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The value of Log files of students' interaction with software applications: Performance Evaluation in Correlation Guessing

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Correlation Guessing App Introduction

- Pearson's correlation for scatterplots
- Difficulty level
- Slider to select estimate
- Game format
- App URL: https://psu-eberly.shinyapps.io/Correlation_Guessing/



Correlation Guessing App Introduction

Correlation Guessing

Overview
Game
References

Find the appropriate correlation

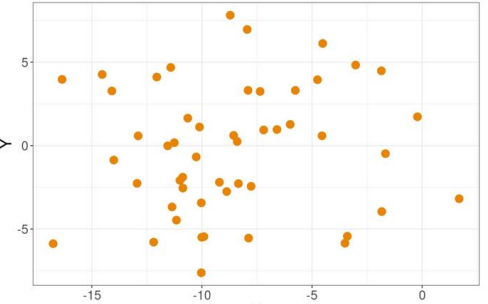
Choose difficulty mode
Without Outlier

Show regression line

Select the correlation
-1 0 1
-1 -0.6 -0.2 0 0.2 0.6 1

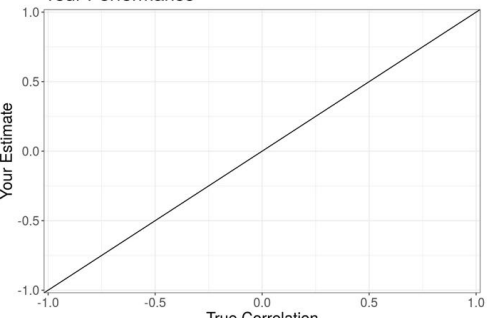
Submit
New Plot

Current Scatterplot



Score: 0
Reset

Your Performance



Reset Performance Log

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Correlation Guessing

Find the appropriate correlation

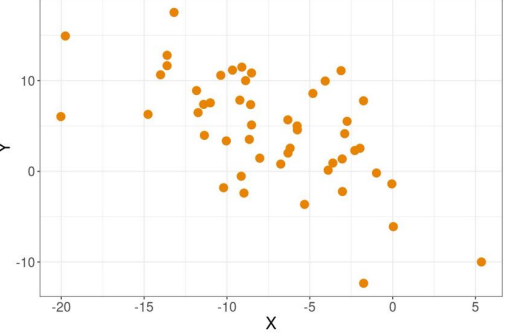
Choose difficulty mode
Without Outlier

Show regression line

Select the correlation
-1 -0.46 1
-1 -0.6 -0.2 0 0.2 0.6 1

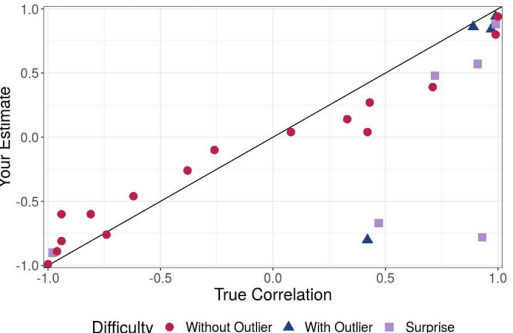
Submit
New Plot

Current Scatterplot



Score: 20
Reset

Your Performance



Correct!
True correlation: -0.62

Difficulty ● Without Outlier ▲ With Outlier ■ Surprise

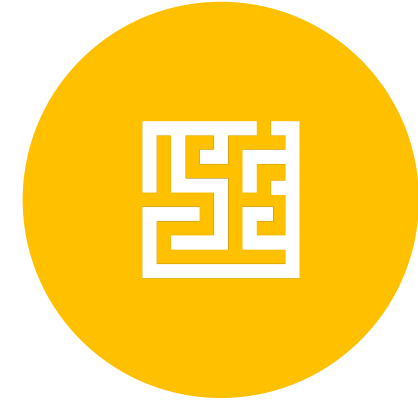
Interactive Log Files



A LEARNING LOCKER TO GATHER LOGFILE
DATA ON STUDENTS' INTERACTION WITH
SOFTWARE APPLICATIONS



EVALUATIONS ON STUDENTS'
UNDERSTANDING OF EACH CONCEPT



IMPROVE THE SOFTWARE (HINTS,
FEEDBACK, INSTRUCTIONS ETC.)



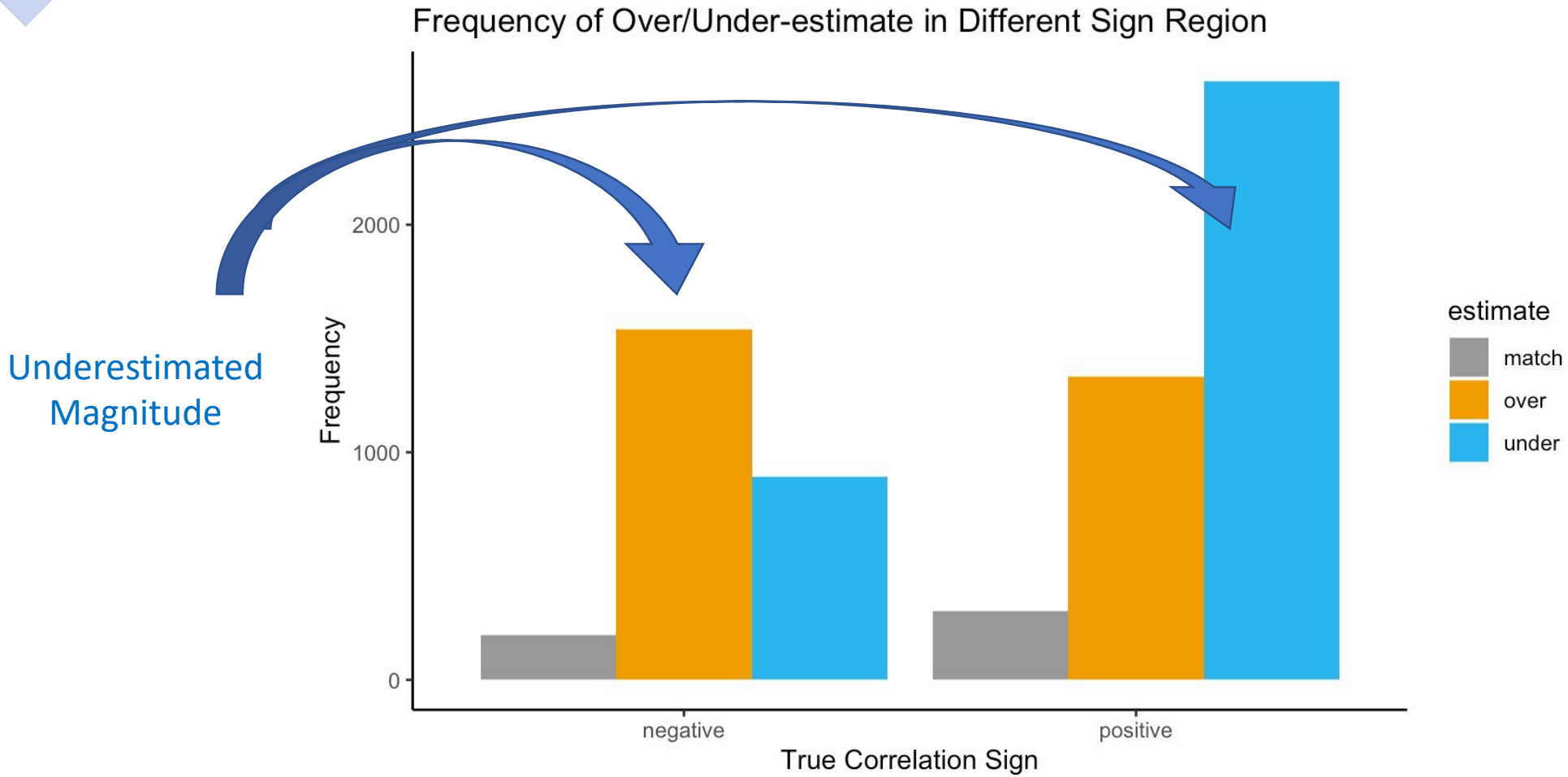
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Data

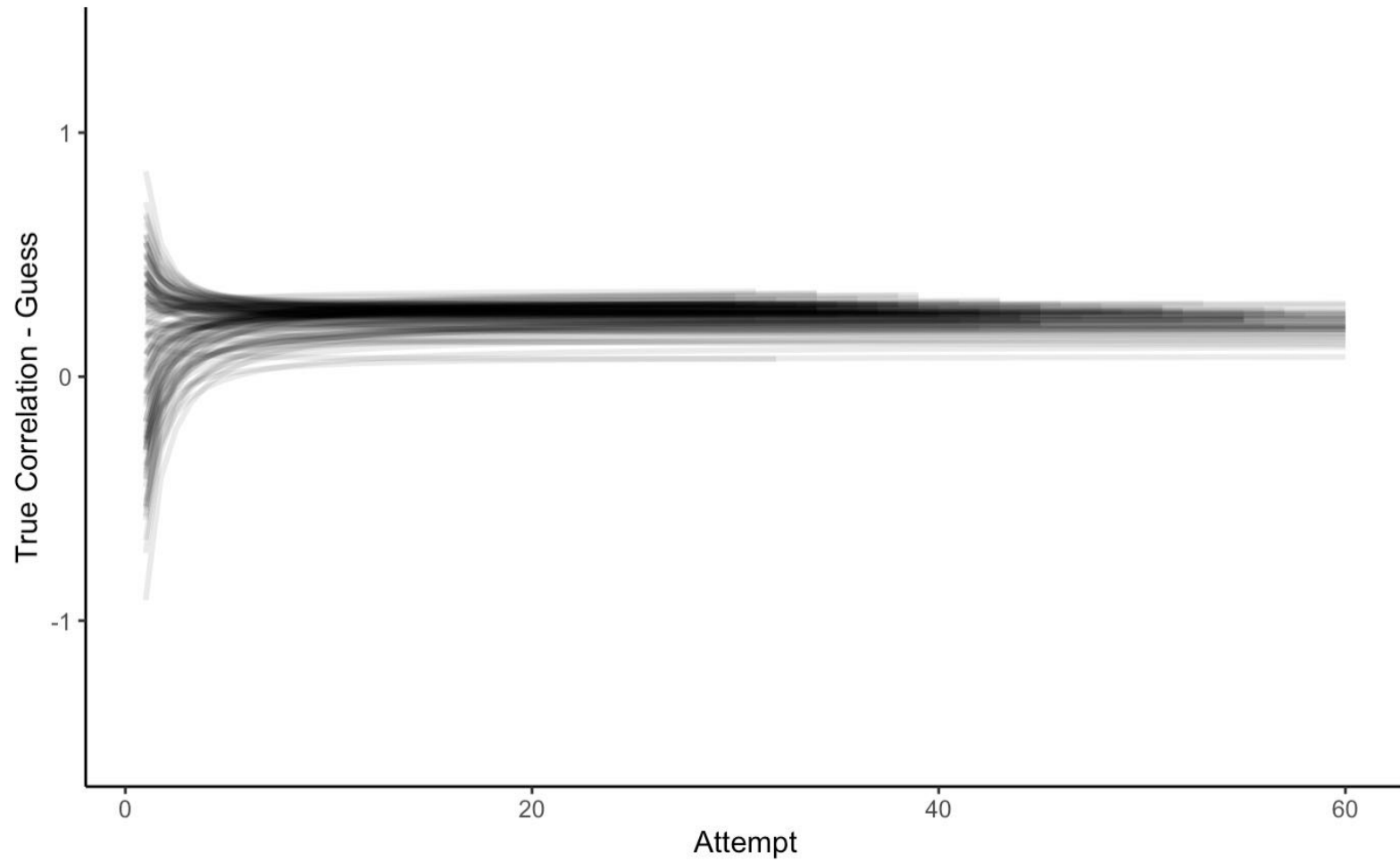
- 6,897 interactions
- 124 actors
- Each actor 30 plots
- 10 with outlier



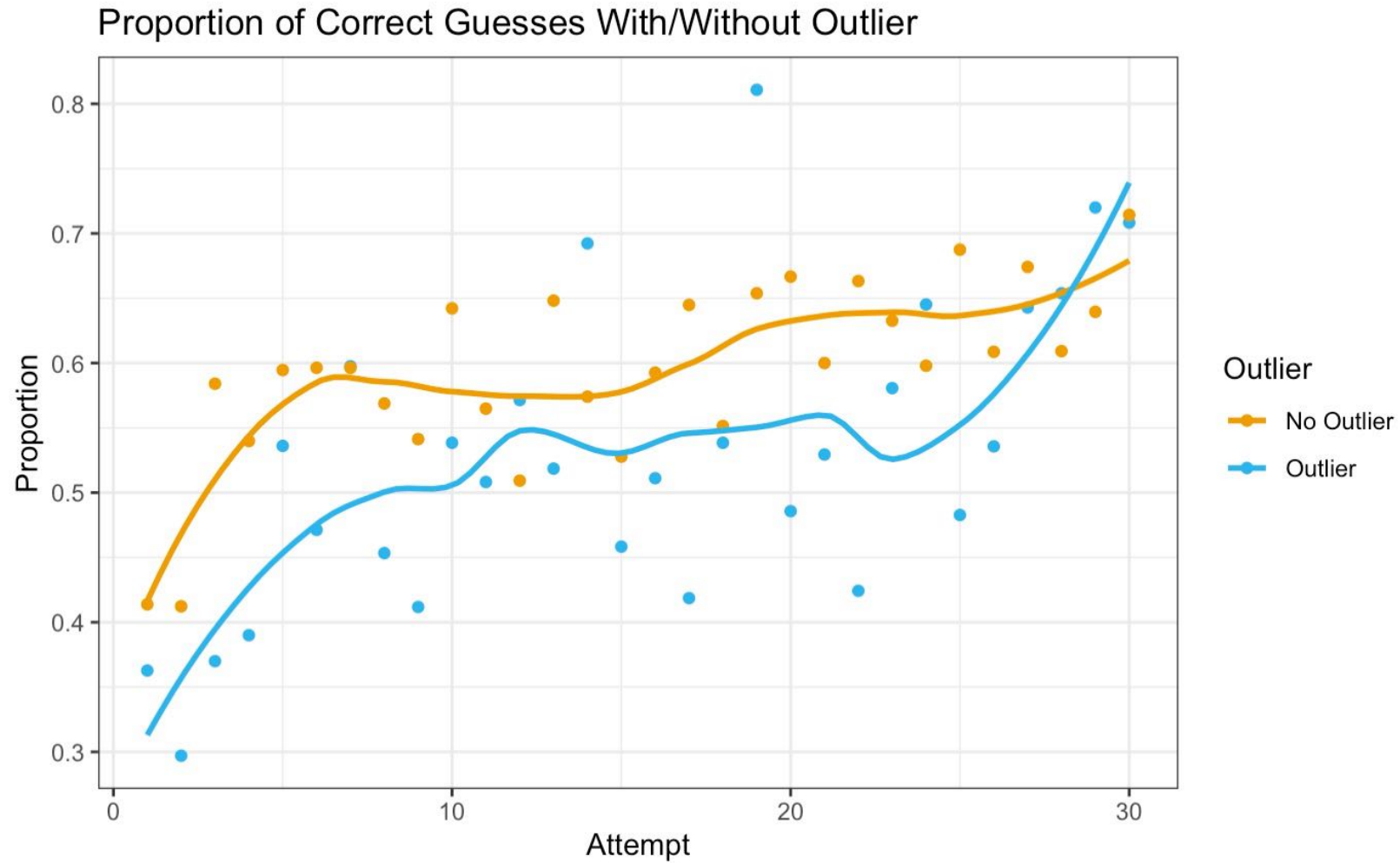
Magnitudes Tend to be Underestimated



Student Engagement



Outliers Matter!



Model & Output

Model: Guess ~ Attempt * Outlier + feedback + (1 Actor)				
	Estimate	Std.Error	z value	Pr(> z)
Attempt	0.01	0.001	7.82	<0.01
outlierTRUE	-0.67	0.09	-6.99	<0.01
feedback	0.37	0.06	6.12	<0.01
Attempt:outlierTRUE	0.001	0.002	0.64	0.52

Confident Interval		
	2.5%	97.5%
0 0.5	-1.22	-0.94
0.5 1	-0.16	0.12
Attempt	0.008	0.014
outlierTRUE	-0.86	-0.48
feedback	0.25	0.49
Attempt:outlierTRUE	-0.0029	0.0057
Estimate of variance of random effect	0.1469	

Variables	Description
Guess	Correctness of the current guess with 3 levels: 0, 0.5, or 1
Attempt	An integer variable with the attempt number of each actor
Outlier	The correlation plots include outlier: True or False
Feedback	Feedback from the previous guess as Correct, Partial Correct, and Incorrect.
Actor	Actor as a random effect of our model

Conclusions & Discussions

Conclusion:

1. Log file provides information about students learning
2. For Correlation Guessing app we saw
 - a) Student underestimate magnitude
 - b) Student engagement is seen by willingness to practice more than required
 - c) Outliers make guessing more difficult

