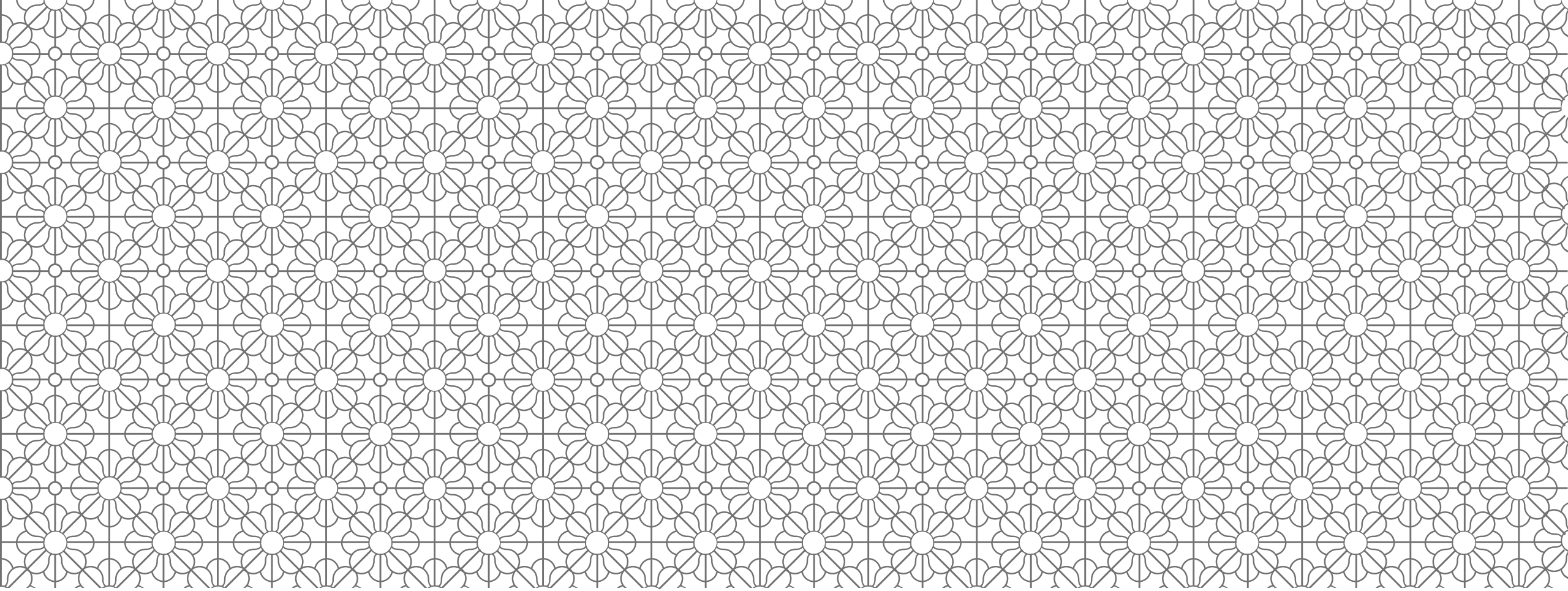
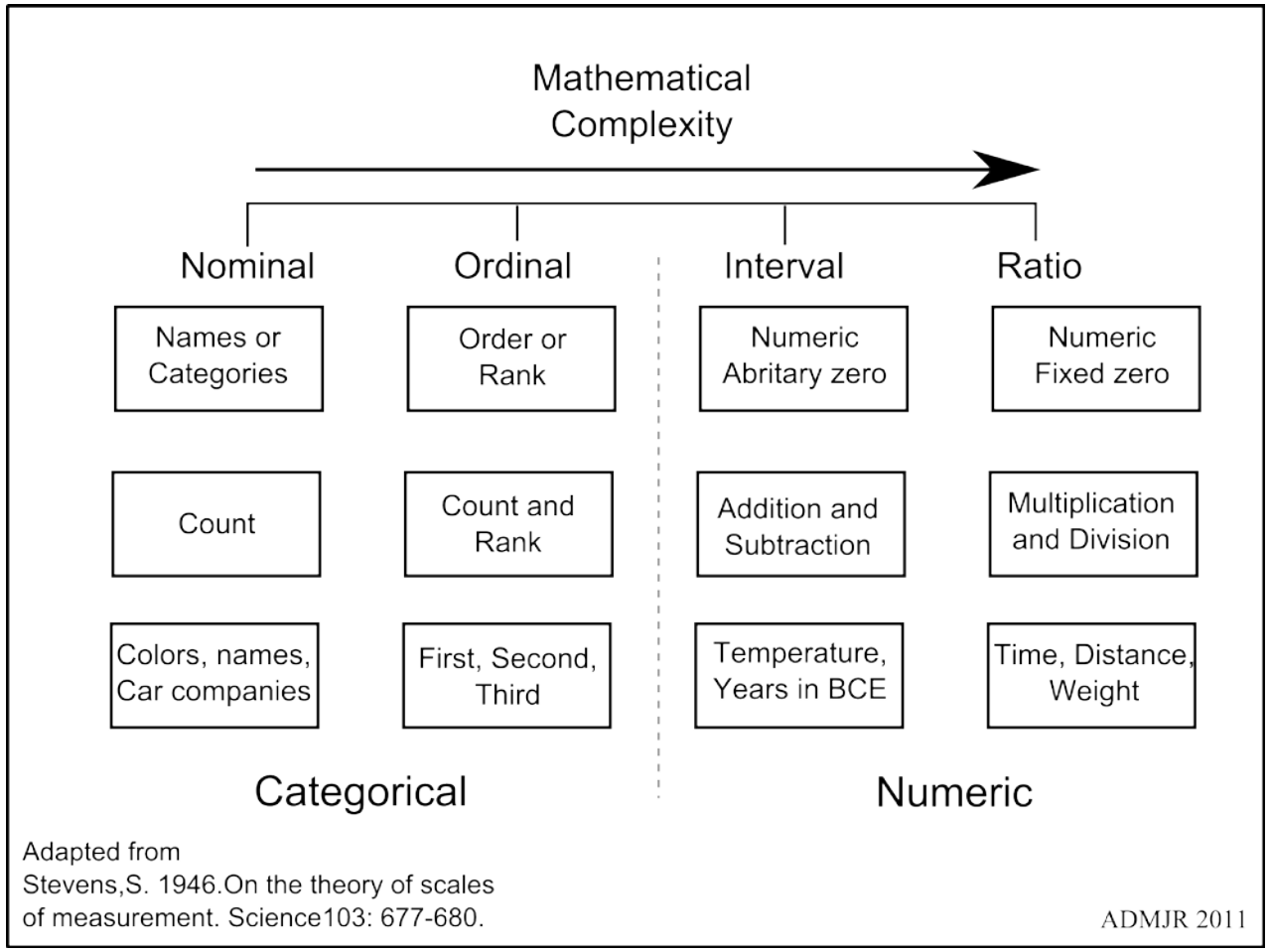


COHEN CHAP 1. INTRO TO STATS

For EDUC/PSY 6600

SCALE VS. VARIABLE



MEASUREMENT SCALE

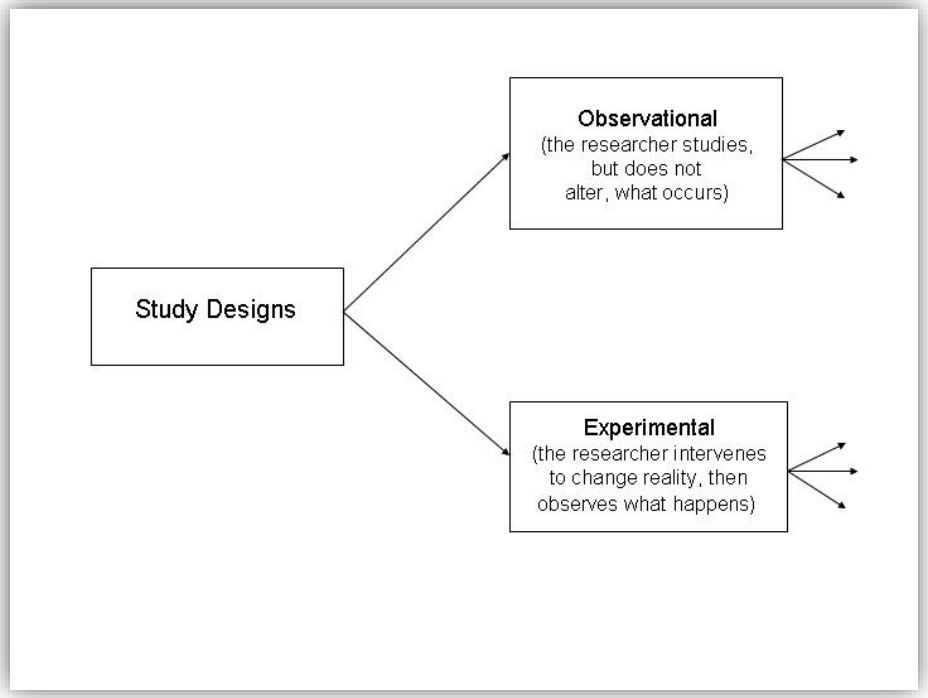
- ❖ Nominal — named groupings, no meaningful order
- ❖ Ordinal — groupings that do have natural order
- ❖ Interval — precise units that are equally spaced
- ❖ Ratio — interval + true zero point

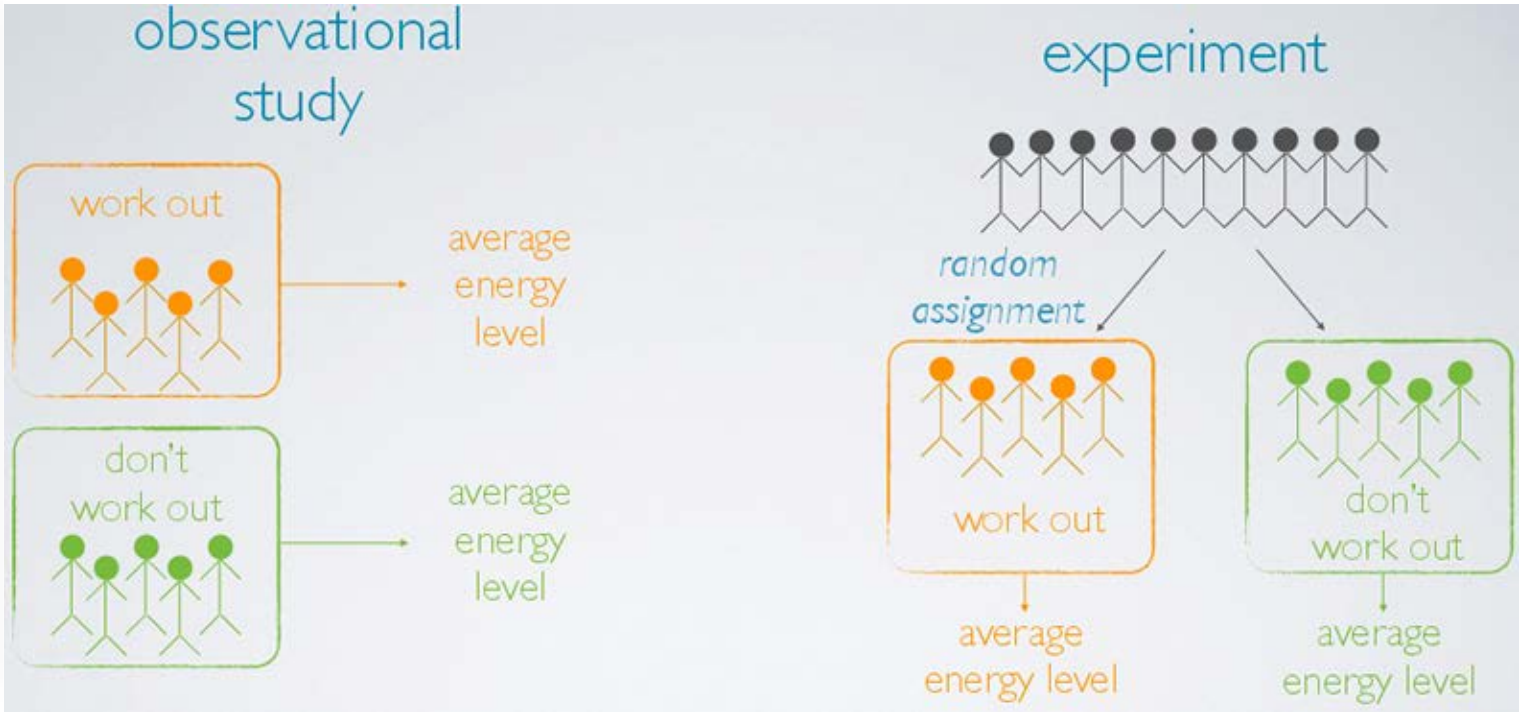
VARIABLE TYPE

- ❖ Discrete — finite, countable number of levels, no intermediate values possible
- ❖ Continuous — infinite intermediate values are possible, at least in theory

*NOTE: due to limits on measurement precision, observed data may be discrete, even though the **underlying construct** is continuous*

OBSERVATIONAL STUDY VS. EXPERIMENT





ROUNDING OFF NUMBERS

Rules for Rounding

If you want to round to N decimal places,
look at the digit in the N + 1 place…

A. If it is LESS than 5 → do not change the digit in the Nth place

B. If it is MORE than 5 → increase the digit in the Nth place by 1

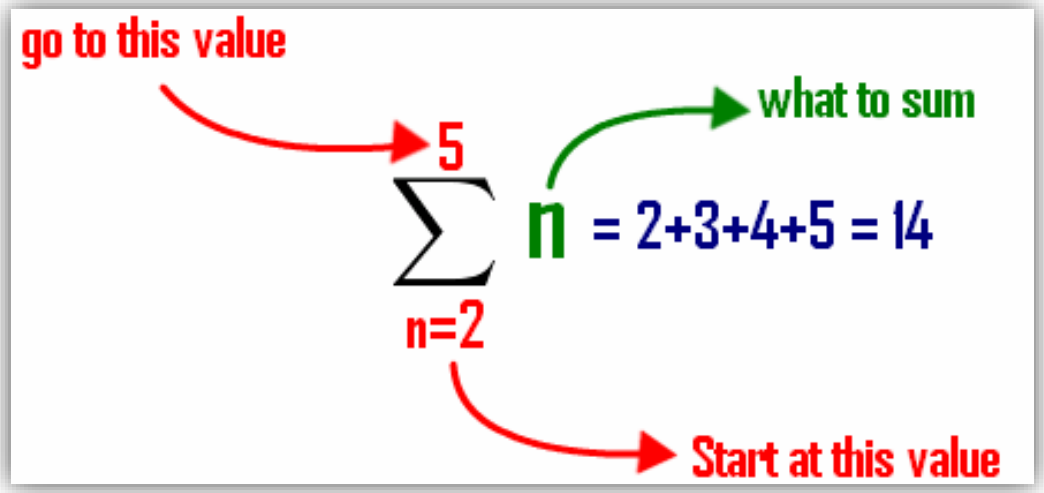
C. If it is EQUAL to 5 AND there are no non-zero digits to the right,
→ increase the digit in the Nth place by 1 ONLY IF the Nth digit is ODD (do not change it if it is EVEN)

In all cases, the last step is to drop the digit in the N+1 place and other digits to the right

Round to TWO decimal places

1. 65.3 =
2. 8/3 =
3. 3/8 =
4. 0.4255 =
5. 0.4358 =
6. 0.425 =
7. 0.435 =

SUMMATION NOTATION



$$\sum_{i=1}^{N} X_i = X_1 + X_2 + X_3 + \cdots + X_N$$

Given these values: $\begin{cases} X_1 = 5, & X_2 = -2, & X_3 = 10 \\ Y_1 = 1, & Y_2 = 7, & Y_3 = 3 \end{cases}$

1. $\sum_{i=1}^{2} X_i =$
2. $\sum Y_i =$
3. $\sum {X_i}^2 =$
4. $(\sum X_i)^2 =$
5. $\sum (X_i * Y_i) =$
6. $(\sum X_i) * (\sum Y_i) =$

SUMMATION RULES

1. $\sum(X_i + Y_i) = \sum X_i + \sum Y_i$ and $\sum(X_i - Y_i) = \sum X_i - \sum Y_i$
2. $\sum C = NC$
3. $\sum CX_i = C \sum X_i$
4. $\sum(X_i * Y_i) \neq \sum X_i * \sum Y_i$

SPSS: STEPS FOR DATASET PREP

1. **Get** the data
2. **Prep** the data
   a) Variable Labels
   b) Value Labels
   c) Missing Values
3. **Compute** new variables and values (fill in missing codes, recode scores, categorize/group values, combine (average, sum, …), etc.)
4. Use **FREQUENCIES** to check what is going on

APPENDIX C: IHNO DATA KEY

Key

Sub_num: arbitrary ID number for each participant.
Gender: 1 = Female; 2 = Male.
Major: 1 = Psychology; 2 = Premed; 3 = Biology; 4 = Sociology; 5 = Economics.
Reason: 1 = Program requirement; 2 = Personal interest; 3 = Advisor recommendation.
Exp_cond: 1 = Easy; 2 = Moderate; 3 = Difficult; 4 = Impossible.
Coffee: 0 = not a regular coffee drinker; 1 = regularly drinks coffee.
Num_cups = number of cups of coffee drunk prior to the experiment on the same day.
Phobia: 0 = No phobia to 10 = Extreme phobia.
Prevmath = Number of math courses taken prior to statistics course.
Mathquiz = Score on Math Background Quiz (a blank for this value indicates that a student did not take the quiz).
Statquiz = Score on 10-question stats quiz given one week before the experiment.
Exp_sqz = Score on stats quiz given as part of the experiment (number correct, including the 11th question).
HR_base = Baseline heart rate (in beats per minute).
HR_pre = Prequiz heart rate.
HR_post = Postquiz heart rate.
Anx_base = Baseline anxiety score.
Anx_pre = Prequiz anxiety score.
Anx_post = Postquiz anxiety score.

SPSS: SPECIFYING VARIABLE LABELS

```
* Add labels to the variables. .

VARIABLE LABELS
Sub_num   "arbitrary ID number for each participant"
Gender    "gender"
Major     "Undergraduate Major"
Reason    "Reason for taking the statistis course"
Exp_cond  "Experimental Condition"
Coffee    "Coffee drinking history"
Num_cups  "Number of cups of coffee drunk prior to the experiment, on same day"
Phobia    "History of phobia"
Prevmath  "Number of math courses taken prior to statistics course"
Mathquiz  "Score on MAth Background quize".
```

	Name	Type	Width	Decimals	Label	Values	Missing
1	Sub_num	Numeric	11	0	arbitrary ID number for each participant	None	None
2	Gender	Numeric	11	0	gender	None	None
3	Major	Numeric	11	0	Undergraduate Major	None	None
4	Reason	Numeric	11	0	Reason for taking the statistis course	None	None
5	Exp_cond	Numeric	11	0	Experimental Condition	None	None
6	Coffee	Numeric	11	0	Coffee drinking history	None	None
7	Num_cups	Numeric	11	0	Number of cups of coffee drunk prior to the e...	None	None
8	Phobia	Numeric	11	0	History of phobia	None	None
9	Prevmath	Numeric	11	0	Number of math courses taken prior to stati...	None	None
10	Mathquiz	Numeric	11	0	Score on MAth Background quize	None	None

SPSS: SPECIFYING VALUE LABELS

```
* Add labels to the categorical values.

VALUE LABELS
/Gender
   1 "female"
   2 "male"
/Major
   1 "Psychology"
   2 "Premed"
   3 "Biology"
   4 "Sociology"
   5 "Economics"
/Reason
   1 "Program requirement"
   2 "Personal interest"
   3 "Advisor recommendation"
/Exp_cond
   1 "Easy"
   2 "Moderate"
   3 "Difficult"
   4 "Impossible"
/Coffee
   0 "not a regular coffee drinker"
   1 "regularly drinks coffee".
```

	Name	Type	Width	Decimals	Label	Values	Missing
1	Sub_num	Numeric	11	0	arbitrary ID number for each participant	None	None
2	Gender	Numeric	11	0	gender	{1, female}...	None
3	Major	Numeric	11	0	Undergraduate Major	{1, Psychol...	None
4	Reason	Numeric	11	0	Reason for taking the statistis course	{1, Program...	None
5	Exp_cond	Numeric	11	0	Experimental Condition	{1, Easy}...	None
6	Coffee	Numeric	11	0	Coffee drinking history	{0, not a reg...	None
7	Num_cups	Numeric	11	0	Number of cups of coffee drunk prior to the e...	None	None
8	Phobia	Numeric	11	0	History of phobia	None	None
9	Prevmath	Numeric	11	0	Number of math courses taken prior to stati...	None	None
10	Mathquiz	Numeric	11	0	Score on MAth Background quize	None	None

SPSS: DECLARING MISSING VALUES

```
FREQUENCIES mathquiz.

IF missing(mathquiz) mathquiz = 999.
EXECUTE.

FREQUENCIES mathquiz.

MISSING VALUES mathquiz (999).

FREQUENCIES mathquiz.
```

	Name	Type	Width	Decimals	Label	Values	Missing
1	Sub_num	Numeric	11	0	arbitrary ID number for each participant	None	None
2	Gender	Numeric	11	0	gender	{1, female}...	None
3	Major	Numeric	11	0	Undergraduate Major	{1, Psychol...	None
4	Reason	Numeric	11	0	Reason for taking the statistis course	{1, Program...	None
5	Exp_cond	Numeric	11	0	Experimental Condition	{1, Easy}...	None
6	Coffee	Numeric	11	0	Coffee drinking history	{0, not a reg...	None
7	Num_cups	Numeric	11	0	Number of cups of coffee drunk prior to the e...	None	None
8	Phobia	Numeric	11	0	History of phobia	None	None
9	Prevmath	Numeric	11	0	Number of math courses taken prior to stati...	None	None
10	Mathquiz	Numeric	11	0	Score on MAth Background quize	None	999

SPSS: COMPUTING NEW VARIABLES

```
* test to create a new variable.

COMPUTE newVar = gender / 2.
EXECUTE.

FREQUENCIES gender newVar.
```

➔ **Frequencies**

Statistics

		Gender gender	newVar
N	Valid	100	100
	Missing	0	0

Frequency Table

Gender gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 female	57	57.0	57.0	57.0
	2 male	43	43.0	43.0	100.0
	Total	100	100.0	100.0	

newVar

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.50	57	57.0	57.0	57.0
	1.00	43	43.0	43.0	100.0
	Total	100	100.0	100.0	

19	newVar	Numeric	8	2		None	None	10	Right	Scale