

PSY/NEU338

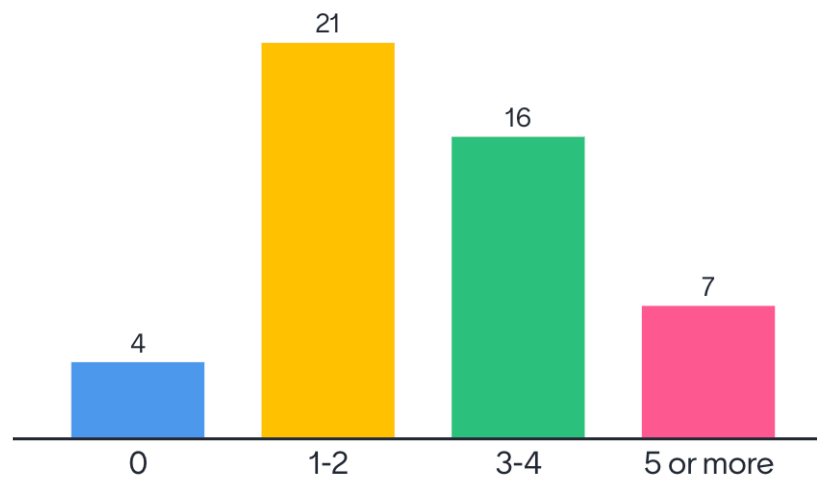
From Animal Learning to Changing People's Minds

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Fall 2023, Tue & Thu 3-4:20pm, Precepts: Wednesdays
Course website: <https://commons.princeton.edu/animallearning/>

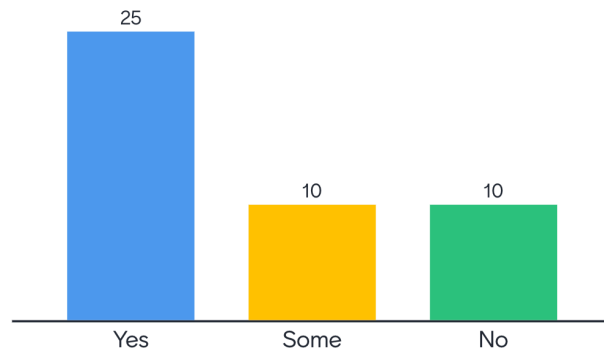
Introductions: *learning, decision making and me*

www.menti.com code 93 70 591

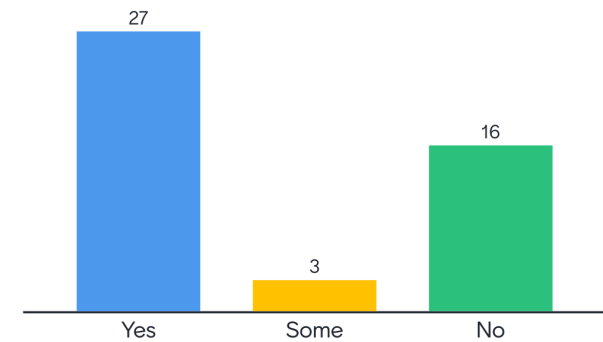
How many people in this class do you already know?



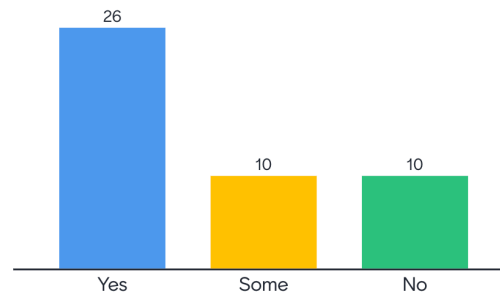
Do you have background in psychology?



Do you have background in neuroscience?



Do you have background in computer science?



What are you most worried about regarding this course?

47 Responses

the workload	Python	I have no background in coding!
Workload	Group projects	Time
Unclear grading standards	python	I am worried about coding.
coding/programming	Getting lost in programming	final project
Lack of experience with coding.	getting to class on time	the psets i guess
coding	First time with this form of course structure	Not knowing/understanding the coding aspect of the course

Making decisions about specific topics for research	Python coding	Creating and meeting goals
The assignments	Little background knowledge	Precept enrollment timing (finding a switch into the one that fits my schedule)
learning computational algorithms	I don't know any coding and am scared that I'll be bad at it / will struggle with psets	not having psych/neuro background and accurately evaluating myself
unfamiliar with the grading structure	Clinical focus	group project
learning curve for coding	Computational problems on the psets	Coding
not being able to code correctly and falling behind	Do we need to use animal brains in this class?	New unfamiliar discipline
writing	The amount of work required as a 5th course. Also, I am concerned that it will not be as technical as I would like, and won't walk away with practical skills	

Applying coding.

I wonder how rigorous the information presented (either through papers or other materials) are.

group project work

Overshooting my work/grade expectations

Group work & not knowing people

coding

final project

No experience in programming/computation

Grading

You are clearly worried about coding/python. This is understandable. But also: we know you can do this! We will help you, and your colleagues (half of which are not new to coding) will help you. You can do it!

who am I?



Professor of Neuroscience and Psychology, Israeli, mom of 2

My name is pronounced Ya'elle or Dr. Niv [why I don't like Ms/Mrs]

Background: computational neuroscience, animal & human learning, decision making

I am interested in understanding learning and behavior as we know them in daily life: how is it that we adapt so well to a complex, changing environment?

What computations does our brain need to do for that?

Methods I use in my research: computational modeling, human behavior and fMRI experiments (+ modeling behavioral and neural data from rodent experiments)

NEW! Clinical interests and training, work with patient populations and with large varied cohorts online



Jamie Chiu, PsyD

- Born in Hong Kong but grew up in Ghana and Australia
- Trained and worked as a clinical psychologist
- Now a second-year PhD student in Psychology and Neuroscience, working with Yael
- Interested in understanding how people learn and change in psychotherapy
- Office Hours: Fridays 9:30am PNI 138A or zoom

Dan-Mircea Mirea (I go by Dan)

- Third-year PhD student (candidate in a month!) in Psychology, working with Yael
- Background: Romanian + went to college in the UK
- Interested in how our cognition interacts with our mental health in real-world settings, such as on social media
- I make educational videos about psychology + linguistics on Tiktok & Instagram (@danniesbrain)
- Office Hours: Wed 4:30pm, same class as precept

there are many ways of knowing and learning

<https://ideaboardz.com/for/PSY338%20introductions/4303562>

Write something that you learned in life that is important to you: from your experience, community, family, ancestors (you can sign it or not, up to you)

(See PDF on Canvas)

what is the point of this course?

Thinking of what you want to get out of your college education *and* this course, which of the following is *most* important to you?

- A. Acquiring information (facts, principles, concepts)
- B. Learning how to use information and knowledge in new situations
- C. Developing lifelong learning and analytical skills

Learning about learning

All three goals are clearly important... but how best to accomplish them?

Learning is not a spectator sport—it takes work (this includes work in the classroom and work that you do outside of the classroom)

Therefore, we have designed this course so that on each of these three goals, you can **make headway outside of class by your own reading and studying**, and in class, **actively working with your classmates and instructors.**

Teaching without grades

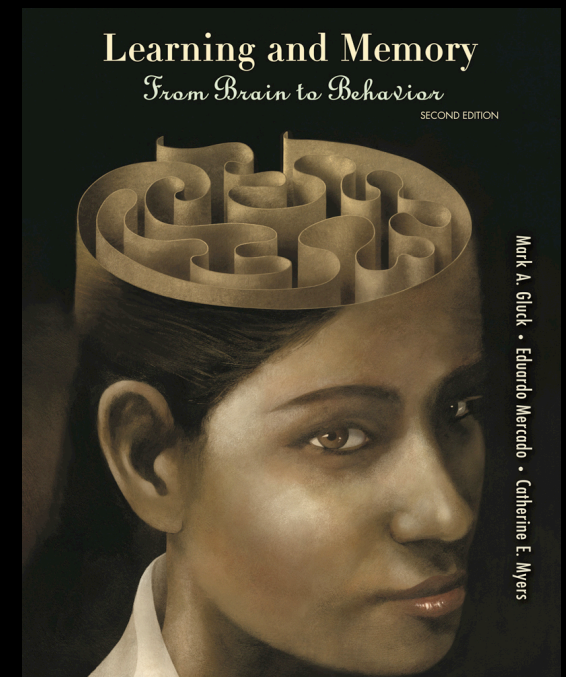
- *Grades are bad for learning* (internal motivation will take you farther)
- Three principles: choice, feedback, a chance to act on the feedback
- “Specs grading” — you choose what components you want to invest in
- *You will get from this course what you decide you want to get from it.*
- **Homework (on Google Classroom): Set your SMART goals**

course materials & resources

- handouts will be made available before class for taking notes/class prep
- oftentimes I purposefully leave things out
- sometimes we don't cover all the slides in the handouts
- **don't let that stress you out!**
- slides *true to what we actually discussed* will be posted online after class on Canvas
- **office hours** - me: Thursday after class; Dan: Wednesday after last precept; Jamie: Friday mornings. Please take advantage of these! We are devoting that time to nothing else but talking to you.
- ***What if I don't have a specific question?*** You can still come to office hours!
- We will also have “themed” office hours:
 - This Thursday (Yael): intro to the brain (in second half)
 - Next Wed/Fri (Dan/Jamie): intro to programming

FAQ: do we have a textbook? (short answer: no)

- Learning and Memory/Gluck et al., 2nd edition
- Well-written, interesting book (learning in everyday life, clinical perspectives etc.), but doesn't cover everything we cover in class. Mostly lays out the psych and neuro background (Ch 1-5)
- Additional “tutorial” readings that can support class learning:
 - Niv & Schoenbaum (2008) - Dialogues on prediction errors
 - Niv (2009) - Reinforcement learning in the brain
 - Drummond & Niv (2020) - Model-based decision making and model-free learning
 - (Niv (2019) - Learning task-state representations)
- These, and background neuroscience readings on Canvas



why do we have a brain?



My answer: To behave

Example: the sea squirt (tunicate)



larval stage: primitive brain & eye, swims around, attaches to a rock

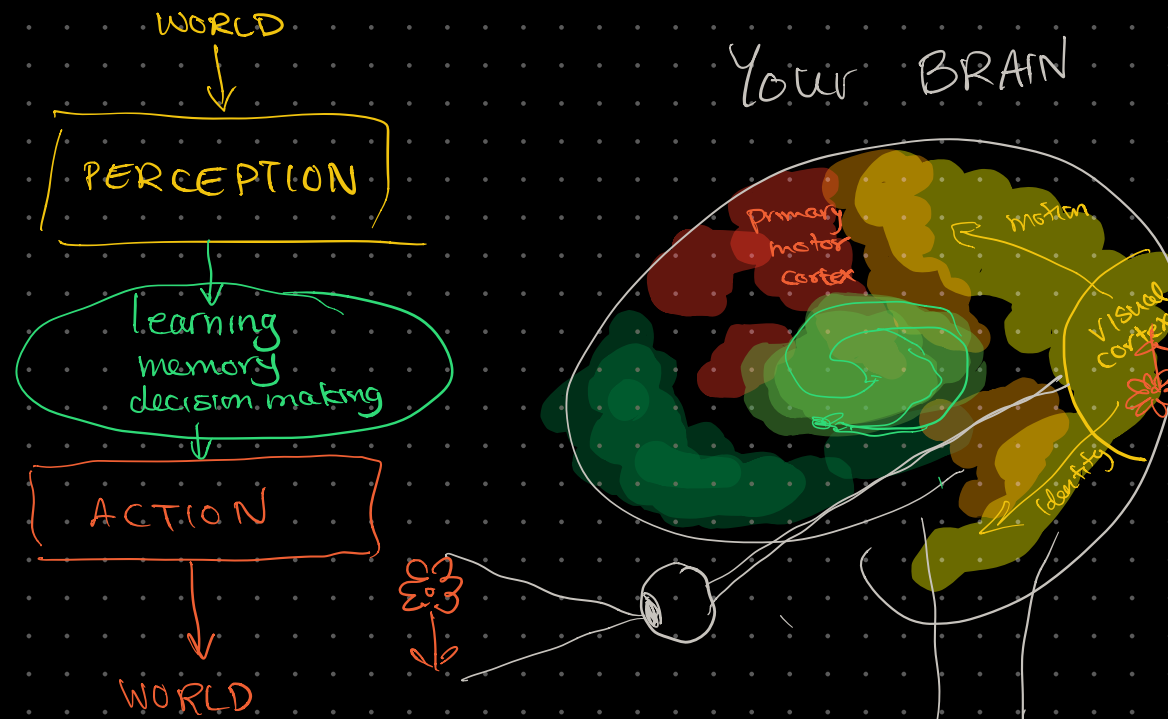
adult stage: digests brain. sits.

why do we have a brain?

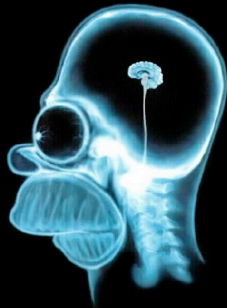


The brain: a mile high view

(expressed through a doodle)



the ultimate goal

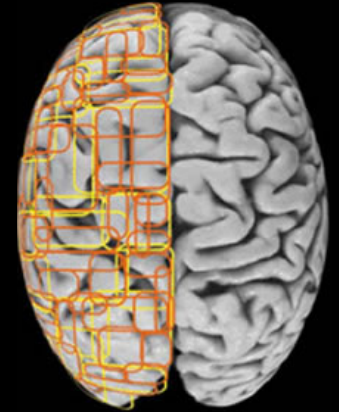


unfortunately...

- The brain is an extremely complex (and messy) dynamic biological system
- $\sim 8.6^{11}$ neurons communicating through $\sim 10^{14}$ synapses
- And, to boot, behavior is really messy and complex!
- We haven't got a chance...
- What to do??

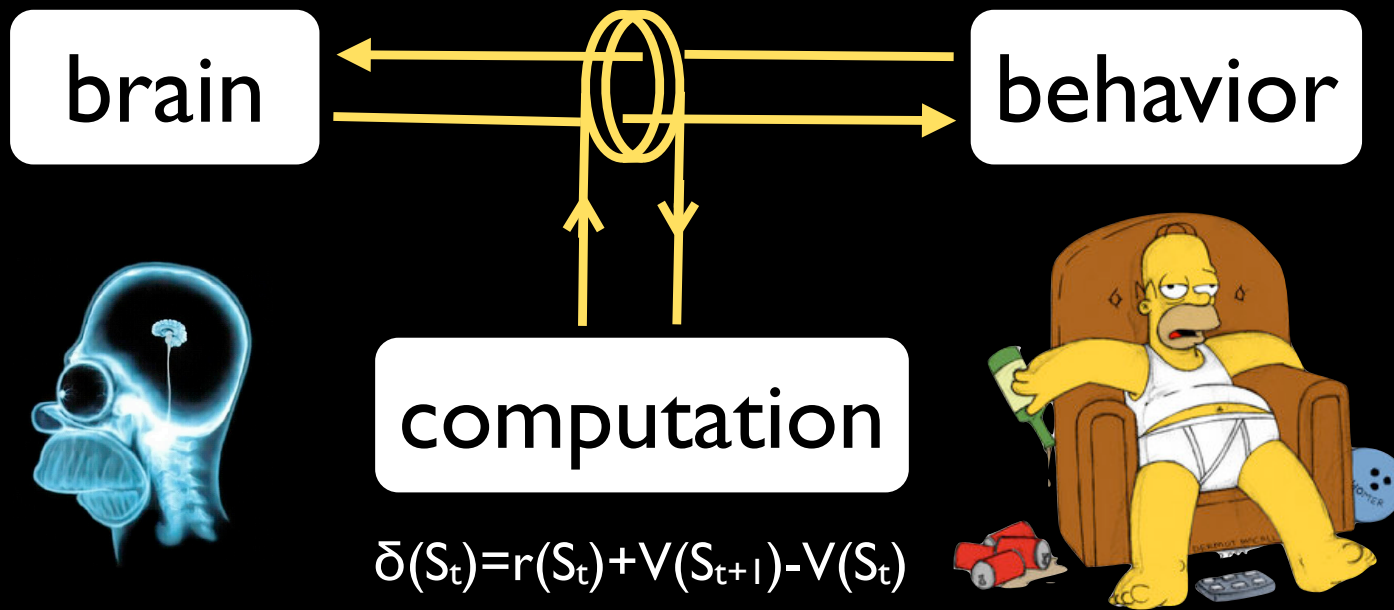


“No matter how closely you examine the water, glucose, and electrolyte salts in the human brain, you can't find the point where these molecules became conscious.”
Dr. Deepak Chopra



(relatively) **New Idea:**

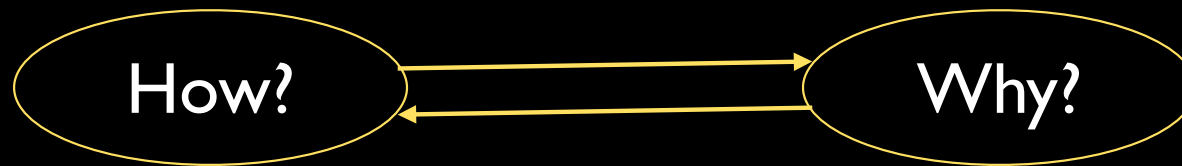
- The brain is a computing device
- Computational models can help us talk about **functions** of the brain in a **precise** way
- Abstract and formal theory can help us organize and interpret data



computational models: descriptive versus normative

how do animals behave?
how does the brain work?

how should animals behave
if they were optimal?
(or: what is this behavior
optimal for?)



summary: a good starting point

- we want to understand how the brain generates adaptive behavior
- that is, how it learns from experience to choose the right action at the right time
- it is not going to be easy...
- ... but we have computational models on our side!

Homework (on Google Classroom)

- *TONIGHT!* ILS questionnaire + google form
- By Monday: draft your SMART goals (explanation on Google Classroom)
- Also by Monday: reading prompt (more on this in precept)