



**SO YOU THINK YOU CAN**  
**GRAPH**

*Hosted by*

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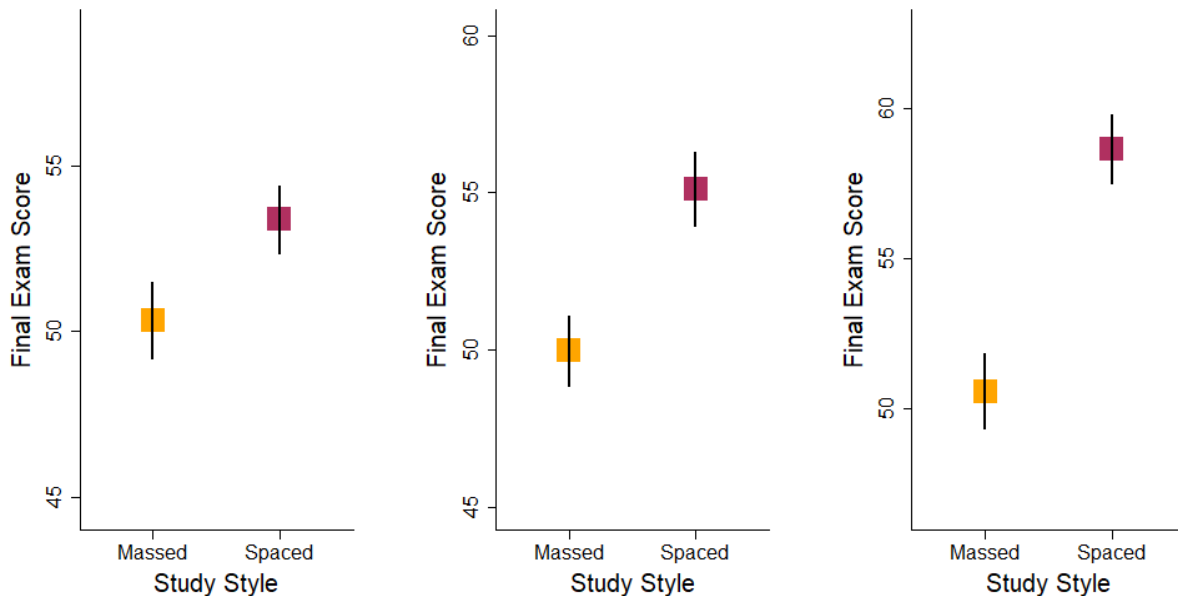
**Deadline for Submissions: April 14<sup>th</sup>**

#### Brief Overview

- Contestants will design a graph that they think best conveys the magnitude of the difference between two groups
- The submitted graphs will be put to the test in an empirical experiment with human observers, who will be asked to estimate the effect size within each graph
- The graph that leads to the best performance among human observers will be declared the winner! Winner gets widely distributed announcements, bragging rights, and a trophy commemorating their victory.

#### Instructions for Contestants

- Each contestant will create 40 versions of their graph based on the same data.
  - Each graph should be the same style, with the only difference across graphs being the actual data in the plot. See example graphs of datasets 12, 24, and 40:



Sample graphs of datasets 12, 24, and 40 based on graph recommendations in Witt (in press).

- Contestants can download the data sets here:
- <https://osf.io/udfpq/>
  - File name: saveData\_SYTYCG\_Season1.csv
  - All 40 datasets are contained within this one file.
  - Each dataset corresponds to one value in the column “graphNum” (which are numbered from 1 to 40).
  - Each dataset contains 80 final exam scores for the Massed group and 80 final exam scores for the Spaced group. The final exam scores are in the column labeled “val”. The group corresponding to each final exam score is in the column labeled “group”.
  - You can also download the script that generated the data here at the OSF link above (file name is dataSimulations\_SYTYCG\_Season1.R)
  - Of the 40 data sets, 1-10 correspond to a null effect, 11-20 correspond to a small effect (Cohen’s  $d = .3$ ), 21-30 correspond to a medium effect ( $d = .5$ ), and 31-40 correspond to a big effect ( $d = .8$ ).
- Graph Requirements:
  - The filename for each graph should your last name plus the graphNum as indicated in the data file.
    - Example: “Witt1.bmp”, “Witt2.bmp”
  - All graphs should be .bmp files
    - If you cannot make .bmp files, the files made must be able to be shown in EPrime EStudio Version 3
  - The dimensions of the graph files must be 600 pixels x 600 pixels
  - Contestants may NOT include the numeric value of the effect size in the graph.
- Optional: Instruction Slides

- Contestants MAY create 1 or more images that include instructions for what is being plotted
- Instructions should NOT include examples of the various effect sizes, but rather to be about explaining components of the graph (e.g. error bars)
- Files should be .bmp files
- Size = 900 pixels x 900 pixels
- Label: lastNameInstruct1.bmp (e.g., WittInstruct1.bmp; WittInstruct2.bmp)
- Create a 1-page PDF overview of your submission
  - Your name, affiliation, and email (and web-page if you would like) – all on separate lines
  - Your version of graphs plotting data sets 12, 24, and 40
    - See example of the 1-page summary here:

[http://amplab.colostate.edu/SYTYCG\\_S1/onePageSummary\\_Example\\_SYTYCG\\_Season1.pdf](http://amplab.colostate.edu/SYTYCG_S1/onePageSummary_Example_SYTYCG_Season1.pdf)

- Create a zip file with:
  - All 40 graph .bmp files
  - All .bmp files if you want to include instructions
  - Your 1-page PDF overview
  - Any R code used to create your graphs
- Upload your zip-file here:
  - <https://forms.gle/6E1fHW3soow2LuKy7>

#### Evaluation of Graph Effectiveness

- Undergraduate students taking an introductory course in psychology will be recruited to participate in the empirical experiment
  - This protocol has been approved by the Colorado State University Institutional Review Board (CSU# 18-8125H; approved 10/16/19; expires 10/11/19)
- Participants will see all 40 versions of 4 different graph styles
  - Assignment of graph style will be randomized
  - Order will be intermixed and randomized
- For each graph, the participant will judge the magnitude of the depicted effect on the following scale:
  - 1 (no effect) 2 (small effect) 3 (medium effect) 4 (big effect)
- Participants' responses will be analyzed to calculate their sensitivity to effect size, bias in estimating effect size, and time to make their judgment. Each of these scores will be z-transformed before being combined into a final graph score.
- Final graph score will be calculated as follows:  $10 * \text{sensitivity} + -5 * \text{bias} + -2 * \text{reactionTime}$
- **Winner will be the graph style that produces the highest final graph score**
- An example of an empirical study that uses the measures of sensitivity and bias (but did not report reaction time) that serves as the model for this contest can be found here: <https://osf.io/udfpg/> (file name is Witt\_inPress\_GraphConstruction.pdf)
- Analysis script can be found here: <https://osf.io/udfpg/> (file name is analysisScript\_SYTYCG\_Season1.R)

*Best of Luck and Thanks for Playing!*