Supplemental Material

CBE—Life Sciences Education

Rivera *et al*.

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Table S1: Featured Scientists in the Scientist Spotlights, their counter-stereotypical features, and related biology topic.

Topic*	Featured scientist	Counter-stereotypical feature
Cancer	Jane C. Wright	Black, woman
Circulatory system	Vivien Thomas	Black, non-traditional path**
Embryonic development	Joanna Bischof	Lesbian, woman
Embryonic development	Shinya Yamanaka	Non-traditional path*
Endocrine system	Carolina Ortega Olivera	Latine, woman
Endocrine system	Frank Talamantes	Latine, non-traditional path**
Immune system	Deborah Doniach***	Woman, non-traditional path**
Nervous system	Ben Barres	Transgender
Nervous system	Mae Guthman	Transgender, woman
Neuronal plasticity	Steve Ramirez	Latine, non-traditional path**
Sensory systems	Doris Tsao	Woman

* When two scientists were listed for the same topic, each student in each course was only shown one of the two.

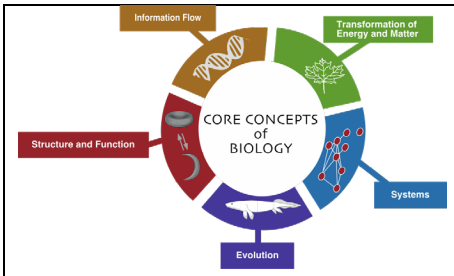
** “Non-traditional path” means that many students wrote that these individuals did not follow what they considered to be a conventional career trajectory to become a scientist, for example if they did not attend college (Thomas) or were not top students in high school (Talamantes, Ramirez).

*** Deborah Doniach was not featured in Quarter 1.

Table S2: Cohen's kappa for coding for course components and Scientist Spotlight-related themes and codes.

Coding scheme	**Theme**	**Code***	**Cohen's kappa****
Course component (Table 2)	Exams		0.80
	Discussion sections		0.74
	Quizzes		1.00
	Journals (general, not Scientist Spotlights)		0.68
	Scientist Spotlights		0.62
	Clickers/ in-lecture questions		1.00
Scientist Spotlight-related themes and codes (Table 3)	Diversity in science	(overall)	0.77
		Scientists have non-identity qualities	0.77
		Generic / non-identity diversity of scientists	0.48
	Self- Efficacy	(overall)	0.62
		Increase in confidence in their ability to do science	1.00
		Anyone can do science	0.20
	Humanizing Scientists	(overall)	0.51
		Scientists face challenges	0.00
		Scientists are people	0.66

* Code is only for the Scientist Spotlight-related themes
** Cohen's kappas of 0.00-020 are considered to be "none to slight" agreement, 0.40-0.59 to be "moderate" agreement, 0.60–0.79 to be "substantial" agreement," and 0.80–1 to be "excellent" agreement (Landis and Koch, 1977).



Biologist Journal Instructions

Nothing would make us happier than getting a variety of answers!

Scientist Spotlight: Mae Guthman

Dr. Mae Guthman is a neuroscientist currently at Princeton University. Previously, she studied how smells can drive different types of behavior. Currently, she researches how hormones can stimulate the nervous system and induce short- and long-term changes to neurons. These changes can then affect how neurons will respond to both ongoing and future input, particularly social inputs- in short, causing the neurons to learn.

Dr. Guthman is a proud queer, transgender woman who loves to play with her cats Willow and Tara in her spare time. On her website, she writes, “Mae’s presence as a queer transgender woman doing this research is of utmost importance to her. … She wants her beautiful trans community to know that there are people doing biology research who both care about and respect them – AND who are them. She does this work for all of her siblings, and she is incredibly honored and grateful to do so.”

Read:

A) Please read more about Dr. Guthman by exploring the About page on her website: https://www.emaescience.com/about . You can also look at her tab “Willow + Tara” to find pictures of her sweet cats.

B) Read about synapses. You’ve learned in class about the action potential, which is how neurons send signals within themselves. Synaptic signaling is how neurons send signals to other neurons. Please familiarize yourself with how synapses work. One good resource to begin with is this one:

Khan Academy, “Neuronal synapses (chemical).”
https://www.khanacademy.org/science/biology/human-biology/neuron-nervous-system/v/neuronal-synapses-chemical

C) Read about Dr. Guthman's work pertaining to synapses. This paper is about the olfactory bulb (OB), which is the part of the brain that initially handles smell input. The olfactory bulb neurons, some of which are called "mitral/tufted neurons" (MT) receive a lot of connections ("inputs") from other neurons like the olfactory receptors, neurons that detect odors. Then, the olfactory bulb neurons themselves "fire," or make action potentials, to convey that information to the rest of the brain.

Please read the following parts of Dr. Guthmans's article, Li et al. 2017. Behavioral Status Influences the Dependence of Odorant-Induced Change in Firing on Prestimulus Firing Rate. *J. Neurosci.*, 37: 1835. (https://www.jneurosci.org/content/37/7/1835.long and posted on Canvas). (You may read more if you wish.): Also think about how these results relate to the synapses between neurons.

a. **Abstract**
b. **The first two paragraphs of the introduction**

Focus on the big picture, not in understanding every detail.

Write:

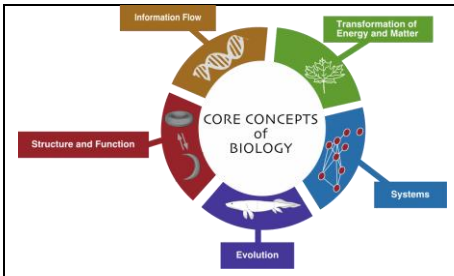
After reading these articles, please write a roughly 200-word note to yourself that covers all of the following topics:

1) What was most interesting or most confusing about the articles you read about Dr. Guthman?

2) Why are synapses important to neurons? What does Dr. Guthmans' article tell you about them?

3) What do these articles tell you about the types of people that do science?

4) What questions do you still have about synapses?



Final Reflection Instructions

Summary: >800 words total of your own ideas (20pts)
There are no right or wrong answers!

The goal of this *Final Reflection* is for you to look back on your experiences and learning this quarter in [course]. From neurobiology, cognitive science, and psychology, we know that reflection is key to remembering and learning.

For your *Final Reflection*, please reflect broadly on your experiences in [this course] this quarter. Please consider all of your experiences, including but not limited to lecture experiences, discussion section experiences, homework, reading assignments, office hours, study groups, and other experiences outside the class setting.

A) **Please write a reflection that is at least 800 words in length** in response to the following prompt:

What did you learn from your experiences in [this course] this quarter that will continue to influence you for many years to come? *How* did you learn these things?

Please be as specific as you can and provide examples whenever possible to support the statements you make. Be sure to share your thoughts in complete sentences.

Your *Final Reflection* can earn you up to 20 points. It will be graded based on: 1) exceeding 800 words, 2) being submitted on time, 3) addressing the prompt in the box above, and 4) evidence of *thoughtful reflection* and *organized writing* on your part.

NOTE: There is no single or "right" way to approach this reflection. That said, your reflection should **not** simply recount or list the activities that you have done this quarter. Also, your reflection should **not** be an evaluation of the course, as there have been multiple other opportunities for that.

Thank you in advance for your time, effort, and honest reflection!

Demographic questions from pre-class survey

Q36 **What gender do you identify as?**

_____

Q38 **Are you a member of the first g<u>eneration</u> in your family to attend college?**

- ○ Yes (1)
- ○ No (2)

Q39 **I most closely identify as (choose all that apply)…**

- ☐ Black/ African-American (1)
- ☐ Latino/a /Chicano/ Hispanic (2)
- ☐ Asian/ Asian-American (4)
- ☐ Native American/ Alaska Native (6)
- ☐ Native Hawaiian/ Pacific Islander (5)
- ☐ SWANA (Southwest Asian/ North African/ Middle Eastern) (9)
- ☐ White/ European-American (3)
- ☐ Decline to state (7)
- ☐ Not listed here (please describe): (8)

_____

Q60 **Do you identify as a member of the LBGTQ+ community?**

- ○ Yes (1)
- ○ No (2)
- ○ Decline to state (4)
- ○ Other: (3) _____

Supplemental Material: Full Coding Guide

Diversity in science:

- **Scientists have non-identity qualities:** Scientists have concrete skills/qualities (i.e. hardworking, dedicated, passionate).
- **Generic / non-identity diversity of scientists:** Scientists are diverse (how scientists are diverse is not specified).
- **Barriers to doing science are external (like racism) & rightful presence:** Minoritized groups deserve to be in science. Lack of representation is due to external factors.
- **Changed mindset about who can BE a scientist / DO science:** Students, in reference to a scientist's identity, realized or acknowledged that anyone can be a scientist.
- **Commitment to being less prejudiced:** Students commit to being less prejudiced towards people of different backgrounds in science.
- **Important to have representation, combats biases:** The Spotlight assignment is a helpful / needed tool to demonstrate the diversity of scientists within the field.
- **Inspiration to the community:** Scientists with diverse backgrounds can inspire a minority group/community.
- **Inspires me to advocate for diversity:** Students want to be part of the movement toward diversity in science.
- **Media portrays scientists stereotypically:** The media **(news/shows/classes)** shows the science field/scientists as being cis-gendered and male-dominant.
- **Non-identity characteristics are more important than identity to being in science:** Concrete qualities (passionate, dedicated, hardworking) are more important than any other identities (i.e. LGBTQIA+)
- **People with minoritized identities are in science:** Scientists have minoritized identities.
- **Science is becoming more diverse:** Students recognize that the science field was not always diverse, but noticed/are noticing it is becoming more diverse recently.
- **Scientists can be advocates for diversity:** Scientists can use their identities and stories to advocate for future diversity.
- **Scientists can have stigmatized identities:** Scientists can have identities that are stigmatized / not always accepted by society (i.e. LGBTQIA+)
- **Surprise/relief about scientists being open:** Students are not only happy about scientists being open about their identities in the field; but they express surprise or genuine relief about the stories from the Spotlights.
- **Surprise/relief about the community being supportive:** Students are not only happy about the scientific community acknowledging the unique identities of scientists, but they express some surprise or genuine relief that the field is accepting.
- **Surprised at the diversity of scientists:** Students not only acknowledged the diversity within science; but were surprised at how diverse the community is / that certain groups of people exist within science.

- **Student had bias / held stereotypes:** Student expresses awareness of previous or still-standing stereotypes or biases about scientists or people in the science field (i.e. certain groups) (even if unconsciously)
- **The science community is supportive:** The science community is supportive of all diverse identities
- **There's more than one path to do science:** Students describe their perception of what the traditional path is or express surprise that there are multiple paths to do science.
- **There's more than one way to do science:** In the **literal** sense, students recognize there is no single way to successfully do science.

Self-Efficacy:

- **Increase in confidence in career capability:** Students express more confidence in the pursuit of their chosen career.
- **Anyone can do science:** Science can be done by anyone, regardless of their identities.
- **Can be proud of identities AND still do science:** Scientists can be proud and open of their stigmatized or minoritized identities, and still do science / be successful.
- **Increase in belonging in science:** Students feel like they "belong" in science, usually having to do with their identity/feeling represented in the community.
- **Increase in confidence in their ability to do science:** Students feel they can "survive" in science / STEM. (i.e. succeed through hardships).
- **Increase in motivation to work in science:** Students express interest in the field of science, either as a potential new career path or an additional opportunity outside of a previously chosen career path.
- **Staying true to myself:** Students say that their identities can coexist with doing/being in science and that they can be themselves.

Humanizing Scientists:

- **Scientists face challenges:** In scientists' personal lives/science lives, they face challenges; not everything comes easy, or is automatic for them.
- **Scientists are people:** Scientists have lives and identities outside of science.
- **Aspire to be like them:** Students express an aspiration to be like a highlighted scientist.
- **I am going to remember this assignment when I am struggling:** Students will remember an aspect from any of the stories shared with them from the Spotlight assignment (could be general themes like "don't give up" or more specific things as scientists struggle) when they are struggling.
- **Scientists draw inspiration from their lives, for their research:** Scientists can intertwine their personal lives / scientific careers, and draw inspiration from each.
- **Scientists work as part of a community:** Scientists do not do science alone, they have a community of support.

- **Shared identity with a highlighted scientist:** Student states a comparison between themselves and a highlighted scientist, specifically mentioning identity characteristics (i.e. race, gender)
- **Shared non-identity characteristics:** Students state a comparison between themselves and a highlighted scientist, specifically mentioning non-identity characteristics (i.e. diligent, hardworking).