H126: Take-Home Exam 1

*Paper due on Canvas site by **Monday, October 9th** at **9:00 pm***

Guidelines for the exam

This take-home exam will require you to answer all three questions below. We believe that if you write in a clear and concise manner, you will be able to respond fully for a total of 5-7 pages, double-spaced. However, your response may not exceed a maximum of 8 pages total for all questions combined. End references will not count towards the page limit. In order to facilitate blind grading of the exams, do not put your name anywhere on your exam. Instead, you should put your student ID number and TF's name in the upper left hand corner.

Note that this exam is to be completed independently, **without** discussion with other students or individuals within or outside the class. Please limit your sources and references to class materials only (i.e. anything that has appeared on lecture/section slides, in lecture, or in the weekly readings/textbook). Finally, you should provide references in APA format (6th edition), double-space your work, and use 1-inch margins (all around) with 12-point serif typeface (e.g. Times New Roman). Make sure to cite all of your sources, whether they be in the readings or from lecture. For references to lecture, please cite in text as follows: (Nelson, Lecture #, Slide ##) or (Gaab, Lecture #, Slide ##); you do not need to include lectures in your end references.

Grading Guidelines

Below are grading guidelines used to assess the short essays. These do not comprise a formal rubric. Rather, these are core essay elements that we keep in mind when grading essays.

1. Technical elements

a. Clarity of writing: Well-developed essays are clear and can be followed with ease. They use an appropriate level of technical language.
b. Mechanics & APA formatting: Well-developed essays have no (or minimal) errors in APA formatting, spelling, punctuation, or grammar. They conform to the guidelines laid out in the assignment instructions (e.g. page limits).

2. Substantive elements

a. Well-developed essays have a well-articulated statement that is relevant to the assignment (for example, the answer to the question is stated unambiguously).
b. Well-developed essays build a logical and relevant argument. They use supporting evidence from the readings to support key assertions in their argument.
c. Well-developed essays present original, measured, concrete, and compelling ideas. They make accurate use of supporting and/or course materials and ideas. They integrate and synthesize information across lectures. They show good understanding of concepts and correct use of terminology and necessary elaboration.

Question 1

a. Prenatal Development: The construction of the human brain occurs rapidly over the prenatal period, beginning with the formation of the neural tube and concluding with the formation of synapses and the laying down of myelin (processes that continue postnatally). Each stage of brain development can be disrupted by genetic or environmental factors, which in turn can derail the course of postnatal behavioral development. Provide an example of a disorder or congenital abnormality that can occur at *each* of the six stages of brain development and what factor contributes to such a disorder.

b. Postnatal Development: In class we spent some time discussing critical or sensitive periods that occur during postnatal development, using examples from speech and face processing. But, as also noted in class, plasticity "cuts both ways." Give an example of one deleterious outcome and one positive outcome that result from either altered or absent experiences during a critical or sensitive period.

Question 2

a. Romeo School District is interested in examining whether their new curriculum is improving executive functioning skills in their preschool cohort (ages 3-5). They ask you to design a study to examine how the curriculum impacts brain function during an executive function task. Specifically, your study should examine whether the new curriculum was effective or not in improving executive functioning, and whether the brain changed in response to the new curriculum. (Your job is not to design the curriculum.)

b. Research has previously shown that doing martial arts may improve executive functioning skills in children. Clements School District wants to test this hypothesis. They ask you to design a study to examine whether second-grade children (ages 7-8) who have previously done martial arts show better executive functioning skills, as well as differences in white matter tracts that support executive functioning, compared to children who have not. They further tell you that School A's second graders have had two years of martial arts instruction, School B's second graders have had one year of martial arts instruction, and School C's second graders have had no martial arts instruction.

How would you design the experiments described in (a) and (b)? For each of the two experiments, please include:

1. Which imaging method(s) you would choose;
2. Which behavioral method(s) you would choose;
3. The experimental design of the study (e.g., how often you would test the children; how many groups you would test; experimental and control conditions if appropriate, etc.)

Question 3

You are asked to consult with the developmental preschool program for Beach School District about screening for and addressing executive function challenges in the students attending the program.

a. Which groups of students might be most likely to experience early executive function challenges? What might these challenges look like in the preschool classroom?
b. Which domains would be important to assess at this age and what other information could be useful in understanding performance?
c. What strategies/curriculum adjustments would you suggest (assuming cost was not a factor) for improving executive function among children who are experiencing deficits?
d. What outcome variables would you suggest the district track in order to determine if your recommended strategies/curriculum adjustments were successful?