YOUR BRAIN

NEUROSCIENCE AND SOCIETY

DESIGN A TOY

You will investigate how the human brain develops during the first few years of life, and then apply this knowledge to design an age and developmentally appropriate educational toy for a human child.

Why this project?

Learning about brain development and the neuroscience of learning can help inform us on how to be better students, friends, (future) parents, babysitters, and overall good people.

How do we design a baby toy?

Your toy must address at least 4 of the following aspects of brain development:

- Vision
- Hearing
- Gross motor skills
- Fine motor skills
- Language

- Thinking/reasoning/problem solving
- Social interaction
- Touch
- Memory

Each member of your group will choose one of the above to study in detail. You will do individual research on the neuroscience behind the development of this trait, and determine how a toy could assist in this development (see research template below). You will then collaborate with your group members to produce a toy that addresses all 4 developmental skills, but also works as a cohesive whole. This toy should be realistic, and should not be a copy of a toy that is currently available.

What is the final product? What will we turn in?

Your final submission for this project will be the following:

1. **Diagrams:** Submit at least 2 labelled diagrams of your toy. Perhaps show it from different angles, or show a child playing with it. These diagrams are meant to show me that you've really thought out the physical design of this toy, and your group can visualize what it would look like if it were built.

2. **Advertisement:** Create an advertisement for your toy. Obviously, this should demonstrate why people should buy it. Consider who the toy is designed for and what the ad's target audience is. This ad can be any format: video, poster, billboard, etc. (A good/fun way to exceed expectations here would be to record a jingle for your toy. Check out some classic toy ads for examples.)

3. **Neuroscience Background:** Submit a written justification of your toy's design that is based on solid, accurate neuroscience. This written portion of your project is meant to show me that your group put some thought into the design decisions you made, and made these decisions based on the science of brain development. If this section isn't chock full of science, you've done something wrong.

   This section of your project should be co-written (everyone contributes to every part). Include the following:

   - Why is your toy appropriate for the stated age?

   - What 4 milestones/skills does your toy help develop?

   - For each of the 4 skills, what is going on in the brain for that age? Discuss this through both a micro (cells) lens and a macro (brain regions) lens.

   - Address at least one critical period. Refer to studies we've looked at in class.

   - Include list of citations (APA format)

How long will this project take?
You will have approximately two weeks of in-class time:

- **Class 1:** Introduction to project, brainstorm ideas with group

- **Class 2:** Individual research due at 8:15am, work with group to design toy, proposal due at the end of class

- **Class 3:** Diagrams and advertisement due at end of class

- **Class 4-5:** Work on written neuroscience explanation

- **Class 5:** Written neuroscience explanation due at end of class

- **Class 5-7:** Work on toy prototype

- **Class 8:** Final project due at beginning of class for toy fair

DESIGN A TOY

How do we learn about child brain development?
Copy/paste this **Individual Research Template** into your group's google doc. Use this template to guide your research. **This is one of the most important parts of this project.** You won't be able to design a science-based developmental toy if you don't know the neuroscience behind brain development. Most of these questions should be answered with a few sentences or paragraphs, not a few words.

Individual Research Template
1. Your name:

2. What developmental trait/skill are you focusing on?

3. What areas/regions/structures of the brain does this involve?

4. When does this development mostly take place? Is there a critical period?

5. What happens if this development does not proceed normally?

6. What studies/resources can you find that deal with this trait/skill?

7. What can be done to help children develop this trait or skill?

8. How can you incorporate your research into a toy?

How will this project be graded?
You will receive a group grade and an individual grade.

Your final group submission will be based on the following rubric:

Grading scale:

- 20-19: exceeds expectations
- 18-16: meets expectations
- 15-13: approaches expectations
- 12-0: does not meet expectations

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Category	Description	Points
Design	Advertisement is well-designed, polished,and fit for public consumption. Advertisement highlights toy's benefits to target age group, and persuades people to buy it	
Application	Toy is purposefully and appropriately designed to assist in developmental milestones. Toy meets at least 4 of the required skills/milestones. Toy shows evidence of being backed by sound neuroscience.	
Knowledge	Written justification of toy design states target age, and describes how brain is developing at that age. Justification includes an analysis of brain development at both the micro and macro levels. At least one developmental critical period is mentioned, in relation to the toy. Details are provided for each of the 4 skills/milestones.	
Presentation	Diagrams of toy are informative, detailed, labelled, and visually pleasing. Diagrams make it abundantly clear what the toy would look like, and how it would work. Prototype demonstrates what toy would look like in 3-D.	
Process	All submitted work is polished, grammatically correct, and conforms to the rules of standard written English. Checkpoints are met. Final product is submitted on time.	
	Total	

You will also have 2 individual grades:

a) Your individual research (using the template above) will be evaluated for completeness, correctness, and effort. This will contribute 20 points to your overall benchmark grade.

b) There will be a post-project individual reflection that will also contribute 20 points.

Your final overall benchmark grade will therefore be group project + individual research + reflection / 140