

# Lecture 6

## Segment 2

Test/re-test reliability analysis in R

# Goal

- Write a script in R
  - Test/re-test correlations

# Example

- Data from ImPACT
  - A computerized neuropsychological assessment of memory and attention
  - Used to assess the cognitive effects of head trauma, for example, sports-related concussion

# ImPACT main measures

- Verbal memory
- Visual memory
- Visual motor speed
- Reaction time
- Impulse control

# ImPACT main measures

- Assume 40 athletes were tested twice
  - Test A
  - Test B

# Repeated measures

- How to structure?
  - Typical to add new columns
  - In R, sometimes it is better to add new rows
  - Here I will demonstrate both

# Write a script

- First line(s) of code should be comments
  - # Statistics One, Lecture 6, example script
  - # Test/re-test reliability analysis, column format

# Script, column format

```
# Statistics One, Lecture 6, example script
# Test/re-test reliability analysis, column format
library(psych)

# Read the data into a dataframe called impact.col
impact.col <- read.table("STATS1.EX.03.COL.TXT", header = T)

# List the names of the variables in the dataframe called impact.col
names(impact.col)

# Descriptive statistics
describe(impact.col)

# Correlations (A & B)
cor(impact.col$memory.verbal.A, impact.col$memory.verbal.B)
cor(impact.col$memory.visual.A, impact.col$memory.visual.B)
cor(impact.col$speed.vismotor.A, impact.col$speed.vismotor.B)
cor(impact.col$speed.general.A, impact.col$speed.general.B)
cor(impact.col$impulse.control.A, impact.col$impulse.control.B)
```



# Correlations, column format

```
> # Correlations (A & B)
> cor(impact.col$memory.verbal.A, impact.col$memory.verbal.B)
[1] 0.6965773
> cor(impact.col$memory.visual.A, impact.col$memory.visual.B)
[1] 0.6250304
> cor(impact.col$speed.vismotor.A, impact.col$speed.vismotor.B)
[1] 0.7273614
> cor(impact.col$speed.general.A, impact.col$speed.general.B)
[1] 0.6492122
> cor(impact.col$impulse.control.A, impact.col$impulse.control.B)
[1] 0.344223
```

# Script, row format

```
# Statistics One, Lecture 6, example script
# Test/re-test reliability ananlysis, row format
library(psych)

# Read the data into a dataframe called impact.row
impact.row <- read.table("STATS1.EX.03.ROW.TXT", header = T)

# List the names of the variables in the dataframe called impact.row
names(impact.row)

# Descriptive statistics
describe.by(impact.row, impact.row$test)

# Correlations (A & B)
cor(impact.row$memory.verbal[impact.row$test=="A"], impact.row$memory.verbal[impact.row$test=="B"])
cor(impact.row$memory.visual[impact.row$test=="A"], impact.row$memory.visual[impact.row$test=="B"])
cor(impact.row$speed.vismotor[impact.row$test=="A"], impact.row$speed.vismotor[impact.row$test=="B"])
cor(impact.row$speed.general[impact.row$test=="A"], impact.row$speed.general[impact.row$test=="B"])
cor(impact.row$impulse.control[impact.row$test=="A"], impact.row$impulse.control[impact.row$test=="B"])
```

# Correlations, row format

```
>
> # Correlations (A & B)
> cor(impact.row$memory.verbal[impact.row$test=="A"], impact.row$memory.verbal[impact.row$test=="B"])
[1] 0.6965773
> cor(impact.row$memory.visual[impact.row$test=="A"], impact.row$memory.visual[impact.row$test=="B"])
[1] 0.6250304
> cor(impact.row$speed.vismotor[impact.row$test=="A"], impact.row$speed.vismotor[impact.row$test=="B"])
[1] 0.7273614
> cor(impact.row$speed.general[impact.row$test=="A"], impact.row$speed.general[impact.row$test=="B"])
[1] 0.6492122
> cor(impact.row$impulse.control[impact.row$test=="A"], impact.row$impulse.control[impact.row$test=="B"])
[1] 0.344223
```

# describe.by

```
> # Descriptive statistics
> describe.by(impact.row, impact.row$test)
```

group: A

	var	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
test*	1	40	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	NaN	NaN	0.00
memory.verbal	2	40	89.35	11.56	93.00	90.97	10.38	58.00	100.00	42.00	-0.98	-0.19	1.83
memory.visual	3	40	82.08	13.76	85.00	83.62	13.34	48.00	99.00	51.00	-0.82	-0.19	2.18
speed.vismotor	4	40	45.70	6.46	47.58	46.35	5.95	31.73	54.13	22.40	-0.69	-0.77	1.02
speed.general	5	40	0.53	0.07	0.52	0.52	0.06	0.41	0.78	0.37	1.29	2.37	0.01
impulse.control	6	40	5.00	3.46	4.50	4.56	3.71	0.00	14.00	14.00	0.95	0.17	0.55

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group: B

	var	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
test*	1	40	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	NaN	NaN	0.00
memory.verbal	2	40	87.65	13.64	93.00	90.06	8.90	45.00	100.00	55.00	-1.32	1.15	2.16
memory.visual	3	40	77.80	11.93	79.50	78.75	13.34	51.00	94.00	43.00	-0.62	-0.65	1.89
speed.vismotor	4	40	44.23	5.68	45.37	44.68	4.94	28.30	52.33	24.03	-0.73	0.04	0.90
speed.general	5	40	0.58	0.08	0.57	0.58	0.08	0.44	0.79	0.35	0.46	-0.58	0.01
impulse.control	6	40	4.53	3.74	4.00	3.88	2.97	1.00	17.00	16.00	1.85	3.62	0.59

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