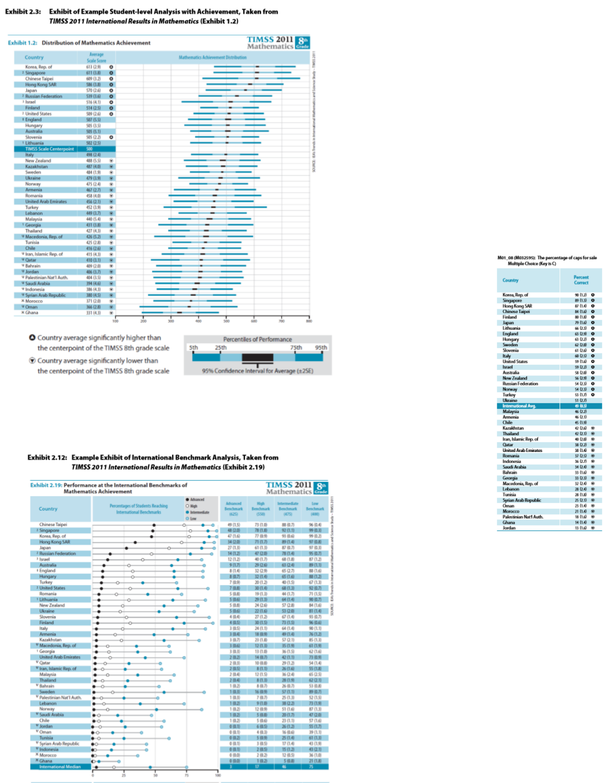
Exploring TIMSS
With R

The IEA and Boston College publicize the amazing TIMSS dataset every 4 years. The study shows how students from different countries perform on the same math and science questions. The dataset comes with guides that explain how to explore and visualize the dataset in SPSS and SAS. However, I will show how easily TIMSS can be explored using packages found in the R ecosystem.

GIVEN VISUALIZATIONS



GIVEN DATA

SPSS SAS

Tool	Description
haven::read_spss	Convert SPSS data into R dataframe
haven::read_sas	Convert SAS data into R dataframe
readxl::read_excel	Convert Excel data into R data frame

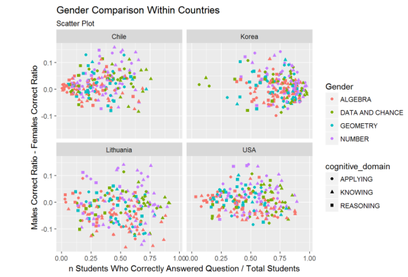
Once data is imported into R it can then go through the 'Exploration Loop'. That is, the data is manipulated, then visualized, and then interacted with. The goal of manipulation is to format the data in a way that is ideal for testing a particular hypothesis. The goal of visualization is to help understand how different datapoints relate to eachother. The goal of interaction is to dig even deeper into the relationships found and to come up with new insights and new hypotheses.

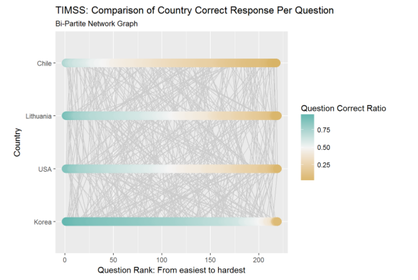
Tool	Description
ggplot2	Implementation of the "Grammar of Graphics" in R

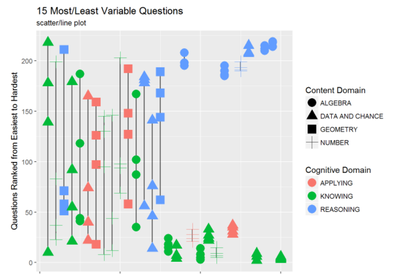
tidyverse

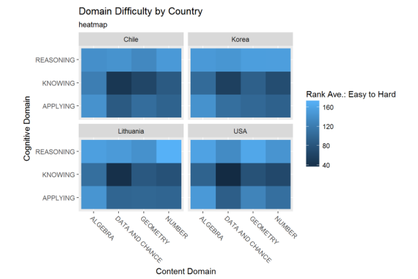
Tool	Description
tidyr::separate	Expand single character column to multiple columns
tidyr::gather	Takes multiple columns and collapse them into key-value pairs
tidyr::nest	Creates a list of dataframes containing all the nested variables
dplyr::mutate	Adds new variables while preserves existing ones
dplyr::filter	Return rows with matching conditions
dplyr::select	Keeps only the queried variables
dplyr::left_join	Join two dataframes by matching variables
stringr::str_detect	Detect substring and return boolean
stringr::str_extract	Extract and return substring
stringr::str_replace	Replace substring with declared string
base::sapply	Create a vector as a result of a row-wise function

EXPLORATION LOOP









Tool	Description
shiny	Create interactive graphics in R
d3.js	NOT AN R LIBRARY: Create interactive graphics in javascript