**Critical Review Assignment**

**Part 1: Technical queries and setup for critical analysis**

1. Make a list of all technical terms or analytical (measurement) techniques that are unfamiliar to you. Do your best to look up the meaning of the word or utility of the analytical tool on Wikipedia or in textbooks. Prepare a list of any remaining questions.
2. Summarize the objectives of the article in your own words.
3. Summarize the hypothesis or hypotheses in your own words. If one is not explicitly stated in the article, write a hypothesis yourself based on the Introduction of the article.
4. Summarize the main findings of the article in your own words.
5. In each figure, identify the independent variable and the dependent variable.
6. In each figure, identify the sample(s) (the set(s) of data where the effect of independent variable is being tested) and control. Note there may be more than one control in each plot. If no controls are shown, be sure to note it for your critical analysis.
7. Match up each section of the results and discussion in the text to the figure or table showing the data being discussed.

**Part 2: Critical analysis**

1. What parts of the study (if any) are novel compared to the current state of knowledge?
2. Was the experiment designed adequately? Were all necessary controls and replicates run?
3. What measurement tools were used? Were they used correctly? Was enough description provided in the methods, discussion, or SI for someone else to do the experiment?
4. Critical analysis of the data interpretation:
   1. Underline in color each line in the discussion that *describes* the data being shown.  
      State whether the description of the data (e.g., figure or table) **clearly matches** the data, is **unclear** from the data, or **does not match (contradicts)** the data.
   2. Highlight each line in the discussion that *proposes* *an explanation* (e.g. a physical or chemical process) for the data being shown. Determine whether the explanation is being supported by theory, previous literature studies, other data presented in the same article (either earlier or later in the article), or if no supporting evidence was provided.
      1. If you think the explanation is incorrect, score the explanation as **“Incorrect”** or **“Unreasonable”** and justify your reasoning (contradicts basic scientific theories, data in the article are clearly being misinterpreted, etc.).
      2. If you think the explanation is reasonable:
         1. Score the explanation as **“Strong”** if it is supported directly by experimental data from the same paper.
         2. Score the explanation as **“Moderately strong”** if it is supported by previous literature studies or well-established theory. What additional experiments or measurements could be done to achieve a “Strong” score?
         3. Score the explanation as **“Weak”** if there is no supporting evidence provided in the explanation, or if the evidence being used is weak or irrelevant. What analyses or experiments could improve the strength of the argument?
5. **Considering the above criteria altogether: Did the article accomplish its objectives, and were the conclusions strongly supported by the data?**