c("Maastricht", "Helsinki"),
14   stringsAsFactors = FALSE
15 )
16
17 P1 +
18   geom_point(data = PTS, aes(x = long, y = lat), color = "black", size = 5) +
19   geom_point(data = PTS, aes(x = long, y = lat), color = "red", size = 4)
20
21
22 NL<-map_data("worldHires", c("Netherlands", "Germany", "Belgium"))
23 P10<-ggplot() + geom_polygon(data=NL, aes(x=long, y = lat, group = group), fill="steelblue3", color="white") +
24   coord_fixed(1.5)
25
26 PTS <- data.frame(
27   long = 5.6910,
28   lat = 50.8514,
29   names = "Maastricht",
30   stringsAsFactors = FALSE
31 )
32
33 P10 +
34   geom_point(data = PTS, aes(x = long, y = lat), color = "black", size = 5) +
35   geom_point(data = PTS, aes(x = long, y = lat), color = "red", size = 4)
36
37
38 NL<-map_data("worldHires", xlim=c(-10,10), ylim=c(30,55))
39 P10<-ggplot() + geom_polygon(data=NL, aes(x=long, y = lat, group = group), fill="steelblue3", color="white") +
40   coord_fixed(1.5)
41
42 PTS <- data.frame(
43   long = 5.6910,
44   lat = 50.8514,
45   names = "Maastricht",
46   stringsAsFactors = FALSE
47 )
48
49 P10 +
50   geom_point(data = PTS, aes(x = long, y = lat), color = "black", size = 5) +
51   geom_point(data = PTS, aes(x = long, y = lat), color = "red", size = 4)
52
53
```



WORDS About Me

▶ Research Profile

Services Strategy, Service Marketing and Management, Relationship Management, Marketing Channels and Supply Chains, Supply Chain Management, B2B Marketing, Technology, Digital Marketing and Social Media and Marketing Research.

▶ Publications

More than 100 journal articles in academic journals and more than 130 contributions to conferences. Supervised 25 PhDs to completion.

About Me

https://scholar.google.de/citations?user=x3L7H_wAAAAJ&hl=en&oi=ao



Martin Wetzels

FOLLOWING

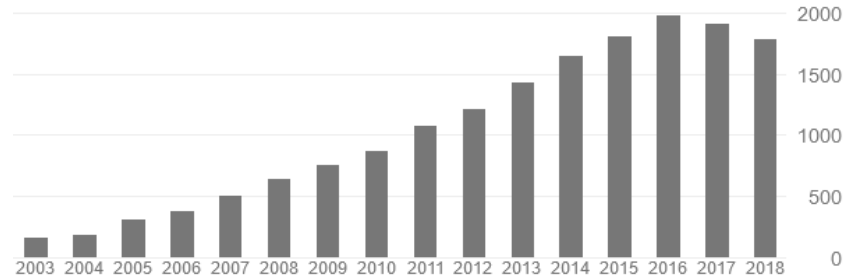
Professor in Marketing and Supply Chain Research, [Maastricht University](#)
Verified email at maastrichtuniversity.nl

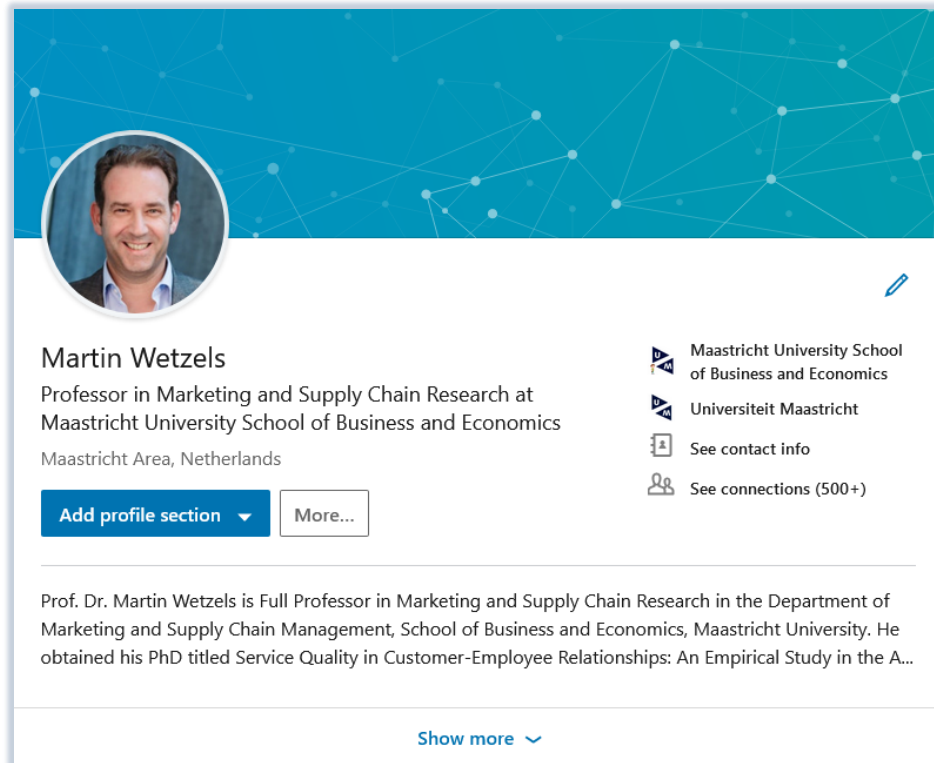
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The image shows a LinkedIn profile card for Martin Wetzels. At the top left is a circular profile picture of a man with short dark hair, smiling. The background of the card is a teal color with a white network graph pattern. Below the profile picture, the name "Martin Wetzels" is displayed in a bold, dark font. Underneath the name, his current position is listed: "Professor in Marketing and Supply Chain Research at Maastricht University School of Business and Economics". Below that, his location is given as "Maastricht Area, Netherlands". To the right of the name and position, there are three icons with corresponding text: a building icon for "Maastricht University School of Business and Economics", another building icon for "Universiteit Maastricht", and a document icon for "See contact info". Below these is a person icon for "See connections (500+)". At the bottom left of the profile section, there are two buttons: a blue button with a white downward arrow labeled "Add profile section" and a white button with a grey border labeled "More...". Below the profile section, there is a short bio paragraph: "Prof. Dr. Martin Wetzels is Full Professor in Marketing and Supply Chain Research in the Department of Marketing and Supply Chain Management, School of Business and Economics, Maastricht University. He obtained his PhD titled Service Quality in Customer-Employee Relationships: An Empirical Study in the A...". At the bottom right of the card, there is a "Show more" link with a downward arrow.

Martin Wetzels
Professor in Marketing and Supply Chain Research at
Maastricht University School of Business and Economics
Maastricht Area, Netherlands

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Prof. Dr. Martin Wetzels is Full Professor in Marketing and Supply Chain Research in the Department of Marketing and Supply Chain Management, School of Business and Economics, Maastricht University. He obtained his PhD titled Service Quality in Customer-Employee Relationships: An Empirical Study in the A...

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Stephan Ludwig, Ko de Ruyter, Mike Friedman, Elisabeth C. Brüggen,
Martin Wetzels, & Gerard Pfann

More Than Words: The Influence of Affective Content and Linguistic Style Matches in Online Reviews on Conversion Rates

Customers increasingly rely on other consumers' reviews to make purchase decisions online. New insights into the customer review phenomenon can be derived from studying the semantic content and style properties of verbatim customer reviews to examine their influence on online retail sites' conversion rates. The authors employ text mining to extract changes in affective content and linguistic style properties of customer book reviews on Amazon.com. A dynamic panel data model reveals that the influence of positive affective content on conversion rates is asymmetrical, such that greater increases in positive affective content in customer reviews have a smaller effect on subsequent increases in conversion rate. No such tapering-off effect occurs for changes in negative affective content in reviews. Furthermore, positive changes in affective cues and increasing congruence with the product interest group's typical linguistic style directly and conjointly increase conversion rates. These findings suggest that managers should identify and promote the most influential reviews in a given product category, provide instructions to stimulate reviewers to write powerful reviews, and adapt the style of their own editorial reviews to the relevant product category.

Keywords: online customer reviews, affective content, linguistic style match, conversion rate, Internet marketing

Recent Work

Ludwig et al. (2014)



SPECIAL ISSUE: IS FOR SYMBOLIC ACTION

TAKE THEIR WORD FOR IT: THE SYMBOLIC ROLE OF LINGUISTIC STYLE MATCHES IN USER COMMUNITIES¹

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The Extended Transportation-Imagery Model: A Meta-Analysis of the Antecedents and Consequences of Consumers' Narrative Transportation

TOM VAN LAER
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MARTIN WETZELS

Stories, and their ability to transport their audience, constitute a central part of human life and consumption experience. Integrating previous literature derived from fields as diverse as anthropology, marketing, psychology, communication, consumer, and literary studies, this article offers a review of two decades worth of research on narrative transportation, the phenomenon in which consumers mentally enter a world that a story evokes. Despite the relevance of narrative transportation for storytelling and narrative persuasion, extant contributions seem to lack systematization. The authors conceive the extended transportation-imagery model, which provides not only a comprehensive model that includes the antecedents and consequences of narrative transportation but also a multidisciplinary framework in which cognitive psychology and consumer culture theory cross-fertilize this field of inquiry. The authors test the model using a quantitative meta-analysis of 132 effect sizes of narrative transportation from 76 published and unpublished articles and identify fruitful directions for further research.



ELSEVIER



CrossMark

Journal of Retailing 91 (1, 2015) 34–49

Journal of
Retailing

Unraveling the Personalization Paradox: The Effect of Information Collection and Trust-Building Strategies on Online Advertisement Effectiveness

Elizabeth Aguirre^{a,*}, Dominik Mahr^a, Dhruv Grewal^b, Ko de Ruyter^a, Martin Wetzels^a

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^b Toyota Chair in E-Commerce and Electronic Business, Department of Marketing, Babson College, 213 Malloy Hall, Babson Park, MA 02457, United States

Abstract

Retailers gather data about customers' online behavior to develop personalized service offers. Greater personalization typically increases service relevance and customer adoption, but paradoxically, it also may increase customers' sense of vulnerability and lower adoption rates. To demonstrate this contradiction, an exploratory field study on Facebook and secondary data about a personalized advertising campaign indicate sharp drops in click-through rates when customers realize their personal information has been collected without their consent. To investigate the personalization paradox, this study uses three experiments that confirm a firm's strategy for collecting information from social media websites is a crucial determinant of how customers react to online personalized advertising. When firms engage in overt information collection, participants exhibit greater click-through intentions in response to more personalized advertisements, in contrast with their reactions when firms collect information covertly. This effect reflects the feelings of vulnerability that consumers experience when firms undertake covert information collection strategies. Trust-building marketing strategies that transfer trust from another website or signal trust with informational cues can offset this negative effect. These studies help unravel the personalization paradox by explicating the role of information collection and its impact on vulnerability and click-through rates. © 2014 New York University. Published by Elsevier Inc. All rights reserved.

Unveiling What Is Written in the Stars: Analyzing Explicit, Implicit, and Discourse Patterns of Sentiment in Social Media

FRANCISCO VILLARROEL ORDENES
STEPHAN LUDWIG
KO DE RUYTER
DHRUV GREWAL
MARTIN WETZELS

Deciphering consumers' sentiment expressions from big data (e.g., online reviews) has become a managerial priority to monitor product and service evaluations. However, sentiment analysis, the process of automatically distilling sentiment from text, provides little insight regarding the language granularities beyond the use of positive and negative words. Drawing on speech act theory, this study provides a fine-grained analysis of the implicit and explicit language used by consumers to express sentiment in text. An empirical text-mining study using more than 45,000 consumer reviews demonstrates the differential impacts of activation levels (e.g., tentative language), implicit sentiment expressions (e.g., commissive language), and discourse patterns (e.g., incoherence) on overall consumer sentiment (i.e., star ratings). In two follow-up studies, we demonstrate that these speech act features also influence the readers' behavior and are generalizable to other social media contexts, such as Twitter and Facebook. We contribute to research on consumer sentiment analysis by offering a more nuanced understanding of consumer sentiments and their implications.

Keywords: consumer sentiment, speech act theory, text mining, online reviews, sales ranks, social media

Elizabeth Aguirre, Dominik Mahr, Ko de Ruyter, Dhruv Grewal, Jan Pelsler,
& Martin Wetzels

The Effect of Review Writing on Learning Engagement in Channel Partner Relationship Management

To develop the knowledge and skill sets of channel partner firms, manufacturers increasingly introduce learning programs as part of their relationship management strategies. However, the engagement of channel partners in these programs tends to be low. The current research, conducted in collaboration with a *Fortune* 100 information technology company, examines ways to strengthen learning engagement. In accordance with self-regulated learning theory, the authors propose and demonstrate that when channel partners write reviews of a learning module that they attended, beyond providing ratings, they are better able to reflect on the relevance of their learning experience and are further engaged in learning activities. The audience and focus of these written reviews determine the engagement of the channel partner sales personnel; therefore, review writing is a valuable, informal mechanism to motivate them. These effects are moderated by characteristics of both the channel partner (salesperson's learning orientation and identification with the manufacturer) and the relationship with the manufacturer (length and exclusivity).

Keywords: partner relationship management, self-regulated learning, feedback systems, review writing

Online Supplement: <http://dx.doi.org/10.1509/jm.15.0121>

Journal of the Academy of Marketing Science
<https://doi.org/10.1007/s11747-018-0585-6>

ORIGINAL EMPIRICAL RESEARCH



The emotional review–reward effect: how do reviews increase impulsivity?

Scott Motyka¹ · Dhruv Grewal² · Elizabeth Aguirre³ · Dominik Mahr⁴ · Ko de Ruyter^{5,6} · Martin Wetzels⁷

Received: 7 May 2017 / Accepted: 23 April 2018
© Academy of Marketing Science 2018

Abstract

A growing reliance on customer reviews prompts firms to develop strategies to encourage customers to post online reviews of their products. However, little research investigates the behavioral consequences of writing a review. The act of sharing personal opinions through reviews is a rewarding experience and makes customers feel socially connected. With an application of reverse alliesthesia theory, the current study predicts that such rewarding experiences drive online reviewers to seek other rewards, such as impulsive buying. Three lab-based and two field studies demonstrate such an emotional review–reward effect: sharing emotional information in the public realm of customer reviews, rather than forming similar opinions privately, drives participants to make more impulsive buying decisions.

Keywords Reverse alliesthesia · Impulsivity · Reward · Online reviews

CORRECTED PROOF

Cutting through Content Clutter: How Speech and Image Acts Drive Consumer Sharing of Social Media Brand Messages

Francisco Villarroel Ordenes ✉, Dhruv Grewal, Stephan Ludwig, Ko de Ruyter,
Dominik Mahr, Martin Wetzels

Journal of Consumer Research, ucy032, <https://doi.org/10.1093/jcr/ucy032>

Published: 09 April 2018

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A Journey of WORDS

Stephan Ludwig, Ko de Ruyter, Mika Friedman, Elisabeth C. Brüggen,
Martin Wetzels, & Gerard Pfann

More Than Words: The Influence of Affective Content and Linguistic Style Matches on Online Reviews on Conversion Rates

Customers increasingly rely on other consumers' reviews to make purchase decisions online. New insights into the customer review phenomenon can be derived from studying the semantic content and style properties of verbatim customer reviews to examine their influence on online retail sales conversion rates. The authors employ text mining to extract changes in affective content and linguistic style properties of customer book reviews on Amazon.com. A

Journal of
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Unveiling What Is Written in the Stars: Analyzing Explicit, Implicit, and Discourse Patterns of Sentiment in Social Media

FRANCISCO VILLARROEL ORDENES
STEPHAN LUDWIG
KO DE RUYTER
DHURU GREWAL
MARTIN WETZELS

J C R
Journal of Consumer Research
Reveals consumer interests, speech act theory, text mining, online reviews, sales letters, social media

Words Don't Come Easy to Me



The Extended Transportation-Imagery Model: A Meta-Analysis of the Antecedents and Consequences of Consumers' Narrative Transportation

TOM VAN LAER
KO DE RUYTER
LUCA M. VISCONTI
MARTIN WETZELS

J C R
Journal of Consumer Research



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Quarterly

SPECIAL ISSUE: IS FOR EVIDENCE ACTION

TAKE THEIR WORD FOR IT: THE SYMBOLIC ROLE OF LINGUISTIC STYLE MATCHES IN USER COMMUNITIES'

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Spreading the Word...

CORRECTED PROOF

Cutting through Content Clutter: How Speech and Image Acts Drive Consumer Sharing of Social Media Brand Messages

Francisco Villarroel Ordenes ✉, Dhruv Grewal, Stephan Ludwig, Ko de Ruyter,
Dominik Mahr, Martin Wetzels

Journal of Consumer Research, ucy032, <https://doi.org/10.1093/jcr/ucy032>

Published: 09 April 2018

J C R
Journal of Consumer Research

Course Outline

Session:

DAY 1

Session 1

Session 2

DAY 2

Session 3

Session 4

DAY 3

Session 5

Session 6

TOPIC:

INTRODUCING MULTIVARIATE ANALYSIS AND R

USING R FOR BASIC ANALYSIS

USING R FOR AN(C)OVA

USING R FOR REGRESSION ANALYSIS

USING R FOR SCALING AND FACTOR ANALYSIS

USING R FOR SEM and PLS PATH MODELING

About You



Introducing Multivariate Statistics and



Prof. Dr. Martin Wetzels
Maastricht University



About R



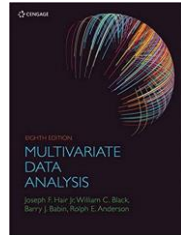
Course Objectives

Introducing multivariate data analysis tools, showing their objectives, assessing the underlying assumptions, discussing the key findings and showing their application in SPSS () and R (), as an open source and integral platform.

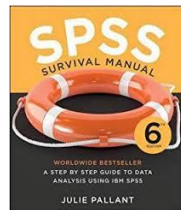
Literature



Malhotra, N. (2010). *Marketing Research: An Applied Orientation*. Upper Saddle River: Pearson/Prentice-Hall.



Hair, J.F. Jr., Black, W.C., Babin, B.J. and Anderson, R.E. (2018). *Multivariate Data Analyses*. Cengage Learning.



Pallant, J. (2016). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS for Windows*. Maidenhead: Open University Press/McGraw-Hill.

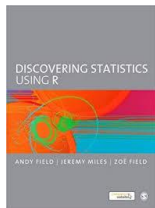
Literature



Muenchen, R.A. (2009). *R for SAS and SPSS Users*. New York, NY: Springer.



Chapman, C., & Feit, E. M. (2015). *R for Marketing Research and Analytics*. New York, NY: Springer.



Field, A., Miles, J. and Field, Z. (2012). *Discovering Statistics using R*. Los Angeles, CA: Sage Publications.

Data Scientist

Davenport and Patil (2012)

The screenshot shows the Harvard Business Review website. At the top left is the Harvard Business Review logo. To its right is a search bar with a magnifying glass icon and the word "SEARCH". Below the logo is a navigation menu with links for "THE MAGAZINE", "BLOGS", "AUDIO & VIDEO", "BOOKS", "WEBINARS", and "COURSE". Below the navigation menu is a banner for "Guest | limited access" with a link to "Register today and save 20%* off your first order! Details". The main content area features the article title "Data Scientist: The Sexiest Job of the 21st Century" by Thomas H. Davenport and D.J. Patil. Below the title is a "Comments (0)" section with social media sharing icons for email, Twitter, LinkedIn, Facebook, and a plus sign for more options. The article text begins with "Care and Feeding" and discusses the need for data scientists to have freedom and close relationships with business executives. On the right side of the article, there is a "RELATED" section with a link to "Executive Summary" and an "ALSO AVAILABLE" section with a link to "Buy PDF".

Harvard Business Review

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THE MAGAZINE

October 2012

Data Scientist: The Sexiest Job of the 21st Century

by Thomas H. Davenport and D.J. Patil

Comments (0)

Care and Feeding

Data scientists don't do well on a short leash. They should have the freedom to experiment and explore possibilities. That said, they need close relationships with the rest of the business. The most important ties for them to forge are with executives in charge of products and services rather than with people overseeing business functions. As the story of Jonathan Goldman illustrates, their greatest opportunity to add value is not in creating reports or presentations for senior executives but in innovating with customer-facing products and processes.

RELATED

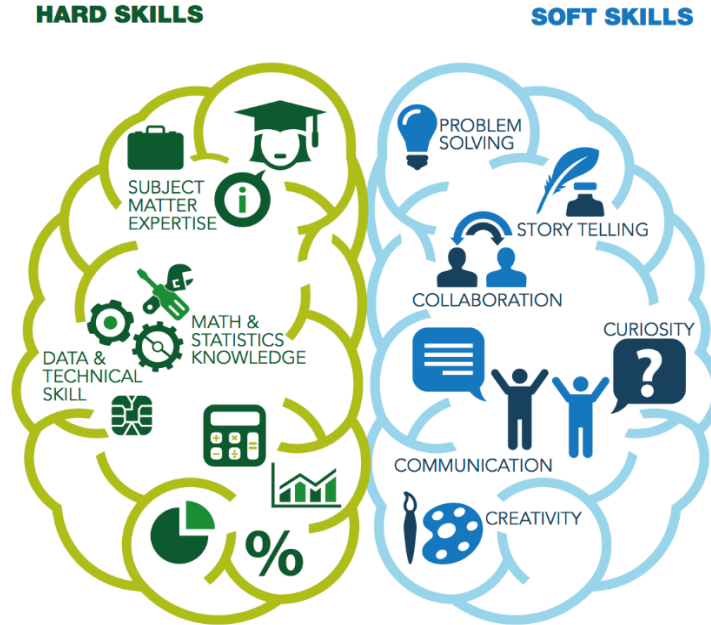
[Executive Summary](#)

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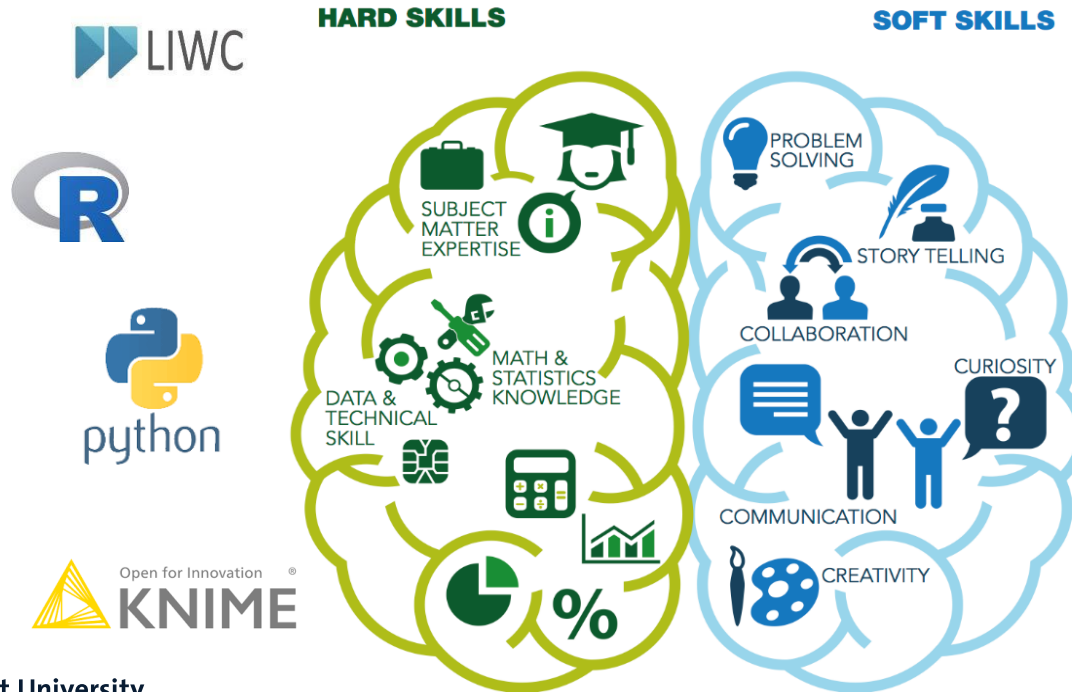
New Skills for a New World

Tech Partnership and SAS (2014, p. 9)



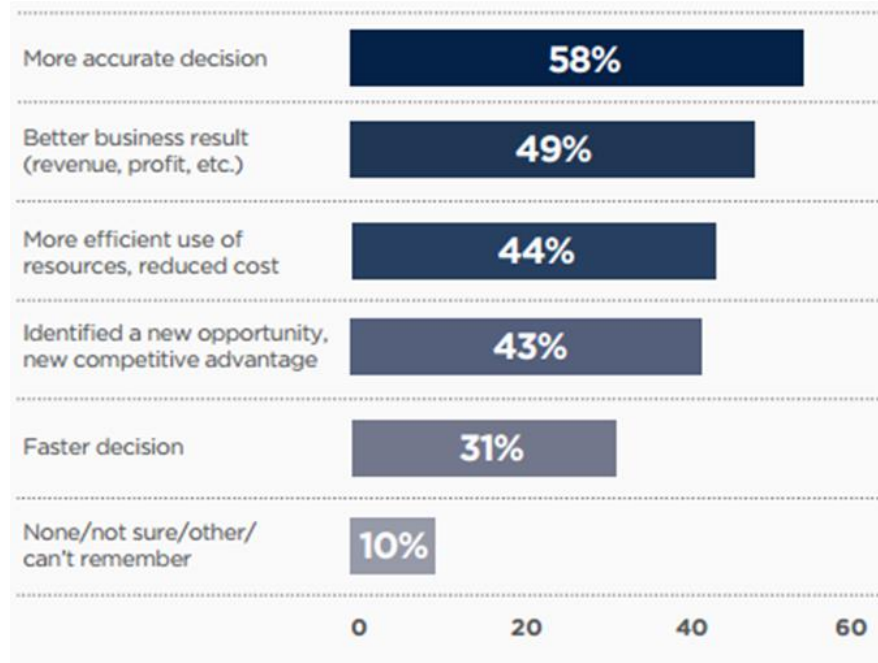
Hard Skills and Soft Skills

Tech Partnership and SAS (2014, p. 9)



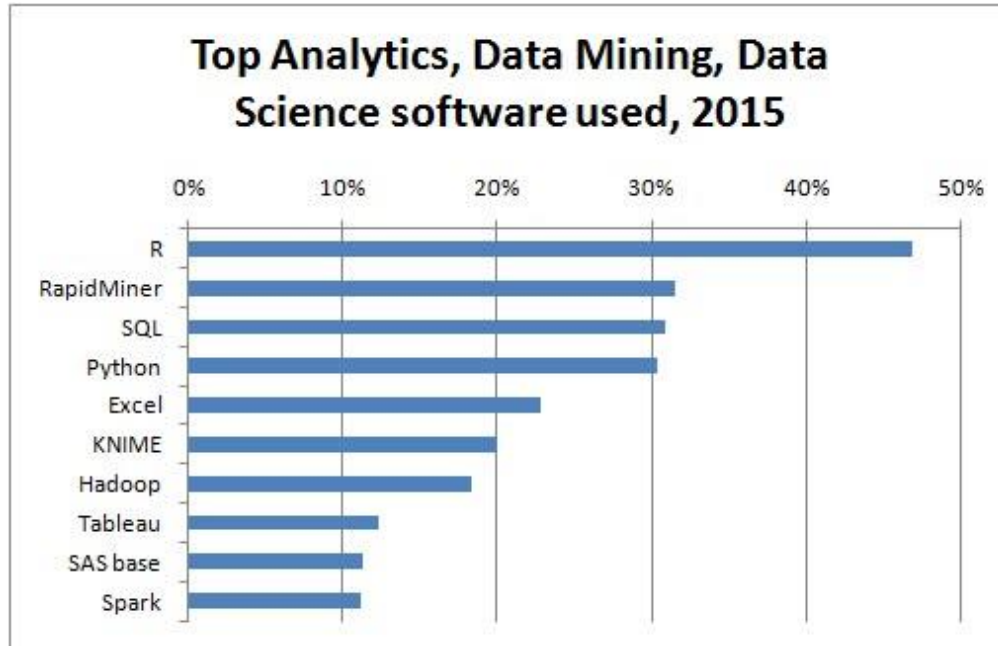
Big Data Marketing

<http://www.teradata.com>



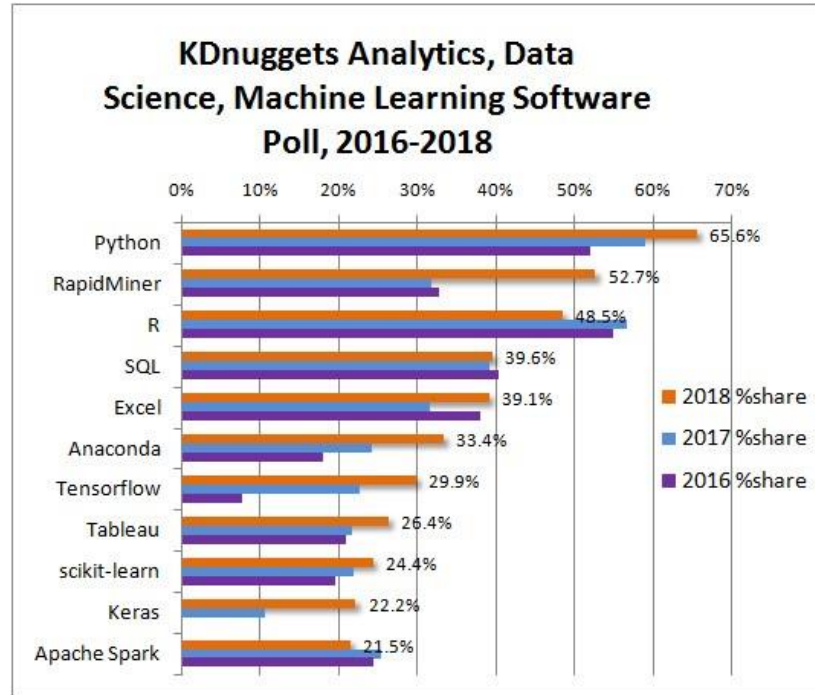
Top 10 Tools

<http://www.kdnuggets.com/2015/05/poll-r-rapidminer-python-big-data-spark.html>



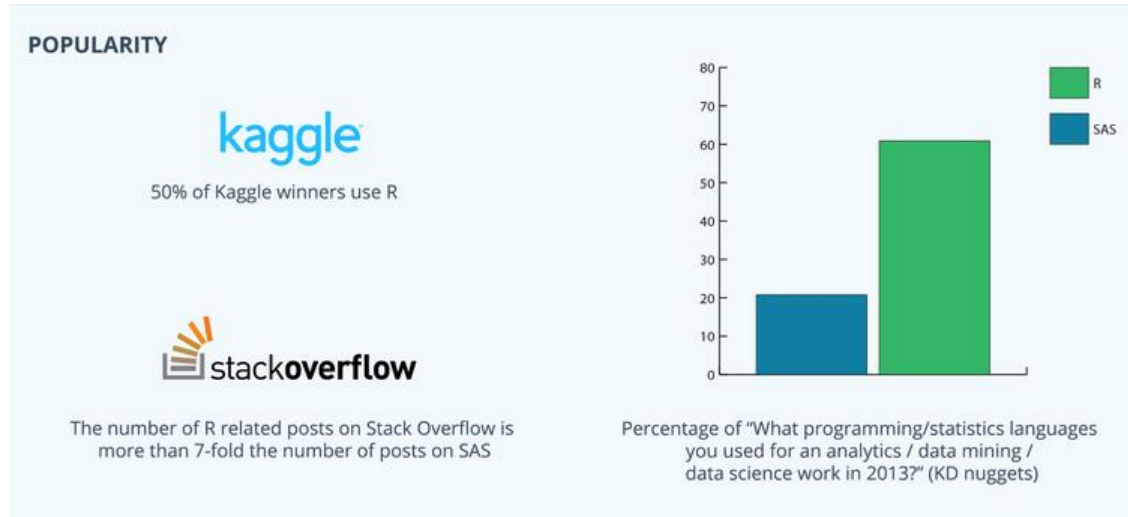
Top Analytics Tools

<https://www.kdnuggets.com/2018/05/poll-tools-analytics-data-science-machine-learning-results.html>



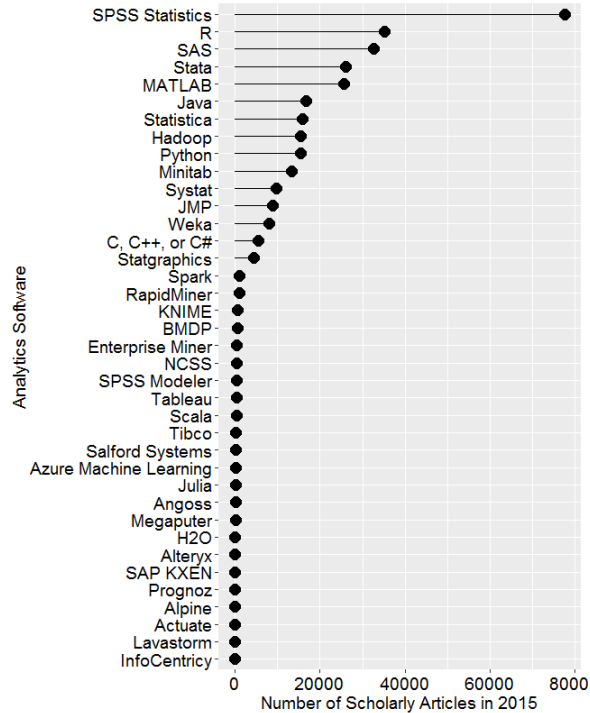
Language Wars...

<https://www.datacamp.com/community/tutorials/statistical-language-wars-the-infograph>



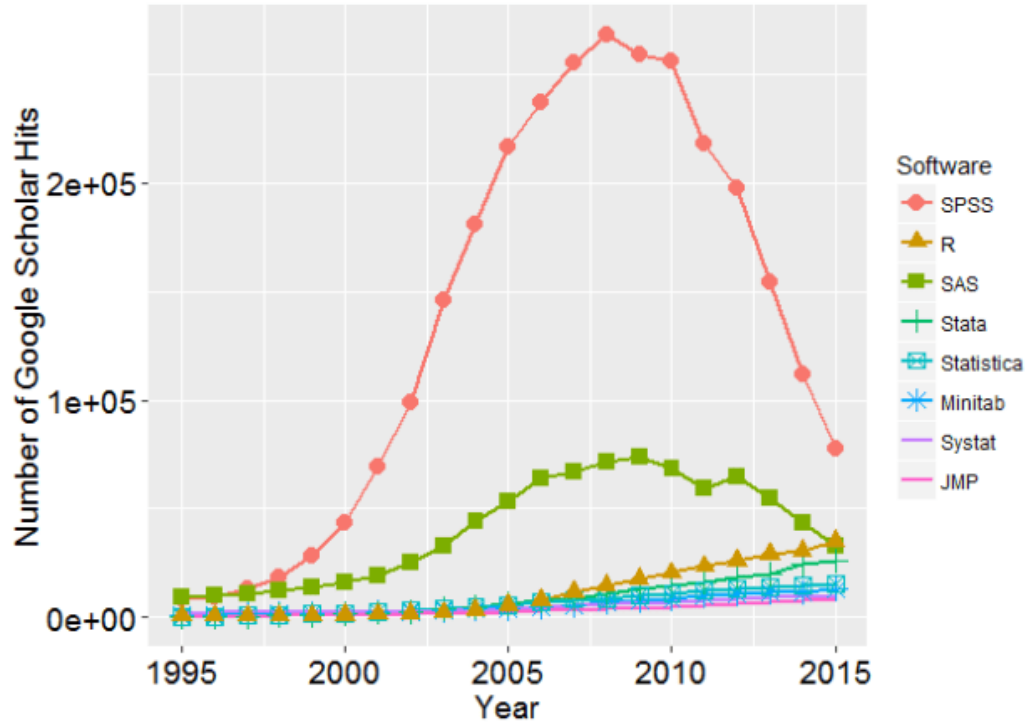
Scholarly Use...

<http://www.r-bloggers.com/r-passes-sas-in-scholarly-use-finally/>



Scholarly Use...

<http://www.r-bloggers.com/r-passes-sas-in-scholarly-use-finally/>



Introducing SPSS



PASW Statistics 18

Predictive Analytics Software

- ▶ What is in the Name?
 - ▶ Statistical Package for Social Sciences
 - ▶ Superior Performing Software Systems
 - ▶ “Just” SPSS
 - ▶ SPSS-X vs. SPSS/PC+ vs. SPSS for Windows vs. SPSS for MAC
- ▶ Applications
 - ▶ Data Entry
 - ▶ Data Analysis
 - ▶ Data Presentation
 - ▶ Tables (Report)
 - ▶ Graphs (Chart Facility)

IBM SPSS 25



Norman Nie
Dale Bent
Hadlai "Tex" Hull

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IBM to Acquire SPSS Inc. to Provide Clients Predictive Analytics Capabilities

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Related XML feeds

\$1.2 billion

ARMONK, N.Y. and CHICAGO - 28 Jul 2009: IBM (NYSE: IBM) and SPSS Inc. (Nasdaq: SPSS) today announced that the two companies have entered into a definitive merger agreement for IBM to acquire SPSS, a publicly-held company headquartered in Chicago, in an all cash transaction at a price of \$50/share, resulting in a total cash consideration in the merger of approximately \$1.2 billion. The acquisition is subject to SPSS shareholder approval, applicable regulatory clearances and other customary closing conditions. It is expected to close later in the second half of 2009.

This acquisition is expected to further expand IBM's [Information on Demand \(IOD\) software](#) portfolio and business analytics capabilities, including the range of offerings available through IBM's recently-announced [Business Analytics and Optimization Consulting](#) organization and network of Analytics Solution Centers. The acquisition is also expected to strengthen IBM's Information Agenda initiative, which helps companies turn information into a strategic asset.

As companies attempt to control costs and use resources more wisely, IDC estimates that the worldwide market for business analytics software will swell to \$25 billion this year, growing 4% over 2008.(1)

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Getting Started...



SPSS Data File (*.SAV)

Table 15.1 Input.sav [DataSet1] - IBM SPSS Statistics Data Editor

Visible: 9 of 9 Variables

	number	sex	familiar	usage	latitude	latitude	ishopping	ibanking	usagegr	var	var	var	var	var	var	var	var	var	var
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2	2	2	2	2	3	3	2	2	1.00										
3	3	2	3	3	4	3	1	2	1.00										
4	4	2	3	3	5	4	1	2	2.00										
5	5	1	4	6	5	4	1	2	2.00										
6	6	2	4	6	5	4	1	2	2.00										
7	7	2	2	2	4	5	2	2	1.00										
8	8	2	3	6	5	4	2	2	2.00										
9	9	2	3	6	6	4	1	2	2.00										
10	10	1	9	15	7	6	1	2	2.00										
11	11	2	4	3	4	3	2	2	1.00										
12	12	2	5	4	6	4	2	2	1.00										
13	13	1	6	9	6	5	2	1	2.00										
14	14	1	6	8	3	2	2	2	2.00										
15	15	1	6	9	6	5	2	1	2.00										
16	16	2	6	8	3	2	2	2	1.00										
17	17	1	6	9	5	3	1	1	2.00										
18	18	1	4	4	5	4	1	2	1.00										
19	19	1	7	14	6	6	1	1	2.00										
20	20	2	6	6	6	4	2	2	2.00										
21	21	1	6	9	4	2	2	2	2.00										
22	22	1	5	5	5	4	2	1	1.00										
23	23	2	3	2	4	2	2	2	1.00										
24	24	1	7	15	6	7	1	1	2.00										
25	25	2	6	6	5	3	1	2	2.00										
26	26	1	6	13	6	6	1	1	2.00										
27	27	2	5	4	5	5	1	1	1.00										
28	28	2	4	2	3	2	2	2	1.00										
29	29	1	4	4	5	3	1	2	1.00										
30	30	1	3	3	7	5	1	2	1.00										
31																			
32																			
33																			
34																			
35																			
36																			
37																			
38																			

Data View Variable View

IBM SPSS Statistics Processor is ready

Getting Started...



SPSS Output File (*.SPV)

Outline

Output

IBM SPSS Statistics Processor is ready

		Sex			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	15	50.0	50.0	50.0
	Female	15	50.0	50.0	100.0
Total		30	100.0	100.0	

Getting Started...



SPSS Syntax File (*.SPS)

Syntax

```
1 FREQUENCIES VARIABLES=sex
2 /ORDER=ANALYSIS.
3
```

Outline

1 FREQUENCIES VARIABLES=sex
2 /ORDER=ANALYSIS.
3

IBM SPSS Statistics Processor is ready | In 3 Col 0

SPSS Data Files...



SPSS Data File (*.SAV)

Variables (columns)

Variable View

	number	sex	familiar	usage	iattitude	tattitude	ishopping	ibanking	iusagegr	var	var	var	var	var	var	var	var	var	var	var
1	1	1	1	7	14	7	6	1	1	2.00										
2	2	2	2	2	2	3	3	2	2	1.00										
3	3	2	3	3	3	3	3	2	2	1.00										
4	4	1	2	3	4	4	4	3	3	1.00										
5	5	1	1	4	5	5	5	4	4	1.00										
6	6	2	2	4	6	6	6	5	5	1.00										
7	7	2	2	2	7	7	7	6	6	1.00										
8	8	2	3	3	8	8	8	7	7	1.00										
9	9	2	3	3	9	9	9	8	8	1.00										
10	10	1	9	9	10	10	10	9	9	1.00										
11	11	2	4	4	11	11	11	10	10	1.00										
12	12	2	5	5	12	12	12	11	11	1.00										
13	13	1	6	6	13	13	13	12	12	1.00										
14	14	1	6	6	14	14	14	13	13	1.00										
15	15	1	6	6	15	15	15	14	14	1.00										
16	16	2	4	4	16	16	16	15	15	1.00										
17	17	1	6	6	17	17	17	16	16	1.00										
18	18	1	4	4	18	18	18	17	17	1.00										
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21	21	1	6	6	21	21	21	20	20	1.00										
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37																				
38																				

Why Use R, anyway? (Muenchen, 2009, p. 1-2, Kabacoff, 2011, p. 5)

- ▶ R is open source and free...
- ▶ R offers a comprehensive statistical platform...
- ▶ R offers superior graphical capabilities...
- ▶ R offers many more (new) methods than SPSS or SAS...
- ▶ R is more flexible...
- ▶ R is more powerful...
- ▶ R runs on almost all PC platforms...
- ▶ A large number of online resources and communities...
- ▶ GUIs are available (R commander, Rstudio, etc.)

Alte R native...

<http://cran.r-project.org>



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The R Manuals

edited by the R Development Core Team.

The following manuals for R were created on Debian Linux and may differ from the manuals for Mac or Windows on platform-specific pages, but most parts will be identical for all platforms. The correct version of the manuals for each platform are part of the respective R installations. The manuals change with R, hence we provide versions for the most recent released R version (R-release), a very current version for the patched release version (R-patched) and finally a version for the forthcoming R version that is still in development (R-devel).

Here they can be downloaded as PDF files, EPUB files, or directly browsed as HTML:

Manual	R-release	R-patched	R-devel
An Introduction to R is based on the former "Notes on R", gives an introduction to the language and how to use R for doing statistical analysis and graphics.	HTML PDF EPUB	HTML PDF EPUB	HTML PDF EPUB
R Data Import/Export describes the import and export facilities available either in R itself or via packages which are available from CRAN.	HTML PDF EPUB	HTML PDF EPUB	HTML PDF EPUB
R Installation and Administration	HTML PDF EPUB	HTML PDF EPUB	HTML PDF EPUB
Writing R Extensions covers how to create your own packages, write R help files, and the foreign language (C, C++, Fortran, ...) interfaces.	HTML PDF EPUB	HTML PDF EPUB	HTML PDF EPUB
A draft of The R language definition documents the language <i>per se</i> . That is, the objects that it works on, and the details of the expression evaluation process, which are useful to know when programming R functions.	HTML PDF EPUB	HTML PDF EPUB	HTML PDF EPUB



R Tutorial | R Interface | Data Input | Data Management | Statistics
Advanced Statistics | Graphs | Advanced Graphs

SITE CONTENTS

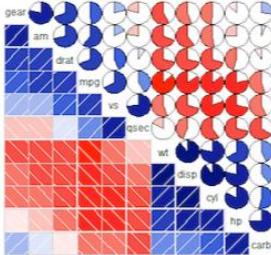
- Learning R
- R Tutorial
- R Interface
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- Data Management
- Statistics
- Advanced Statistics
- Graphs
- Advanced Graphs

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- Site Contents

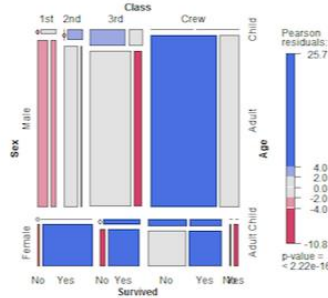
About Quick-R

Correlations Among Auto Characteristics



A lower triangular matrix of pie charts showing correlations between auto characteristics: gear, am, drat, mpg, vs, wsec, disp, cyl, hp, carb. The diagonal is all blue (1.0). Correlations are generally positive (blue) for gear-am, gear-mpg, gear-cyl, gear-hp, gear-carb, am-mpg, am-cyl, am-hp, am-carb, mpg-cyl, mpg-hp, mpg-carb, vs-wsec, disp-cyl, disp-hp, disp-carb, cyl-hp, cyl-carb, hp-carb.

Who Survived the Titanic?



A bar chart showing survival counts by Class (1st, 2nd, 3rd, Crew, Child) and Sex (Female, Male). The y-axis is 'Survived' with 'No' and 'Yes' categories. A legend indicates Pearson residuals: 25.7 for Class, -10.8 for Sex, and $< 2.22e-16$ for the interaction. A color scale for residuals ranges from -4.0 (red) to 4.0 (blue).

R is an elegant and comprehensive statistical and graphical programming language. Unfortunately, it can also have a [steep learning curve](#). I created this website for both current R users, and experienced users of other statistical packages (e.g., SAS, SPSS, Stata) who would like to transition to R. My goal is to help you quickly access this language in your work.

Journal of Statistical Software

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Established in 1996, the Journal of Statistical Software publishes articles, book reviews, code snippets, and software reviews on the subject of statistical software and algorithms. The contents are freely available on-line. For both articles and code snippets the source code is published along with the paper. Statistical software is the key link between statistical methods and their application in practice. Software that makes this link is the province of the journal, and may be realized as, for instance, tools for large scale computing, database technology, desktop computing, distributed systems, the World Wide Web, reproducible research, archiving and documentation, and embedded systems. We attempt to present research that demonstrates the joint evolution of computational and statistical methods and techniques. Implementations can use languages such as C, C++, S, Fortran, Java, PHP, Python and Ruby or environments such as Mathematica, MATLAB, R, S-PLUS, SAS, Stata, and XLISP-STAT.



Recent Publications

Articles

[missMDA: A Package for Handling Missing Values in Multivariate Data Analysis](#) [PDF](#)
Julie Josse, François Husson

[GMCM: Unsupervised Clustering and Meta-Analysis Using Gaussian Mixture Copula Models](#) [PDF](#)
Anders Ellern Bligrau, Poul Svante Eriksen, Jakob Gulddahl Rasmussen, Hans Erik Johnsen, Karen Dybkaer, Martin Boegsted

[Quantile-Based Spectral Analysis in an Object-Oriented Framework and a Reference Implementation in R: The quantSpec Package](#) [PDF](#)
Tobias Kley

[bartMachine: Machine Learning with Bayesian Additive Regression Trees](#) [PDF](#)
Adam Kapelner, Justin Bleich

[TMB: Automatic Differentiation and Laplace Approximation](#) [PDF](#)
Kasper Kristensen, Anders Nielsen, Casper W. Berg, Hans Skaug, Bradley M. Bell

[CircNNTSR: An R Package for the Statistical Analysis of Circular, Multivariate Circular, and Spherical Data Using Nonnegative Trigonometric Sums](#) [PDF](#)
Juan José Fernández-Durán, María Mercedes Gregorio-Domínguez

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- By Title

Announcements

New JSS server

The *Journal of Statistical Software* moved to a new server based on Open Journal Systems (OJS, <http://pkp.sfu.ca/ojs/>) which not only hosts published software/manuscripts but also provides a full editorial system. Thus, all submissions, reviews, etc. can now be

The screenshot shows the R-bloggers website homepage. At the top is the logo "R-bloggers" with the tagline "R news and tutorials contributed by (573) R bloggers". A navigation bar includes links for Home, About, RSS, add your blog!, Learn R, R jobs, and Contact us. The main content area features three articles:

- Exploring Spatial Patterns and Coexistence** by grumble10 (June 11, 2016). The article includes a mathematical equation:
$$N_{i,t+1} = r_{i,t}(N_{i,t} - N_{i,t}^2) + \sum_{j \neq i} c_{ij} N_{j,t} + (1 - N_{i,t} - r_{i,t} + N_{i,t}^2) N_{i,t}$$
 and a "Read more" link.
- Balancing a centrifuge** by mtrnj (June 11, 2016). The article includes a circular diagram with colored segments and a "Read more" link.
- useResearch – Usage Analytics for R Functions, Pt. 1** by data_steve (June 11, 2016). The article includes a grid of icons representing different users and a "Read more" link.

On the left side, there is a "WELCOME!" section with a "Follow @rbloggers" button (32.5K followers), a "Subscribe" button (30173 readers), and a "Like Page" button (34K likes). Below this is a section for "Be the first of your friends to like this" with a grid of profile pictures. At the bottom left, there is a note: "If you are an R blogger yourself you are invited to add your own R content feed to this site (Non-English R bloggers should add themselves here)".

On the right side, there is a search bar labeled "Search & Hit Enter". Below it are two sections: "RECENT POPULAR POSTS" listing "Interactive maps and charts in R", "Radial bar charts in R using Plotly", and "Introduction to R for Data Science :: Session 7"; and "MOST VISITED ARTICLES OF THE WEEK" listing 9 items, including "R Passes SAS in Scholarly Use (finally)", "How to write the first for loop in R", and "Free e-book: Exploring Data Science". At the bottom right, there is a "SPONSORS" section featuring the "EARL" logo with the tagline "EFFECTIVE APPLICATIONS OF THE R LANGUAGE".

The screenshot shows the Stack Overflow homepage. At the top, there's a navigation bar with 'StackExchange', 'sign up', 'log in', 'tour', 'help', and a search bar. Below the navigation bar is the 'stackoverflow' logo and a menu with 'Questions', 'Jobs', 'Tags', 'Users', 'Badges', and 'Ask Question'. The main content area features a promotional banner for the Stack Overflow community, followed by a question titled 'Obtaining outlier and collinearity diagnostics from the svyglm function in R'. The question is by user 'r' and was asked on May 28, 2015. It has 6 votes and 1 answer. To the right of the question is a 'Looking for a job?' section with several job listings, including 'ALGORITHM DEVELOPER (m/f)' and 'Principal Analyst, Prognostic Health Monitoring'.

Stack Overflow is a community of 4.7 million programmers, just like you, helping each other.

Join them; it only takes a minute:

[Sign up](#)

Join the Stack Overflow community to:

- Ask programming questions
- Answer and help your peers
- Get recognized for your expertise

Obtaining outlier and collinearity diagnostics from the svyglm function in R

asked 1 year ago
viewed 44 times

intel Software **CARRY YOUR CODE FORWARD** Guides and examples from Intel can help [Watch Here >](#)

1 I am busy with a simulation study for my PhD where I am comparing output generated from ordinary least squares, weighted least squares and survey-weighted least squares regression applied to a stratified two-stage cluster sample. I've used `influence.measures()`, `vif()` and `colldiag()` on the ordinary least squares and weighted least squares regressions, but cannot find a clear answer as to how the same diagnostics can be obtained for `svyglm()`. Can these measures be obtained in R and if so, how?

asked May 28 '15 at 10:01

Retha Luus
6 • 1

Looking for a job?

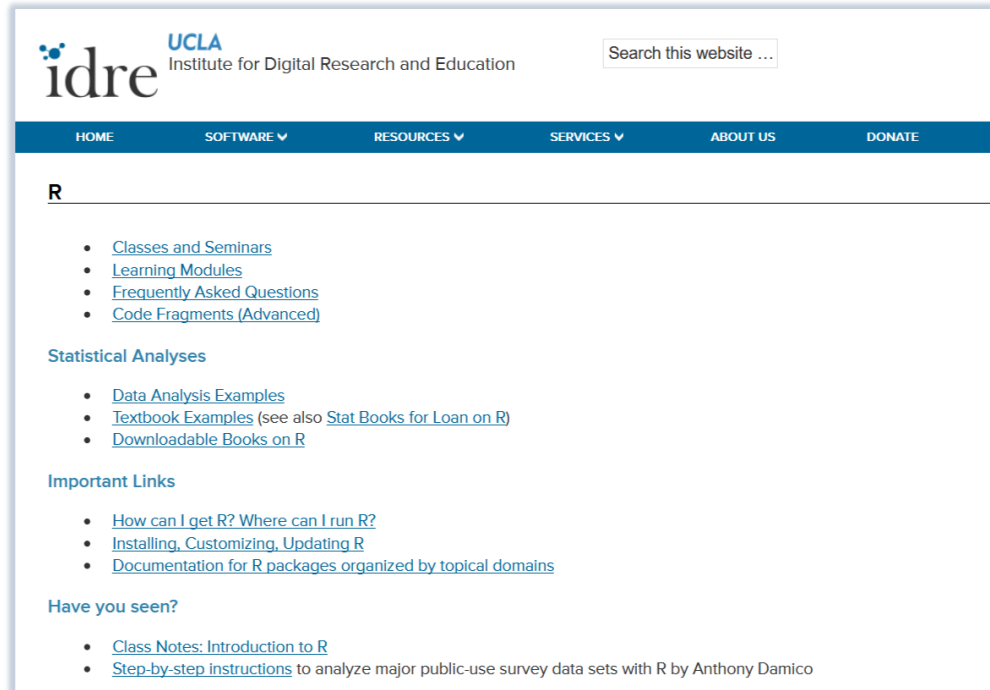
ALGORITHM DEVELOPER (m/f)
Belvilla • Amsterdam, Netherlands
data-science artificial-intelligence

Principal Analyst, Prognostic Health Monitoring
Abbott Talent Acquisition • Lake Forest, IL
bioinformatics statistics

Softwareentwickler C++ (m/w) für Systeme

Alte R native...

<https://stats.idre.ucla.edu/r/>



The screenshot shows the UCLA Institute for Digital Research and Education (IDRE) website. The header includes the IDRE logo, the text "UCLA Institute for Digital Research and Education", and a search bar. A dark blue navigation bar contains links for HOME, SOFTWARE, RESOURCES, SERVICES, ABOUT US, and DONATE. The main content area is titled "R" and lists several resource categories:

- [Classes and Seminars](#)
- [Learning Modules](#)
- [Frequently Asked Questions](#)
- [Code Fragments \(Advanced\)](#)

Statistical Analyses

- [Data Analysis Examples](#)
- [Textbook Examples](#) (see also [Stat Books for Loan on R](#))
- [Downloadable Books on R](#)

Important Links

- [How can I get R? Where can I run R?](#)
- [Installing, Customizing, Updating R](#)
- [Documentation for R packages organized by topical domains](#)

Have you seen?

- [Class Notes: Introduction to R](#)
- [Step-by-step instructions](#) to analyze major public-use survey data sets with R by Anthony Damico

Getting ...

- ▶ <https://cran.r-project.org/>
- ▶ Windows, Mac and LINUX
- ▶ Current version 3.5.2 ("Eggshell Igloo")
- ▶ Currently 13578 packages available
(<https://cran.r-project.org/web/packages/>)

WELCOME!

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If you are an R blogger

Installing R on OS X

October 20, 2015

By hrbrmstr

Like 1 Share in Share

(This article was first published on rwd.is = R, and kindly contributed to R-bloggers)

Share Tweet

I was in a conversation with an academic colleague (wicked smart dude) and the subject of installing R came up (NOTE: this will happen to you, too, if you ever have the misfortune to have a face-to-face convo with me ;-). They noted that getting up and running with R was not as seamless as one would like it to be and, to be honest, I have to agree, especially after typing the rest of this post out.

I recently had a similar experience helping folks who use Windows get R & RStudio up and running and that's even more of a nightmare, especially if you do not have Administrator privileges (or, perhaps I just scare easily).

Prior to these experiences, I never really stopped to consider just how less friendly the installation process of R is when compared to Excel, Tableau or other apps one might use for data analysis and visualization. Hopefully this will become a top priority for the R Consortium.

Since this colleague uses OS X, I offered to put together instructions for how to get R & RStudio installed and finally had 5 minutes to crank out a blog post to help the broader community with the information.

SEARCH R-BLOGGERS

Google Custom Search

RECENT POPULAR POSTS

- future apply - Parallelize Any Base R Apply Function
- Let R/Python send messages when the algorithms are done training
- A primer in using Java from R - part 1
- Forecasting my weight with R
- Why R 2018 Winners

MOST VISITED ARTICLES OF THE WEEK

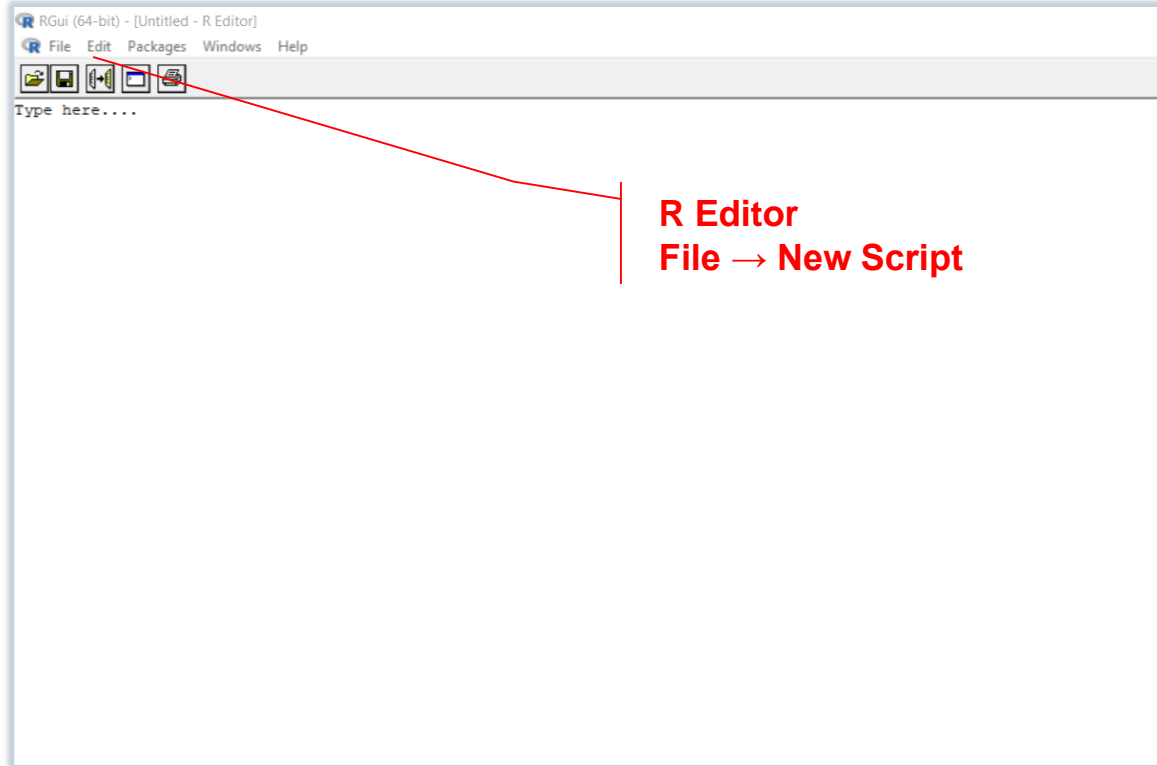
- How to write the first for loop in R
- Installing R packages
- Using apply, sapply, lapply in R
- R - Sorting a data frame by the contents of a column
- How to perform a Logistic Regression in R
- How to Make a Histogram with Basic R
- Tutorials for learning R
- How to Make a Histogram with ggplot2
- Creating Slopegraphs with R

Alte R native...

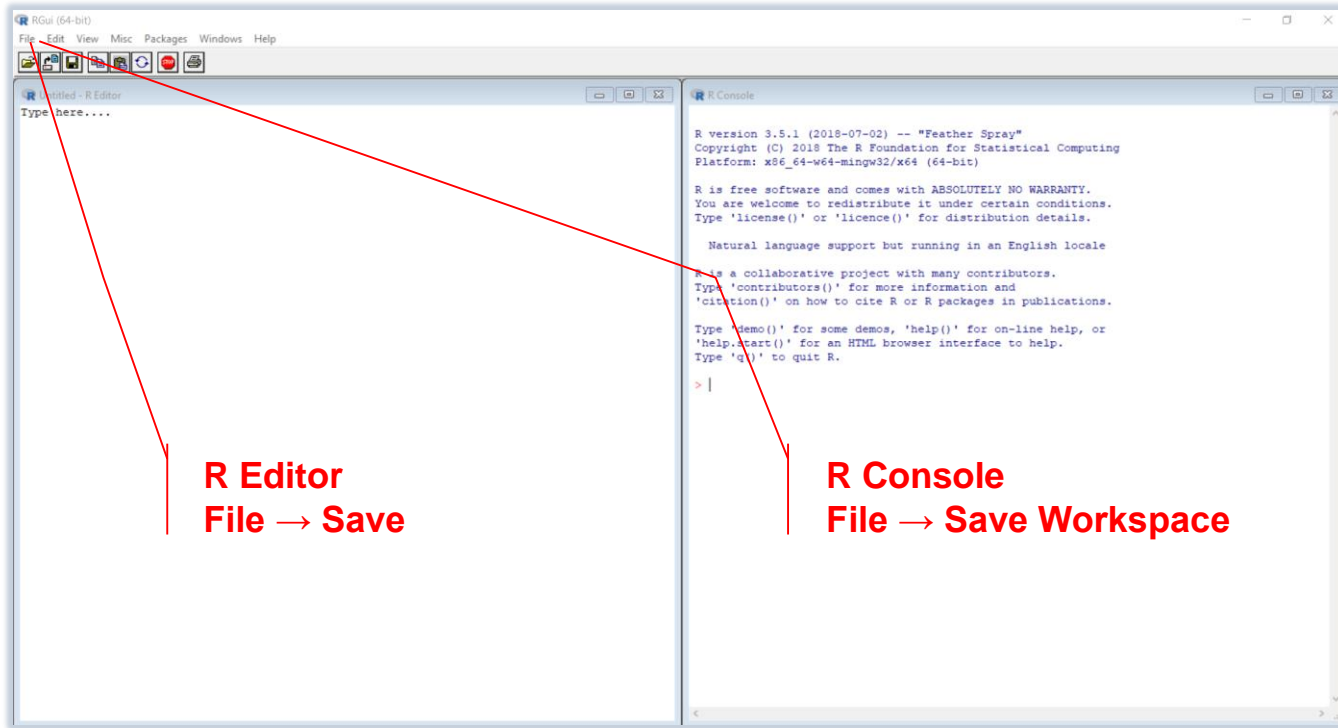
A screenshot of the RGui (64-bit) - [R Console] window. The window title is "RGui (64-bit) - [R Console]". The menu bar includes "File", "Edit", "View", "Misc", "Packages", "Windows", and "Help". The toolbar contains icons for file operations and execution. The console text reads: "R version 3.5.1 (2018-07-02) -- \"Feather Spray\"", "Copyright (C) 2018 The R Foundation for Statistical Computing", "Platform: x86_64-w64-mingw32/x64 (64-bit)", "R is free software and comes with ABSOLUTELY NO WARRANTY. You are welcome to redistribute it under certain conditions. Type 'license()' or 'licence()' for distribution details.", "Natural language support but running in an English locale", "R is a collaborative project with many contributors. Type 'contributors()' for more information and 'citation()' on how to cite R or R packages in publications.", "Type 'demo()' for some demos, 'help()' for on-line help, or 'help.start()' for an HTML browser interface to help. Type 'q()' to quit R.", and a red prompt "> |". A red arrow points from the text "R Console" to the console area.

R Console

Alte R native...



Alte R native...



```

RGui (64-bit) - [R Console]
File Edit View Misc Packages Windows Help

> load("C:\\Users\\M.Wetzels\\Desktop\\SEM.R\\PPT\\Materials\\R\\PPT.RData")
> ls()
[1] "Data.01.PPT" "Mediation" "Moderation"
> Data.01.PPT
  q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 FEU PU ATT INT
1 3 3 3 4 4 5 5 4 4 4 4 4 3.000000 4.333333 4.333333 4.000000
2 3 3 3 2 2 3 3 1 2 5 5 3 3.000000 2.333333 2.000000 4.333333
3 2 2 2 3 3 4 3 2 3 5 4 5 2.000000 3.333333 2.666667 4.666667
4 6 6 6 4 5 5 7 7 7 6 5 5 6.000000 4.666667 7.000000 5.333333
5 3 4 3 2 2 3 3 2 3 5 3 2 3.333333 2.333333 2.666667 3.333333
6 1 1 1 3 3 4 2 1 3 3 3 3 1.000000 3.333333 2.000000 3.000000
7 4 5 4 3 3 4 5 3 4 5 4 5 4.333333 3.333333 4.000000 4.666667
8 3 3 3 3 4 4 3 3 4 2 2 3.000000 3.333333 3.333333 2.666667
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11 5 6 5 3 3 3 4 3 3 5 5 5 5.333333 3.000000 3.333333 5.000000
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17 2 2 2 4 4 4 4 3 4 5 3 4 2.000000 4.000000 3.666667 4.000000
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19 4 4 4 5 5 6 5 4 5 5 5 5 4.000000 5.333333 4.666667 5.000000
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25 3 3 3 3 4 4 6 5 6 4 3 3 3.000000 3.666667 5.666667 3.333333
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27 4 4 4 5 6 5 4 2 3 5 3 3 4.000000 5.333333 3.000000 3.666667
28 5 5 5 2 3 3 4 3 3 2 3 3 5.000000 2.666667 3.333333 2.666667
29 3 4 4 4 5 5 4 2 4 4 4 4 3.666667 4.666667 3.333333 4.000000
30 4 4 4 5 4 5 4 4 3 4 4 4 4.000000 4.666667 3.666667 4.000000
31 5 5 4 5 5 6 5 4 4 6 4 5 4.666667 5.333333 4.333333 5.000000
  
```

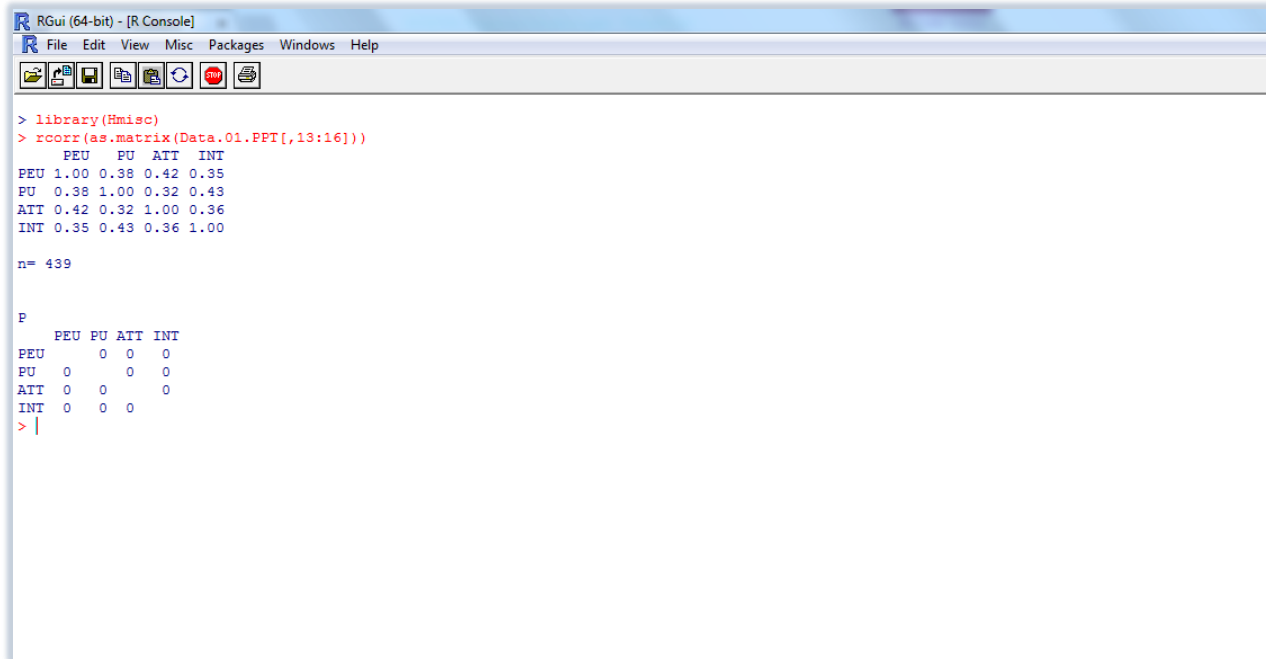
```

R File Edit View Misc Packages Windows Help
[Icons]

> ls()
[1] "Data.01.PPT" "Mediation" "Moderation"
> cor(Data.02.PPT)
Error in is.data.frame(x) : object 'Data.02.PPT' not found
> cor(Data.01.PPT)
      q1      q2      q3      q4      q5      q6      q7      q8      q9      q10     q11     q12     FEU     FU     ATT     INT
q1  1.0000000 0.8097975 0.8138406 0.2930891 0.3428762 0.3247076 0.3972089 0.3653399 0.3904451 0.2589751 0.3152825 0.3138578 0.9328149 0.3439444 0.4139689 0.3257088
q2  0.8097975 1.0000000 0.8166044 0.3060620 0.3243314 0.3472221 0.3690113 0.3518016 0.3464314 0.2588477 0.3161738 0.3141935 0.9346877 0.3498104 0.3830650 0.3260625
q3  0.8138406 0.8166044 1.0000000 0.3239042 0.3529852 0.3680337 0.3736317 0.3532527 0.3557382 0.2689082 0.3398670 0.3201764 0.9396350 0.3739597 0.3886151 0.3384005
q4  0.2930891 0.3060620 0.3239042 1.0000000 0.8009082 0.7970698 0.2921024 0.2462745 0.3006136 0.3145539 0.4183882 0.4015143 0.3291739 0.9272086 0.3014059 0.4142796
q5  0.3428762 0.3243314 0.3529852 0.8009082 1.0000000 0.8116305 0.2979363 0.2597337 0.3236039 0.3231403 0.3839118 0.3765244 0.3636331 0.9356141 0.3165713 0.3981133
q6  0.3247076 0.3472221 0.3680337 0.7970698 0.8116305 1.0000000 0.2478376 0.2426744 0.2686053 0.3321825 0.3861757 0.3707145 0.3709495 0.9334255 0.2725093 0.4008660
q7  0.3972089 0.3690113 0.3736317 0.2921024 0.2979363 0.2478376 1.0000000 0.8026353 0.8059340 0.2570709 0.3164261 0.3369713 0.4058197 0.2995601 0.9369643 0.3331362
q8  0.3653399 0.3518016 0.3532527 0.2462745 0.2597337 0.2426744 0.8026353 1.0000000 0.7732401 0.2332786 0.2897454 0.3177918 0.3811711 0.2678096 0.9230840 0.3072647
q9  0.3904451 0.3464314 0.3557382 0.3006136 0.3236039 0.2686053 0.8059340 0.7732401 1.0000000 0.2726496 0.3677583 0.3916562 0.3889120 0.3193535 0.9262602 0.3756716
q10 0.2589751 0.2588477 0.2689082 0.3145539 0.3231403 0.3321825 0.2570709 0.2332786 0.2726496 1.0000000 0.6810155 0.6744540 0.2803795 0.3469233 0.2740098 0.8965442
q11 0.3152825 0.3161738 0.3338670 0.4183882 0.3839118 0.3861757 0.3164261 0.2897454 0.3677583 0.6810155 1.0000000 0.7859497 0.3441139 0.4246864 0.3498089 0.8966885
q12 0.3138578 0.3141935 0.3201764 0.4015143 0.3765244 0.3707145 0.3369713 0.3177918 0.3916562 0.6744540 0.7859497 1.0000000 0.3378509 0.4105496 0.3757832 0.8989238
FEU 0.9328149 0.9346877 0.9396350 0.3291739 0.3636331 0.3709495 0.4058197 0.3811711 0.3889120 0.2803795 0.3441139 0.3378509 1.0000000 0.3807257 0.4221206 0.3528830
FU  0.3439444 0.3498104 0.3739597 0.9272086 0.9356141 0.9334255 0.2995601 0.2678096 0.3193535 0.3469233 0.4246864 0.4105496 0.3807257 1.0000000 0.3184720 0.4337164
ATT 0.4139689 0.3830650 0.3886151 0.3014059 0.3165713 0.2725093 0.9369643 0.9230840 0.9262602 0.2740098 0.3498089 0.3757832 0.4221206 0.3184720 1.0000000 0.3649072
INT 0.3257088 0.3260625 0.3384005 0.4142796 0.3981133 0.4008660 0.3331362 0.3072647 0.3756716 0.8965442 0.8996885 0.8989238 0.3528830 0.4337164 0.3649072 1.0000000
> cor(Data.01.PPT[,13:16])
      FEU     FU     ATT     INT
FEU 1.0000000 0.3807257 0.4221206 0.3528830
FU  0.3807257 1.0000000 0.3184720 0.4337164
ATT 0.4221206 0.3184720 1.0000000 0.3649072
INT 0.3528830 0.4337164 0.3649072 1.0000000
> |

```

Alte R native...



```
RGui (64-bit) - [R Console]
File Edit View Misc Packages Windows Help

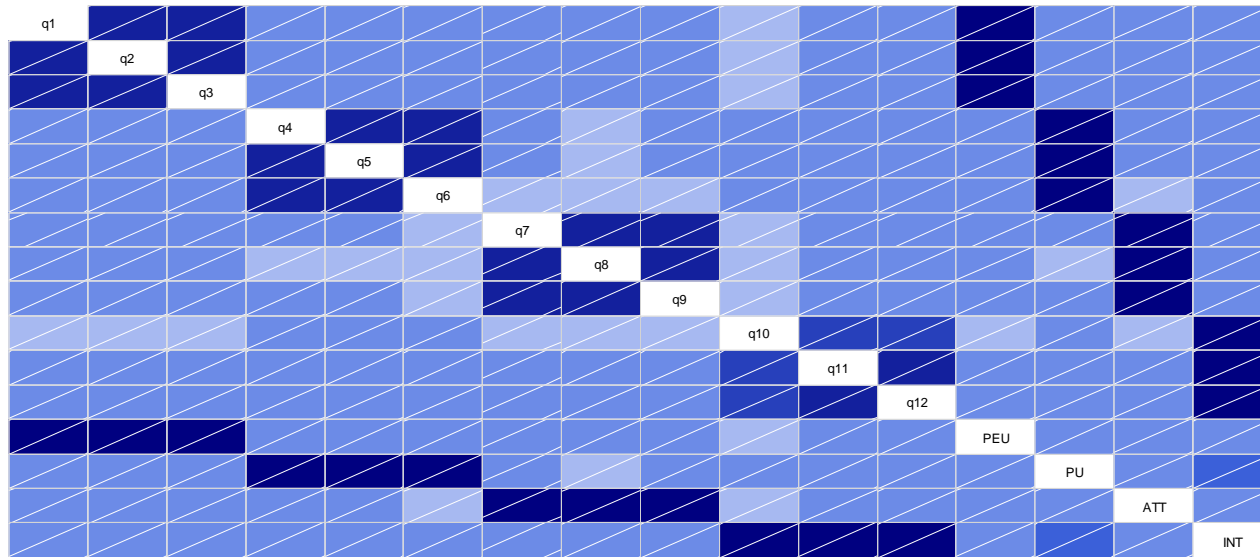
> library(Hmisc)
> rcorr(as.matrix(Data.01.PPT[,13:16]))
      PEU  PU  ATT  INT
PEU  1.00 0.38 0.42 0.35
PU   0.38 1.00 0.32 0.43
ATT  0.42 0.32 1.00 0.36
INT  0.35 0.43 0.36 1.00

n= 439

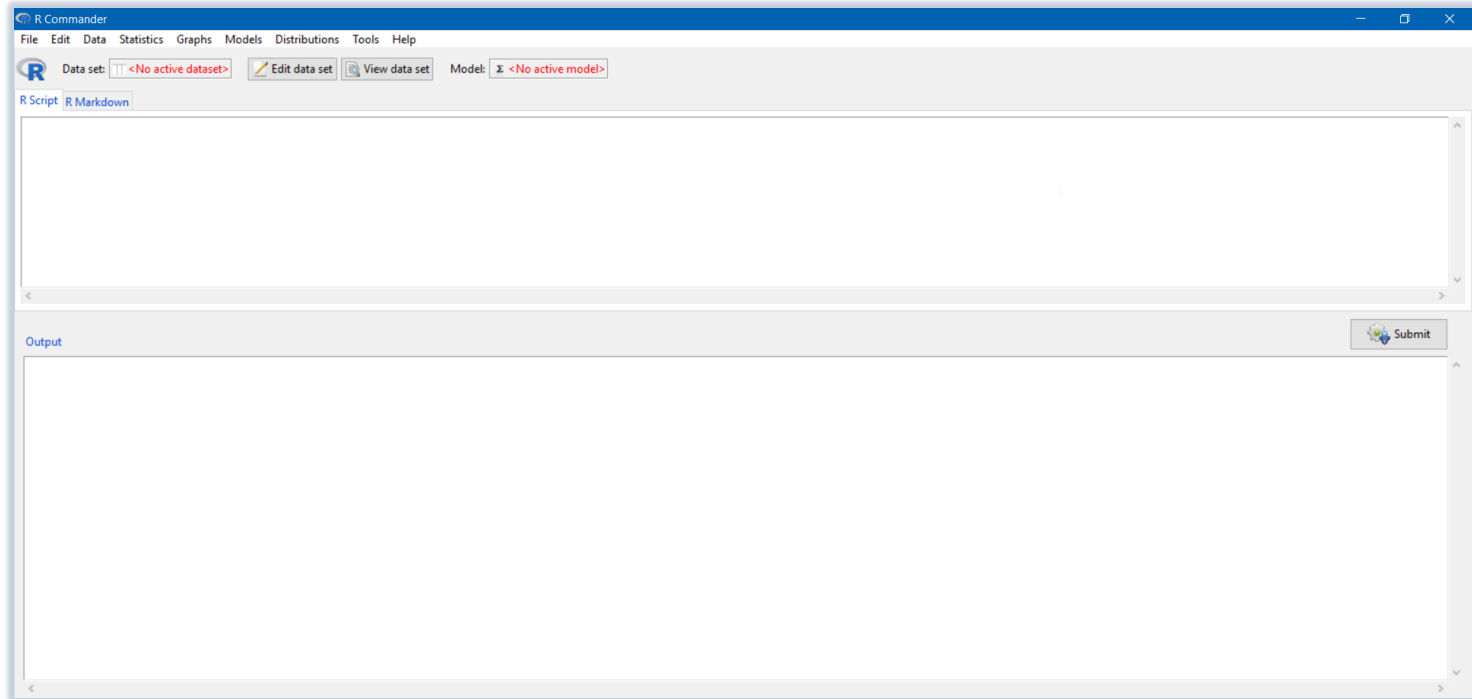
P
  PEU PU ATT INT
PEU  0  0  0
PU   0  0  0
ATT  0  0  0
INT  0  0  0
> |
```


Alte R native...

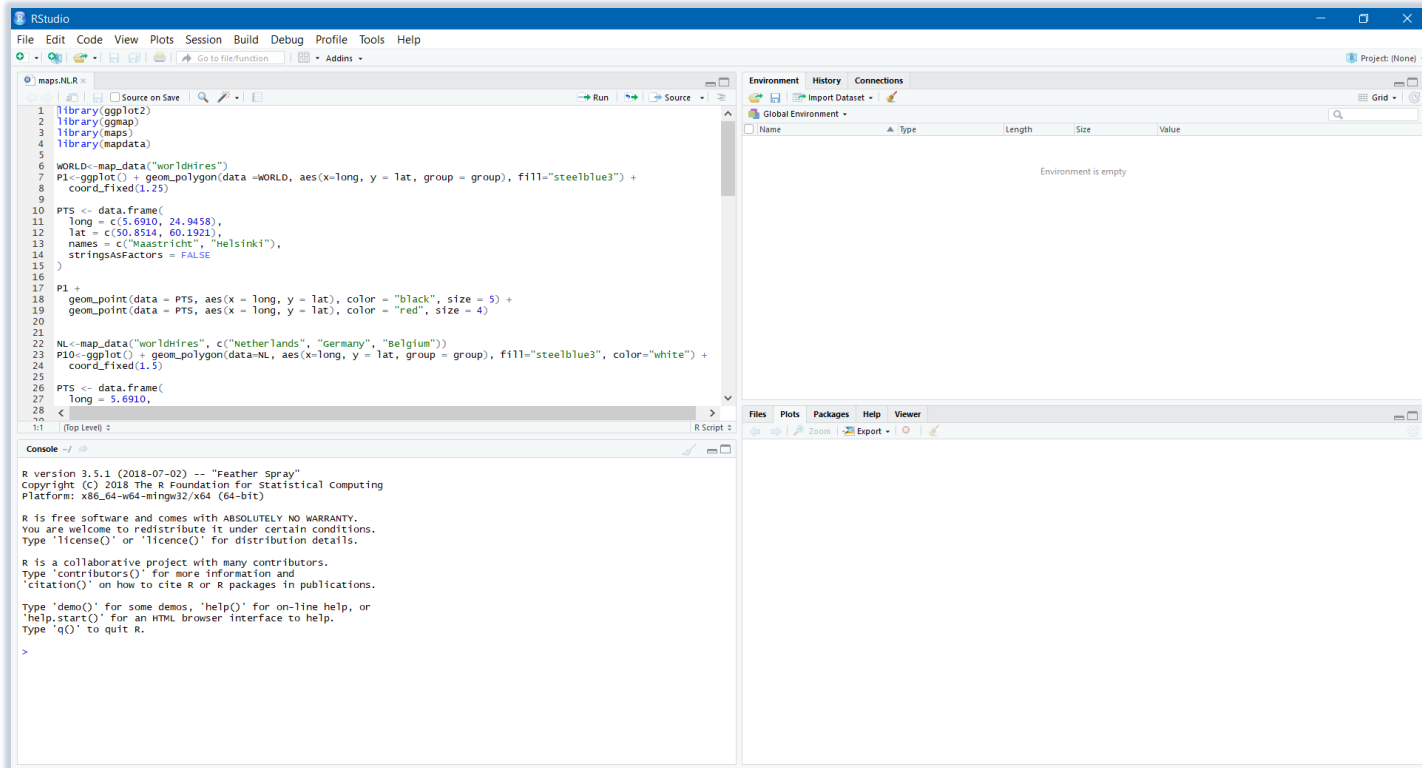
Correlogram



Alternative... R Commander (GUI)



Alte native...R Studio (GUI)



The screenshot displays the RStudio interface with a script editor on the left containing R code for creating a map. The console at the bottom shows the R startup message.

```
1 library(ggplot2)
2 library(ggmap)
3 library(maps)
4 library(mapdata)
5
6 WORLD<-map_data("worldhires")
7 P1<-ggplot() + geom_polygon(data =WORLD, aes(x=long, y = lat, group = group), fill="steelblue3") +
8   coord_fixed(1.25)
9
10 PTS <- data.frame(
11   long = c(5.6910, 24.9458),
12   lat = c(50.8514, 60.1921),
13   names = c("Maastricht", "Helsinki"),
14   stringsAsFactors = FALSE
15 )
16
17 P1 =
18   geom_point(data = PTS, aes(x = long, y = lat), color = "black", size = 5) +
19   geom_point(data = PTS, aes(x = long, y = lat), color = "red", size = 4)
20
21
22 NL<-map_data("worldhires", c("Netherlands", "Germany", "Belgium"))
23 P10<-ggplot() + geom_polygon(data=NL, aes(x=long, y = lat, group = group), fill="steelblue3", color="white") +
24   coord_fixed(1.5)
25
26 PTS <- data.frame(
27   long = 5.6910,
28
29 )
30
31 #> (Top Level) >
```

Console output:

```
R version 3.5.1 (2018-07-02) -- "Feather Spray"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

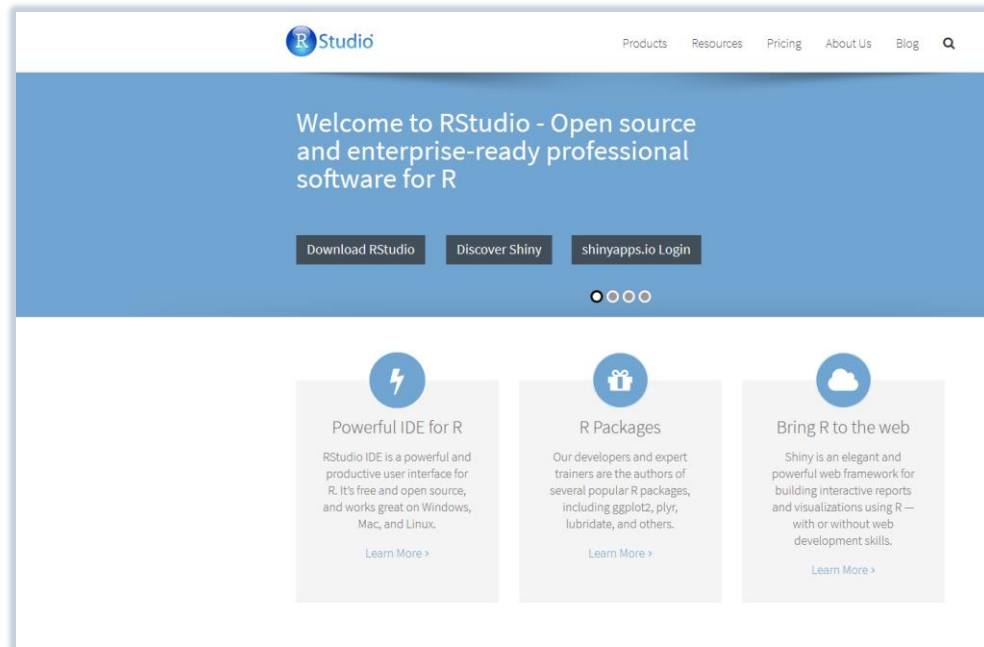
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

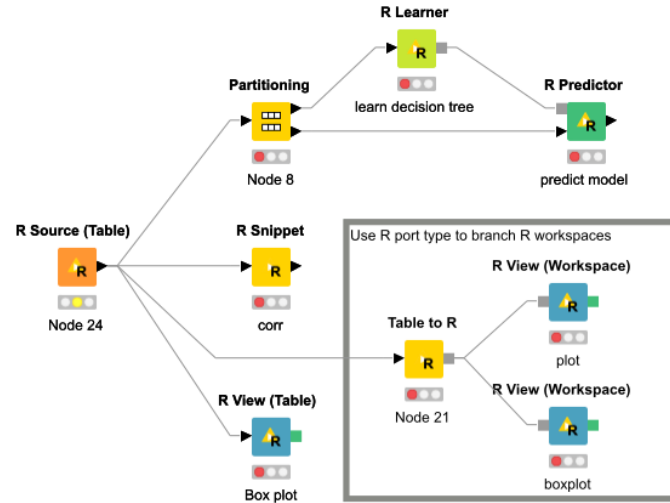
>
```

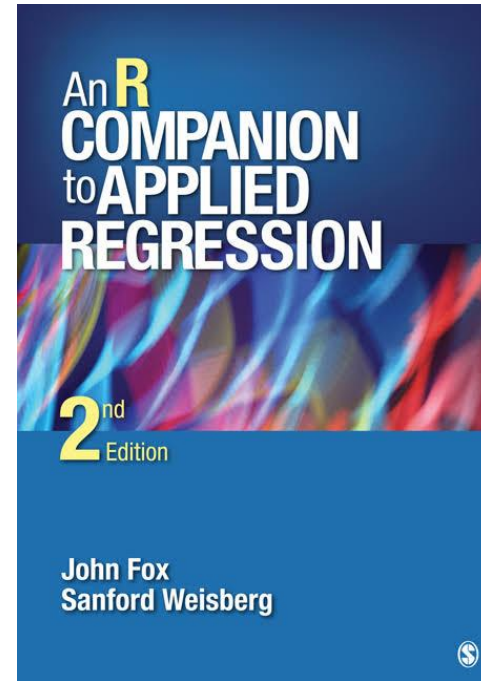
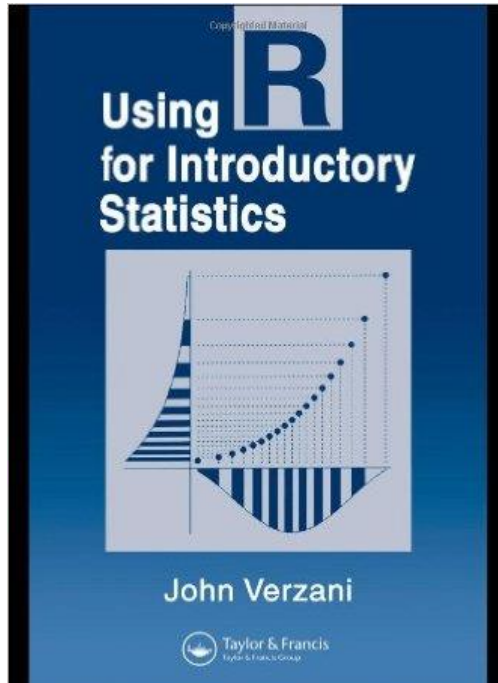
Getting ...

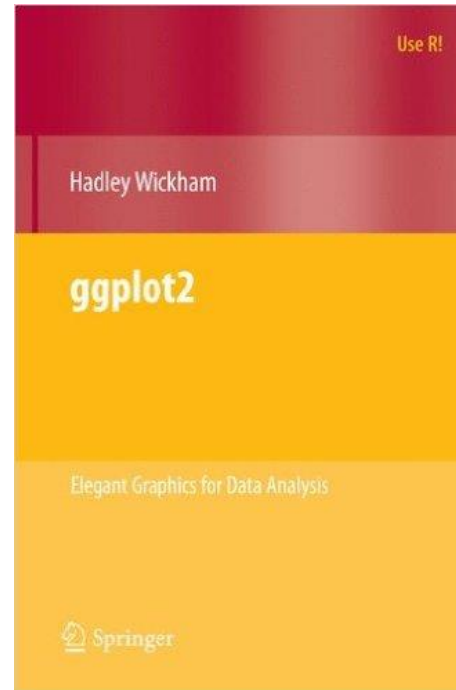
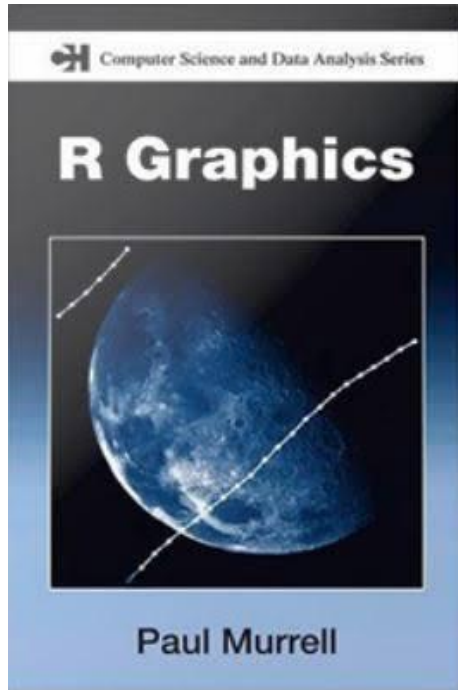
► <https://www.rstudio.com/>

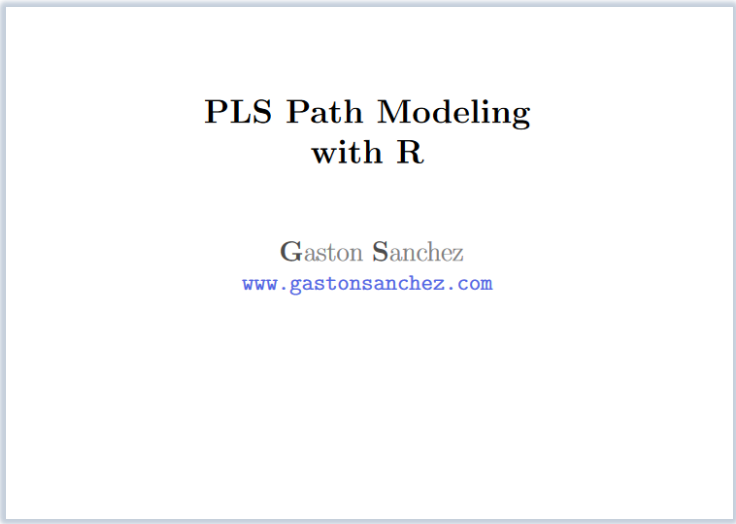
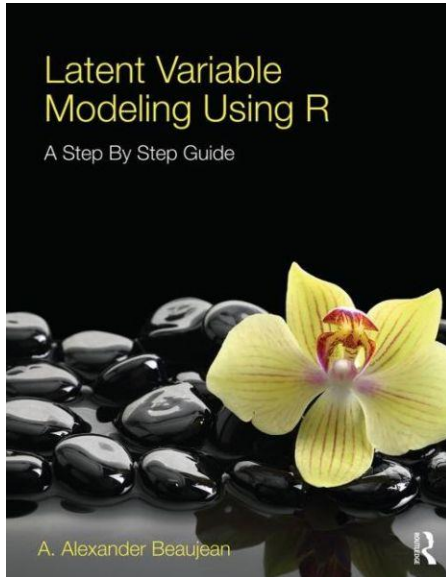


► <https://www.knime.org/>

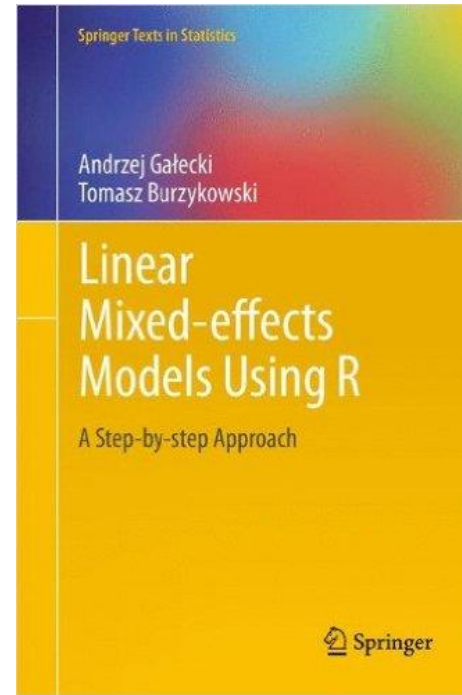
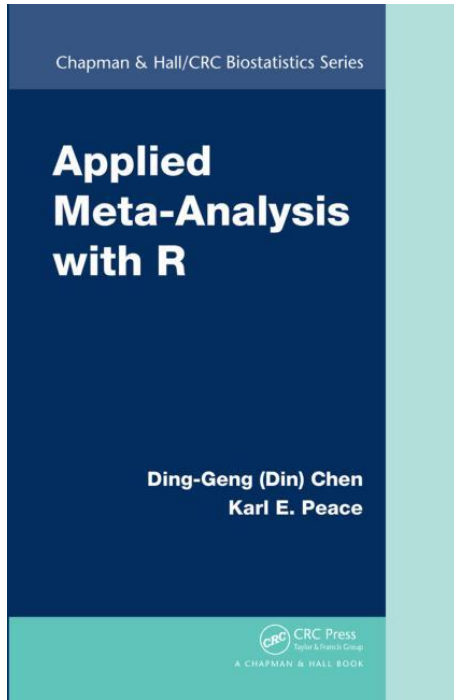


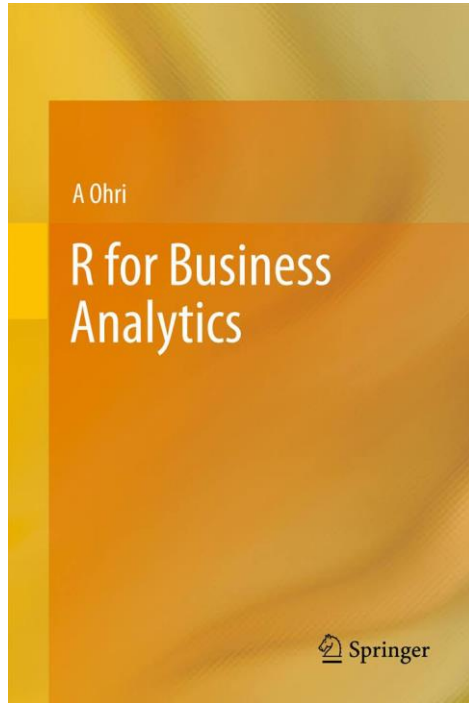


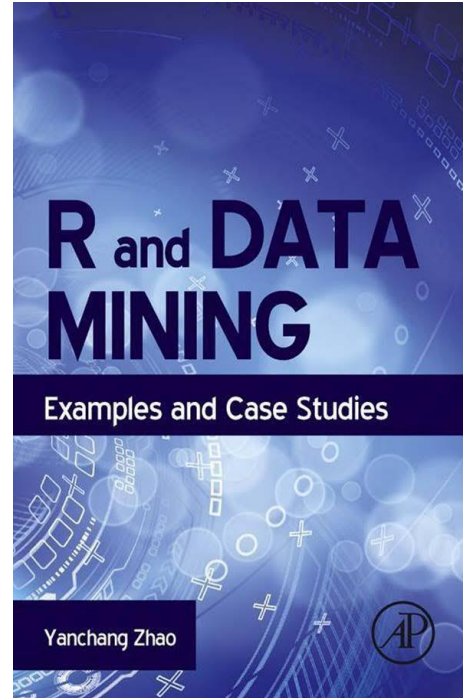
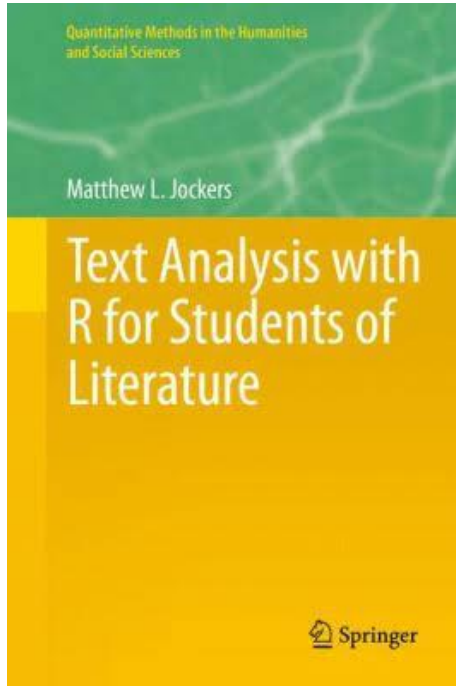




http://gastonsanchez.com/PLS_Path_Modeling_with_R.pdf







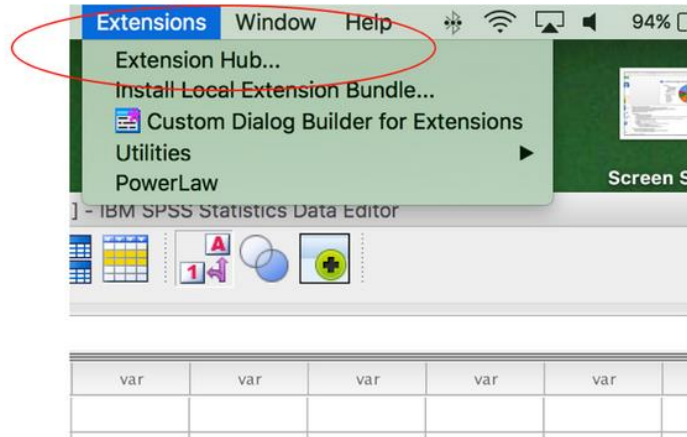
IBM SPSS and

- ▶ SPSS is developing into an integral analysis platform
 - ▶ Python Essentials 
 - ▶ R Essentials 

SPSS 25 R 3.3

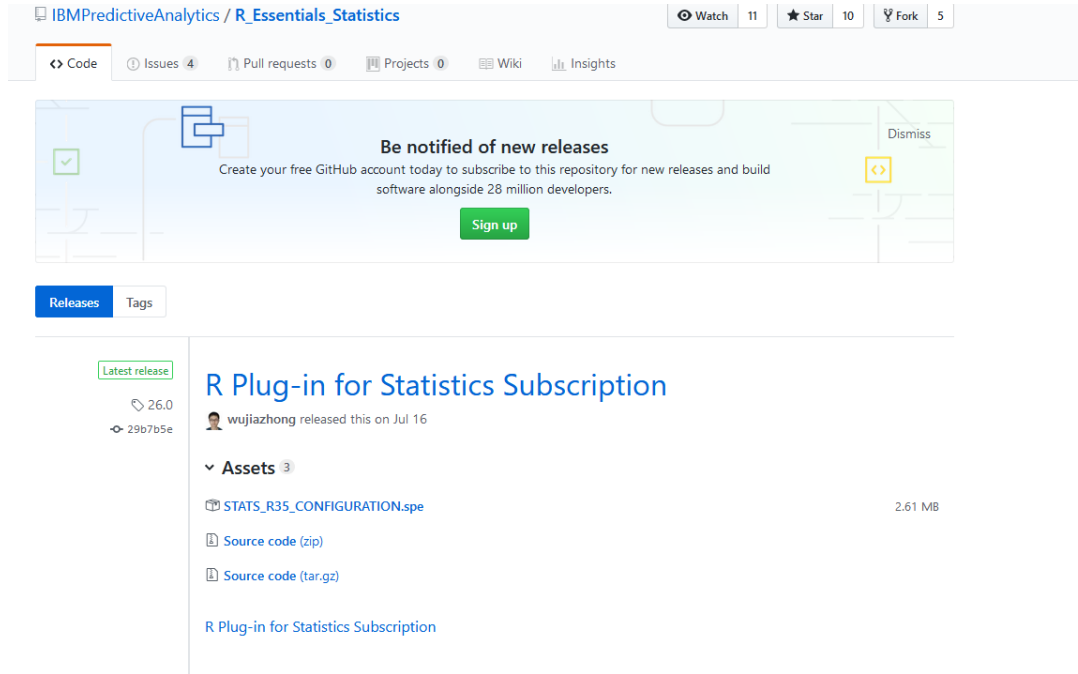
Downloading and installing the ibm spss statistics r Configuration extension

1. Start the IBM SPSS Statistics client on your workstation, and then open the Extension Hub dialog (located under the "Extensions" menu).



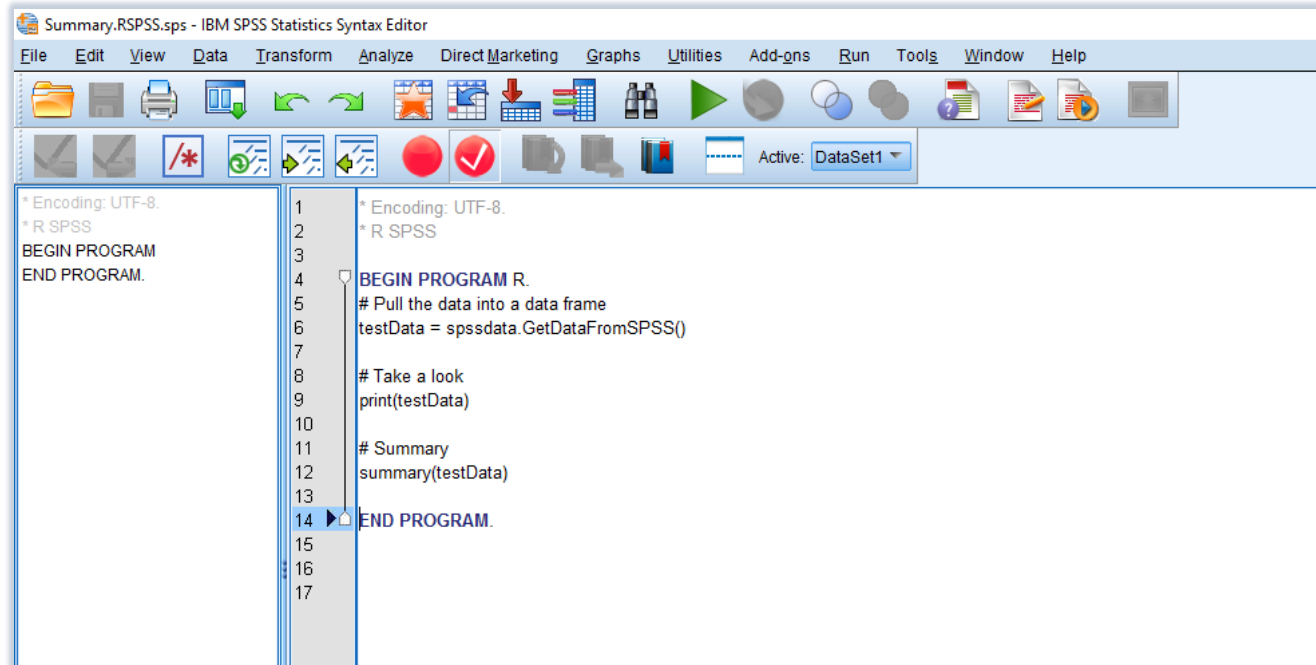
IBM SPSS and

https://github.com/IBMPredictiveAnalytics/R_Essentials_Statistics/releases



The screenshot shows the GitHub repository page for `IBMPredictiveAnalytics / R_Essentials_Statistics`. At the top, there are navigation links for `Code`, `Issues 4`, `Pull requests 0`, `Projects 0`, `Wiki`, and `Insights`. On the right, there are buttons for `Watch 11`, `Star 10`, and `Fork 5`. A prominent green banner in the center reads "Be notified of new releases" and includes a "Sign up" button. Below the banner, there are tabs for `Releases` and `Tags`. The `Releases` tab is active, showing the "Latest release" section for version 26.0, released on Jul 16 by user `wujiazhong`. Under the "Assets" section, there are three items: `STATS_R35_CONFIGURATION.spe` (2.61 MB), `Source code (zip)`, and `Source code (tar.gz)`. A link for "R Plug-in for Statistics Subscription" is also visible at the bottom of the release details.

IBM SPSS and



The screenshot shows the IBM SPSS Statistics Syntax Editor window titled "Summary.RSPSS.sps - IBM SPSS Statistics Syntax Editor". The menu bar includes File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Add-ons, Run, Tools, Window, and Help. The toolbar contains various icons for file operations, editing, and execution. The main text area displays the following syntax:

```
Encoding: UTF-8.
* R SPSS
BEGIN PROGRAM
END PROGRAM.

1  * Encoding: UTF-8.
2  * R SPSS
3
4  BEGIN PROGRAM R.
5  # Pull the data into a data frame
6  testData = spssdata.GetDataFromSPSS()
7
8  # Take a look
9  print(testData)
10
11 # Summary
12 summary(testData)
13
14 END PROGRAM.
15
16
17
```

*Output2 [Document2] - IBM SPSS Statistics Viewer

File Edit View Data Transform Insert Format Analyze Direct Marketing Graphs Utilities Add-ons Window Help

Output
Log

```

* Encoding: UTF-8.
* R SPSS

BEGIN PROGRAM R.
# Pull the data into a data frame
testData = spssdata.GetDataFromSPSS()

# Take a look
print(testData)

# Summary
summary(testData)

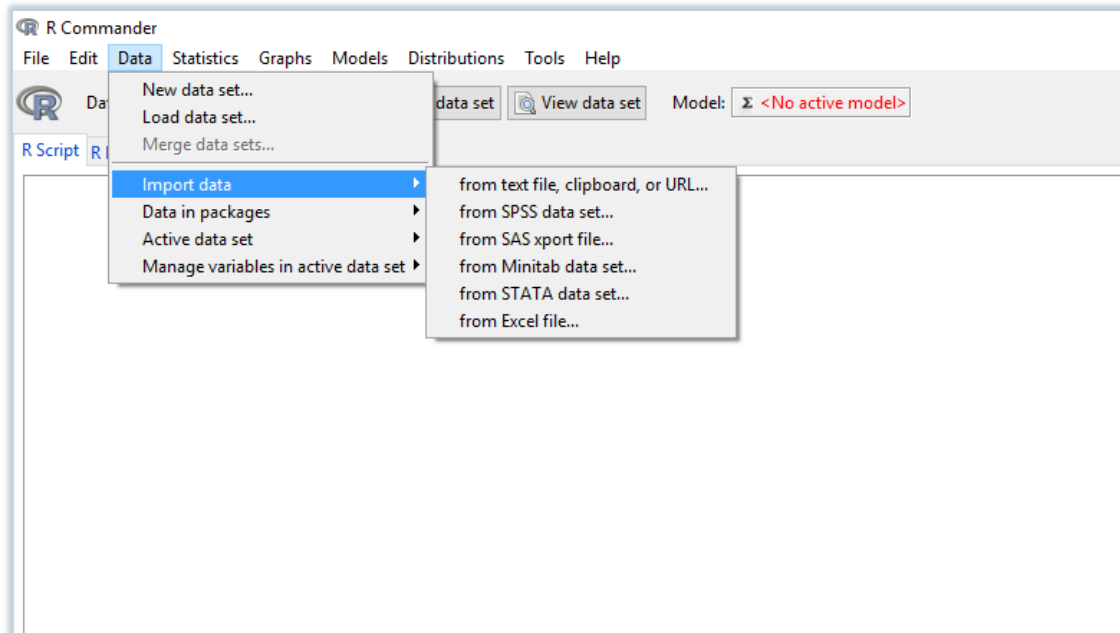
END PROGRAM.

  number sex  familiar iusage iattitude  tattitude  ishopping  ibanking  iusagegr
1      1  1      7      14           7           6           1           1           2
2      2  2      2      2           3           3           2           2           1
3      3  2      3      3           4           3           1           2           1
4      4  2      3      3           7           5           1           2           1
5      5  1      7      13          7           7           1           1           2
6      6  2      4      6           5           4           1           2           2
7      7  2      2      2           4           5           2           2           1
8      8  2      3      6           5           4           2           2           2
9      9  2      3      6           6           4           1           2           2
10     10 1      NaN    15           7           6           1           2           2
11     11 2      4      3           4           3           2           2           1
12     12 2      5      4           6           4           2           2           1
13     13 1      6      9           6           5           2           1           2
14     14 1      6      8           3           2           2           2           2
    
```


Read Data from SPSS

```
1 # SPSS Data
2
3 library(foreign)
4
5 D.00 <- read.spss("Table 15.1 Input.sav", use.value.labels=FALSE, to.data.frame=TRUE)
6
7 library(Rcmdr)
8
```

Read Data from SPSS





Import Dataset

Name: Table.15.1.Input

Input File: i:\>number,sex,familiar,iusage,iattitude,tattitude,ishop

Heading: Yes No

Separator: Comma

Decimal: Period

Quote: Double quote (")

na.strings: NA

Strings as factors

Data Frame

i..number	sex	familiar	iusage	iattitude	tattitude	ishop
1	1	7	14	7	6	1
2	2	2	3	3	3	2
3	2	3	3	4	3	1
4	2	3	3	7	5	2
5	1	7	13	7	4	1
6	2	4	6	5	4	2
7	2	2	2	4	5	1
8	2	3	6	5	4	2
9	2	3	6	6	4	1
10	1	9	15	7	6	2
11	2	4	4	3	3	1
12	2	5	4	6	4	2
13	1	6	9	6	5	1
14	1	6	8	3	2	2
15	1	6	5	5	4	1
16	2	4	3	4	3	2

Import Cancel

Measurement Level

Malhotra (2010)

NonMetric Data

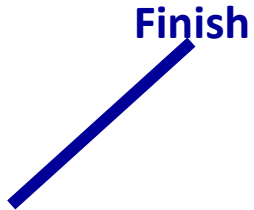
► Nominal Scale

- Numbers assigned serve only as labels or tags for the subjects



► Ordinal Scale

- Numbers assigned indicate the relative extent to which the subjects possess the characteristic



Measurement Level

Malhotra (2010)

Metric Data

► Interval Scale

- Numerically equal distances on the scale represent equal values in the characteristic being measured. Moreover, there is no absolute zero point.

► Ratio Scale

- Possesses all properties of a nominal, ordinal and interval scale, and a absolute zero point.



Finish

Rating on 1
to 5 Scale

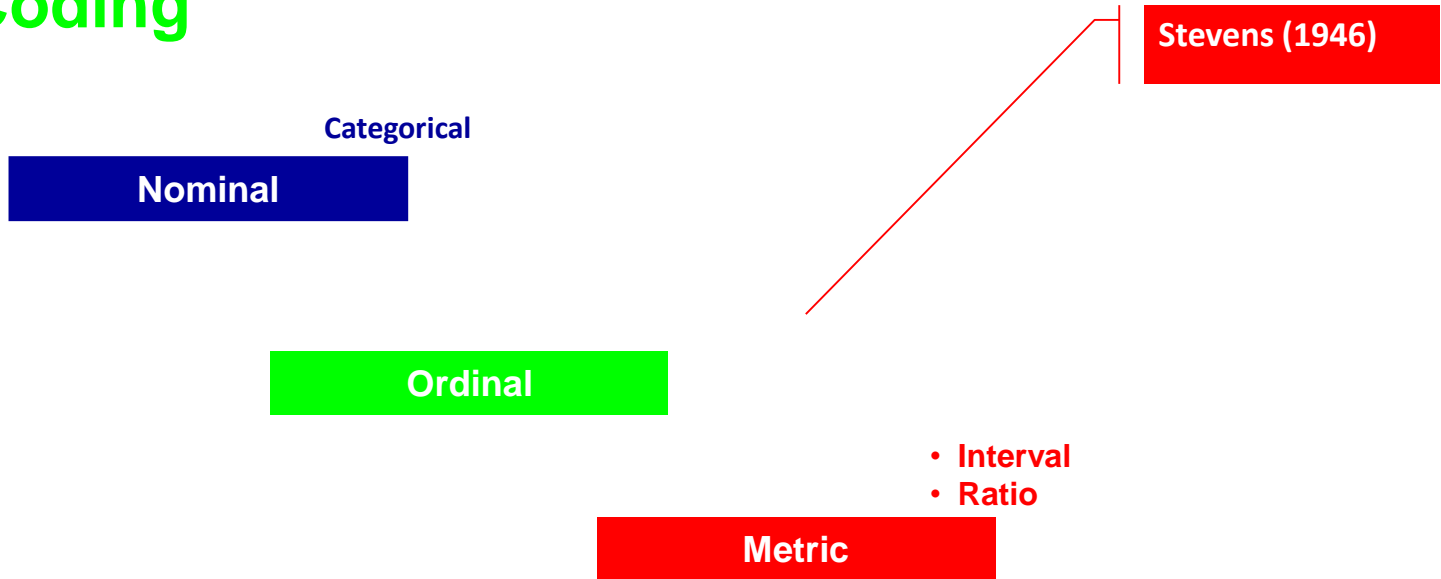


Finish

Seconds to
Finish

Measurement Level

Color Coding



RECAP: Measurement Level

Stevens (1946)

SCIENCE

Vol. 103, No. 2684

Friday, June 7, 1946

On the Theory of Scales of Measurement

S. S. Stevens

Director, Psycho-Acoustic Laboratory, Harvard University

FOR SEVEN YEARS A COMMITTEE of the British Association for the Advancement of Science debated the problem of measurement. Appointed in 1932 to represent Section A (Mathematical and Physical Sciences) and Section J (Psychology), the committee was instructed to consider and report upon the possibility of “quantitative estimates of sensory events”—meaning simply: Is it possible to measure human sensation? Deliberation led only to disagreement, mainly about what is meant by the term measurement. An interim report in 1938

by the formal (mathematical) properties of the scales. Furthermore—and this is of great concern to several of the sciences—the statistical manipulations that can legitimately be applied to empirical data depend upon the type of scale against which the data are ordered.

A CLASSIFICATION OF SCALES OF MEASUREMENT

Paraphrasing N. R. Campbell (Final Report, p. 340), we may say that measurement, in the broadest sense, is defined as the assignment of numerals to objects or events according to rules. The fact that

SPSS Data Files: Table 15.1 (Malhotra, 2010)



SPSS Data File (*.SAV)

Table 15.1 Input.sav [DataSet1] - IBM SPSS Statistics Data Editor

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	11	0	Respondent Nu...	None	None	8	Right	Scale	Input
2	sex	Numeric	11	0	Sex	{1, Male}...	None	8	Right	Scale	Input
3	familiar	Numeric	11	0	Familiarity	{1, Very Unf...	9	8	Right	Scale	Input
4	iusage	Numeric	11	0	Internet Usage ...	None	None	8	Right	Scale	Input
5	iattitude	Numeric	11	0	Attitude toward ...	{1, Very Unf...	None	8	Right	Scale	Input
6	tattitude	Numeric	11	0	Attitude toward ...	{1, Very Unf...	None	8	Right	Scale	Input
7	ishopping	Numeric	11	0	Internet Shopping	{1, Yes}...	None	8	Right	Scale	Input
8	ibanking	Numeric	11	0	Internet Banking	{1, Yes}...	None	8	Right	Scale	Input
9	iusagegr	Numeric	8	2	Internet Usage ...	{1.00, Light ...	None	8	Right	Scale	Input
10											
35											
36											
37											
38											
39											

Table 15.1 Input.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

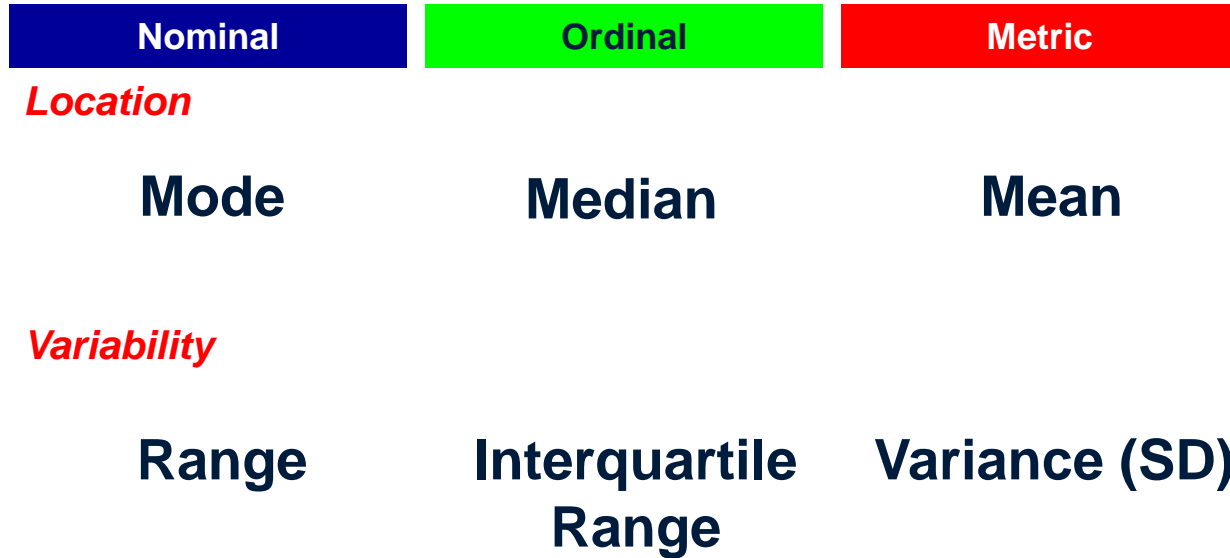
	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	11	0	Respondent Nu...	None	None	8	Right	Scale	Input
2	sex	Numeric	11	0	Sex	{1, Male}...	None	8	Right	Scale	Input
3	familiar	Numeric	11	0	Familiarity	{1, Very Unf...	9	8	Right	Scale	Input
4	iusage	Numeric	11	0	Internet Usage ...	None	None	8	Right	Scale	Input
5	iattitude	Numeric	11	0	Attitude toward ...	{1, Very Unf...	None	8	Right	Scale	Input
6	tattitude	Numeric	11	0	Attitude toward ...	{1, Very Unf...	None	8	Right	Scale	Input
7	ishopping	Numeric	11	0	Internet Shopping	{1, Yes}...	None	8	Right	Scale	Input
8	ibanking	Numeric	11	0	Internet Banking	{1, Yes}...	None	8	Right	Scale	Input
9	iusagegr	Numeric	8	2	Internet Usage ...	{1.00, Light ...	None	8	Right	Scale	Input
10											

Data View Variable View

IBM SPSS Statistics Processor is ready

Nominal
Ordinal
Scale

Descriptive Statistics...



Descriptive Statistics...



Data

1, 2, 2, 2, 3, 3, 4, 4, 5, 6, 7

Nominal

Ordinal

Metric

Location

Mode

Median

Mean

2

3

3.55
(39/11)

Descriptive Statistics...



Nominal

Ordinal

Metric



Frequencies



Descriptives

Table 15.1 Input.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

Reports
Descriptive Statistics
Tables
Compare Means
General Linear Model
Generalized Linear Models
Mixed Models
Correlate
Regression

Frequencies...
Descriptives...
Explore...
Crosstabs...
Ratio...
P-P Plots...
Q-Q Plots...

	number	sex
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	

Descriptive Statistics...



Nominal

Ordinal

Metric



Frequencies



Descriptives

Sex

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	15	50.0	50.0	50.0
Female	15	50.0	50.0	100.0
Total	30	100.0	100.0	

Descriptive Statistics

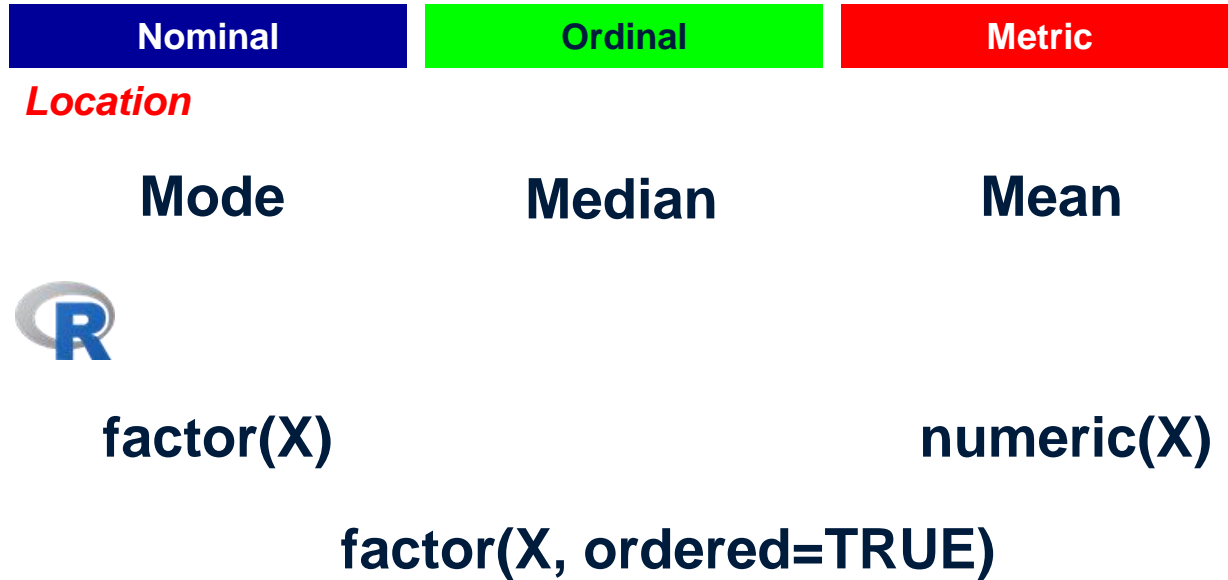
	N	Minimum	Maximum	Mean	Std. Deviation
Attitude toward internet	30	3	7	5.17	1.234
Valid N (listwise)	30				

Sex

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	15	50.0	50.0	50.0
Female	14	46.7	46.7	96.7
3	1	3.3	3.3	100.0
Total	30	100.0	100.0	

3: "Out of Range"

Descriptive Statistics...



Transforming Data



Compute...

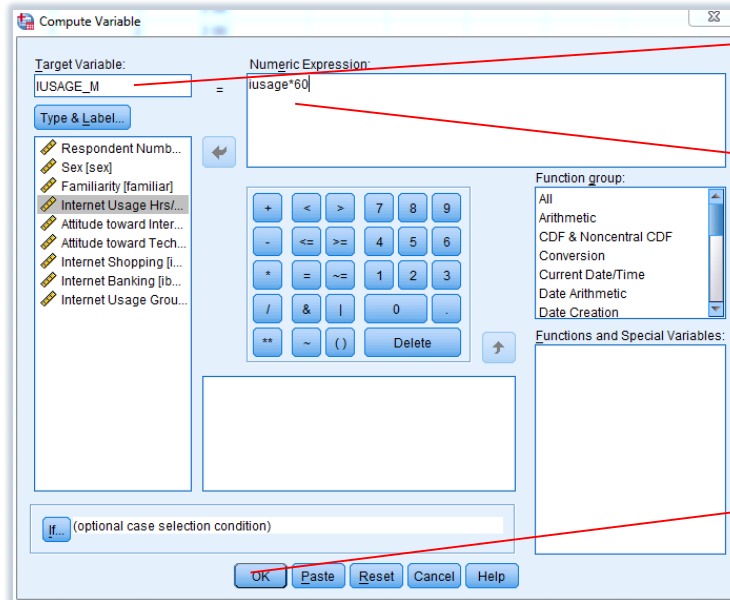
Recode...

number	attitude	tattitude	ishopping	ibanking	iusagegr				
1	1			1	2.00				
2	2			2	1.00				
3	3		1	2	1.00				
4	4	3	1	2	1.00				
5	5	7	1	1	2.00				
6	6	7	1	2	2.00				
7	7	5	2	2	1.00				
8	8	5	4	2	2.00				
9	9	6	4	1	2.00				
10	10	7	6	1	2.00				
11	11	4	3	2	1.00				
12	12	6	4	2	1.00				
13	13	6	5	2	1.00				
14	14	1	6	8	3	2	2	2.00	
15	15	1	6	5	5	4	1	2	1.00

Transforming Data



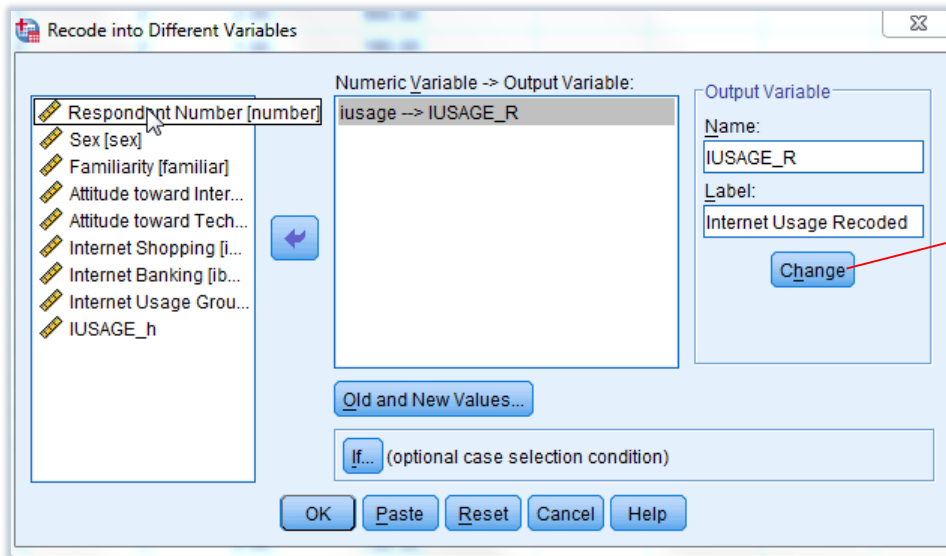
- ▶ **IUSAGE** (Internet usage, h/week)
 - ▶ Compute IUSAGE_M (*Internet usage in minutes per week*)



Transforming Data



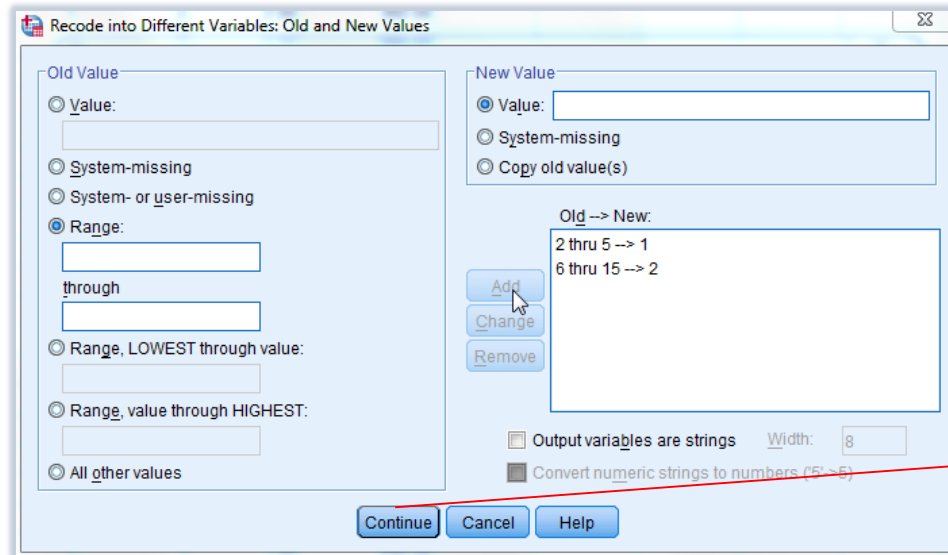
- ▶ **IUSAGE** (Internet Usage, h/week)
 - ▶ Recode IUSAGE_R (1 'low' = [2-5h], 2 'high' = [6-15h])



Transforming Data



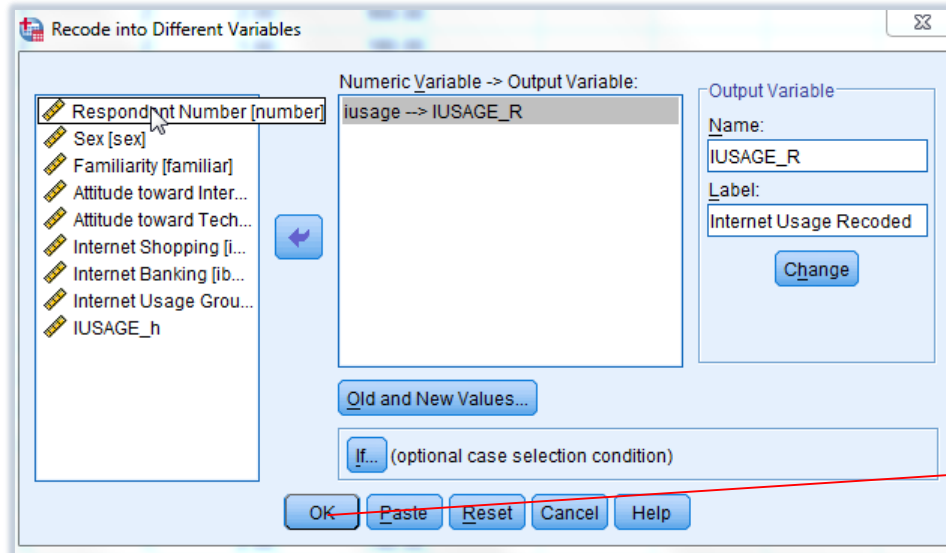
- ▶ **IUSAGE** (Internet Usage, h/week)
 - ▶ Recode IUSAGE_R (1 'low' = [2-5h], 2 'high' = [6-15h])



Transforming Data



- ▶ **IUSAGE** (Internet Usage, h/week)
 - ▶ Recode IUSAGE_R (1 'low' = [2-5h], 2 'high' = [6-15h])



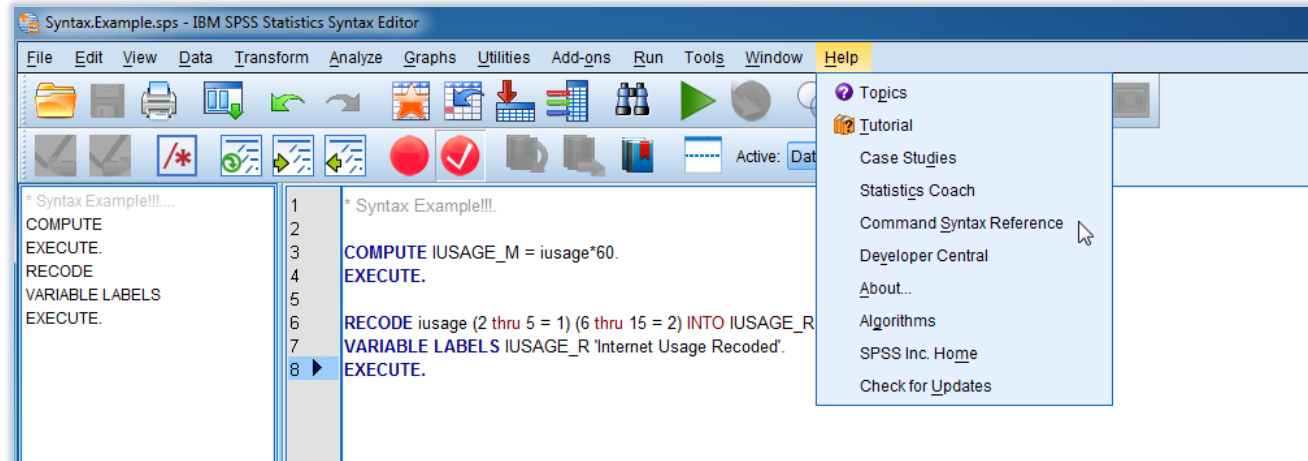
Transforming Data



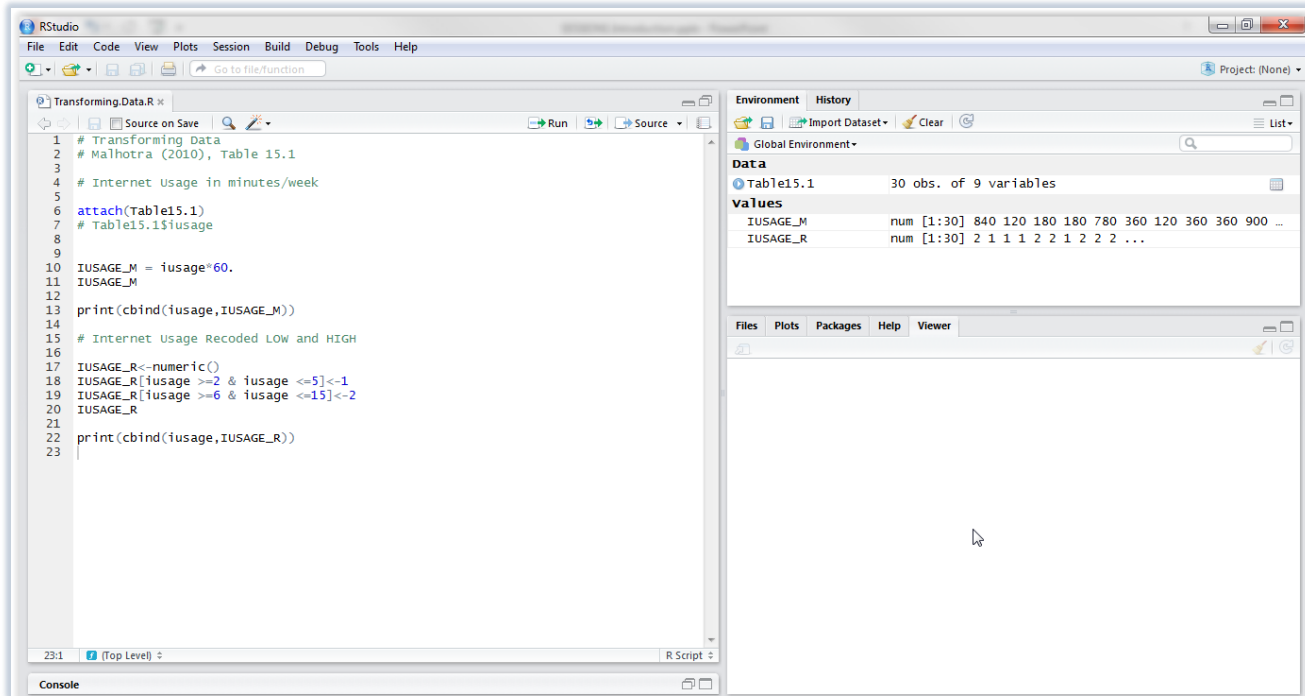
Table 15.1 Input.TRANS.sav [DataSet1] - IBM SPSS Statistics Data Editor

	number	sex	familiar	iusage	iattitude	tattitude	ishopping	ibanking	iusagegr	IUSAGE_M	IUSAGE_R	var
1	1	1	7	14	7	6	1	1	2.00	840.00	2.00	
2	2	2	2	2	3	3	2	2	1.00	120.00	1.00	
3	3	2	3	3	4	3	1	2	1.00	180.00	1.00	
4	4	2	3	3	7	5	1	2	1.00	180.00	1.00	
5	5	1	7	13	7	7	1	1	2.00	780.00	2.00	
6	6	2	4	6	5	4	1	2	2.00	360.00	2.00	
7	7	2	2	2	4	5	2	2	1.00	120.00	1.00	
8	8	2	3	6	5	4	2	2	2.00	360.00	2.00	
9	9	2	3	6	6	4	1	2	2.00	360.00	2.00	
10	10	1	9	15	7	6	1	2	2.00	900.00	2.00	
11	11	2	4	3	4	3	2	2	1.00	180.00	1.00	
12	12	2	5	4	6	4	2	2	1.00	240.00	1.00	
13	13	1	6	9	6	5	2	1	2.00	540.00	2.00	
14	14	1	6	8	3	2	2	2	2.00	480.00	2.00	
15	15	1	6	5	5	4	1	2	1.00	300.00	1.00	
16	16	2	4	3	4	3	2	2	1.00	180.00	1.00	
17	17	1	6	9	5	3	1	1	2.00	540.00	2.00	
18	18	1	4	4	5	4	1	2	1.00	240.00	1.00	
19	19	1	7	14	6	6	1	1	2.00	840.00	2.00	
20	20	2	6	6	6	4	2	2	2.00	360.00	2.00	
21	21	1	6	9	4	2	2	2	2.00	540.00	2.00	
22	22	1	5	5	5	4	2	1	1.00	300.00	1.00	
23	23	2	3	2	4	2	2	2	1.00	120.00	1.00	
24	24	1	7	15	6	6	1	1	2.00	900.00	2.00	
25	25	2	6	6	5	3	1	2	2.00	360.00	2.00	
26	26	1	6	13	6	6	1	1	2.00	780.00	2.00	
27	27	2	5	4	5	5	1	1	1.00	240.00	1.00	
28	28	2	4	2	3	2	2	2	1.00	120.00	1.00	
29	29	1	4	4	5	3	1	2	1.00	240.00	1.00	
30	30	1	3	3	7	5	1	2	1.00	180.00	1.00	
31												

Transforming Data



Alte native...Transforming Data



The screenshot shows the RStudio interface with a script editor on the left and the Environment pane on the right. The script editor contains the following R code:

```
1 # Transforming Data
2 # Malhotra (2010), Table 15.1
3
4 # Internet usage in minutes/week
5
6 attach(Table15.1)
7 # Table15.1$Iusage
8
9
10 IUSAGE_M = Iusage*60.
11 IUSAGE_M
12
13 print(cbind(Iusage,IUSAGE_M))
14
15 # Internet Usage Recoded LOW and HIGH
16
17 IUSAGE_R<-numeric()
18 IUSAGE_R[Iusage >=2 & Iusage <=5]<-1
19 IUSAGE_R[Iusage >=6 & Iusage <=15]<-2
20 IUSAGE_R
21
22 print(cbind(Iusage,IUSAGE_R))
23
```

The Environment pane on the right shows the following data:

Global Environment	
Table15.1	30 obs. of 9 variables
Values	
IUSAGE_M	num [1:30] 840 120 180 180 780 360 120 360 360 900 ...
IUSAGE_R	num [1:30] 2 1 1 1 2 2 1 2 2 2 ...

Graphs



- Two procedures:
- Chart Builder
 - Legacy Dialogs

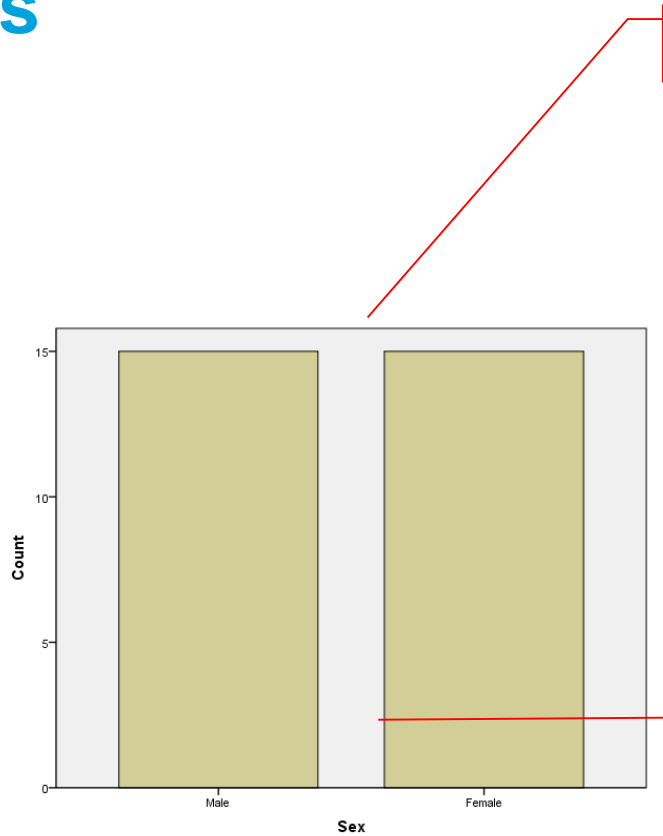
	number	sex	familiar	iusage	attitude	attitude	shopping	banking	iusagegr	IUSAGE_h	IUSAGE_R	var
1	1	1	7	14	7	6	1	1	2.00	840.00	2.00	
2	2	2	2	2	3	3	2	2	1.00	120.00	1.00	
3	3	2	3	3	4	3	1	2	1.00	180.00	1.00	
4	4	2	3	3	7	5	1	2	1.00	180.00	1.00	
5	5	1	7	13	7	7	1	1	2.00	780.00	2.00	
6	6	2	4	6	5	4	1	2	2.00	360.00	2.00	
7	7	2	2	2	4	5	2	2	1.00	120.00	1.00	
8	8	2	3	6	5	4	2	2	2.00	360.00	2.00	
9	9	2	3	6	6	4	1	2	2.00	360.00	2.00	
10	10	1	9	15	7	6	1	2	2.00	900.00	2.00	
11	11	2	4	3	4	3	2	2	1.00	180.00	1.00	
12	12	2	5	4	6	4	2	2	1.00	240.00	1.00	
13	13	1	6	9	6	5	2	1	2.00	540.00	2.00	
14	14	1	6	8	3	2	2	2	2.00	480.00	2.00	
15	15	1	6	5	5	4	1	2	1.00	300.00	1.00	
16	16	2	4	3	4	3	2	2	1.00	180.00	1.00	
17	17	1	6	9	5	3	1	1	2.00	540.00	2.00	

Graphs



Legacy Dialogs

- Bar...
- 3-D Bar...
- Line...
- Area...
- Pie...
- High-Low...
- Boxplot...
- Error Bar...
- Population Pyramid...
- Scatter/Dot...
- Histogram...



 : to edit

Graphs



**Chart Builder
Assumes Metric for
Measure is correct!!!**

Table 15.1 Input.TRANS.sav [DataSet2] - IBM SPSS Statistics Data Editor

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	11						Right	Nominal	Input
2	sex	Numeric	11						Right	Nominal	Input
3	familiar	Numeric	11						Right	Scale	Input
4	iusage	Numeric	11						Right	Scale	Input
5	iattitude	Numeric	11						Right	Scale	Input
6	tattitude	Numeric	11						Right	Scale	Input
7	ishopping	Numeric	11						Right	Nominal	Input
8	ibanking	Numeric	11						Right	Nominal	Input
9	iusagegr	Numeric	8						Right	Nominal	Input
10	IUSAGE_h	Numeric	8						Right	Scale	Input
11	IUSAGE_R	Numeric	8						Right	Nominal	Input
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

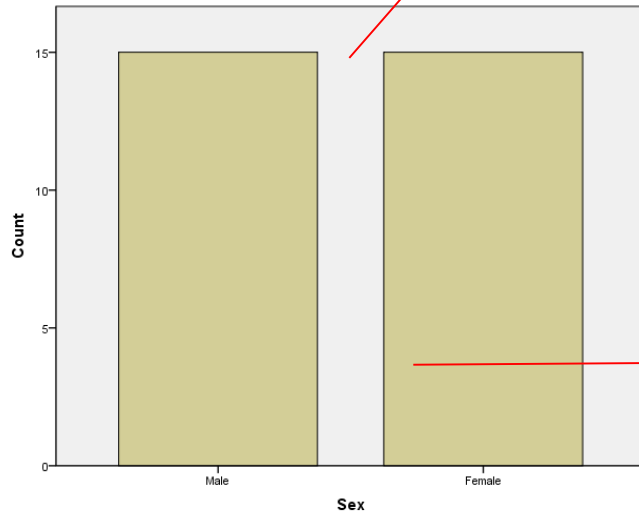
Chart Builder dialog box:

- Variables: Respondent Number, Sex (sex), Familiarity (familiar), Internet Usage His..., Attitude toward Inter..., Attitude toward Tech..., Internet Shopping (I..., Internet Banking (Ib..., Internet Usage Grou..., IUSAGE_h, Internet Usage Rec...
- Gallery: Bar, Line, Area, Pie/Polar, Scatter/Dot, Histogram, High-Low, Boxplot, Dual Axes
- Buttons: OK, Paste, Reset, Cancel, Help, Element Properties..., Options...

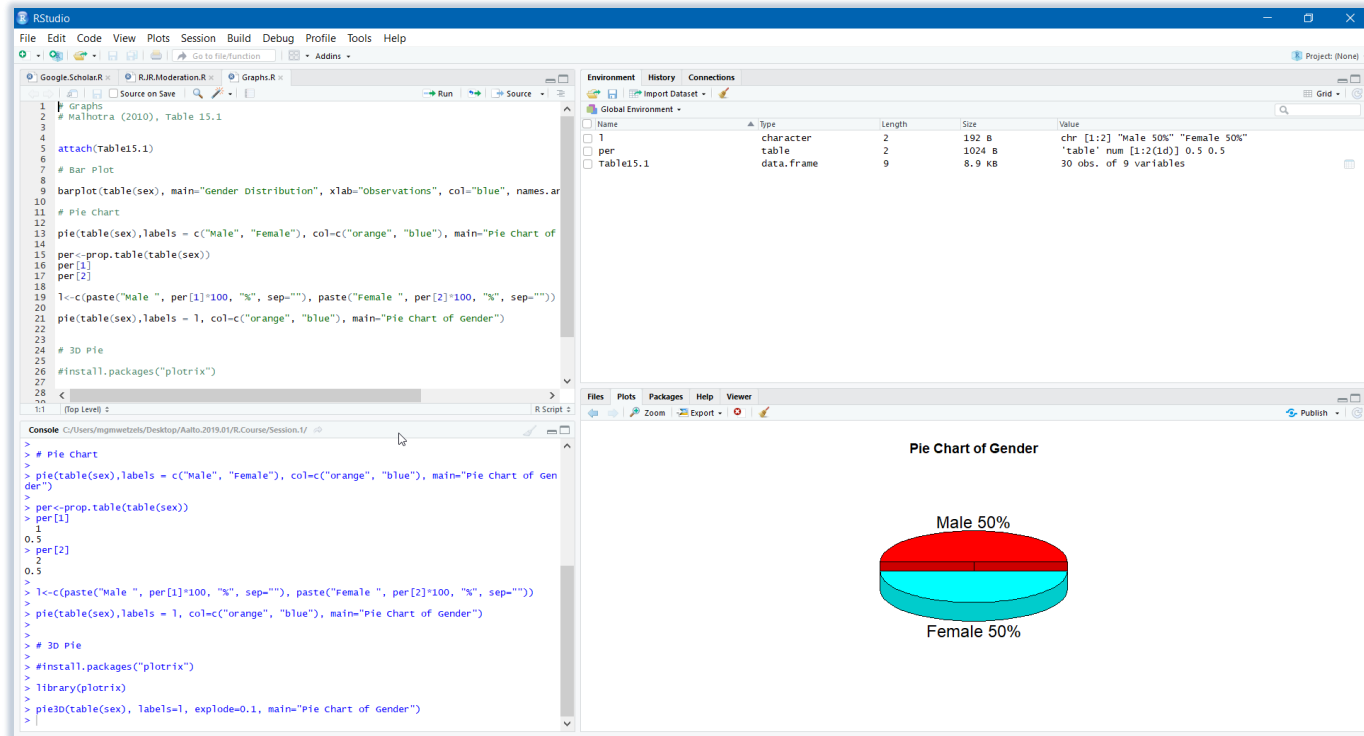
Graphs



Chart Builder



 : to edit



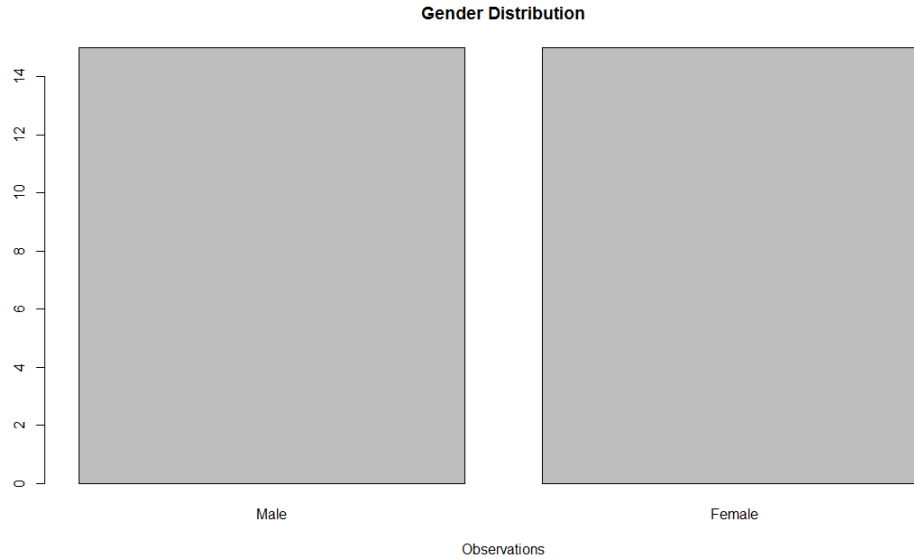
The screenshot shows the RStudio interface with the following components:

- Code Editor:** Contains R code for creating a 3D pie chart. The code includes comments, data attachment, bar plot creation, and the use of the `pie3D` function from the `plotrix` package.
- Environment:** Shows the global environment with variables `l` (character), `per` (table), and `Table15.1` (data.frame).
- Console:** Displays the execution output of the R code, showing the creation of the 3D pie chart.
- Plots:** Displays a 3D pie chart titled "Pie Chart of Gender" with a red slice for "Male 50%" and a cyan slice for "Female 50%".

```
1 # Graphs
2 # Malhotra (2010), Table 15.1
3
4 attach(Table15.1)
5
6 # Bar Plot
7
8
9 barplot(table(sex), main="Gender Distribution", xlab="Observations", col="blue", names.ar
10
11 # Pie chart
12
13 pie(table(sex), labels = c("Male", "Female"), col=c("orange", "blue"), main="Pie chart of
14
15 per <- prop.table(table(sex))
16 per[1]
17 per[2]
18
19 l <- c(paste("Male ", per[1]*100, "%", sep=""), paste("Female ", per[2]*100, "%", sep=""))
20
21 pie(table(sex), labels = l, col=c("orange", "blue"), main="Pie chart of Gender")
22
23
24 # 3D Pie
25
26 #install.packages("plotrix")
27
28 <
29
30 [top Level]
31 R Script 1
```

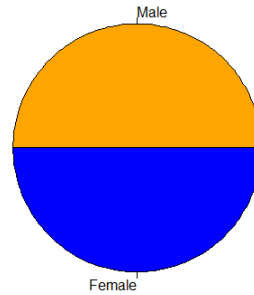
Console output:

```
> # Pie chart
> pie(table(sex), labels = c("Male", "Female"), col=c("orange", "blue"), main="Pie chart of gen
der")
> per <- prop.table(table(sex))
> per[1]
[1] 0.5
> per[2]
[1] 0.5
> l <- c(paste("Male ", per[1]*100, "%", sep=""), paste("Female ", per[2]*100, "%", sep=""))
> pie(table(sex), labels = l, col=c("orange", "blue"), main="Pie chart of Gender")
>
> # 3D Pie
> #install.packages("plotrix")
> library(plotrix)
> pie3D(table(sex), labels=l, explode=0.1, main="Pie chart of Gender")
>
```




Alte R native...Graphs


Pie Chart of Gender



Alte native...ggplot2

<https://ggplot2.tidyverse.org/index.html>

 **ggplot2** part of the [tidyverse](#)
3.1.0.9000

[Reference](#) [Articles](#) [News](#) 

Overview

ggplot2 is a system for declaratively creating graphics, based on [The Grammar of Graphics](#). You provide the data, tell ggplot2 how to map variables to aesthetics, what graphical primitives to use, and it takes care of the details.

Installation

```
# The easiest way to get ggplot2 is to install the whole tidyverse:  
install.packages("tidyverse")  
  
# Alternatively, install just ggplot2:  
install.packages("ggplot2")  
  
# Or the the development version from GitHub:  
# install.packages("devtools")  
devtools::install_github("tidyverse/ggplot2")
```

Links

Download from CRAN at <https://cloud.r-project.org/package=ggplot2>

Browse source code at <https://github.com/tidyverse/ggplot2>

Report a bug at <https://github.com/tidyverse/ggplot2/issues>

Learn more at <http://r4ds.had.co.nz/data-visualisation.html>

Extensions at <http://www.ggplot2-exts.org/gallery/>

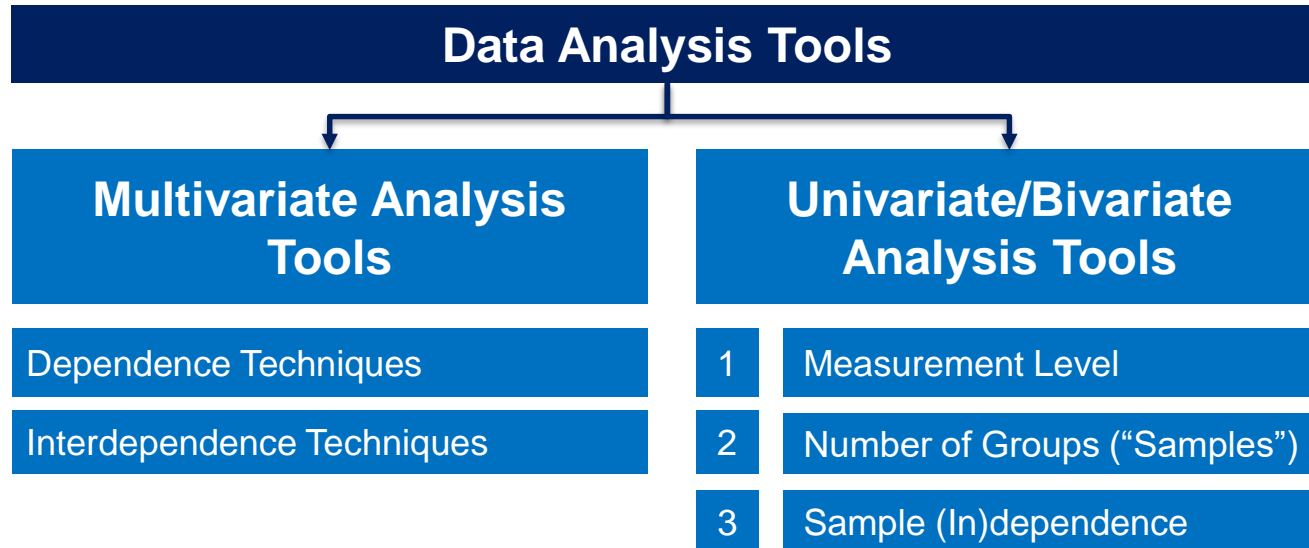
License

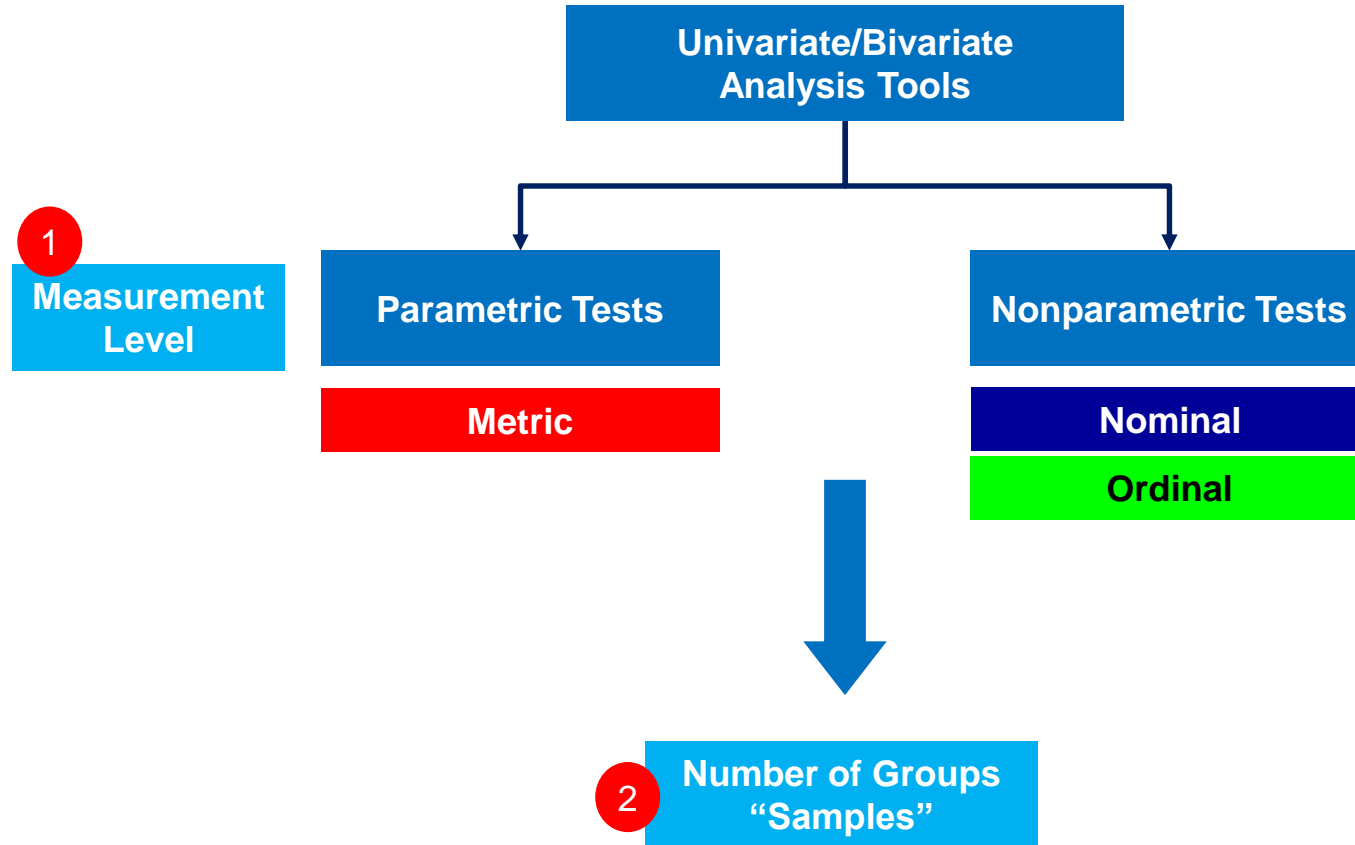
GPL-2 | [file LICENSE](#)

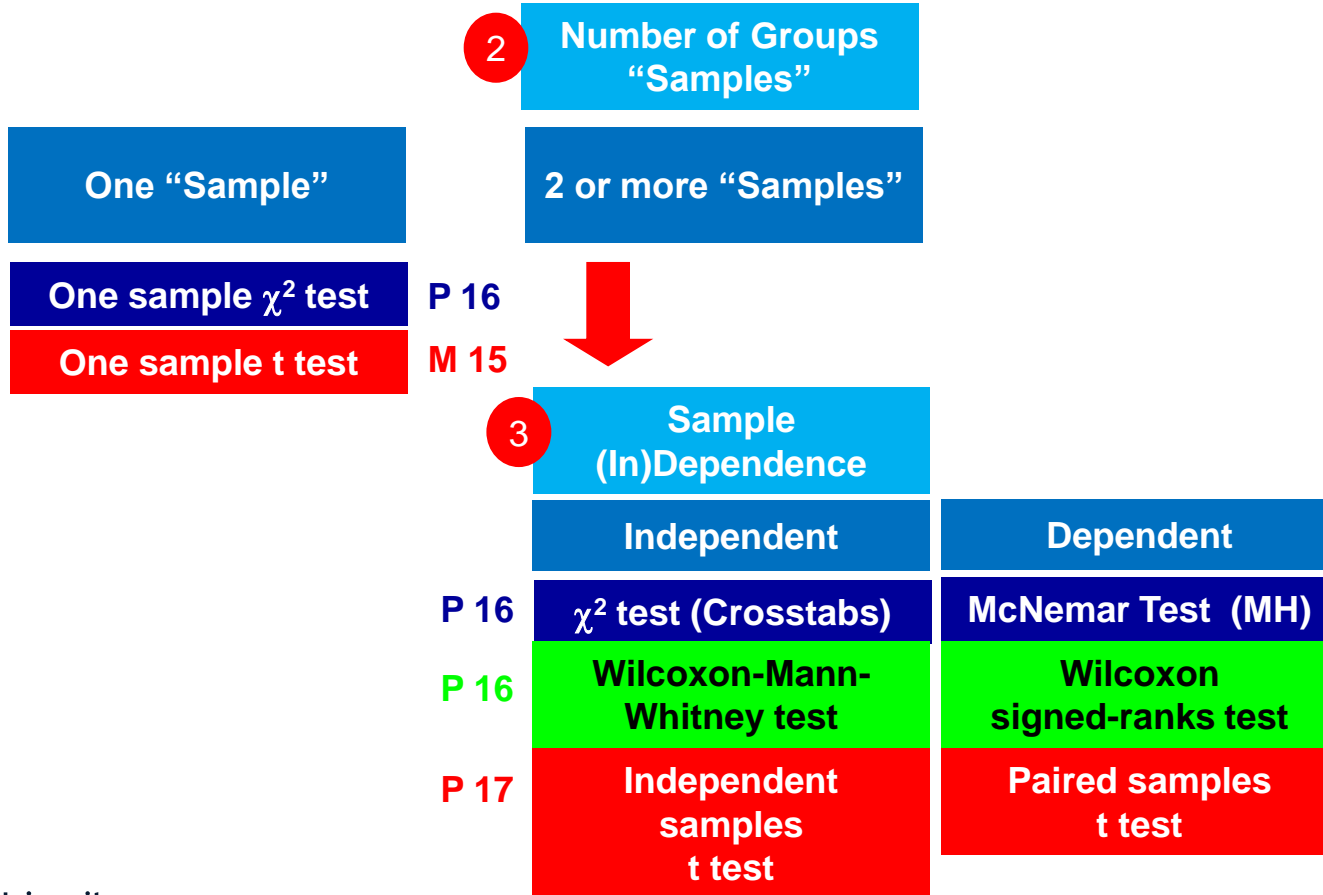
Citation

Overview over Data Analysis Tools for Marketing Research

Malhotra (2010); Pallant (2016)







Hypothesis Testing Procedure

Malhotra (2010); Pallant (2016)

1

Research Problem

→

H_0 : “No Effect”

H_1 : “Effect”

2

- Choose Appropriate Test Statistic
- Specify significance level ($\alpha \rightarrow 0.05$)

3

Collect Data

4

Calculate Test Statistic and Probability Value (p value)

5

If $p \leq \alpha$, **reject H_0**

If $p > \alpha$, **do not reject H_0**

Significance Level (α)

Cohen (1992, 1988); Malhotra (2010)

	Reality	
Statistical Decision	H_0 : "No Effect"	H_1 : "Effect"
H_0 : "No Effect"	1- α	β Type II Error
H_1 : "Effect"	α Type I Error	1- β Power

Why not set α at 0.000000000001?

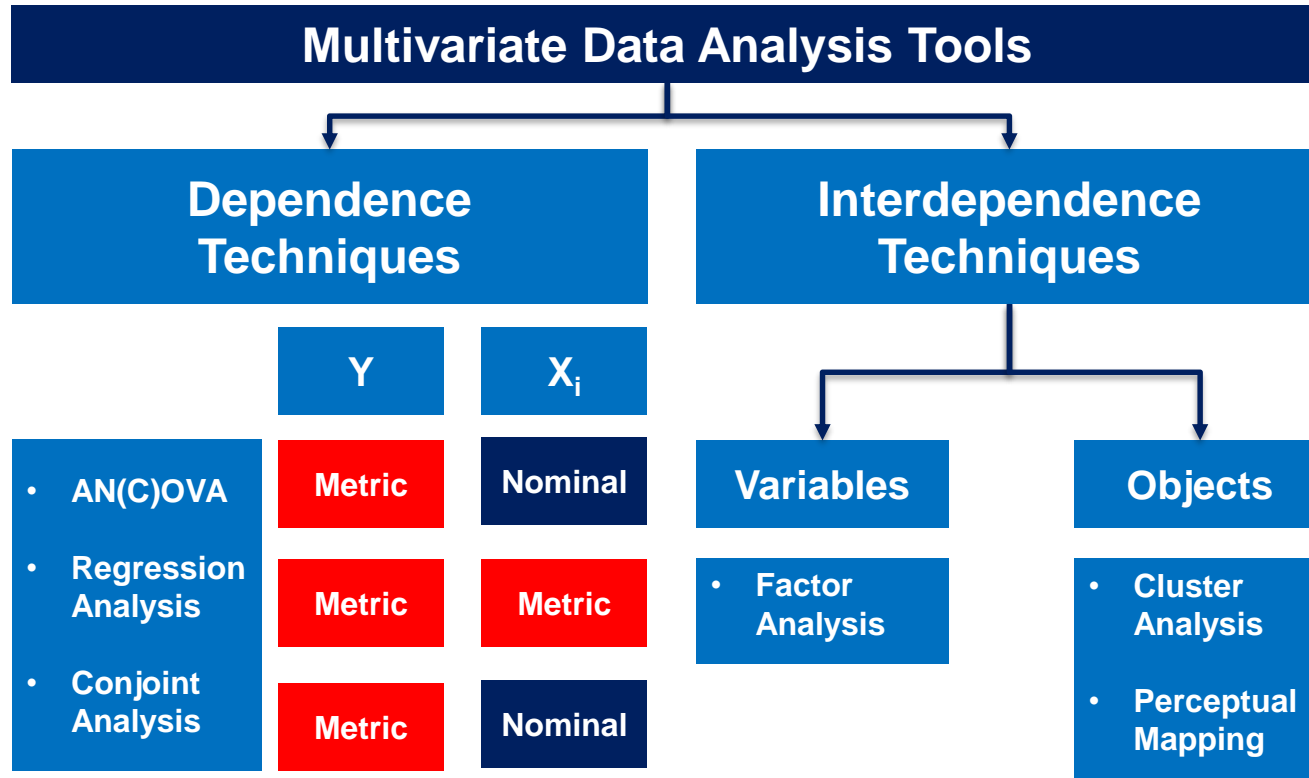
$$\alpha \downarrow \rightarrow \beta \uparrow \rightarrow (1 - \beta) \downarrow$$

Would increasing the sample size help?

$$n \uparrow \rightarrow \beta \downarrow \rightarrow (1 - \beta) \uparrow$$

Data Analysis Tools

Hair et al. (2018); Malhotra (2010)



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**Thank you for
Your Attention!**