

Introduction to JASP for Data Analysis

Frederick Anyan, Ph.D.

frederick.anyan@ntnu.no

[Personal website](#)

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases

- Example Analyses
 - Exploratory and Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - Mediation modelling

 - Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformation
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases



- Example Analyses
 - Exploratory and Confirmatory
 - Multigroup analyses and measurement invariance
 - Mediation modelling
 - Advanced modeling in JASP
 - Longitudinal/Growth models –

Longitudinal Data Analysis using Mplus and R

Workshop materials:

[Mplus users](#)

[R users](#)

Frederick Anyan, Ph.D.

frederick.anyan@ntnu.no

[Personal website](#)

Håvard R. Karlsen, Ph.D.

h.karlsen@ntnu.no

[Personal website](#)



Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases

- Example Analyses
 - Exploratory and Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - Mediation modelling

 - Advanced modeling in JASP

What does JASP stand for?



In recognition of Bayesian pioneer Sir Harold Jeffreys, JASP stands for Jeffreys's Amazing Statistics Program.

• JASP: Downloading, installing, and opening JASP

1. JASP: Downloading, installing, and opening JASP
 - <https://jasp-stats.org/download/>
 - Windows
 - macOS
 - Installation guide: <https://jasp-stats.org/installation-guide/>
 - Linux
 2. Support, support and support materials...
 - How to use JASP: [Explanatory articles, videos and GIFs](#)
 - JASP Materials: [Manual, Online resources, Books, Papers, workshops, etc](#)
 3. FAQs...?
 - [Here...](#)
- [Open Science Framework with JASP](#)

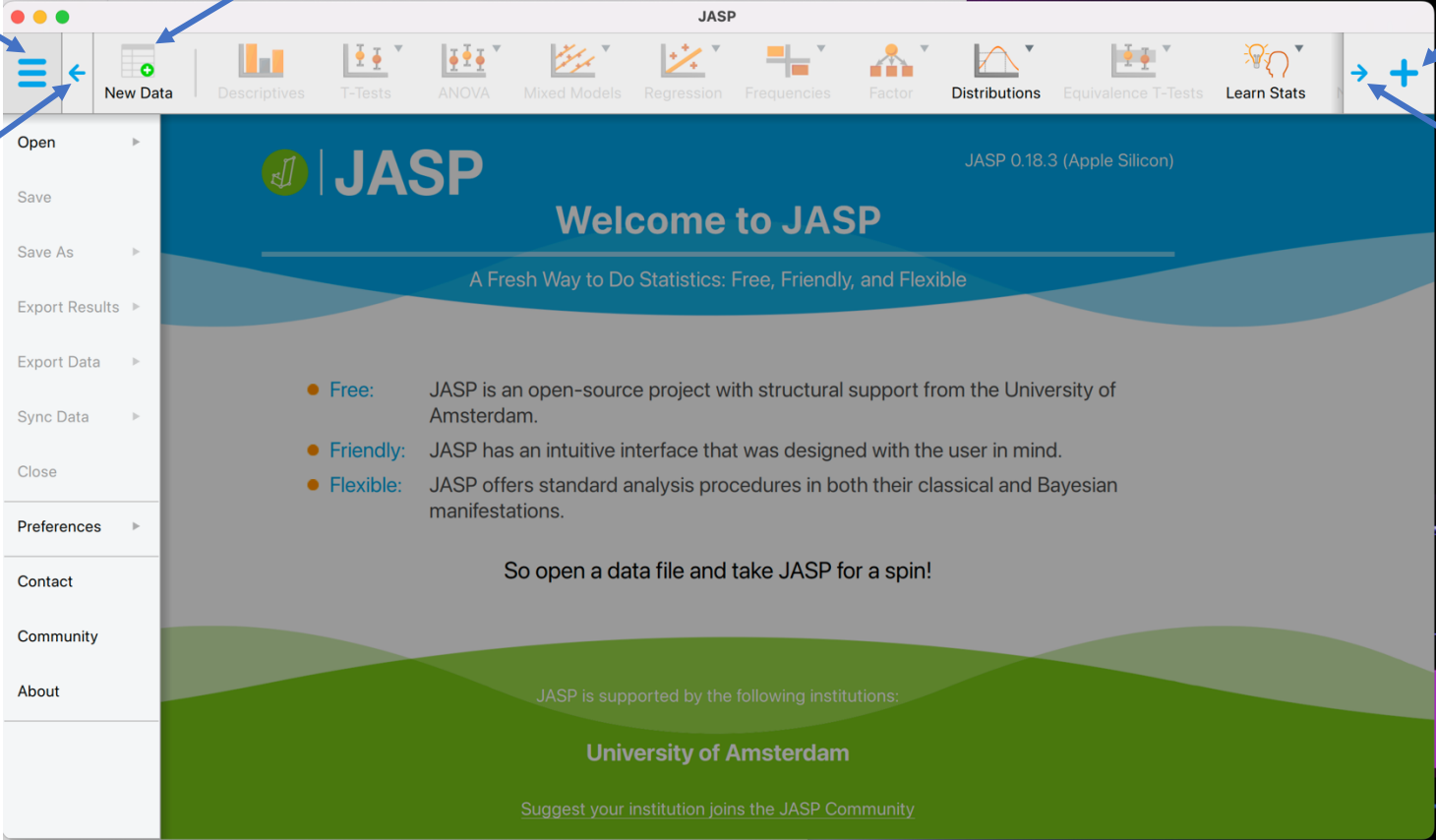
• JASP: Downloading, installing, and opening JASP

Show or hide main menu

Open data editor (workspace)

Add modules

Show already added modules



The screenshot shows the JASP application window. The title bar reads 'JASP'. Below it is a toolbar with icons for 'New Data', 'Descriptives', 'T-Tests', 'ANOVA', 'Mixed Models', 'Regression', 'Frequencies', 'Factor', 'Distributions', 'Equivalence T-Tests', and 'Learn Stats'. On the far right of the toolbar is a blue plus sign icon. A vertical menu is open on the left side, listing options: Open, Save, Save As, Export Results, Export Data, Sync Data, Close, Preferences, Contact, Community, and About. The main content area has a blue header with the JASP logo and 'Welcome to JASP' text. Below the header, it says 'A Fresh Way to Do Statistics: Free, Friendly, and Flexible'. There are three bullet points: 'Free: JASP is an open-source project with structural support from the University of Amsterdam.', 'Friendly: JASP has an intuitive interface that was designed with the user in mind.', and 'Flexible: JASP offers standard analysis procedures in both their classical and Bayesian manifestations.' Below this, it says 'So open a data file and take JASP for a spin!'. At the bottom, it says 'JASP is supported by the following institutions: University of Amsterdam' and 'Suggest your institution joins the JASP Community'.

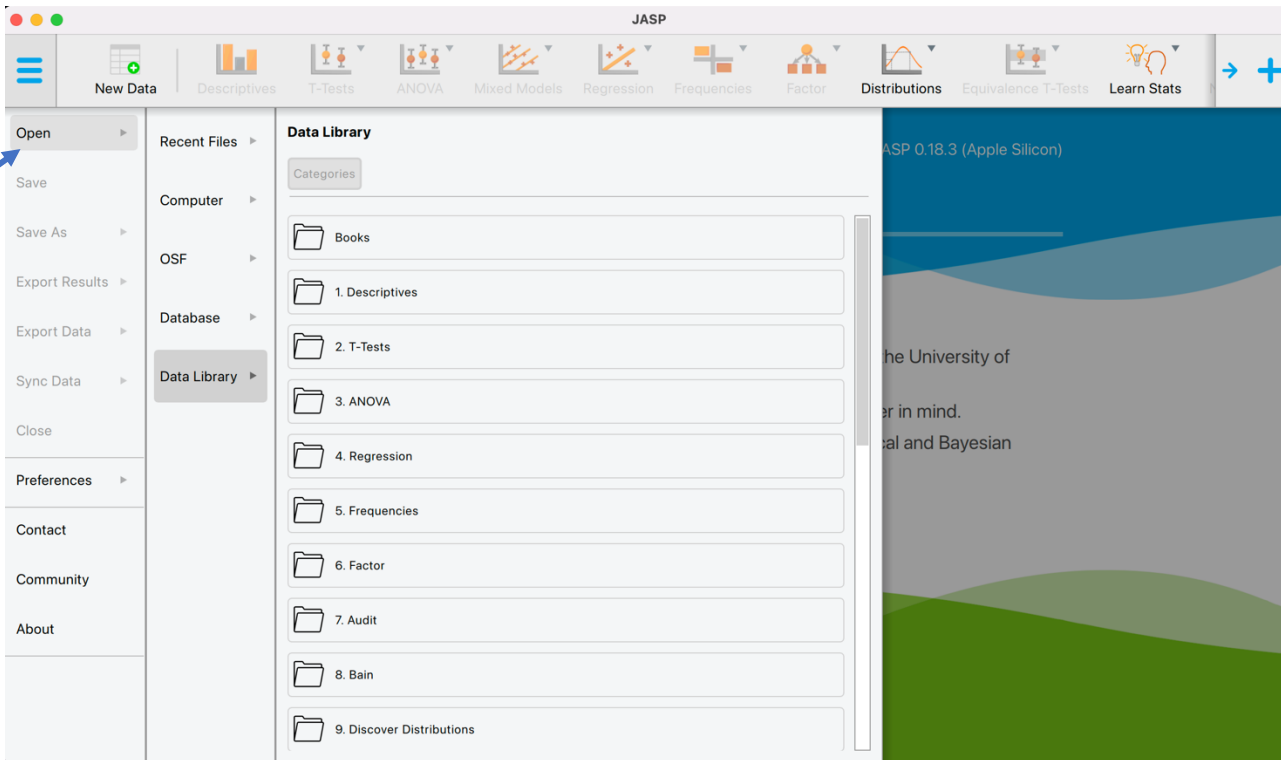
Plan for today

- JASP: Downloading, installing, and opening JASP
- **Reading data into JASP**
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases

- Example Analyses
 - Exploratory and Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - Mediation modelling

 - Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

• Reading data into JASP



Click Open on the main menu

- Recent files
- Computer
- OSF
- Database
- Data library

JASP currently reads the following formats: .csv, .txt, .tsv, .ods, .dta, .sav, .zsav, .por, .sas7bdat, .sas7bcat, .xpt and of course the .jasp format.

• Reading data into JASP

The screenshot displays the JASP software interface for a Confirmatory Factor Analysis (CFA) model. The title bar reads "Mental Ability". The toolbar includes icons for Edit Data, Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, Distributions, Equivalence T-Tests, and Learn Stats. The main workspace is titled "Mental Ability: Confirmatory Factor Analysis".

On the left, a list of variables is shown, including V1, id, sex, ageyr, agemo, school, grade, x1 through x9. The "Visual" factor is selected, and its associated variables (x1, x2, x3) are listed in the "Visual" box. The "Textual" factor is associated with x4, x5, and x6. The "Speed" factor is associated with x7, x8, and x9.

The right panel provides a detailed description of the model and variables. The "Description" section states: "The classic Holzinger and Swinford (1939) dataset consists of mental ability test scores of second grade children from two different schools (Pasteur and Grant-White). In the original dataset, there are 26 tests. However, a smaller subset with 9 variables is more widely used in the literature (for example, Joreskog's 1969 paper, which uses the 145 subjects from the Grant-White school only)."

The "Variables" section lists the following:

- **id** - Identifier
- **sex** - Gender
- **ageyr** - Age, year part
- **agemo** - Age, month part
- **school** - School (Pasteur or Grant-White)
- **grade** - Grade
- **x1** - Visual perception
- **x2** - Cubes
- **x3** - Lozenges
- **x4** - Paragraph comprehension
- **x5** - Sentence completion
- **x6** - Word meaning
- **x7** - Speeded addition
- **x8** - Speeded counting of dots
- **x9** - Speeded discrimination straight and curved capitals

The "References" section lists: Holzinger, K., and Swinford, F. (1939). A study in factor analysis: The stability of a bifactor solution.

Three blue arrows point to the left sidebar, the variable selection area, and the output panel, respectively.

Click arrow/triangle to reveal data view or use slider to resize the data, analysis and output panes

• Reading data into JASP

Data/variable view Analyses Name of data file Results/Output

The screenshot displays the JASP software interface. On the left, the 'Data/variable view' shows a dataset with columns V1, id, sex, and a plus sign for more variables. The 'Analyses' section is set to 'Confirmatory Factor Analysis'. The 'Name of data file' is 'Mental Ability'. The 'Results/Output' section shows the 'Confirmatory Factor Analysis' results, including a Chi-square test table and a table of fit indices.

Model	X ²	df	p
Baseline model	918.852	36	
Factor model	85.306	24	< .001

Index	Value
Comparative Fit Index (CFI)	0.931
Tucker-Lewis Index (TLI)	0.896
Bentler-Bonett Non-normed Fit Index (NNFI)	0.896
Bentler-Bonett Normed Fit Index (NFI)	0.907
Parsimony Normed Fit Index (PNFI)	0.605
Bollen's Relative Fit Index (RFI)	0.861
Bollen's Incremental Fit Index (IFI)	0.931
Relative Noncentrality Index (RNI)	0.931

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- **Variables/Data transformations**
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases
- Example Analyses
 - Exploratory and Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - Mediation modelling
 - Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

• (Re)Naming variables

Data/variable view

	V1	id	sex
1	1	1	1
2	2	2	2
3	3	3	2
4	4	4	1
5	5	5	2
6	6	6	2
7	7	7	1
8	8	8	2
9	9	9	2
10	10	11	2
11	11	12	1
12	12	13	1
13	13	14	2
14	14	15	2
15	15	16	1
16	16	17	2
17	17	18	2
18	18	19	1
19	19	20	2
20	20	21	2
21	21	22	1
22	22	23	1

Double click for Variable setting

(Re)Name and describe variables

Name: V1 Long name: V1

Column type: Scale Description:

Computed type: Not computed

Missing Values

Use custom values

.
NA
NaN
ddd
nan

Reset

Show workspace missing





	V1	id	sex	ageyr	
1	1	1	1	13	1
2	2	2	2	13	7
3	3	3	2	13	1
4	4	4	1	13	2
5	5	5	2	12	2
6	6	6	2	14	1
7	7	7	1	12	1
8	8	8	2	12	2

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- **Variables/Data transformations**
 - (Re)Naming Variables
 - **Setting levels of measurement**
 - Computing (Recoding) new variables
- Selecting and filtering cases
- Exploratory and Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
- Mediation modelling
- Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

• Set level of measurement

Categorical variable types in JASP

-  Nominal
(1 = Females; 2 = Males)
-  Nominal text (string)
(F = Females; M = Males)
-  Ordinal
(1 = Mild, 2 = Moderate; 3 = Severe)
-  Continuous
Scale data




Factors/Groupings

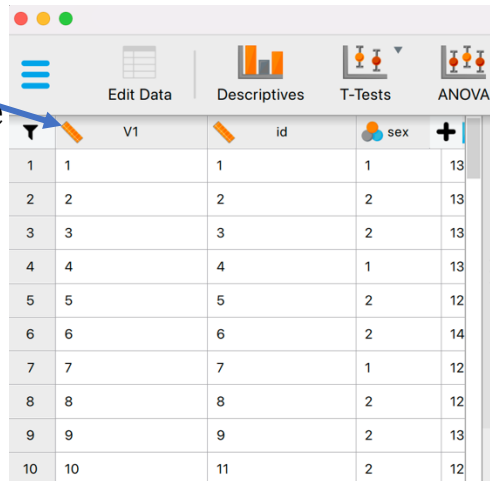
Can set value labels that will show in results

(Re)Name and describe variables

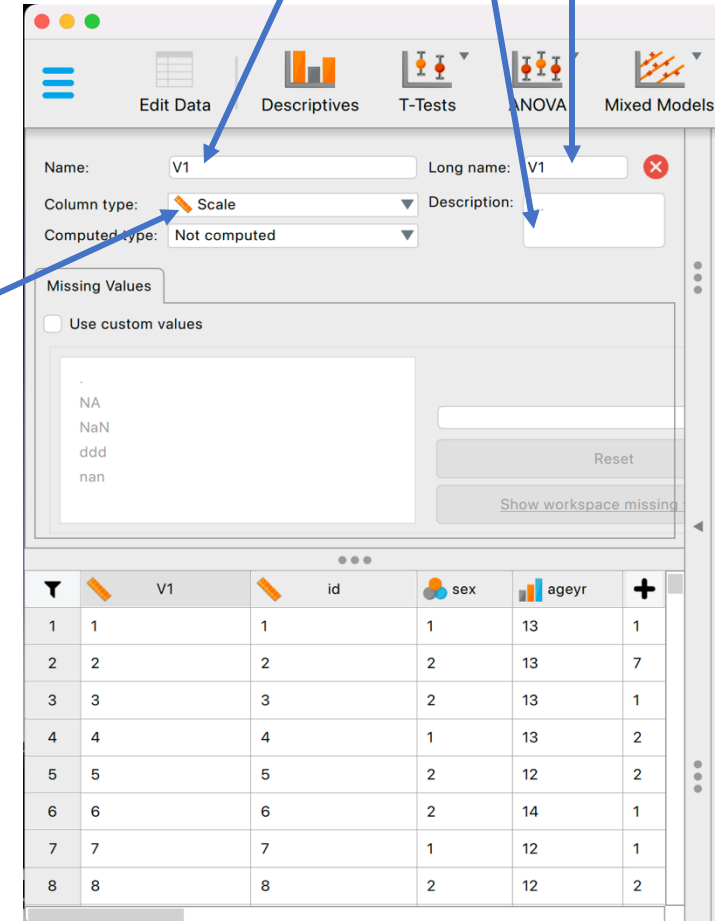
Set level of measurement or Change column type

Set level of measurement or Change column type

-  Scale
-  Ordinal
-  Nominal



	V1	id	sex	
1	1	1	1	13
2	2	2	2	13
3	3	3	2	13
4	4	4	1	13
5	5	5	2	12
6	6	6	2	14
7	7	7	1	12
8	8	8	2	12
9	9	9	2	13
10	10	11	2	12



Name: V1 Long name: V1

Column type: Scale Description:

Computed type: Not computed

Missing Values

Use custom values

NA
NaN
ddd
nan





Reset

Show workspace missing

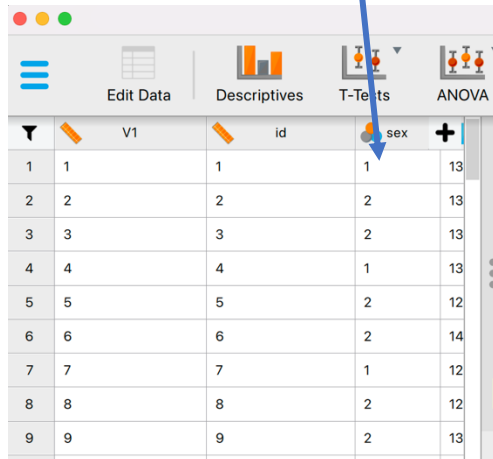
	V1	id	sex	ageyr	
1	1	1	1	13	1
2	2	2	2	13	7
3	3	3	2	13	1
4	4	4	1	13	2
5	5	5	2	12	2
6	6	6	2	14	1
7	7	7	1	12	1
8	8	8	2	12	2

• Set level of measurement

Categorical variable types in JASP

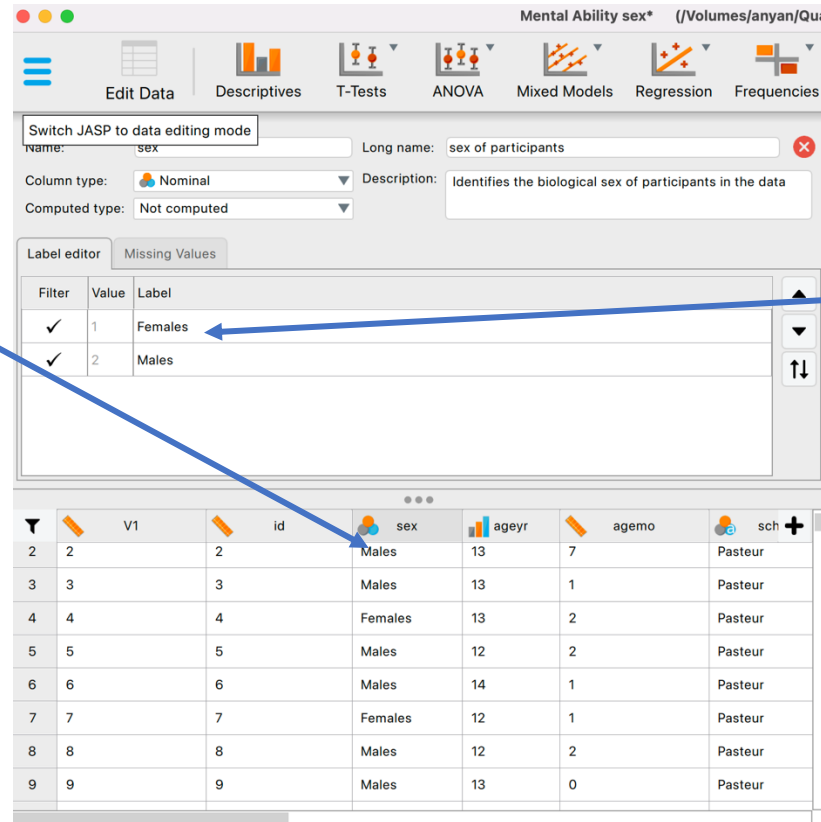
-  Nominal
(1 = Females; 2 = Males)
-  Nominal text (string)
(F = Females; M = Males)
-  Ordinal
(1 = Mild, 2 = Moderate; 3 = Severe)
-  Continuous
Scale data

Numbers or labels...?



	V1	id	sex	
1	1	1	1	13
2	2	2	2	13
3	3	3	2	13
4	4	4	1	13
5	5	5	2	12
6	6	6	2	14
7	7	7	1	12
8	8	8	2	12
9	9	9	2	13

Value labels



Switch JASP to data editing mode

Name: sex Long name: sex of participants

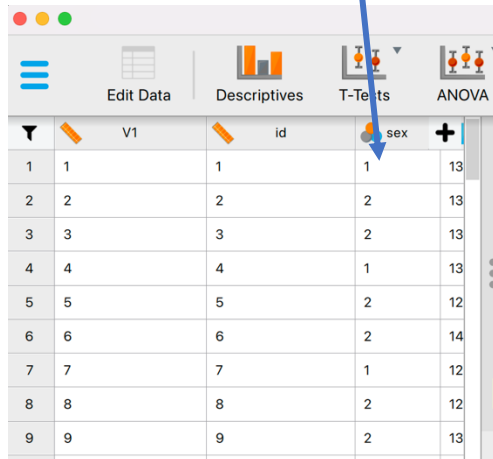
Column type: Nominal Description: Identifies the biological sex of participants in the data

Computed type: Not computed

Label editor

Filter	Value	Label
✓	1	Females
✓	2	Males

Double click to set labels under 'label'



	V1	id	sex	
2	2	2	Males	13
3	3	3	Males	13
4	4	4	Females	13
5	5	5	Males	12
6	6	6	Males	14
7	7	7	Females	12
8	8	8	Males	12
9	9	9	Males	13

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- **Variables/Data transformations**
 - (Re)Naming Variables
 - Setting levels of measurement
 - **Computing (Recoding) new variables**
- Selecting and filtering cases
- Example Analyses
 - Exploratory and Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - Mediation modelling
 - Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

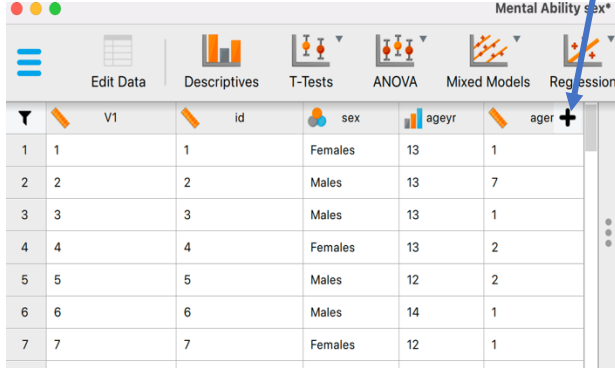
- **Computing/creating/Recoding new variables**

**Mean and sum
scores**

• Computing/creating/Recoding new variables

Mean and sum scores

Compute/create/recode into new variables



Mental Ability sex*

Edit Data Descriptives T-Tests ANOVA Mixed Models Regression

	V1	id	sex	ageyr	ager
1	1	1	Females	13	1
2	2	2	Males	13	7
3	3	3	Males	13	1
4	4	4	Females	13	2
5	5	5	Males	12	2
6	6	6	Males	14	1
7	7	7	Females	12	1

• Computing/creating/Recoding new variables

Compute/create new variables

Name new variable

Set level of measurement to scale

Click compute

Mean and sum scores

	V1	id	sex	ageyr	ager
1	1	1	Females	13	1
2	2	2	Males	13	7
3	3	3	Males	13	1
4	4	4	Females	13	2
5	5	5	Males	12	2
6	6	6	Males	14	1
7	7	7	Females	12	1

Confirmatory Factor Analysis

Create Computed Column

Name: sum_visual

Define column through drag and drop formulas

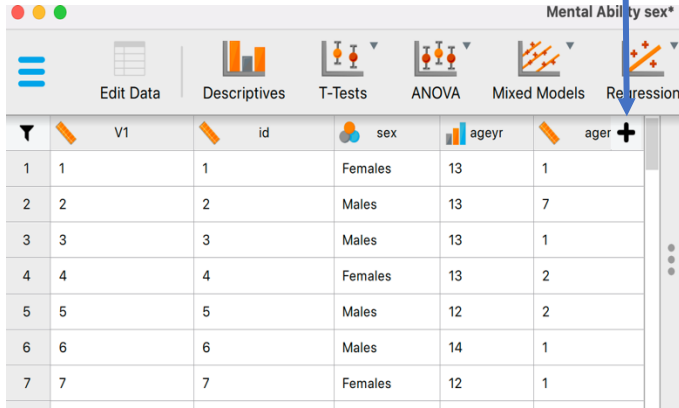
Scale | Ordinal | Nominal | Text

Create Column

• Computing/creating/Recoding new variables

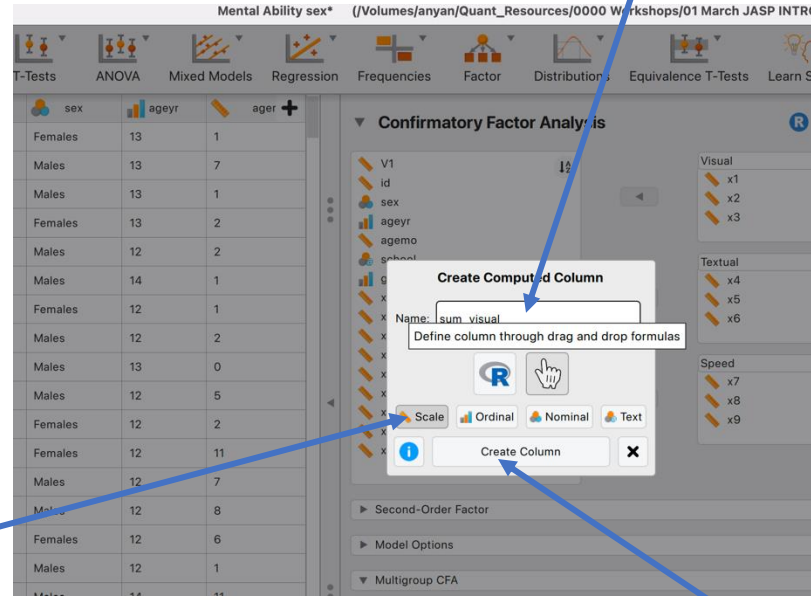
Compute/create new variables

Mean and sum scores



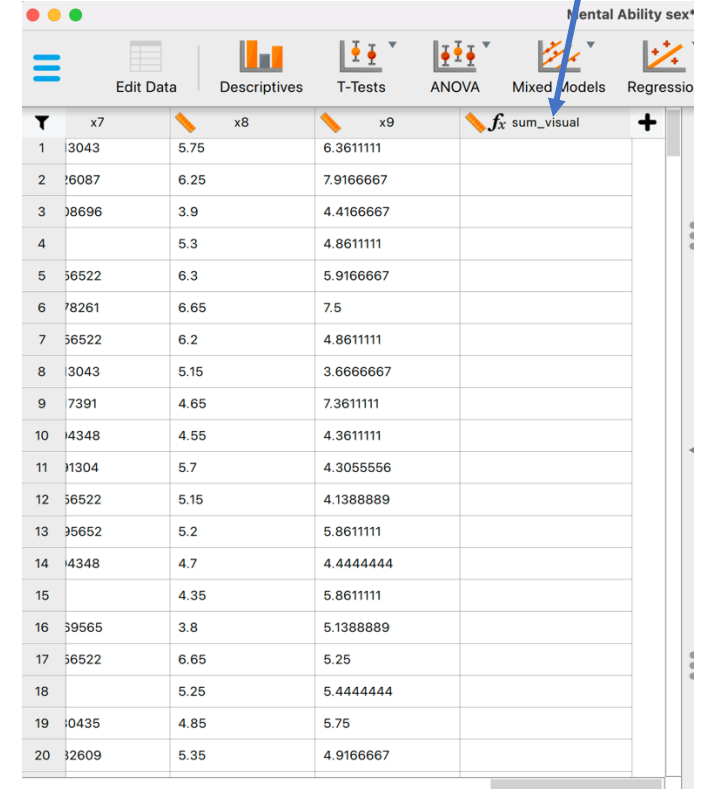
	V1	id	sex	ageyr	ager
1	1	1	Females	13	1
2	2	2	Males	13	7
3	3	3	Males	13	1
4	4	4	Females	13	2
5	5	5	Males	12	2
6	6	6	Males	14	1
7	7	7	Females	12	1

Name the new variable



The screenshot shows the 'Create Computed Column' dialog box in JASP. The 'Name' field contains 'sum_visual'. Below the name field, there are radio buttons for 'Scale', 'Ordinal', 'Nominal', and 'Text'. The 'Scale' option is selected. A 'Create Column' button is at the bottom right of the dialog.

New variable appears in the data pane



	x7	x8	x9	sum_visual
1	3043	5.75	6.3611111	
2	6087	6.25	7.9166667	
3	8696	3.9	4.4166667	
4		5.3	4.8611111	
5	6522	6.3	5.9166667	
6	8261	6.65	7.5	
7	6522	6.2	4.8611111	
8	3043	5.15	3.6666667	
9	7391	4.65	7.3611111	
10	4348	4.55	4.3611111	
11	1304	5.7	4.3055556	
12	6522	5.15	4.1388889	
13	6522	5.2	5.8611111	
14	4348	4.7	4.4444444	
15		4.35	5.8611111	
16	9565	3.8	5.1388889	
17	6522	6.65	5.25	
18		5.25	5.4444444	
19	0435	4.85	5.75	
20	2609	5.35	4.9166667	

Set level of measurement to scale

Click compute

• Computing/creating/Recoding new variables

Mean and sum scores

Select variables from the list into the drag and drop constructor

Apply function to create new variable in drag and drop constructor

Compute column to apply function

	x7	x8	x9	sum_visual
1	3.3913043	5.75	6.3611111	11.4583333
2	3.7826087	6.25	7.9166667	12.7083333
3	3.2608696	3.9	4.4166667	11.625
4	3	5.3	4.8611111	16.0833333
5	3.6956522	6.3	5.9166667	10.4583333
6	4.3478261	6.65	7.5	12.5833333
7	4.6956522	6.2	4.8611111	9.8333333
8	3.3913043	5.15	3.6666667	13.7916667
9	4.5217391	4.65	7.3611111	11.75
10	4.1304348	4.55	4.3611111	9.5
11	3.7391304	5.7	4.3055556	11.4166667
12	3.6956522	5.15	4.1388889	14.7083333
13	5.8695652	5.2	5.8611111	14.2916667
14	5.1304348	4.7	4.4444444	13.25
15	4	4.35	5.8611111	15.2083333
16	4.0869565	3.8	5.1388889	11.7916667
17	3.6956522	6.65	5.25	10.5833333
18	4	5.25	5.4444444	14
19	3.9130435	4.85	5.75	14.9166667
20	3.4782609	5.35	4.9166667	18.0833333
21	2.6086957	4.6	5.3888889	15.8333333
22	4.4782609	5.45	7	19.2916667

Name: sum_visual Long name: sum_visual

Column type: Scale Description:

Computed type: Computed with drag-and-drop

Computed column definition: $(x1 + x2) + x3$

Variables in the list: grade, x1, x2, x3, x4

Buttons: Compute column

	ageyr	agemo	school	grade	x1	x2	x3
1	13	1	Pasteur	7	3.3333333	7.75	0.375
2	13	7	Pasteur	7	5.3333333	5.25	2.125
3	13	1	Pasteur	7	4.5	5.25	1.875
4	13	2	Pasteur	7	5.3333333	7.75	3
5	12	2	Pasteur	7	4.8333333	4.75	0.875
6	14	1	Pasteur	7	5.3333333	5	2.25
7	12	1	Pasteur	7	2.8333333	6	1
8	12	2	Pasteur	7	5.6666667	6.25	1.875
9	13	0	Pasteur	7	4.5	5.75	1.5
10	12	5	Pasteur	7	3.5	5.25	0.75
11	12	2	Pasteur	7	3.6666667	5.75	2
12	12	11	Pasteur	7	5.8333333	6	2.875

• Computing/creating/Recoding new variables

New variable appears in the data pane

Mean and sum scores

Compute/create new variables

Name new variable

Set level of measurement to scale

Click compute

	V1	id	sex	ageyr	ager
1	1	1	Females	13	1
2	2	2	Males	13	7
3	3	3	Males	13	1
4	4	4	Females	13	2
5	5	5	Males	12	2
6	6	6	Males	14	1
7	7	7	Females	12	1

	x7	x8	x9	sum_visual
1	3043	5.75	6.3611111	
2	5087	6.25	7.9166667	
3	9896	3.9	4.4166667	
4		5.3	4.8611111	
5	56522	6.3	5.9166667	
6	78261	6.65	7.5	
7	56522	6.2	4.8611111	
8	3043	5.15	3.6666667	
9	7391	4.65	7.3611111	
10	4348	4.55	4.3611111	
11	11304	5.7	4.3055556	
12	56522	5.15	4.1388889	
13	56522	5.2	5.8611111	
14	4348	4.7	4.4444444	
15		4.35	5.8611111	
16	39565	3.8	5.1388889	
17	56522	6.65	5.25	
18		5.25	5.4444444	
19	10435	4.85	5.75	
20	32609	5.35	4.9166667	

Select variables

Apply function to create new variable in drag and drop constructor

Compute column to apply function

	x7	x8	x9	sum_visual
1	3.3913043	5.75	6.3611111	11.4583333
2	3.7826087	6.25	7.9166667	12.7083333
3	3.2608696	3.9	4.4166667	11.625
4	3	5.3	4.8611111	16.0833333
5	3.6956522	6.3	5.9166667	10.4583333
6	4.3478261	6.65	7.5	12.5833333
7	4.6956522	6.2	4.8611111	9.8333333
8	3.3913043	5.15	3.6666667	13.7916667
9	4.5217391	4.65	7.3611111	11.75
10	4.1304348	4.55	4.3611111	9.5
11	3.7391304	5.7	4.3055556	11.4166667
12	3.6956522	5.15	4.1388889	14.7083333
13	5.8695652	5.2	5.8611111	14.2916667
14	5.1304348	4.7	4.4444444	13.25
15	4	4.35	5.8611111	15.2083333
16	4.0869565	3.8	5.1388889	11.7916667
17	3.6956522	6.65	5.25	10.5833333
18	4	5.25	5.4444444	14
19	3.9130435	4.85	5.75	14.9166667
20	3.4782609	5.35	4.9166667	18.0833333
21	2.6086957	4.6	5.3888889	15.8333333
22	4.4782609	5.45	7	19.2916667

Try it for the mean of x1-x3

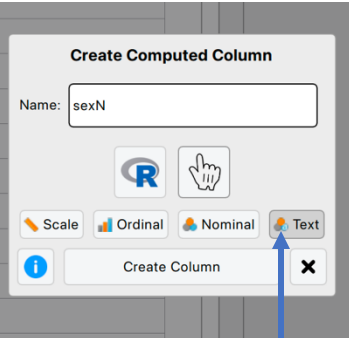
- **Computing/creating/Recoding new variables**

**Logical values
and numbers**

• Computing/creating/Recoding new variables

Logical values
and numbers

Function in the drag and
drop constructor



Nominal text

Computed column definition


sex = 1


Computed columns code applied


average_vis	ave_vis	sing	normal	sexN
44433	3.819444433	13.06076966	0.2261049675	TRUE
111	4.2361111	12.31076966	2.384583437	FALSE
	3.875	12.06076966	1.293551	FALSE
111	5.3611111	15.68576966	-0.1684331397	TRUE
111	3.4861111	10.56076966	-1.001924957	FALSE
44433	4.194444433	12.18576966	0.2418056116	FALSE
77767	3.277777767	11.93576966	-1.10498061	TRUE
22233	4.597222233	13.06076966	1.527410902	FALSE
66667	3.916666667	12.18576966	-0.9387907607	FALSE
66667	3.166666667	10.93576966	2.045771668	FALSE
55567	3.805555567	12.68576966	0.2892169494	TRUE

• Computing/creating/Recoding new variables

Split sum_visual **at the mean** (mean = 13.27; ranges from 5.92 – 20.37)

 **Nominal**
(0 = Low; 1 = High)


 **Nominal text (string)**
(Low; High)


 **Ordinal**
(1 = Low, 2 = medium, 3 = High)

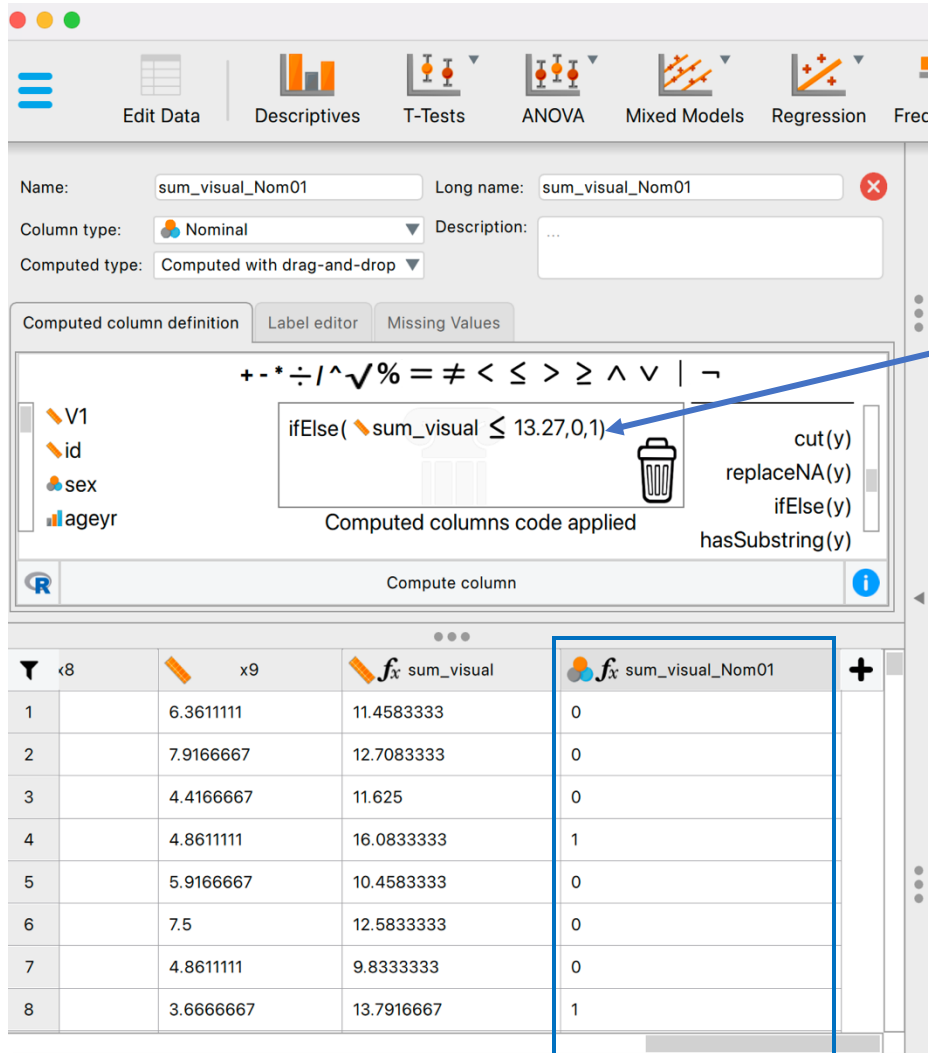
 **Continuous**

• Computing/creating/Recoding new variables

Split sum_visal at the mean (mean = 13.27; ranges from 5.92 – 20.37)

 Nominal
(0 = Low; 1 = High)

 Nominal text (string)
(Low; High)



Computed column definition

Name: sum_visual_Nom01 Long name: sum_visual_Nom01

Column type: Nominal Description: ...

Computed type: Computed with drag-and-drop

Computed column definition

Label editor Missing Values

ifElse(sum_visual ≤ 13.27, 0, 1)

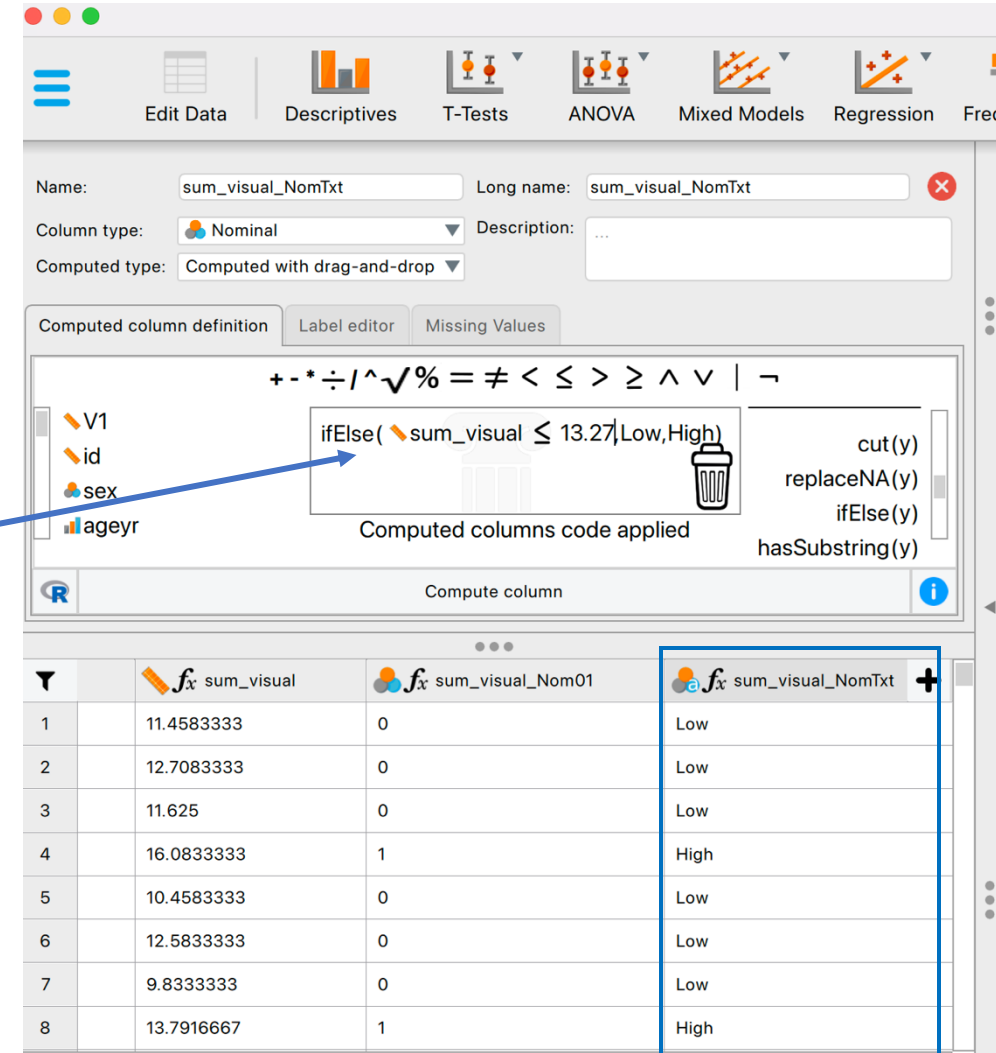
Computed columns code applied

Compute column

	x8	x9	f _x sum_visual	f _x sum_visual_Nom01
1		6.3611111	11.4583333	0
2		7.9166667	12.7083333	0
3		4.4166667	11.625	0
4		4.8611111	16.0833333	1
5		5.9166667	10.4583333	0
6		7.5	12.5833333	0
7		4.8611111	9.8333333	0
8		3.6666667	13.7916667	1

If sum_visual ≤ 13.27, then = 0, but if untrue (else) then = 1

If sum_visual ≤ 13.27, then = Low, but if untrue (else) then = High



Computed column definition

Name: sum_visual_NomTxt Long name: sum_visual_NomTxt

Column type: Nominal Description: ...

Computed type: Computed with drag-and-drop

Computed column definition

Label editor Missing Values

ifElse(sum_visual ≤ 13.27, Low, High)


Computed columns code applied

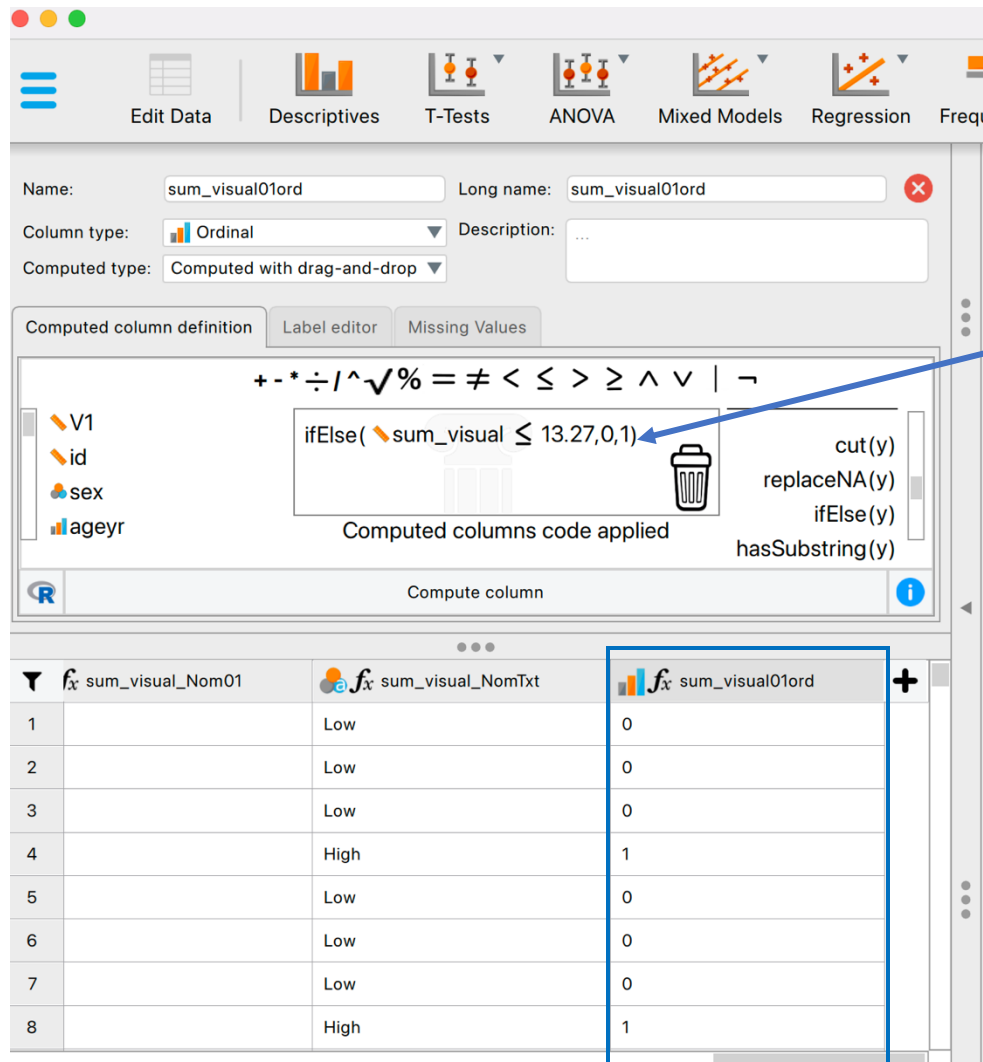
Compute column

	f _x sum_visual	f _x sum_visual_Nom01	f _a sum_visual_NomTxt
1	11.4583333	0	Low
2	12.7083333	0	Low
3	11.625	0	Low
4	16.0833333	1	High
5	10.4583333	0	Low
6	12.5833333	0	Low
7	9.8333333	0	Low
8	13.7916667	1	High

• Computing/creating/Recoding new variables

Split sum_visual at the mean (mean = 13.27; ranges from 5.92 – 20.37)

 Ordinal
(1 = Low, 2 = High)



Computed column definition

ifElse($\sum_visual \leq 13.27, 0, 1$)


	sum_visual_Nom01	sum_visual_NomTxt	sum_visual01ord
1		Low	0
2		Low	0
3		Low	0
4		High	1
5		Low	0
6		Low	0
7		Low	0
8		High	1

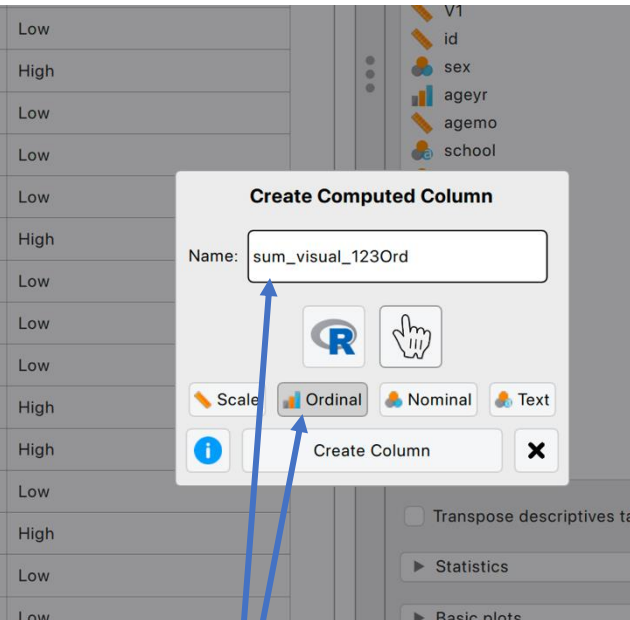
If sum_visual \leq 13.27, then = 0, but if untrue (else) then = 1

• Computing/creating/Recoding new variables

Split sum_visual into three (3) categories (mean = 13.27; SD = 2.63; ranges from 5.92 – 20.37)

- 5.92 – 10.00 = 1 (Low)
- 10.01 – 16.00 = 2 (Medium)
- 16.01 – 20.37 = 3 (High)

 Ordinal
(1 = Low, 2 = medium, 3 = High)

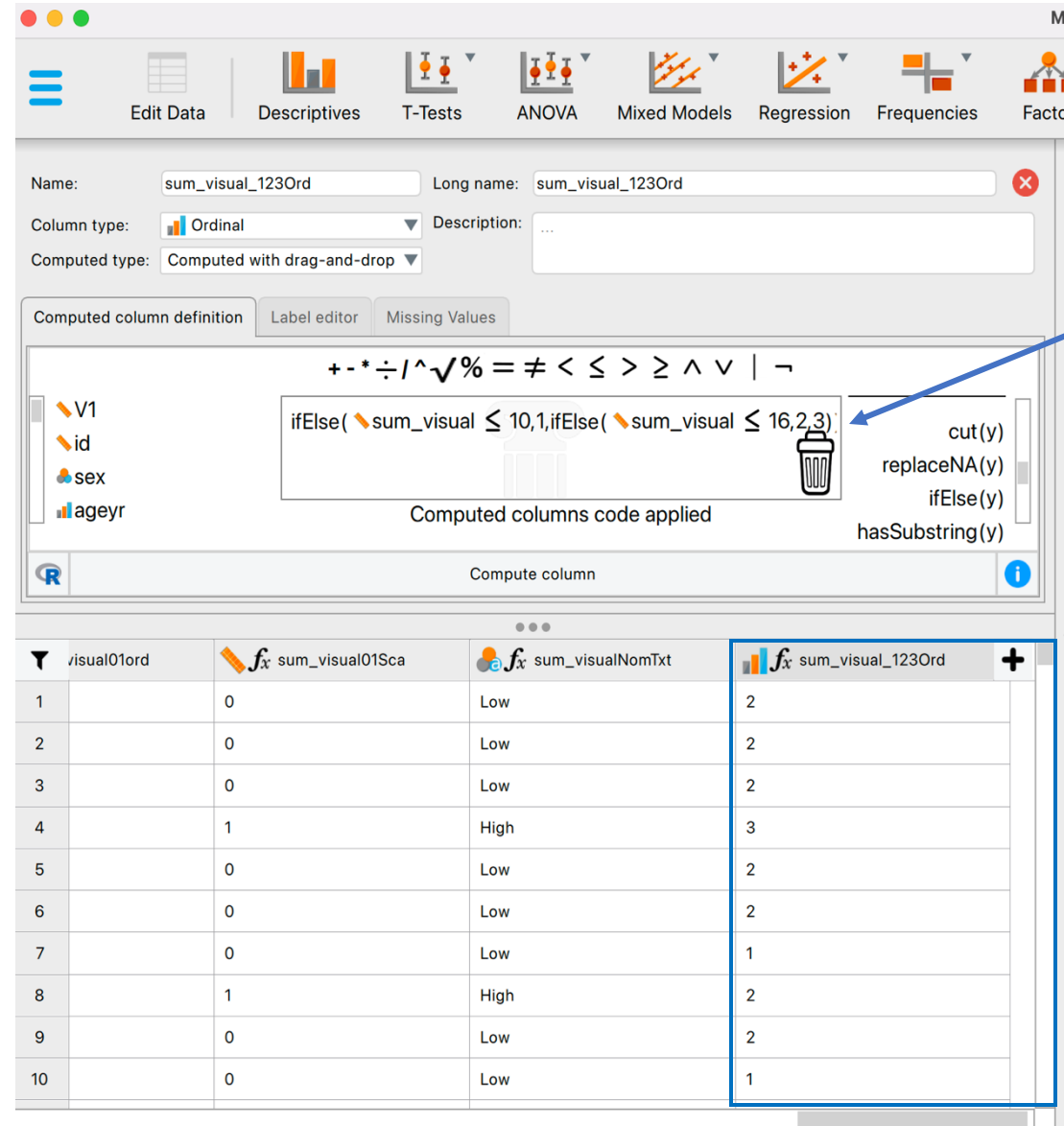


Create Computed Column

Name: sum_visual_123Ord

Column type: Ordinal

Create Column



Name: sum_visual_123Ord Long name: sum_visual_123Ord

Column type: Ordinal

Computed type: Computed with drag-and-drop

Computed column definition

ifElse(sum_visual ≤ 10, 1, ifElse(sum_visual ≤ 16, 2, 3))

Compute column

visual01ord	sum_visual01Sca	sum_visualNomTxt	sum_visual_123Ord
1	0	Low	2
2	0	Low	2
3	0	Low	2
4	1	High	3
5	0	Low	2
6	0	Low	2
7	0	Low	1
8	1	High	2
9	0	Low	2
10	0	Low	1

Function to create three groups

Try to change labels to Low, medium and high

Name new variable and set level of measurement

• Computing/creating/Recoding new variables

Replace missing values

The screenshot shows the R Studio interface with a 'Create Computed Column' dialog box open. The dialog box has a 'Name' field containing 'varAreplaced', a 'Scale' type selected, and a 'Create Column' button. The background shows a data table with columns 'varA' through 'varE' and a 'Descriptive Statistics' panel.

The screenshot shows the 'Missing Data*' dialog box in R Studio. The 'Missing Values' tab is active, showing the 'Computed column definition' field with the code `replaceNA(varA, mean(varA))`. The 'min(y)', 'max(y)', 'mean(y)', 'sign(y)', and 'round(y)' functions are visible in the right-hand list. A blue arrow points to the `replaceNA` function in the code field, and another blue arrow points to the 'mean(y)' function in the list.

Create mean replacement function

Scroll down for pre-installed functions to find ***replaceNA*** and ***mean(y)*** functions

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- **Selecting and filtering cases**

- Example Analyses
 - Exploratory and Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - Mediation modelling

 - Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

• Selecting and filtering cases

Use sum_visual_123Ord

Go to Label editor

Uncheck to filter out or exclude from analysis

Select variable

Filter	Value	Label
<input checked="" type="checkbox"/>	1	Low
<input type="checkbox"/>	2	Medium
<input checked="" type="checkbox"/>	3	High

	x9	sum_visual	sum
1	6.3611111	11.4583333	Medium
2	7.9166667	12.7083333	Medium
3	4.4166667	11.625	Medium
4	4.8611111	16.0833333	High
5	5.9166667	10.4583333	Medium
6	7.5	12.5833333	Medium
7	4.8611111	9.8333333	Low
8	3.6666667	13.7916667	Medium
9	7.3611111	11.75	Medium
10	4.3611111	9.5	Low

Data has 301 rows, 72 (~24%) passed through filter

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases

- **Example Analyses**
 - Principal Components and Exploratory
 - Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - Mediation modelling

 - Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

• Principal Components Analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a Total
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	3,216	35,737	35,737	3,216	35,737	35,737	2,763
2	1,639	18,208	53,945	1,639	18,208	53,945	2,226
3	1,365	15,168	69,114	1,365	15,168	69,114	2,088
4	,699	7,766	76,879				
5	,584	6,493	83,372				
6	,500	5,552	88,924				
7	,473	5,257	94,181				
8	,286	3,178	97,359				
9	,238	2,641	100,000				

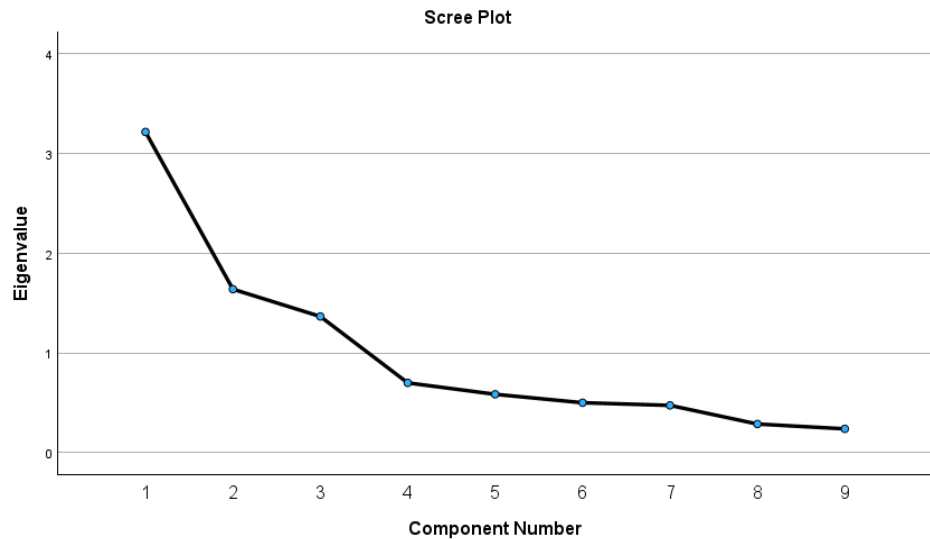
Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

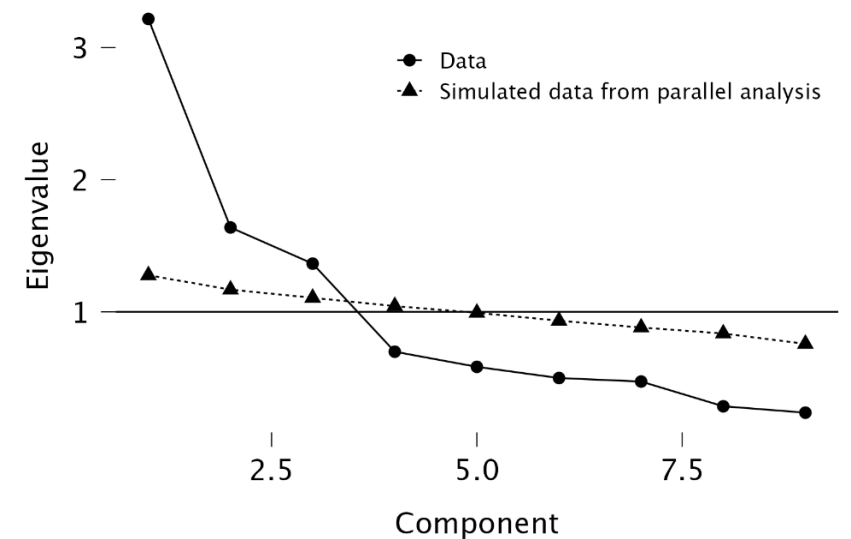
Component Characteristics ▼

	Unrotated solution			Rotated solution		
	Eigenvalue	Proportion var.	Cumulative	SumSq. Loadings	Proportion var.	Cumulative
Component 1	3.216	0.357	0.357	2.502	0.278	0.278
Component 2	1.639	0.182	0.539	1.899	0.211	0.489
Component 3	1.365	0.152	0.691	1.819	0.202	0.691

SPSS JASP



Scree plot



• Exploratory Factor Analysis

Pattern Matrix^a

	Component		
	1	2	3
x5	.928		
x4	.902		
x6	.874		
x3		.804	
x2		.770	
x1		.648	
x7			.873
x8			.828
x9			.596

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Component Correlation Matrix

Component	1	2	3
1	1,000	,303	,223
2	,303	1,000	,265
3	,223	,265	1,000

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

Component Loadings ▼

	RC1	RC2	RC3	Uniqueness
x5	0.930			0.175
x4	0.903			0.186
x6	0.875			0.207
x3		0.814		0.369
x2		0.774		0.455
x1		0.655		0.413
x7			0.876	0.278
x8			0.822	0.308
x9			0.581	0.389

Note. Applied rotation method is promax.

SPSS JASP

Component Correlations ▼

	Component 1	Component 2	Component 3
Component 1	1.000	0.319	0.218
Component 2	0.319	1.000	0.274
Component 3	0.218	0.274	1.000

Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases

- **Example Analyses**
 - **Principal Components and Exploratory**
 - **Confirmatory Factor Analyses**
 - Multigroup analyses and measurement invariance
 - Mediation modelling

 - **Advanced modeling in JASP**
 - Longitudinal/Growth models – SEM

• Confirmatory Factor Analysis

MODEL FIT INFORMATION

Number of Free Parameters 30

Loglikelihood

H0 Value -3737.745
H1 Value -3695.092

Information Criteria

Akaike (AIC) 7535.490
Bayesian (BIC) 7646.703
Sample-Size Adjusted BIC 7551.560
($n^* = (n + 2) / 24$)

Chi-Square Test of Model Fit

Value 85.306
Degrees of Freedom 24
P-Value 0.0000

RMSEA (Root Mean Square Error Of Approximation)

Estimate 0.092
90 Percent C.I. 0.071 0.114
Probability RMSEA <= .05 0.001

CFI/TLI

CFI 0.931
TLI 0.896

Chi-Square Test of Model Fit for the Baseline Model

Value 918.852
Degrees of Freedom 36
P-Value 0.0000

SRMR (Standardized Root Mean Square Residual)

Value 0.060

Mplus JASP

Model fit ▼

Chi-square test

Model	X ²	df	p
Baseline model	918.852	36	
Factor model	85.306	24	< .001

Note. The estimator is ML.

Additional fit measures ▼

Fit indices

Index	Value
Comparative Fit Index (CFI)	0.931
Tucker-Lewis Index (TLI)	0.896
Bentler-Bonett Non-normed Fit Index (NNFI)	0.896
Bentler-Bonett Normed Fit Index (NFI)	0.907
Parsimony Normed Fit Index (PNFI)	0.605
Bollen's Relative Fit Index (RFI)	0.861
Bollen's Incremental Fit Index (IFI)	0.931
Relative Noncentrality Index (RNI)	0.931

Information criteria

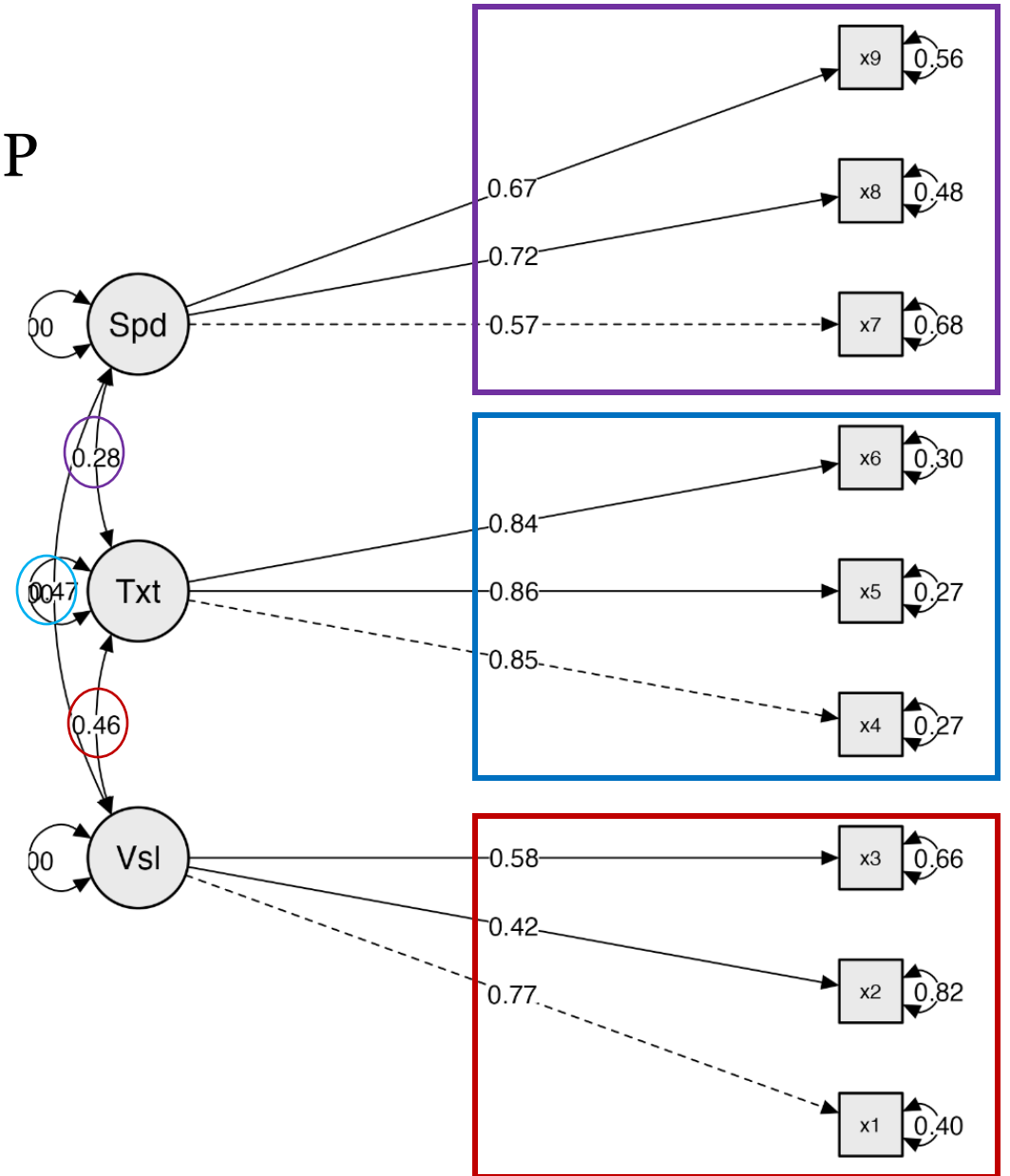
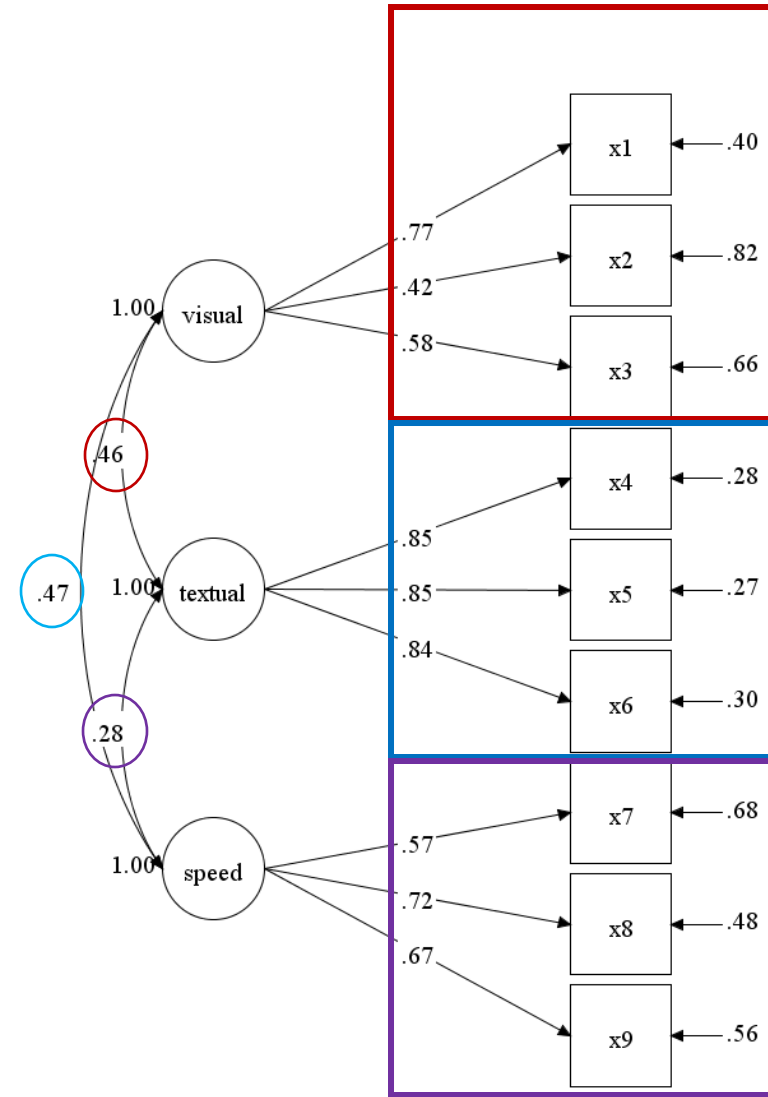
	Value
Log-likelihood	-3737.745
Number of free parameters	30.000
Akaike (AIC)	7535.490
Bayesian (BIC)	7646.703
Sample-size adjusted Bayesian (SSABIC)	7551.560

Other fit measures ▼

Metric	Value
Root mean square error of approximation (RMSEA)	0.092
RMSEA 90% CI lower bound	0.071
RMSEA 90% CI upper bound	0.114
RMSEA p-value	6.612×10^{-4}
Standardized root mean square residual (SRMR)	0.060
Hoelter's critical N ($\alpha = .05$)	129.490
Hoelter's critical N ($\alpha = .01$)	152.654
Goodness of fit index (GFI)	0.996
McDonald fit index (MFI)	0.903
Expected cross validation index (ECVI)	0.483

• Confirmatory Factor Analysis

Mplus JASP



Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases

- Example Analyses
 - Principal Components and Exploratory
 - Confirmatory Factor Analyses
 - Multigroup analyses and measurement invariance
 - **Mediation modelling**

 - Advanced modeling in JASP
 - Longitudinal/Growth models – SEM

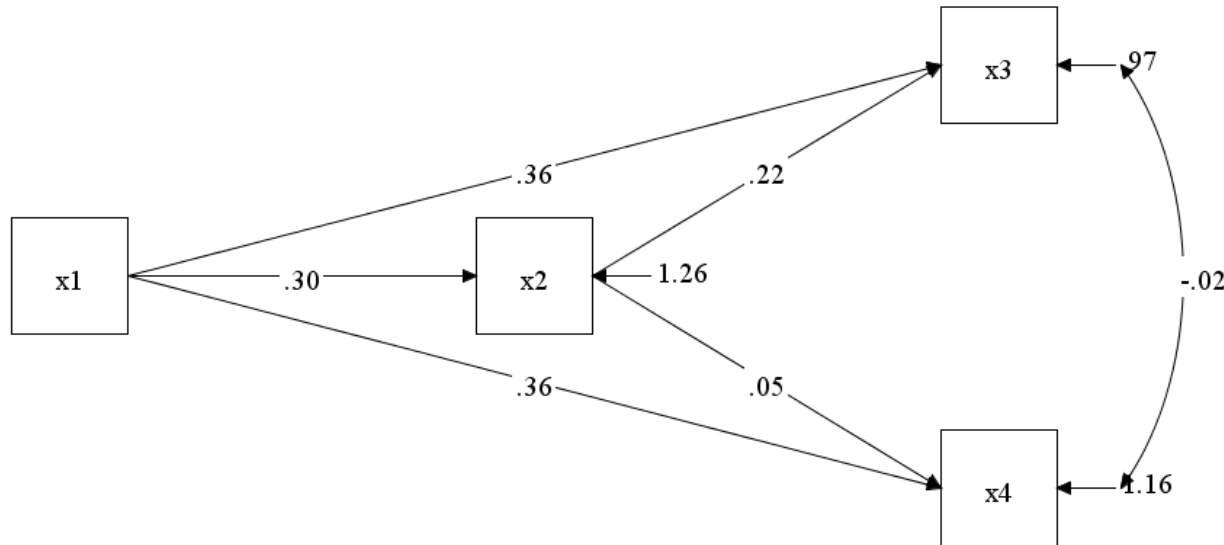
• Mediation modelling

		Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
X3 ON	X1	0.361	0.049	7.337	0.000
	X2	0.220	0.056	3.962	0.000
	X3				
X4 ON	X1	0.358	0.065	5.548	0.000
	X2	0.046	0.071	0.640	0.522
	X3				
X2 ON	X1	0.300	0.057	5.262	0.000
X4 WITH	X3	-0.020	0.058	-0.347	0.729

Mplus JASP

CONFIDENCE INTERVALS OF TOTAL, TOTAL INDIRECT, SPECIFIC INDIRECT, AND DIRECT EFFECTS

	Lower .5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper .5%
Effects from X1 to X4							
Indirect	-0.051	-0.030	-0.023	0.014	0.044	0.051	0.066
Effects from X1 to X3							
Indirect	0.022	0.031	0.037	0.066	0.107	0.113	0.124



Path coefficients

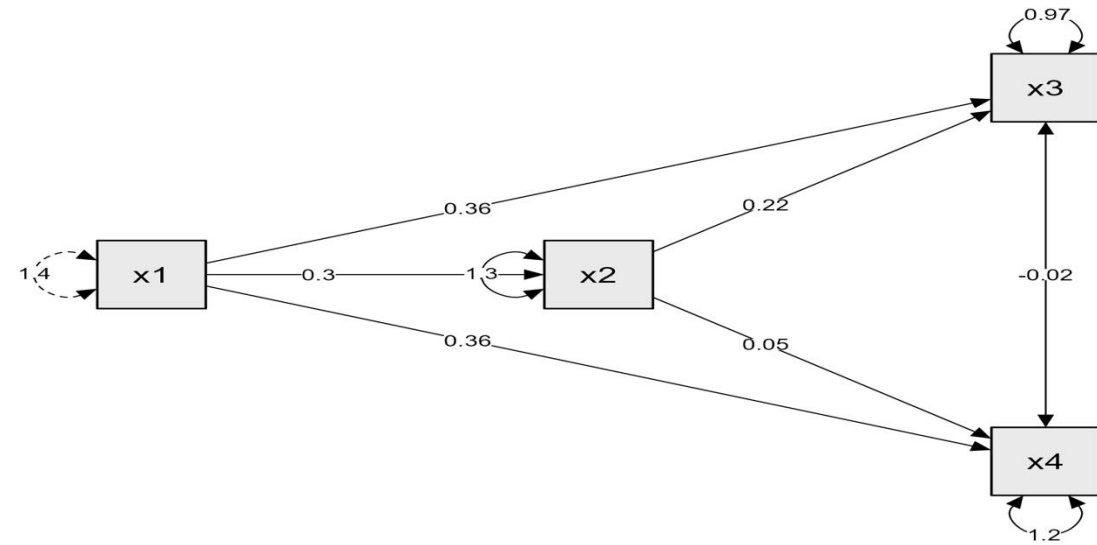
	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
x2 → x3	0.220	0.050	4.358	< .001	0.111	0.326
x1 → x3	0.361	0.051	7.088	< .001	0.258	0.457
x2 → x4	0.046	0.055	0.825	0.409	-0.082	0.185
x1 → x4	0.358	0.056	6.415	< .001	0.247	0.499
x1 → x2	0.300	0.056	5.403	< .001	0.195	0.418

Note. Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

Indirect effects

	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
x1 → x2 → x3	0.066	0.019	3.392	< .001	0.032	0.115
x1 → x2 → x4	0.014	0.017	0.816	0.414	-0.026	0.055

Note. Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.



Plan for today

- JASP: Downloading, installing, and opening JASP
- Reading data into JASP
- Variables/Data transformations
 - (Re)Naming Variables
 - Setting levels of measurement
 - Computing (Recoding) new variables
- Selecting and filtering cases
- Exploratory and Confirmatory Factor Analyses
 - Multigroup and measurement invariance testing
- Mediation modelling
- **Advanced modeling in JASP**
 - Longitudinal/Growth models – SEM

• Longitudinal Growth Models – SEM

Mplus JASP

MODEL FIT INFORMATION

Number of Free Parameters 12

Loglikelihood

H0 Value	-7952.058
H1 Value	-7866.567

Information Criteria

Akaike (AIC)	15928.116
Bayesian (BIC)	15986.164
Sample-Size Adjusted BIC	15948.053
(n* = (n + 2) / 24)	

Chi-Square Test of Model Fit

Value	170.982
Degrees of Freedom	23
P-Value	0.0000

RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.083
90 Percent C.I.	0.072 0.095
Probability RMSEA <= .05	0.000

CFI/TLI

CFI	0.824
TLI	0.839

Chi-Square Test of Model Fit for the Baseline Model

Value	862.101
Degrees of Freedom	21
P-Value	0.0000

SRMR (Standardized Root Mean Square Residual)

Value	0.120
-------	-------

Additional Fit measures

Fit indices

Index	Value
Comparative Fit Index (CFI)	0.824
Tucker-Lewis Index (TLI)	0.839
Bentler-Bonett Non-normed Fit Index (NNFI)	0.839
Bentler-Bonett Normed Fit Index (NFI)	
Parsimony Normed Fit Index (PNFI)	0.878
Bollen's Relative Fit Index (RFI)	
Bollen's Incremental Fit Index (IFI)	0.823
Relative Noncentrality Index (RNI)	0.824

Information criteria

	Value
Log-likelihood	-7952.058
Number of free parameters	12.000
Akaike (AIC)	15928.116
Bayesian (BIC)	15986.164
Sample-size adjusted Bayesian (SSABIC)	15948.053

Other fit measures

Metric	Value
Root mean square error of approximation (RMSEA)	0.083
RMSEA 90%% CI lower bound	0.072
RMSEA 90%% CI upper bound	0.095
RMSEA p-value	1.598 × 10 ⁻⁶
Standardized root mean square residual (SRMR)	0.108
Hoelter's critical N (α = .05)	192.460
Hoelter's critical N (α = .01)	227.657
Goodness of fit index (GFI)	0.989
McDonald fit index (MFI)	0.924
Expected cross validation index (ECVI)	0.209

• Longitudinal Growth Models – SEM

Mplus JASP

S	WITH				
I		4.020	1.458	2.758	0.006

Means					
I		35.736	0.384	93.114	0.000
S		4.219	0.099	42.764	0.000

Variances					
I		47.598	6.538	7.280	0.000
S		0.031	0.419	0.074	0.941

Residual Variances					
MATH2		60.697	7.521	8.070	0.000
MATH3		50.842	5.025	10.118	0.000
MATH4		38.667	4.198	9.211	0.000
MATH5		27.675	3.664	7.554	0.000
MATH6		22.165	3.682	6.020	0.000
MATH7		32.152	6.168	5.212	0.000
MATH8		39.961	8.355	4.783	0.000

Parameter estimates

Latent curve

Component	Parameter	Estimate	Std. Error	z-value	p	95% Confidence Interval	
						Lower	Upper
Intercept	Variance	47.603	6.538	7.281	< .001	34.788	60.417
	Mean	35.737	0.384	93.113	< .001	34.984	36.489
Linear slope	Variance	0.031	0.419	0.074	0.941	-0.789	0.852
	Mean	4.219	0.099	42.763	< .001	4.025	4.412

Latent covariances

		Estimate	Std. Error	z-value	p	95% Confidence Interval	
						Lower	Upper
Intercept	↔ Linear slope	4.019	1.458	2.757	0.006	1.162	6.877

Residual variances

Variable	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
math2	60.694	7.521	8.070	< .001	45.954	75.434
math3	50.842	5.025	10.118	< .001	40.993	60.690
math4	38.666	4.198	9.211	< .001	30.439	46.894
math5	27.673	3.663	7.554	< .001	20.493	34.853
math6	22.166	3.682	6.020	< .001	14.949	29.382
math7	32.151	6.168	5.212	< .001	20.062	44.241
math8	39.956	8.354	4.783	< .001	23.583	56.330

• Longitudinal Growth Models – SEM

Mplus JASP

R-SQUARE

Observed Variable	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
MATH2	0.440	0.056	7.855	0.000
MATH3	0.523	0.038	13.893	0.000
MATH4	0.623	0.031	20.069	0.000
MATH5	0.722	0.030	24.464	0.000
MATH6	0.784	0.033	24.070	0.000
MATH7	0.734	0.043	17.031	0.000
MATH8	0.708	0.053	13.402	0.000

R-Squared ▼

Variable	R ²
math2	0.440
math3	0.523
math4	0.623
math5	0.722
math6	0.784
math7	0.734
math8	0.708